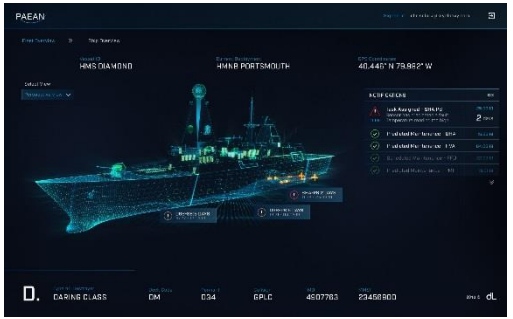
# Transforming Defence

Hugh Durrant-Whyte FRS
Chief Scientific Advisor, Ministry of Defence



# UK Defence – The Challenge of Modernisation

Two Modernising Imperatives

- **Evolving threats**: From state-based threats to individual terrorist acts, the challenges to our peace and prosperity are increasingly complex, ambiguous, destabilising and potentially catastrophic.
- **Rapid technology change**: Technology, especially digital technology, is developing at a breath-taking pace making pervasive many capabilities once only imagined in science fiction.

Modernisation of culture and skills as well as tools and technologies

# Four Pillars of Defence Modernisation

1. Foundations
2. Technology
3. Skills
4. Operations

Modernisation pillars **shape and transform**, rather than replace, current war-fighting capabilities

# Modernisation 1: Foundations

- Build a renewed (**digital**) foundation on which the broad spectrum of future threats can be understood, deterred and defeated.
- Adopt and deploy a common architectures for all components, systems and command structures:
  - **Top level** – a coherent cross-government command and control (C2) facility enabling integration of intelligence and situational awareness, and delivery of full spectrum effect as a contribution to the *Fusion Doctrine*.
  - **Operational level** – Multi-domain C2 bringing together *pan-defence* intelligence, effects and command structures in both permanent and deployed headquarters.
  - **Tactical level** – Adopt modern *open architecture* principles across the equipment programme to enhance interoperability and ensure agility to technical change.

# Sidebar – Open Architectures

- Past year - Defence has actively committed to open architectures, primarily to get after agile ever-green software development, access to best in class algorithms, and through-life cost savings.
- Open architecture is now an untradeable KUR on all Cat A acquisitions – Type 31a, MIV, Radar 2, NSIT (D), and others:
  - "Open" is through functional test (*cf.* Morpheus). It is not a set of standards. Openness is both technical and commercial.
  - "Open" implies specification of modules with corresponding "APIs", potentially contracted for separately.
  - A growing MoD community of practice in open systems specification, contracting and commercial development

Building a significant and important culture change in Defence

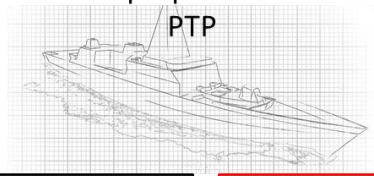
# Modernisation 2: Technology

- **Modern Deterrence**: How information, mass and effect can be projected to influence, deter and de-escalate aggression and harm.
- Increased investment in (see also S&T):
  - **Information Advantage**:  improved resilient and secure communications, increased sensing and situational awareness, intelligent processing and understanding of information, and defensive and offensive cyber capabilities.
  - **Modernised mass and effect**: including complex weapons, advanced protection and defensive aids, robotics and autonomous systems.
  - **Enhance existing capabilities**:  Focus on modern digital and intelligent systems applied to build advantage, in areas including ISR, ASW, A2AD and force readiness.

# Sidebar - Project NELSON – Data and AI at Sea

Integrated Test Facility
RFA TIDESPRING

Future Ship Open Architecture
PTP



HMS DIAMOND/PTP*

Data
Radar, AIS, Met, ADSB, EO, GNSS

APIs
NELSON Data Platform
ESRI (Geo Data)

Apps
ASuW AI Anomaly Detection
ArcGIS

Data
Radar, AIS, IFF, GNSS, Cyber

APIs
NELSON Data Platform
ESRI (Geo Data)
CySAFA(D)

Apps
ASuW AI Anomaly Detection
Cyber tools
ArcGIS

Data
Radar, AIS, IFF, EW, GNSS

APIs
NELSON Data Platform
ESRI (Geo Data)

Apps
4 x Combat Management
MEWP de-risking
ArcGIS

Data
Real-time Engineering
Real-time PMS Cyber

APIs
NELSON Data Platform
CySAFA(D)

Apps
Splunk (Cyber)
PMS AI Fault Prediction

SatCon

SatCon

SatCon
Emulators
&
Bandwidth
Optimisers

PTP New Style of IT Hub

UKHO

MetO

MDA
ESRI (Geo Data Hub)

Satellite Imagery

MIXG

JOMOC

PTP New Style of IT Hub

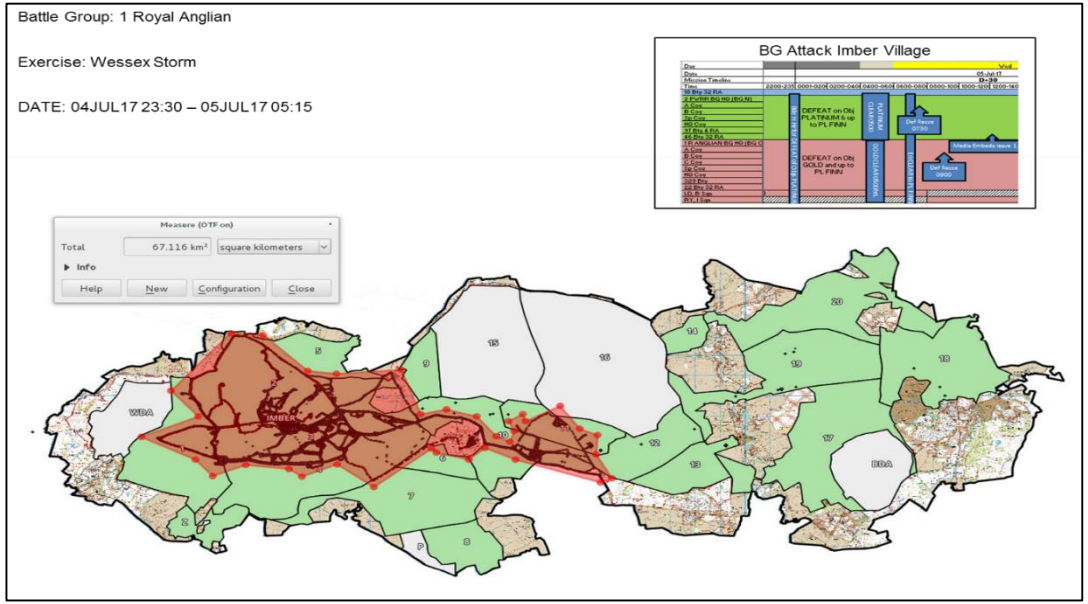
ESRI (Geo Data)
EW Datasets

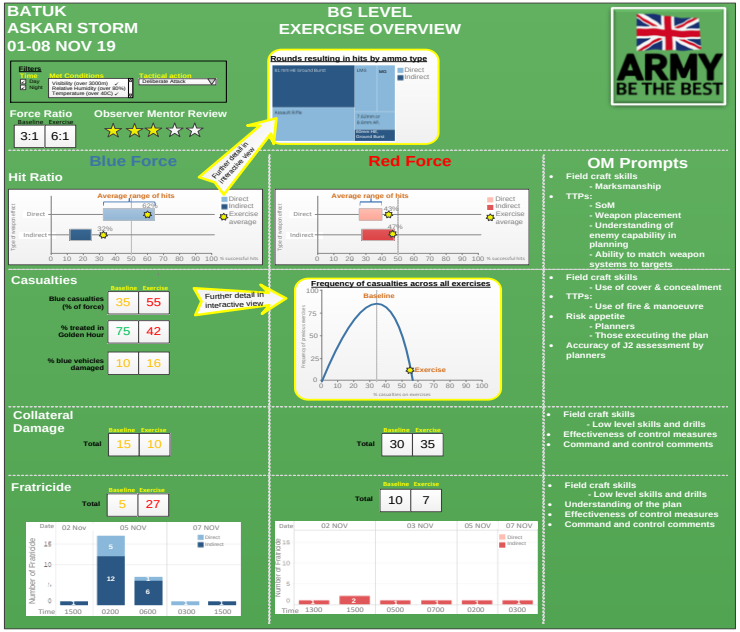
MCSU
Cyber Security
Operations Centre

# Modernisation 3: Skills

- Defence culture will need to embrace digital and information skills
- Modernisation will put a premium on **training in information skills**:
  - Command skills in areas such as information manoeuvre
  - Synthetic environments to build and exercise skills from decision making (wargames) to simulated training.
- **Culturally shifts**:
  - Embrace connectedness and sharing of information not just across systems and commands, but also across government.
  - Recognise that technology, especially automation and AI, will drive reductions in the number of people and platforms required to deliver defence outcomes – and prepare for this.

# Sidebar - Data-Driven Combat Training



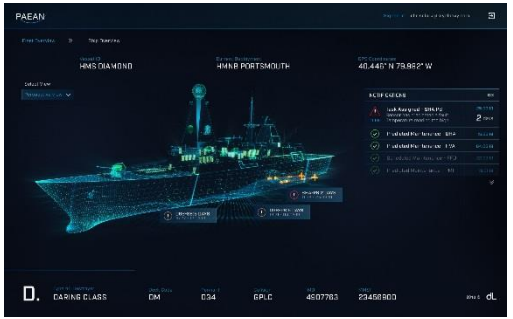
# Modernisation 4: Operations

- Modernisation aspects of both external and internal operations.
- **External** - our adversaries no longer adhere to a rules-based order and where technology has become a ubiquitous disruptor:
  - Cross-command and cross-government coherence,
  - Permissions and legality of modern, often digital, effects,
  - Increased agility, flexibility and responsiveness to address the spectrum of modern threats.
- **Internally** - embrace rampant and pervasive technology:
  - More innovative, flexible and agile approach to equipment procurement and sustainment
  - Adoption of modern automation technologies in the way we deliver efficient outcomes across the business of Defence.

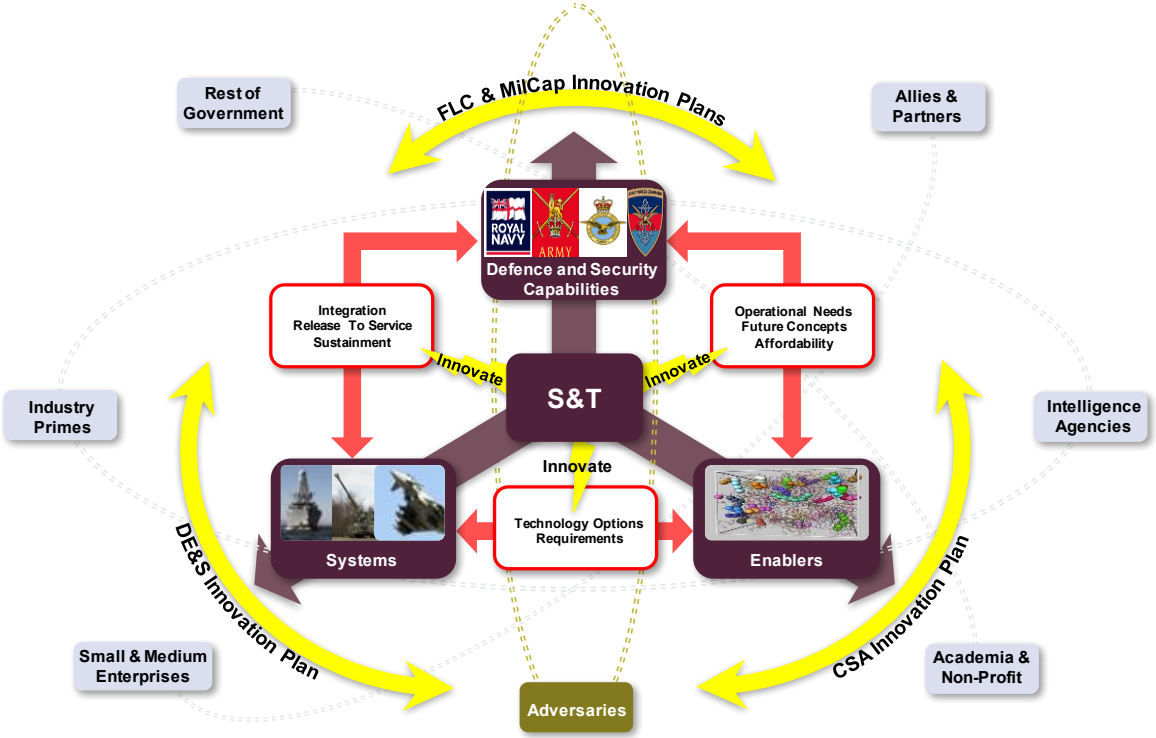
# Sidebar – Wargaming the Threat

- Recent Strategic Wargames:
  - Modern Deterrence, Escalation Wargame
- Key Insights:
  - Information and understanding
  - Force readiness and resilience
  - Grey-zone conflict and permissions
- Tactical wargames:
  - Eagle, Agile, Information, Unmanned Warrior – and others
  - Playing in technology cards
- Experimentation
  - Joint venture, strike brigade

# Transforming Defence: The Role of S&T



# S&T Strategy: In the Mainstream



# S&T Big Bets –Building Blocks for Transformation

**Information**

1. Autonomous Systems – robotics, machine learning, AI
2. Cyber Deterrence – defensive and offensive systems, tactical EWS
3. ISR and Data Fusion – distributed resilient sensing, data fusion
4. Next Generation Command & Control (C2) – open architectures, PED
5. Affordable space – resilient communications and intelligence

**Effects**

6. Novel Weapons – modular systems, low-cost mass, directed energy
7. Protection – defensive aids, missile defence, armour

**Skills**

8. Synthetic War Environments – war gaming, decision support
9. People – human augmentation, skills and training

Higher TRL, More Experimentation

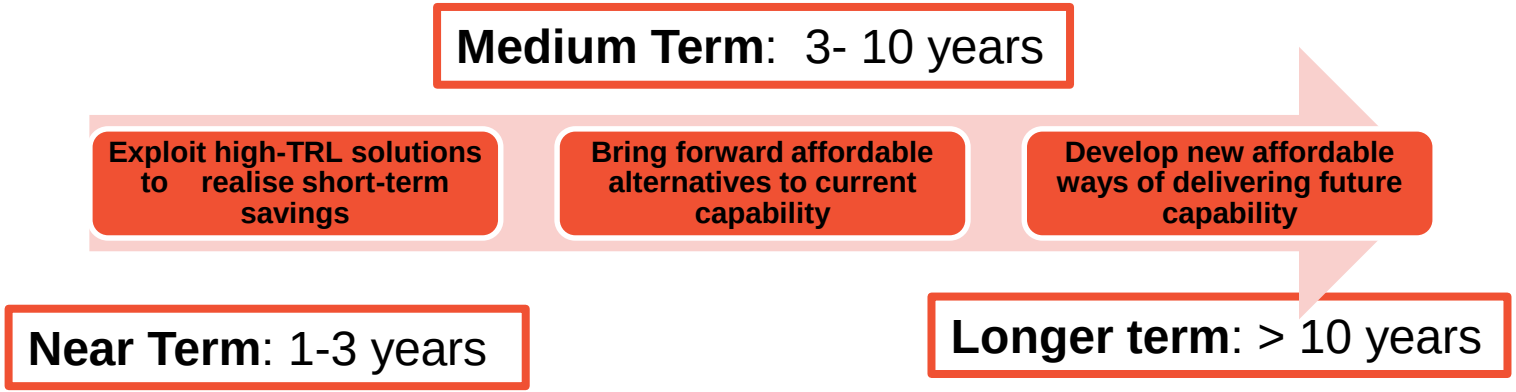
# Spearheads – Modernising Capability

- Bring together technology to change **capability**:
  - Spiral outcomes in the short, medium and longer terms
  - Higher levels of “in field” experimentation
  - High levels of external industry engagement

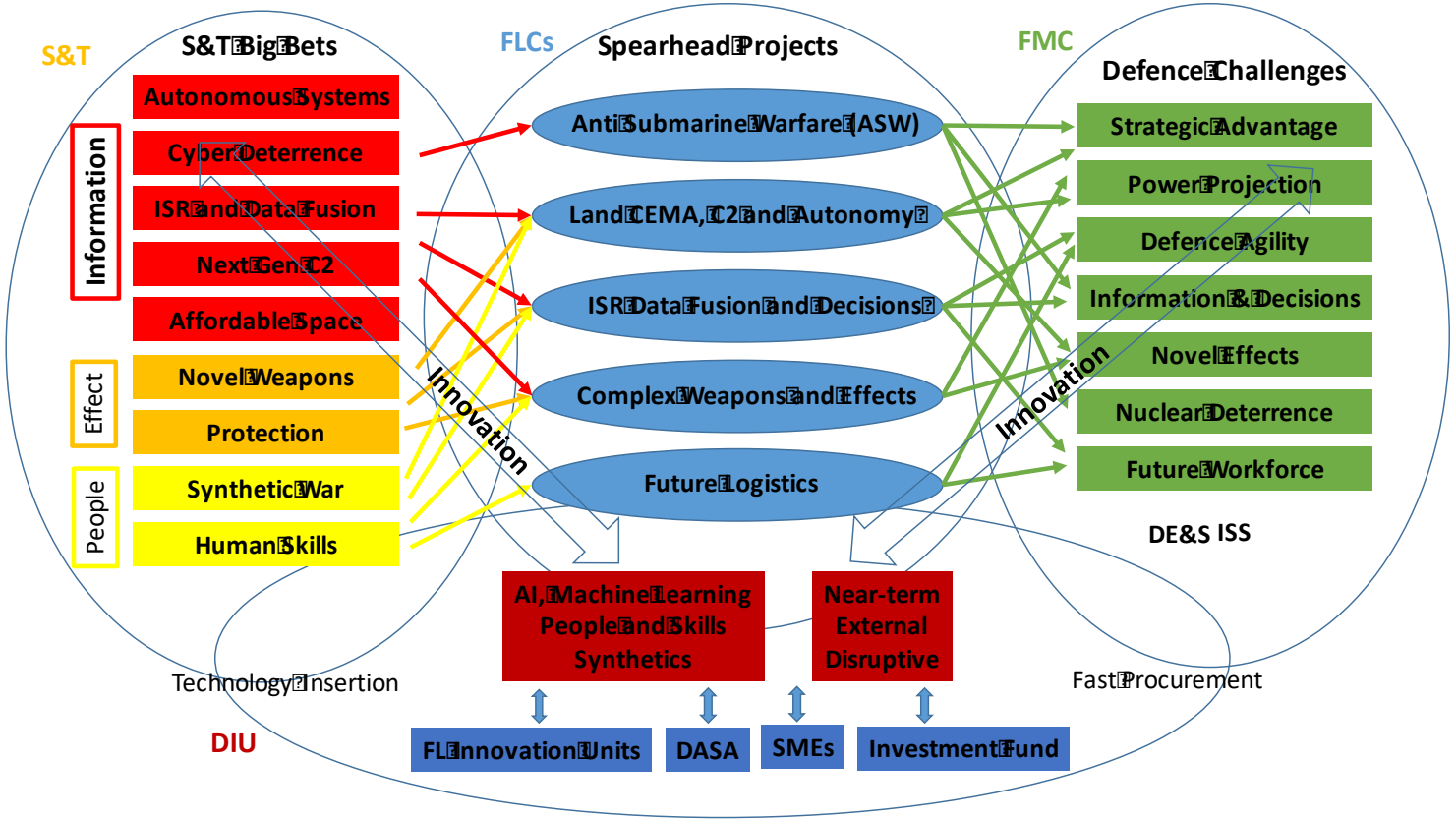
- Drive necessary changes in **culture**:
  - Acquisition and operationalisation of open technology
  - Wargame operational concepts
  - Integrate in to training and doctrine

# Spearheads: Capability *and* Affordability

- Anti submarine warfare (ASW)
- Land: CEMA C2 and autonomy
- ISR: Data fusion and decision
- A2AD: complex and novel weapons
- Future Logistics



# Innovation – Technology and Process

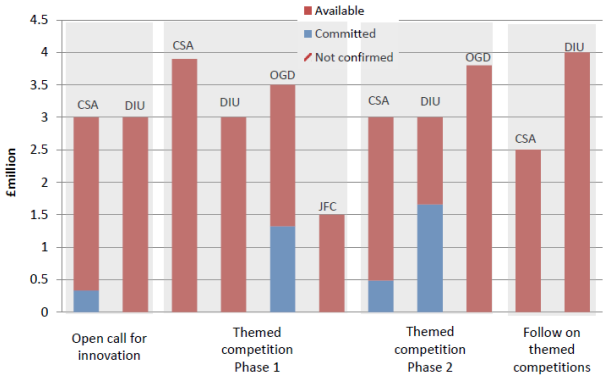


# Innovation – Defence and Security Accelerator

Defence and Security Accelerator

May 2018

## FY 18/19: £m going through DASA




*Includes £250k US funding
** Includes £1.5m UKRI funding

## Total: £34.2m



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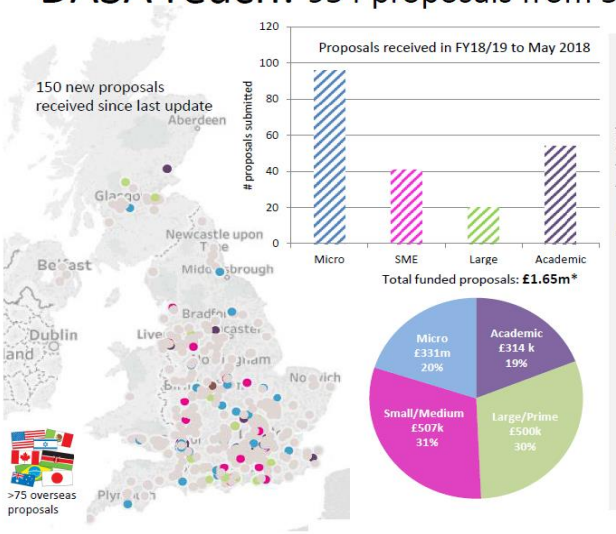
Defence and Security Accelerator

May 2018

## DASA reach: 954 proposals from 553 organisations




*Open Call and Phase 1



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# Key Messages

- **This is a challenging time:** Threats and technology
- **Future Capabilities:**
  - Focussed on information, effects and ”modern deterrence”
  - Deliver key cultural and skills shifts
  - Address affordability
- **S&T** – transforming defence
  - Big Bets – information, effects and skills
  - Spearheads – addressing holistic capability change
  - Innovation – new ways of doing business