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Defense Technology Acquisition - Some UK Government and Industry Perspectives

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Caveats!

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- These Government perspectives are based upon my own views and experiences.
- Nevertheless the information is drawn from reliable sources.
- The UK Industry aspects represent the BAE SYSTEMS (UK) view. Nevertheless I would expect similar messages to result from Rolls Royce, Thales (UK), Smiths etc.
- My presentation covers R&T *not* R&D or even R,D,T&E! The UK MOD's R&T equates to the US DoD 6.1, 6.2 and 6.3 programmes. MOD does not have an R&D programme as such.

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Some UK Government (MOD) Defense R&T Statistics and Background

- In 1991 the UK MOD was spending $1.8Bn on defense R&T.
- Today it is spending approximately $810M.
- Also, the R&T expenditure has halved as a proportion of the total defense budget.
- Main role of MOD's defense research has changed from *creating* a technology base to accessing, integrating and exploiting technology

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MOD R&T Background (1)

- Until 1991 the (largely autonomous) Government Research Establishments (REs) undertook R&T according to their own priorities.
- Limited connection to military customers' specific needs and limited military oversight/direction.
- "Vote" funded and limited accountability.
- Sometimes unfocused but an innovative environment.
- Defence Research Package Management instigated in 1991 with military defining much of the R&T requirement.
- REs disbanded in 1991 and single Defence Research Agency formed.

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MOD R&T Background (2)

- Applied Research Programme (ARP) formed taking about 3/4 of R&T budget. Shorter-term military relevance with military officers holding the budget. DRA/DERA largely responsive to Customer's needs.
- Corporate Research Programme (CRP), originally Strategic Research Programme, formed for longer term, innovative and generic research. Central scientific staffs (civilian scientists) held budget and defined requirement. Strong DRA/DERA influence
- Also University Joint Grants Scheme, International Research Collaboration etc.

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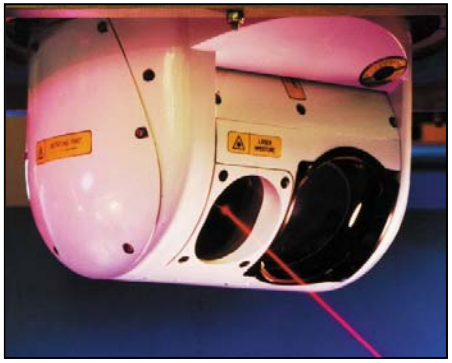
The ARP

- In 2002 budget was around $550M.
- Constructed from 14 Packages (originally many more before consolidation).
- Examples of Packages of applied research:
  - Command, Control and Information Infrastructure
  - Nuclear, Biological and Chemical Protection
  - Theatre Airspace
  - Deep Strike
  - Above Water Battlespace



- Budgets of Packages between about $13M and $90M.

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The CRP

- In 2002 the budget was around $200M
- Constructed from 13 groups (Domains)
- Examples of groups are;
  - Acoustics, electromagnetics and hydrodynamics
  - Aerodynamics, propulsion, guidance and control
  - Electronic device technology
  - Infrared and visible technology
  - RF technology

- Budgets of groups between $1.8M and $31M

Recent Developments

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- In 2001, MOD's Chief Scientific Advisor directed a technology review. New strategy for improved delivery of defense S&T formulated.
- Seeking better "outcomes" of S&T for defense and increased relevance, exploitation, efficiency and value for money.
- New management and delivery framework based upon 7 "corporate" S&T *Outputs*. Clearer articulation of why MOD undertakes research.
- Empowered *Output* owners with delegated budgets.
- Strong support for IRC (particularly the USA) for *real* collaboration, i.e. technology *creation*.

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MOD's S&T Outputs (1)

Output 1: Advice to Ministers on S+T issues

Expert S+T advice to Ministers and Head Office. This includes:

i) advice in sensitive areas (e.g. nuclear assurance, chemical and biological defence, missile defence)

ii) advice on emerging hot/risk issues (eg depleted uranium).

iii) independent scrutiny to support decision-making

Output 2: Advice to Policy and Planning

Expert S+T advice and operational analysis to inform the Department's strategic and corporate planning processes.

Output 3: Advice to Capability Management

Expert S+T advice and operational analysis to support decision-making.

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MOD's S&T Outputs (2)

Output 4: Advice availability

Ensuring MOD's advice supplier base (people, tools, networks etc) is created, sustained and refreshed for use across the Department.

Output 5: Technology awareness

Ensuring the MOD is aware of global S+T advances and understands their impact in Defence.

Output 6: Technology/capability in the supplier base

Getting the right technologies of the right maturity into the right supplier base at the right time to support acquisition.

Output 7: Innovative solutions to Defence problems

Developing innovative solutions to big defence challenges by exploiting science and technology.

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MOD S&T Summary

- Reduced S&T budget, but better directed and focused.
- Clearer objectives, owners and deliveries.
- Retained place for “sensitive” defence S&T etc. within Government, i.e. Dstl.
- Reliant upon Dstl, QinetiQ, Industry and universities.
- Closer relationship with Industry and the “supplier base”?

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The Industry (BAE SYSTEMS) Perspective of Defense R&T

- **BAE SYSTEMS is an innovative and technologically-oriented Company where advanced technology is seen to be a key asset and differentiator in our capabilities and business winning.**
- **We take R&T very seriously:**
  - **within the UK operations we invest over $200M per year**
  - **within the North America operations we invest over $120M per year**
- **R&T is funded and supported both corporately (centrally) and by the individual Business Units.**

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- Advanced Technology Centre
- Avionics
- Air Systems
- Royal Ordnance Defence
- Underwater Systems/Submarines
- C4ISR
- Naval Ships
- Future Systems
- Advanced Technology (Corporate HQ)
- North America

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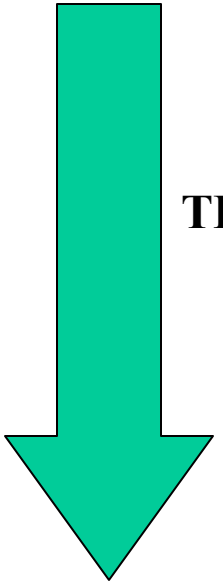
Technology Acquisition

- **University Partnerships**
- **Advanced Technology Centre**
    - **Advanced Technology Programme**
        - **Strategic Options**
        - **Underpinning Technology**
    - **Systems Engineering Innovation Centre**
- **Integrated Capability Programme**
- **Business Units (major part of R&T funding)**



Clear, focused "Thrust" themes

(This is the UK perspective)

Technology Investment Trends

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Priority

- **Significant investment in core military *transformation* technologies, including: electronic warfare, information operations, sensing, data and information fusion for shared situation awareness, and communications.**
- **Increasing investment in command and control, battlespace management, modelling, simulation, visualisation, analysis, architectures, systems integration, upgradability/obsolescence and systems engineering of complex systems.**
- **Autonomous systems/technologies (e.g. UAVs) is a key area.**
- **Maintained capability in under-pinning areas, e.g. aerodynamics, electromagnetics, materials, structures etc.**

The Value Stream

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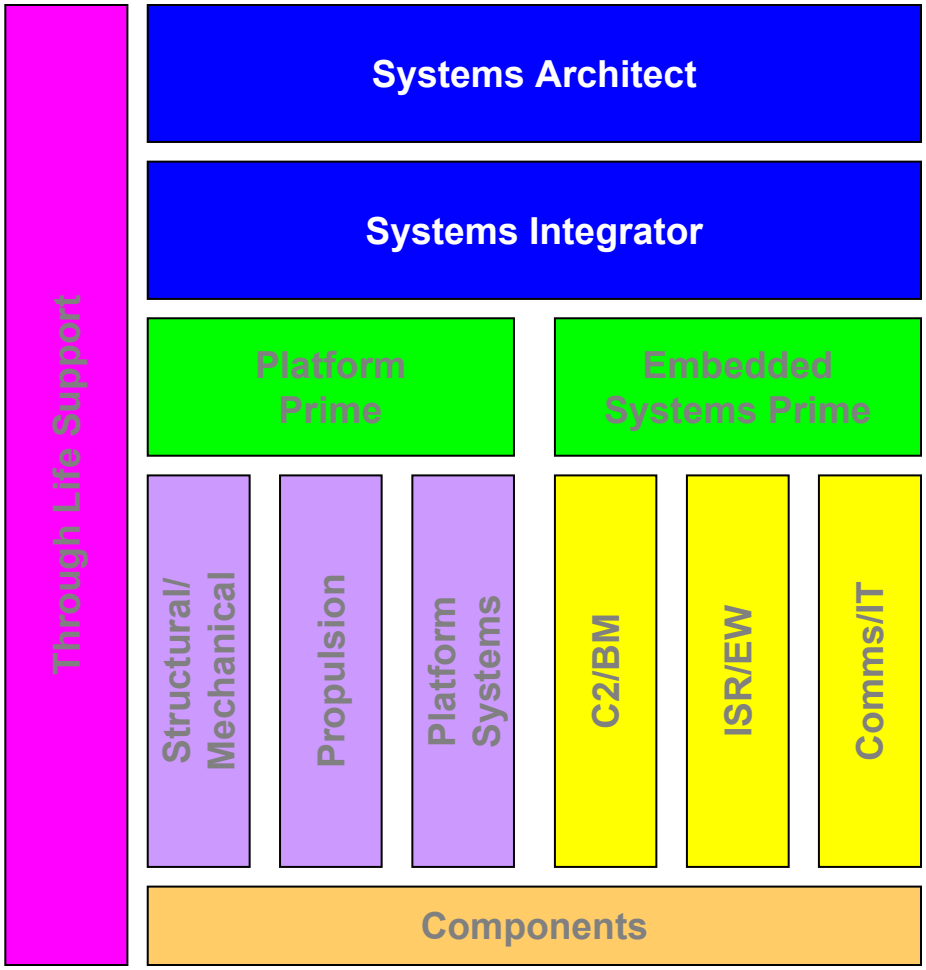

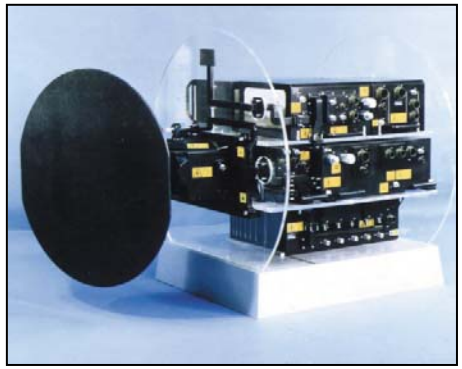

Developments - Challenges and Opportunities

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- MoD's new Research Management Processes
- UK/ US Technology Transfer
- European Union Defence Agency/European Collaboration
- Government Initiatives
- Eurosystems
- Closer alignment with North America?

University Partnerships

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Strategic University Partnerships linking R&T, Education and Recruitment are being established in the following areas:

- **Systems Engineering (SEIC) - Loughborough**
- **Aeronautical Engineering - Cranfield**
- **Signal & Information Systems - Edinburgh/ Herriott Watt**
- **Support Engineering - Cambridge**
- **Distributed Data & Info Systems - Southampton**

Key point is strategic agreement with UK academic funding Council (EPSRC)

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Corporate ATC Programme - Advanced Technology Programme

- **Intelligent Autonomous Systems**
- **2020 Networks**
- **Battlespace Information and Knowledge**

C4ISR-Related

- **Micro and Nano Technology**
- **Directed Energy Warfare**
- **Biofutures**
- **e-Engineering**
- **Electromagnetics, CFD, Devices (RF and optical), Materials etc.**

Integrated Capability Programme

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- **Network Sensing -** for Shared Situation Awareness experimentation using real assets. Initial naval focus. Distributed data fusion technology thrust.
- **Integrated Sensors** - RF/EO/EW.
- **Upgradability/ Obsolescence -** Best design for whole life cycle. Technology insertion. Modular avionics, certification etc.

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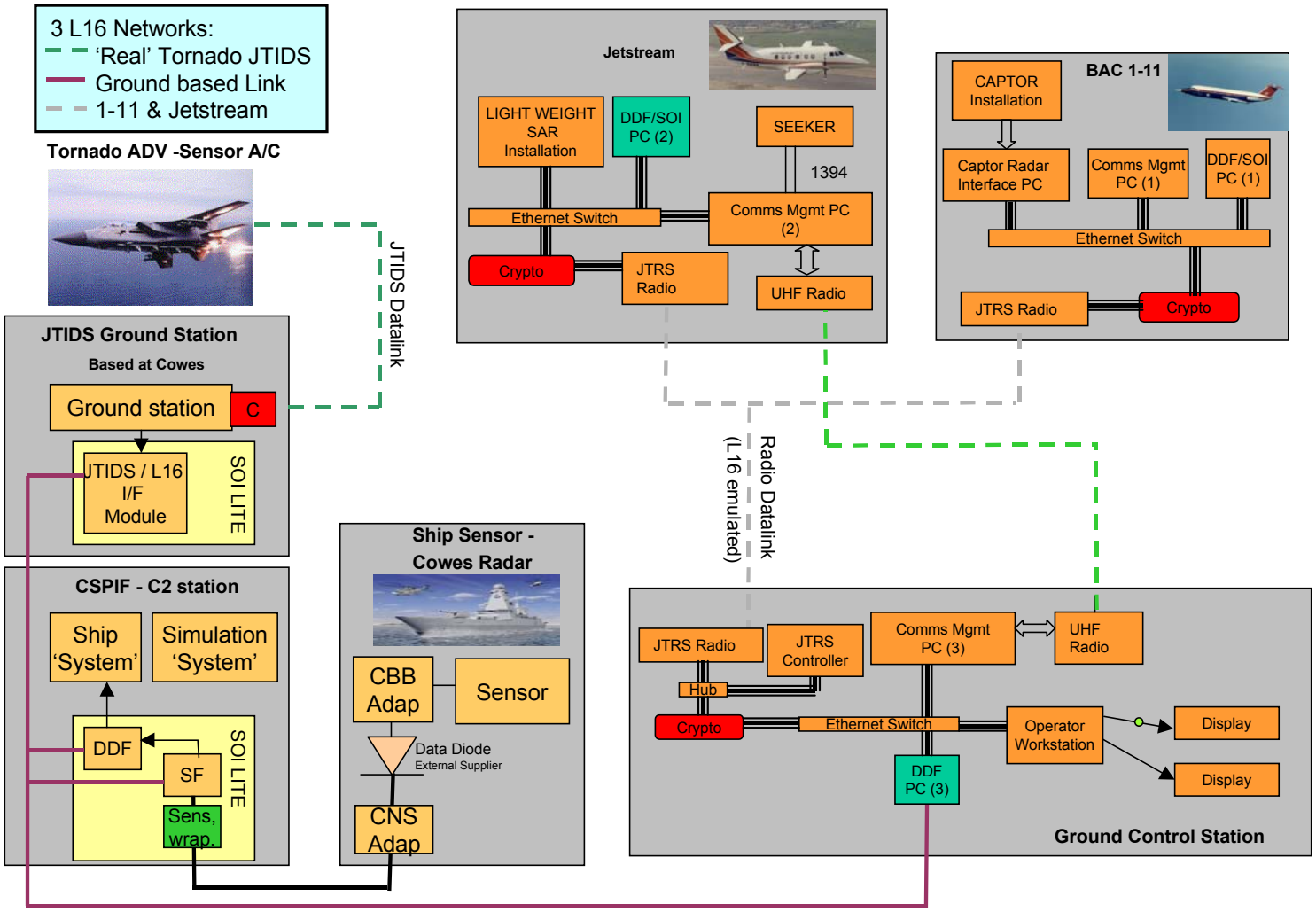
ICP - Network Sensing Demonstration



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Overall Concluding Remarks

- We have limited and tight defence R&T budgets in the UK
- Most probably need a greater emphasis on ***demonstration*.**
- Considerable, leading edge technological capability remains.

Thanks for listening!