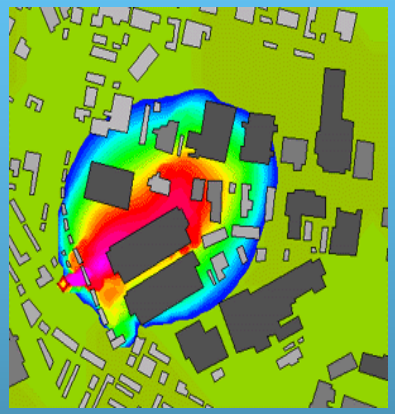
UK DEFENCE RESEARCH PRIORITIES



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Director General
(Research & Technology)
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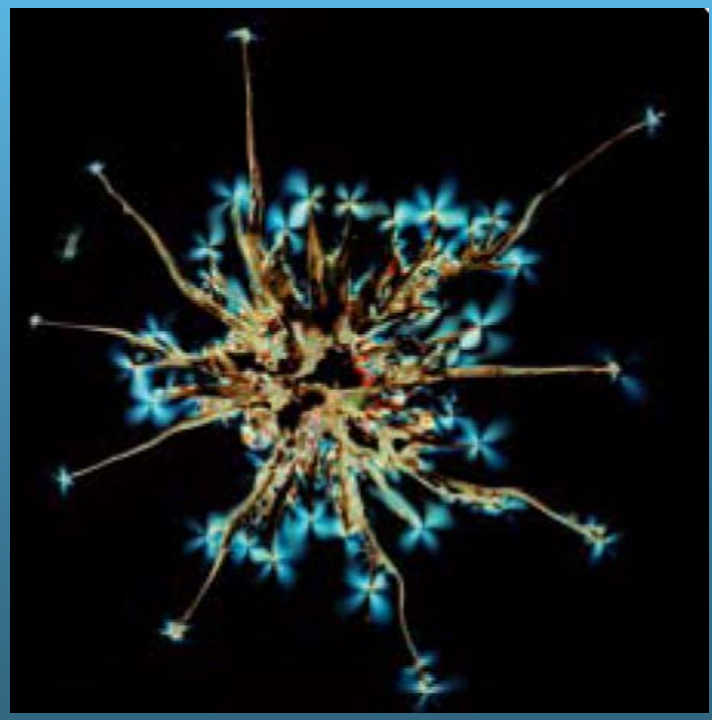
Agenda

- Background and Context
- Defence Technology Strategy
  - Structure
  - Themes
  - Collaboration
- Conclusions
- Questions?



Context: Civil Sector Dominance

- 20+ years ago defence spending dominated much of the S&T scene; but now civil leads, mainly in ICT and biosciences
- < 5% of world research is done in the UK
- Need to tap the remaining 95%
  - An opportunity and a threat
- Therefore emphasis shift to capture and transition of science and technology balanced against the need to retain an in-house ability in key areas

Context: Changing Military Role

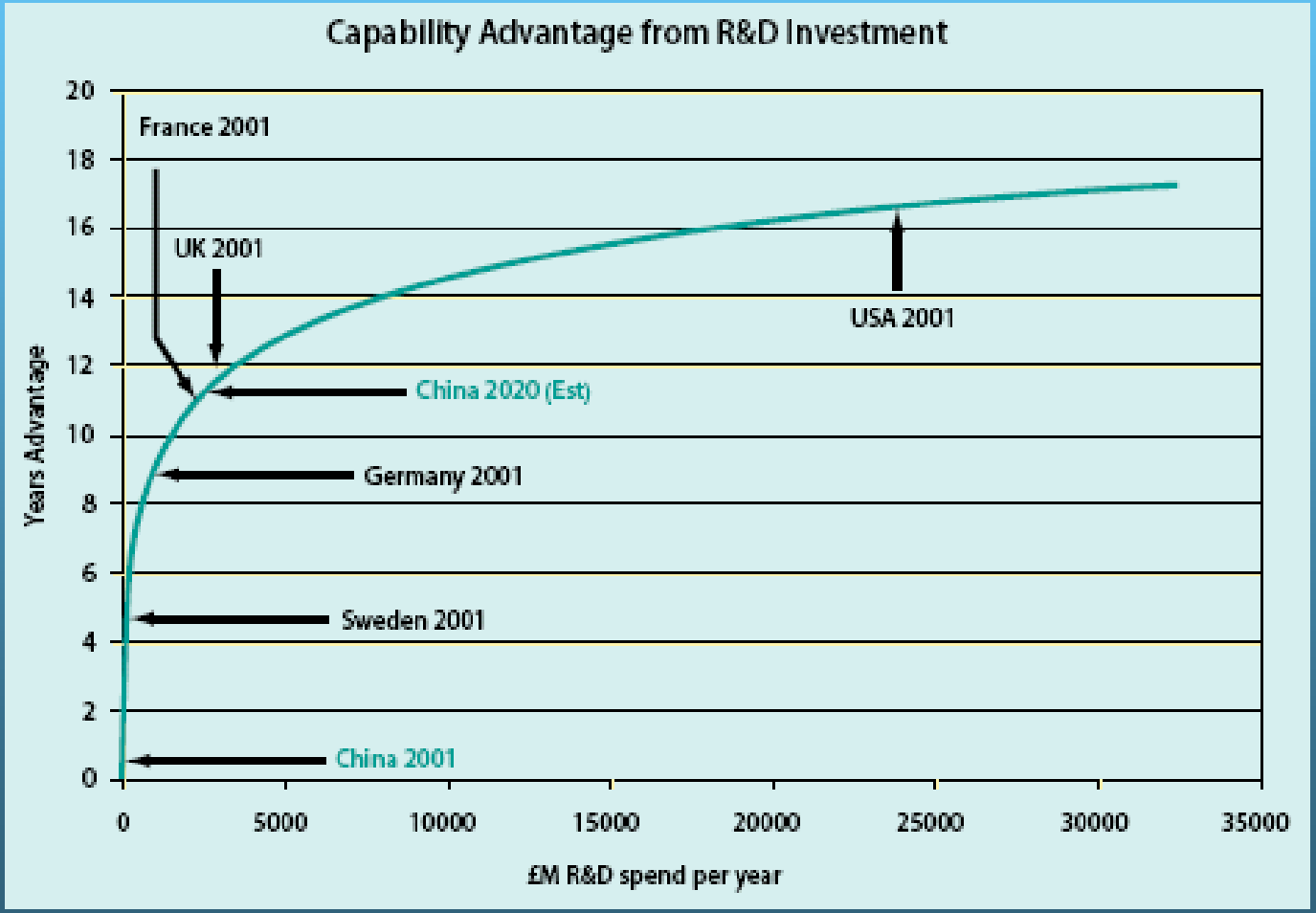
- Future military operations
  - Coalition
  - Expeditionary
  - Humanitarian
  - Joint
- Move from Cold War Stance to Dealing with Asymmetric Threats
- Environmental and legal issues

Why Do Research?

- Deliver required Military Capability - technology insertion
  - Provide viable, affordable concepts that provide VFM
  - Fund key defence enabling technologies
  - Exploit and better understand civil technology
  - Reduce technical risk to acceptable level
  - Reduce system Whole Life Costs
- Understand the threat
- Enable informed decisions
  - e.g. on policy re ethics, H&S, environment
- Outputs
  - **skilled people who understand relevant S&T underpinning tools, materials etc and their associated networks**
  - **ideas and techniques**

Why Do Research?

- You get what you pay for!



Defence Technology Strategy

- Provides details of;
  - R&D priorities for the next 20 years
  - what we have to retain in the UK to maintain the freedom to develop technologies in the way we choose
  - where there are opportunities for collaboration
  - how we shall go about sustaining key science and technology skills

Prediction isn't easy and is rarely accurate!

1958

"Some success has been achieved in the development of detectors sensitive to a wavelength of the order of 10 microns. This work has now ceased as there is no requirement for a detector sensitive to such wavelengths"

From Radar Research Establishment (now QinetiQ Malvern) Annual Review

1998 ***UK STAIRS 'C'***

General Themes

- Current threats emphasise that science and technology is fundamental to UK military capability
- Need for greater combined MOD and industry investment in R&D with more emphasis on research
- Increased emphasis on new technologies
- World class research skills and science & technology expertise are essential
- MOD must own and control key technologies

Close Combat & Combat Support

- UK armour design
- Mine countermeasures
- Exploit civil power cells

Helicopters

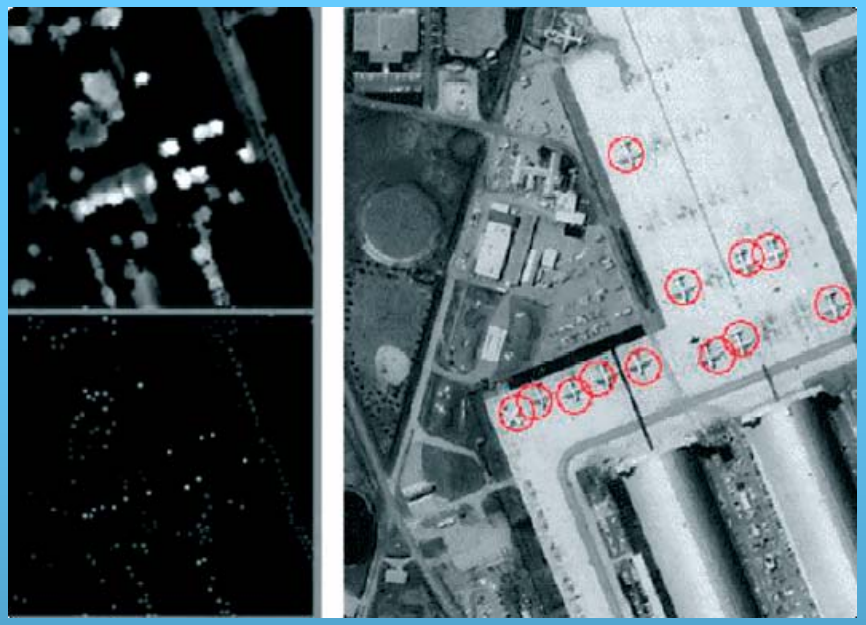
- Survivability
- Crew protection
- Day/night all environment technologies

General Munitions and Energetics Technologies

- On-shore Design Authority
- UK Test and Evaluation capability
- National Community on Energetics

Complex Weapons

- UK design and integration
- Protection measures
- Develop testing systems
- International Technology Programme on Missiles



C4ISTAR

- MOD Design Authority for C4ISTAR architecture
- UK control cryptography
- Interoperable with allies

CBRN

- Engage with academia and SMEs
- Biological Detectors
- Generic medical counter-measures

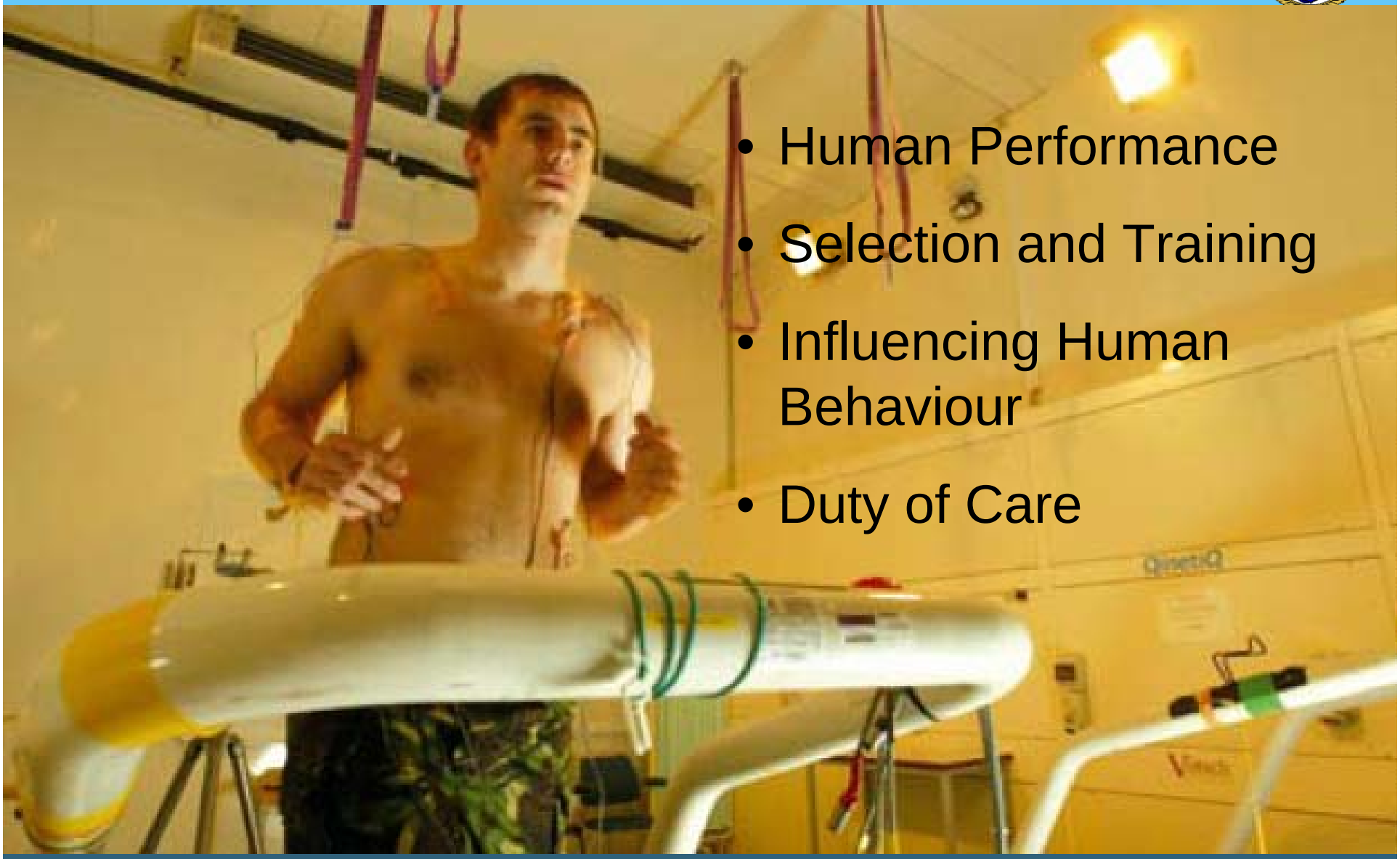
Counter Terrorism

- Engage with SMEs and academia across the UK to access innovative solutions
- Pursue sensors and technologies that provide advantages against terrorists, and the ability to counter rapidly changing threats including IEDs

Cross-Cutting Technologies

- Sensors and countermeasures
- Information exploitation
- The human as part of the system
- Platforms and structures
- The physical environment
- Technologies to enable Through Life Capability Management

The Human as Part of the System



- Human Performance
- Selection and Training
- Influencing Human Behaviour
- Duty of Care

Emerging Technologies

- Information and Decision Support
- Human cognitive processes
- Novel signature management
- Autonomous systems
- Generic Technologies
  - nano-materials
  - advanced electronics

Competition of Ideas

A "Competition of Ideas" to expose and seek solutions to major defence problems that need innovation and the injection of new ideas from a wide range of suppliers.

- Themes:
  - Prediction of Intent
  - Protection
  - Automatic Object Recognition
  - Ad Hoc Networking

www.ideas.mod.uk

University Research Schemes

- Fellowships
  - Up to 3 post doctoral fellowships
  - Working with the Royal Society
- Studentships
  - Up to 30 doctoral research studentships
  - In partnership with Industry

Grand Challenge

"Produce an autonomous or semi autonomous system designed to detect, identify, monitor and report a comprehensive range of physical threats in a complex urban environment"

- Challenging UK innovators including industry, SMEs and academia, to develop a capability to minimise the threats to troops
- The reward will be a trophy and a contract for follow on work
- Grand Challenge will be formally launched on 28th November

www.challenge.mod.uk

DTS and Collaboration (1)

- Provides greater focus and additional clarity to our international engagements
- Will engender a more proactive approach
- States importance of US, both as military ally and research partner
  - UK will continue to support this extremely valuable relationship
  - Foster new collaborations in areas of mutual benefit
  - Two-way technology sharing important to realise full benefits
- UK desires to be a more effective and valued partner

DTS and Collaboration (2)

- UK and US are good research partners
- Collaboration across the full S&T spectrum
- Common operational challenges and technology issues
  - World-leading technology for the warfighter
  - Interoperability

Information Exploitation

- International Technology Alliance
  - Network theory
  - Security across system of systems
  - Sensor information processing and delivery
  - Distributed coalition planning and decision making

The Armour Technical Working Group

- The UK-US ATWG MOU originated in the early 1960's and has been in place ever since
- Originally developed to exchange information on Chobham Armour
- The programme now exchanges information at high classification level on all armour technologies including advanced electric armour topics and novel techniques for FRES and FCS
- It has been particularly useful during recent operations, helping both sides to develop effective countermeasures to insurgent threats

Challenger 2

Abrams M1A2

The Armour Technical Working Group

- ATWG MOU considered to be of very considerable value by both sides
- Very valuable information exchange has led to both sides requesting a new MOU to include collaborative PAs
- New (continuation) MOU now in staffing
  - First draft from US due by end of November 2006
- All physical protection technologies are included

UK Electric Armour Tests

Warrior with bar armour

Third Generation Focal Plane Arrays for IR Sensors

- Thermal Imaging sensors are a battle winning technology
- 3rd generation dual band sensors will be key for achieving acquisition overmatch
  - i.e. we ID the threat before they detect us
- Cost is a very significant driver to wide deployment of high performance 3rd gen sensors
- UK has made key breakthrough in low cost substrates for LWIR and dual band thermal imaging detector arrays
- US has excellent understanding of the requirements for dual band imaging sensors

Third Generation Focal Plane Arrays for IR Sensors

- Project Arrangement with Night Vision Lab is in final stages of staffing
- Both nations will undertake research to grow IR detectors on low cost substrates
- We will establish a common understanding of performance requirements of IR imaging arrays
- We will evaluate each-other's technology, with the aim of identifying the best way forward for low-cost technology

Conclusions

- **Military capability investment is made against a future that is unknown - S&T allows us to make better informed and more timely decisions**
- **Military advantage will be gained:**
  - **from rapid exploitation of civil technology**
  - **investment in development of defence specific technologies**

- **Advances in military technology will increasingly raise difficult ethical and political issues that you will have to deal with in the future**
- **Collaboration, including appropriate sharing of technology, will be vital to ensure that the UK and its allies have battle-winning technology and remain interoperable**

Questions?