The role of PSREs in technology exploitation

Brief to DSR Annual Seminar 2008 - Innovation

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Innovation – some definitions…..

From a business perspective

- "Fresh thinking that *creates value*" (Richard Lyons, GS)

Not the same as **invention** or **creativity**

- "Invention turns £ into ideas,
  innovation turns ideas into £££" (Economist)

For MOD, it implies better kit, better Capability through

- "The successful exploitation of new ideas" (HMG)

Exploitation

MOD's over-arching need (i.e. what MOD normally means by 'Exploitation')

- Pull-through of (new) technology/knowledge into defence capabilities, from
  - its own R&D investment
  - global advances in science and technology

MOD's obligation to society (Govt policy)

- Transfer MOD-funded dual-use technologies to the civil sector

Dstl has a clear and key role in both areas

Dstl's role (from the DTS)

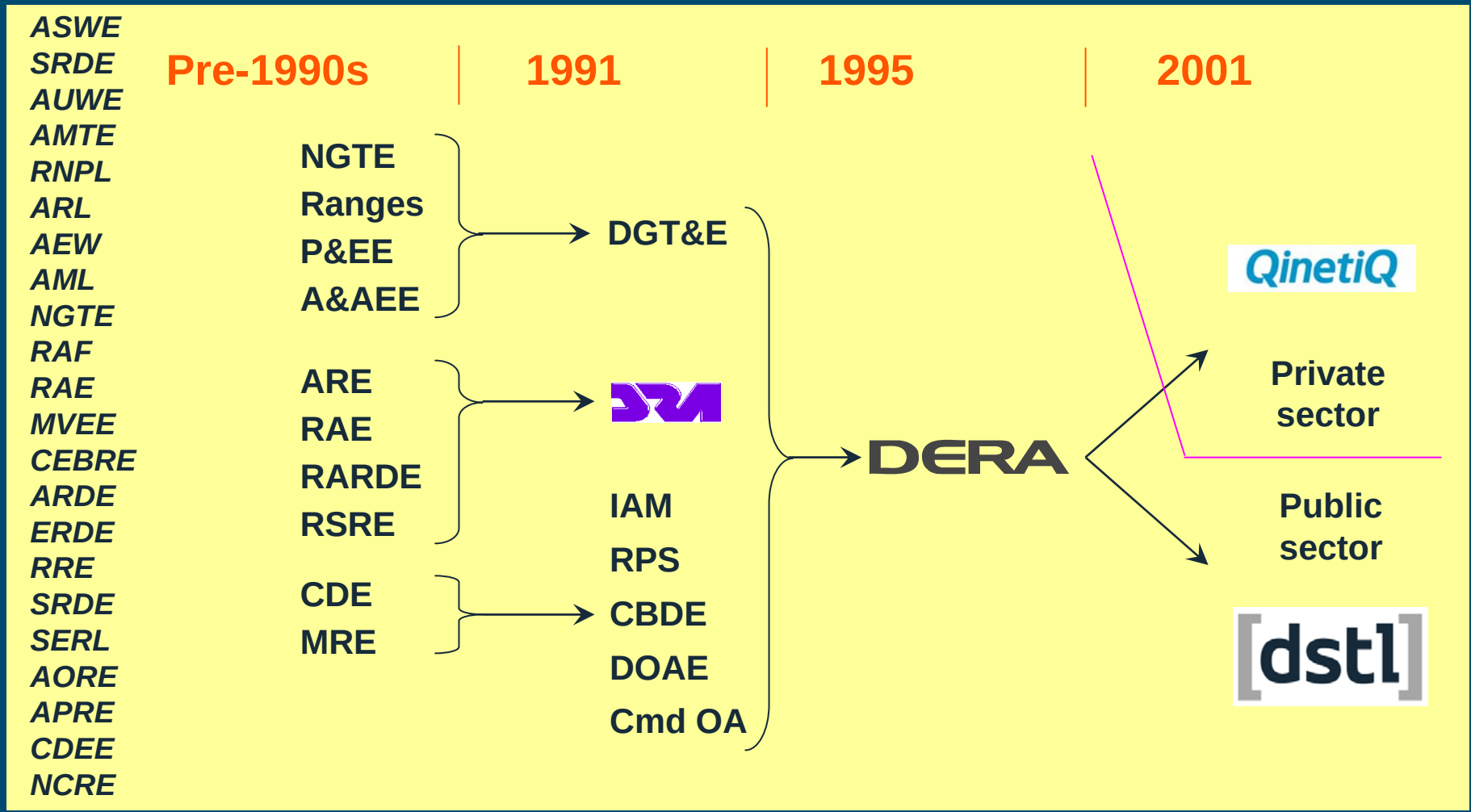
Dstl's core role is to provide independent, high quality scientific and technological services to the MoD, the UK Armed Forces and wider Government

- 'sovereign capabilities' in areas that must remain in Government
- policy, operational, military capability, scientific and acquisition decisions
- focus for international research collaboration
- advice on the exploitation of both its own and wider (global) advances in science and technology
- Spin off knowledge for civil application

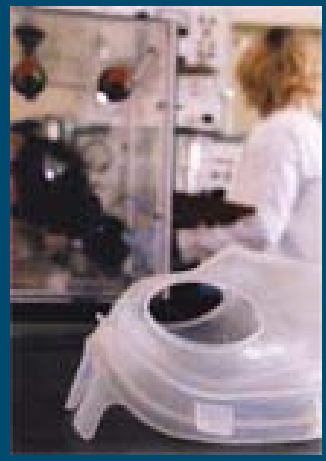
Dstl key facts

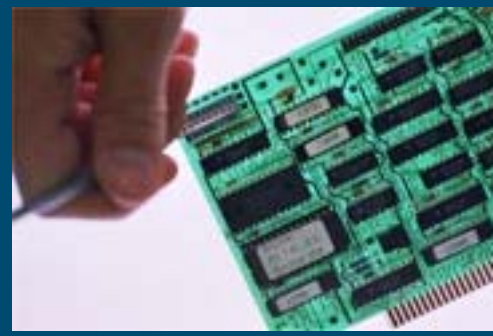
- Integral part of MOD
- 100% contract funded (Trading Fund)
  - Turnover £353 million
  - Assets £199 million
- 3500 staff
  - 2,700+ scientists & engineers
  - 100+ military
  - all fully committed to serving UK Defence Forces and wider Government

History



What does Dstl do?





Dstl provides

- High quality science and technology research
- Impartial advice on defence and security issues
- Integrated solutions to MOD/Govt science and technology problems

What does Dstl do?

- Dstl's work covers the spectrum of:
  - Threat, risk and option analysis
  - Supporting policy decision makers
  - Supporting military capabilities
  - Supporting the acquisition process
  - Science on the front line
  - Science on the home front

DTS “Sovereign Capabilities” within Dstl include:

- Potential areas where Dstl should maintain at least part of the UK sovereign capability
  - Design Authority for Armour
  - Integrated survivability
  - Open systems technologies
  - Secure and interoperable network architectures and technologies
  - CT & strategic systems technologies
  - CBR
  - ECM & EW systems & technologies
  - Human performance
  - Social network analysis

Capability through Partnering

- Dstl's span of competence is required to be very broad, and backed up by world-class S&T research in specific areas
- A full in-house S&T capability across the spectrum is impossible. We cannot do it all ourselves, and we should not try
- Wider engagement and partnership with industry, academia, OGDs, IRC etc reinforced by DIS, DTS, DTP

Dstl partnering

- A range of ‘strategic partnering agreements’ with primes and systems integrators
- Interaction with industry across the full range of defence acquisition on behalf of MoD, and with both industry and the universities via co-operative research models such as DTCs, TsoE, CRCs etc.
- Spend with ‘top 20’ universities ~ £5M per annum, ~£10M across 55 in all
- Dstl annual spend with SMEs ~ £35M-£40M

Dstl also supports….

- Grand Challenge – Dstl support to bidders and bid management.
- The Competition of Ideas - Dstl support to bid assessment
- Horizon scanning/identifying emerging technology – Dstl already leads this but the activity is being expanded

and, since 2008…….

- Centre for Defence Enterprise – Dstl support
- DE&S Science Gateways – Dstl appointments

Exploitation of Dstl IP

Public Sector Research Exploitation
Government policy

- Baker Report 1999: Creating Knowledge Creating Wealth – Realising the value of PSREs
- Sainsbury Report 2007: The Race to the Top – A review of the Government's Science & Innovation Policies
- Continuous and consistent policy placing high importance on fullest commercial exploitation of the knowledge created by PSREs

Exploitation of Dstl-owned IP

It is a MoD Top Level Objective for Dstl to:

- "Exploit its intellectual property (IP), in line with MoD and Government policy for technology transfer, in order to generate value for money for the taxpayer. This should be done for example, by generating a financial return for the taxpayer through developing equity by Joint Ventures and income through licensing." (Framework document, 2006)

The main policy driver is

- Wider socio-economic benefit
- but there are benefits, too, for MOD/Dstl

Why commercialise Dstl-owned technology?

- Public good - ensures the full benefit of Dstl research / innovation contributes to the well-being of society as a whole
- Contribute to UK competitiveness and economic growth
- Generate income to benefit Dstl/MoD (longer term)
- Bring intellectual & financial resources of industry to bear to help meet defence needs
- Enhance reputation of Dstl and reward Dstl staff

Dstl patented technologies

Dstl IP portfolio segment	Technologies (examples)
Healthcare & biotechnology (91)	Vaccine antigens, drug & vaccine delivery systems, assays and biological components of assays for detecting infectious agents, health monitoring systems, biological signal amplification technologies
Sensors and measurement (40)	Advanced optical based detectors, alternatives to radioactive ion sources, gas sensors, air monitoring systems, detection system components, airborne particle collection systems
Protection & Purification (14)	Asset, personal and collective protection e.g. respirators, adsorbent media, blast barriers, decontamination and cleaning formulations
Coatings and materials (11)	Oil- and water-repellent coatings, adhesives, novel materials, specific uses of materials
Electromagnetic & Communications (13)	Electromagnetic and X-ray technologies, ICT, location devices and ancillary technologies including software
Other technologies (13)	Explosives, flares, optics, remediation, miscellaneous technologies

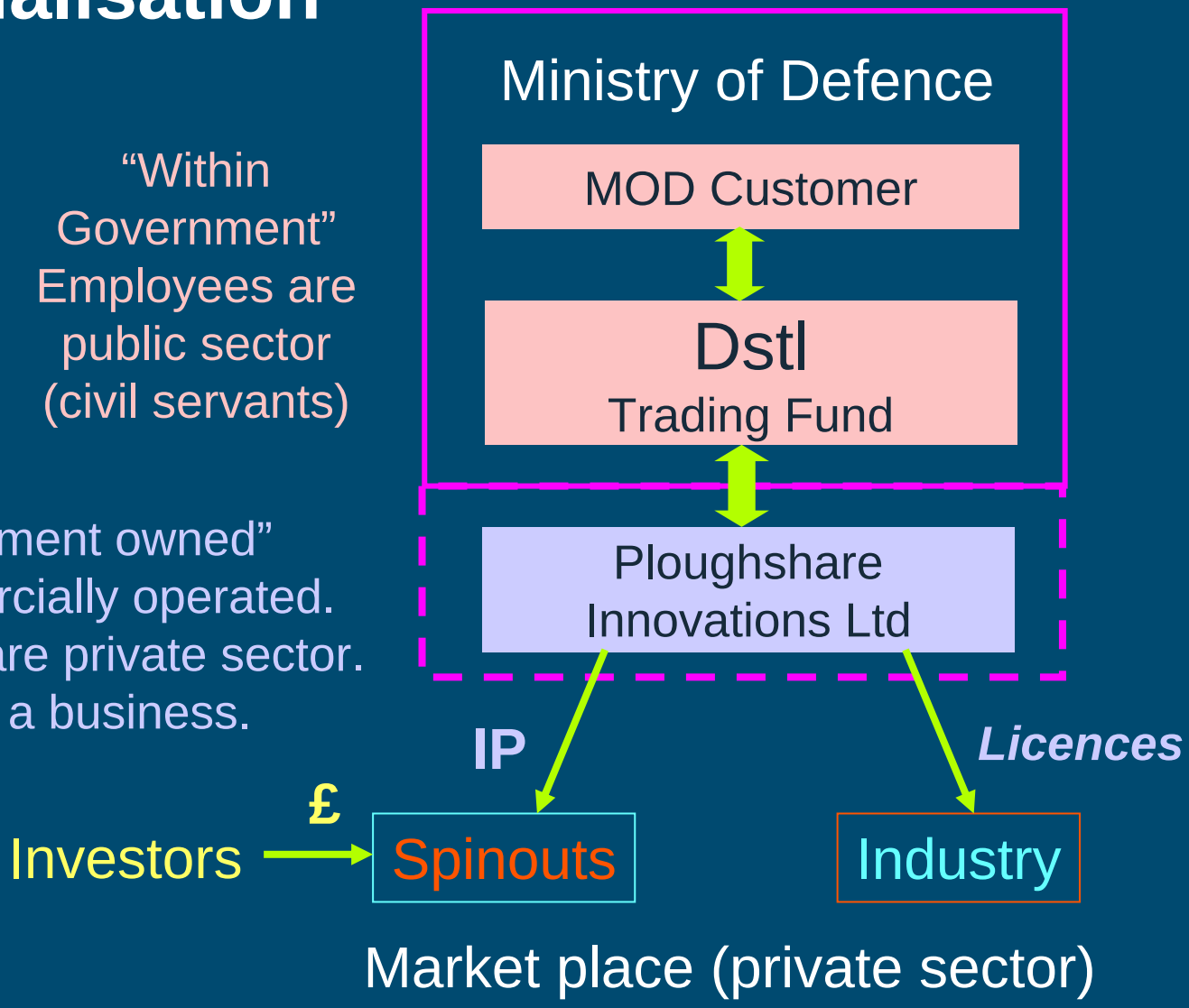
Dstl technology transfer 2005

- **Ploughshare Innovations Ltd**
  - Formed in April 2005, based at Porton Science Park
  - Independent & commercially managed
    - The sole shareholder is Secretary of State
  - Exclusive licence to exploit selected Dstl IP
  - Pan-Dstl remit
  - Reinvestment in departments to develop the next wave of ideas

Commercialisation of Dstl IP post 2005

"Within Government" Employees are public sector (civil servants)

"Government owned" but commercially operated. Employees are private sector. Run as a business.

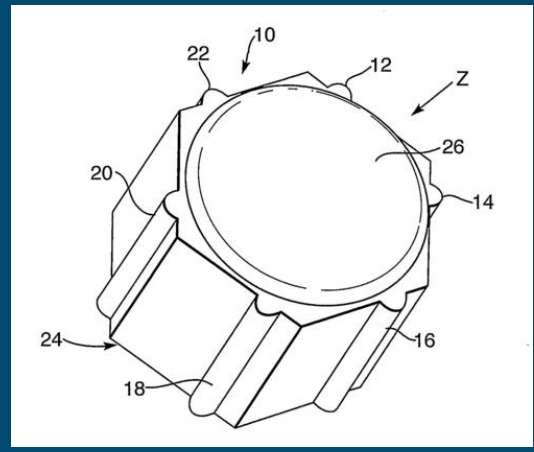


Ploughshare business model

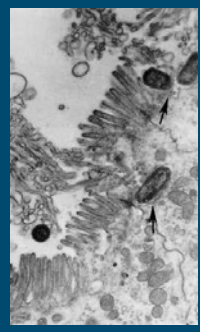
- Balancing resource investment in
  - Licensing
  - Spin-outs / Joint ventures
  - Equity disposal
- Complementary activities for success
  - IP pipeline development in Dstl
  - Controlling IP costs
- Future trends
  - Looking beyond Dstl, within MOD (DCD, AWE, DE)

In the pipeline….

- Underwater cat’s-eyes
- Carbon polymer adhesive
- Sample concentration technology
- Cell lines
- Micro-encapsulation technologies
- Liposome technologies
- Borohydride fuel cell technology
- Ceramic armour



Ploughshare Innovation Fund



- Improving live vaccines in partnership with Cobra

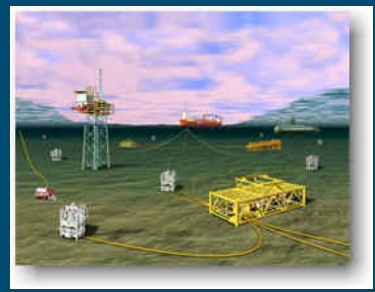
  Investment (£41k) allows PoC of proprietary vaccine production system. MOD will receive full rights for use and a royalty on sales.

- Carbon-Polymer Composite Adhesive

  Investment will strengthen IP position for this breakthrough in metal and alloy adhesives, and will accelerate commercialisation.

- Development of sonar reflectors with Avon Rubber

  Investment (£12k) allows PoC of a novel, long-lived, non-toxic, and inexpensive, commercially viable product.



UW asset location – case study

- High cost of replacing battery packs of existing devices
- Existing passive devices use toxic CFCs – use restricted
- Demand for cost-effective devices increasing
  - Wider exploration / exploitation of sub-sea resources
  - More high value assets
  - Oil & communications routes
- Ploughshare is commercialising proven Dstl IP in a novel passive device
- New spin-out company
  - Sub-sea Asset Location Technologies Ltd (SALT)

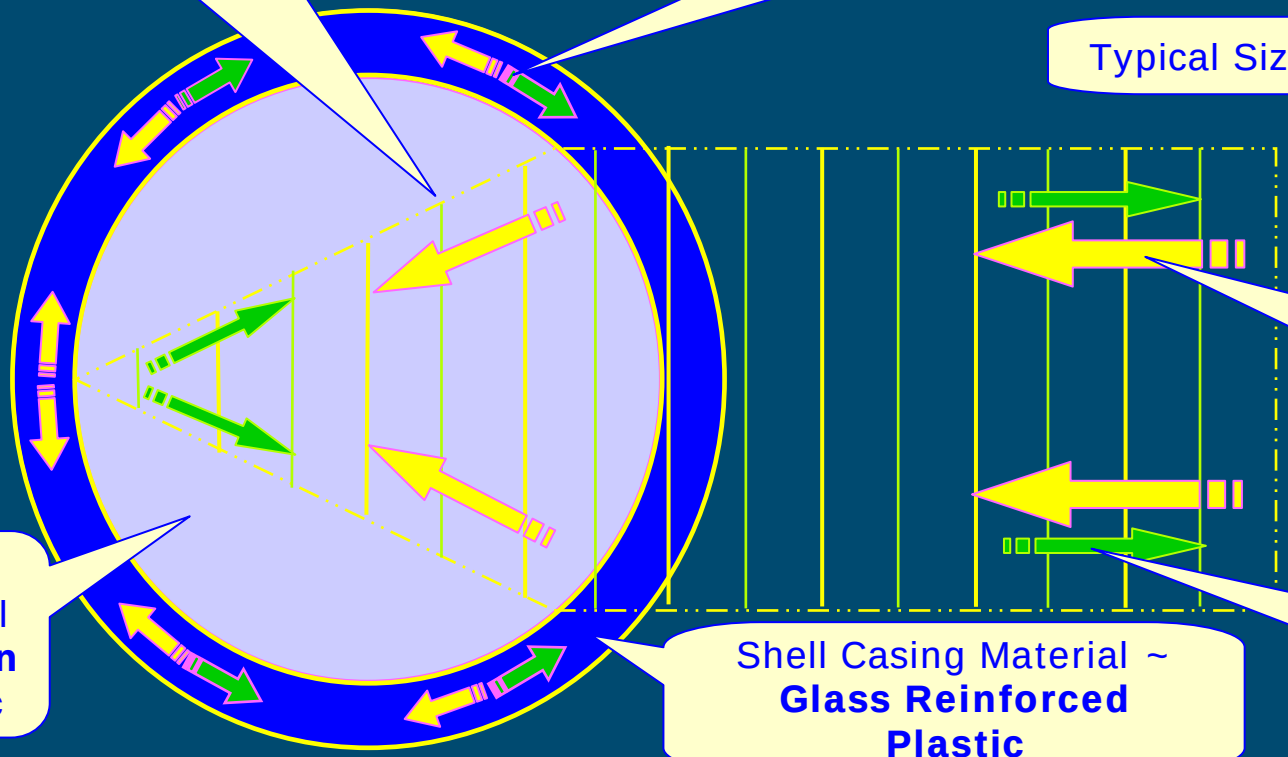
Acoustic ‘Catseye’ Underwater Reflector

- Core Technology

Typical Size = 10” (25cm)

Core Material Transmits Refracts / Reflects Acoustic Waves

Constructive interference from shell properties



Incoming Acoustic Waves

Reflected Acoustic Waves

Core Material ~**Silicon Plastic**

Shell Casing Material ~ **Glass Reinforced Plastic**

Ploughshare spin-outs (2007 on)

Spin-out	Technology	Application
ProKyma Technologies Ltd	Use of ultrasound to handle micro-particulates (e.g. bacteria, blood cells)	Sample preparation for detection; rapid blood grouping
Sherwood Therapeutics Ltd (1)	Wound-healing enzymes identified in maggots	Accelerated wound-healing, and immuno-modulation in healthcare
Sub-sea Asset Location Technologies (SALT)	Sonar reflective materials	Underwater markers
Claresys Ltd	Covert camera technology	Surveillance, security, remote survey

Summary

- Dstl is a unique example of a PSRE
- Clear role to support MOD's exploitation of advances in S&T to improve defence capability
- Can only fulfil its mission by active partnership and collaboration, whilst preserving impartiality
- Parallel role to ensure own IP is exploited commercially
  - For civil benefit
  - Flow-back into Defence
- Ploughshare is the shop window to industry and investors

Questions?