UK military R&D: changing times

Dr Stuart Parkinson

Scientists for Global Responsibility
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We will discuss…

- Background on UK military R&D
- Recent changes
  - military sector cuts
  - green sector growth
- Work of Scientists for Global Responsibility

Background on UK military R&D

UK is major military power

- UK military budget is world's 4th largest
  - Up 18% since 2002
- UK is one of 5 'official' nuclear weapons states
- UK forces active in recent major conflicts
  - e.g. Afghanistan, Iraq, Libya
- UK is home to world's 2nd largest arms company
  - BAE Systems
- UK is 5th largest arms exporter
  - Recent recipients include Algeria, Bahrain, Libya, Saudi Arabia, Tunisia, Yemen

• UK military budget was $62.7 bn in 2011 – world's 4th largest behind USA, China and Russia
• UK military spending per person: more than 2 times that of Russia; more than 10 times that of China
• UK spending per person/ per unit GDP is much larger than EU average
• UK is home to world's 2nd largest arms company – BAE Systems
• UK is 5th largest arms exporter behind USA, Russia, Germany and France

Main references: Stockholm International Peace Research Institute (2012); Committees on Arms Export Controls (2011).

Approach to national security

- Government military/ defence strategy based on:
  - High technology, especially 'networked' technologies
  - Prominent role for military force/ weapons
- Major role of military corporations
  - Often monopoly suppliers
- Involvement of scientists/ engineers essential
  - Large budgets for Research and Development

Current strategy in USA, UK and elsewhere is based on concept known as Revolution in Military Affairs (RMA)

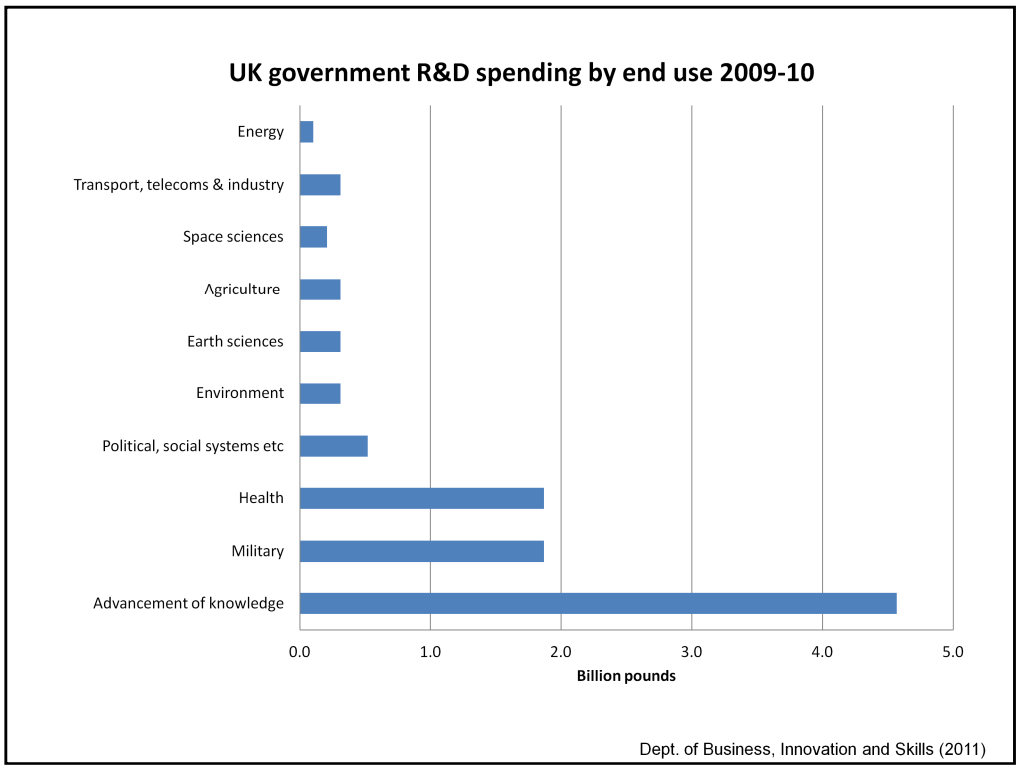
Ministry of Defence (MoD)

- Spends about £14 billion per year on military technology/ equipment
- Around £2 bn per year of this on R&D
  - Around 20% of UK Gov R&D spending
  - One of the world's largest funders of military R&D
- Main research arm is Defence Science and Technology Laboratory (DSTL)
- WMD work at AWE and Porton Down

• Spending figures from DASA (2011), Table 1.4 – more detailed figures on R&D are given later

• Atomic Weapons Establishment (AWE) at Aldermaston has been expanding – possibly to prepare itself for development of next generation of UK nuclear weapons

• Porton Down – chemical and biological weapons research – defence only as laid down in CW and BW treaties, but there is thin line between offence and defence work



• Military R&D is spending by Ministry of Defence – however it is claimed that a large fraction of Ministry of Defence R&D spending is on civilian projects. Nevertheless, these projects will complement priorities of MoD.

• In the last couple of years, health R&D spending has risen, while military R&D has fallen, so that they are now close.

• Private R&D spending (by arms companies) is smaller and less certain – around a few hundred million pounds (Langley, 2005)

• Further analysis is given later

BIS (2011). Tables 2.4 & 2.2.

Military corporations

- Majority of military R&D (including gov-funded R&D) takes place within industry
  - Represents a subsidy of over £500m annually
- UK home to major military corporations
  - BAE Systems
  - Rolls Royce
  - QinetiQ
  - Many others incl. subsidiaries of foreign companies

• Often, government funds military R&D within industry and then purchases the resulting technology – effectively paying twice (Langley, 2005)

• Estimate of subsidy (Jackson, 2011)

• BAE Systems – world's largest arms company following takeover of several US contractors

• Rolls Royce – specialises in engines for ships, aircraft (2nd largest in UK)

• QinetiQ – privatised government military labs (5th in UK)

• Aggressive lobbying – sit on many influential advisory committees

Military & UK universities

- Numerous paths for military funding of R&D in universities
  - About £200 million a year, but figures very uncertain
- Government schemes
  - Through military labs, civilian Research Councils etc
- Corporate schemes
  - Large programmes run by Rolls Royce, QinetiQ
- Joint government-industry schemes in recent years
  - Defence Technology Centres (DTC)
  - Towers of Excellence (ToE)
  - Defence & Aerospace Research Partnerships (DARP)

• Government schemes run in conjunction with: Defence Science and Technology Labs (DSTL); Engineering and Physical Sciences Research Council (EPSRC)

• ToEs and DARPs seem to have been discontinued

• References: Langley (2005); Langley et al (2007, 2008)

Military-university consortia in the UK - who was involved in 2004

	UTC	DTC	DARP	ToE
Bath				*
Birmingham	*	**	*	*
Bristol		*	***	
Brunel		*		
Cambridge	***	*	***	
Cardiff		*		
City			*	
Cranfield	*	**	***	***
De Montfort		*		
Edinburgh		*		
Glasgow		*	**	
Glasgow Caledonian			*	
Heriot Watt		*		
Imperial College	*	*	****	***
Leeds		*		
Leicester			*	
Loughborough	*		**	*
Manchester	*		***	
Nottingham	**			
Oxford	**		**	
Sheffield	***	*		*
Southampton	**	**	***	*
St Andrews		*		
Strathclyde	*	*		
Surrey	*	*	*	*
Sussex	*		*	
Swansea	*		*	
University College		*		**
York	*		*	

Langley (2005)

- Data from Langley (2005)
- Research by SGR and others has yet to identify a UK university which does not receive any military funding (Langley et al, 2008)

Military & UK science education

- Military corporations are especially involved in sci/tech education
- Schools
  - provide sci/tech curriculum materials
- Colleges
  - Apprenticeships, especially engineering
- Universities
  - R&D funding influences on teaching

• Leading arms companies have school education programmes, including Atomic Weapons Establishment

• BAE Systems is leading provider of UK engineering apprenticeships

• Langley et al (2007)

Main areas of military R&D

- Top 5 project areas:
  - Future Submarines
  - Nuclear Propulsion (warships/ submarines)
  - Typhoon (fast jets)
  - Joint Combat Aircraft (fast jets)
  - Lynx (helicopters)

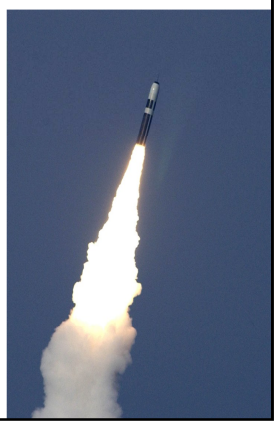
• Top 5 categories (all above £100m) for 2009-10 (MoD, 2012a)

• Other areas of interest include cyber-security, robotic aircraft, body armour, chemical/biological/radiological/nuclear defence, communications systems, emerging technologies etc (e.g. MoD, 2012b)

• In public relations, the 'life-saving' contribution of military R&D projects is often emphasised, e.g de-mining, although in practice this is a small proportion.

UK nuclear weapons R&D

- Atomic Weapons Establishment (AWE), Aldermaston
- Major expansion, involving new research facilities
  - Supercomputers; Orion Laser etc
- Collaboration with USA and France
  - New joint research centre with France
- Concern that these undermine the NPT and CTBT
- R&D spending £100m per year
  - from total budget of £1 bn+



New facilities installed in recent years – details:

• Supercomputers (Blue Oak, Larch etc) – simulation of nuclear explosion

• Orion Laser – small-scale simulation of nuclear detonation, e.g. fusion and boosting

• Materials testing laboratory – to study behaviour of nuclear weapons components

New joint research centres with France – as part of 2010 Teutates agreement

• Joint radiographic/ hydrodynamics facilities – Teutates EPURE at Valduc, France, and Teutates Technological Development Centre at AWE, UK

Claimed not to be connected to development of new nuclear warheads, but many doubts remain, especially regarding whether they undermine the Nuclear Non-proliferation Treaty and Comprehensive Test Ban Treaty.

Sources:

AWE annual reports and other related documents. http://www.awe.co.uk/

MoD (2012a)

Nicholls (2011)

Photo: Trident nuclear missile

Robotic aircraft ('drones')

- Rapidly developing technology globally
- UK situation:
  - Armed drones first deployed in 2007
  - Collaboration with Israel to develop and deploy
  - BAE Systems: Mantis, Taranis
  - FLAVIIR: R&D involving 10 UK universities
- Numerous concerns
  - e.g. proliferation, civilian casualties

UK situation

• Drones initially deployed for reconnaissance, but from 2007 the UK began deploying (US-made) armed 'Predator' drones in Afghanistan. By the end of 2011, the RAF had carried out over 200 drone strikes.

• UK collaboration with Israeli military and arms industry to deploy and develop drones

• BAE Systems developing two armed drones: Mantis and Taranis

• 10 UK universities involved in R&D on drones (FLAVIIR programme)

Ethical issues

• Expansion of 'battlespace'

  • 'Illegal' CIA use in civilian areas (e.g. Pakistan)

  • Pilots not in combat zone so temptation to deploy more frequently

  • High risk of civilian casualties

• Serious arms proliferation risk – small drones, especially, are also a potential terrorist weapon

• Industry is developing the potential for them to act autonomously

Drone Wars UK (2012); Langley et al (2008)

Photo: BAE Mantis

A shift away from military research and development?

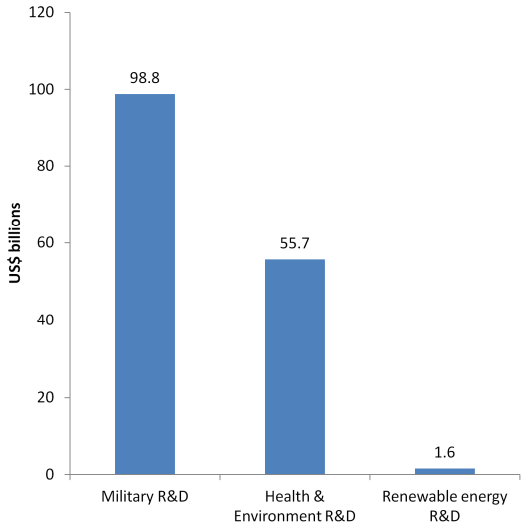
Main criticisms of military R&D

1. Fuels current and future arms races, increasing the risk of conflict
2. Diverts resources from important civilian R&D, including that which has major security benefits
3. Reduces openness in scientific research

1. There is not enough consideration of the proliferation risks that come with the development of new military technologies – especially when exports are involved.
2. Some comparisons are given in the next slide.
3. This was highlighted by, for example, Langley et al (2008).

Global comparisons with other R&D sectors

- Government R&D spending in OECD countries in 2007
- Spending imbalance has social justice, environmental & **security** consequences



Sources: AAAS (2008), IEA (2008)

Figures in US$ (purchasing power parity)

Military spend – Organisation for Economic Co-operation and Development (OECD) countries (AAAS, 2008)

Health & environment (mainly health) – OECD countries (AAAS, 2008)

Renewable energy – International Energy Agency (IEA) countries (IEA, 2008) – i.e. OECD minus 4 countries

More recent data – especially from USA – indicates gap is closing slowly

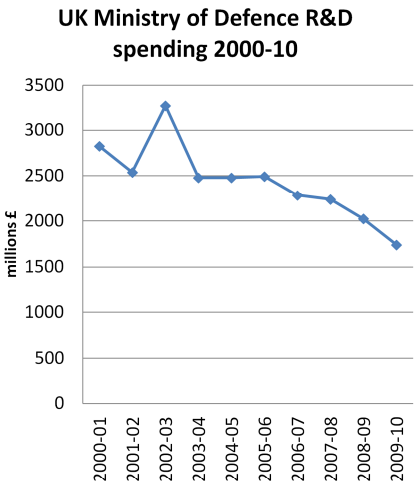
But things are changing in the UK...

- Strategic Defence and Security Review
  - Largest cuts to military since end of Cold War
    - 8% spending cut from 2010-2014
    - Including warships, fighter planes, tanks ...
  - Greater military co-operation with allies, especially USA, France
- National Security Strategy
  - Acknowledgement that security problems need a broader approach
    - Need to consider 'drivers of insecurity', e.g. climate change
    - Threat from environmental problems, disease, accidents

Ministry of Defence (2010); Cameron (2010); HM Government (2010)

Military R&D spend falling in UK

- Over last 10y:
  - ~40% fall in MoD R&D budget (real terms)
  - As a fraction of total public R&D budget, a fall from 33% to 17%
  - More MoD 'civilian' work?



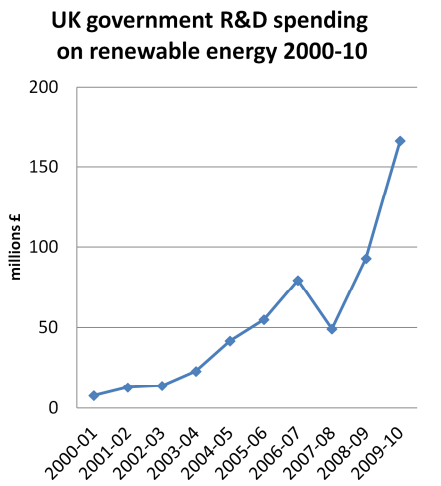
BIS (2011)

In mid-1980s, MoD R&D budget was about half of total public R&D budget

Reference: BIS (2011). Tables 2.2 & A2.2

Cleaner energy R&D rising in UK

- Over last 10y:
  - 20-fold increase in government R&D spend on renewables
  - Still less than one-tenth of military R&D spend



IEA (2012)

Figures in graph include demonstration phase, so R&D on its own is less.

IEA (2012)

Growth of ‘green collar’ sectors

- Examples
  - Rise of interdisciplinary academic environmental research centres
  - Renewable energy industries
    - annual growth rate of 11% compared to 1.4% across economy
- But government R&D spending is still small
  - Huge opportunities in marine energy

Figures from: Renewable Energy Association (2012)

But resistance...

- New defence sci/tech strategy
  - Includes ‘defence’ and ‘security’ sectors
  - Government support:
    - To retain major ‘defence industrial base’
    - To expand and promote arms exports
    - New minimum level of research spending
    - Justified by desire to retain ‘technology advantage’ in key military fields
  - But more ‘off-the-shelf’ procurement

- Entitled ‘National security through technology’
- Research spending to be set at 1.2% of total MoD budget

MoD (2012b)

Alternative security strategies

- Governments could (and should) move away from aggressive military/ foreign policies, for example:
  - Non-Offensive Defence
  - Sustainable Security
- R&D could support this more effectively
  - e.g. understanding roots of conflict; assessing effectiveness of non-violent conflict resolution or disarmament processes

• Non-Offensive Defence – focus on narrowly-defined defence (national territory, peace-keeping); decommission weapons systems that can be used for large-scale attack, eg nuclear weapons, aircraft carriers, long-range bombers/ missiles/ warships (Civilisation 3000, 2010)

• Sustainable Security – focus on tackling the roots of conflict such as resource depletion, militarisation, climate change (Abbott et al, 2006)

Key changes needed

- Greater transparency over military R&D spend
- Cutting military R&D to very low levels
- Focus military R&D on supporting disarmament activities
- A ban on R&D which is aimed at supporting war-fighting capability from universities
- More funding of environment/ social R&D which can help tackle roots of armed conflict

Examples:

Cutting military R&D to low levels: e.g. less than 5% total government R&D

Focus military R&D on supporting disarmament activities: e.g. effective weapons decommissioning, monitoring to prevent diversion of 'dual-use' technologies

A ban on war-fighting R&D at universities: e.g. 'civil' (peace) clauses

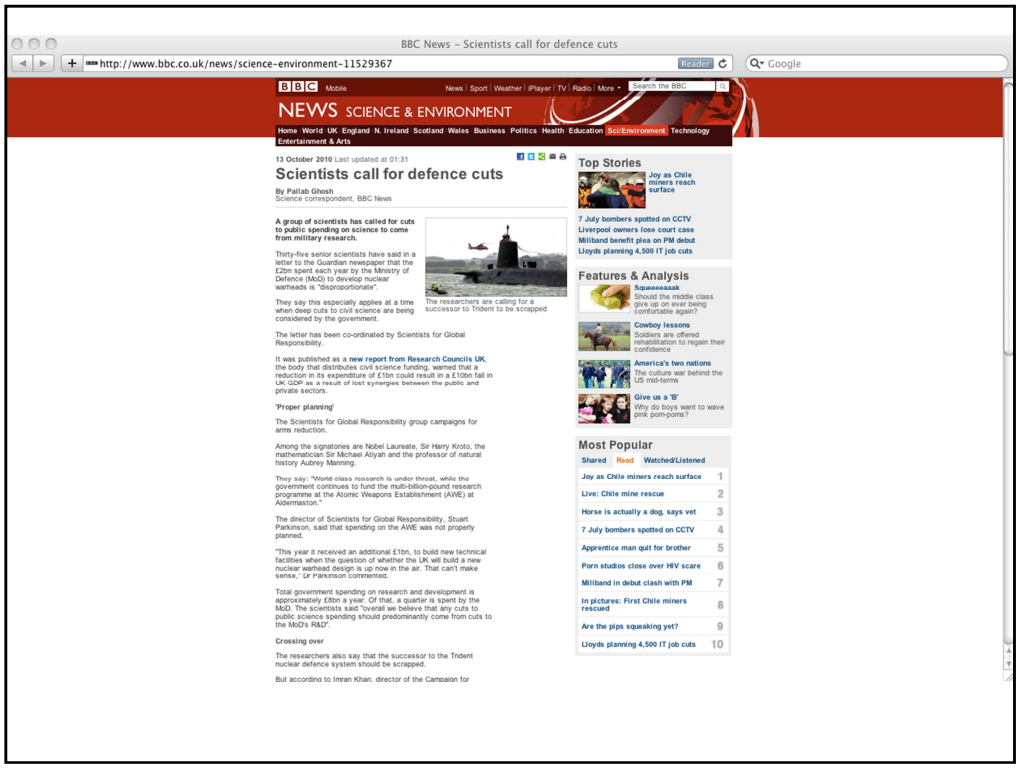
More env/ social R&D: e.g. Focus on improving energy security/ food security, mitigating/ adapting to climate change

SGR activities

- 'Soldiers in the Laboratory' (2005)
  - Detailed report on military sci/tech, especially in UK (and links to US), incl. funding, lobbying, ethical & political issues
- 'Scientists or Soldiers?' (2006)
  - Ethical issues and potential for alternative careers
- 'More Soldiers in the Laboratory' (2007)
  - Assessed new UK government/ industry military programmes
- 'Behind Closed Doors' (2008)
  - Examined growing military involvement in UK university sector
- 'Science and the Corporate Agenda' (2009)
  - In-depth report including chapter on military corporate sector
- New report on reform of UK security R&D in progress...

Other SGR activities include education work – including presentations to academics, peace campaigners, and students; articles in specialists media etc – and advocacy work with SGR members and other campaign groups on issues related to military involvement in R&D (for example, see next slide)

Reports listed in references



BBC News online (2010)

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