Challenging military research and development in the UK

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We will discuss...

- Background on UK military R&D
- Ethical arguments against military R&D
- Activities of Scientists for Global Responsibility (SGR)
Background on UK military R&D
• UK military budget was £38.6 bn ($59.6 bn) in 2010 – world’s 3rd largest behind USA and China; ahead of 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 largest arms company – BAE Systems (has become largest following further takeovers of US companies)
• UK is 5th largest arms exporter behind USA, Russia, Germany and France

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

**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
But things are changing...

• Strategic Defence and Security Review
  — Largest cuts to military since end of Cold War
    • 8% spending cut over next 4y
    • 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
    • Threats from environmental problems, disease, accidents
Ministry of Defence (MoD)

• Spends about £13 billion per year on military technology/equipment
• About £2 bn per year of this on R&D
  • Over 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 Aldermaston, Porton Down

• Spending figures from DASA (2010), Table 1.4
• Atomic Weapons Establishment at Aldermaston is currently 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.

Approx. 30% fall in military R&D over previous 10y (real terms)

As a percentage of total gov R&D, military R&D has fallen from 35% to 20% over previous 10y

BIS (2010). Tables 2.4 & 2.2.
Military corporations

• Majority of military R&D (including government-funded R&D) takes place within industry
  — Represents a large subsidy
• 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)
• 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 (3rd in UK)
• Aggressive lobbying – sit on many influential advisory committees
Military & UK universities

• Numerous paths for military funding of R&D in universities
  — Over £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
  — 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)
• References: Langley (2005); Langley et al (2007, 2008)
• 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 UK Military R&D

- From Defence Technology Strategy...
  - General munitions and explosives
  - Cross-cutting technologies, e.g. sensors
  - Command systems, e.g. computing
  - Close combat support
  - Counter terrorism
  - Robotic/fixed wing aircraft and helicopters
  - Maritime weapons and vessels
  - Complex weapons
  - Emerging technologies, e.g. nanotechnologies
  - Chemical, biological, radiological and nuclear (CBRN)

These categories are from the Defence Technology Strategy (Ministry of Defence, 2006)

More detail:
- Cross-cutting technologies – includes sensors, platforms, radar
- Command systems - includes telecommunications and information gathering networks
- Close combat support – includes protective clothing and vehicles able to withstand explosives more robustly
- Maritime weapons and vessels – includes submarines
- Emerging technologies – includes nanotechnologies and devices which interface people and machines
- CBRN – methods to detect and disable weapons
UK nuclear weapons R&D

- Atomic Weapons Establishment (AWE), Aldermaston
- Major expansion, involving new research facilities
  - New supercomputers
  - Orion Laser
  - Materials testing lab
- Claimed not to be connected to development of new nuclear warheads
- Collaboration with USA and France
- Estimated to be approx. £1 bn per year

Purposes:
- 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

Sources: AWE annual reports and other related documents. http://www.awe.co.uk/
Photo: Trident nuclear missile
Robotic aircraft (‘drones’)

- Rapidly developing technology globally
- Increasing use of armed drones
  - e.g. Pakistan, Afghanistan, Libya
  - Dubious legality
  - Potential for proliferation
- In the UK:
  - BAE Systems: Mantis, Taranis
  - FLAVIIR: R&D involving 10 UK universities

Hookes (2011); Langley et al (2008)
Photo: BAE Mantis
Ethical criticisms of military involvement in research and development
Main arguments against 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
Military R&D and weapon lethality

- Theoretical Lethality Index
  - maximum number of casualties per hour that a weapon can generate
- Military R&D has been a key factor in exponential growth in lethality of weapons during 20th Century

Theoretical ‘Lethality Index’ includes consideration of: rate of fire, number of targets, relative effectiveness, range effects, muzzle effects, accuracy, reliability, etc.

Graph from Lemarchand (2007).
Casualties in war

Comparisons with other R&D sectors

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

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
Military v. Health & Environment
Government R&D spending in OECD, 2007

Source: AAAS (2008)
Some current drivers of military R&D

• ‘Full spectrum dominance’
  – US doctrine for military superiority on land, sea, air & space

• Control of information
  – Monitoring & surveillance; telecommunications; networked computer systems

• ‘Refinement’ of weapons
  – ‘Smart’ weapons; robotic delivery
  – Attempting to reduce/ remove need for soldiers
  – Further development of nuclear weapons

• Corporate profits
  – Spiralled during ‘War on Terror’

• US sets operational objectives 20y ahead and this drives R&D programmes
• Researchers are identified and funded worldwide which can contribute to the R&D to meet the 20y operational objectives

Sources: Langley (2005); Lemarchand (2007); Langley et al (2007)
Further concerns

• Prolonged threat of nuclear war
• Weaponisation of space
• Shifting of risk from ‘our’ soldiers to others
  – Increased risk of civilian casualties
  – War becomes ‘more acceptable’?
• Shift from ‘threat-driven’ defence to ‘capability-based’ defence
  – Military corporations driving defence policy
Countering pro-military arguments (1)

• ‘We need more military R&D to develop technologies to keep us secure’
  a. Current size of military R&D is huge (especially US)
  b. New military technologies lead to proliferation
    • through arms trade (legal/illegal)
  c. Trust-building measures are more effective at keeping the peace between nations
    • e.g. peace agreements, diplomacy, trade, cultural exchange
  d. Military R&D irrelevant for broader security issues
    • e.g. environmental hazards, disease, accidents
Countering pro-military arguments (2)

• ‘Military R&D provides important civilian benefits from spin-out technologies’
  a. Significant spin-outs generally happen when military R&D is large fraction of total R&D
     • i.e. civilian R&D is squeezed
  b. Far more cost-effective to fund R&D in area of concern, rather than wait for spin-out
  c. Benefits from military R&D spin-outs exaggerated
     • Often small role or dwarfed by spin-in from civilian sector
  d. Can be a route for proliferation

a. e.g. in USA currently, or in UK in post-war period.
b. Spin-out can happen from any sector to any other sector – there is nothing about military R&D which makes it special in this respect. Indeed, the innovation pathway from military to civilian technologies is generally costly.
c. For example, the military played a small role in the early development of the internet, but the vast majority of the subsequent development occurred in civilian sector, from which the military now benefits greatly.
d. Nuclear power is obvious example.
A difficult area...

- Cutting military R&D to zero
  - Much more difficult to make a case for unilateral cut to zero
  - Needs to be part of change in national security strategy
  - Would be greatly helped by more progress on international peace treaties
  - Some military R&D needed for disarmament monitoring and verification
Alternative security strategies

• Governments could (and should) move away from aggressive military/ foreign policies, for example:
  – Non-Offensive Defence
  – Sustainable Security
• R&D should support this
  – 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)
Potential campaign targets

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

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

3. A ban on R&D which is aimed at supporting war-fighting capability from universities
   – e.g. peace clauses
SGR activities
SGR publications

- ‘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

Listed in references
Other SGR activities

• Numerous lectures and workshops for students, academics and campaigners

• Work with campaign groups, e.g.
  – Campaign Against Arms Trade
  – Campaign for Nuclear Disarmament

• Media work
  – Open letters to policy-makers

• Web
  – Publicise our reports and activities via our website
BBC News online (2010)
References (p1)


References (p2)

http://www.iea.org/Textbase/stats/rd.asp

http://www.sgr.org.uk/publications/soldiers-laboratory

http://www.sgr.org.uk/publications/more-soldiers-laboratory

http://www.sgr.org.uk/publications/behind-closed-doors


References (p3)


