



Behind Closed Doors

Military influence,
commercial pressures and
the compromised university

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SGR

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and technology*

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Executive Summary

Military sector involvement with universities in the UK is growing. Two factors are especially significant in contributing to this trend. The first is the increasing dependence on high-technology, weapons-based approaches for dealing with complex security threats, not least as part of the so-called 'War on Terror'. The second is the growing commercialisation of universities, which is encouraging them to work more closely with large corporations. In previous reports, SGR has highlighted major concerns related to the growing military-university links, including the way in which they can contribute to the marginalisation of alternative approaches to dealing with security problems. In this study, we investigate in more depth how military and related commercial involvement affects universities, based on new data gathered using the Freedom of Information Act, interviews with senior staff at universities and other sources.

Our findings reveal much higher levels of military involvement – both corporate and government – than officially acknowledged, a disturbing lack of openness and accountability on the part of universities and other institutions, and serious concern about bias in research agendas. Questions are also raised by our investigation about the value for money of public expenditure in this area.

In more detail, our findings are:

- Military involvement in and funding of research, teaching and training at UK universities is much more prevalent than generally acknowledged:
 - Financial data collected in this study indicates that official figures for military involvement at universities underestimate the extent considerably, possibly by as much as five times. It is also important to remember that funding is only part of the influence exerted by the military within academia.
 - Data indicates that a very high proportion of the over 100 universities in the UK receive military funding. For example, 42 out of 43 UK universities investigated in this and three previous studies have been found to receive funding to pursue military objectives (data on the other university was inconclusive).
 - The military sector especially targets high-prestige universities and departments of engineering and physical sciences for funding – with the potential to limit the availability of skilled staff for work in alternative civilian areas. Indeed, lucrative contracts from this highly profitable sector can be very appealing to researchers on tight budgets.
- Universities present themselves as open, accountable institutions yet, when challenged during this study, they fell well short in many respects as follows:

- Detailed, comprehensive data on military involvement in universities is very difficult to obtain due to a combination of incomplete record keeping, commercial restrictions, pressures on researchers and, most disturbingly, evasiveness on the part of officials.
- Senior university officials, corporations and researchers are reluctant to discuss details of their activities related to military involvement within universities despite these institutions receiving significant public funding or co-funding.
- There is considerable disquiet among non-military-funded staff in universities about growing military involvement. One main concern is related to general worries about the power of vested interests – especially large corporations – in influencing the research agenda and making it more 'conformist'. Another concern is that high-technology, weapons-based approaches to dealing with security threats or other global problems are unduly given priority over, for example, political, diplomatic or other non-technological approaches. Funding and other pressures mean that these staff members often do not express their concerns openly.
- There is some limited evidence to suggest that the quality of research publications may not be as high in military-funded work as in the non-military areas.

We also make a number of important recommendations especially to universities, researchers and government. In general, universities need to remember that they are publicly-funded institutions and therefore need to be more accountable. University managers should be open and transparent about the funding that their university receives and be responsive to legitimate scrutiny. They need to ensure that Freedom of Information requests are properly dealt with and that the legislation is understood and acted on. In addition, there needs to be much greater acceptance on the part of senior academics and university managers that military involvement on campus is an area of serious ethical concern among other members of staff, students, and the wider community – and that there consequently needs to be a much wider debate on this issue.

We also urge professional and policy circles to give greater recognition to the fact that there are viable and effective alternatives to the dominant high technology, weapons-based approach to security problems. Finally, we recommend diverting a large fraction of the financial and other resources currently allocated to military budgets to expand work on these alternatives.

1. Introduction

Science, engineering and technology (SET) have for many years played pivotal roles in providing the expertise necessary for the research and development (R&D) of weapons and their support infrastructure¹. A significant proportion of military budgets in industrialised nations is given over to R&D of such systems and these high-technology means of waging war have come to dominate the security agenda. Military R&D increasingly involves expertise residing in the universities of countries like the USA and UK².

The complex relationship between the military sector and SET in the UK has been a focus of critical examination by Scientists for Global Responsibility (SGR) for over five years. In January 2005, we published *Soldiers in the Laboratory: Military Involvement in Science and Technology – and Some Alternatives* (known as the SITL report³), which described the developments in this field, including the universities, over the previous 15 years. It traced how the military sector – involving both government and corporations – has considerable influence over SET in the UK. It also pointed out how the growing commercialisation of universities can lead to an increase in this influence.

An update to the SITL report – entitled *More Soldiers in the Laboratory* (MSITL⁴) – was published in summer 2007. This described a range of major developments since the original report, including new programmes which form part of the UK Defence Technology Strategy of 2006.

The SGR publications have since been complemented by a report by Tim Street and Martha Beale, published in late 2007, called *Study War No More* (SWNM⁵). This focused particularly on the academic sector, documenting recent military projects in 26 leading UK universities.

In this report, we build on these previous analyses by using case studies to investigate in more detail whether a military presence within universities increases problems such as secrecy, and/or diverts the research and teaching agendas away from key civilian work (both security-related and other areas). In particular, we examine a number of questions, including:

- On an increasingly commercialised campus how does the military presence – both corporate and governmental - within teaching, research and funding affect important attributes of the university, such as openness and independence?
- Where significant funding for military objectives is attracted by specific research groups, how does this impact on staff and students within the same university department? Is the direction of research affected?

- How does military-sector funding and involvement affect research output, such as the publication of academic papers?
- Is there evidence to suggest that military involvement at universities is greater than officially acknowledged?
- More broadly, how do senior academics, such as Vice-Chancellors, see the role of universities in the modern world? Are they concerned about the impact of the increasing commercial and military influence at their university? Are they even willing to discuss these issues?

In investigating how military funding and related corporate involvement affect research and teaching, we looked at 16 universities in the UK. Some were selected for their high levels of military involvement but for others we lacked detailed information about their levels of military support. We used a combination of questionnaires, Freedom of Information (FoI) Act requests, web-based research and other methods to gather data.

The report is structured as follows. Section 2 provides background information to the study, summarising recent developments in policy and programmes relating to military involvement at universities. Section 3 summarises the data gathered and its analysis. While we were only able to obtain limited data, there are clear indications from the work that openness and independence are being adversely affected by the military presence on campus. Indeed the major obstacles that we had to overcome in order to obtain the material are, in themselves, important indications of the secrecy that we encountered. Also in this section we summarise the financial data on military involvement that we have obtained for our case study universities. Section 4 gives the conclusions and recommendations for reform.

2. Background – the changing role of the university

Universities have fulfilled a number of traditional and valuable roles in the societies in which they exist – including education both for intellectual and professional development and also independent investigation of the world around us. These two roles – education and research – have made major contributions to society’s wellbeing, resulting in universities world-wide containing vast sources of expertise in the sciences, engineering and arts⁶. However, serious questions are increasingly being asked about whether the traditional ideals of academia – such as objectivity and critical debate – are being compromised by recent major changes in the ways universities are operated and funded⁷. The editor of the influential journal *Times Higher Education* recently wrote that “All universities have a duty to extend and diffuse knowledge, so teaching and research are essential, but to what degree? Both rely on a third requirement – freedom of thought and expression – and most would concede a fourth, to foster inquiring minds that can do more than merely acquire skills.”⁸ We examine later the extent to which these duties have been compromised.

Universities play a pivotal role in science and technology – training practitioners and providing the structure for research to be undertaken. Universities therefore occupy the foreground in the developments that these disciplines throw up. There have always been controversies and contention in how people relate to science and technology, and how the process of science reflects the various, sometimes hidden, agendas that drive R&D programmes. SGR has long been concerned about the potential for narrow, vested interests to strongly influence the R&D agenda. Our SITL and MSITL reports described how military sources of funding tend to import a variety of values, many of which are counter to those which traditionally define the university⁹. However, many areas of ‘defence’ research, especially in electronics and aerospace, are seen by scientists and engineers as being of ‘high’ prestige and good for departmental income. But, as we see later in this report, there are examples where other important, if not such high-technology and therefore less prestigious, areas cannot develop and thrive in an environment that is dominated by the ‘high-prestige’ research.

2.1 Growing commercial and military pressures

Over the past twenty years, academic scientists have been increasingly working within a very commercialised setting, one which can all too easily place constraints on the traditional role

of universities¹⁰. Economic globalisation is, in large measure, responsible for such a change, especially in driving the search for cheaper ways of undertaking R&D, which themselves alter both the nature and direction of the globalised economy. This is reflected too in how subjects are taught and researched in universities in the UK and other industrialised countries, a trend derived from the USA¹¹.

Meanwhile, global military spending has increased each year over the past five years, driven by the so-called ‘War on Terror’. The global budget now amounts to a massive \$1.2 trillion¹². The United States is the major spender on arms and the associated R&D. The UK, however, is the second largest global military spender. In 2007/08 the planned ‘defence’ budget was expected to be around £33.4 billion¹³. Worldwide the UK spends the third largest amount on military R&D (around £2.5 billion net expenditure for R&D activity by the Ministry of Defence for 2005/06¹⁴, approximately 30 % of all government spending on R&D). The UK is also currently the second biggest arms exporter^{15,16}.

Not only has the ‘War on Terror’ fuelled the relentless increase in the global military burden, it has also contributed to a variety of changes in the ways in which security is framed by policymakers – many of them very controversial. One key aspect has been the growing emphasis on high-technology, weapons-based approaches to tackling security problems¹⁷. This obviously has a very significant effect on the science and technology communities because of the greatly increased spending on a whole range of security-related R&D and technology programmes, from weapons systems to surveillance. In 2006, governments in the richer, industrialised nations spent a total of \$96 billion on military R&D, but only \$56 billion on R&D related to health and environmental protection¹⁸. Renewable energy R&D only attracted \$1.1 billion¹⁹.

Military R&D spending has also had a marked influence in many other areas, such as the biosciences, information technology and data handling. Here questions about the potential security risks engendered by the research process and its outcome are coming to the foreground²⁰.

There are some signs of a change of thinking, with the UK’s new *National Security Strategy*²¹ (published in March 2008) showing some concession to the view that security requires a far more complex and nuanced approach than simple power projection. For instance, it points out that the UK should ‘monitor the effects of our actions, and more systematically learn the lessons of our

Table 1. UK university-military partnerships

University-military partnership ¹	UK Funding source			
	Military corporations	Ministry of Defence	Other government departments	Research Council
Defence Technology Centre (DTC)	✓	✓	-	-
Defence Aerospace Research Partnership (DARP)	✓	✓	✓	✓
FLAVIR ²	✓	-	-	✓
Towers of Excellence	✓	✓	-	-
Joint Grants Scheme	-	✓	-	✓
University Technology Centre (UTC)	✓	-	-	-
Other university collaborations with the military sector ³	✓	-	✓	-

1. All the partnerships involve university research groups which receive funding from non-military sources too. These include the research councils and the government support mechanisms for research and teaching.

2. FLAVIR is a collaborative programme between BAE Systems and EPSRC to the tune of over £6 million for unmanned airborne vehicles and involves ten UK universities including Cranfield, Cambridge and Imperial College London.

3. This form of partnership includes joint military and non-military funding of Centres, research programmes or training within universities. They can be of short duration or longer.

experience in recent years in the Balkans, Iraq, Afghanistan, the Middle East, Africa and elsewhere²². Disturbingly, though, the Strategy still continues the Ministry of Defence framework that stresses the need to depend upon high-technology equipment and, for example, US 'missile defence' platforms in Europe²³.

2.2 Recent changes in UK universities

No university in the industrialised world has escaped these various pressures. In the UK there has been an array of government and business incentives for universities to take on many commercially oriented roles in society. Since 2002 a number of military-university partnerships have also been put in place in the UK. These comprise research groups in universities, together with support from the publicly-funded research councils, commercial partners (including large military corporations) and government departments such as the Ministry of Defence. The partners provide both funding and expertise. These collaborative programmes are described in detail in SITL report and are summarised in Table 1.

The UK government's *Defence Technology Strategy* of 2006, produced with significant business input, has identified a number of areas that, it is felt, call for further university expertise in order to assist the development of military objectives. One should be clear that although the actual spending on military R&D in universities by government is relatively small this may well change with the implementation of the *Defence Technology Strategy*. Furthermore, military influence within universities comprises not simply the funds that are spent on projects but also the leverage this gives to the military sector for influencing the direction and governance of research, teaching and training.

The various partnerships tabled above basically involve corporations and government departments (providing both financial support and staff) together with funding from one of the research councils, or from corporate sources on an ad hoc basis. One should recall too that universities are also participating in a variety of research and development projects and collaborations with other large conglomerates in biopharmaceuticals, communications and transport. Commercial interests also demand that universities produce employable members of the

workforce in these specific areas, often through business-focused training and degree programmes.

At the same time as security and commercialisation have become major themes in education and research, scientists and technologists have suffered from a crisis in public trust which has arisen over such disparate concerns as MMR vaccination, genetically-modified food and nuclear power. Some unease has been articulated in both the lay and professional press over the commercial funding of research and the scope for bias and reduction in transparency. Concerns have been especially directed at tobacco, oil, biotechnology and pharmaceutical companies' funding of university-based research. A number of disclosures in the UK and USA concerning the power of large multinationals to shape and control the openness, reliability of data and the balance of such research have added to this unease²⁴. Rather less, however, has been written about the potential for such conflict of interest, bias, secrecy and the erosion of traditional aspects of universities by the funding and involvement of the 'defence', aerospace and related sectors in university R&D.

Prompted by this gap, SGR began a new research programme investigating the effect of military involvement on science and technology, especially in the UK. The SITL report – published in 2005 – described the many different areas in which the military sector (both corporate and government) are involved within the universities and the broader science and engineering community, and the potential impacts that this may have for these communities and for society as a whole²⁵. Following rapid developments in this area, we published an update – the MSITL report – in summer 2007. A further report, *Study War No More* (SWNM) published jointly by the Fellowship of Reconciliation and Campaign Against Arms Trade in December 2007, provided more detail of the military involvement in UK universities. The authors looked at 26 UK universities during the period 2001 to 2006 and described the military-related research carried out under contracts worth at least £725 million in sponsorship for military objectives over these six years.

This latest report explores in more depth some of the issues covered by the SITL, MSITL and SWNM reports. Most especially, we examine what the local effects are of military involvement with universities – including the potential to shape research and teaching programmes – and how participants see their roles and their academic freedom. We also describe the experiences that we had of trying to obtain further information concerning the impact of the military sector presence in a number of UK universities, including those known to attract large sums from private and government sources to pursue research with military objectives.

2.3 Further commercial pressures on UK universities

The UK government has provided a number of recent incentives for developing further close ties between universities and the business community – ties which military corporations are well-placed to exploit. The history and a critique of this process have been described in the SITL and MSITL reports and elsewhere. Universities in the UK are increasingly being pressured into having a largely economic set of objectives, aided and abetted by a number of government directives, not least the current ten-year *Science and Innovation Investment Framework*²⁶ launched in 2004. Furthermore, the main beneficiaries of this approach are often the larger, established corporations. Ruth Kelly, then Secretary of State for Education, pointed out in a letter of direction to the Higher Education Funding Council for England, sent in January 2006, that she considered that the provision of higher education should be “partly or wholly designed, funded and provided by employers”²⁷. This impetus continues to be maintained.

Let us look at some of the more recent of these government directives in order to see the kinds of expectations that are placed upon universities in the UK, including even the most research intensive and prestigious ones. Three recent reviews have especially set the scene for strengthened business-university collaboration. The first was the *Lambert Review of Business-University Collaboration* which issued its final report to HM Treasury in December 2003²⁸. The report was openly written from a predominantly business perspective and its view of universities was clear: the university sector was fundamentally about ensuring economic growth in the UK. Among the many recommendations about R&D, the following indicate how business values the uniqueness of universities:

- ...an enhanced role for the development agencies in facilitating business-university links. [Recommendation 2.3]
- Universities UK and the Standing Conference of Principals should establish a list of academics with relevant qualifications who are interested in becoming non-executive directors on company boards, and should arrange training for them in this role [Recommendation 3.1]
- ...third stream funding should be allocated for three years on the basis of universities' business plans for their third stream activities [Recommendation 3.7]
- Excellent research undertaken with industry or other users should be recognised as being of equal value to excellent academic research [Recommendation 6.1]
- The Government should create a significant new stream of business-relevant research funding which would be available to support university departments that can demonstrate strong support from business [Recommendation 6.2]

These and a series of other recommendations in the review strengthen business involvement with universities and contain elements that can potentially assist in the creation of approaches and products that are socially and environmentally useful. However, there are significant concerns about who would benefit from these changes and how they fit in with the already existing university partnerships with large and powerful corporations, including those from the 'defence' and aerospace sector. The pursuit of independent and objective scholarship seems to fade into the background in the Lambert Review. These concerns are discussed later.

Secondly, the *Leitch Review for HM Treasury* was published in December 2006²⁹. This review's main focus was on skills in the UK workforce and the ways in which various skills shortfalls might be remedied. As in previous reviews on the topic of training and education, the Leitch Review stressed the need for the UK's economic position to be greatly strengthened, with very little talk of personal satisfaction or intellectual wellbeing being components of education. The needs of business were in the foreground. The review added, in its major recommendations, that there was an urgent need for "strengthening the employer voice" and that this would be needed across the spectrum of skills development, including that provided by the universities.

The *Sainsbury Review for HM Treasury* was published in October 2007. It examined the role of science and technology and the innovation process in further strengthening the UK economy³⁰. Interestingly, Sainsbury and his team met with a variety of organisations, including the military corporations and the US Departments of Defense and Energy, and took submissions for consideration from such corporate interests as Rolls Royce, QinetiQ and BAE Systems. There were very few submissions from those with a more nuanced view of innovation or the role of universities today. The review again saw the role of universities as central to economic success and pointed to knowledge transfer from the university sector and the growth of spin-outs as being healthy signs of such a role.

In terms of commercial partnerships, two aspects of the review are worthy of further examination. Firstly, the authors of the review described a new role for the existing Technology Strategy Board, to work with various funders, including the Regional Development Agencies, to simplify access to R&D funds for business. This would undoubtedly include business-university partnerships. Secondly, to increase knowledge transfer, the review suggested that more support should be given to the Higher Education Innovation Fund to assist the so-called business-facing universities. At the time of writing, the Department for Innovation, Universities and Skills was preparing a science and innovation strategy containing an implementation plan for taking forward the Sainsbury Review recommendations.

The Sainsbury Review also recommended that the research councils be expected to stress the potential business value of their research funding portfolio, making it clear to researchers that an essential part of such funding was that results should be exploitable and income generating. The Technology Strategy Board in September 2007 became a free-standing body disconnected from the former Department of Trade and Industry (DTI), and its goal seen as the stimulation of knowledge transfer and to help business make wise investments in technology. Furthermore, the creation of the Science and Technology Facilities Council (STFC) in April 2007 from a merger of the former Council for the Central Laboratory of the Research Councils and the Particle Physics and Astronomy Research Council saw technology transfer become a major activity of a funding council. The STFC website states that one of its roles is to:

'encourage researchers to create new businesses based on their discoveries and [we] help established companies to use the fruits of [our] research as the basis of new or improved products and services'³¹.

It is thus clear that universities are seen through the eyes of government and business to be fundamental to the growth of UK business and its objectives. The UK government sees the development of weapons and their infrastructure as part and parcel of such a growth economy and, as was pointed out in the SITL, MSITL and SWNM reports, the universities play an essential role here too. This is, of course, compatible with a world where globalisation has provided a global marketplace for skills and R&D. However, one factor that is given far too little emphasis in such discussions is that there is much expertise within universities that can help tackle urgent social and environmental problems – from global poverty to climate change – but this expertise is often not prioritised because it either does not contribute directly to economic growth or is less economically attractive than other research. Indeed, in some areas that do have large potential economic benefits, e.g. cleaner energy technologies, there are still many obstacles.

Furthermore, there are intangible assets located in universities, which are a hallmark of advanced democracies – not least the way they act as centres of independent thought and expertise. Such roles are vital to us all. Universities teach many skills, not just those that are of benefit to potential employers. In the rush for ever more unsustainable growth these values tend to be forgotten.

3. The military influence on UK universities – data and analysis

How do the universities themselves see their identity when government expects them to take on the many more commercially-focused roles as described Section 2? Additionally, the military sector (corporate and government) are increasingly involved with not only university R&D, but also training and teaching of students within universities. Once again, there is very little research data about how such activities might influence openness, freedom to publish, teaching, the exchange of ideas and personnel, and how business-centred departments handle ethical issues thrown up in the research process. We therefore planned to obtain preliminary data in this area to trace some of the changes occurring in universities in the last decade to produce a more commercialised environment.

We chose 16 universities in the UK to gather information on how the culture of research, training and teaching might be influenced by the presence or absence of military involvement, together with relevant factors such as commercial ethos. We used both

individual contact and data collected from open-access sources like websites, press releases and annual reports. Nine of the universities examined were known to attract significant military funding, for example, one or more of the consortia described in Table 1. The other seven were selected at random from the remainder of the academic sector. The universities selected are given in Table 2.

Four main data collection stages were undertaken with these case study universities, although limited resources meant that not all data collection stages were applied to every university (see Table 2). Firstly, contacts were made with the Vice Chancellors and their offices in order to provide us with an overview of what they saw as the future direction and role of their university. Secondly, individual contacts were made with researchers supported by military funds, chosen on the basis of the research that they undertook and other information obtained from university websites. Thirdly, researchers without military funding

Table 2. Case study universities and the data collection methods used for each

University	Vice Chancellors approached	Military-funded staff contacted	Non-military funded staff contacted	Fol Act request
Birkbeck College, London	✓	-	✓	✓
Bournemouth	✓	-	✓	✓
<i>Bristol</i>	✓	✓	✓	✓
<i>Cambridge*</i>	✓	-	✓	✓
<i>Edinburgh</i>	✓	✓	✓	✓
Exeter	-	✓	-	✓
<i>Imperial College, London</i>	-	✓	✓	✓
<i>Leeds</i>	✓	✓	-	-
Leeds Metropolitan	✓	-	✓	✓
Newcastle	-	-	✓	✓
<i>Oxford*</i>	-	✓	-	✓
Plymouth	✓	-	✓	✓
<i>Sheffield</i>	✓	✓	-	-
<i>Southampton</i>	✓	✓	✓	✓
<i>University College, London</i>	-	✓	✓	✓
West of England	-	-	✓	✓

Universities in ***bold and italic letters*** are those known, prior to this study, to attract significant funds from military sources. For the other universities listed, we had little or no information on them as to their military funding for research or teaching.

* indicates those universities contacted using the Freedom of Information (Fol) Act in both 2006 and 2007.

were contacted – this group did not exclude those who receive other kinds of commercial funding. Both of these groups were asked to participate and to respond to a short set of questions. Lastly, we asked a number of questions, through the Freedom of Information (FoI) Act, of a group of 14 of the 16 universities chosen in order to obtain details of military funding for the period 1st January 2005 to 31st December 2006, the destination of such funds and the resultant research output. We also wished to know what posts, if any, were directly funded by the military sector (see sections 3.2 and 3.3).

3.1 Vice Chancellors and university policies

The universities approached and the people contacted are listed in Table 2. A copy of the Vice Chancellor (VC) questionnaires is in Appendix A. Each VC was approached firstly via their office by telephone and the nature of the request detailed. An e-mail was then sent to the VC's personal assistant to be forwarded to the VC. The message described the nature of the project and the questions (see Appendix B) being asked. It was made clear that either e-mail or telephone responses were acceptable and if the VC was unable to respond, then we would appreciate the name of someone appropriately senior to whom we might go for responses.

In all cases the initial response to our telephone call was favourable and in some cases the office suggested sending the request and questions directly to the VC. The VCs were given two or three weeks to respond and in the event of no response chaser e-mails were sent.

Of the sixteen universities none of the VCs approached accepted our invitation to describe the vision that their university had of the challenges and opportunities that they faced in a commercialised environment. There were five direct refusals to participate, the reasons given included being “too busy” and that the VC did “not wish to participate in this questionnaire process”. There were only two situations where the name of another senior academic was provided, who would respond in a “personal capacity” only. The remainder of the VCs simply did not respond even after several chasers were sent.

This outcome is noteworthy for a number of reasons. Firstly, all the universities approached had websites which carry various kinds of ‘mission statements’, most of which stressed the economic importance of the university, but also carried details of the university's corporate responsibility, as well as its recognition of the need for openness. For instance, the University of Plymouth website³² states that its values include:

- **Scholarship**
- **Capability**
- **Community**
- **Accessibility**

- **Effectiveness**
- **Quality**

Adding:

Scholarship

The University is committed to the discovery, transmission, dissemination and application of knowledge and good practice in an environment which fully supports the freedom of intellectual inquiry, of creativity, and of professional development.

Community

The University is committed to the well-being of its staff and students, and to the personal and professional development in a culture of trust and equality of opportunity. As a community, we will

- *be responsive to the needs and aspirations of others*
- *demonstrate a sense of social responsibility*
- *work collaboratively with others in our region and beyond.*

It is difficult to therefore explain why the University's VC did not respond to questions about his vision of its role and its future and how he considers the various facets of funding and unbiased enquiry. When challenged³³ about why he did not respond to our enquiries given the statements appearing on the university's website Plymouth's acting VC, Professor Newstead, simply ignored our request.

Similarly Leeds Metropolitan VC Professor Simon Lee in his Inaugural Address in November 2003, available on the University's website³⁴, makes great play of openness by saying:

“Leeds Metropolitan University needs to be out in the wider community, promoting change in ourselves as well as in partner institutions, opening ourselves up to new scrutiny and new influences”.

This again sits uneasily with how our simple request was repeatedly ignored³⁵, despite several reminders, without any reasons being given. The Director of University Research at Leeds Metropolitan, Professor Sheila Scraton was also approached and she too felt unable to provide the University's vision for its future and how it might respond to issues of funding and the ethical challenges implicit in certain kinds of funding source.

Southampton University, which attracts significant military sector support, claims, in its mission statement, available on its website³⁶, that its objectives include:

- **The advancement of knowledge**
through critical and independent scholarship and research of international significance
- **The communication of knowledge**
in an active learning environment involving staff at the forefront of their disciplines

- **The application of knowledge**
for the benefit of society, both directly and by collaboration with other organisations.

However, Southampton University's VC simply ignored all requests for his input to our questionnaire³⁷. It would thus appear that Scientists for Global Responsibility is not one of the organisations that the University feels the need to collaborate with. Other senior members of the University explained how busy they were with a variety of commercial as well as academic duties and were therefore "unable to respond to unsolicited e-mails".

Despite it being made clear at the time of the initial approach and in chaser messages, no VC's office provided the name of another senior member of the university prepared to give an 'official' view from the perspective of the university's overall policy or governance.

The University of Bournemouth in its Corporate Plan which we were sent in place of a response from the VC, Professor Paul Curren, certainly sees itself as a 'business-facing' university. The Plan talks at great length about financial indicators, employability of graduates and interactions with the business community. The Plan does not reflect (as it is not intended to do) on questions of academic freedom, research funding and any possible pressures on research stemming from funding sources. Such a Plan therefore does not stand in for the views of Professor Curren on what he sees as the potential challenges identified in our questions, and how this 'new' university might respond to such challenges.

There are similar contrasts between the goals of the other universities approached, as elaborated on their websites, and our experience in seeking information, either through the Fol Act (see section 3.2) or through direct contact with staff members, including VCs. One is therefore led to the conclusion that such mission statements are simply marketing devices and that they can be selectively interpreted by senior staff. The concerns that we raised in the SITL report and reiterated in the MSITL report about the commercialised university being averse to openness and influenced by business objectives like secrecy and confidentiality is supported by this later experience.

A number of the senior members at the universities approached voiced varying degrees of concern about commercialisation and how overwhelmed many feel with the number of calls on their time. Additionally, in our conversations with academics, many felt that questions about military funding closed the door to any discussions with us, as the subject was seen to be far too difficult to discuss 'publicly'. It was, however, pointed out to these contacts that this information had already been obtained through the Fol Act as described below.

One senior researcher felt that military funding raised a whole series of questions about transparency and that these were being ignored at her university³⁸. Another felt that at his university there were many that saw military funding as being at variance with the university's desire for an open and more holistic approach to research and teaching³⁹. Others felt that funders would not be happy with their recipient universities making it clear that funds were accepted from such sources. In any event, the outcome from this phase of the project is worrying for claims that universities are open institutions willing to engage with others in the academic and wider communities.

3.2 Freedom of Information (Fol) Act requests: military funding

As discussed earlier, we approached 14 of our 16 case study universities for information on the funding they received from the military sector, using the new UK Fol Act. In addition to asking for information on funding from the Ministry of Defence and its research institute, the Defence Science and Technology Laboratory (DSTL), we also asked for information on seven of the largest corporations known to develop military technology and provide funding to UK universities – these were BAE Systems, Boeing, GKN, General Dynamics, Lockheed Martin, QinetiQ and Rolls Royce.

As discussed in the SWNM report⁴⁰, because such corporations also develop some products for the civilian sector, it can be difficult to connect all the funding they provide to universities unambiguously to military objectives. However, we agree with the argument in that report that, if a corporation ranks highly in both total worldwide military sales and in the proportion of its income from military sales (as all the ones considered in this report do), then it is likely that its university-based R&D will be used for at least some military applications. In addition, there is other university R&D, mainly directed towards goals of a civilian nature, which also contributes to the development of military products – known as 'spin-in'. Such civilian R&D is not included in our analysis. Indeed, 'spin-in' tends to be greater than 'spin-out' from the military sector, and thus our figures for military funding are arguably underestimates^{40,41}.

We also used the Fol Act to seek detailed data directly from the DSTL itself about its own funding of R&D and that of the Ministry of Defence (the DSTL handles requests on behalf of the Ministry of Defence). We also approached the Home Office, which is increasingly involved in aspects of 'security' including the funding of research in university departments in the UK. This research, which is mainly concerned with terrorism, was not covered in our previous reports (see Table 4).

The military funders we requested information about are detailed in Table 3, and the total amounts of funding for each university given in Table 4. It should be noted that data is only given for 13 universities as we were not able to obtain fully comprehensive and reliable data from the Leeds Metropolitan University (see Table 4, note 6).

We also contacted the Office of Naval Research (ONR) and Defense Advanced Research Projects Agency (DARPA), both in the USA, for details of the funding and projects that they offer to UK researchers. Neither of these US-based organisations responded to our repeated contacts. We have found a minimum of detail on the funding offered to UK universities by the US Department of Defense and disbursed offices such as the ONR and DARPA through websites and personal contacts with US-based organisations like the American Association for the Advancement of Science and the Federation of American

Scientists. These various sources indicated that the Department of Defense provided around £30 million in 2004 to UK university research groups⁴³.

Using the figures obtained from Fol Act enquiries for the 13 universities in our sample, and including the figures above for sums from the US Department of Defense but not the figure for 'security' research funds from the UK Home Office, gives an approximate average for the annual military funding per university in region of £2.1 million. This is similar to that derived from the 26 universities in the SWNM report – roughly £2.2 million⁴⁴ – although there are some differences in the funding sources considered in the two studies. For example, the SWNM report did not include detailed data from the US Department of Defense and US military corporations, but did include co-funding for military projects from the Engineering and Physical Sciences

Table 3. Sources of military funding in case study universities

University	BAE Systems	Boeing	GKN	Lockheed Martin	General Dynamics	QinetiQ	Rolls Royce inc. UTCs funding	DSTL & MoD	Former DTI
Birkbeck College, London	-	-	-	-	-	-	-	✓	✓
Bournemouth	-	-	-	-	-	✓	-	✓	✓*
Bristol	✓	-	-	-	✓	-	✓	✓	✓
Cambridge+	✓	✓	✓	-	✓	✓	✓	✓	✓
Edinburgh	✓	-	-	-	-	✓	-	✓	✓
Exeter	✓	✓	✓	✓	✓	✓	✓	✓	✓
Imperial College, London+	✓	-	✓	-	✓	✓	✓	✓	✓
Leeds Metropolitan	?	?	?	?	?	?	?	?	?
Newcastle	✓	-	-	-	-	✓	✓	✓	✓
Oxford+	✓	-	-	-	-	✓	✓	✓	✓
Plymouth ++	-	-	-	-	-	-	-	✓	✓
Southampton	✓	✓	▲	▲	✓	✓	✓	✓	✓
University College, London	✓	-	-	-	-	✓	✓	✓	✓
West of England+	✓	-	✓	✓	✓	✓	✓	✓	✓

The information was elicited from approaches made using the Fol Act.

- indicates that no funding from this source at the named university was received in the period covered

✓ indicates funds received from this source for 2005/06

✓* Bournemouth in the period 2005/06 received funds from the former DTI through its Knowledge Transfer Partnerships.

+ these universities were approached in 2006 and 2007 – the table shows for these universities data obtained for **both** years

++ data for Plymouth were provided for the period 2004/05

▲ indicates that we were not provided with this information.

The information on funding from the former DTI (now Department for Innovation, Universities and Skills) is provided by the universities contacted and will cover funding for research of both civil and military utility as well as sums which form part of co-funding with other bodies like the research councils or corporate partners and are provided as part of the various consortia (see Table 1).

Table 4. Figures for military funding of case study universities – 2005/06

University	Total military sector funding ¹	Patents from this funding	Percentage funding for:		Home Office security funding
			Teaching	Research	
Birkbeck College, London	£121,207	None	0%	100%	None
Bournemouth	£43,937	None	100%	0%	None
Bristol ²	Government £2,242,976 Corporate £1,218,547	None None	▲ ▲	▲ ▲	None
Cambridge ³	Government £1,941,066 Corporate £2,852,331	▲ ▲	▲ ▲	▲ ▲	£499,625
Edinburgh	Government £1.37 million Corporate £637,175	▲ ▲	▲ ▲	▲ ▲	None
Exeter ⁴	Government £99,084 Corporate £57,945	▲ ▲	12% 0%	88% 100%	None
Imperial College, London ⁵	Government £1.83 million Corporate £2.6 million	None ▲	▲ ▲	▲ ▲	None
Leeds Metropolitan ⁶	?	?	?	?	?
Newcastle	Government £819,321 Corporate £227,950	▲ None	▲ ▲	▲ ▲	£381,493
Oxford ⁷	Government £1.6 million Corporate £1.42 million	▲ ▲	▲ ▲	▲ ▲	None
Plymouth ⁸	Government £214,310	None	▲	▲	£125,576
Southampton ⁹	Government £1.8 million Corporate £851,000	None ▲	▲ ▲	▲ ▲	£302,000
University College, London ¹⁰	Government £12,900 Corporate £459,081	▲ ▲	▲ ▲	▲ ▲	£281,456
West of England ⁸	Government £173,355 Corporate £864,370	None None	100% 42.5%	0% 57.5%	£690,842

Figures for military funding of case study universities – 2005/06

All the information in this table was collected using the Freedom of Information Act and covers the period 1st January 2005 to 31st December 2006 unless indicated in the notes below.

Some of the universities were prepared to separate research and teaching funding in their responses to the Fol Act requests (such as University of West of England) whereas others (like the University of Bristol) were not.

▲ indicates that we were not provided with the information.

- 1 The data in the table represents the funds received from government or corporate military sources for the case study universities. The private corporations included BAE Systems, Boeing, General Dynamics, GKN, Lockheed Martin, QinetiQ and Rolls Royce. Government sources cover only those in the UK, including Ministry of Defence, DSTL and the former DTI. Where data was supplied we have included projects receiving funds from the DTI which were possibly of military interest and excluded those outside this area – for example, we did not include funds for projects in biopharmaceuticals and flood prevention. Similarly we excluded research council funds from the table.
- 2 The University of Bristol received funds from Rolls Royce, BAE Systems and General Dynamics UK. The figure provided for government funds for military objectives includes £1.33 million from the former DTI which may well involve projects which have both civilian and military objectives.
- 3 The University of Cambridge data covers the 12 month period up to 31st July 2005. Corporate funding was received from Atomic Weapons Establishment, Filtronic, Thales and EADS in addition to the seven sources about which information was sought. Cambridge also received £913,420 additionally from US government military organisations, in this period.
- 4 The data for the University of Exeter government funding includes an undisclosed amount from the Foreign and Commonwealth Office.
- 5 Data obtained under the Fol Act for Imperial College London was aggregate data for the period 2003 to 2006. The amounts provided in the table above are therefore averages for this period and in the case of government figures exclude the former DTI and the DARPs scheme which may contain funds from other sources
- 6 The response from Leeds Metropolitan University is anomalous. The Fol Act person contacted at the University in May 2007, said that “the university does not hold the information [on corporate and government military funding] that you have requested. The response given is based upon enquiries that I have made with specific members of staff, in the relevant faculties, who have responsibilities for contract management”.
- 7 The figures for the military corporate funding at the University of Oxford include figures for several different sectors of Rolls Royce business and may include civil as well as military projects. The figures relate to the period August 2005 to July 2006.
- 8 The data provided for the University of Plymouth and the University of West of England are for the period 2004/05.
- 9 The information supplied by the University of Southampton originates from a publicly available source accessible from the University's website.⁴⁷ However, this source did not include information on the Ministry of Defence and DSTL which we had to seek using the Fol Act. The figures in the table are totaled from these sources. Government figures are for 2004/05 and do not include former DTI funding, while corporate figures are for the year ending 31st July 2006.
- 10 The data for government funding at the University College, London do not include that from DSTL or the former DTI.

Research Council (EPSRC). Hence it can be argued that both estimates are conservative for the sample of universities considered.

It is important to consider the implications of these figures for the national context. The most recent government figure for military funding of UK universities is £44 million in 2004⁴⁵, an average of under £400,000 per year for each of the 100 or so higher education institutions in the UK⁴⁶. This is less than one-fifth of the two estimates above. While both of these estimates are based on samples which include a significant fraction of universities receiving higher than average military funding, the discrepancy is nevertheless very disturbing. Indeed, the total annual figure for just the 26 universities investigated in the SWNM report (correcting for an unusually lucrative 22-year contract for Cranfield University) is over £58 million – this alone is higher than the government figure for the whole higher education sector. Our analysis leads us to ask whether government statistics in this area are as reliable as they should be.

Furthermore, the four reports which have investigated this sector (SITL, MSITL, SWNM and this one) have documented a total of 42

universities receiving military funding with one other case (Leeds Metropolitan) being uncertain (See Appendix D). We have yet to find an unambiguous case of a university not receiving military funding. This also contributes to the conclusion that military involvement in the UK university sector is far higher than officially admitted.

3.3 Fol Act requests: further interpretation

The Fol Act was used to request a variety of information that, it was hoped, would allow us to understand in more depth the experience of those being funded by military sources. This information would include: the effect of such funding on research output (especially publications and presentations); which departments attracted military support; and the range of funding from military sources which those universities about which we had no previous information might attract. One of the major problems that we encountered was the unevenness of response, that made comparison across the case study universities difficult. This problem was compounded by the fact that some universities provided aggregate figures for funding from both private and

Table 5. Projects jointly funded by the EPSRC and a military corporate partner, 2007

EPSRC contribution only	Corporate partner	Number of current projects
£59,242,425	Rolls Royce	104
£84,727,851	QinetiQ	121
£79,128,369	BAE Systems	96

These projects include a variety of funding arrangements, some of which we have previously described (i.e. Defence Aerospace Research Partnerships and the Joint Grant Scheme – see Table 1), but also those involving partnerships with military companies through project grants. The sums given refer only to those monies obtained from the EPSRC, the corporate partners will contribute in both financial and in-kind ways to the projects listed as current in 2007⁴⁸. There may be some duplication in the number of grants listed as some may involve more than one of the corporate partners.

public sources, whilst others broke the information down into individual funding sources. Many of those approached refused to provide detail of departmental destination of funding and any detail of publications or patents resulting from such funding. None of those approached provided details of teaching or research posts directly supported by military sources, some claiming exemption under the FoI Act.

Although these difficulties made simple comparisons across the universities approached impossible, we were able to discern several significant results by augmenting the information sent under the FoI Act with other sources of material such as annual reports and university websites.

Firstly, as previously noted in the MSITL report, material released under the FoI Act is often partial and one needs to be vigilant that all the questions asked are answered in their entirety – thus several university FoI Act offices ‘forgot’ to respond to all of the questions, and subsequent responses took a further statutory 20 working days. Accounts departments sometimes used different identifiers for the military-university consortia and added details outside the accounting period. In addition, some data that we were sent did not specify whether funds were for research or teaching or both.

It is worth noting that one university stood out in its openness about its funding. Cambridge University publishes full information on its sources of funding in the public domain – in the journal, *Cambridge Reporter*. Other universities would do well to follow their example.

The data gathered did reveal some significant information about the size of the military funding received by some of the more prestigious universities. As mentioned in the previous section, all the case study universities for which data was available received funding from military sources. In certain cases, the data available was more detailed and could be revealing (see table 4). For instance, Cambridge University in the 12 months up to 31st July 2005 received about 11% of its UK-origin industrial and commercial research funding from the aerospace and military sector; a further 15% of its overseas-origin research funding

came from military sources such as Boeing and the US Army and Navy. To place these figures into a broader context, Cambridge in this period received only 2.9% of its overseas-origin research funding from the petroleum industry with a mere 0.75% of its UK-industrial research funding from the petroleum industry. In this period Cambridge University received a total of £20.6 million from industrial and commercial sources and a further £11.1 million from non-UK sources for research.

Imperial College London received funding in 2003 to 2006 from military corporations like General Dynamics, Thales, QinetiQ and EADS, with General Dynamics providing the largest amount - £3.3 million in the period 2003-06.

Another result revealed by the data relates to a comparison between pre-1992 and post-1992 universities (the latter were formerly known as ‘polytechnics’). In the cases of some of the post-1992 universities (including those we approached), funding from both private and government military sources is targeted predominantly for training and teaching programmes catering to the business interests of the funder. For example, the University of Bournemouth received funds from military sources for degree courses (Bachelors and Masters) specifically for the funding-provider, but very little funding for research⁴⁹. Meanwhile, University College London (a pre-1992 university) received military funding for both degree courses geared towards the funder and also attracted much larger funds for research⁵⁰. Case study universities clearly have different strengths perceived by the military sector.

The data also revealed some interesting information related to research output. In some cases, we were provided with publication output from groups funded by the military but not from all those approached. But it is clear that some consortia make details of research output readily available. For instance the Electromagnetic Remote Sensing Defence Technology Centre (EMRS DTC) makes its annual conference presentations available on its website. The EMRS DTC website states:

‘These conference proceedings have been approved for release into the public domain through oral and written papers,

*presentation and web publishing. The work described in these proceedings has been funded jointly by UK MOD and the EMRS DTC consortium companies under UK MOD contract C/SEW/N03751. The EMRS DTC consortium consists of SELEX Sensors and Airborne Systems Ltd, Thales Defence (UK) Ltd, Filtronic Plc and Roke Manor Research Ltd. The ownership of all work rests with the originators.*⁵¹

Despite this open attitude to publishing research findings arising from the funding provided in this DTC, we are not able to say how open and under what specific pressures individual researchers within the EMRS DTC are under to publish or engage with others in the same area.

Another factor uncovered by the data relates to the quality of the research output. Although it needs further investigation in order to verify, the available data seems to indicate that some of the departmental researchers with military funding produce relatively more conference presentations than journal papers. Although impressionistic at present, this is important as conference presentations tend to be more speculative and are generally not 'peer-reviewed', whereas papers in academics journals have to undergo the scrutiny of independent reviewers (generally two) before being accepted for publication. Such practice is standard in academia as a key form of quality control.

An example from the data available to us is the case of one researcher who had funding from QinetiQ, General Dynamics and the Ministry of Defence. From 2005 to 2007 inclusive, he had produced eleven conference presentations and a single journal article⁵². In a similar department, a researcher of similar seniority who did not have military funding for these years, had three conference presentations and four journal papers and a chapter in a book published in the same period⁵³. The differences in the two situations may be related to commercial or security sensitivity of data, delays in obtaining clearance within the period of interest, the nature of the R&D process, or variations in publishing practices across universities. There are also a small number of conferences that do require presentations to be peer-reviewed. Hence further examination of the impact of the funder on publishing practices in this area would be useful.

3.4 Discussions with the commercial military partner

As described in our SITL and MSITL reports and the SWNM report, there are a range of programmes in the UK involving commercial and government partners together with one or several universities that undertake research programmes with 'defence' or security objectives (see Table 1). Large and influential corporations such as BAE Systems, Boeing, Rolls Royce and QinetiQ are the most active in forging such links through their own research and development laboratories, core

departmental programmes (such as the Rolls Royce University Technology Centres) or as partners in government funding initiatives such as the Defence Technology Centres, Towers of Excellence or the Defence Aerospace Research Partnerships. Table 3 details the corporate military funders examined in this study, where this was provided through the FoI Act for 14 of the case study universities.

There is very little information on the precise ways in which university-commercial partnerships function, especially concerning the research culture within which staff find themselves in military partnerships. In order to understand better the precise effect on how research and teaching are undertaken in those departments and research groups that attract funding from 'defence' and aerospace corporations, we approached private funders to attempt to find out more about the day-to-day reality of working with a business partner from the military sector. We sent a set of questions to BAE Systems and Rolls Royce (Appendix C) after locating the appropriate person to contact. Requests for information on university liaison were also made to QinetiQ. These approaches were not made through the FoI Act because commercial entities are not covered by the Act.

We sent eleven separate requests for information to BAE Systems, to senior members of the public relations and corporate affairs departments, as well as to the Head of the University Partnership Programme, John Murphy, at the BAE Systems research site at Filton near Bristol⁵⁴. At the time of writing no response has been received either to the initial letter seeking a response or to the detailed questions. Again this response, like that from contacts with the case study universities is at variance with the claims made on relevant websites. BAE Systems makes the following claims on its web pages:

"BAE Systems recognises its responsibilities to the people it employs, its customers and suppliers, its shareholders, the wider community and to the environment. We are a well-managed, responsible and ethical company and are determined to be widely recognised for our world-class technology, the skills of our people and the seriousness with which we take our corporate responsibilities.

*We are proud of the role we play as one of the leaders in the defence sector and as part of this we recognise our specific responsibility to understand the concerns of others. We aim through this website and our corporate reporting to provide information and demonstrate through our performance that BAE Systems is both a responsible corporate citizen and a responsible defence company.*⁵⁵

Leaving aside the plethora of issues concerning the sales by BAE Systems of arms to governments with dubious human and environmental records and its claim to be an "ethical company", it would seem that Scientists for Global Responsibility's questions about the nature of the university partnerships operated by BAE

Systems does not fall within the company's understanding of the "concerns of others" and they therefore felt under no obligation to engage with us and act as a "responsible defence company" in this respect. We were unable to find sufficient detail on websites or in published material about the working of the various extensive BAE Systems partnerships with universities to describe how they functioned and the research cultures which were in place.

QinetiQ, comprising staff from the former UK government defence laboratories, and now a corporation with a significant US market, has a well-developed network of various partnerships with UK and other universities (see the SITL and MSITL reports) formed over several years. The company was approached through a number of avenues, including its press office and website, to build up a picture of how it worked with UK universities to form research partnerships. Again, no response was forthcoming to repeated requests for information. However, QinetiQ states on its website that:

"We recognise that we need to be accountable for our environmental, social and ethical impacts if we are to claim to be managing the risks that define our reputation as a responsible business."⁵⁶

Such responsibility clearly is lacking when the company is asked for details about the nature of its substantial partnership programme with UK universities.

Rolls Royce operates University Technology Centres (UTCs) in the UK, Europe and the USA, as well as being involved in some of the other consortia described in Table 1. These UTCs are located, in the main, in engineering departments and involve not only R&D but also teaching and outreach activities. In order to understand the impact of such partnerships, contact was made with the company's press office. We were told that the Chief of University Research Liaison at the company, Eddie Williams, would be prepared to speak and respond to our questions about the partnerships that the company operated with UK universities, and in particular the UTCs. After more than two months of evasion and delay, Dr Williams coyly suggested⁵⁷ that the Press Office, which had provided his name, would in fact be the best place to find the answers sought. Eventually our questions were answered, but in a limited way (see Appendix C).

The company did not satisfactorily answer several of the questions. For instance, when asked about how the UTCs balanced concerns of academic freedom, dissent and free exchange of information with commercial imperatives, the response we obtained spoke of "local processes" and "constraints of commercially sensitive information". No details were provided about how the UTCs output was evaluated and the company refused to expand on their limited response. When asked about what training and teaching functions were built into UTCs the response spoke about "Universities build[ing] training programmes appropriate to their and our

needs". Again no further information could be elicited. Clearly we did receive some response from this company, unlike the others approached, but we were still unable to obtain sufficient detail on how universities interacted with such a powerful 'partner'.

BAE Systems, QinetiQ and Rolls Royce are partners with the EPSRC for a variety of research programmes (Table 5.), with both civilian and military objectives, and involving a wide range of research groups and large sums of money. We understand from EPSRC that intellectual property rights (IPR) and publication arrangements reside with the company acting with the research group involved. As we have not received information from BAE Systems and QinetiQ and only partial responses from Rolls Royce about the detail of these arrangements it is impossible to know what constraints and precise working relationships are in place with research groups to ensure freedom of enquiry, exchange of information and other aspects of research activities.

Let us put these corporate responses into context. The attitudes and responses, even those of Rolls Royce, indicate that those in the 'defence' and aerospace sector may make many claims on their websites about corporate responsibility, but when it comes to being open and honest about their relationships with the academic community, there is a yawning hole between what is claimed on the web page and the reality. The expertise in universities, which is such a common feature of military R&D today, is supported and sustained by taxpayer's funds, as is that in QinetiQ, which was formerly part of the Government Defence Research Establishments and so received funds from the public purse. Similarly the teaching of science and technology has a major role to play in addressing a variety of issues, including broadly defined security, not simply those of interest to corporate funders. Therefore we would expect access to be provided to information about how the publicly-supported expertise is being used in the partnerships with large corporations to pursue military R&D effort.

When corporations refuse to respond to simple questions about their relationships with public-sector bodies like the universities, there is little opportunity for public scrutiny of what actually goes on in those universities attracting military funds.

As we pointed out in the SITL and MSITL reports, the involvement of the military sector will tend to import a variety of practices, which include secrecy and protection of financial interests and activities⁵⁸ – the evidence from the approaches both to the case study university VCs and to private companies supports this contention.

Public confidence in science and technology calls for a number of professional work practices and attitudes on the part of all those involved in university-business collaboration to be put in place. These include transparency and the willingness to engage with members of the academic and wider community – such attitudes were in short supply in this study.

3.5 Individual voices – interviews with academics

The creation of the increasingly commercialised university in the UK gives rise to a research culture that differs in many ways from that in the more traditional ‘public-interest’ university. There is very little research literature that looks in depth at the effects on individuals in universities of being involved in research that focuses on economic end-points^{59, 60}. Despite our small sample size we nevertheless felt it useful to attempt to find out if there were differences in outlook and perception of the role of the university in modern society between those who received funding from the military sector and those who did not.

We approached individual researchers in those universities that were known to attract significant departmental military funding, particularly through the various consortia programmes – Bristol, Cambridge, Edinburgh, Imperial College London, Leeds, Oxford, Sheffield, Southampton and University College London. In addition we wanted to speak with those in the remaining seven universities in the sample that attracted lower levels of support – Birkbeck College London, Bournemouth, Exeter, Leeds Metropolitan, Newcastle, Plymouth and West of England. This would allow us to make some comparisons that might reflect the impact of funding, or attitude to source of possible funding, in areas such as teaching, commercial ethos and research. As mentioned above, we made contact with the VCs at most of these universities to obtain an additional and more general view of the university’s own perception of its many and sometimes competing roles as a modern public institution. Our approach to individuals, both military and non-military funded researchers, was in order to build up a composite picture of the research environment that both kinds of researcher worked in and to match this with the mission of their university.

We approached 36 individuals in those universities attracting high levels of military-sector funding, including four Directors of military funded research centres/consortia. Departments whose staff we contacted were in the physical sciences, especially materials science, and engineering. In the less intensely military-funded universities we approached 42 individuals, including four researchers receiving military funding. Of the 78 randomly chosen individuals (except for the Fol officers and VCs who were identified and approached because of their roles) responses were made in the form of e-mail messages and telephone conversations. A number of main features became evident as a result of this process of approaching individuals at the 16 universities, as follows.

Firstly, there was a markedly more positive response to our approaches from the non-military-funded groups than from those obtaining funding from the military. Many of those in the former category responded (around 40%) whilst only 20% in the latter

provided information. However, all responders, either at the first approach or after chasers were sent, said that they were extremely busy and, as in the case of the non-responding VCs, several said that they simply “did not respond to unsolicited questionnaires”. It was clear from most of the conversations we had that ensuring sufficient levels of research funding was a major issue for all approached.

A second feature was that, for all those approached whether supported by the military sector or not, a large proportion of their research income was commercially connected. Many felt that this did not impact significantly on the process of publication or their research direction. However, questions of transparency and openness were recurrent themes in our conversations. One senior academic said that “all universities should be far more accountable and open”⁶¹. He added that commercial funding, whilst not a “bad thing” in itself, should be open and accountable. One professor suggested that “conformism in research and teaching was supported by business objectives” in the funding process and needs to be challenged⁶².

Many of the more senior researchers pointed out that there is a very intense competition for funding and many felt that researchers are not too concerned about the source of that funding, as long as it supports their research work. Many that we spoke with took the view that it was entirely acceptable to receive military or other commercial sources of funding even if there was little likelihood that the specific objectives for which the funding was awarded would be met, as long as one’s own curiosity-driven research was supported.

Another feature was that a majority of those approached (both military and non-military funded) felt that the commercial sector was keen to let the researchers who they funded “get on with their research”. They felt that issues of patents or intellectual property rights (IPRs) would be protected by the university’s IPR policies. This is a view that Rolls Royce and other commercial partners expressed too. However, one needs to examine in considerable detail how much this process is actually followed in specific situations. The question of who benefits from military-university partnerships needs to be closely scrutinised, as much of the expertise in the university will have been supported either by public or commercial funding and the opportunity costs entailed in carrying out military R&D are at present unknown. In some of the departments in the survey the majority of the research undertaken by individuals is funded by the military sector – UK and US in origin – even where the kinds of projects could have civilian utility. How such research could develop non-military products depends upon technology transfer processes and innovatory pathways which are notoriously weak in the UK⁶³.

The interviews also revealed that many who did not receive military funding but were in prestigious departments (those with a high ranking in the national ‘Research Assessment Exercise’)

felt that successive UK governments were locked into high technology as a way of addressing many important issues like climate change, sustainability and security. One of those surveyed suggested that the professional bodies representing SET favoured 'advanced' technologies and this support was often without proper science-based appraisal or engagement with the wider community. Many responders felt that such an approach to complex issues was partial and that other interested parties should be involved in such issues. When asked, they felt that security was a multi-dimensional area that required a number of different kinds of expertise – from the universities and elsewhere – and not simply that from 'cutting-edge' engineering, and its high-technology products.

Some to whom we spoke also pointed out that universities that are very business-facing may well become highly conformist and that this would lead to a lack of independent thinking and expertise. However, those who were in departments which enjoyed high levels of military funding said that scientists and engineers should be much more willing to "give a good account of their research and its importance to society"⁶⁴. One engineering researcher who was not supported by military funding but whose department was, felt that engineering research "probably should be application-driven, so to benefit [hu]mankind"⁶⁵. Our overall impression was that those who are not supported by military funders, but who are in departments that might be expected to attract funds, have made a conscious decision to avoid such sources of research income.

Another feature revealed by the interviews was that the Defence Technology Centres (DTCs) that we approached varied in their working ethos, some being far more open and approachable than others. It was clear however, in speaking with senior members of the university and the commercial partner at two of the DTCs, that publications are screened for 'military sensitivity' and that this involves those within the Centre's university staff. How this process of evaluation impacted on the nature and kinds of research publication was uncertain from our conversations. We were unable to ascertain for either DTCs or UTCs how much teaching and research training featured in the activities of the Centres. Because of the obstacles we encountered, we were unable to explore in depth if there was in these consortia an open culture for sharing ideas and expertise with other researchers or whether those in the Centres were expected to limit their involvement in other projects. What was obvious was the commercial imperatives that the two DTCs we looked at were under, especially to satisfy the Ministry of Defence's defined research output goals. This, of course is fully understandable, but it remains unknown what effect this imperative has on other research in the participating departments.

A further interesting point was that most of those spoken with in the non-military funded research groups considered that military

and other forms of commercial funding can create marked changes to the traditional openness, scholarship and academic freedom enjoyed by their own and most universities. Two senior researchers suggested that the funding provided for R&D with military objectives in universities should be "strongly questioned" and a full public debate held, one adding that "The long reach of military spending is a source of deep concern in many walks of life including academic research. The arena for this valid debate is where the extent of Government spending on defence can be challenged"⁶⁶. They also argued that 'prestige funding' from the 'defence' and aerospace sector could endanger other more novel and innovative areas such as sustainable engineering. However, one non-military funded professor felt that military funding of training courses at his university brought added kudos to the department and university, and did not create, in his words "ethical dilemmas"⁶⁷. His university attracted military funds which were used almost exclusively for teaching and training.

Others to whom we spoke also saw no ethical problems with research that, whilst not supported by military funding, could have military utility. From web-based data sources it is apparent that the research portfolios of many of those researchers who attract military funding (especially in the consortia and at Bristol, Imperial College London, Southampton and University College London) were almost entirely military in focus, with little in the way of civilian projects.

The interviews also revealed a mix of views about the running of courses designed specifically for the military (corporate and government). Two responders in universities attracting high levels of military funding saw serious problems in the provision of a Masters course which was being offered for the benefit of the funder's staff, by teachers in the university. This concern was widespread in this institution we were told. Our responders added that such funding would lead to secrecy and loss of research objectivity. Others to whom we spoke felt that courses for the benefit of the military funders brought added value to the university (see above).

Overall, two different views of the role of universities emerged during the course of the study: one was of an entrepreneurial university where commercial forces were a facet of life in research, teaching and training and should be welcomed, adding not only income but prestige. Such a view saw research benefiting from such an environment and brought very few ethical challenges. The second model was of a university which tried to maintain more traditional values of openness and independence and related working practices in the face of government and business expectations. This model did recognise ethical dilemmas being implicit in the source of funding and tended to deal with concerns from staff on an ad hoc basis.

4. Conclusions and recommendations

We have provided in previous reports (SITL and MSITL), and further described in the material presented here, the rise of the commercialised university and the growth of an approach to security which emphasises high-technology weapons and their support infrastructure. These trends produce a number of significant interlinked problems, not least the potential to compromise the integrity of the research process in universities. In UK and other European universities R&D which has, as a pivotal objective, the addressing of societal or environmental problems is increasingly being marginalised by narrow economic and military research agendas. This is despite the urgent need for science and technology to assist in tackling problems such as global poverty or climate change.

US commentators have drawn attention to many of the problems intrinsic to a commercialised university in research and teaching – these include: lack of transparency; research predominantly for commercial end-points, often of a short-term nature; the monopolisation of research expertise for funder objectives; lack of objectivity and independence in a range of areas including expert evaluation; greater likelihood of professional misconduct – possibly exacerbated by researchers in departments attracting significant amounts of military funding being reticent to draw attention to the direction of research; and the erosion of public confidence in science and technology^{67,68}. Investigations of corporate involvement in research, especially from businesses in pharmaceuticals and tobacco have highlighted serious concerns about openness and research integrity.

The experience of endeavouring to engage with senior members of a group of 16 UK universities and the major commercial players in military-university collaborative partnerships has provided evidence that these concerns also relate to the military sector. We summarise our main conclusions below, followed by a series of recommendations.

4.1 Main Conclusions

- 1) The data gathered highlights that military involvement in and funding of research, teaching and training at UK universities is much more prevalent than generally acknowledged:
 - a) Of 43 UK universities investigated in this and three previous studies, 42 have been found to receive military funding, with the details of military funding in one university being uncertain. While this is not an unbiased sample, it does nevertheless indicate a likelihood that a very high proportion of the over 100 universities in the UK receive military funding.

- b) The data collected as part of this study indicates that the sample of UK universities receive on average in the region of £2 million per year from military sources. These figures include some, but not all, of the co-funding from civilian sources for military work. This level of annual funding is similar to that found by another recent study (*Study War No More*). This level of funding – if representative across the country – would indicate that national science statistics considerably underestimate funding for military projects at UK universities, possibly by as much as five times. It is also important to remember that funding is only part of the influence exerted by the military within academia.

- c) The high-prestige universities tend to be targeted by the military as research partners, and hence they receive the highest levels of funding for military work. The more research-intensive universities are, for instance, over-represented in the various consortia with the military sector.

For example, the University of Cambridge received 11% of its UK-origin industrial research income and 15% of its overseas research income from military sources. This is especially worrying as it shows the ability of the military to draw upon the 'best brains' with a potential to compromise alternative viewpoints.

- d) In common with previous research, we find that the disciplines which attract the highest proportion of military funding are engineering and the physical sciences. It is likely that a great many engineering departments in the UK universities have some military connections.

- 2) Universities present themselves as open, accountable institutions yet, when challenged during this study, they fell well short in many respects, as follows:

- a) Detailed, comprehensive data on military involvement in universities was very difficult to obtain even when the Freedom of Information Act was invoked. The causes were a combination of incomplete record-keeping, commercial restrictions, pressures on researchers and, most disturbingly, evasiveness on the part of officials. University websites often contained sparse information on funding source and research output. One notable exception was Cambridge University, which publishes full information on its sources of funding in the public domain.

- b) Senior academics such as Vice-Chancellors were very reluctant to discuss issues related to 'defence' and 'military' work at their universities. Researchers receiving military funds were also less willing to speak to us.
 - c) A lack of data prevented us carrying out any other detailed comparisons between universities, departments or researchers with regard to the effect of the receipt of military funding. Similarly, we were unable to ascertain the extent of military funding of teaching staff posts in the case study universities, or any consistent effects on practice regarding patents.
- 3) There was a limited amount of evidence to suggest that military-funded research results in a greater proportion of non-peer-reviewed output (e.g. conference papers) compared with peer-reviewed material. While this observation needs to be confirmed by more detailed research, it is of serious concern since it indicates that research publication quality may be being compromised by military involvement.
- 4) There was significant concern voiced by many of the non-military funded researchers in our sample about several issues related to military and commercial involvement in universities, as follows:
- a) The increasing involvement of commercial and military interests was considered to be causing research to become more 'conformist', less open and accountable, and less able to address difficult ethical issues. The pressure to bring research work into line with what is useful to such powerful interests has increased over the past ten years. Researchers admitted that they often did not feel able to express their concerns openly. They argued that there needs to be an open debate both within academia and more widely about these issues, and are concerned that without it public trust will be compromised. This view contrasts with that held by many military funded researchers, which considers increasing commercial and military involvement not to be problematic, either from a research quality or ethical point of view. Given the other evidence revealed by this study, we conclude that the former view – which includes serious concerns about openness, accountability and related issues – is more accurate.
 - b) High-technology approaches to dealing with global issues (whether security related or not) are often prioritised compared with approaches not relying on high technology. Non-military-funded researchers argued that little rigorous evidence has been given to justify this preference, especially in government. If such evidence is not forthcoming, they argued, research agendas should be changed.
- 5) Military corporations, which work closely with universities and therefore benefit from publicly-funded expertise and resources, are very reluctant to publicly discuss the nature of the collaboration. This is despite claims in their mission statements to be open and engage with the academic and wider communities.

4.2 Recommendations

Universities need to remember that they are publicly-funded institutions and therefore should be more responsive to legitimate scrutiny. Much more diligence is needed in the implementation of procedures for openness and accountability, especially with regard to information concerning military and commercial involvement at universities. The handling of Freedom of Information requests is an area in need of particular attention.

In addition, there needs to be much greater acceptance on the part of university managers, researchers and other staff that military involvement on campus is an area of serious ethical concern among other members of staff, students, and the wider community. Given the many current controversies relating to the UK's security stance and the military, this is not surprising. Our evidence indicates that those institutions and employees involved in military-supported research and teaching are often reluctant to engage with the concerns of others, despite their being publicly funded. We strongly urge that they take the conclusions of this report seriously and rethink their position – else they risk losing public trust.

In detail, we recommend the following:

To university managers

- i) Collect and publish annually detailed information about all funding – including that from commercial and military sources – together with related publications and other outcomes arising from the funding provided.
- ii) The open publication of funding sources by Cambridge University is an example that at minimum should be adopted by all UK universities.
- iii) Ensure that Freedom of Information requests are properly dealt with and that the legislation is understood and acted on.

To researchers

- iv) There needs to be more awareness that funding from narrow, vested interests can bias the research agenda even when there is perceived to be no 'interference' from the funder. The concern in the particular case of military funding is that security-related research can be biased towards 'solutions' which focus on the development and use of high-technology weapons, rather than alternative non-military approaches.
- v) More research is needed to examine the effects on cultural changes at universities brought about by increasing military and commercial involvement, especially with regard to research, teaching and training.

To government

- vi) Universities are a cornerstone of an educated and healthy democracy, and there needs to be a profound shift away from seeing them in narrowly economic terms. Research, teaching and training need to contribute more explicitly to social justice, climate change mitigation and to challenge other threats to global security, and should not simply be seen as a primary means to increase business profits.
- vii) Stronger enforcement of the Freedom of Information Act – especially the statutory time allowed for making a response – is required to ensure greater co-operation by publicly-funded bodies, especially universities.
- viii) More transparency and debate needs to be injected into how the UK frames its security stance. This must involve not only the public but also non-partisan expertise at UK universities.
- ix) A significant diversion of funds, in particular away from the current high-technology focus on security problems, with its associated R&D, towards work which addresses the diverse drivers of conflict and discontent. More support is required for non-military approaches to conflict resolution, and the science and technology to help tackle global poverty and environmental problems – which themselves are root causes of insecurity.

Universities in the UK have changed significantly in the last two decades. They tend now to have a largely economic focus. These changes have come about without a full public debate. With the added impetus to include the expertise in universities as part of the military R&D effort it is clear that there is an urgent need to critically question what role the university fulfils today. Universities have a major part to play in society and must continue to be a key means of obtaining independent and reliable opinion on a host of topics, not least advising on more inclusive notions of security.

Glossary

- DARP – Defence and Aerospace Research Partnership (UK)
- DARPA – Defense Advanced Research Projects Agency (USA)
- DSTL – Defence Science and Technology Laboratory (UK)
- DTC – Defence Technology Centre (UK)
- DTI – Department of Trade and Industry
- EMRS DTC – Electromagnetic Remote Sensing Defence Technology Centre
- EPSRC – Engineering and Physical Sciences Research Council
- FoI Act – Freedom of Information Act
- IPR – intellectual property rights
- MSITL – 'More Soldiers in the Laboratory' report
- ONR – Office of Naval Research
- R&D – research and development
- SET – science, engineering and technology
- SITL – 'Soldiers in the Laboratory' report
- STFC – Science and Technology Facilities Council
- SWNM – 'Study War No More' report
- UTC – University Technology Centre
- VC – Vice-chancellor

Appendix A - Vice Chancellor questions

- 1) Could you please tell us something about your own career path?
- 2) Can you briefly describe what are the three or four most important roles which universities should play in the UK in the 21st century?
- 3) In light of the commercial environment in which universities now function what, in your view, are the major challenges such as conflict of interest that academics face in their teaching and research? For example does the government's emphasis on universities pursuing economic objectives outweigh the more traditional roles such as scholarship and disinterested enquiry?
- 4) The impact of tobacco and pharma company sponsorship of university research has raised important practical and ethical questions. Do you think that military funding (private or public) of university activities, from the UK or elsewhere, raises particular issues or concerns?
- 5) In the main do you think that universities are open and sufficiently accountable, for instance about funding and the links between the research agenda and commercial interest for instance? Should they be more open?
- 6) Given these issues what changes in the governance of universities would you like to see take effect in the next twenty years?
- 7) Does your university have departments of engineering, computer science and mathematics? Do they receive funding from military sources (such as corporations like BAE Systems, GKN, General Dynamics and Boeing and from government departments such as the Ministry of Defence)?
- 8) Do you have any questions which you should like to ask us?

Date sent

Appendix B – Cover letter

Dear Professor

I am the principal researcher for the UK-based organisation Scientists for Global Responsibility. I am making contact with you and other senior figures in the UK universities to seek co-operation in a research project. The project will gather further information on the role of universities in the 21st century and the impact of industrial collaboration on the ways in which universities form part of the intellectual community. All comments will be treated in strict confidence and will only be used to provide information on a non-attributable basis. I provide a brief outline of the goals of Scientists for Global Responsibility below, as well as an attached list of the questions which I should like to speak with you about. If more convenient you can answer the questions by e-mail. Once you have had the opportunity to think about the questions, perhaps I could contact your office early in August to arrange a convenient time to speak with you by telephone.

Scientists for Global Responsibility:

- promotes ethical science, design and technology, based on the principles of openness, accountability, peace, social justice, and environmental sustainability.
- is an independent UK-based membership organisation of about 1000 natural and social scientists, engineers, IT professionals and architects
- carries out research, education, and lobbying centred around the military, environmental and political aspects of science, design and technology
- provides a support network for ethically-concerned professionals in these fields
- More may be found on the website at www.sgr.org.uk

Chris Langley MA PhD
 Scientists for Global Responsibility
www.sgr.org.uk

Appendix C - Rolls-Royce and UK University Technology Centres – responses to our questions

- 1) **What is the policy concerning the publication of research which originates in Rolls-Royce UTCs? Does the company require the material to be cleared before submission? Does the intellectual property rights reside with the researcher or Centre or jointly?**

All information published by Rolls-Royce or our partners in collaborative programmes is reviewed by all parties to ensure commercially sensitive information from any party is removed. Intellectual property resides with an owning party agreed in advance of the programme start. The terms of such an agreement are likely to be specific to that project and themselves would normally constitute commercially sensitive information.

- 2) **Are those in UTCs employed by Rolls-Royce or by the host university, or are positions joint appointments?**

They are employed by the university. Funding may come from the University, Rolls-Royce, public funding bodies or a mixture of any of these.

- 3) **How do Centres balance questions of academic freedom, dissent and free exchange of information between those in UTCs and other researchers?**

This is managed locally by the Universities in accordance with their local processes and the constraints of commercially sensitive information control.

- 4) **Does Rolls-Royce undertake any kind of evaluation of the output of its UTCs?**

We carry out an annual evaluation of the performance of each UTC.

- 5) **Across all the UTCs in the UK and elsewhere what would be your estimate of the ratio of civilian to military objectives of the research undertaken?**

Because our technology challenges are normally fundamentally scientific in nature rather than application or product specific it is impractical to quote a meaningful split for this. Generally our UTCs investigate technologies well before they are adapted for use in specific products (subjects like noise, aerodynamics, etc) and we have a byword of 'invent once and use many times', so technologies that are identified in our Vision 20 research programmes, if then moving successfully through the important validation process, are applied across all our products – energy, marine, civil aerospace and defence aerospace. A key focus currently is environmental improvements, also the increasing use of electrical systems to improve the overall efficiency of a wide range of products and installations.

- 6) **Do some or all UTCs have teaching, training of research students and skills training as integral elements in the way in which the Centres function within the university department(s)?**

Yes, the Universities build training programmes appropriate to their and our needs to develop high quality students.

- 7) **How does Rolls-Royce decide if it is appropriate for researchers to apply for funding from other funding sources, which maybe are also commercial. That is, would there be a ban on seeking funds from potential funders who were seen as competitors to Rolls-Royce.**

Rolls-Royce places no constraints on Universities applying for funding from any third party sources.

- 8) **How would Rolls-Royce respond to the charge that such Centres take expertise away from other, perhaps non-commercial, needs, such as the early stages of research into environmental or health technologies? That is, to address pressing global needs which do not have an immediate commercial incentive for investigation?**

The research undertaken at our UTCs generally addresses fundamental cutting-edge science and technology challenges – and many of them do target radical environmental improvements. Some of their technology advances in topics such as engineering condition monitoring have been read across to practical advances in the health industry for patient care improvements. If you've not done so already, it might be worth talking to some of our UTC directors and researcher fellow and students to see what benefits they themselves see from the real-world challenges our technology tasks bring to them.

- 9) **Do UTCs have a limit to their workload? How would you feel about researchers taking on heavy commitments outside the UTCs but within the research arena?**

There is no constraint applied by Rolls-Royce on researchers working within our UTCs to say they cannot work on projects in addition to those undertaken with the Company. In many cases their working on other projects is valuable to all parties in maximising cross-fertilisation of knowledge across industry sectors and across research teams around the globe.

Initial request was sent on 10 June 2007, response above was received 10 September 2007 by e-mail. We tried to seek clarification of several of the less helpful answers but this was refused.

Appendix D - Universities examined by recent reports

University	SITL	MSITL	SWNM	This report
Bath	✓	✓		
Birkbeck College, London				✓
Birmingham	✓	✓	✓	
Bournemouth				✓
Bristol	✓	✓	✓	✓
Brunel	✓	✓		
Cambridge	✓	✓	✓	✓
Cardiff	✓		✓	
City University, London	✓			
Cranfield	✓	✓	✓	
De Montfort	✓	✓		
Durham			✓	
Edinburgh	✓	✓	✓	✓
Exeter				✓
Glasgow	✓	✓	✓	
Glasgow Caledonian	✓			
Heriot-Watt	✓	✓		
Hull			✓	
Imperial College, London	✓	✓	✓	✓
King's College, London			✓	
Leeds	✓	✓	✓	✓
Leeds Metropolitan				✓
Leicester	✓	✓		
Liverpool		✓	✓	
London School of Economics			✓	
Loughborough	✓	✓	✓	
Manchester	✓		✓	
Newcastle			✓	✓
Nottingham	✓		✓	
Oxford	✓	✓	✓	✓
Plymouth				✓
Queen's University, Belfast			✓	
Sheffield	✓	✓	✓	✓
Southampton	✓	✓	✓	✓
St Andrews	✓	✓		
Strathclyde	✓	✓		
Surrey	✓	✓		
Sussex	✓			
Swansea	✓		✓	
University College, London	✓	✓	✓	✓
Warwick			✓	
West of England				✓
York	✓		✓	

Total: 43

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- 33 Our e-mail sent 12 October 2007
- 34 http://www.lmu.ac.uk/the_news/nov03/r19nov.pdf (See p2)
- 35 Our e-mails sent 27 July 2007 and 13 August 2007.
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- 37 Our e-mail reminders were sent on 12 August, 22 August and 19 September 2007.
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- 47 <http://www.soton.ac.uk/finance/central/FA2006.pdf> (See p41)
- 48 The material was obtained using the EPSRC free-text search facility – which can be found at <http://gow.epsrc.ac.uk/FreeText.aspx> - using strings such as 'BAE' and 'Rolls Royce'.
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- 51 <http://www.emrstdtc.com> (accessed May 2007)
- 52 Website accessed in August and September 2007
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About this briefing

This briefing builds upon the disclosures of, and recommendations provided in, *Soldiers in the Laboratory* and *More Soldiers in the Laboratory* and focuses on the impact of military sector influence within the research and teaching environment of universities in the UK.

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