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The political and economic context of European defence R&D

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The political and economic context of European defence R&D

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Abstract

Along with all other defence-related issues, defence research is a controversial area for EU action. Until recently, defence issues have not figured prominently among EU policy discussions and defence research has played little, if any, role in European technology policy. Although the Framework Programme is funding research projects that could have potential military applications in addition to their explicit civilian goals, there is no strategy on how to address such "dual-use" research activities. Yet, this paper argues that the interaction between technologies developed for civilian and for military use has led to a situation in which it is increasingly difficult to refer to distinct military and civilian technology bases. From the point of view of policy formulation a strict separation between defence and civilian technologies is increasingly appearing as anachronistic.

The extent to which "dual-use" research will be explicitly considered in the development of the 6th Framework Programme will again emerge as a matter of debate. The paper presents and discusses different avenues through which dual-use and defence-related research could be given formal consideration in the development and implementation of the 6th Framework Programme.

Introduction

Mainstream debates on European research policy have tended to ignore the role of defence research and defence production in shaping the European innovation system. One can venture several reasons as to why this has been the case. On the political and security fronts the end of the Cold War and the economic conditions of the early 1990s brought about a fall in defence R&D expenditure. As investment in emerging IT-related sectors and services rocketed, stimulated by the prospect of emerging commercial markets of colossal proportions, defence R&D no longer commanded the same political priorities as it had over the preceding decades. The stagnant research investment in a sector whose "*raison d'être*" was being increasingly questioned by public opinion could no longer be seen as a motor of technological development. In fact, the central arguments of defence science and technology policy strategists shifted. Instead of fencing off critics with examples of how defence R&D had eventually led to technological developments that had been appropriated by society at large ("spin-off"), the main concern became the exploitation of technological developments occurring elsewhere in the economy for the benefit of military production ("spin-in").

While defence research descended in the hierarchy of political priorities it remained a controversial area for EU action, along with all other defence-related issues. Although the Maastricht Treaty introduced the "Common Foreign and Security Policy" (CFSP) as one of the "legs" of the European Union, the involvement of the European Commission on defence issues has not yet received undivided support. The original Treaty of Rome did not cover security matters and included an article (223) allowing any Member State to take "such measures as it considers necessary for the protection of the essential interests of security" when dealing with military production and trade matters. The article has often been interpreted as an exemption from Commission rules for all military-related activities. Historically, cooperation in foreign affairs under the European Political Cooperation (EPC) remained outside the Treaty and took place outside the Community framework. CFSP heralded, in principle, a change to this situation, but the Maastricht Treaty tasked the Western European Union (not the European Commission) with the elaboration and implementation of Union decisions with defence implications (Article J4).

Against this background the involvement of the Commission in security-related issues (including research) is breaking new ground and encounters opposition from a variety of fronts. Political attitudes towards defence issues vary markedly from country to country and obviously from political party to political party, and some groups in the European Parliament regard with acute suspicion any Commission move into security-related matters.

Therefore, defence issues did not, until recently, figure prominently among EU policy discussions. Classical reference works on the European Community could very well do without a single reference to defence and security matters.[1] In this context of perceived lower priority and sustained political difficulties, it is not surprising that the incentives to address the role of defence research in European technology policy were, to say the least, feeble.

From the observation of these trends, should we conclude that defence research matters have no place in the development of a European approach to science and technology issues? This paper argues that defence research requires attention when dealing with issues that may shape the future European science and technology system. Changes have occurred, both in the technological and political fronts driving the Commission to take on more responsibilities on defence-industrial issues. It may be true that, in comparison with the rapid changes in Information Technologies and their applications, and the environmental and welfare challenges faced by European societies, defence R&D policy is unlikely to ride on the crest of popular attention. However, defence-led investment still accounts for a substantial share of total R&D effort and of Government R&D appropriations. This research effort and the manufacturing and engineering skills that still depend on defence work are being confronted with rapid changes in the relationship between defence and civil technology. In addition, the political context is shifting: the need for a common European policy on defence issues is becoming more evident on the wake of the Balkan crises and the re-emergence of difficult political issues in areas like technology export controls. The paper will briefly review the nature of these trends and discuss their implications for European research policy.

Defence research: main trends and recent issues

Dual-use and its implications

The changing relationship between military and civilian technologies

Research and technological development efforts can often result in a variety of applications, regardless of their initial funding sources. Although this observation can be considered quite banal, it acquires a distinct relevance when dealing with the relationship

[1] This is the case for instance of Jones and Budd (1994), a classical reference book on the EC that saw five editions between 1985 and 1994.

between military and civilian technologies. That a technology that had initially been developed in the pursuit of military goals may then be applied to civilian objectives (and vice versa) has important implications for science and technology policy and its relationship with foreign and defence policy. This is not an occasional occurrence; the outputs of R&D activities can often be applied to military as well as civilian goals; in other words, they are "dual-use". In fact, it is common for R&D to be conducted for *both* military and civil goals within large diversified firms (Stewart 1989).

Besides, the relationship between R&D activities conducted primarily for defence goals and those oriented initially to civilian applications has changed. In many key areas, like electronics and information technologies, the pace of civilian-led innovation has outstripped military-led innovative efforts.[2] Nowadays, components and products developed for civilian markets often provide better performance and cost specifications than similar items developed specifically for military customers. For more than a decade it has been widely recognised that the success of military production depends on the existence of robust commercial firms and industrial activity (US Congress, Office of Technology Assessment 1988). In many sectors defence customers have been forced to resort to commercial technologies.

Take for instance electronics. While defence R&D accounted for the early development of most electronics industries, as the technologies matured and the cost of production fell, the commercial markets soon outstripped military demand. In the US, government sales of semiconductors (including but not limited to the military) accounted for only 1.3% of total US sales in 1995, and the military market was shrinking at a rate of 15% per year (Cooper and Finnegan 1995). Meanwhile the costs of developing and producing new semiconductor chips have escalated. Between 1980 and 1991, R&D annual expenditures by US semiconductors producers grew from $600 million to $2.9 billion. Manufacturing costs have grown even faster: the cost of building an advanced wafer production facility rose from $25 million in 1989 to over $500 million in 1992 (US. Congress. Office of Technology Assessment 1993b). The combination of growing costs and market stagnation has left the military with no other solution than having to resort to components and semiconductors developed for commercial applications.

The importance of these changes for science and technology policy in Europe were recognised by the European Commission in its Communication on *The Challenges facing the European defence-related industry* (European Commission 1996). Although the Community research and technological development programmes explicitly focus on civil objectives, they are bound to fund projects with defence applications. According to European Commission estimates (European Commission 1996) as much as one third of the overall Community research budget is invested in areas of "potential dual-use interest".

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[2] This is not surprising given the changing balance between the R&D efforts funded by the military and the R&D paid for by other economic actors. In 1960, for instance, the US DoD funded one third of *all* R&D carried out in the Western world. By 1992, this percentage was less than 14% and falling (Alic et al. 1992).

Dual-use research policy

Defence-industrial policies, particularly in the US, have tried to address this situation by developing mechanisms to improve the exploitation of the results of "dual-use research" across different, military and civilian, applications. Elsewhere, we have defined *"dual-use policies"* as any course of action adopted by a public or private organisation to facilitate the wide use of dual-use technologies in both military and civilian applications (Molas and Robinson 1997).[3] Given the large diversity of dual-use technologies and the even broader variety of ways in which these technologies can flow between military and civilian applications (Molas-Gallart 1997) dual-use policies can be very different in their definition and objectives. Indeed, there have been significant shifts in their meaning and orientation. In the US, where the concept has been more widely used in official contexts, the emphasis shifted from the application of technological capabilities initially developed in the defence field to civilian applications, to developing means to exploit for defence applications technologies developed elsewhere.[4]

Sectoral differences

It must be noted that, although the trend for military innovation to become more dependent on the results of civilian-oriented research is broad and affects many technological fields, it is by no means ubiquitous. There are sectors where present evidence suggests that defence R&D continues to finance the larger share of research with dual-use applications. This occurs particularly in fields where high-costs, low volume technologies are being developed for use in very specialised applications where performance is a paramount concern.

The most important example is perhaps advanced materials: the development of lighter and stronger materials for (mainly) aerospace applications continues to be funded to a large extent by defence monies, although many of the technologies find commercial applications later on. It has been reported for instance that, as late as in the mid-90s, the US Department of Defense funded 73% of all US research in metallurgy and materials (National Research Council 1996). This is not surprising: the aerospace sector is one of the main drivers of advanced materials research (particularly structural materials), and, within the sector, new materials are customarily applied first to military aircraft.[5]

It follows that dual-use research policies cannot focus exclusively in the defence exploitation of innovations generated elsewhere. It must be acknowledged that some areas of research, with important potential civilian applications, retain the military as their potential "first-user" even in the present context of budgetary strictures in the defence field.

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[3] This includes both policies aimed at generating dual-use technological capabilities and, more important, policies aimed at increasing the capabilities to apply dual-use technologies across as broad an application area as possible.

[4] As "dual-use policy" has meant very different things in different policy contexts, support for dual-use research, as recommended in some quarters (Defence Committee and Trade and Industry Committee 1995), is too vague a proposal.

[5] The approach to the introduction of new structural materials in commercial aircraft is rather conservative, due above all, to the safety concerns and regulations that characterise this segment of industrial activity.

Dual-use and technology controls

This paper focuses mainly on the relationship between defence and civilian research and innovation, and the opportunities it offers for a wider exploitation of research results. Yet, the same dual-use character of many R&D efforts and technological developments is posing important foreign policy and security problems related to the control of the international transfer and proliferation of weapons technology. Why is this so?

Dual use policies promoting the establishment of dual use technology transfer mechanisms can be used not only to assist in the diversification (or even conversion) of defence-related facilities, but also to support military production. Whenever fluid channels exist for the application of military technology developments to civilian use, it is also possible to follow the contrary route: emphasis on the exploitation of civilian technologies in military production is increasing the relevance of commercial technology for weapons manufacturing. Further, the emergence of integrated civil/military industry segments and the use of common components and sub-systems in both military and civilian production can make it more difficult to track and monitor the development of military capabilities and therefore may pose a problem to anybody concerned with proliferation matters.

How to address these issues constitutes an important element of the CFSP, and has been a concern of the European Commission already for some years. First and foremost, the Commission has had to intervene to prevent the internal market from being used to export military-relevant technologies through the EU Member States with more lax export control regulations. A common approach to export control appears therefore as a natural corollary of the internal market when dual-use technologies exist. The need for harmonisation in this area of foreign policy has led to the development of EU-wide regulations on the export of "dual-use goods" (OJ No L278, 30.10.96).[6]

Defence R&D in Europe: some aggregate data

An initial caveat: defining Defence R&D

Any attempt to present a summary overview of the defence R&D efforts is immediately faced with a serious difficulty: the scarcity of available data and its suspect reliability. Cross-national comparisons and longitudinal analysis alike have to be approached with caution. The causes for this situation can be traced back to the traditional secrecy with which defence agencies and firms treat data and information, but more importantly to the changing relationship between military and civilian research and the ensuing difficulties to capture the shifting situation through the use of old indicators. In particular, the problems are bound to become more intense if the efforts to improve the exploitation of R&D efforts (in both military and civilian applications regardless of the source of funds) meet with any sort of success. Dual-use policies may further blur the distinction between what is to be considered "civilian" and "military" research.

[6] Yet, these regulations are not in line with some of the international technology control regimes of which the Member States are signatories. Particularly the regulations in the Chemical Weapons Convention regarding the control of dual-use technologies with potential applications in chemical weapons, do not fit with the present approach defined in EU regulations, which refer instead to the control of the *export* of technologies listed in specific control lists. For a detailed analysis of this issue see Molas-Gallart and Robinson (1997).

Besides, national data sets are based on disparate definitions and approaches to the construction of defence R&D indicators, which often do not comply with the Frascati definitions. In France, for instance, the Ministry of Defence releases three different indicators of defence R&D, plus a further one by the Ministry of Research. The latter attempts to provide an estimate following the definitions used in the "Frascati manual" (Serfati 1998). In Britain, the Ministry of Defence has traditionally not conformed to Frascati definitions, although other departments publish defence R&D data according to it, and the Ministry of Defence has tried to reconcile its practices with the Frascati conventions (Gummett and James 1998).

Facing this difficulty in acquiring even nationally-based data suitable for a longitudinal analysis, researchers have had to rely on the only source of long-term, comparable defence R&D indicators: the OECD. Yet the OECD approach to defining *defence* vis-à-vis *civilian* R&D may lead to inaccurate estimates.[7] According to the Frascati manual "...the criterion is not the nature of the product or subject (or who is funding the programme) but the objective*"* (Organisation for Economic Co-operation and Development 1994, p. 77). This approach addresses the fact that not all defence research is supported by defence agencies and, at times, defence agencies support research that appears to pursue civilian objectives.[8] Yet the OECD definition relies on the ability of an analyst to elucidate whether a research programme or a project is being conducted *"primarily"* for military or for civilian goals. In doing so, this approach is faced with the problem of how to deal with research programmes that, explicitly or implicitly, pursue dual-use objectives.[9] Trying to estimate defence R&D on the basis of the potential application of the research effort or its primary goal is fraught with problems and often subjected to judgements that may eventually prove incorrect. Taking into consideration the dual-use potential of much R&D, a safer approach to defining Defence R&D would be to include *all* R&D funded by defence agencies plus other R&D expenditures *officially* identified as being conducted for military purposes, although funded by other public organisations. Yet, no R&D data is collected on this basis, and therefore the use of present OECD indicators on defence R&D for the purposes of national comparisons and longitudinal analysis must be approached with care. Only the most general comparisons and trend analysis can be carried out. In the absence of much needed improvements to data collection, any detailed analysis of trends and any attempt at formally testing hypothesis through economic modelling, would require, at least, a case by case validation of the indicators by reference to the original national data sources.

[7] For a complete discussion of this issue see Molas-Gallart (1999).

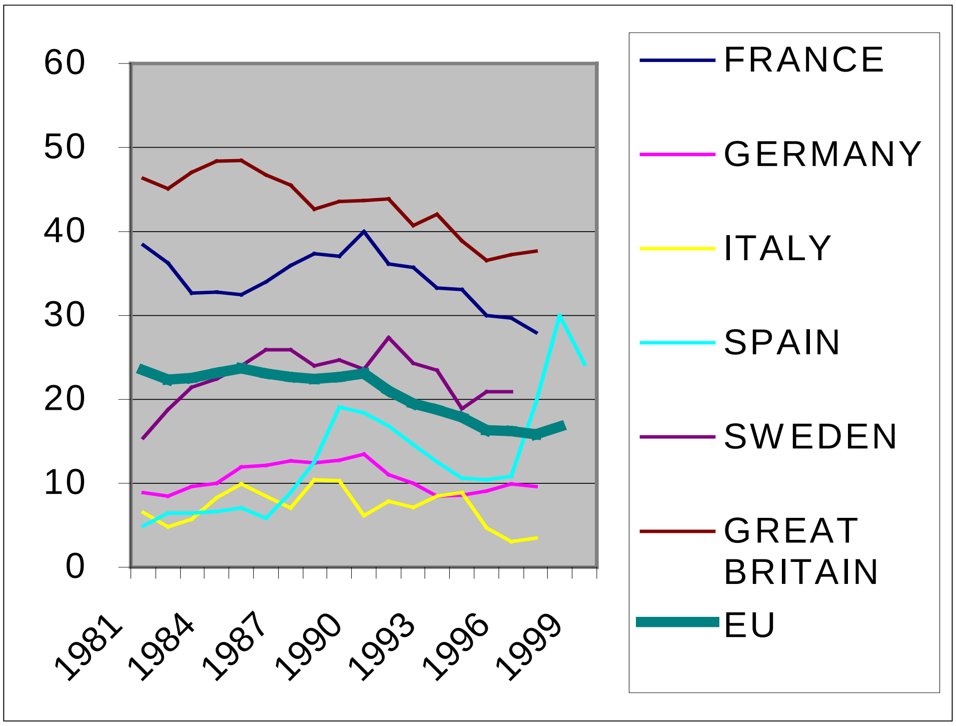
[8] In the US, for instance, nuclear weapons research has always been funded by the Department of Energy. In Britain, in the days of the Ministries of Aviation and of Technology in the 1960s, the main defence-related research establishments were outside the scope of the Ministry of Defence.

[9] As the OECD defines basic research as research *primarily* undertaken to acquire new knowledge, it follows that, strictly speaking, no basic research can be considered defence R&D (even if it is funded by defence agencies). We should note that, although basic research accounts for a relatively low share of total R&D funded by defence agencies, defence agencies fund a very substantial portion of basic R&D in several scientific fields. The US Department of Defense supports 68% of all federally-funded research in social psychology, 60% of research in mathematics and computer sciences, and 40% in psychology (Hagelin and Reppy 1998).

National differences and general trends

Given the difficulties outlined above, here we can provide no more than a very general discussion of defence R&D trends based on existing analyses of national data sources and a sketchy international comparison based on OECD indicators. Although defence R&D expenditure has declined in most countries, it still remains very significant. Figure 1 presents the evolution of defence R&D budgets as a percentage of government R&D budgets or appropriations according to OECD data, for the largest EU Member Countries and for the EU as a whole.[10] In general we can appreciate a downward trend in the evolution of this *relative* indicator, yet the downfall is not as sharp as some might have expected. The aggregate EU data shows a stable but slow downward trend, with about 15% of government R&D appropriations being still applied primarily to defence goals. Yet, this aggregate figure hides important differences across countries.

Figure 1 Defence R&D Budget as a % of total GBAORD



Source: OECD, Science and Technology Indicators

In those EU countries at the forefront of military technology development (mainly Britain and France), defence R&D remains particularly important. Only in the last years has French expenditure in defence R&D as a percentage of total government expenditure fallen slightly under one third, but its present absolute level is the same as in the heyday of military expenditure in the mid-1980s (Serfati 1998). In Britain defence R&D as a percentage of total government expenditure is still close to 40%. In Germany, where the

[10] The level of defence R&D in most small EU countries with no sizeable defence industry (not represented in the table) is often negligible.

level of defence R&D expenditure is much lower, it has remained stable (around 10% of government R&D appropriations) for the last two decades.

In some countries with smaller, niche, defence industries, defence research is retaining or even increasing its role. Stability is the trend in the Netherlands, with R&D accounting for about 1% of the total defence budget, and remaining at this level over the years (Smit 1998). In Spain, defence R&D has sharply increased over the last two years and is reaching unprecedented levels of investment; yet, the Spanish figures are very likely to include engineering and manufacturing activities that could not be classified as R&D using standard Frascati criteria (Molas-Gallart et al. 1998). In comparison, Italy has experienced a substantial decline.

We can conclude that defence R&D deserves attention as it remains an important element in the definition of public Science and Technology policies. The decline in defence budgets has stopped well short of erasing the relevance of defence-related research activities. It could therefore appear as surprising that defence R&D has not featured in the EU research strategy. The following section explains this apparent inconsistency by reference to the political backdrop of the evolving EU involvement in defence and security matters.

The political context: European defence research and the CFSP

We turn our attention to the policy environment partially responsible for the marginal consideration that EU research policies have given to the defence sector. Until recently, the European Commission has been reluctant to address this issue as well as any other defence-related problem: it was broadly understood that defence problems fell beyond the scope of action of the European Communities. This approach was supported by Article 223 of the treaty of Rome (Article 296 of the Amsterdam Treaty). The article states:

> 1. The provisions of this Treaty shall not preclude the application of the following rules:
>
> (a) No Member State shall be obliged to supply information, the disclosure of which it considers contrary to the essential interests of its security;
>
> (b) Any Member State may take such measures as it considers necessary for the protection of the essential interests of its security which are connected with the production of or trade in arms, munitions and war material; such measures shall not, however, adversely affect the conditions of competition in the common market regarding products which are not intended for specifically military purposes.

Although the Article falls well short of preventing all actions by the European Communities that could affect the defence-related industries, it is often still interpreted in this manner.[11] Most Member Countries have traditionally applied a very broad interpretation of Article 223, assuming it to mean a complete exemption of all defence-

[11] In fact, the same Treaty of Rome, in the much less quoted, Article 225, allows the Commission or any Member State who considers that a Member State is making "improper use" of the powers provided by Article 223 to bring the matter to the European Court of Justice.

related areas from Commission action. This approach is now being increasingly challenged, both at the political level and by the Commission itself.[12]

The most important turning point was the signature of the Treaty on European Union (Maastricht Treaty) on 7 February 1992. It sets up the structure of the European Union as resting upon three "pillars": (1) the European Communities, (2) the Common Foreign and Security Policy (CFSP), and (3) co-operation in Justice and Home Affairs. The CFSP is described in Article J.4 of the Maastricht Treaty as comprising “all questions related to the security of the Union, including the eventual framing of a common defence policy, which might in time lead to a common defence.” The same article calls on the Western European Union (WEU) to elaborate and implement Union decisions with defence implications, thus making the WEU the executive arm of the CFSP.[13]

The slow progress in the development and implementation of the CFSP has affected the way in which the European institutions can address defence issues, including procurement, and R&D policies. Every step has had to be supported by substantial declaratory policy. An initial move towards explicit involvement of the European Commission in defence industrial issues was the Communication of January 1996 (European Commission 1996) on the challenges faced by the European defence industries, later endorsed by the European Parliament in May 1997. Later in 1997 the Commission proposed a Common Position to develop a European armaments policy (European Commission 1997) covering a broad variety of defence industrial and technology issues. In December 1998, Britain and France signed the Saint-Malo Declaration acknowledging the need to develop a European defence capability supported by a strong European defence technology. Finally the Presidency Conclusions of the European Council summit in Helsinki (December 1999) adopted a Presidency Report on “Strengthening the Common European Policy on Security and Defence” setting specific targets to develop a capacity to conduct *EU-led military operations* in response to international crises.

There is now an open search for ways in which the EU can take on defence and security responsibilities, including defence production issues; a far cry from the times in which defence was generally understood to be clearly out of the scope of action of the European Communities. A new framework for the elaboration of defence-related policies by the European Communities is emerging. As Chris Patten, European Commissioner for External Relations, stated in a speech in December 1999:

> A European security and defence policy, to be operationally effective, needs the support of a number of complimentary building blocks. ... For example, [it] cannot be developed in the absence of a competitive and open European defence industrial and technological base ... We in the Commission can contribute to this with a range of instruments in areas like public procurement, the internal market, research and competition (Patten 1999).

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[12] An apparently minor but nevertheless significant development has been the September 1999 ruling of the European Court of Justice against Spain (Case C-414/97), who had invoked article 223 to exclude from VAT intra-comunitary transfer of arms, munitions and military equipment.

[13] The Maastricht Treaty annex on the WEU established the intention of creating an European Armaments Agency to increase co-operation in the field of arms production among Member States; yet its constitution has been delayed by profound disagreements about its potential role, structure and responsibilities. It is now expected that the WEU will be subsumed within the European Commission.

These developments, away as they may seem from the research policy domain, are however playing a key enabling role in the definition of a EU-wide research policy. This can be illustrated by reference to the discussion on defence-related and dual-use research that took place while the 5th Framework Programme was being prepared.

The Commission support of research and technological development activities has always addressed only civilian objectives. However, it has long been recognised that dual-use research has always been carried out through the Framework Programme. In internal discussions while the 5th Framework Programme was being prepared, Commission officials at the then DG-XII (now DG Research) had noted that more than 8% of the total number of participants in the BRITE, EURAM, ESPRIT, ACTS and TRANSPORT programmes were defence-related organisations. Of course, the projects in which they participated complied with the civilian objectives of the Framework programme; yet, the involvement of firms and laboratories with a very high degree of dependence on military work, suggested the dual-use nature of the projects under development. Previously, the European Commission had estimated that as much as one third of the overall Community research budget was invested in areas of "potential dual-use interest" (European Commission 1996).

The issue of how to deal with dual-use technologies in the context of the 5th Framework emerged explicitly during the discussions that led to its design and approval. This topic had already appeared in relation to the definition of the 4th Framework Programme. Then, the "Industrial R&D Advisory Committee of the Commission of the European Communities" (IRDAC) argued in a discussion document that the Commission should play an important role in examining the extent to which the results of defence-related research could be used for civilian purposes (IRDAC 1993). Similar issues were discussed much more actively during the definition of the 5th Framework Programme, particularly during 1996 and 1997. Not only had "dual-use" policies become established in some EU countries and, particularly, in the United States, but the Commission had issued its 1996 Communication on the challenges faced by the European defence industries. The Commission Communication was discussed extensively in the European Parliament a few months before the Parliament dealt with the Framework Programme. The Parliament approved the Communication and issued a Report on it concluding, *inter alia*, that national governments should agree on long-term R&D projects, and that the EUCLID[14] defence research programme and the Community R&D programmes should be strengthened and better co-ordinated (Titley 1997, p.15). The opinion of the "Economic and Social Committee of the European Communities" (ESC) on the same Communication stated that "redefining funding for scientific and technological research in dual use terms might help to improve the technology base of the European defence industry" (ESC 1997). Yet, an official recognition of this need in the Commission research policy was fraught with difficulties, related mostly to the unclear responsibilities of the Commission and other EU institutions in defence matters. A debate followed.

Some Commission officials and organisations like the European Defence Industrial Group (EDIG) were clearly in support of the establishment of a co-ordinated approach to defence and civil research in Europe. An Industry/Research Centres/Commission

[14] EUCLID is a European defence R&D programme managed by the Western European Armaments Group.

working group argued in an internal report that the presence of dual-use research in both EUCLID and the Framework Programme provided a chance to exploit synergies, and that dual-use projects should not be negatively discriminated in the Framework Programme.[15] The working group concluded that these issues had to be considered in the discussions leading to the definition of the 5th Framework so that further steps would be "facilitated" in the 6th Framework, and pointed out that further steps could be taken particularly if the CFSP was to become a reality. Therefore, the conclusions of this working group linked the explicit consideration of dual-use and defence research issues within the Framework Programme, to the success in defining a CFSP. Such linkage was also made at the time, by critics of the inclusion of reference to dual-use research in the 5th Framework. For instance, Stelios Argyros a MEP actively involved in the discussions on the 5th Framework put forward this point in his "Opinion" on the 1996 Commission Communication. Argyros considered that proposals for the Framework Programme to attempt to enhance synergies between military and civil R&D activities, incorporating dual-use considerations were "remarkably misguided" (Argyros 1996 p.3). Among other reasons Argyros argued that this approach would "suggest that the Framework Programme is a suitable tool for forging a common foreign and security policy (CFSP). …. Just because such a policy does not yet exist, the Commission or individual Member States should not try to bring it about through EU research policy" (Argyros 1996, p.3). In other words, the inclusion of defence-related initiatives in the Framework Programme had to be the result of, rather than the means to, a CFSP.

The reluctance to make an explicit reference to dual-use issues in the 5th Framework was buttressed by those political groups that were completely opposed to any mention of defence-related research among the Commission responsibilities. Given the political difficulties that this issue was likely to open, it was decided to let matters stand where they were.

In the context of a policy vacuum, defence companies continue to access Framework Programme funds through dual-use research projects, but still face the uncertainty that their defence activities may count against their chances of success when submitting proposals. Not only is there no strategic vision behind a European defence or dual-use research policy, but, in the absence of explicit guidelines, it continues to be left to individual evaluators to decide whether a project which could have defence applications should be funded.

Conclusions: European research policy and new perspectives on European security

This paper has argued that defence-related research remains an important component of European scientific and technological activity. There are opportunities for the wider

[15] For some time, defence industrialists had privately voiced concerns that, in practice, they had been discriminated in the implementation of the Framework Programme. They felt there had been instances in which they had failed to win research projects because the evaluators had reacted negatively to the presence of a "defence company" requesting EC research funds, regardless of whether the objective of the study was (or was presented as) civilian. In the absence of clear guidelines on dealing with dual-use issues, it was often left to the individual reviewers to make private assessment as to whether or not the involvement of a defence-related company was acceptable. Although formally, defence-related firms could not be discriminated against, in practice their defence nature appears to have barred their participation in some EC-funded research projects.

exploitation of research efforts and improved coordination of government research investments. It is however this interaction between security and research matters that has so far stifled the development of Europe-wide common defence R&D strategies. The Framework Programme has yet to address the implications of dual-use technologies and has not taken into consideration the activities of the much more modest European defence research programme (EUCLID). While the exploitation of dual-use capabilities in as broad a range of applications as possible has been a priority of US research policy for several years, in Europe these issues have been left to the national authorities.

Meanwhile, the growing interaction between technologies developed for civilian and for military use has led to a situation in which it is increasingly difficult to refer to distinct military and civilian "technology bases". From the point of view of policy formulation a strict separation between defence and civilian technologies is increasingly appearing as anachronistic. Many problems will emerge from such a development, particularly in the area of arms and technology transfers. In any case, a strict separation between defence and civilian technological activities cannot constitute the basis of a research policy programme, nor can it be a criterion on which to select research projects submitted to a programme.[16] The Framework Programme has long been funding research into dual-use technologies, and is bound to continue to do so. The extent to which the consideration of dual-use will become an explicit element in the development of the 6th Framework Programme will again emerge as a matter of debate, probably with more force than ever before.

There are different avenues through which dual-use and defence-related research could be given formal consideration in the development and implementation of the 6th Framework Programme. These will be contingent however on the evolving role of the Western European Union and the Western European Armaments Group (WEAG), and their relationship with the European Commission. If EUCLID continues its activities and the WEAG retains the responsibility for its management, an avenue would be a formal process of co-ordination between EUCLID and the Framework Programme. As it stands, such co-ordination would remain a difficult task. Not only are they very different in size, but they are also managed in different ways: while the Framework Programme is managed at the European level, EUCLID relies on national agencies to administer substantial areas of the programme.

Another avenue would be the explicit inclusion of dual-use objectives and considerations in the 6th Framework Programme. Dual-use considerations could be made a criterion for the selection of research programmes or projects. Also, the Commission could identify key dual-use technology fields where European research efforts are weak, and incorporate them into the Framework Programme planning.

These are difficult questions, both at the political and at the policy level and they will require early attention. In any case, however, the organisational structure and the goals of a *European* defence and security policy need to be firmly established, so that specific defence related research objectives can be developed within a European framework.

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16 For a more detailed discussion of this issue see Molas-Gallart and Robinson (1997).

References

Alic, J., L. Branscomb, et al. (1992). *Beyond Spinoff. Military and Commercial Technologies in a Changing World*. Boston: Harvard Business School Press.

Argyros, S. (1996) *Opinion for the Committee on Foreign Affairs, Security and Defense Policy on the challenges facing the European defence-related industry (COM(96)0010 – C4-0093/96).* 18 December. Brussels: European Parliament.

Cooper, P. and P. Finnegan (1995). Firms Exit Military Chip Arena. Shift to Commercial Products, Erodes Critical Supplier Base. *Defense News*. **10** (28 August- 3 September)**:** 3, 20.

European Commission (1996). *The challenges facing the European defence-related industry, a contribution for action at European level* COM(96) 10 final, 24 January. Brussels, European Commission.

________ (1997). *Implementing European Union Strategy on Defence-Related Industries*. Commission Communication to the Council, the European Parliament, the Economic and Social Committee and the Committee of the Regions. COM (97) 583 final, 12 November. Brussels, European Commission.

ESC (1997). *Opinion on the Communication from the Commission – The challenges facing the European defence-related industry, a contribution for action at European level.* 19-20 March. Brussels: Economic and Social Committee of the European Communities.

Gummett, P. and A. James (1998). The UK. Paper prepared for the 2nd Meeting of the METDAC Network. Budapest 8-10 October.

Hagelin, B. and J. Reppy (1998). The United States RDT innovative system 1987-1997. Paper prepared for the 2nd Meeting of the METDAC Network. Budapest 8-10 October.

IRDAC (1993). *IRDAC Opinion on Framework Programme IV.* 8 October. Brussels: Industrial R&D Advisory Committee of the Commission of the European Communities.

Jones, A. and S. Budd (1994). *The European Community. A Guide through the Maze.* 5th edition. London: Kogan Page.

Molas-Gallart, J. (1997) Which way to go? The diversity of “dual-use” technology transfer. *Research Policy* Vol. 26 (3): 367-385.

________ (1999) Measuring Defence R&D: A Note on Problems and Shortcomings. *Scientometrics*. Vol 45 (1): 3-16.

Molas-Gallart, J., J. Farrero, and F. Mañà (1998). Spain. Paper prepared for the 2nd Meeting of the METDAC Network. Budapest 8-10 October.

Molas-Gallart, J. and J.P. Robinson (1997) *Assessment of Dual Technologies in the Context of European Security and Defence*. Final Report. Working document for the STOA Panel. PE 166 819/Final. October, Luxembourg: European Parliament, Directorate General for Research.

National Research Council (1996). Driving Innovation Through Materials Research. Proceedings of the 1996 Solid States Sciences Committee Forum. Washington, DC: National Academy Press.

Oranisation for Economic Co-operation and Development (1994). *The measurement of scientific and technological activities. Proposed standards practice for surveys of research and experimental development. Frascati Manual 1993*. Paris: OECD.

Patten, C. (1999) The Future of the European Security and Defence Policy (EPSD) and the role of the European Commission. Speech by Rt Hon Chris Patten, CH, Member of the European Commission responsible for External Relations to the *Conference on the Development of a Common European Security and Defence Policy. The Integration of the New Decade*. Berlin 16 December. http://europa.eu.int/comm/external_relations/speeches/patten/speech_99_215.htm

Serfati, C. (1998). France. Paper prepared for the 2nd Meeting of the METDAC Network. Budapest 8-10 October.

Smit, W. (1998) National military innovation systems: the Netherlands. Paper prepared for the 2nd Meeting of the METDAC Network. Budapest 8-10 October.

Stewart, W. (1989). International Comparisons of Defence Research and Development. A report for British Aerospace.

Titley, G. rapporteur (1997). *Report on the Commission communication on the challenges facing the European defence-related industry, a contribution for action at European level*. A4-0076/97. 6 March. European Parliament.

US Congress. Office of Technology Assessment (1988). *Holding the Edge: Maintaining the Defence Technology Base*. OTA-ISC-420. Washington, DC: US Government Printing Office.

________ (1993). *Contributions of DOE Weapons Labs and NIST to Semiconductor Technology.* Washington, D.C.