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Civilian–military co-operation strategies in developing new technologies

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Abstract

Dual use technology has been advocated as the solution for the twin problem of maintaining a high tech defence technology base and improving economic competitiveness. The concept of dual use technology turns out to be rather imprecise representing a multitude of different meanings. This paper focuses on one important aspect, notably the co-operation between civilian and military actors in developing a new technology, by analysing the evolution of a socio-technical network related to the development of an advanced battery in The Netherlands.

The analytical framework used for interpreting the empirical case builds on theories of socio-technical networks and on two previous and complementary analyses in *Research Policy* on dual use technology. Our analysis of the dynamics underlying the evolution of the ‘battery network’ shows how the emerging notion of the battery’s duality became a window of opportunity for a co-operation strategy of either joint or concurrent development of the battery for both civilian and military applications. The interactions within the evolving network are steered by the search for expertise and funding.

In view of the difficulties of realising civilian–military integrated joint development projects, the establishment of ‘dual capacity networks’ is suggested as part of a possible strategy towards an integrated civilian–military technology and industrial base.

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1. Introduction

1.1. The concept of ‘dual use’

During the last decade governments, and to a lesser degree, defence related companies have shown substantial interest in the issue of dual use technology: technology that has, generally speaking, both military and civilian applications. Though the concept of dual use technology is not entirely new, for some

technology fields its meaning has shifted from a problematic to a desirable feature. The concept entered the discourse on weapons and technology exports that started in the years after World War II (Reppy, 1999). The acrimonious East–West relations soon resulted in the establishment of the Co-ordinating Committee for Multilateral Export Controls (COCOM) in 1949. It became the major framework for the US and its allies for export controls. Under this regime, dual use was viewed as a negative feature that complicated export controls: countries might try to obtain militarily sensitive technology under the guise of buying civilian technology. The presumed dual nature of some products

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and technologies also created tensions between the economic and the defence perspective on technology exports, not only within the US, but also between the US and west-European countries (Bertsch, 1988).

By the time the Cold War ended, a profound change in the discourse on dual use products occurred. Rather than a negative feature, the dual use aspect of technology was viewed as something that should be promoted and pursued, as it might solve the twin problem of maintaining a high tech defence technology base restrained by limited budgets, and improving a country's economic competitiveness by a more efficient allocation of R&D funds. From this perspective, the civilian and military contexts for developing technology should be integrated where possible, rather than separated by a technological divide between military and civilian applications (OTA, 1994, 1995).

Though at face value the distinction between civilian and military technology seems obvious, from an analytical point of view it appears that such a distinction, and therefore the concept of dual use technology, is less clear. One position on the meaning of civilian, military and dual use technology is that it is an intrinsic feature of the technology or product itself. The opposite and equally extreme position is that it all depends on the social context of the (use of) technology. The former position seems very hard to maintain. For instance, in the 1960s and 1970s even nuclear explosives have been designated as having possible civilian applications, like digging canals and creating underground storage cavities, next to being used as nuclear weapons (see e.g. Davies (1979)). No intrinsic feature distinguished nuclear explosives for military purposes from those for peaceful purposes. Indeed, basically all the R&D required to develop these explosives were the same, only the intention of application and the accompanying institutional setting might be different (Goldblat, 1982, p. 27).¹ Nowadays, however, the perceptions have changed, and such civilian applications are no longer considered as a serious option: nuclear explosions now have only military applications. In the same vein, Gummert (1991) has argued that the distinction between military and civilian technology

is an institutional rather than an intrinsic one. Still, given a certain social-cultural setting, some technologies will be more apt for applications in both domains than others. In the next section we will describe the perspective of our study on the phenomenon of dual use technology.

1.2. *This study's perspective on dual use*

From a technology studies perspective, which emphasises the mutual shaping of technology and its social context, neither the proposition that the military or civilian nature of a technology is located only in the technology itself, nor that it all and only depends on the social context is tenable. In line with this view, we will focus on the *interactions* between civilian, military and dual-oriented actors, which shape both technology and context. Many aspects—technological, cultural, social and organisational—will influence the interpretation of a technology as being military, civilian or dual use. These include, differences in governmental influence and regulations, goals (national security versus commerce), market structure, standards and specifications ('milspecs'), sensitivity to costs, different product cycles (years in the commercial versus decades in the military sector), industrial and technological 'cultures'. Alic et al. (1992) comment on military and commercial technological innovation as two systems which, though drawing on a common base of technical knowledge, "involve different sets of institutions and in general operate quite differently—the result of differences in goals and technical requirements, as well as in managerial arrangements accompanying defence production in particular and all governmental activities in general. "[...] As a result, in the majority of cases military and commercial innovation have evolved distinctive technical 'cultures' [...]." MacKenzie (1990), in a detailed study on the development of guidance technologies in their social context and on technological choices for improving accuracy, has shown how different emphases in requirements for missile accuracy and for civilian (and military) air navigation resulted in alternative forms of technological change: the former focusing on accuracy; the latter, on reliability, producibility and economy.

In this article, rather than focusing on conceptual problems of the meaning of dual use technology, we

¹ Of course, the development of delivery systems for nuclear weapons and the adaptation of nuclear explosives to this end may require further R&D. For the physics and principles of nuclear explosives, see e.g. Hansen (1988, pp. 18–29).

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