

Dual-use technology

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In politics and diplomacy, **dual-use** is technology that can be used for both peaceful and military aims.

More generally speaking, dual-use can also refer to any technology which can satisfy more than one goal at any given time. Thus, expensive technologies which would otherwise only serve military purposes can also be used to benefit civilian commercial interests when not otherwise engaged such as the Global Positioning System.

Dual use goods are products and technologies normally used for civilian purposes but which may have military applications.^[1]

-European Commission, Trade Topics, Dual Use

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Missile

Originally developed as weapons during the Cold War, the United States and the Soviet Union spent billions of dollars developing rocket technology which could carry humans into space (and even eventually to the moon). The development of this peaceful rocket technology paralleled the development of intercontinental ballistic missile technology and was a way of demonstrating to the other side the potential of one's own rockets.

Those who seek to develop ballistic missiles may claim that their rockets are for peaceful purposes, e.g., are for commercial satellite launching or scientific purposes. However even genuinely peaceful rockets may be converted into weapons, and provide the technological base to do so.

Within peaceful rocket programs different peaceful applications can be seen as having parallel military ones for example the return of scientific payloads safely to earth from orbit would be indicative of a re-entry vehicle capability and the demonstration of the ability to launch multiple satellites with a single launch vehicle can be seen in a military context as having the potential to deploy multiple independently targetable reentry vehicles.

Nuclear

Dual-use technology refers to the possibility of military use of civilian nuclear power technology. Many technologies and materials associated with the creation of a nuclear power program have a dual-use capability, in that several stages of the nuclear fuel cycle allow diversion of nuclear materials for nuclear weapons. When this

happens a nuclear power program can become a route leading to the atomic bomb or a public annex to a secret bomb program. The crisis over Iran's nuclear activities is a case in point.^[2]

Many UN and US agencies warn that building more nuclear reactors unavoidably increases nuclear proliferation risks.^[3] A fundamental goal for American and global security is to minimize the proliferation risks associated with the expansion of nuclear power. If this development is "poorly managed or efforts to contain risks are unsuccessful, the nuclear future will be dangerous".^[2] For nuclear power programs to be developed and managed safely and securely, it is important that countries have domestic "good governance" characteristics that will encourage proper nuclear operations and management.^[2]

These characteristics include low degrees of corruption (to avoid officials selling materials and technology for their own personal gain as occurred with the A.Q. Khan smuggling network in Pakistan), high degrees of political stability (defined by the World Bank as "likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism"), high governmental effectiveness scores (a World Bank aggregate measure of "the quality of the civil service and the degree of its independence from political pressures [and] the quality of policy formulation and implementation"), and a strong degree of regulatory competence.^[2]

Chemical

The modern history of chemical weapons can be traced back to the chemical industries of the belligerent nations of World War I, especially that of Germany. Many industrial chemical processes produce toxic intermediary stages, final products, and by-products, and any nation with a chemical industry has the potential to create weaponised chemical agents.

Biological

Lax biosecurity at laboratories is worrying researchers and regulators^[4] that potential select agents may have fallen into the hands of malevolent parties. It may have been instrumental to the 2001 anthrax attacks in the United States. Universities sometimes flout regulations, complacent as to the dangers in doing so. Though the majority of breaches are benign, the hybridization of hepatitis C and dengue-fever viruses at Imperial College London in 1997 resulted in a fine when health and safety rules were not observed. A research program at Texas A&M University was shut down when *Brucella* and *Coxiella* infections were not reported. That the July 2007 terrorist attacks in central London and at Glasgow airport may have involved National Health Service medical professionals was a recent wake-up call that screening people with access to pathogens may be necessary. The challenge remains to maintain security without impairing the contributions to progress afforded by research.^[5]

Reports from the project on building a sustainable culture in dual-use bioethics suggest that, as a result of perceived changes in both science and security over the past decade, several states and multilateral bodies have underlined the importance of making life scientists aware of concerns over dual-use and the legal obligations underpinning the prevention of biological weapons. One of the key mechanisms that have been identified to achieve this is through the education of life science students, with the objective of building what has been termed a "culture of responsibility".

At the 2008 Meeting of States Parties to the Biological and Toxin Weapons Convention (BTWC), it was agreed by consensus that: States Parties recognized the importance of ensuring that those working in the biological sciences are aware of their obligations under the Convention and relevant national legislation and guidelines...States Parties noted that formal requirements for seminars, modules or courses, including possible mandatory components, in relevant scientific and engineering training programmes and continuing professional education could assist in raising awareness and in implementing the Convention.^[6]

With several similar stipulations from other states and regional organisations, there is evidence to suggest that the concept of biosecurity education has become increasingly salient in the contemporary security discourse. Unfortunately however, there is an emerging understanding in both the policy and academic literature that life scientists across the globe are frequently uninformed or underinformed on issues such as biosecurity, dual-use, the BTWC and national legislation outlawing biological weapons.^{[7][8]} Moreover, despite numerous declarations by states and multilateral organisations, the extent to which statements at the international level have trickled down to multifaceted activity at the level of scientists remains limited.^{[9][10]}

Night Vision & Thermal Imaging

Imaging systems with extraordinary performance characteristics (high gain, specific spectral sensitivity, fine resolution, low noise) are heavily export-restricted by the few states capable of producing them, mainly to limit their proliferation to enemy combatants, but also to slow the inevitable reverse-engineering undertaken by other world powers.

These precision components, such as the image intensifiers used in night vision goggles and the focal plane arrays found in surveillance satellites and thermal cameras, have numerous civil applications which include nature photography, medical imaging, firefighting, and population control of predator species.

Night scenes of wild elephants and rhinos in the BBC nature documentary series Africa were shot on a Lunax Starlight HD camera (a custom-built digital cinema rig encompassing a Generation 3 image intensifier), and recolored digitally.^[11]

In the United States, civilians are free to buy and sell American-made night vision and thermal systems, such as those manufactured by defense contractors Harris, L3 Insight, and FLIR Systems, with very few restrictions. However, American night vision owners may not bring the equipment out of the country, sell it internationally, or even invite non-citizens to examine the technology, per International Traffic in Arms Regulations.^[12]

Export of American image intensifiers is selectively permitted under license by the United States Department of Commerce and the State Department. Contributing factors in acquiring a license include diplomatic relations with the destination country, number of pieces to be sold, and the relative quality of the equipment itself, expressed using a Figure Of Merit (FOM) score calculated from several key performance characteristics.

Competing international manufacturers (European defense contractor Photonis Group, Japanese scientific instrument giant Hamamatsu Photonics, and Russian state-financed laboratory JSC Katod) have entered the American market through licensed importers. In spite of their foreign origin, re-export of these components outside of the United States is restricted similarly to domestic components.

A 2012 assessment of the sector by the Department of Commerce and Bureau of Industry and Security made the case for relaxing export controls in light of the narrowing performance gap and increased competition internationally,^[13] and a review period undertaken by the Directorate of Defense Trade Controls in 2015 introduced much more granular performance definitions.^[14]

Other technologies

In addition to obvious and headline grabbing dual-use technologies there are some less obvious ones, many erstwhile peaceful technologies can be used in weapons. One example during the First and Second World War, is the role of German toy manufacturers. Germany was one of the leading nations in the production of wind-up toys, the ability to produce large numbers of small and reliable clockwork motors was converted into the ability to produce shell and bomb fuses.

Control

Most industrial countries have export controls on certain types of designated dual-use technologies, and they are required by a number of treaties as well. These controls restrict the export of certain commodities and technologies without the permission of the government. The principal agency for investigating violations of dual use export controls in the United States is the Bureau of Industry & Security, Office of Export Enforcement.^[15] Interagency coordination of export control cases are conducted through the Export Enforcement Coordination Center (E2C2).

There are several international arrangements among countries which seek to harmonize lists of dual-use (and military) technologies to control. These include the Nuclear Suppliers Group, the Australia Group, which looks at chemical and biological technologies, the Missile Technology Control Regime, which covers delivery systems for weapons of mass destruction, and the Wassenaar Arrangement, which covers conventional arms and dual-use technologies.

See also

- Treaty on the Non-Proliferation of Nuclear Weapons

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13. "Critical Technology Assessment: Night Vision Focal Plane Arrays, Sensors, and Cameras". *bis.doc.gov*. US Department of Commerce. Retrieved 9 December 2016.
14. "Export Control Reform Comes to USML Category XII". *Export Law Blog*. Retrieved 9 December 2016.
15. <https://www.bis.doc.gov/index.php/oe>

External links

- U.S. Department of Commerce, Bureau of Industry and Security (<http://www.bis.doc.gov>)
- Militarily Critical Technologies List (MCTL) (<http://www.dtic.mil/mctl/>) from the US Government's Defense Technical Information Center (<http://www.dtic.mil/>)
- Federation of American Scientists Case Studies in Dual-Use Research (<https://fas.org/biosecurity/education/dualuse/index.html>)
- University of Bradford Disarmament Research Centre Dual Use Bioethics Homepage. (<http://www.bradford.ac.uk/bioethics/>)
- European Commission, List of Dual-use items and technologies (http://trade.ec.europa.eu/doclib/docs/2008/september/tradoc_140595.pdf)
 - Commission updates EU control list on dual use items (<http://trade.ec.europa.eu/doclib/press/index.cfm?id=1166>) (22 October 2014)
- European Parliament Rapporteur Marietje Schaake on Dual-Use / Surveillance Technology (<http://www.vieews.eu/foreign-affairs/dual-use-surveillance-technology-marietje-schaake-mep-alde/>)

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Categories: Military technology | Nuclear proliferation

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