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UOW Response to the Inquiry into Defence Trade Controls Amendment Bill 2023 [Provisions]

The University of Wollongong (UOW) welcomes the opportunity to respond to the exposure draft of the Defence Trade Controls Amendment Bill 2023. We note the proposed amendments and have reflected on how these might influence the operations of UOW as follows:

1. We seek clarity on the extent to which the inclusion of ‘DSGL Services’ as defined (including ‘training’) may encompass advanced research where such research includes activities such as design, manufacture, testing and assembly of items defined in the DSGL (especially Part 2). We seek this clarification because Subsection 4(1)17.b) includes ‘any other DSGL goods or DSGL technology that are prescribed by the regulations’ and is therefore beyond the construct of DSGL Part 1.

Universities routinely undertake research activities that generate prototype components or sub-components which are the result of design, manufacture and engineering thereof, which potentially fall under the ‘fundamental research’ exemption.

2. We seek clarity on the extent to which components and sub-components of systems described and encompassed by the DSGL, are included in the DSGL (especially Part 2) and by the definitions of ‘DSGL goods’ and ‘DSGL technology’. In a sense, our efforts are similar to the ‘Build to print’ exemption, where universities would typically conduct research to construct/manufacture a component, which may be tested or validated within a standard system that is usually civilian in nature.
3. We welcome the proposed amendment to the definition of ‘fundamental research’. It appears from both the AU and USA definitions that the principal defining feature is whether the intention is to publish and disseminate the results of the research, somewhat independent of the state of maturation of the technology.
4. We seek clarification on whether the interpretation is correct, i.e., that the project should be effectively unencumbered by restrictions from publication and that the intention is to publish and/or disseminate the results, in order to fall within the exemption.
5. UOW supports the proposed definition and the interpretation we present above. This definition and interpretation cover the majority of university research.
6. We seek clarification on whether a temporary injunction from publication, for example, to enable patenting, would lead to the research falling outside of the exemption (e.g., for a maximum period of 90 days from the tendering of a notice of intention to publish).
7. We seek clarification on whether technology maturation falls within the scope of the exemption (e.g. a prototype at TRL 6). The USA definitions exclude ‘industrial development, design, production, and product utilization, the results of which ordinarily are restricted for proprietary or national security reasons’. It could be argued that middle-advanced prototypes fall under the concept of ‘industrial development’.
8. We seek clarification on whether the state of maturation of a technology could exclude it from the exemption, regardless of whether or not there are restrictions on publication of the results



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(e.g. up to TRL 5 is included in the exemption, beyond TRL 5 is excluded from the exemption. In the USA, the notion of ‘Experimental Development’ is contemplated as one of three embodiments of research (Basic, Applied, Experimental Development), a version of which is ‘*Systematic application of knowledge or understanding, directed toward the production of useful materials, devices, and systems or methods, including design, development, and improvement of prototypes and new processes to meet specific requirements. (adapted from OMB Circular A-11, FASAB, and NSF Definitions)*’. This definition was sourced from <https://osp.uccs.edu/export-controls/export-control-definitions>.

The full definition per OMB Circular A-11 is:

Experimental development (character class codes 143x). Creative and systematic work, drawing on knowledge gained from research and practical experience, which is directed at producing new products or processes or improving existing products or processes. Like research, experimental development will result in gaining additional knowledge.

For reporting experimental development activities, include the following:

- *The production of materials, devices, and systems or methods, including the design, construction, and testing of experimental prototypes.*
- *Technology demonstrations, in cases where a system or component is being demonstrated at scale for the first time, and it is realistic to expect additional refinements to the design (feedback R&D) following the demonstration.*

However, not all activities that are identified as "technology demonstrations" are R&D.

If the state of maturation of a technology in and of itself excludes the research from the exemption, whether encumbered or not with restrictions on publication, we recommend a clarifying statement that excludes it from the ‘Fundamental Research’ exemption.

9. We recommend that consideration be given whether to specify that the *results* of fundamental research, *not the items*, fall under the exemption. This aligns with the USA protocols and would clarify the AU intentions, and would imply that physical items must be controlled and accounted for, even from ‘foreign persons’ who participated in their development and testing.

UOW DEFENCE CAPABILITIES

The University of Wollongong (UOW) has a long-standing history of providing education, research, and innovative technology and services to help meet the needs of Australia’s Defence.

We consistently develop highly skilled STEM graduates, and this is central to meeting the objectives of strengthening Australia’s sovereign capabilities and supporting Nuclear-Powered Submarine Program initiatives. UOW is uniquely positioned to drive innovation and cultivate the AUKUS workforce by providing cutting-edge research facilities, access to industry partnerships, and specialised education programs. While defence-related education and research is undertaken across the University, the supply of high-quality and relevant research and innovative technology has been driven by UOW’s strengths in science, engineering, and IT.



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UOW's capabilities in Defence include signal processing, robotic welding, steels, human performance, radiation physics/detection, post-quantum cryptography, undersea surveillance, autonomous systems and AI, digital twins, maritime law/law of the sea, communications, innovative materials, and diplomacy. Capabilities aligned with the national Defence Strategic Review (DSR) include statecraft, Northern Australia bases, fuels, supply chains, long-range fires, and nuclear-powered submarines. Activities aligned with priorities in the Advanced Strategic Capabilities Accelerator (ASCA) program include hypersonics, trusted autonomy, quantum technology, directed energy, information warfare, and long-range fires.

UOW has made significant research and development contributions to major Defence projects, particularly in the fields of welding, robotics, automation and materials. Centres and institutes that specialise in our capabilities are:

- **Materials sciences:** Australian Institute of Innovative Materials, the Intelligent Polymer Research Institute, and the Institute for Superconducting and Electronic Materials
- **Energy generation and storage:** Australian Institute of Innovative Materials and the Institute for Superconducting and Electronic Materials
- **Welding, joining and automation:** Facility for Intelligent Fabrication and UOW Industry 4.0 Hub
- **Information technology and cybersecurity:** Institute of Cybersecurity and Cryptology and the Decision Systems Lab
- **Robotics and sensors, including trusted autonomous systems:** Facility for Intelligent Fabrication, UOW Industry 4.0 Hub, SMART Infrastructure Facility, and the Decision Systems Lab
- **Medical countermeasures and chemical threats** - including toxicology, antimicrobial resistance and radiation protection: Centre for Medical Radiation Physics, Molecular Horizons, Centre for Atmospheric Chemistry, and the Centre for Environmental Informatics
- **Enhanced human performance:** Centre for Medical and Exercise Physiology, and the Intelligent Polymer Research Institute
- **Integrated intelligence** – including sonar and radar technology, and reconnaissance through artificial vision and crowd-monitoring applications: SMART Infrastructure Facility, Institute for Superconducting and Electronic Materials, and the Centre for Signal and Information Processing
- **Other areas including Internet of Things, decision support systems, maritime security and law, and use of drones:** SMART Infrastructure Facility, Future Mobility Group, Australian National Centre for Ocean Resources and Security, and the Decision Systems Lab

UOW is a founding partner of the DMTC (formerly Defence Materials Technology Centre) and is part of the Defence Science Partnership Program with the Defence Science and Technology Group (DST Group). UOW is also a founding member of the Defence Innovation Network (DIN), which brings together leading scientists and engineers from nine public universities in NSW and ACT.

UOW works with industry, government, universities and other partners, such as the Australian Nuclear Science and Technology Organisation (ANSTO), the University of South Australia, and Osborne Naval Shipyard to deliver solutions and technology to the challenges faced by Defence. UOW is the only Australian university that represents the tertiary education sector on the Naval Shipbuilding Industry Representative Committee.



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The work undertaken by UOW and DMTC includes the core activities of welding and joining, industrial automation and steel design, together with additive manufacturing, corrosion, advanced armour, and piezoelectric sonar. UOW has made significant research and development contributions to major Defence projects, particularly in the fields of welding, robotics, automation and materials. Projects include the Bushmaster and Hawkei armoured vehicles built by Thales Australia, maritime welding and fabrication for the Collins Class submarines and the Air Warfare Destroyers.

Four research groups across UOW are actively engaged in naval research. These are the Decision Systems Lab (DSL), DMTC, the Australian National Centre for Ocean Resources and Security (ANCORS), and the Centre for Signal and Information Processing (CSIP).

The DSL has had significant engagement with a variety of Defence entities such as the DST Group, BAE Systems and Lockheed Martin Australia around AI applications in Defence. A NSW Defence Innovation Network pilot project that DSL researchers are working on investigates autonomous systems and systems engineering in conjunction with BAE Systems.

Through several real-world and Defence-initiated projects, the CSIP is training the next generation of researchers with skills in AI and machine learning. CSIP researchers have developed AI tools for drone imaging to detect targets and AI algorithms for biometric applications such as age prediction from facial images. They are also developing machine learning tools for maritime vessel surveillance using satellite imagery.

ANCORS has collaborated with the Australian Border Force (ABF) and Maritime Border Command (MBC) for many years, supporting the Australian Government to enhance national maritime security through improved border protection measures. Every year, ANCORS undertakes capacity-building activities in maritime security on behalf of the Department of Foreign Affairs and Trade and ABF in Malaysia, Indonesia, Papua New Guinea, Vietnam and the Philippines.

Researchers at UOW's Institute for Superconducting and Electronic Materials (ISEM) are working with the DST Group to provide knowledge and technology of relaxor-ferroelectric crystal growth, enabling advanced ultrasound transducers for ultrasound medical imaging and underwater acoustic imaging. At the Intelligent Polymer Research Institute (IPRI), researchers are collaborating with the Australian Department of Defence (Land Division) and the DST Group to develop a new type of soft body armour using smart materials.

Research at the SMART Infrastructure Facility in the areas of social media data analysis, intelligent sensors and the Internet of Things (IoT) have enormous potential in Defence applications, from monitoring suspicious social events for terrorism threats to tracking and managing Defence assets.

UOW's membership in the Defence Industry Security Program (DISP) and our levels of accreditation significantly differentiate us from many other Australian universities. UOW has achieved Level 2 membership for Governance, and Personnel Security (SECRET) as well as being underpinned by entry-level membership for Physical Security, and Information/Cyber Security (UNCLASSIFIED).

Our Chief Security Officer holds an active high-level security clearance. The Chief Security Officer sponsors UOW staff to obtain required security clearances to undertake Defence research and associated activities. UOW has a Defence Strategy Leader and Defence Security Officer and Network Leader.



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Examples of current activities include:

- The team at the Facility of Intelligent Fabrication has played a pivotal role in the success of DMTC projects. Notably, their recent project, conducted in conjunction with DMTC and partners BlueScope and the DSTG, led to the development of enhanced, more survivable, naval shipbuilding steel.
- The Australian Institute for Innovative Materials at UOW is central to a \$6 million NGTF/DSTG/DMTC Advanced Piezoelectric Materials and Applications Program for next-generation sonar.
- BAE Systems Maritime Australia and ASC Shipbuilding are involved in a three-year project with UOW and ANSTO for weld modelling and distortion control for Hunter Class Frigates.
- UOW recently completed a four-year investigation into Life of Type Extension (LOTE) of Collins-class submarine steel grades and repair procedures.
- Researchers from UOW's Decision Systems Lab are collaborating across seven research projects to inform Defence of the potential benefits and practical limitations of cyber technologies.
- In collaboration with Hover UAV and NSW Defence Innovation Network (DIN), SMART is exploring flexible and dynamic solutions for cooperative operation of ground vehicles and UAVs for emergency and disaster management.