TUS Export Controls for Researchers Policy Guidelines

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Approval:

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1.0	Joint VPs & Dean Council	24/04/2023

This Policy was approved by Joint VPs and Dean Council. It shall be reviewed and, as necessary, amended by the University annually. All amendments shall be recorded on the revision history section above.

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Contents

Introduction

1. The Technological University of the Shannon: Midlands Midwest supports, develops, and welcomes knowledge creators, innovators, and entrepreneurs, while supporting regional and national industry and other stakeholders. Our vision is to deliver excellence in multidisciplinary research practice and encourage collaboration between researchers and strategic European and global partners in industry and academia. The aim is to advance the key research priorities relevant to the region, aligned with national and European research priorities, and the United Nations' Sustainable Development Goals (SDGs). Technological University of the Shannon: Midlands Midwest is renowned for active leadership in education, enterprise, and engagement. TUS is committed to providing an environment where research integrity prevails through the promotion of good research practices, together with the use of fair and transparent procedures. The National Policy Statement on 'Ensuring Research Integrity in Ireland', substantively based on the European Code of Conduct for Research Integrity, and the National forum on Research Integrity commits Irish research performing organisations to the highest standards of integrity in carrying out their research, so that partners and other stakeholders, and the international research community have full confidence in the Irish research system.

2. International collaboration is a fundamental part of TUS research activity, our researcher's career development and national research success. TUS's network of international research partners is evolving as diversification of our global linkages grows. This brings with it a host of opportunities, for example, partnerships with globally leading researchers and access to cutting-edge research facilities. International research collaboration also carries risks. Among these is the potential to, even unintentionally, breach national and international law by collaborating in ways that contravene international legal frameworks designed to:

    - Prevent the proliferation of weapons of mass destruction,
    - Support global security,
    - Protect human rights,
    - Prevent terrorism,
    - Support regional stability.

3. Dual-use export controls govern activities involving items (materials) equipment, software, and technologies) which can be used for both civil and military purposes and possibly associated with the creation of conventional military items or the proliferation of nuclear, radiological, chemical, or biological weapons, also known as Weapons of Mass Destruction, and their delivery systems such as missiles and drones.

4. As a result, researchers at TUS may require an export licence from the Trade Licensing & Control Unit of the Department of Enterprise, Trade and Employment (DETE). In the researcher context, export controls are most likely to apply in relation to scientific and technical research with military, nuclear, chemical, biological, missile and aerospace applications.

1https://enterprise.gov.ie/en/Publications/Publication-files/Export-Licensing-and-Control-Information-for-Exporters.pdf
2 https://trade.ec.europa.eu/consultations/documents/consul_183.pdf
3https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv%3AOJ.L_.2021.338.01.0001.01.ENG&toc=OJ%3AL%3A2021%3A338%3ATOC
4https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32009R0428
5https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1550829571808&uri=CELEX:32019R0125

However, all researchers, particularly those in the scientific and engineering disciplines, need to understand export control regulations and ensure that they comply with them. Compliance with export control should also be seen as part of the broader responsibility for research integrity. A breach of controls would constitute a serious offence and could result in the guilty party being liable to a fine or imprisonment. These penalties apply to both individuals and corporate entities.

5. It is the responsibility of each individual researcher to ensure that they do not export controlled items without an appropriate licence. Researchers are expected to familiarise themselves with this guidance policy with due reference to the Government of Ireland Export Licensing and Control Information for Exporters[1], EU compliance guidance for research involving dual-use item[2] and European COMMISSION RECOMMENDATION (EU) 2021/1700 on internal compliance programmes for controls of research involving dual-use items under Regulation (EU) 2021/821 of the European Parliament and of the Council[3].

Export Controls

1. The European Union operates a system of controls on the export of sensitive items from the member states. These controls form part of a global framework designed to prevent the proliferation of weapons of mass destruction, to preserve regional stability and to protect human rights. Export controls under the relevant legal frameworks comprise licensing requirements for certain sensitive goods, technologies and technical assistance or export restrictions (sanctions) in respect of certain destination countries or end-users.

2. In Ireland, the Department of Enterprise, Trade and Employment (DETE) is the national competent authority. Its Trade Licensing & Control Unit is responsible for administering the export licensing system set out in the relevant Irish and European legislation. This guidance is for 'research involving dual-use items': dual-use items that are used during research or research that results in research output in any possible form meeting the technical specification of a dual-use item in the EU dual-use control list or in a complementary national dual-use list (if any).

3. In a limited number of cases, it includes situations with military or WMD end-use(r) concerns for non-listed dual-use items. It is important to note that not every research activity involving dual-use items will require an authorisation. The Trade Licensing & Control Unit has produced a general guide[1] for exporters, including higher education institutions, to understand export controls and their obligations under relevant EU and national legislation[1,2,3]. TUS and TUS researchers must in all cases comply with these guidelines, consistent with the HEA Principles for Good Practice in Research in HEIs and HEA governance and oversight requirements more generally.

1https://enterprise.gov.ie/en/Publications/Publication-files/Export-Licensing-and-Control-Information-for-Exporters.pdf
2 https://trade.ec.europa.eu/consultations/documents/consul_183.pdf
3https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv%3AOJ.L_.2021.338.01.0001.01.ENG&toc=OJ%3AL%3A2021%3A338%3ATOC
4https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32009R0428
5https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1550829571808&uri=CELEX:32019R0125

4. Since dual-use items are predominantly used for civilian purposes, their potential for abuse is often not apparent at first glance. In the wrong hands, however, they pose a threat to international peace and the security interests of the European Union and its Member States. The definitive list of dual-use items is set out in EU legislation, namely, Annex I of Council Regulation (EC) 428/2009[4]. The list of dual-use items is updated annually by the European Commission, based on the work of technical experts in several multilateral non-proliferation regimes, to take account of advances in technology and geo-political developments.

   The range of controlled items is very broad and spans 10 categories:

   - Category 0 Nuclear materials, facilities and equipment
   - Category 1 Special materials and related equipment
   - Category 2 Materials processing
   - Category 3 Electronics
   - Category 4 Computers
   - Category 5 Telecommunications and "information security"
   - Category 6 Sensors and lasers
   - Category 7 Navigation and avionics
   - Category 8 Marine
   - Category 9 Aerospace and propulsion

5. Many ICT products, both hardware and software (e.g., data storage, networking, cybersecurity), are classified as dual-use items by virtue of the fact that they incorporate strong encryption for security purposes. Products for aerospace applications (e.g., drones, planes, rockets) can also be controlled when there is a risk of diversion to weapon delivery systems. Most dual-use items can move freely within the EU. However, a licence is required to export them to a third country (i.e., outside the EU).

6. The exceptions, which require a transfer licence for movement within the EU, are very sensitive items such as nuclear materials, which are listed in Annex IV of the Dual-Use Regulation[4]. A licence is required for transfers of military equipment within the EU, as a well as for export to a third country (i.e., outside the EU). The export or import of items listed in Annex II of the Anti-Torture Regulation[5] is prohibited. The export of items listed in Annex III of the Anti-Torture Regulation[5] is subject to prior approval and licensing by the Department. There are corresponding licensing requirements for brokering of controlled goods and for providing technical assistance related to these goods. The legal obligation to comply with export controls rests with the exporter.

7. The aim of export controls is not to censor scientific research (output), but to prevent security-related abuse when sensitive goods or knowledge are transferred abroad. Scientists and research institutions are bound by the same laws as manufacturing industry and everyone else. Before goods are exported or information is transferred, exporters and information brokers have a duty to check whether their actions require prior regulatory approval. Academic freedom principles and/or Open Access related to research output and data does not exempt TUS researchers from complying with Export Controls regulations.

1https://enterprise.gov.ie/en/Publications/Publication-files/Export-Licensing-and-Control-Information-for-Exporters.pdf
2 https://trade.ec.europa.eu/consultations/documents/consul_183.pdf
3https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv%3AOJ.L_.2021.338.01.0001.01.ENG&toc=OJ%3AL%3A2021%3A338%3ATOC
4https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32009R0428
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8. The following topics are some examples of research that could trigger dual-use export controls:

   - changing the host spectrum of lumpy skin disease virus to include human reservoirs;
   - multispectral imaging camera sensors for data collection of crops;
   - laser-based next-generation uranium enrichment technology as a potential alternative for the industrial enrichment that involves gaseous uranium in centrifuges;
   - 3D printing of energetic materials;
   - prototype drone with spraying system for combatting Eastern equine encephalitis virus; and
   - autonomous scientific underwater vessel that collects data automatically in deep sea regions.

9. Illustrated in **Appendix 1** are research areas that, among others, may be subject to dual-use export controls. Some recurring research scenarios that may trigger export controls include:

   - Teaching, consulting, collaborating, or working on research involving dual-use items with visiting foreign researchers inside the customs territory of the Union;
   - Teaching, consulting, collaborating, or working on research involving dual-use items outside customs territory of the Union;
   - Organising a (virtual) conference/meeting/seminar or presenting at a (virtual) conference/meeting/seminar inside or outside the customs territory of the Union about research involving dual-use items;
   - Publishing about listed dual-use technology;
   - Submitting information for patent application and patented information; and
   - Exporting tangible dual-use items (goods), including prototype design and second-hand lab equipment.

10. For many items their control status is determined by their performance characteristics. Low-specification items may not be controlled while higher specification variants or very specialised models are controlled. Export controls may apply to information as well as physical goods. Transfers of information, or technology, related to controlled items are themselves controlled. The provision of technical assistance relating to a controlled item may also be subject to control. Similar but distinct legal definitions of the term's 'technology' and 'technical assistance' apply depending on whether the context is dual-use items, military equipment, or sanctions.

11. For dual-use items the definitions are given below-

    Technology' means specific information necessary for the "development", "production" or "use" of goods. This information takes the form of 'technical data' or 'technical assistance'.
    '**Technical assistance'** may take forms such as instructions, skills, training, working knowledge and consulting services and may involve the transfer of 'technical data'. '**Technical data'** may take forms such as blueprints, plans, diagrams, models, formulae, tables, engineering designs and specifications, manuals and instructions written or recorded on other media or devices such as disk, tape, read-only memories.

1https://enterprise.gov.ie/en/Publications/Publication-files/Export-Licensing-and-Control-Information-for-Exporters.pdf
2 https://trade.ec.europa.eu/consultations/documents/consul_183.pdf
3https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv%3AOJ.L_.2021.338.01.0001.01.ENG&toc=OJ%3AL%3A2021%3A338%3ATOC
4https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32009R0428
5https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1550829571808&uri=CELEX:32019R0125

12. The EU dual-use Regulation contains several de-controls, stating under which conditions a certain listed item is excluded from control. Hence, while such item meets the technical requirements, it will not require a licence for export or transfer. Importantly, the de-controls can only be applied to listed dual-use items.

- **Technology Resulting from Basic Research**- "Experimental or theoretical work undertaken principally to acquire new knowledge of the fundamental principles of phenomena or observable facts, not primarily directed towards a specific practical aim or objective." Non-fundamental research or applied research is not "de-controlled and a scientific classification of a project as 'basic research' does not necessarily mean de-control. Criteria for determination will be based on Technology Readiness Level (TRL-Appendix 3), prevalence of industry funding and will be on a case-by-case.
- **Technology already in the public domain**- Technology or software made available without restrictions upon its further dissemination (Copyright restrictions do not remove technology or software from being 'in the public domain'). In essence, this de-controls listed dual-use software and technology which anyone can obtain. If information is only made accessible after an individual decision has been taken by the information carrier or owner, then not everyone has the possibility to access the information. Publications: Intention to publish and act of publishing are not exempt from control.
- **Minimum necessary information for patent application-** Minimum info required to file patent applications. National, EU and international. Published in public domain – exempt. European Patent Office / Member State patent office standards.

1https://enterprise.gov.ie/en/Publications/Publication-files/Export-Licensing-and-Control-Information-for-Exporters.pdf
2 https://trade.ec.europa.eu/consultations/documents/consul_183.pdf
3https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv%3AOJ.L_.2021.338.01.0001.01.ENG&toc=OJ%3AL%3A2021%3A338%3ATOC
4https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32009R0428
5https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1550829571808&uri=CELEX:32019R0125

TUS Compliance and Governance Structure

1. The responsibility for compliance with export control regulations ultimately rests with the individual researcher who intends to export goods, technology, software, or Knowledge. All TUS staff members (scientific and administrative) are bound to comply with all EU and national dual-use export control laws and regulations**.**

2. These policy guidelines provide direction to ensure TUS and TUS researchers are fully compliant in respect of National and International policy on Export Controls and should be read with due reference to the TUS Research Integrity Policy and the TUS Research Ethics Policy for researchers and referenced National and EU recommendation documents. TUS also provides as part of the National Research Integrity Forum a specialist module on Export Controls (contact the Graduate Research Office for access to these training modules).

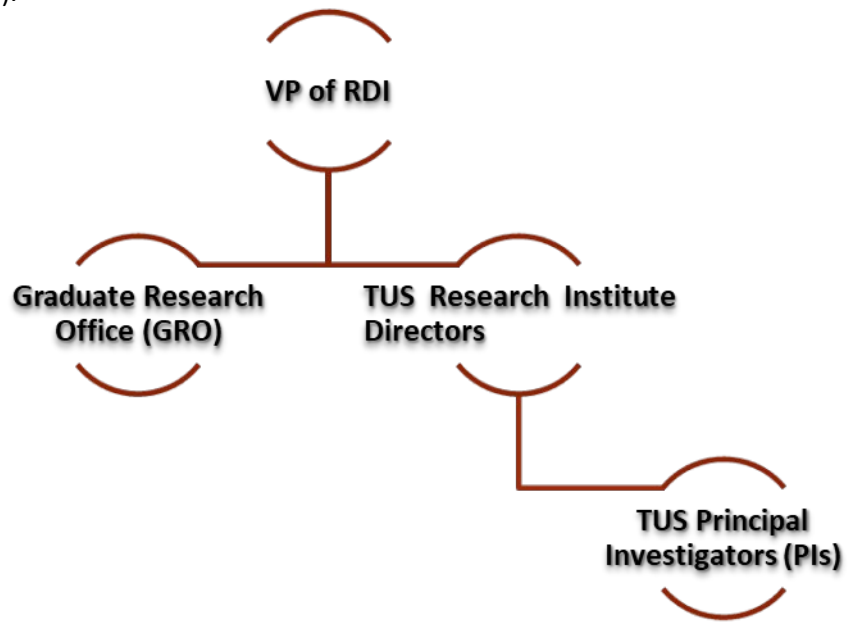

Figure 1 TUS Organisational Compliance Structure

Vice President of Research Development and Innovation- Overall responsibility for implementing TUS's export screening process and procedural compliance policies. This includes approval of licence applications, oversight that adequate resources are allocated to compliance as well as ensuring that there are regular reviews, audits, reporting, risk assessments, corrective actions and updates of the compliance measures in place.

1https://enterprise.gov.ie/en/Publications/Publication-files/Export-Licensing-and-Control-Information-for-Exporters.pdf
2 https://trade.ec.europa.eu/consultations/documents/consul_183.pdf
3https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv%3AOJ.L_.2021.338.01.0001.01.ENG&toc=OJ%3AL%3A2021%3A338%3ATOC
4https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32009R0428
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Graduate Research Office (DOR/HOR)- Export compliance function responsible for developing and/or implementing the compliance measures of TUS. The tasks of this function include responding to export control enquiries, deciding whether a licence application is relevant and what mitigating measures are necessary for a given activity. GRO will also help staff to understand licence conditions, apply due diligence checks, maintain appropriate records securely and provide access to training and raising awareness of the policy guidelines.

TUS Research Institute Directors- Responsibility for the implementation of practical steps to be taken by researchers to ensure conformity with TUS requirements. This function entails tasks such as identifying projects that might require a licence, apply end-use/end-user checks and undertake the prescribed mitigating measures and approvals while performing research activities. The screening process collects and analyses relevant information concerning the following aspects: item classification, risk assessment of the activity, licence determination and application, and post-licensing. Depending on the scope and the sensitivity of the research undertaken, the export control screening process can be relevant to several activities:

- Exporting items (through tangible means of transfer);
- Contracting (primarily with international partners);
- Patenting/licensing of research results/Publishing (e.g., articles, conference material, software);
- Electronic transmissions (including making items available online);
- Hiring staff and receiving visitors (mostly, sanctions related);
- Travelling abroad.

TUS Researchers Responsibility for compliance with the policy guidelines. Individual researchers must be able to identify and report export control issues while conducting their research. If a researcher suspects that an export licence may be required, they should consult with the research Institute Director and the GRO. Should a licence be required the application process will require considerable input from the researcher and may require a signed undertaking from the end user of the item or technology. The licence application will require approval of VP RDI. Once a licence has been issued the Research Institute Director and the GRO will discuss any terms of the licence with the researcher as well as their record keeping responsibilities. Export cannot take place until the licence has been issued and it must comply with all terms of the licence. When exporting physical items using a freight forwarding service or similar, it is important to ensure that they satisfy professional standards. It is also essential to provide clear written instructions to the freight forwarding agent which will include the full licence details, an explanation of the implications of licence for the export (e.g., for routing) and their responsibility for documentation (e.g., returning completed customs declaration for records).

1https://enterprise.gov.ie/en/Publications/Publication-files/Export-Licensing-and-Control-Information-for-Exporters.pdf
2 https://trade.ec.europa.eu/consultations/documents/consul_183.pdf
3https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv%3AOJ.L_.2021.338.01.0001.01.ENG&toc=OJ%3AL%3A2021%3A338%3ATOC
4https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32009R0428
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Export Screening Risk Assessment Procedures

1. **Item classification, including software and technology**; This aspect of the screening procedure seeks to understand whether an item used or produced in the framework of a research falls within the scope of the control list(s) or, whether a research project will be confronted with controlled items. This is done by comparing the technical characteristics of an item against the EU and national dual-use control lists. If applicable, identify whether the item is subject to restrictive measures (sanctions and embargoes) imposed by the EU.

2. **Risk assessment of the activity**; Ensure that none of the parties involved in a project or sensitive activity are subject to restrictive measures. Know your partner(s) and consider how they intend to use your research involving dual-use items. Be aware of the existence of research organisations acting as cover for military research or having strong ties with state-owned entities. Ask for an end-use statement if the activity involves listed dual-use items or when there are end-use(r) concerns in the case of non- listed dual-use items.

3. **Stated end-use and involved parties screening**; There might be indications suggesting that a partner will use dual-use items shared or delivered by your organisation in the context of unauthorised military research or, in relation to WMDs and their means of delivery or, other unlawful purposes.

4. **Diversion risk screening**; be vigilant for diversion risk indicators and signs about suspicious enquiries for cooperation.

5. **Catch-all controls for non-listed dual-use items**: If a TUS researcher or TUS becomes aware or suspects that an activity or project entails a risk, it must abstain from engaging further in this research and immediately inform the competent authorities who will conclude whether a licence application is necessary.

6. If the result of the items classification and the risk assessment of the activity leads to the conclusion that the activity is controlled then further aspects including a determination of which licence (authorisation) is needed (e.g., for export, brokering, transfer and transit) as well as application for such licence and post-licensing, including shipment control and compliance with the conditions of the authorization will be required.

1https://enterprise.gov.ie/en/Publications/Publication-files/Export-Licensing-and-Control-Information-for-Exporters.pdf
2 https://trade.ec.europa.eu/consultations/documents/consul_183.pdf
3https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv%3AOJ.L_.2021.338.01.0001.01.ENG&toc=OJ%3AL%3A2021%3A338%3ATOC
4https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32009R0428
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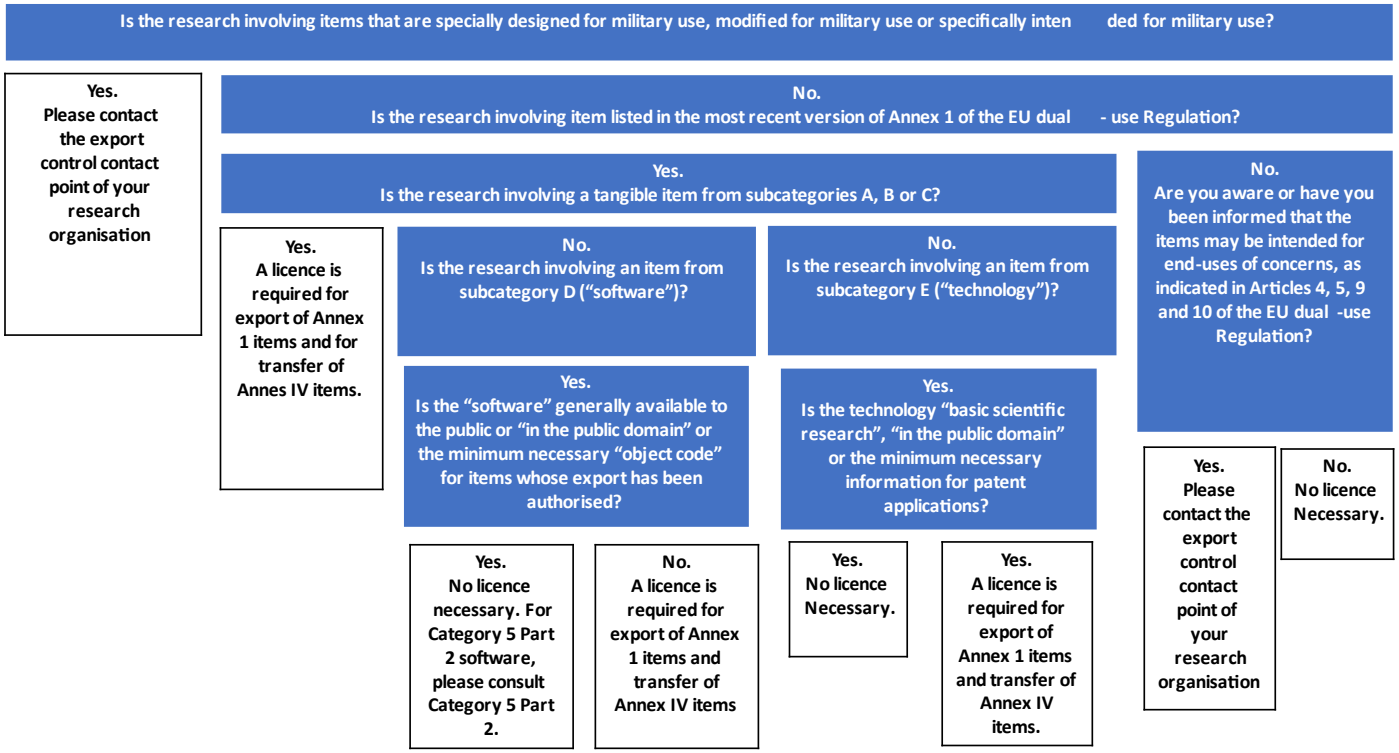


Figure 2 Decision tree flow chart of licence requirements for exports (adapted from [3])

Record Keeping

The GRO will be responsible for ensuring that the following records are maintained.

- Details of licence requests.
- Details of the consignee and end user (as well as anyone else involved in the export) including name, address and country.
- The nature of the export and description of the item exported (including quantity).
- Original source of the items exported (including supplier details).
- Correspondence with the Trade Licensing & Control Unit of the Department of Enterprise, Trade and Employment (DETE)relating to the project.
- The export licence.
- Records (including dates) of each transfer under the licence.
- The date of the transfer or the period over which the transfer takes place.
- In the case of software, the software that is exported and the details of the transfer.
- In the case of a transfer by electronic means, the email or facsimile.
- Any further records required by the licence or judged relevant by VPRDI.

These records will be kept for a minimum of 6 years from the end of the year in which the export took place or longer if required by the licence. A register of all export licences obtained by the University will also be kept by the GRO.

Audit Export licences may be subject to audit by the Trade Licensing & Control Unit of the Department of Enterprise, Trade and Employment (DETE) to ensure that the terms of the licence have been complied with. The Research Institute Directors, GRO, and the researcher involved in the export will be involved in the audit. Office of VPRDI through GRO and the research Institute Directors will also undertake an annual internal audit of a small number of existing licences (the number will be proportionate to the number of active licences). The results of the audit will be reviewed and any necessary changes to this policy will be made.

Frequently Asked Questions

1. **Who is the "exporter"?**

   Both natural persons and legal persons are covered by the definition of exporter. This means that a TUS researcher on his or her own behalf or the TUS organisation on behalf of the researcher can be the exporter. It is up to the TUS office VP Research Development and Innovation to make internal arrangements concerning who will apply for a licence. It should be noted that the identification of the exporter is different from the identification of an export. When a visiting third country researcher gets access to, for instance, controlled technology at a university campus inside the customs territory of the Union, then no export takes place. When this researcher returns home to his/her third country and brings with him/her the controlled technology, then an export takes place which requires an approved and valid licence. Hence, prior to this export, a licence application needs to be filed. The last person inside the customs territory of the Union deciding on the transmission of the controlled technology outside the EU, needs to apply for a licence.

2. **If a publication contains controlled technology, does the TUS author, the TUS university or the scientific publisher have to apply for a licence?**

   The key point here is that a natural or legal person needs to apply for a licence and thus acts as the exporter. Who that is depends on the internal policy or the contractual arrangement between the author of the publication and the scientific publisher. If the publisher is established outside the EU, then the last person inside the EU deciding on the transmission of the controlled technology outside the EU, needs to apply for a licence. May include Master and PhD theses and may require amendments/redactions/restricted access to parts. If these mitigations appear unfeasible, researchers at TUS through office VP RDI should liaise with the government Department re fulfilling licence requirements.

3. **Can a TUS employee when traveling abroad on a professional visit remotely accessing controlled technology or software located on the server of an EU-based research organisation?**

   TUS Employees accessing controlled technology or software abroad on a professional visit generally must apply for a licence before traveling.

4. **Who needs to apply for a licence in case of a research consortium with partners in multiple EU Member States and third country partners?**

   The exporter, and thus the one who must apply for a licence, is the one that is the contractual partner of the consignee in the third country and has the power for determining the sending or transmission of the items from the customs territory of the EU. In other words, the consortium partner itself or the consortium leader itself may have to request a licence before sending off the dual-use items. This depends on the contractual arrangements between the consortium partners and the consortium leader.

5. **Conferencing?**

   Virtual: Transmitting controlled technology outside the Union, requires licensing.

6. **Collaborating or working on research involving dual-use items outside EU?**

   No control for EU persons engaged outside the EU in research involving dual-use items. So, no licence is needed in principle if there is no access to controlled dual-use items from within the customs territory of the Union. However, national measures may require a technical assistance licence or may ban technical assistance. Sanctioned entity / country involvement may necessitate licensing / may be prohibited.

Appendix 1 Summary of Research Areas impacted by dual-use export controls

The following research areas are more likely to be impacted by dual-use export controls. Please note that this list is non-exhaustive and may serve as (non-binding) tool to identify relevant research more easily. In this Appendix, the dual-use descriptors (right column) are rather general in nature. Specific export controls comprising sharp technical parameters are summarised below (adapted from [3]).

Research areas	Dual-use descriptors
Biology and (nano)biotechnology	Human, plant and animal pathogens Toxins Biological protection, containment and handling equipment
Chemistry Advanced material science	Chemicals, polymers, lubricants and fuel additives Chemical manufacturing facilities, equipment and components such as pumps, heat exchangers, valves and distillation columns Chemical protection, containment and handling equipment
Nuclear physics and engineering	Nuclear reactors and specially designed or prepared equipment and components Nuclear material
Energy and environmental technology	Optical and acoustic sensors Cameras
Computer science and engineering Information and communications technology	Source code for some listed acoustic data processing Digital ruggedized computers Intrusion software related items Telecommunications systems, equipment, components and accessories (including interception and jamming) Information security hardware, software and technology (including encryption and cryptanalysis)
Avionics and aerospace engineering and design	Accelerometers Gyroscopes Navigation (receiving) systems Drones Launch platforms Satellites Aero gas turbine engines Ramjet, scramjet or combined cycle engines
Semiconductor	Integrated circuits Semiconductor manufacturing, testing or inspection equipment Wafer substrates (Computer-aided-design) software for semiconductors

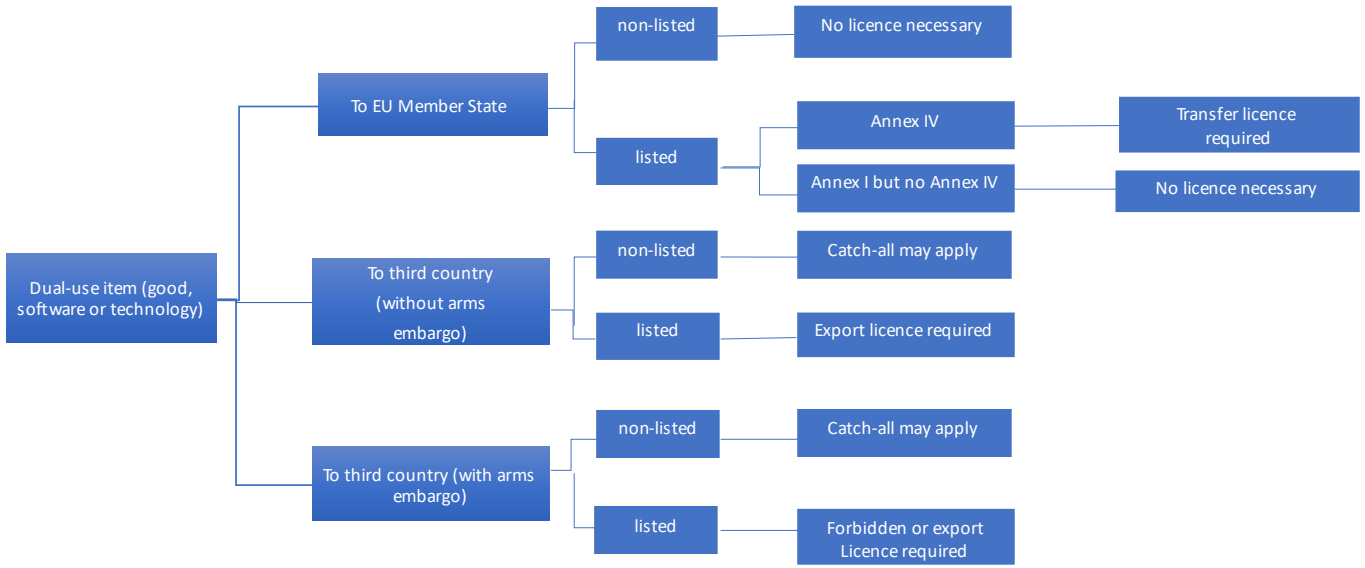
Optical engineering	Lasers Optical sensors Imaging cameras
Robotics and process automation	Machine tools Robots, end-effectors and remotely controlled articulated manipulators Dimensional inspection systems
Additive manufacturing (3D printing)	Feedstock materials Manufacturing equipment
Quantum technologies	Quantum cryptography
Artificial intelligence and machine learning	Neural network integrated circuits Neural computers Electronic components
Naval technologies	Surface vessels Underwater vessels Underwater vision systems Power transmission and generation systems
Cyber-surveillance items	Mobile telecommunications interception equipment Internet surveillance systems Tools for the generation, command and control, or delivery of intrusion software Law enforcement monitoring software Digital forensic/investigative tools

The following are scenarios where dual-use export controls may come into place. The list is non-exhaustive. (Adapted from [3])

Scenario	What does the EU dual-use Regulation say?	To be considered as well
Teaching, consulting, collaborating or working on research involving dual-use items inside customs territory of the Union with visiting third country researchers	— The EU dual-use Regulation does not foresee controls for non-EU per- sons accessing dual-use items inside the customs territory of the Union. Hence, no licence is needed as long as the controlled dual- use items remain inside the customs territory of the Union. When the visiting third country researcher returns home with access to (or in possession of) the controlled dual-use item, then a licence is needed.	— In some cases, based on national provisions, a technical assistance licence is required or the supply of technical assistance is prohibited. — A licence may be required in case a sanctioned entity or a natural/legal person of a sanctioned country seeks cooperation inside the EU. In some cases such cooperation is prohibited according to EU sanctions.
Teaching, consulting, collaborating or working on research involving dual-use items outside customs territory of the Union	— The EU dual-use Regulation does not foresee controls for EU persons engaged outside the customs territory of the Union in research involve- ving dual-use items. Hence, no licence is needed in principle *if there is no access to controlled dual-use items from within the customs territory of the Union*.	— In some cases, based on national provisions, a technical assistance licence is required or the supply of technical assistance is prohibited. — A licence may be required in case a sanctioned entity or natural/legal person of a sanctioned country seeks cooperation inside the EU. In some cases such cooperation is prohibited according to EU sanctions.
Organising inside customs territory of the Union a (virtual) conference/ meeting/seminar/… or presenting at a (virtual) conference/meeting/ seminar/… on research involving dual-use items	— The EU dual-use Regulation does not foresee controls for non-EU per- sons accessing dual-use items inside the customs territory of the Union. Hence, no licence is needed *if the controlled dual-use items remain inside the customs territory of the Union.* When the visiting third country researcher returns home with access to (or in possession of) the con- trolled dual-use item, then a licence is needed. — If the conference/meeting/seminar is virtual and transmitted to a des- tination outside of the EU, then a license is needed for that part of the research that involves controlled dual-use items.	— In some national cases, a technical assistance licence is required — It is a good compliance practice to warn participants of licence requirements when exiting the customs territory of the Union with the controlled item(s). — A licence may be required in case a sanctioned entity or natural/legal person of a sanctioned destination seeks cooperation inside the cus- toms territory of the Union. In some cases such cooperation is prohibited according to EU sanctions.
Organising outside customs territory of the Union a (virtual) conference/meeting/seminar/… or presenting at a (virtual) conference/ meeting/seminar/… on research involving dual-use items	— The EU dual-use regulation does not foresee controls for EU persons engaged outside the customs territory of the Union in research involve- ving dual-use items. Hence, no licence is needed in principle. — *if orally presented, even when recorded on the spot, as long as there is no access to controlled dual-use items from within the customs territory of the Union.*	— In some cases, based on national provisions, a technical assistance licence is required or the supply of technical assistance is prohibited. — A licence may be required in case a sanctioned entity or a natural/legal person of a sanctioned country seeks cooperation inside the EU. In some cases such cooperation is prohibited according to EU sanctions

	— *if accompanied by presentation or other conference material where the information is not meeting the controlled technology threshold(s).* — The EU dual-use regulation requires a licence, — *if there is access to controlled dual-use items from within the customs territory of the Union.* — *if accompanied by presentation or other conference material (carried in paper, on laptop or other physical carrier such as USB stick) that contains controlled dual-use technology.*	
Publishing listed dual-use technology	— A publication including technology that meets the thresholds for dual-use control needs an export authorisation. The intention to publish (and thus the act of publishing) is not enough to be considered to be in the public domain and is therefore not exempted from control. The export control authorities rely on the due diligence of research organisation to screen prepublications in sensitive research areas. — In case a (draft) publication (or raw data) meets the thresholds for containing export controlled dual-use technology it is subject to export controls. This applies to both the pre-publication phase and to the actual publication phase. In principle, this can also apply to Master or PhD thesis that meet the controlled technology threshold(s).	The researcher or research organisation could consider to amend or omit the specific parts that contain the controlled technology or restrict the access to these specific parts. If mitigation is not feasible the researcher or research organisation should contact the competent authority how to fulfil the licence requirement (e.g. individual licence application).
Patented information and information for patent application	— No licence is needed in principle, as the export of patented information that is fully disclosed on the public record is considered to be "in the public domain" and hence exempted from export controls. — No licence is needed for the export of the minimum necessary information for patent applications.	
Export of tangible dual-use items (goods), including prototype design and second-hand lab equipment	— Research organisations may (re)sell, donate or lend dual-use items or temporarily export them for their own research projects. Regardless whether the items are new, a prototype or second-hand, they require a licence for export if listed in Annex I and for intra-EU transfers if listed in Annex IV of the EU dual-use Regulation.	

Appendix 2 Summary of Licence requirements for Dual-Use Items (adapted from [3])



Appendix 3 Technology Readiness Levels