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**Doctoral thesis**

**-Public Version-**

**Interferences between non-proliferation and science:  
'exporting' dual-use know-how and technology in  
conformity with security imperatives**

*« Conscience sans science et science sans conscience sont mutilées et mutilantes »*

*Edgar Morin*

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## **Executive Summary**

Chapter 1 introduces the reasoning underpinning the study. What are the main drivers and the overall objective for undertaking this intellectual endeavour? It also sets the main questions to be answered and a hypothesis to be verified.

Chapter 2 sets the scene where the study evolves. What is the role of research and what is the mission of different types of research organisations in today's environment? The chapter discusses also the definitions of related terms such as Research and Development as these are entrenched in texts with universal applicability.

Chapter 3 illuminates the role of knowledge from a proliferation point of view. What are the obligations stemming from legally binding treaties for industry and academia? The chapter also offers a comparative analysis of the multilateral export control regimes including main principles, control lists and terminology used. The concluding section attempts to explain the dual-use problem by providing a definition of dual-use research.

Chapter 4 explains the main policies applying for EU funded research by focusing on the dissemination and use of research results for practical and commercial purposes. The chapter offers an analysis of the EU legal framework governing technology transfers of dual-use items. Following that, the main scenarios where trade controls come into play in a research context are discussed. Finally, the chapter offers an analysis of a case study exemplifying the interpretation and implementation of provisions and terms discussed all over the study. The H5N1 case study brings to the fore the differences between the EU and US in the oversight of dual-use research.

Chapter 5 presents an assessment of the US trade controls towards academia. How do the US authorities interpret the fundamental research exemption? What is a 'deemed export' and how does it affect academic research? How the term 'publicly available information' should be understood?

Chapter 6 sheds light on the role of internal controls in complying with the law and their nature as discretionary measures. The chapter provides a summary of the main principles and key elements of an Internal Compliance Programme (ICP). Then, it highlights the main steps required for designing and implementing ICPs.

Chapter 7 examines the export compliance practices followed by firms, universities and public research organisations. In doing so, it identifies challenges encountered and compliance mechanisms used in different research environments.

Chapter 8 sets forward a method for identifying export controls risks in the initial phase of development of an internal compliance structure. The risk identification method builds on international standards and previous experience for tackling export control concerns in a research setting. To that effect, an international public research organisation, the European Commission Joint Research Centre is used as a test case.

Finally, chapter 9 compiles the main findings of the study responding also to the main questions set forth in the introductory chapter.

# 1. Introduction

## 1.1 Preliminary remarks

At a time when the diffusion of knowledge into society and the utilisation of science by industry is as high as ever some types of research may undergo restrictions on the basis of ethical principles and security imperatives. The role of this doctoral study is to clarify the legal obligations affecting research activities and explore the level of awareness of proliferation risks within the scientific community. National law provisions and especially international law would normally reflect and codify long-lasting ethical principles and patterns that guarantee the smooth functioning of societies. The study by no means intends to stigmatise specific areas of research and direct a purely ethical discussion on what should be considered as moral or not when conducting research. Instead, its main purpose is to identify the implications of export controls of dual-use items and technologies for legitimate research and equip researchers and research organisations with a strategy to cope with the challenges posed by the combat against the proliferation of Weapons of Mass Destruction (WMD).

A second clarification concerns the motives of this study. While the role of technology and subsequently, of knowledge is generally acknowledged in the literature dealing with the ‘proliferation-problematic’ it seems that there is a lack of impetus to study and tackle some intricate issues stemming from the application of export controls in the transfers of dual-use technologies and know-how<sup>1</sup>.

From a scientific point of view and focusing on nuclear proliferation, there are scholars and theories explaining why States aspire to acquire nuclear weapons and how recognised and latent nuclear powers have managed to develop nuclear weapon capabilities<sup>2</sup>. Furthermore, there are scholarships examining how nuclear assistance shared for peaceful purposes can be diverted to military purposes<sup>3</sup> while other studies and reports shed light on how proliferation takes place by identifying the main patterns of illicit trade in nuclear materials and equipment<sup>4</sup>. Lastly, there are studies and handbooks presenting the export controls fundamentals and providing to potential exporters guidance and ‘best practices’ for complying with arms and dual-use export controls rules<sup>5</sup>. However, there are no extensive studies examining the implications of export controls for the academia and the whole research community. This might be true for diverse reasons such as the highly technical nature of the export controls field, the controversial character of issues touching upon restrictions in the diffusion of information and the containment of sensitive research as well as the partly right perception that research is or should be excluded from the scope of export controls.

Despite the lack of interest in the relationship between export controls and research in the literature, the question whether research activities can contribute to nuclear, biological and

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<sup>1</sup> Meier, 2014; Fuhrmann, 2012; Kroenig, 2009; Reed, 2009.

<sup>2</sup> Sagan & Waltz, 2012; Singh & Way, 2004; Davis & Frankel, 1993; Rhodes, 1988.

<sup>3</sup> Stulberg & Fuhrmann, 2013; Fuhrmann, 2012.

<sup>4</sup> Albright, Stricker, & Wood, 2013; Albright, 2010.

<sup>5</sup> Rosanelli, 2014; Michel et al., 2013; Joyner, 2006.

chemical proliferation and how deliberate misuse of research for criminal and terrorist purposes can be averted is a hotly-debated issue lately. Especially as regards the possible misuse of emerging technologies relating to biology and chemistry there is a rather vast body of literature on the so-called ‘dual-use dilemma’<sup>6</sup>. Most of these studies see the topic from an ethics perspective or, highlight physical security and safety parameters whereas examine the role of export controls to only a limited extent. Apart from the ethical dimension, ‘trading’ in sensitive materials may bring economic and criminal sanctions to those disregarding export control rules either purposefully or by ignorance regardless of whether they are States, entrepreneurs or scientists. The debate taking place in the US and most interestingly, the legal dispute over the claim of the Dutch licensing authority to ask an export authorisation for the publication in a well-known journal of a research study -exploring the transmissibility of H5N1 virus between mammals- has recently caught public attention and brought to the fore the problematic lying in the interferences between export controls and research in the most unequivocal manner.

From a political point of view, it is increasingly acknowledged that an effective non-proliferation strategy should target not only State-sponsored proliferation but also illicit networks, terrorist groups and individuals willing to carry the cost of proliferating or acquiring WMD capabilities. This broader scope of today’s non-proliferation concept is captured adequately by the United Nations Security Council Resolution (UNSCR) 1540 which obliges all UN member States to refrain from providing any form of support -including financial assistance- to non-State actors that attempt to develop, and acquire WMD and their means of delivery<sup>7</sup>. The resolution commits UN members to adopt and enforce effective and appropriate laws, national export and trans-shipment controls and physical protection measures securing thereby the production, use, storage, transport, export and transit of such items.

At the EU level, the proliferation of WMD and delivery systems was identified as ‘potentially the greatest threat to European security in the landmark document inaugurating the ‘European Security Strategy’ and titled ‘A Secure Europe in a Better World’<sup>8</sup>. The EU’s commitment to strong national and internationally coordinated export controls and the need to enhance them in view of rising threats such as the ‘new terrorism’ and challenges such as a diversified economic and technological environment is omnipresent in all relevant policy documents. Moreover, export controls are considered as a suitable tool for curbing the diffusion of

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<sup>6</sup> See indicatively: Rath, Ischi, & Perkins, 2014; Tucker, 2012; Miller & Selgelid, 2007.

<sup>7</sup> UN Security Council Resolution 1540 on Non-Proliferation of Nuclear, Chemical and Biological Weapons, S/RES/1540, 2004.

<sup>8</sup> The document was adopted by the European Council on 13 December 2003 and drafted under the responsibility of the EU High Representative Javier Solana. It provides the conceptual framework for the Common Foreign and Security Policy (CFSP), including what would later become the Common Security and Defence Policy (CSDP) and, singles out five key threats:

- terrorism
- proliferation of weapons of mass destruction (WMD)
- regional conflicts
- State failure
- organised crime

sensitive technology and know-how by both tangible and intangible means. In fact, the inclusion of intangible transfers of technology (ITT) within the scope of the European export controls dates back to 2000 and the discussion on their effectiveness is a recurrent topic on the agenda for more than a decade.

Furthermore, it is increasingly realised that the non-proliferation efforts should address and actively engage two sets of 'key stakeholders' as called by Husbands in the 'Technology Transfers and Non-proliferation', the industry and the international scientific community<sup>9</sup>. The role of these stakeholders and their ever increasing responsibilities *vis-à-vis* export controls in the context of modern globalisation is implied in the literature and European policy texts alike. For instance, the introduction of awareness raising models for undertakings, scientific and academic circles as well as financial institutions was mentioned already in 2008 among the priorities set by the 'New Lines for Action in Combating the Proliferation of WMD and their Delivery Systems' (NLA), the EU's action plan for implementing the 'EU's Strategy Against the Proliferation of WMD'<sup>10</sup>. Likewise, the strengthening of cooperation in terms of consular and scientific vigilance and the development of professional codes of conduct for scientists are further initiatives foreseen in the NLA of 2008 and the more recent 'Council's Conclusions on Ensuring the Continued Pursuit of an Effective EU Policy on the New Challenges Presented by the Proliferation of WMD and their Delivery Systems'<sup>11</sup>. Despite the forceful language, the EU institutions and the EU Member States have not yet succeeded in implementing all the prescribed measures, let alone the ongoing debate on the effective implementation of technology transfers controls. Apart from a list of 'sensitive disciplines' agreed upon by the competent Council committees back in 2009 and a report including ideas and best practices for strengthening consular vigilance, the progress is limited to the implementation of awareness raising seminars and the adoption of codes of professional conduct by only some MS enforcing such measures in their respective national jurisdictions.

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<sup>9</sup> Oliver Meier, *Technology Transfers and Non-Proliferation of Weapons of Mass Destruction: Between Control and Cooperation*, Oxon: Routledge, 2014.

<sup>10</sup> The EU Strategy against the Proliferation of WMD adopted by the Council in 2003 declares the resolve of the Union to use all instruments and policies at its disposal, to prevent, deter, halt and, where possible, eliminate programmes for the proliferation of WMD and missiles and, sets out an action plan towards this target. The document can be consulted in:

<http://register.consilium.europa.eu/doc/srv?l=EN&f=ST%2015708%202003%20INIT>

<sup>11</sup> The Foreign Affairs Council meeting of 21 October 2013 identified the main areas where action should be taken or stepped up by the EU institutions and the Member States with the view to responding to the new dimensions of the proliferation threat. The main points included the following:

- effectively protecting the access to proliferation-sensitive knowledge and know-how in the EU, and ensuring their peaceful use
- reacting to rapid developments in science, technology and communication which provide proliferators with easier access to the knowledge and know-how required for the design of weapons of mass destruction by proactively adapting EU instruments for combating proliferation

With regards to the implementation of export controls, the European Commission has launched the process for the review of the regulation 428/2009 -henceforth the Regulation or the dual-use regulation- establishing the EU trade control system and regulating inter alia ITT<sup>12</sup>. The Commission with its Communication to the Council and the European Parliament has identified a number of possible policy options and steps forward for the modernization and of the EU export controls system. The application of export controls to the ITT and the ‘research of dual-use concern’ are among the areas that could potentially require reforming or further actions to be taken: “The Commission could examine options to promote a specific strategy to ensure ‘immaterial control’ and address the challenges posed by ITT, including the need to clarify the control of ‘dual-use research’, while avoiding undue obstacles to the free flow of knowledge and the global competitiveness of EU science and technology”<sup>13</sup>. In fact, this could be a first class opportunity to address identified malfunctions and establish a modern export control system compatible with the constantly changing external environment. Having said this, this doctoral study seeks also to contribute to this policy-oriented discussion on how EU initiatives could better address challenges inherent to the control of dual-use research and ITT.

To conclude, both my supervisors Pr. Dr. Q. Michel and Dr. F. Sevini, as well as I are convinced about the drivers thrusting this doctorate. The limited literature examining the potential implications of technology controls for research activities and, the urgency to tackle legal and policy questions along with pragmatic problems stemming from the application of export controls to the transfers of ‘proliferation sensitive knowledge’ provide the main impetus for this intellectual endeavour.

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<sup>12</sup> EU, *Council Regulation No 428/2009 setting up a Community regime for the control of exports, transfer, brokering and transit of dual-use items*, Official Journal of the EU (L134), Brussels, 2009. The consolidated version as amended of 12/06/2014 can be found in: <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02009R0428-20140702&qid=1461583498859&from=pl>.

<sup>13</sup> EU Commission, *Communication to the Council and the European Parliament: The Review of Export Control Policy: Ensuring Security and Competitiveness in a Changing World* (COM(2014) 244 final), 2014, 7.

## 1.2 Main questions and methodology

‘Export controls’ or, as increasingly referred to ‘strategic trade controls’ are considered to be as one of the lynchpins of the international non-proliferation enforcement strategy along with the international safeguards and physical protection frameworks<sup>14</sup>. In the arms control, disarmament and non-proliferation context, strategic trade controls could be defined as “a State’s regulation and activities to control international trade that represent direct or indirect threats to its national strategic security”<sup>15</sup>. Export controls function as a trade measure serving security imperatives (economic vs. security interests) and ‘dual-use goods’ are defined as primarily civil items which may also have military applications (military vs. civil application). From the preamble, it is clear that export controls of dual-use items are in the centre of ostensibly or actually contrasting principles and notions that necessitate the attainment of fine balances. If one attempts to draw simple ‘competing pairs’ relating to export controls, he or she will most probably come up with the following table:

**Table I: ‘Competing pairs’ in strategic trade controls**

Strategic Trade Controls: Competing Pairs		
<i>‘high politics’</i>		<i>‘low politics’</i>
<i>security interests</i>		<i>economic interests</i>
<i>trade restrictions</i>		<i>trade liberalisation</i>
<i>Common Foreign &amp; Security Policy</i>	<i>versus</i>	<i>Common Commercial Policy</i>
<i>military nature</i>		<i>civil nature</i>
<i>technology controls</i>		<i>diffusion of knowledge</i>
<i>restricted research</i>		<i>academic freedom, openness and communality</i>

<sup>14</sup> Some scholars prefer to use the term ‘trade’ rather than ‘export’ as the former appears to capture better the broad scope of activities, items and actors concerned by trade controls. Indeed, if one looks at the dictionary definitions export seems to have a more restrictive understanding –to carry or send a commodity abroad- whereas trade is defined as ‘the activity or process of buying, selling, or exchanging goods or services’. It is characteristic that the sole peer-reviewed Journal dedicated specifically to export controls is named ‘Strategic Trade Review’. However, formal texts and guidance usually prefer to use the long-standing term of export controls. Therefore, the study uses both terms interchangeably without implying any difference. Definitions drawn from Merriam-Webster online dictionary, available in: <http://www.merriam-webster.com/dictionary/export> and, <http://www.merriam-webster.com/dictionary/trade>.

<sup>15</sup> Renaud Chatelus, “The Role of Customs in Strategic Trade Controls: Challenges and Potential, Taking a States’ Enforcement Perspective,” Center for International Trade and Security (University of Georgia), 2012, 6, retrieved from: [http://cits.uga.edu/uploads/documents/chatelus\\_customs.pdf](http://cits.uga.edu/uploads/documents/chatelus_customs.pdf).

Some of the foregoing dipoles are not necessarily contrasting or ideally should act in complementarity. Generally speaking, foreign policy decisions are not taken in isolation from economic and trade interests and *vice-versa*. The discussion on the broader role of foreign policy and the impact of economic interests in shaping foreign policy decisions, is not new and relates to a more fundamental debate concerning the prevalence or not of what is traditionally considered as ‘high politics’ (e.g. foreign policy-security aspect) on ‘low politics’ (e.g. economic policy-trade aspect)<sup>16</sup>. From a non-proliferation standpoint, “economic and security interests among and within parties to non-proliferation agreements often clash. Reviews of the non-proliferation treaties and reforms on export control arrangements can damage international security should they be driven mainly by profit interests.”<sup>17</sup>

Export controls of dual-use items represent an intriguing case where trade imperatives and economic interests should be balanced against security and foreign policy considerations. However, export controls are not the only measure reflecting both economic and security objectives; trade agreements and sanctions are relevant examples not least due to the fact that the latter are largely enforced through export controls. What makes dual-use export controls particularly interesting is the nature of the controlled items as primarily civil products, without necessarily direct military applications, originating from any industry sector. Dealing with this special case in the EU context poses further challenges due to the complex institutional setting and the different decision-making modes applying to the policy areas involved. International security and non-proliferation concerns traditionally fall in the realm of Common Foreign and Security Policy whereas dual-use trade controls are governed by the Common Commercial Policy<sup>18</sup>.

This study draws on another less anticipated ‘competing pair’ namely, the imperative to curb the diffusion of proliferation sensitive knowledge and technology without disturbing unduly the conduct of research. Striking a balance between academic principles underpinning the free diffusion of information and non-proliferation imperatives calling for the safeguard of sensitive knowledge and technology from misuse seems to be an extremely difficult task. In today’s world, knowledge and technology that is to say the application of knowledge to the practical needs of societies, is at the heart of both academic and entrepreneurial activities. Apart from the control of raw materials and substances which are available in nature, non-proliferation efforts may concern technology in all its aspects (technological equipment, and technical assistance) including what is deemed as ‘proliferation sensitive knowledge’. The control of knowledge and technology on the basis of proliferation concerns is arduous also

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<sup>16</sup> For the multifaceted role of the EU foreign policy please see: Stephan Keukeleire and Tom Delreux, *The Foreign Policy of the European Union*. Basingstoke: Palgrave Macmillan, 2014.

<sup>17</sup> Meier, *Technology Transfers and Non-Proliferation of Weapons of Mass Destruction*, 252.

<sup>18</sup> The author has explored the interconnection between CCP and CFSP in the case of dual-use export-controls for his master thesis concluding inter alia that: “it is impossible to say if trade or security imperatives prevail in the policy formulation and implementation of the dual-use export control system. What is clear is that the interdependence between trade and foreign policy demands the concerted collaboration of policy actors and instruments from different policy areas across the EU edifice, *i.e.* regardless the remaining confines of the abolished pillar structure”.

from a practical point of view given that knowledge and technology flows are increasingly enabled through intangible means of transfer.

This problematic provides the impetus to set a fundamental question pervading the whole reasoning of the study:

How would it be possible for a system of norms, rules and decision making procedures to avert the diffusion of proliferation-sensitive knowledge and safeguard it from misuse? This question can be reformulated and answered also as a normative one: Is it acceptable to impose controls in the dissemination of proliferation sensitive information?

The practice shows that risks relating to the proliferation of WMD are perceived by politicians and citizens—at least in the West- as quite high and, the international and European law deal with this issue by setting certain constraints in the diffusion of sensitive knowledge and technologies. Therefore, a pragmatic approach should be adopted in order to come up with a realistic and workable answer.

To that end, it is expedient to set two more specific research questions:

First, what are the obligations of scientists and research organisations stemming from the international non-proliferation framework and how are these reflected in the trade controls system of dual-use items of the EU?

Second, how could researchers and research organisations comply with the existing regulations and respond to non-proliferation and export control imperatives?

Taking into account the intrinsic challenges in the implementation of technology transfer controls, fostering the accountability of research organisations through the adoption of internal compliance mechanisms, in synergy with further governmental initiatives, could reflect an appropriate and workable option for addressing requirements set in the non-proliferation law. In that regard, the study seeks to verify the validity of the following hypothesis:

Given the peculiarities of research and the challenging application of export controls in technology transfers, the implementation of internal compliance programmes by research organisations may represent both a fitting and a compelling response to heightened proliferation concerns.

Internal Compliance Programmes (ICPs) are useful tools towards both the attainment of a climate of awareness and responsibility within exporting organisations and the fulfilment of export control requirements by the exporters. Effective ICPs may function in synergy with codes of conduct or other agreed guidelines and comprise a clear policy and standardised

procedures ensuring that all employees are aware and compliant with any export control obligations relating to their work. Furthermore, the adoption of ICPs constitutes a common practice for industry already for a number of years already. On the contrary, most academic and research institutes -at least in Europe- do not have in place compliance mechanisms and awareness-raising tools *vis-à-vis* the export control legislation albeit they are not always untouched by legal consequences deriving from such laws. Enhancing the accountability of the research community and achieving compliance with non-proliferation and other security imperatives may presuppose a mix of self-governance measures tailored to the needs of researchers, In that regard, the ultimate goal of this doctoral study is not to validate or refute a hypothesis in view of a theory or a conceptual framework. Instead, the main purpose is to test if an ICP could be adapted accordingly so as to function efficiently in a research setting.

With a view to answering the aforementioned research questions, the study is structured along three main axes:

A. The first part seeks to achieve three main objectives. The first is the conceptualisation of ‘scientific research’, including the description of the different organisations (*e.g.* industrial, academic, and research institutes) where research takes place. The second is to identify restraints posed by the non-proliferation treaties and international export control regimes and their potential impact on research activities. In addition to this, the analysis will evidence the intricate nature of dual-use trade controls by examining the various understandings of the dual-use term as well as the scope and the content of the trade control legislation and pertinent control lists. The main driver behind this is to provide a definition of the ‘dual-use research’ from an export control point of view. Finally, the third objective concerns the very heart of the problems in question that is to say the implications of export controls for the academia and research institutions. In that respect, the EU trade control system will be set under close examination for clarifying the nexus between trade controls and research activities. With a view to understanding better the challenges and opportunities connecting with the implementation of export controls in a research setting, the American approach will be set under probation, as well. The analysis in Part A will rely mostly on the review of the related literature and an extensive analysis of legal documents for providing argumentation and broader conclusions. In addition, a case study will be used for elucidating the practical implementation of export controls *vis-à-vis* academia in the European and the American context.

B. The second part intends to elucidate the concept of export compliance and suggest a way forward for complying with legal requirements identified in the first section. Why ICPs are considered as a necessary tool for ensuring compliance with export control requirements and especially ITT controls? What are the drivers and main motives behind the adoption of ICPs and what one can learn from the experience of industry implementing such programmes already for years? Part B will offer an analysis of the main principles and key elements for building ICPs by illustrating different compliance practices followed by industry, universities and other research organisations. This part will explore also whether American and European universities are aware of export controls and the predominant attitudes of the research community in that regard. The ultimate objective here is to define a basic method for

identifying export control risks and designing internal compliance measures tailored to academic and research organisations. In order to succeed in this, the Part B will utilise a mix of online surveys, inquiries and in-depth interviews with export compliance practitioners, researchers and academics. This way information gained through online surveys will be cross-checked and upgraded with insights provided by experienced professionals.

C. The third Part aims to elaborate and test in practice the method conceived in part B for identifying export control risks and designing compliance systems fitted to research organisations. The Joint Research Centre (JRC), the European Commission's in-house science service will be used as a test case. The JRC constitutes a plausible option since it represents a European organisation undertaking research in a wide array of disciplines - including proliferation sensitive ones- and employing thousands of researchers in different sites. What are the components that an export control compliance management system for the JRC should definitely have in place? Should such a system be integrated in the existing compliance structure of the organisation or not? What are the main challenges in implementing such a system and how these could be overcome? How an effective strategy increasing the awareness and responsibility of the JRC researchers *vis-à-vis* export controls could be designed? With a view to responding to these questions, an online survey will be addressed to the JRC employees including scientific and administrative staff. In addition, for aspects requiring technical expertise and a solid background in various JRC research areas and institutional processes, I will resort to interviews with JRC experts and competent staff. Visibly, the last two parts of the thesis are closely interrelated since the ultimate goal is to suggest a methodology for enforcing export control compliance in a research environment, in this case at the Joint Research Centre.

Last, it must be underscored that the present thesis is particularly concerned with exploring how certain legal terms and provisions are interpreted and how proliferation-related concepts are understood in different contexts. This means that framing concepts and commenting on the interpretation of definitions and other legal provisions will be a recurrent issue all along the study. Apart from providing answers to the foregoing questions and verifying the study hypothesis, the concluding section will also attempt to come up with policy initiatives and measures that could be taken by government authorities in concert with the efforts of research institutions for furthering export control objectives.

### **1.3. Data collection and data analysis**

The present study is a practice oriented and policy driven study. It is above all a scientific enterprise utilising a variety of data sources and data collection methods with a view to yielding evidence-based findings. To that end, the study relies on both primary and secondary data. The political, legal and highly technical and practical character of the issues in question require the use of primary data such as:

- personal and phone interviews with policy-makers, technical experts and scientists
- online surveys targeting scientists and export control practitioners
- participation in international conferences and symposia in the area of non-proliferation and export controls.

Also, secondary data sources are used as follows:

- available literature and peer reviewed journal articles
- legal and archival documents available from the EU institutions, international organisations and national governments
- information available on websites

It goes without saying that for issues relating to practices and problems of the scientific community as well as some technical questions the study draws also from the experience and expertise accumulated within the JRC. Likewise, the author relies on his personal insight acquired through earlier professional experience and participation in various Council and Commission Committees on dual-use export controls as well as seminars organised regularly by the Joint Research Centre for analysing the various issues addressed in the study.

Last, the research strategy comprises both inductive and deductive reasoning. Deductive in the sense that basic concepts and main elements are first defined against the broader context prior to being analysed from an export control point of view. Inductive in the sense that different case studies and actual experiences are used as a basis for drawing general conclusions on the interpretation of the legal framework or, the compliance practices and attitudes adopted by different organisations.

## **2. Conceptualising Scientific Research and Research Organisation**

This chapter intends to define what is denoted by the term ‘scientific research’, what are the different contexts where research activities take place as well as what is the role of research in today’s environment. This introductory chapter sets the scene for some of the main issues discussed in this doctoral study and sheds some light on the reasons why certain terms are understood in a given way also in the context of export controls.

### **2.1 Defining research: what are its determinant elements?**

No matter how general concept it is, research relates above all with the term ‘science’, most probably because research is the vehicle to science and science is the end of research. Science comes from the Latin word ‘scientia’ and has as a synonym the word ‘episteme’ originated from Greek (επιστήμη). Both terms, the Latin and the Greek one as well, are translated in English as ‘knowledge’ and indeed, this is in the very heart of this study, the transfer and dissemination of knowledge.

If one looks at dictionary definitions, ‘re-search’ is almost invariably defined as “systematic investigation to establish facts or principles or to collect information on a subject”<sup>19</sup>. Research is a general concept that is not normally defined in policy and legal texts. Although everybody has a common understanding of this term, research may refer to varying scientific fields and cover different types of activity specified each time by the given context; doing research might mean collecting and processing data, studying reports, developing theoretical models or observing phenomena and experimenting in a laboratory. The Merriam-Webster dictionary provides an all-encompassing definition of research as “investigation or experimentation aimed at the discovery and interpretation of facts, revision of accepted theories or laws in the light of new facts, or practical application of such new or revised theories or laws”<sup>20</sup>. Thus, one may argue that research is connected with an element of novelty since its aim is to establish new knowledge, or to revise acquired knowledge based on new facts or to apply such new or revised knowledge.

As it will be shown below, research is usually paired with terms such as ‘experimental development’, ‘technological development’ (RTD) or simply development (R&D). Whereas R&D activities concern both academic and industrial research, the term is closely linked to and primarily used in the fields of economics and business. In that regard, R&D can be defined as follows: “a process intended to create new or improved technology that can provide a competitive advantage at the business, industry or national level”<sup>21</sup>. However, research is not necessarily oriented towards the development of a marketable product or

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<sup>19</sup> See for instance the Oxford Dictionary of Current English or the online Collins Dictionary (2014) in: <http://www.collinsdictionary.com/dictionary/english/research?showCookiePolicy=true>.

<sup>20</sup> See the online Merriam-Webster Dictionary in: <http://www.merriam-webster.com/dictionary/research>.

<sup>21</sup> The definition of R&D is provided in the online dictionary US Legal, retrieved from: <http://definitions.uslegal.com/r/research-and-development/>.

service. Academic research in particular may intend to explain physical phenomena, respond to unsolved questions relating to the human existence or just satisfy human curiosity. This reasoning implies that who conducts a given research is a determinant factor. For example, academia and industry may reflect different environments and differing primary goals and needs. It is therefore useful to distinguish between academic and industrial research, albeit academic research may serve industry's objectives and industrial research may contribute to the stock of knowledge.

The United Nations Educational Scientific and Cultural Organisation (UNESCO) has attempted to provide definitions with universal application for research activities and related terms. In fact, the recommendation concerning the International Standardization of Statistics on Science (1978) classifies 'scientific research activities' under a wider category named as 'scientific and technological activities' (STA). The STA consist of all these "systematic activities concerning with the generation, advancement, dissemination, and application of scientific and technical knowledge in all fields of science and technology"<sup>22</sup>. The STA bring under the same category 'research and experimental development', 'scientific and technological education and training' (STET) and 'scientific and technological services' (STS). The terms are defined in great detail in the Manual for Statistics on Scientific and Technological Activities. Understanding in depth the specific activities covered under each term is out of scope for this study especially since the objective of the 'manual for statistics on STA' and other related manuals is the establishment of sound and internationally accepted standards and methods for the measurement and collection of statistical data on scientific and technological activities. However, relying on such UNESCO recommendations and related manuals for understanding the basic characteristics and important parameters of research could be a useful approach.

To begin with, scientific research activities are almost invariably defined in the UNESCO recommendations and related manuals in the light of 'research and experimental development' term. In fact, the definitions provided for R&D and 'scientific research activities' could be considered as conceptually identical. The 'Frascati Manual'<sup>23</sup> provides an

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<sup>22</sup> The scientific and technological activities (STA) concern in general the production, distribution and utilisation of scientific and technical knowledge. However, as it clarified in the manual, several activities such as general school education at the primary and secondary levels, non-formal industrial training, routine activities of publishing houses, radio and television broadcasting corporations, general and specialized medical and health services, industrial production and distribution of goods and services should be excluded from the scope of measurement of STA. Most of these exemptions (excluding maybe industry related activities) are also meaningful from an export control point of view. See: UNESCO, *Manual for Statistics on Scientific and Technological Activities* (Paris: UNESCO, Division of Statistics on Science and Technology, Office of Statistics, 1984), 17, retrieved from: [http://www.uis.unesco.org/Library/Documents/STSMannual84\\_en.pdf](http://www.uis.unesco.org/Library/Documents/STSMannual84_en.pdf).

<sup>23</sup> The 'Frascati Manual' was first issued 50 years ago by the Organisation for Economic Co-operation and Development (OECD) and in spite of its technical nature, it is considered as the cornerstone of OECD efforts to increase the understanding of the role played by science and technology. It deals exclusively with the measurement of human and financial resources devoted to research and experimental development and it has become a standard for the conduct of R&D surveys and related data collection worldwide. The document was written by experts from the OECD member countries and its latest sixth edition (2002) is available in the OECD website:

internationally accepted definition of R&D which is used in various policy and legal documents including the European Charter of Researchers and has as follows:

*“Research and experimental development’ (R&D) comprise creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications”<sup>24</sup>.*”

The UNESCO recommendation on the International Standardisation of Statistics on Science and Technology<sup>25</sup> and the manual for Statistics on Scientific and Technological Activities define ‘scientific research activities’ as “any systematic and creative work aimed at increasing the stock of scientific knowledge and at applying it in practice”<sup>26</sup>.

It is clear that both definitions confer to research the same principal elements: creativity, systematic effort, generation of new knowledge and last but not least the practical utilization of research results. Therefore, one could claim that what renders policy-makers and scholars eager to use the R&D term is most probably this reference on the quality of research to attain practical objectives as well as to lead to new applications/inventions.

According to the aforementioned recommendations and explanatory manuals, the R&D concept reflects three types of research activities: fundamental research, applied research and experimental development. The distinction between fundamental and applied research is particularly important and it will be discussed extensively thereafter in the study. It is prudent therefore to provide the definitions for the whole spectrum of research activities as they appear in the Frascati Manual and the UNESCO Recommendation on the Status of Higher-Education Teaching Personnel<sup>27</sup>.

Fundamental or basic research is defined the experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundation of phenomena and observable facts, without any particular application or use in view.

Applied research is also original investigation undertaken in order to acquire new knowledge. It is, however, directed primarily towards a specific practical aim or objective.

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OECD, *Frascati Manual: Proposed Standard Practice for Surveys on Research and Experimental Development* (Paris: OECD, 2002), retrieved from:

<http://www.oecd.org/sti/inno/frascati/manual/proposedstandardpracticeforsurveysonresearchandexperimentaldevelopment6thedition.htm>.

<sup>24</sup> OECD, *Frascati Manual*, 2002, 30.

<sup>25</sup> UNESCO, *Recommendation concerning the International Standardization of Statistics on Science and Technology*, 1978, retrieved from: [http://portal.unesco.org/en/ev.php-URL\\_ID=13135&URL\\_DO=DO\\_TOPIC&URL\\_SECTION=201.html](http://portal.unesco.org/en/ev.php-URL_ID=13135&URL_DO=DO_TOPIC&URL_SECTION=201.html).

<sup>26</sup> The wording “applying it in practice” should not be interpreted strictly as fundamental research is not supposed to be oriented towards any particular application.

<sup>27</sup> UNESCO, *Recommendation on the Status of Higher-Education Teaching Personnel*, 1997, retrieved from:

[http://portal.unesco.org/en/ev.php-URL\\_ID=13144&URL\\_DO=DO\\_TOPIC&URL\\_SECTION=201.html](http://portal.unesco.org/en/ev.php-URL_ID=13144&URL_DO=DO_TOPIC&URL_SECTION=201.html).

Experimental development is systematic work, drawing on existing knowledge gained from research and/or practical experience, which is directed to producing new materials, products or devices, to installing new processes, systems and services, or to improving substantially those already produced or installed.

*OECD, Frascati Manual, 2002, 77-79*

As it is implied by this categorization, research activities can be also distinguished on the basis of the objective served and the intention of researcher to undertake research of more general character or not. Whereas research activities are generally oriented towards the acquirement of new knowledge and the attainment of a practical aim, development activities intend to produce new materials, devices and processes based on existing knowledge.

It seems that there is an element of complementarity unifying these three types of research: first, basic research establishes new facts, general principles, theories and laws normally ‘affecting a broad field of science and usually claiming universal validity’. In its turn, applied research develops further the results of fundamental research ‘in a way to respond to specific cases and problems and with a view to achieving a predetermined practical aim’. Finally, the experimental development goes some steps further ‘by setting the principles and/or devising the applications required for the actual application of research results’<sup>28</sup>.

In practice, drawing a line and setting where fundamental research ends and applied research starts might be too difficult. How the wording ‘directed primarily towards a specific practical aim or objective’ should be interpreted? Distinguishing between experimental development and the pre-production phase can be equally challenging. Normally, all substantial improving and installing of new processes, systems and services takes place during the experimental development whereas the primary objective of the pre-production phase ‘is the development of markets, the pre-production planning and/or the smooth operation of production lines and relating control systems’. However, how easy can it be to distinguish between experimental development and industrial production ‘when the latter involves substantial modifications and granules of novelty’<sup>29</sup>?

Also, semantically, the dipole basic and applied research represents a ‘definite hierarchy of academic prestige’ that is becoming less apparent. The old-fashioned logic dictates that the

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<sup>28</sup> I practically summarise the objectives of basic and applied research as well as of experimental development as described in UNESCO, *Manual for Statistics on STA*, 1984, 20-29.

<sup>29</sup> The ‘Frascati Manual’ provides a practical rule -devised by the US National Science Foundation (NSF)- for clarifying experimental development: “If the primary objective is to make further technical improvements on the product or process, then the work comes within the definition of R&D. If, on the other hand, the product, process or approach is substantially set and the primary objective is to develop markets, to do pre-production planning or to get a production or control system working smoothly, the work is no longer R&D”. However, practically, for individual industries it is difficult to verify when there is an appreciable element of novelty or when a product/ process is substantially set. See OECD, *Frascati Manual*, 42.

“more abstract and detached a discipline is from the ‘real world’, the higher its prestige”<sup>30</sup>. However, as the analysis in section 2.2.1 will show, “research universities are involving into structures in which academic departments conducting elite education and basic research are surrounded by a constellation of quasi-university organisations that draw intellectual strength from the core university and provide important financial, human and physical resources in return<sup>31</sup>.” In that regard, the blurring of basic and applied research is manifested also in terms of the institutional structures where research takes place.

Last, a more straightforward categorisation of scientific research concerns the field where it takes place. One can distinguish between research activities undertaken in the area of natural sciences including engineering and technology, medical and agricultural sciences (NS) and research relating to social sciences and humanities (SSH)<sup>32</sup>. Scientific research activities falling in the realm of natural sciences are of greater interest to this study since they are most likely to lead to the attainment of sensitive dual-use results and applications. What ‘dual-use’ might mean is explained thereunder in the study. The Frascati Manual provides a more detailed division into the various functional fields of science. The classification of Fields of Science and technology (FOS) determines six main categories of science (1.natural sciences, 2.engineering and technology, 3.medical and health sciences, 4.agricultural sciences, 5.social sciences and 6.humanities) and sets out sub-categories for each distinct field. The revised version of the FOS classification can be found in Table II.

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<sup>30</sup> James J. Duderstadt, “The Changing Nature of Research and the Future of the University,” in *Reinventing the Research University*, ed. Luc E. Weber and James J. Duderstadt (France: Economica, 2004), 83.

<sup>31</sup> *Ibid.*

<sup>32</sup> Scientific research activities in the natural sciences, engineering and technology, medical and agricultural sciences can be defined as any systematic and creative activities designed to ascertain the links between, and the nature of, natural phenomena, to generate knowledge of the laws of nature and to contribute to the practical application of this knowledge of laws, forces and substances. Scientific research activities in the social sciences and humanities can be defined as any systematic and creative activity aimed at increasing or improving knowledge of man, culture and society, including use of such knowledge for the solution of social and human problems. See UNESCO, *Manual for Statistics on STA*, 19.

**Table II: Revised Fields of Science and Technology (FOS) classification<sup>33</sup>**

Revised FOS Classification	
<i>1. Natural Sciences</i>	1.1 Mathematics 1.2 Computer and information sciences 1.3 Physical sciences 1.4 Chemical sciences 1.5 Earth and related environmental sciences 1.6 Biological sciences 1.7 Other natural sciences
<i>2. Engineering and Technology</i>	2.1 Civil engineering 2.2 Electrical engineering, electronic engineering, information engineering 2.3 Mechanical engineering 2.4 Chemical engineering 2.5 Materials engineering 2.6 Medical engineering 2.7 Environmental engineering 2.8 Environmental biotechnology 2.9 Industrial Biotechnology 2.10 Nano-technology 2.11 Other engineering and technologies
<i>3. Medical and Health Sciences</i>	3.1 Basic medicine 3.2 Clinical medicine 3.3 Health sciences 3.4 Health biotechnology 3.5 Other medical sciences
<i>4. Agricultural Sciences</i>	4.1 Agriculture, forestry, and fisheries 4.2 Animal and dairy science 4.3 Veterinary science 4.4 Agricultural biotechnology 4.5 Other agricultural sciences

<sup>33</sup> The revised FOS classification amending the one contained in the Frascati Manual (Chapter 4.4, p. 67) can be found on the website of the OECD: <http://www.oecd.org/science/inno/38235147.pdf>. OECD Working Party of National Experts on Science and Technology Indicators, *Revised Field of Science and Technology (FOS) Classification in the Frascati Manual*, Document DSTI/EAS/STP/NESTI(2006)19/FINAL, (Paris: OECD, 2007).

5. <i>Social Sciences</i>	5.1 Psychology 5.2 Economics and business 5.3 Educational sciences 5.4 Sociology 5.5 Law 5.6 Political Science 5.7 Social and economic geography 5.8 Media and communications 5.9 Other social sciences
6. <i>Humanities</i>	6.1 History and archaeology 6.2 Languages and literature 6.3 Philosophy, ethics and religion 6.4 Art (arts, history of arts, performing arts, music) 6.5 Other humanities

## 2.2 The typology of research organisations

As mentioned above, the nature of research can be defined to some extent on the basis of the specific context in which takes place. For instance, researchers working for the R&D department of a company may have to adhere to different principles and deal with a different organisational structure compared to their colleagues conducting research in a university. This does not necessarily imply that the very essence of research conducted for instance, by a pharmaceutical company differs from the research undertaken by biologists in a university. However, the general orientation, the specific objectives as well as the privileges and obligations of researchers might be varying. Initiating a discussion on the limits between academic and industrial research and the compatibility of science with commercialisation activities is beyond the intentions of this study. Instead, discussing the different types of research organisations by highlighting their main characteristics is necessary for comprehending better the nature of research and framing the conceptual basis of the study.

**University based research:** The University is considered as the predominant house of higher education. What makes a university standing out is its role as centre of diffusion and advancement of knowledge and culture. The interrelation between research and teaching activities is of central importance to the mission of a university. Simply put, “the results of research feed into teaching, and information and experience gained in teaching can often result in an input to research”<sup>34</sup>. As the ‘Magna Charta Universitatum’ proclaims teaching and research must be inseparable if universities wish to effectively address the changing

<sup>34</sup> OECD, *Frascati Manual*, 35.

needs and demands of the society<sup>35</sup>. To that end, universities should emphasize on and develop both components of their educative role teaching and researching.

**Industry based research:** Contrary to universities, industrial organisations do not have amongst their primary objectives the advancement of knowledge per se and they are not considered as traditional carriers of education. Firms are sources of economic growth and development and they are traditionally setup with the goal of yielding economic profit to their stakeholders. Industrial organisations may contribute to the education indirectly through the professional formation that they provide to their employees and other lifelong learning activities offered to their staff. Regardless of their area of activity, firms may also conduct research activities and further the public wellness. Large firms operate normally a R&D department and in some cases they may establish research institutes within their structures. Microsoft Research is a telling example of a company maintaining several research institutes worldwide and working in close collaboration with governments and academia<sup>36</sup>. This is not strange, given that R&D activities and subsequent innovations generated can be of vital importance to the economic soundness and overall existence of a firm.

**Research performed by non-university organisations:** The diversity of research organisations is not limited to universities and firms. Therefore, it is practical to delineate also a third category bringing together all these research-performing organisations not falling in the other two categories. National Academies of Sciences and Humanities and public research institutes are good examples of organisations pertaining to this category. National Academies provide quite often science-based advice to policy-makers. The Academy of Athens for instance, undertakes research activities in a variety of scientific areas and provides expertise and insightful studies mostly on issues of major importance, such as education and fiscal policy. Public research institutes concern national laboratories and other public organisations conducting research usually in furtherance of set national policies and objectives. National atomic agencies dealing with nuclear development and safety and, public health organisations in charge of public health and disease control are typical examples of such public organisations. Admittedly, public research organisations may differ in terms of both legal status and mission. In Germany, for instance, the research landscape includes research institutes run by federal and State (Länder) authorities as well as other non-profit institutes conducting research for both public and private stakeholders<sup>37</sup>. Unifying different research institutes under the roof of one association is also a quite common practice.

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<sup>35</sup> The ‘Magna Charta Universitatum’, was signed in Bologna 1201 to celebrate the 900<sup>th</sup> Anniversary of the Alma Mater, available in: <http://www.magna-charta.org/resources/files/the-magna-charta/english>.

<sup>36</sup> For more information on the Microsoft network of research labs consult the relevant website: <http://research.microsoft.com/en-us/labs/default.aspx>.

<sup>37</sup> It must be noted that the role of each institution may reflect different responsibilities ranging from undertaking research to tuning the funding of different projects. For more information see: Federal Ministry of Education and Research, *The German Research Landscape: Who does research in Germany?* Bonn: Deutscher Akademischer Austauschdienst (DAAD), 2015.

## 2.2.1 The differences ‘unifying’ research organisations

Regardless of their type, research organisations can vary in terms of main fields of activity, organisational structure and legal personality. Among the three categories, one could presume that universities and industries will reflect two distinct environments whereas the mosaic of research organisations forming the third category it is likely to be similar to universities. Table III summarises the main features of research performing organisations in Europe.

**Table III: Types of organisations performing research in Europe**

<i>Elements</i>	<b>Types of organisations performing research in Europe</b>		
	<i>Industry</i>	<i>University</i>	<i>Other research Organisations</i>
<b>Diversity of activities</b> (NS or SSH):	focused	focused and multidisciplinary	focused and multidisciplinary
<b>Type of research</b> (basic or applied):	mainly applied	basic and applied	basic and applied
<b>Organisational structure:</b>	unique		
<b>Legal personality:</b>	normally private	public or private	public or private
<b>Funding:</b>	mainly private	mainly public	mainly public

**Main fields of activity:** Universities can be distinguished on the basis of the distinction between SSH and NS. Visibly, for industry organisations, such a categorisation is not particularly interesting. In France, the renowned ‘Université Paris-Sorbonne’ (Paris 4) and the ‘Université Pierre et Marie Curie’ (Paris 6) are good examples of research universities dedicated to SSH and NS respectively<sup>38</sup>. However, universities may undertake interdisciplinary research crossing both categories. Drawing always from the French higher education system, the ‘Université Paris Diderot’ (Paris 7) is a good example of a multidisciplinary university bringing sciences from both broad fields (SSH and NS) under one institutional structure<sup>39</sup>.

In addition, universities and other research institutes may pool their strengths in order to develop clusters or poles of research furthering synergies with other universities or non-university institutions and enhancing their research capabilities. An example of such a cluster

<sup>38</sup> See the official websites of Paris Sorbonne and ‘Pierre et Marie Curie’ universities respectively: <http://www.paris-sorbonne.fr/l-universite/>; <http://www.upmc.fr/en/research.html>.

<sup>39</sup> Université Paris Diderot website: <http://www.univ-paris-diderot.fr/english/sc/site.php?bc=universite&np=universite&g=sm&h=o/>.

is the so-called ‘Sorbonne Universités’<sup>40</sup>. This cluster comprises the University Paris-Sorbonne and the University Pierre and Marie Curie mentioned above plus one engineering university, one business school and various public research organisations. The same logic is valid also for non-university research organisations. Generally speaking, research centres tend to conduct more practice-oriented or specialised research compared to academic universities. The Pasteur Institute specialised in biology and matters of public health and the European Organization for Nuclear Research (CERN) working on nuclear physics are well-known examples of research institutes with more targeted research agendas<sup>41</sup>. However, as it is the case with the large multidisciplinary universities, one can identify public research organisations with activities spanning the whole spectrum of sciences. The National Centre for Scientific Research in France (Centre National de la Recherche Scientifique) is a telling example of a public organisation conducting research in different scientific areas (life sciences, mathematics, astronomy, nuclear physics and social sciences and humanities)<sup>42</sup>.

In sum, the classification into SSH and NS and their functional sub-fields has a true interest for multidisciplinary research organisations only if one segregates into the constituents of a given organisation in order to identify compact departments and faculties focusing on specific scientific fields. Besides, it should be noted that the complexity of contemporary research requires very frequently multidisciplinary teams and collaborations involving different research departments and scientists with diverse backgrounds.

**Type of research:** Another issue to examine is whether the categorisation to different types of research is meaningful for distinguishing between research organisations of either fundamental or applied research. Such an idea presents some interest given that research of fundamental nature is excluded from the scope of controls.

The discussion on the different types of research relates in the first place to the key orientation of a given research organisation. Separating between practice-oriented and academic research institutes is a very common practice. In Germany, for example they distinguish between academic universities and universities of applied sciences (Fachhochschulen). In Finland, the institutions of higher education are classified under two main groupings: academic universities promoting scientific and artistic education and polytechnics, known as Universities of Applied Sciences (UAS) maintaining close contacts with the industry<sup>43</sup>. Accordingly, one can identify research institutes of applied research such as the Organisation for Applied Scientific Research (TNO) in the Netherlands and research

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<sup>40</sup> See the website of the University of Sorbonne available in: <http://www.sorbonne-university.com/about-us/>.

<sup>41</sup> Websites of ‘Institut Pasteur’ and CERN respectively: <http://www.pasteur.fr/en/institut-pasteur/about-us>; <http://home.cern/about>.

<sup>42</sup> More information can be found in the CNRS website: <http://www.cnrs.fr/en/aboutcnrs/overview.htm>.

<sup>43</sup> Information from website “Study in Finland,” retrieved from: [http://www.studyinfinland.fi/faq\\_on\\_institutions\\_and\\_degrees](http://www.studyinfinland.fi/faq_on_institutions_and_degrees).

institutes with focus on basic research like the non-profit organisation ‘Max Planck Society’ in Germany<sup>44</sup>.

From an epistemological perspective, ‘applied sciences’ would mainly refer to the engineering strand of sciences leading to the development of technology and thereby, to technological applications. However, it must be emphasized that the progression of basic knowledge from the library or the laboratory to societal application is far from linear<sup>45</sup>. Organisations of applied research and even industrial R&D departments may or respond to fundamental research questions whereas organisations of fundamental research can be engaged with more practical questions, for instance, in the framework of partnerships with firms. To conclude, it is possible to distinguish between research organisations undertaking in principle either basic or applied research bearing though in mind that their overall activities may involve different types of research (basic, applied and experimental development).

**Organisational structure:** Research organisations may also differ on the basis of the organisational structure they represent. The term organisational structure refers to those arrangements determining the hierarchical relations, the rights and the duties of each line of authority and the information flows between the different levels of management<sup>46</sup>. One could assume that all research-performing organisations will have invariably some elements in common. In practical terms, universities, non-university institutes and firms will normally have in place a configuration of hierarchical levels and specialized units including a board of governors and an administrative/secretariat department. Most interestingly, the organisational structure denotes also the model of governance and the organisational culture of a research establishment albeit the latter is a unique element for every type of organisation. In that sense, universities and industries represent two different worlds, as it referred in the relevant literature<sup>47</sup>.

To begin with, universities are usually organised along a backbone of faculties and departments each of them representing a specific scientific area. For the research focused universities, the strong connection between research and teaching is often reflected in their structures. Specific research institutes, research advisory bodies and ethics committees are examples of research focused departments embedded in the structure of such universities.

Defining a European model of governance for universities can be too venturesome. Yet, some general characteristics can be identified. Universities are autonomous entities relying traditionally in a collegiate style of governance albeit operating according to principles and

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<sup>44</sup> See the Max-Planck-Gesellschaft and TNO websites, available in:

<https://www.mpg.de/short-portrait>; <https://www.tno.nl/en/about-tno/mission-and-strategy/>.

<sup>45</sup> Duderstadt, “The Changing Nature of Research and the Future of the University,” 77.

<sup>46</sup> Definition retrieved from Business Dictionary, available in:

<http://www.businessdictionary.com/definition/organizational-structure.html>.

<sup>47</sup> Indicatively see: Weber and Duderstadt, *Reinventing the Research University*; Andreas Altmann and Bernd Ebersberger, eds. *Universities in Change, Managing Higher Education Institutions in the Age of Globalisation*, (New York: Springer Science + Business Media, 2013). Henry Etzkowitz et al. “The Future of the University and the University of the Future: Evolution of Ivory Tower to Entrepreneurial Paradigm,” *Research Policy* 29 (2000): 313-330.

rules set by public authorities frequently at local, national and European levels. Traditionally, educational policy in Europe used to be a salient matter of national importance and it largely remains so. However, today European universities have to rethink their role, redesign their governance structure and meet standards established at European level. The Bologna process and the subsequent founding of the European Higher Education Area (EHEA) is a good example of a voluntary process committing universities originated from 47 States to attain common standards and objectives<sup>48</sup>. Simply put, universities are called to assume governance responsibilities previously held by the governments safeguarding at the same time the independence of their research. In addition, universities are required to be accountable in new ways, move towards the establishment of a more executive style of institutional management and seek for funding sources on their own. The ‘Universitatum World’ stands out for some other distinct elements, too. The principle of academic freedom, the tenure system of promotion and the reward structure of the scientific personnel -based on the publications records- render universities a *sui generis* locus.

At the other end, firms are organised on the basis of business principles with a view to creating markets and generating economic profits. The organisational structure of firms includes departments reflecting their distinct role such as sales, customer services and marketing departments. Nonetheless, identifying a predominant model of governance is rather a difficult case due to the variety of the models used and the diversity of firms’ needs and functioning.

The technological factor, namely the application of science to industry and commerce needs is an asset of strategic importance for every firm. The business world emphasizes the close link between a company’s ability to manage technology and its capacity to innovate. The main source for generation of new product ideas is either the customers or the R&D department of the firm<sup>49</sup>. From the conception of the idea and the subsequent generation of applied knowledge till the introduction and diffusion of an innovation in the market place, the whole process will demand the existence of R&D departments within the structure of the firms. Quite interestingly, firms may also opt to outsource certain R&D activities to universities or other research institutes given that new products and processes can be substantially benefited by pertinent academic research<sup>50</sup>. Therefore, research activities or differently, ‘technology development’ is considered to be of central importance for the functioning of economically sound and entrepreneurially successful business.

In broad terms, industrial research responds to different challenges compared to the academic ones. The existence of diverging research agendas between research universities and firms is only one manifestation of this reality. Firms may differ from universities in terms of principles, culture and managerial model embodied in their structure in various ways. For

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<sup>48</sup> More information on the Bologna process and the creation of the European Higher Education Area (EHEA) can be found on the (EHEA) formal website available in: <http://www.ehea.info/>.

<sup>49</sup> Indicatively see: Michael John Baker and Susan J. Hart, *Product Strategy and Management* (Edinburgh: Pearson Education Limited, 2007).

<sup>50</sup> Edwin Mansfeild, “Academic Research Underlying Industrial Innovations: Sources, Characteristics, and Financing,” *The Review of Economics and Statistics* 77 (1995): 55.

example industrial R&D departments are permeated by a norm of secrecy (*e.g.* research classified as ‘trade secret’) which is not compatible with the ‘culture of openness’ prevailing in academic environments. As Oosterlinck remarks, industry-based research may be equal to university research as far as quality is concerned, but it lacks the obligation to publish which is so characteristic of university research<sup>51</sup>. However, like universities, firms have to operate in conformity with the regulatory framework governing their activities and they should be accountable and responsible towards the society in new ways, as well. Whereas business organisations have a distinct role compared to research universities, they are still compelled to confront an increasingly changing environment and adapt their structure and governance accordingly.

**Legal personality and funding sources:** The last criterion determining the nature of research-performing organisations is the legal personality they hold: are they public or private entities? What does the legal personality implies for the governance model and the organisational structure of research organisations?

It must be noted that the legal nature of any organisation relates in general with two main issues: the overall control of a research organisation and the emanation of the financial resources. Generally speaking, in Europe, public universities and public research organisations are accountable either to national or regional authorities and depend largely on public funding<sup>52</sup>. This is also why in most countries the discussion about granting more autonomy to universities is usually connected with reforms increasing the financial accountability of these institutions (*e.g.* performance based budgets, introduction of strategic planning). However, the private status of a university does not necessarily imply real differences to public institutions. In fact, in certain European countries the legal framework regulating the operation of private universities is the same with the one applicable to public ones and the financing comes invariably from public sources. In the US, private universities account for the majority of higher education institutions and they are able to generate considerable income from private resources and donations alongside their public income<sup>53</sup>. Indeed, US universities in general have been more proactive in distributing and applying knowledge by capitalising for instance the economic value of the intellectual property created by research<sup>54</sup>.

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<sup>51</sup> Andre Oosterlinck, “The Modern University and its Main Activities,” in *Reinventing the Research University*, ed. Luc E. Weber and James J. Duderstadt (France: Economica, 2004), 122.

<sup>52</sup> In fact, for 2003, within the 27 Member States of the European Union, 79.9 % of the funding for higher education institutions came from public sources. For a comprehensive analysis of the research landscape in the EU, see: EU Commission (Directorate-General for Education and Culture), *Higher Education Governance in Europe. Policies, Structures, Funding and Academic Staff* Brussels: Eurydice European Unit, 2008.

<sup>53</sup> Frans A. van Vught, “Closing the European Knowledge gap? Challenges for the European Universities of the 21<sup>st</sup> century,” in *Reinventing the Research University*, ed. Luc E. Weber and James J. Duderstadt (France: Economica, 2004), 103.

<sup>54</sup> *Ibid.*

The issue of funding is a crucial one since it may bear consequences for the overall orientation and independence of research organisations. It must be born in mind that research-performing organisations may utilise a mix of public and private funds independently of their legal personality. This is actually a common practice that can be attributed to two main reasons: First, the unequivocal need of research organisations to mobilise funds for their research and second, the great interest of public and private stakeholders to further both scientific research and industrial R&D. With regards to the first factor, Duderstadt has observed already 10 years ago that there is a growing pressure on faculty to achieve excellence in teaching and research, but also to generate the resources necessary to support their activities<sup>55</sup>. This is still applicable today all the more due to the repercussions of the global financial crisis of 2008. Concerning the second factor, the section 2.2.2 outlines the role of knowledge in driving economic and social development.

### **2.2.2 Toward the ‘entrepreneurial university’ and the ‘academic firm’?**

What are the variables revolutionising the role of research organisations? What imperatives lead research organisations originating frequently from distinct environments to develop close relations between each other? Vught provides a plausible answer: “today we live in a knowledge society and our economy is strongly dependant on the creation and distribution of knowledge. Our markets, production processes and institutions are knowledge-based”<sup>56</sup>.

The collaborations between universities and industrial corporations, the utilisation of research results with a view to yielding profits for both universities and enterprises (through patenting and licensing activities for instance) and the traditional consultation between academic, governmental and industrial organisations are practices that have been intensified during the course of last three decades. Admittedly, the connection between academic universities and governmental or public authorities is as old as the founding of the first universities. However, the intensification of university-industry relations is a rather new blossom. In fact, it is a product of the consciousness of scientists that research must be responsive to the challenges of present times and the recognition of economic operators that knowledge and technology can play a drastic role in the acceleration and sustainability of economic growth. In that regard, the role of governments in directing and supporting interfaces between research and business organisations has been important.

Knowledge-based economies depend on highly-skilled workers and a science system capable of producing and transferring knowledge to economic operators and the society as a whole<sup>57</sup>. The struggle to further ‘knowledge-based economies’ through for instance, the development of synergies between industry and academia can be traced in the organisational structure of both firms and universities. For the former it may be translated into the establishment of R&D departments and units providing life-long training and for the latter it might mean the

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<sup>55</sup> Duderstadt, “The Changing Nature of Research and the Future of the University,” 76.

<sup>56</sup> Vught, “Closing the European Knowledge gap?” 90.

<sup>57</sup> For an introduction to the knowledge-based economy concept see: OECD, The Knowledge-Based Economy, OCDE/GD/102, Paris, 1996, available in: <https://www.oecd.org/sti/sci-tech/1913021.pdf>.

introduction of functions connecting academia with the business world. The particular type of such functions might range from simple liaison or career offices supporting students' professional development and their smooth absorption by firms to special units and R&D departments furthering closer university-industry relations by assisting researchers on issues such as patenting of inventions, student business start-ups and contracting with corporations. An example of a dedicated unit coordinating knowledge and technology transfers is the Leuven Research and Development (LRD) at the Catholic University of Leuven, in Belgium. The main idea underpinning the role of the LRD is described in the website of the university:

*“A university is a source of innovative research, but valuable research results and knowledge often go untapped. Research valorisation -creating economic and social value through research - is becoming increasingly important and should be encouraged, always with due respect to the freedom of the researcher. Various funding channels are available for research valorisation”<sup>58</sup>.*

Similar statements can be found in the websites of several universities in the EU and certainly all European universities have a kind of liaison office albeit at varying development levels. In the other side of Atlantic, American universities are considered as pioneers in accommodating research and industrial objectives. It is indicative that the US universities are allowed to patent and license their inventions from federally funded research from 1980 (with the US Bayh-Dole Act). In addition, the establishment of Technology Transfer Offices (TTO) within American universities has been a common practice for many years already<sup>59</sup>.

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<sup>58</sup> KU Leuven website (as of 9/6/2015), “Industry and Society”, retrieved from: <http://www.kuleuven.be/research/industry/>.

<sup>59</sup> Eric Canton et al., *Crossing Borders: When Science Meets Industry* (The Hague: CPB Neatherlands Bureau for Economic Policy Analysis, 2005).

### 3. Identifying Constraints in the sight of International Law

Having clarified the concept of research including connected terms (e.g. ‘scientific and technological activities’, ‘research and experimental development’) as well as the role of knowledge and technology in different organisation environments, it is useful to examine how these concepts and related activities are seen from a non-proliferation and export controls point of view. The main intent is to explore first, whether there are any provisions in the international non-proliferation law constraining research activities and second, to clarify the role of multilateral export control regimes in the combat against the proliferation of WMD. The chapter offers some observations on the role of knowledge in the proliferation context and makes also references to the milestones of the non-proliferation history.

#### 3.1 Proliferation of WMD: ‘a problem of knowledge’?

As Smith neatly mentions, the nature of the nuclear and of proliferation problem confronting mankind is, in its fundamental sense, a ‘problem’ of knowledge<sup>60</sup>. The advancement of science frequently involves or even requires the extensive interaction and collaboration between scientists coming from all over the world and probably this is one of the characteristics rendering science a common endeavour. The development of nuclear energy for instance, has been from the very beginning truly international as the ideas and work of scientists in one country stimulated and fertilized the minds of their colleagues in others<sup>61</sup>. From the conception of the atomic bomb by Leo Szilard and the discovery of fission by Otto Hahn, Lise Meitner and Otto Frisch till the first man-made self-sustaining fission reaction by Enrico Fermi, the whole process did involve scientists of different nationalities working for research institutions in various European countries and the US. Today the unprecedented technological progress and particularly the numerous breakthroughs in Information and Communication Technologies (ICT) have rendered information sharing and exchanges of knowledge easier than ever. This practically means that both knowledge and technology have no boundaries.

The origins of the nuclear problem lie not in any unique social or political circumstance of our time, but rather in the attainment by mankind after centuries of scientific thought and endeavour, of a certain level of knowledge of the physical universe.

*Smith, Explaining the Non-Proliferation regime, 266*

In general, constructing a nuclear weapon presupposes the existence of three main elements: the fissile material, the essential technological equipment and the expertise to effectively use the other two elements. In other words, even if a proliferator has at his disposal the raw material, he will also need the technological capabilities taking the form of both explicit knowledge (e.g. computational capacity) and implicit knowledge (technical expertise) in order to build a nuclear device. The destructive efficiency of such a bomb will depend largely

<sup>60</sup> Roger K. Smith, “Explaining the Non-Proliferation Regime: Anomalies for Contemporary International Relations Theory,” *International Organisation* 41 (1987): 266.

<sup>61</sup> David Fischer, *History of the International Atomic Energy Agency: The First Forty Years (A fortieth anniversary publication)* (Vienna: IAEA, 1997), 15.

on the technological factor or to put it differently, “any intelligent college student, with enough enriched uranium, high explosives, and truck capacity, can build and deliver an inefficient but deadly A-bomb, but those without access to large-scale computers will not be admitted to the H-bomb fraternity”<sup>62</sup>. However, if the control of trade flow in proliferation-sensitive materials sounds feasible, the constraint of information and knowledge flow could be largely unattainable. How is that actually possible for a system of norms, rules and decision making procedures to avert the diffusion of sensitive knowledge and safeguard it from misuse? This is a major question confronted throughout this doctoral study. Smith provides us again with a meaningful answer: “the ‘solution’ to the associated dangers of nuclear energy use in both peaceful and bellicose forms is only partially amenable to technical remedy; fundamentally, the ‘solution’ lies in the patterns of social and political interaction that man fashions”<sup>63</sup>.

The fight against the proliferation of WMD is not only about nuclear weapons, it also concerns biological and chemical weapons and their means of delivery. In fact, chemical weapons such as war gases had been first used, long before the Trinity event (Man’s first nuclear detonation in 1945), on the battlefields of the World War I, also referred by some historians as ‘the chemist’s war’. The exploitation of chemistry for military purposes has been intense and the pursuit of chemical arsenals a common practice for many countries, including the USA and the Soviet Union. Likewise, the foundation of microbiology by Louis Pasteur and Robert Koch was exploited from the very beginning also for military purposes. The use of anthrax and glanders bacteria with a view to poisoning the horses of Allied powers during World War I and, the attacks of imperial Japan using disease-causing agents against Chinese cities between 1932 and 1945, are notorious incidents of biological warfare. Today, successive advancements in life sciences and especially the pace of progress in emerging technologies such as genetic engineering and synthetic genomics demand flexible governance strategies engaging State and non-State actors in the oversight of proliferation-sensitive scientific and technological activities.

Furthermore, the construction of biological and chemical weapons differs in relation to nuclear weapons in that the resources required and the processes employed for their development. As Tucker stresses pathogens and viruses can be isolated from nature or synthesized in a lab, have a great variety of civil applications and are impossible to detect at a distance with available technologies. In contrast, highly enriched uranium and plutonium cannot be found in nature in a concentrated form suitable for weapons use and thus, their enrichment or reprocessing takes considerable time and funding. In addition, atmospheric and underground nuclear tests can be detected and nuclear technology advances slowly compared to the short time lag from scientific discovery to technological application in life sciences. Differences do exist also between chemical and biological weapons development since chemical warfare agents are manufactured compounds not existing in nature, have few

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<sup>62</sup> Thomas C. Reed and Danny B. Stillman, *The Nuclear Express: A Political History of the Bomb and its Proliferation* (Minneapolis: Zenith Press, 2009), 52.

<sup>63</sup> Smith, “*Explaining the Non-Proliferation Regime*,” 266.

peaceful applications and they are derived from a limited set of precursor chemicals whose export and import can be controlled<sup>64</sup>.

Regardless of the foregoing differences, the weaponisation of nuclear, biological and chemical materials and equipment is a technically challenging process involving both explicit and tacit knowledge. In particular, knowledge as it is expressed in its tacit form, *i.e.* skills, know-how and sensory cues that transferred mainly through personal contacts is a key capability not always diffused or readily available. Yet, nowadays the tacit knowledge is getting increasingly available due to the global distribution of skilled staff and the extensive collaboration between industry and academia in the R&D phase. As Meier highlights, globalisation leads to technology diffusion and it is inexorably linked to the sharing of technologies including dual-use technologies<sup>65</sup>.

Explicit knowledge is the information that can be codified, written down in the form of a recipe or laboratory protocol, and transferred from one individual to another by impersonal means, such as publication in a scientific journal.

Tacit knowledge, in contrast involves skills, know-how, and sensory cues that are vital to the successful use of a technology yet cannot be reduced to writing and must be acquired through hands-on practice and experience”

*Tucker, Innovation, Dual Use, and Security, 23*

Therefore, one could presume that each technology associates with a distinct R&D process and varying technical characteristics which in turn imply specific challenges and opportunities from a non-proliferation perspective. Some technologies consist primarily of hardware, others are based largely on intangible information, and still others are a hybrid of the two<sup>66</sup>. In that regard, Tucker et al. have developed a methodology for assessing and managing risks in the area of emerging biological and chemical technologies<sup>67</sup>. In practice, the said methodology builds a so-called ‘Decision Framework’ that can be used for assessing both the risk of misuse and the governability of certain dual-use technologies. The overall objective is, based on this assessment and a cost-benefit analysis, to select the appropriate mix of governance measures (hard-law, soft-law and informal measures) to be taken for the oversight of each technology. It is suggested also that governance approaches based on denial, such as export controls and interdiction, are most effective in the early stages of technology development when few suppliers and users exist<sup>68</sup>. It is worth wondering if such an analytical tool could be used in respect of the export controls policy-making.

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<sup>64</sup> Jonathan B. Tucker, *Innovation, Dual Use, and Security, Managing the Risks of Emerging Biological and Chemical Technologies* (Cambridge: The MIT Press, 2012), 2-3.

<sup>65</sup> Meier, *Technology Transfers and Non-Proliferation of Weapons of Mass Destruction*, 9.

<sup>66</sup> Tucker, *Innovation, Dual Use, and Security*, 70.

<sup>67</sup> *Ibid*, see in particular chapters 4 and 21.

<sup>68</sup> *Ibid*, 78.

### 3.2 The non-proliferation system yesterday and today

In its very essence, ‘non-proliferation’ comprises international efforts to prevent the spread and use of nuclear, biological and chemical weapons as well as to inhibit the diffusion of ‘sensitive’ raw material, technical equipment and knowledge that can be used for the development, use and delivery of such weapons. ‘Non-proliferation’ as a term is primarily used in connection to the proliferation of nuclear weapons and technologies. This is rather anticipated if one thinks of the destructive power of atomic and hydrogen bombs and the impact of ‘nuclear deterrence’ during the cold-war period. Nevertheless, the first serious efforts to prohibit chemical and bacteriological warfare preceded the foundation of the ‘nuclear non-proliferation regime’, notably with the signature of the so-called ‘Geneva Protocol’ dating back in 1925<sup>69</sup>. Regardless of ethical concerns relating to the use of WMD and the actual contingency of mutual destruction in the event of a nuclear war, the pursuit of WMD and, especially nuclear armaments, used to be and it is still considered as a chief matter of International Strategy. It is in principle interwoven with the real or perceived changes in the power balance among dissimilar State actors<sup>70</sup>. At the same time, it entails strong economic interests for the main players involved.

Historically, in the nuclear field, the proliferation of nukes and sensitive technology was encouraged by the two nuclear superpowers dominating the post-World War II period. As Reed and Stillman highlight, within the decade followed the Trinity event, the US and the Soviet Union were transferring nuclear technology to their client States on a massive scale. “They tolerated and actually encouraged, cross-fertilization until it was too late to turn back”<sup>71</sup> Thereafter, it was a matter of time and political will for other ‘second-range’ players to gain a share in the exploitation of the atomic energy. Nuclear proliferation took place through effective espionage, deliberate transfer of technology to allied countries and expatriate scientists. Indeed, “the acquisition of Western technology by China did not rely primarily on the espionage but it was accomplished one graduate student at a time”<sup>72</sup>.

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<sup>69</sup> This is logical since the use of chemical and biological warfare preceded the nuclear distress caused by the explosion of the two A-bombs in Japan. The ‘Geneva Protocol’ which was signed in June, 1925 prohibits the use in war of asphyxiating, poisonous or other gases, and of bacteriological methods of warfare and it is considered by many legal scholars as customary international law; retrieved from:

[http://www.un.org/disarmament/WMD/Bio/pdf/Status\\_Protocol.pdf](http://www.un.org/disarmament/WMD/Bio/pdf/Status_Protocol.pdf).

<sup>70</sup> “The balance of power is generally used to refer to the system of interstate relations created in Europe following the defeat of Napoleon. Hedley Bull argues that both an objective and subjective balance are necessary for a balance of power to operate.” See David Mutimer, “Reimagining Security the Metaphors of Proliferation,” in *Critical Security Studies, Concepts and Cases*, ed. Keith Krause and Michael C. Williams. (London: UCL Press, 1997), 205. See also chapter 6 “Anarchic Orders and Balances of Power” in the Kenneth N. Waltz Theory of International Politics (Long Grove: Waveland Press, 1979).

<sup>71</sup> Reed and Stillman, *The nuclear express*, 2.

<sup>72</sup> *Ibid*, 87.

Even the first years following the foundation of the International Atomic Energy Agency (IAEA), the cooperation and assistance for the peaceful development of nuclear energy mirrored another area of competition between the two superpowers<sup>73</sup>.

Technology is fungible: US, Soviet and British nuclear technology all flowed from the same wellspring: pre-war Europe. Junior states ‘borrowed’ from their seniors, but in time all three thermonuclear superpowers came to learn from each other as they recruited each other’s scientists and examined each other’s nuclear debris.

*Reed and Stillman, The Nuclear Express, 52*

Today, the non-proliferation system could be described as a sophisticated construction founded on international, regional and bilateral agreements and arrangements backed up by national legislation and enforcement mechanisms as well. Non-proliferation efforts reflect a mix of different factors and objectives. In fact, the non-proliferation system relates directly or indirectly to a diversity of ‘adjacent’ initiatives and problems. For instance, disarmament and physical security and safety mechanisms for the transfer and storage of chemical, biological and nuclear materials and equipment are not disjoint from non-proliferation and trade controls for both practical and substantial reasons. First, such objectives emanate from the same legal foundations underpinning the non-proliferation system as it is the case with the nuclear, biological and chemical disarmament. Second, the non-proliferation system should be working complementary to other related elements since failure to achieve for instance, physical security and safety objectives or even worst, negligence to consider them could negate the effectiveness of the non-proliferation system as a whole. It should be also noted that the ‘non-proliferation’ is a politically charged concept shaped *inter alia* by political purposefulness as many other terms used in political science and relating to the international security environment. For instance, Bentley when explaining the ‘WMD’ term notes that there is no essentialist definition of WMD but a concept constructed to fit specific political and institutional aims<sup>74</sup>.

### **3.3 The foundations of the non-proliferation system: a ‘dual role’ for researchers?**

What are the main principles and elements underpinning the functioning of the non-proliferation system? Answering this question demands first of all to study the legal foundations of the non-proliferation construction that are the main international treaties and conventions. Treaties can be vague and raise multiple interpretations and treaty-parties may try to shape or manipulate the legal provisions for their own benefit. Despite this, the cost of

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<sup>73</sup> With the enactment of the Atomic Energy Act by the US Congress in 1954, “the USA, its hands now free, and the Soviet Union began to compete in offering nuclear research reactors to strengthen ties with friends and allies and to gain favour with the developing countries”. See Fischer, *History of the International Atomic Energy Agency*, 29.

<sup>74</sup> Michelle Bentley, “WMD Terrorism: Defining ‘Mass Destruction’ in US Law,” *Politics* 31 (2011): 50. Bentley focuses on the legal understandings of the ‘WMD’ term in the US. This doctorate provides further examples on the criteria used for designing export control lists. In addition, Section 3.3 observes that different national interests may influence the non-proliferation policies pursued by States.

non-compliance or disregard for treaties with almost universal applicability is generally deemed as high by State actors. For example, in today's geopolitical scene countries that stand as 'pariah States' run the risk of undergoing economic or other sanctions and being isolated from a large part of the international community. Therefore, it could be useful to shed some light on the main principles and features underlying the functioning of the main treaties clarifying also the role of research community *vis-à-vis* the non-proliferation system.

A preliminary remark concerns the origins and the initial focus of the non-proliferation treaties. Regardless of their date of signature and entry into force, the Nuclear Non-Proliferation Treaty (NPT)<sup>75</sup>, the Biological Weapons Convention (BWC)<sup>76</sup> and the Chemical Weapons Convention (CWC)<sup>77</sup> were primarily negotiated and shaped during the post-World War II period marked *inter alia* by the 'cold-war' tensions. Taking into account the international security and economic environment of that time it is not surprising that non-proliferation was targeting mainly State-sponsored proliferation and certain bloc of countries instead of terrorist groups and individual States. Notwithstanding that State actors and State-sponsored arsenals are still of high interest today, the external environment has dramatically changed as briefly discussed above. Economic operators are getting increasingly autonomous in acting and shaping the international environment changing thereby how the proliferation-related trade might take place. At the same time terrorist organisations have threatened to use nuclear weapons and they have managed to execute attacks involving lethal bacteria and toxic gases<sup>78</sup>. Hence, a question raised quite often by scholars and policy-makers on the occasion of the various treaty review conferences concerns the extent to which old-aged treaties provide a solid and modern legal basis for responding to new challenges and addressing new players.

Second, non-proliferation treaties are centred on three main axes: (1) non-proliferation, (2) disarmament and (3) peaceful development of nuclear, biological and chemical technologies. Table IV provides a compendious presentation of the main treaty areas clarifying as well the most relevant treaty provisions for each of these three axes. With regards to disarmament, the BWC -the first multilateral treaty banning an entire category of weapons- and the CWC bind the signatory States to eliminate entirely their offensive bio-chemical arsenals and related facilities while the NPT is restrained to express the desire of its parties to pursue "a treaty on

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<sup>75</sup> The Treaty on the Non-Proliferation of Nuclear Weapons opened for signature in July 1968 and entered into force in March 1970.

<sup>76</sup> The Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction opened for signature in April 1972 and entered into force in March 1975.

<sup>77</sup> The Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction opened for signature in January 1993 and entered into force in April 1997.

<sup>78</sup> In fact, as a report of Harvard Kennedy School notes WMD terrorism is a real and imminent threat. The report reveals that Al Qaeda has not only threatened to use WMD but it has also actively pursued to buy, steal or construct WMD. See Rolf Mowatt-Larssen, *Al Qaeda Weapons of Mass Destruction Threat: Hype or Reality?* (Cambridge: Belfer Center for Science and International Affairs, Harvard Kennedy School, 2010), 2-9, retrieved from:

<http://belfercenter.ksg.harvard.edu/files/al-qaeda-wmd-threat.pdf>.

general and complete nuclear disarmament” as well as “to undertake effective measures for the cessation of the nuclear arms race”. As concerns the attainment of non-proliferation objectives, the situation is rather delicate since the containment of WMD-related technologies could hamper the exchange of scientific information and ultimately, the further development of nuclear physics, biology and chemistry. From a cooperation perspective, all State-parties pledge themselves to share any benefits reaped for the development of peaceful applications in nuclear, biological and chemical fields as well as to resolve any source of strife within the frameworks provided by the treaties and the UN Charter. Collaborative actions could involve the provision of assistance and the deployment of preventive measures especially for those States not being in position to achieve enhanced technical capabilities and a high level of readiness in safety and security areas.

**Table IV: The non-proliferation treaty system**

<b>What</b>	<b>NPT</b>	<b>BWC</b>	<b>CWC</b>
<i>Disarmament</i>	Article VI	Article II	Article I (2)(3)(4)(5)
<i>Non-proliferation:</i>	Articles I,II, III	Articles I, III, IV	Articles I, IV, V
<i>Peaceful development:</i>	Article IV	Article X	Article XI
<b>How</b>			
<i>Verification activities:</i>	Article III & IAEA safeguards	-	Article IV, V & Verification Annex
<i>Export controls:</i>	Article III	Article III	Article VI (2)
<i>Cooperation/capacity building:</i>	Article V/ IAEA technical cooperation	Article VII/ capacity building by ISU	Article IX, X/ capacity building by OPCW
<i>Implementing body:</i>	IAEA	ISU	OPCW

In practice, all treaty systems commit their parties not to develop, stockpile, use and transfer nuclear, biological and chemical weapons as well as not to transfer sensitive material, equipment or assistance pertinent to the development and use of such weapons. To that end, a host of implementation measures are required such as:

- controls in arms and WMD related items and technologies;
- on-site inspections and monitoring in order to verify -where applicable- the progress of destruction of prohibited weapons and,

- further verification activities to ensure that nuclear and chemical materials and technologies are not used for non-peaceful applications.

The implementation of the treaties and the observance of their main principles require national legislation and enforcement measures. The treaties' provisions may entail also the conclusion of bilateral or multilateral agreements between national authorities and the treaties' implementing organisations, namely the International Atomic Energy Agency (IAEA), the Organisation for the Prohibition of Chemical Weapons Convention (OPCW) and the Implementation Support Unit (ISU)<sup>79</sup>.

Third, international law binds in the first place sovereign States to take the necessary measures in order to achieve compliance with its stipulations. Logically, all individuals should abide by the implementing laws enacted in their respective jurisdictions and consequently, researchers are not excluded from this obligation. It is noteworthy that Article VII of the CWC calls each State-party to adopt national measures *inter alia* "to prohibit natural and legal persons anywhere on its territory or in any other place under its jurisdiction [...] from undertaking any activity prohibited to a State party under this convention".

Nonetheless, each treaty represents a unique structure with its own stipulations and means to implement them. A non-proliferation treaty can be less controversial or comprehensive compared to another due to the distinct problematic and historical course followed in each area<sup>80</sup>. The most notable difference concerns the fact that the NPT sets to some extent unequal obligations in its parties on the basis of a distinction between recognised Nuclear Weapons States (NWS) and Non-Nuclear Weapon States (NNWS) that are not entitled to acquire or manufacture nuclear weapons<sup>81</sup>. In addition to this, NNWS are not allowed to acquire sensitive nuclear material and equipment even for peaceful purposes unless they have concluded safeguards agreements with the IAEA<sup>82</sup>.

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<sup>79</sup> In 2006, with the 6th review conference, the BWC -the only treaty then without an implementing organisation- acquired its Implementation Support Unit (ISU) operating under the UN Office for Disarmament Affairs.

<sup>80</sup> The CWC with its 'Annex on Implementation and Verification' represents probably the most comprehensive treaty system.

<sup>81</sup> Article IX of the NPT qualifies as Nuclear Weapons States (NWS) those states which have manufactured and exploded a nuclear weapon or other nuclear explosive device prior to 1 January, 1967.

<sup>82</sup> In fact, Article III of the NPT provides for the implementation of safeguards by emphasizing three issues:

- a.) all NNWS are required to accept safeguards, as set forth in an agreement to be negotiated and concluded with the IAEA in accordance with the IAEA's Statute;
- b.) all NWS undertake not to provide source or special fissionable material, or equipment or material especially designed or prepared for the processing, use or production of special fissionable material, to any NNWS for peaceful purposes, unless the source or special fissionable material shall be subject to the safeguards;
- c.) finally, it is reiterated the inalienable right, proclaimed in Article IV of the treaty, of all parties to the treaty to undertake nuclear research for peaceful purposes in consistence with the obligations set forth in the safeguards agreements. To that end, the implementation of safeguards agreements should

Another interesting difference concerns the use of the so called ‘general purpose criterion’ for defining controlled toxic chemicals and their precursors and, controlled biological agents and toxins in the CWC and BWC respectively<sup>83</sup>. Such substances exempt from controls on the condition that are intended for peaceful purposes and their types and quantities are consistent with such purposes. This provision is considered as an element of a central importance for the functioning of the treaties since it allows the unhindered use for peaceful purposes (e.g. industry, agricultural, medical, pharmaceutical, research) of otherwise controlled substances<sup>84</sup>.

A further difference concerns the lack of formal declaration and inspection measures for implementing the BWC system. On the contrary, the CWC disposes a comprehensive verification regime let alone the IAEA’s full-fledged safeguards framework in the nuclear area. In relation to this, whereas all treaty systems are equipped with an organisation to oversee their implementation the statute, structure and powers of each implementing organisation may differ significantly. In broad terms, their competences range from setting standards for safety and security to implementing emergency and technical assistance projects and from supporting the national implementation of treaty provisions to undertaking verifications activities. Also, given that the treaties do take time to evolve, implementing organisations usually facilitate negotiations taking place in the review conferences (normally every five years) though scientific and preparatory work. Again, the technology monitoring capabilities of each treaty vary significantly. For instance, the Scientific Advisory Board of the OPCW does not have adequate resources to carry out its mandated functions whereas the BWC lacks a forum or mechanism to assess the implications of scientific and technological developments<sup>85</sup>.

With respect to the role of research, the signatories of all three treaty systems are committed to promoting the development of peaceful applications of bio-chemical and nuclear technologies be it in economic or scientific field. In fact, quite often the treaties use the same language for referring to the overarching principle of ensuring the unhindered conduct of R&D activities. For example, the signatory parties of both the CWC and the BWC accept that the conventions shall be implemented “in a manner designed to avoid hampering the economic or technological development of State-parties [...] or international co-operation in the field of peaceful chemical and biological activities”<sup>86</sup>. Also, the BWC and the CWC lay down that “State-parties have the right to participate in, the fullest possible exchange of equipment, materials and scientific and technological information for the use of

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be designed in a way to avoid hampering the economic or technological development of the signatories or international cooperation in the field of peaceful nuclear activities.

<sup>83</sup> See Article II and Article I of the CWC and the BWC respectively.

<sup>84</sup> The CWC specifies in its Schedules 1, 2 and 3 certain chemicals that have been used or can be used in connection to chemical weapons and that shall be prohibited and/or subject to verification activities.

<sup>85</sup> Tucker, 2012, 334.

<sup>86</sup> See Articles VI (11) and X (2) in the CWC and BWC respectively.

bacteriological (biological) agents and toxins as well as toxic chemicals and precursors for peaceful purposes”<sup>87</sup>.

This (the atomic) greatest of the destructive forces can be developed into a great boon, for the benefit of all mankind.

*‘Atoms for Peace Speech’, USA President Dwight D. Eisenhower, December 1953*

Likewise, Article IV of the NPT proclaims “the inalienable right of all parties to the treaty to develop research, production and use of nuclear energy for peaceful purposes without discrimination” observing however, the commitments assumed under the treaty. As it is the case with the CWC and BWC, all parties to the NPT “undertake to facilitate international cooperation, ‘through the fullest possible exchange of equipment, materials and scientific and technological information for the peaceful uses of nuclear energy”. Furthermore, Article III clarifies that the safeguards required under the treaty “shall be implemented in a manner designed to comply with Article IV [...] and to avoid hampering the economic or technological development of the Parties or international co-operation in the field of peaceful nuclear activities”. To that end, NWS undertake to make available to NNWS, on a non-discriminatory basis and under appropriate safeguard agreements, “potential benefits from any peaceful applications of nuclear explosions”. What’s more, “the charge to NNWS Party to the Treaty for the explosive devices used will be as low as possible and exclude any charge for research and development”<sup>88</sup>.

This imperative to reap the benefits of atomic energy preventing however its diversion from peaceful uses to military applications had become apparent from the very beginning. Already in 1945, the three holders of nuclear know-how (USA, UK, and Canada) had declared their intention to share fundamental scientific information to be used for the peaceful development of atomic energy with any nation that would fully reciprocate. However, they were opposed to the disclosure of detailed information concerning the practical industrial application of atomic energy until the devise of effective measures acceptable to all nations and, ensuring the peaceful application of the atomic energy<sup>89</sup>. This last argument was based on the still

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<sup>87</sup> Article X (1) in the BWC: “The States Parties to this Convention undertake to facilitate, and have the right to participate in, the fullest possible exchange of equipment, materials and scientific and technological information for the use of bacteriological (biological) agents and toxins for peaceful purposes. Parties to the Convention in a position to do so shall also co-operate in contributing individually or together with other States or international organisations to the further development and application of scientific discoveries in the field of bacteriology for the prevention of disease, or for other peaceful purposes”.

Article VI (11) of the CWC: “The foregoing provisions shall be implemented in a manner which avoids hampering the economic or technological development of SP, and international cooperation in the field of chemical activities for purposes not prohibited under this Convention including the international exchange of scientific and technical information and chemicals and equipment for the production, processing or use of chemicals for purposes not prohibited under this Convention”.

<sup>88</sup> See Article V of the NPT.

<sup>89</sup> See the “Three Nation Agreed Declaration on Atomic Energy”, by The President of the US, Harry Truman, the Prime Minister of the UK Clement Attlee and the Prime Minister of Canada Mackenzie

valid premise that the military exploitation of atomic energy depends, in large part, upon the same methods and processes as those required for industrial uses. The need to stem the destructive power of nuclear energy and the realisation that technology transfers are rather inevitable have shaped over time both the negotiations in the framework of NPT and the role of IAEA since its foundation in 1957 and onwards.

The extent to which State-parties to the treaties have managed to promote the seamless development of nuclear, biological and chemical technologies for all compliant countries and safeguard peaceful research from misuse is debatable. Especially in the nuclear area, there are developing countries questioning the commitment of supplier countries to share technological advancements. In this regard, some analysts point out that technologically superior States see nuclear technologies ‘as commercial assets which cannot be forced to share with those whom they disapprove of or who cannot pay the price’<sup>90</sup>. Concerning the prevention of misuse of peaceful facilities and processes, North Korea -the first and only up to now State to withdraw from the NPT- openly accepted in 2005 that safeguarded nuclear fuel cycle capabilities developed ostensibly for peaceful purposes had been exploited for the development of nuclear weapons. Almost three decades earlier, in 1974, India -presently a non-signatory of the NPT- became nuclear by exploding a ‘peaceful’ device after having diverted plutonium produced in a reactor provided by Canada for peaceful nuclear research<sup>91</sup>.

Any criticism to the functioning of the non-proliferation system and identification of weaknesses should not be used as an excuse for not complying with it. Ideally, criticism could suggest alternatives and ways to increase transparency, accountability and effectiveness of the non-proliferation system as a whole. Scientists in particular seem to have a dual role in this pursuit of reinforced accountability *vis-à-vis* non-proliferation objectives. On the one hand, researchers themselves have an obligation to comply with the evolving treaties, export control regulations, and other security and safety imperatives. On the other hand, they could engage in the review of the non-proliferation treaties and subsequent implementing laws with a view to enhancing the scientific and technical back-up made available to the non-proliferation community. The first aspect implies that researchers today face increased possibilities to get involved in proliferation-sensitive activities for instance, in the framework of international collaborations with other research institutes or partnerships with industrial operators. Therefore, they need to become aware of proliferation concerns so as to act responsibly in the conduct of their research. The second aspect suggests that researchers and academics are well-placed to identify important technological breakthroughs that could change the state of play and suggest solutions already from the phase when policies are being shaped and formulated. In the last analysis, researchers shall reasonably have a say on issues affecting their work and take up initiatives responding to the ‘proliferation problematic’.

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King, 1945, available in: [http://www.nuclearfiles.org/menu/key-issues/nuclear-energy/history/dec-truma-atlee-king\\_1945-11-15.htm](http://www.nuclearfiles.org/menu/key-issues/nuclear-energy/history/dec-truma-atlee-king_1945-11-15.htm).

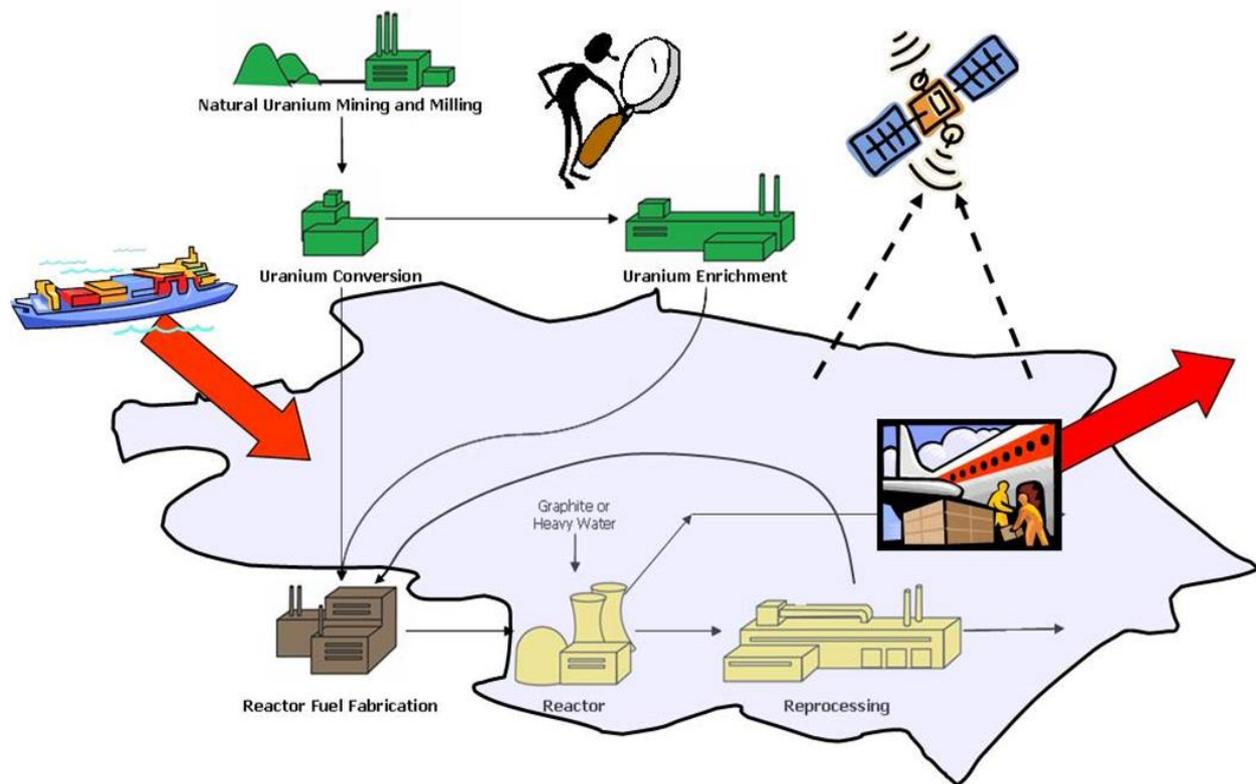
<sup>90</sup> Ian Anthony, Christer Ahlström and Vitaly Fedchenko, *Reforming Nuclear Export Controls, the Future of the Nuclear Suppliers Group*, SIPRI Research Report No 22, (New York: Oxford University Press, 2007), 4.

<sup>91</sup> India, Israel, Pakistan and South Sudan are the only countries that have not signed yet the NPT.

### 3.4 Implementing non-proliferation imperatives through export controls

Implementing the complex system of international non-proliferation treaties and other related agreements demands taking up a number of measures for the lawful supply, safe transportation and stockpiling of sensitive materials and equipment as well as the rightful operation of sensitive nuclear and bio-chemical facilities. Especially for nuclear non-proliferation, the monitoring of nuclear flows and the verification of the peaceful character of nuclear activities pursuant to IAEA safeguards agreements, the control of supply of nuclear related material and technology through export controls as well as the physical protection of nuclear facilities are all equally important and concern all the processes and activities consisting of ‘the nuclear fuel cycle’<sup>92</sup>. For this doctorate, the focus is on the second element: the role of trade controls and the main principles underpinning their functioning.

**Figure I: “The nuclear fuel cycle”<sup>93</sup>**



<sup>92</sup> The various activities associated with the production of electricity from nuclear reactors are collectively referred to as the nuclear fuel cycle.

<sup>93</sup> Pictorial presentation of the nuclear fuel cycle including the relevance of trade control activities. See: Filippo Sevini, Nuclear Export Controls and Nuclear Safeguards, Proceedings of the 7<sup>th</sup> Joint ESARDA-INMM Workshop, Aix en Provence, 2011, retrieved from: [https://esarda.jrc.ec.europa.eu/images/files/2011-workshop-aix/Working-groups/WG3/Filippo\\_SEVINI\\_pa.pdf](https://esarda.jrc.ec.europa.eu/images/files/2011-workshop-aix/Working-groups/WG3/Filippo_SEVINI_pa.pdf).

Enforcing controls in the export and import of certain commodities is a common practice for diverse necessities such as customs duties, fight against the crime (*e.g.* trafficking in drugs and luxury goods) as well as protection of flora and the fauna, public health and cultural heritage of a State (*e.g.* illegal transfers in specimens of wild animals and plants or cultural items of national heritage). On top of that, trading small and light arms and other conventional arms and munitions as well as nuclear, biological and chemical weapons is forbidden or strictly regulated. Such restrictions are frequently referred as Strategic Trade Controls (STC). Whereas there is no specific definition clarifying the STC term and determining what items should be covered under this concept, it is generally accepted that such controls target areas bearing consequences for the national and international security. Trade in drugs, diamonds and items that can be used for internal repression and human rights infringements could broadly fall under the scope of sensitive trade with security implications, too. However, this study grapples with one of the *par excellence* ‘strategic trade’ areas, namely the export of dual-use items and technologies.

### 3.4.1 The origins and evolution of trade controls in dual-use items

Strategic assets are not to be shared or, to be more accurate, are not to be shared with non-allies. It was largely around this perception that unilateral national export control systems and the first multilateral export control regime, to say the ‘Coordinating Committee for Multilateral Export Controls’ (CoCom), were built. From the first US Export Control Act in 1940 intending to save critical items in a pre-war environment and limit the exportation of certain materials and equipment (*e.g.* aeronautic parts, chemicals and minerals) to Imperial Japan and, the operation of CoCom (from 1949 till 1994) to restrict the flow of weapons and technology to the Soviet Bloc and China, it became clear that items and technology with civil applications can be under scrutiny for national and international security concerns<sup>94</sup>. Controlling ‘sensitive’ civilian items sounds as a plausible practice if one considers the dual character of the nuclear power or the great variety of items and materials -such as common industrial chemicals- which can be deadly when used as weapons. Besides, an item or technology can be ‘strategic’ in terms of both practical capabilities and economic power conferred to its holder. Taking this into account, one could argue that export controls of dual-use items were intended not only to deprive certain countries from critical technological capabilities but also to restrict the availability of economic means required to develop such capabilities. Targeted sanctions and embargoes imposed by national, regional and most notably international actors (*e.g.* UN, EU and OSCE sanctions and embargoes) are other

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<sup>94</sup> In fact, the CoCom regime was organised on the basis of three control lists:

- a munitions list including all military items;
- an atomic energy list including sources of fissionable materials, nuclear reactors, and their components and,
- an industrial/commercial list

See Congress of the US, *Technology and East-West Trade* (Washington: Office of Technology Assessment, 1979), 155. See also: US Congress, *Export Control Act of 1979* (96<sup>th</sup> Congress, Congressional record, Vol. 125 1979), available in: <https://www.gpo.gov/fdsys/pkg/STATUTE-93/pdf/STATUTE-93-Pg503.pdf>.

measures adopted in the name of various national and international interests -including proliferation concerns- and having a great deal of economic consequences.

The evolution of trade controls is inexorably linked to the development of the non-proliferation system *per se*. As explained in section 3.3, the non-proliferation treaties provide the legal basis and main impetus for devising mechanisms to control the transfers of WMD and their means of delivery as well as materials and technologies which are integral to such weapons. The obligation to clarify and implement sometimes ambiguous treaty provisions has led to the establishment of relatively agile and informal structures, the ‘international export control regimes’ also known as the ‘Multilateral Export Control Regimes’ (MECR). For instance, in the nuclear field, the need to clarify certain NPT provisions and implement internationally coordinated export controls was firstly illustrated with the creation of an informal group, the ‘Nuclear Exporters Committee’ also known as the ‘Zangger Committee’<sup>95</sup>. The Zangger Committee started its deliberations in 1971 with a view to clarifying Article III §2 of the NPT<sup>96</sup>. Contrary to the CWC where explicit definitions of controlled toxic chemicals and precursors are given, the NPT does not specify what ‘source and special fissionable material’ shall mean and how ‘especially designed or prepared (EDP) material and equipment for the processing, use or production of special fissionable material’ should be understood. The Committee reached in 1972 a first consensus on an illustrative list of controlled material and equipment (the so-called ‘trigger list’) as well as conditions of supply of such items (safeguards agreements with the IAEA and re-export clause). In fact, the fruit of these discussions were two separate memoranda –one on the export of source and special fissionable material and one on the exports of other materials and equipment for the production of such fissionable material- published for the first time in 1974 by the IAEA as Information Circular 209 (INFCIRC/209). The committee has maintained ever since its focus on the interpretation of article III of the NPT taking into account technological advancements and new needs<sup>97</sup>.

Export controls have been evolved also as a result of most or least predictable incidents that marked the proliferation timeline and changed the international security landscape. As Jankowitsch-Prevor notes the export control regimes evolved primarily in response to unforeseen events.

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<sup>95</sup> Between 1971 and 1974, a group of 15 States -some already parties to the NPT, others prospective parties- held a series of informal meetings in Vienna chaired by Professor Claude Zangger of Switzerland. The group which came to be known as ‘the Zangger Committee’, decided that its status was informal and that its decisions would in themselves not be legally binding upon its members. Today, the Zangger Committee has 39 members including all the NWS. Decisions of the Committee are taken by consensus. Information from the official website: <http://www.foi.se/en/Customer--Partners/Projects/zc/zangger/history/>.

<sup>96</sup> According to Article III (2) of the NPT, treaty-parties undertake not to provide (a) source or special fissionable material, or (b) equipment or material especially designed or prepared for the processing, use or production of special fissionable material, to any Non-Nuclear-Weapon State (NNWS) for peaceful purposes, unless the source or special fissionable material shall be subject to IAEA safeguards.

<sup>97</sup> Since the last revision of its ‘trigger list’ in 2000, the importance of the committee seems to have been reduced or surpassed by the NSG.

First, the ‘peaceful’ explosion conducted by India in 1974 demonstrated the need for adoption of full-scope safeguards along with enhanced export controls on the basis of common guidelines and led to the foundation of the London Suppliers Group, later renamed as the Nuclear Suppliers Group (NSG)<sup>98</sup>. The NSG followed and expanded the work done by the Zangger Committee. Indeed, “it achieved *ab initio* a more comprehensive and at the same time flexible approach adding further specific procedures and conditions” such as formal governmental assurances, physical protection measures and strengthened re-export provisions<sup>99</sup>. Second, the discovery of the covert Iraqi nuclear weapons programme in 1992 brought to the fore the role that dual-use technologies and equipment can play in the proliferation of WMD and led to the establishment of an additional set of NSG guidelines “for the transfers of dual-use equipment, material, software and related technology, which could make potentially a significant contribution to an unsafeguarded nuclear fuel cycle or nuclear explosive activity”<sup>100</sup>. Most recently, in 2001, terrorist groups demonstrated their ability to bring strikes of critical importance and declared also their intention to use WMD in a future attack. In response, the NSG reviewed its Guidelines with a view to preventing and countering the misuse of nuclear exports for terrorist purposes<sup>101</sup>.

Likewise, in the bio-chemical field, various incidents have shaped the non-proliferation course<sup>102</sup>. For instance, in 1984, it was revealed that chemical weapons used against Iranians and Kurds in the context of the Iran- Iraq conflicts had been sourced through legitimate trade in chemicals and related civil materials. As a result, two years later the Australia Group (AG), the multilateral arrangement for the control of export of certain bio-chemical agents and related equipment and manufacturing facilities came into life<sup>103</sup>. Also, the Missile Technology Control Regime (MTCR) controls technologies enabling the delivery of WMD<sup>104</sup> whilst the Wassenaar Arrangement (WA), the successor of CoCom sets export control norms for the transfer of conventional weapons and dual-use items and technologies<sup>105</sup>. These two were founded in 1987 and 1996 respectively and complete the ‘quartet’ of informal arrangements regulating in a non-legally binding mode the trade of ‘strategic’ technologies

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<sup>98</sup> The NSG guidelines were first published in 1978 by IAEA as Information Circular 254 and since then the IAEA continues publishing the subsequent amendments of the NSG Guidelines. These guidelines constitute today Part 1 of the INFCIRC/254 and govern the transfers of certain items that are ‘especially designed or prepared for nuclear use’, setting the so-called NSG ‘trigger list’.

<sup>99</sup> Odette Jankowitch-Prevor, “A New Role of industrial Operators in Trade in an Evolving Nuclear Export Control Regime- Beyond Legal responsibilities?”, in *Sensitive Trade - The Perspective of European States*, ed. Quentin Michel (Brussels: P.I.E. Peter Lang, 2011), 23.

<sup>100</sup> The guidelines for nuclear related dual-use items were published as Part 2 of IAEA INFCIRC/254 in 1992. See the NSG website available in: <http://www.nuclearsuppliersgroup.org/en/history1>.

<sup>101</sup> IAEA INFCIRC/254/Rev. 5/Part 1, 16 January 2002.

<sup>102</sup> Terrorist attacks of small scale involving poisonous gases have been executed in 1995 when members of the religious movement ‘Aum Shinrikyo’ released sarin agent in the Tokyo subway. More recently, the 9/11 attacks in 2001 followed the mailing of letters containing anthrax in various US and European countries raising international alarm and concern about bio-terrorist threats.

<sup>103</sup> See the website of the Australia Group (AG), available in: <http://www.australiagroup.net/en/>.

<sup>104</sup> See the website of the Missile Technology Control Regime (MTCR), available in: <http://www.mtcr.info/english/>.

<sup>105</sup> See the website of the Wassenaar Arrangement (WA), available in: <http://www.wassenaar.org/>.

that can contribute to the development of WMD, conventional weapons and their means of delivery.

In today's landscape, the importance given to export controls has been raised as a result of the realization that legitimate trade can be used for proliferation purposes and the existence of an international security environment susceptible to old and new proliferation risks. The revelations about A.Q. Khan's proliferation network in 2003 and the threats posed by new actors such as terrorist organisations have dispelled doubts on the need for implementing export controls. The stake actually today is how to modernize and harmonise national trade control systems towards the development of a global level playing field ensuring at the same time peaceful development of dual-use technologies. The UNSCR 1540 adopted in 2004 goes towards this direction by addressing smuggling and terrorist threats and binding all the UN Member States to:

- i. develop effective measures to account for and secure sensitive items within their borders by establishing also physical protection measures and,
- ii. enact national legislation and enforce effective border controls in the transfers of sensitive items including through international cooperation when necessary.

The term 'sensitive items' (author's wording) covers as much WMD as materials and delivery systems relating to such weapons that are to say the dual-use items. As a consequence, the Resolution obliges all States to implement a large number of measures within their States that can affect domestic politics, a step not exemplified in international legal tradition<sup>106</sup>. Also, as an instrument adopted under Chapter VII of the UN charter, the Resolution is legally binding on all UN Member States. These two elements have led scholars to point out that 'resolution 1540 is one of the broadest legal instruments in the non-proliferation field'<sup>107</sup>. Further, the Resolution provides the basis for implementation assistance: 'States in a position to do so' are invited to 'offer assistance as appropriate in response to specific requests to the States lacking the legal and regulatory infrastructure, implementation experience and/or resources for fulfilling the above provisions'<sup>108</sup>.

The Security Council decides [...] that all States shall take and enforce effective measures to establish domestic controls to prevent the proliferation of nuclear, chemical, or biological weapons and their means of delivery, including by establishing appropriate controls over related materials.

*§3 of the UNSCR 1540*

<sup>106</sup> Andrea Viski, "United Nation Security Council Resolution 1540, A Universal Model?" in *Modelling Dual-Use Trade Control Systems*, ed. Odette J. Prevor, Quentin Michel and Sylvain Paile-Calvo (Brussels: P.I.E. Peter Lang, 2014), 102-103.

<sup>107</sup> Indicatively, see: See Cole J. Harvey, "Two Steps Forward, One Step Back: Slow, But Steady Progress Implementing UNSCR 1540," *Nuclear Threat Initiative*, July 20, 2011, retrieved from: <http://www.nti.org/analysis/articles/unscr-1540/>

<sup>108</sup> Sybille Bauer, "Arms Trade Control Capacity Building: Lessons from Dual-Use Trade Controls", *SIPRI Insights on Peace and Security* 2 (2013): 5.

Pursuant to the resolution, the so-called ‘1540 Committee’ has been established with the aim of overseeing and facilitating the implementation of the resolution’s provisions by the UN Member States<sup>109</sup>. UN Member States are required to report legislative and enforcement measures undertaken domestically to the Committee which in turn shall be responsible for reporting the progress achieved to the Security Council. The contribution of the Resolution to the development and consolidation of export control systems can be evaluated mainly indirectly. In fact, “over the past decade, Resolution 1540 has become the main driver for the establishment and enhancement of export controls by non-members of the international export control regimes, and for the mobilisation of funding for capacity building purposes”<sup>110</sup>. For instance, as Shaw mentions, today companies trading in Asia and Near East have to deal with new or significantly upgraded export control laws and regulations in China, South Korea, Taiwan, Singapore, Malaysia, the Philippines, India, Pakistan and the United Arab Emirates and the list of countries with related frameworks continues to grow. In terms of awareness, whereas as of October 2004, only 59 States had submitted annual reports, today more than 100 States have submitted their reports<sup>111</sup>. This could be an indicator of the increasing legitimacy of the resolution among the members of the international community and of their compliance performance. That said, the extent to which the ‘1540 reporting system’ and the resolution *per se* provide the robust and rigorous framework needed for the international coordination of export controls is questionable. Besides this, the nature of UN resolutions is such that further clarifications and national measures are always required for implementing general proclamations and provisions.

Overall, the UNSCR 1540 is a landmark document. It does not determine specific rules and channels whereby common goals could be achieved but it sets legally binding requirements for the application of trade controls and other security measures by essentially all members of the international community. Given the dispersion of dual-use technologies and the interrelated problem of foreign availability, the danger of economic undercut is higher and sensitive civilian technologies may easier fall in the wrong hands. International cooperation and harmonisation promoted largely by the resolution 1540 are important aspects to look at for overcoming such challenges. In that regard, enhancing collaboration and developing an action plan that lays down specific steps to be taken at international and national level for the harmonised implementation of export controls could be an added value to the current global framework of export controls.

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<sup>109</sup> “Originally designed as a temporary committee to collect states' implementation reports and provide a summary report to the Council, the 1540 Committee has evolved into a more permanent body charged with collecting information on best practices, sharing information and outreach, and matching states' needs with offers of assistance. Four permanent working groups, composed of representatives of Security Council states, coordinate the committee's efforts. The four groups cover national implementation, assistance, cooperation with international organizations, and transparency and outreach”. See: Harvey, “Two Steps Forward, One Step Back” *Nuclear Threat Initiative*, July 20, 2011; on the evolution of the role and the tasks of the ‘1540 Committee’ see also its website: <http://www.un.org/en/sc/1540/index.shtml>.

<sup>110</sup> Bauer, “Arms Trade Control Capacity Building,” 5-6.

<sup>111</sup> Robert Shaw, “Export Controls and the Life Sciences: Controversy Or Opportunity?” *EMBO reports* 17, (2016): 477.

### 3.4.2 Dual-use trade controls and arms controls

Continuing this plunge into ‘strategic trade controls’, it is worth to reflect on the relationship between export controls in dual-use items and arms. Such an analysis could help one to understand *inter alia* what items are actually targeted by dual-use trade controls.

Although both trade controls and arms controls satisfy international security and peace and stability objectives, they represent distinct legal regimes. Generally speaking, arms and dual-use export controls originate from different legal sources, associate to a great extent with distinct controlled items and technologies and follow distinguishable courses. For instance, in the EU, the Council Common Position 2008/944/CFSP<sup>112</sup> establishes common rules for the exports of military technology and equipment whereas the Council’s Regulation (EC) 428/2009 provides the common framework under which exports of dual-use items are controlled<sup>113</sup>. At international level the newly adopted Arms Trade Treaty (ATT)<sup>114</sup> establishes a distinct framework ruling the trade in conventional arms -from small arms to battle tanks and combat aircrafts- while dual-use items and WMD are addressed by the non-proliferation treaties and most notably the UNSCR 1540<sup>115</sup>. This approach suggests the

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<sup>112</sup> See EU Council, *Common Position 2008/944/CFSP defining common rules governing control of exports of military technology and equipment*, Official Journal of the EU (L 335), Brussels, 2008, available in: <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32008E0944&qid=1462652331602&from=EN>.

<sup>113</sup> Separating between military and civilian dual-use lists pursuant to distinct legal frameworks is a common practice for many countries. In the USA for instance, there is the United States Munitions List (USML) pursuant to the International Traffic in Arms Regulations (ITAR) and the Commerce Control List (CCL), pursuant to Export Administration Regulations (EAR). In fact, there is also a third list, the Nuclear Regulatory Commission Controls (NRCC) concerning nuclear equipment and materials, such as those referred in the Part I of the NSG Guidelines. Despite that, there are also other examples of countries like Japan where one single comprehensive list of controlled strategic items is applicable.

<sup>114</sup> See the UN Office of Disarmament Affairs website: The landmark Arms Trade Treaty (ATT), regulating the international trade in conventional arms was adopted by the UN General Assembly in April 2013 and entered into force on 24 December 2014, retrieved from: <https://www.un.org/disarmament/convarms/att/>.

<sup>115</sup> There are also further instruments governing specific areas of trade in conventional arms at European and international levels. The UN Protocol against the Illicit Manufacturing of and Trafficking in Firearms, their Parts and Components and Ammunitions which is one of the three protocols supplementing the UN Convention against Transnational Organized Crime, adopted in 2001, constitutes a relevant example. In the EU, the regulation 258/2012 implements article 10 of the aforementioned UN protocol and the Regulation 98/2013 sets controls on explosive precursors. Examples like these, illustrate how much segregated the legal instruments controlling conventional arms can be. See The United Nations Convention against Transnational Organized Crime, adopted by General Assembly resolution 55/25 of 15 November 2000, available in: <https://www.unodc.org/unodc/treaties/CTOC/> and EU Regulation No 258/2012 of The European Parliament and of the Council implementing Article 10 of the United Nations’ Protocol against the illicit manufacturing of and trafficking in firearms, their parts and components and ammunition, supplementing the United Nations Convention against Transnational Organised Crime (UN Firearms Protocol), and establishing export authorisation, and import and transit measures for firearms, their parts and components and ammunition, Official Journal of the EU (Law 94), Brussels, 2012, available in: <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32012R0258&qid=1462650828136&from=EN>.

providence of policy-makers to keep the two areas separated for practical (mainly the differing nature of the items and technologies concerned by each regime) and political reasons (the national interests entailed in each area). From a practical perspective, trade in arms entails varying patterns and challenges compared to dual-use trade. For example, economic operators are evidently aware of the risks inherent to the production of weapons and, the relationship between military corporations and national governments is traditionally much stronger than with manufactures and exporters of dual-use goods. In political terms, “export of conventional arms is an area considered to be close to the heart of national sovereignty and a political instrument, much more so than dual-use exports”<sup>116</sup>. This fact has been clearly manifested in the EU context where common rules for arms exports are still decided through intergovernmental instruments (Council common decision) whereas ‘dual-use trade falls within the EU’s competence (EU regulation adopted under the ‘co-decision procedure’)<sup>117</sup>.

Nonetheless, overlaps between dual-use and arms trade controls do exist for a number of reasons. First, as it will be discussed in part 3.5, ‘dual-use’ items relate not only to biochemical and nuclear weapons but also to conventional arms. This is true due to technical linkages between the controlled technologies and, the existing segregation of various policy initiatives and it may result in situations where items with same or similar characteristics appear in both conventional and WMD-related control lists<sup>118</sup>. This is for instance, the case with the EU dual-use list containing in certain instances, entries regulated also under military related frameworks such as the Common Position 2008/944 and the Council regulation 98/2013 controlling military items and explosives precursors respectively<sup>119</sup>. *In fine*, the overarching objective underpinning both dual-use and arms export controls is to regulate the transfers of strategic items that can be used for military purposes be they conventional or WMD. Therefore, one could argue that the relationship between dual-use and arms export controls is complementary. This is clearly manifested in the European dual-use and military lists. For several entries of the dual-use list there is the phrasing ‘see also military goods controls’ referring to the EU common military list and related national military lists<sup>120</sup>. This

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<sup>116</sup> Sybille Bauer, “Arms Trade Control Capacity Building: Lessons from Dual-Use Trade Controls”, *SIPRI Insights on Peace and Security* 2 (2013): 19.

<sup>117</sup> Formally known as the ‘ordinary legislative procedure’. For an introduction to the different legislative procedures applying in the EU see the European Parliament’s website: <http://www.europarl.europa.eu/aboutparliament/en/20150201PVL00004/Legislative-powers>.

<sup>118</sup> Bauer emphasizes that there are technical linkages as some categories of goods and technologies appear on both conventional and WMD control lists, and some conventional arms can also be used to deliver WMD. Some items, such as machine tools and lasers, have both conventional arms and WMD applications. See Bauer, “Arms Trade Control Capacity Building,” 8.

<sup>119</sup> EU, Regulation No 98/2013 of the European Parliament and of the Council on the marketing and use of explosives precursors, Official Journal of the EU (L 39), Brussels, 2013, available in: <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013R0098&qid=1462649718213&from=EN>.

<sup>120</sup> The General Notes to Annex I of the dual-use regulation clarify: “for control of goods which are designed or modified for military use, see the relevant list(s) of controls on military goods maintained by individual Member States”. References in this Annex that state “SEE ALSO MILITARY GOODS CONTROLS” refer to the same lists”.

exhortation urges *inter alia* the authority and the exporter to compare between ‘pure’ military and dual-use entries in order to verify how certain dual-use items may be used or adapted for military uses<sup>121</sup>. Conversely, for some entries of the EU common military list there is a text like ‘see [corresponding entry] on the EU Dual-use list’ with a view to distinguishing items with similar technical capabilities governed however by the dual-use legal framework.

Second, the staff implementing controls in dual-use items and conventional arms quite frequently overlaps or at least emanates from the same ministries and agencies. This is primarily valid for customs officers who are called to interdict the illicit trade in both arms and dual-use goods as well as in various other products (*e.g.* drugs, diamonds, luxury goods) as mentioned in the beginning of the chapter. Third, non-proliferation, disarmament and arms controls are all closely related meaning that they satisfy the same security-associated imperatives and hence, they should not be addressed in sharp disconnection. Ultimately, what appears as an overarching need is some degree of coordination among the different ‘strategic’ trade control frameworks and also between them and further policy initiatives and mechanisms satisfying broader security and safety concerns such as ‘CBRN-E preparedness’<sup>122</sup>.

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<sup>121</sup> In this regard, it is worth noting that in the EU common military list there is often next to control entries the wording ‘specially designed for military use’. Logically, such a wording refers to the specific technical parameters rendering the item in question useful for military purposes. What ‘specially designed for military uses’ shall mean is explained each time by specifying the characteristics that a given military item should satisfy for being controlled. In some cases, specially designed items for military uses may be excluded from the scope of military controls if certain conditions are met. For example ML10 (note 1) specifies that ‘aircraft’ and ‘lighter-than-air vehicles’ or variants of those ‘aircraft’ specially designed for military use, are not covered by the list if have all of the following:

- a. not a combat aircraft
- b. not configured for military use and not fitted with equipment or attachments specially designed or modified for military use; and,
- c. certified for civil use by the civil aviation authority in an EU Member State or in a Wassenaar Arrangement Participating State

See EU Council, *Common Military List of the EU*, Official Journal of the EU (C 107), Brussels, 2014, 25.

Quite frequently, such items that are exempted from the EU military list fall within the scope of dual-use controls or have technical characteristics very close to the dual-use controlled ones. In addition, Article 6 of the Common Position clarifies that without any prejudice to the dual-use regulation, the provisions of the Common Position and especially the eight criteria mentioned in Article 2 and the consultation procedure under Article 4 will be applicable also to dual-use items where there are serious grounds for believing that they will be used by military end-users (*e.g.* armed forces and internal security forces).

<sup>122</sup> CBRN-E risks relate to chemical, biological, radiological, nuclear and explosive materials that can cause great harm and pose significant threats to the people and the environment should a CBRN incident takes place. CBRN incidents may be accidental due to human errors, natural disasters and technical defaults or, intentional due to criminal or malicious motives such as terrorist acts and sabotages. Dual-use items and military components may be included in the scope of CBRN-E initiatives aiming at enhancing both prevention and preparedness for CBRN-E incidents.

For an introduction to the CBRN concept indicatively see:

<http://www.ceep.ca/education/CBRNintrosheet.pdf>.

### 3.4.3 The main attributes of trade controls today

So far, it was explained why export controls are necessary instruments for implementing non-proliferation objectives, how they have been evolved over time and what sort of items may target. It is prudent to clarify now how trade controls of dual-use items and technologies are implemented.

**What is a trade control system?** To begin with, trade controls are built upon the principle that any ‘export’ of a controlled item outside the boundaries of a certain country or a union of countries requires an export license. ‘Export’ means the physical shipment of controlled items, technologies and software (by air, sea or land) or the electronic transmission of such ‘goods’. Passing on information through interpersonal contacts is also covered under the term. In certain cases, a ‘deemed export’ may also take place when items or technology are transferred to foreigners situated within the country imposing such a requirement (see US controls chapter 5). Export control rules may require from recipients of controlled technology not to export such technology outside the boundaries of the importing State unless they have first obtain the permission of the initial exporting State (re-export clause)<sup>123</sup>. On top of this, § 3(d) of the resolution 1540 commits UN Member States to adopt legislation and enforce controls in the transit, trans-shipment and re-export of WMD and related materials as well as in the provision of funds and services related to such exporting procedures and intermediary transactions (*e.g.* brokering and transporting activities). Consequently, the application of export controls may relate to complex legal issues such as the implementation of extraterritorial provisions and the applicability of multiple jurisdictions.

The implementation of export controls presupposes the development of a licensing system and the establishment of certain criteria, rules and procedures for controlling sensitive items. Despite cooperation and coordination actions undertaken mainly in the framework of the major international export control regimes or other harmonisation efforts at regional level, each State implements its own system maintaining sometimes different legal definitions and trade provisions. This is particularly valid for enforcement aspects of export controls. Each State disposes its own customs system, penal and sanctions legislation as well as prosecution procedures. In that respect, organisations such as the World Customs Organisation (WCO)

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The EU’s Centers of Excellence (CoE) is an EU initiative aimed to mitigate CBRN risks by strengthening regional security in close collaboration with partner countries in Asia, Africa and Europe. Fostering export control systems of dual-use items for instance through outreach activities in partner countries is amongst the key objectives of CoE. The EU CBRN Risk Mitigation CoE Initiative is implemented jointly by the United Nations Interregional Crime and Justice Research Institute (UNICRI) and the JRC in coordination with the European Commission’s Directorate General for Development and Cooperation (DG DEVCO) acting as the initiative’s decision making body and the European External Action Service (EEAS). See relevant websites: <http://www.cbrn-coe.eu/> and <http://www.unicri.it/topics/cbrn/coe/>.

<sup>123</sup> For instance, the so called ‘re-export clause’ has been contained in legislation enacted by the US causing in the past frictions with its trade partners such as the EU. For more information on the extraterritorial application of the US export control legislation see: U. Bachem-Niedermeier and Q. Michel, 2012; Q. Genard, 2012.

have a useful role to play in stepping up collaboration and promoting common rules and principles at international level<sup>124</sup>.

**What are the main elements of a trade control system?** The 1540 Committee has developed matrices representing the requirements of the resolution alongside with measures - including export controls- that States may consider to take in respect of these requirements<sup>125</sup>. The committee has adopted a rather maximalist approach by compiling a long list of measures which however should be seen only as a reference tool<sup>126</sup>. In other words, it is hardly possible for a State to implement the matrix in its entirety. Generally speaking, a trade control system comprises a multiplicity of elements and processes and most probably the following ones<sup>127</sup>:

- basic legal act
- licensing procedures including general licensing;
- control lists;
- lists of proscribed and/or of low risk destinations;
- risk assessment procedures;
- information exchange and consultation mechanisms;
- a system of enforcement and penalties and,
- outreach activities to potential exporters.

It is also worth remarking that all modern trade control systems provide for the implementation of a ‘catch-all’ mechanism controlling the export of non-listed dual-use items when certain conditions are met. Export of items with close technical parameters to the controlled ones may be targeted by export controls in respect of a given end-use and/or end-user. The imperative for implementing end-user controls including end-user certificates and post-shipment proofs is acknowledged also in the resolution 1540<sup>128</sup>. Also, in general, UN sanctions and embargoes constitute a common reference for compiling lists of proliferation sensitive destinations, entities and individuals. Again, national perceptions and interests may guide States to impose export control restrictions on other destinations as well. Conversely, for low risk destinations and transactions, export control exemptions and privileged treatment are usually applicable. In such cases, trade control systems will normally place further

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<sup>124</sup> A concrete example of the initiatives that could be undertaken by concerned international organisations is the WCO Implementing Guide on Strategic Trade Control Enforcement providing practical assistance to senior customs managers and policy officials and operational customs officers, available in: <http://www.wcoomd.org/en/topics/enforcement-and-compliance/instruments-and-tools/guidelines/wco-strategic-trade-control-enforcement-implementation-guide.aspx>.

<sup>125</sup> Please consult the related webpage of 1540 Committee available in: <http://www.un.org/en/sc/1540/national-implementation/matrix.shtml>.

<sup>126</sup> The ‘1540 Matrix’ can be accessed here: <http://www.un.org/en/sc/1540/national-implementation/pdf/Matrix%20Template%202013%20%28E%29.pdf>.

<sup>127</sup> I rely on the ‘western’ experience and the supplier point of view as encapsulated in requirements set by the international export control regimes for identifying elements that would be normally indispensable for the functioning of a trade control system.

<sup>128</sup> See §3 (d) of the UN Security Council Resolution 1540.

compliance obligations in those exporters taking advantage of available trade facilitations in each country.

**What are the main trends today?** Having broadly described the essential components of an export control system, it is useful to pinpoint the main trends underlying the functioning of trade controls today. First of all, export controls are grappling with challenges shaping the international environment. They are getting more sophisticated in terms of structures and mechanisms (*e.g.* the catch-all mechanism and risk-based approach); more stringent by controlling a wider range of items and activities (*e.g.* inclusion of intangible transfers, transit and brokering) and also, they have been given a legally binding status at international level with the adoption of resolution 1540. Individuals, civilian society and especially firms and academia seem to have an increasingly important role to play in the export controls context. Such key stakeholders need to be vigilant and proactive so that to observe their legal obligations and benefit the non-proliferation system. In their turn, State authorities have to make stakeholders aware of such legal and social obligations and engage them in the policy formulation and implementation. Again, resolution 1540 has captured this demand by requiring from UN members “to work with and inform industry and the public regarding their obligations under such laws”<sup>129</sup>.

Furthermore, it seems that trade controls are shifting from State-centric approaches and obsolete divides between Western and Eastern campuses towards more modern approaches promoting international homogenisation and cooperation. Resolution 1540 has flagged the necessity to change course by calling upon all UN Member States “to take cooperative action to prevent illicit trafficking in WMD, their means of delivery, and related materials”<sup>130</sup>. Despite this, there are still sources of dispute and, the smooth evolution of the non-proliferation system can be undermined in the name of national interests and long-lasting sources of disruption. One could mention for instance, the North-South divide between developed and developing countries intensified in the nuclear field with the ‘discrimination’ between nuclear haves and have-nots<sup>131</sup>. A ‘perceptual divide’ also, as seen by Latham and Bow had an impact on the relations between suppliers and recipients States of controlled technologies in the context of international export control regimes<sup>132</sup>. As it will be shown later in the discussion of international export control regimes and the examination of the EU trade control system, certain issues and well-known weaknesses are yet to be fully addressed.

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<sup>129</sup> *Ibid*, §8 (d).

<sup>130</sup> *Ibid*, §10.

<sup>131</sup> “The divide touches both provisions of Article IV (of the NPT): the practical meaning of ‘inalienable rights’ to the peaceful uses of nuclear energy (Article IV, section 1) and the extent of the technology cooperation imperative, which would bind advanced nuclear energy states to share technology and know-how with developing countries (Article IV, section 2)”. See Giorgio Franceschini, “The NPT Review Process and Strengthening the Treaty: Peaceful uses,” *Non-Proliferation Papers No 11, EU Non-Proliferation Consortium* (2012): 4.

<sup>132</sup> Andrew Latham and Brian Bow, “Multilateral Export Control Regimes, Bridging the North-South Divide,” *International Journal* 53 (1998): 465-486.

Nevertheless, there are indications that progressively both developed and developing countries agree on this the importance of promoting security through the implementation of export controls. From the one part, traditional supplier countries are willing to offer assistance and cooperate on equal footing with emerging economies and countries with restricted resources. On the other hand, non-western countries have increasingly realised the need to take up non-proliferation and counter-proliferation actions including export controls. Cooperation and capacity building activities such as the US Export Control and Related Border Security Programme<sup>133</sup> (EXBS) or the EU Cooperation in Dual-use Export Control Programme<sup>134</sup> are telling examples on how bilateral and multilateral cooperation in the export control field develops. Turpen and other scholars have neatly presented the challenges shaping the international environment and changing the rules of the play for export controls and the non-proliferation system in general<sup>135</sup>. In response to this, moving from a denial technology approach to a minimum standard of technology governance at international level can be crucial<sup>136</sup>. In order to succeed in this, the private sector must work in tandem with governments so as to enable the transitioning from a reliance on technology denial to an increased focus on comprehensive technology governance<sup>137</sup>. The UN security resolution sets the basis and provides the appropriate mandate for materialising such a shift. However, the actual implementation of such an approach requires further initiatives at both national and international levels.

### **3.5 Identifying constraints posed by the Multilateral Export Control Regimes**

‘Suppliers-focused, obscure decision-making, non-universal, west-oriented’: These are some of the accusations charged to the Multilateral Export Control Regimes (MECR). It is true that the operation of these international arrangements -some scholars contend the term international- confirms in many ways the existence of the problems mentioned above<sup>138</sup>. Decision-making procedures, plenary meetings and technical discussions take place behind closed doors and a certain degree of secrecy and confidentiality is required. The decision-

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<sup>133</sup> “The Export Control and Related Border Security (EXBS) program seeks to prevent the proliferation of weapons of mass destruction and destabilizing accumulations and irresponsible transfers of conventional weapons by building effective national strategic trade control systems in countries that possess, produce, or supply strategic items, as well as in countries through which such items are most likely to transit”. Form the US Department of State, available in: <http://www.state.gov/t/isn/ecc/index.htm>.

<sup>134</sup> In February 2016, the EU Outreach in Export Control Programme was renamed to EU P2P (Partner-to-Partner) Export Control Programme. Outreach activities on export controls cover three main areas: dual-use export controls; conventional arms and, arms transfers obligation under the ATT. For more information please check: <https://export-control.jrc.ec.europa.eu/>.

<sup>135</sup> See: Meier, *Technology Transfers and Non-Proliferation of Weapons of Mass Destruction* and, Elisabeth Turpen, “Achieving Nonproliferation Goals: Moving from Denial to Technology Governance,” *Policy Analysis Brief*, The Stanley Foundation (June 2009): 1-8.

<sup>136</sup> Turpen, “Achieving Nonproliferation Goals,” 8.

<sup>137</sup> Ibid, 1.

<sup>138</sup> The terms international export control regimes or simply MECR will be used invariably in order to refer to the four major multilateral export control regimes, namely the WA, the AG, the NSG and MTCR.

making is consensus-based and so is the admission of new members. Besides, MECR cannot be considered as truly international since the participating States originate from a relatively restricted number of States typically supplier countries. In that regard, some Southern states still see MECRs as illegitimate, unnecessary and discriminatory clubs whose purpose is to deny developing nations the commercial technology they need<sup>139</sup>. Despite these criticisms, it is also true that MECR have fostered national export controls by setting principal norms and consolidating a common export control culture. Anecdotal evidence and empirical evidence gathered imply that national export controls have had a significant effect in slowing the WMD proliferation<sup>140</sup>. Therefore, one cannot but admit that MECR have contributed to this outcome by coordinating and harmonising national export control regulations.

The regimes own their existence to the determination of like-minded States to enhance the regional and international security and stability in accordance with the principles of the UN Charter and the relevant international treaties and regional agreements. If one tries to identify direct obligations posed by multilateral arrangements for exporters and more particularly for public research institutes and academia will have a great difficulty to list any. “Within these regimes, all existing restrictions upon manufacture, possession and trafficking in weapons related technologies are addressed to States”<sup>141</sup>. The NSG for instance, use quite frequently the term ‘suppliers’ in its guidelines referring to supplier countries that have voluntarily agreed to take on measures and comply with a number of rules set for the ‘transfers’ of nuclear and related dual-use items. Also, the MTCR and the AG use exactly the same wording in clarifying that it is within national discretion of the exporting State to implement and decide on the export of controlled items. The MTCR in §1 of its guidelines clarifies that the governments will implement the Guidelines in accordance with national legislation and §2 sets forth that the decision to transfer remains the sole and sovereign judgment of the governments. The same wording is used in paragraphs 1 and 2 of the AG. It comes out that all regimes address export restrictions in principle to States. From a pragmatic point of view, this is an anticipated approach since international security norms used to be and remain largely State-centric.

“The MECR are based upon non-binding foundational documents, yet have elements of institutional structure such as regularized meetings, sophisticated information sharing networks and procedures for continuing norm generation”<sup>142</sup>. Although wholly independent each other, all multilateral frameworks regulating the export of sensitive items and technologies have certain goals and mechanisms in common. The primary purpose is to

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<sup>139</sup> Latham and Bow, “Multilateral Export Control Regimes, Bridging the North-South Divide,” *International Journal* 53 (1998): 466. See also the Indonesia’s perspective in Andy Rachmianto, “Indonesia’s approach to Strategic Trade Controls: the Perspective of a Developing and Archipelagic Country,” *Strategic Trade Review* 2 (2016): 138. “MECR regimes remain unable to accommodate the interests of developing countries, including Indonesia’s, particularly in relation to the use of goods and technologies for peaceful purposes”.

<sup>140</sup> Daniel H. Joyner, “Restructuring the Multilateral Export Control Regime System”, in *Non-Proliferation Export Controls: Origins, Challenges, and Proposals for Strengthening* (Burlington: Ashgate Publishing Limited, 2006), 2-3.

<sup>141</sup> *Ibid*, 2.

<sup>142</sup> Joyner, “Restructuring the Multilateral Export Control Regime System”, 214.

coordinate and harmonise national export control policies. To that end, all regimes build upon basic guidelines setting rules for the export of items and information included in controlled lists established again by the regimes.

Each regime clarifies in its Guidelines the scope and main purpose of controls and sets principles to be observed and criteria to be met for the control of exports of sensitive items by State authorities:

I. The NSG seeks to avert the proliferation of nuclear weapons by establishing two sets of guidelines; simply put, the NSG differentiates between guidelines targeting what it considers as ‘nuclear transfers’ (trigger list items) and guidelines for the ‘transfers of nuclear related dual-use equipment, materials, software and related technology’. According to the first set of NSG Guidelines (INFCIRC/254, Part 1) concerning items with a clear fuel cycle utility the participating governments agree on certain measures and formal governmental assurances to be asked as a prerequisite for transfers to NNWS<sup>143</sup>. In fact, the supplier States are required to consider a number of pre-conditions to be fulfilled from the recipient States. These requirements range from the implementation of effective export controls to the application of IAEA safeguards agreements and the fulfilment of certain levels of physical protection and safety. According to the second set of Guidelines (INFCIRC/254, Part 2), supplier States should exercise a policy of restriction –by adopting licensing regulations, enforcement measures and penalties for violations- for items and technology that could contribute to a ‘nuclear explosive activity’, an ‘unsafeguarded nuclear fuel cycle activity’ or acts of nuclear terrorism<sup>144</sup>.

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<sup>143</sup> The general description of the items concerned by the NSG Part I Guidelines (as given in the NSG website:

- nuclear reactors and equipment therefor;
- non-nuclear material for reactors;
- plants and equipment for reprocessing;
- plants and equipment for fabrication of nuclear fuel elements;
- plants and equipment for separation of isotopes;
- plants for heavy water production; and
- plants and equipment for conversion.

<sup>144</sup> In §3 of the NSG Guidelines Part 2, the terms ‘nuclear explosive activity’ and ‘unsafeguarded nuclear fuel cycle activity’ are defined as follows:

(a) ‘Nuclear explosive activity’ includes research on or development, design, manufacture, construction, testing or maintenance of any nuclear explosive device or components or subsystems of such a device.

(b) ‘Unsafeguarded nuclear fuel-cycle activity’ includes research on or development, design, manufacture, construction, operation or maintenance of any reactor, critical facility, conversion plant, fabrication plant, reprocessing plant, plant for the separation of isotopes of source or special fissionable material, or separate storage installation, where there is no obligation to accept IAEA safeguards at the relevant facility or installation, existing or future, when it contains any source or special fissionable material; or of any heavy water production plant where there is no obligation to accept IAEA safeguards on any nuclear material produced by or used in connection with any heavy water produced therefrom; or where any such obligation is not met.

II. The AG controls the ‘transfer’<sup>145</sup> of equipment, materials, technology and software that could contribute to chemical and biological weapon (CBW) activities including tangible and intangible transfers that could enhance the CBW capabilities of both States and non-State actors<sup>146</sup>.

III. The MTCR controls the transfers of delivery systems (other than manned aircraft) including their components that could enable the launch of WMD<sup>147</sup>.

IV. Last, the WA has a broader role by promoting transparency and greater responsibility in the transfers of both conventional arms and dual-use goods and technologies that could contribute in the development or enhancement of military capabilities thus preventing destabilising accumulations and acquisitions of such items by terrorists<sup>148</sup>.

**Common elements and distinct characteristics:** First, as it was implied from the onset, MECR are structured along similar main lines and logics albeit they are not equally comprehensive. The WA for instance, has adopted along with its main guidelines a number of further guiding documents and best practices dealing with more specific issues and ranging from common rules for exports of Small Arms and Light Weapons (SALW) and re-exports of conventional weapons to guidance on exports of non-listed dual-use items and ITT controls<sup>149</sup>. Regardless of any differences, all regimes set in their respective basic guidelines a number of criteria against which national authorities should evaluate the exports in question most frequently on a case-by-case basis<sup>150</sup>. Not surprisingly, these criteria emphasise, amongst other factors, the compliance records with the non-proliferation law of the recipient State, the plausibility of end-use and end-user for a stated export as well as the risk of diversion. Due attention must be shown also in evaluating the risk of misuse by terrorist groups and individuals.

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<sup>145</sup> To the author, specialized in the European context, the use of the term ‘transfer’ by the regimes sounds strange. Although certain security and safety measures may apply in every transfer of sensitive dual-use material (such as source material, special fissionable material and certain chemicals) even within the boundaries of a given territory, the MECR deal with exports controls in the first place and thus, it is expected to refer to exports instead of transfers. I exceptionally use the term transfer in order to be close in the spirit of the regimes. Especially from the EU export control perspective, the term is used in connection to transfers of most sensitive dual-use items and related technology controlled also within the EU and it is not be used for exports to third countries.

<sup>146</sup> See the “AG Guidelines for Transfers of Sensitive Chemical or Biological Items,” as of June 2015, available in: <http://www.australiagroup.net/en/guidelines.html>.

<sup>147</sup> See the “MTCR Guidelines for Sensitive Missile-Relevant Transfers,” as of 2003, available in: <http://www.mtcr.info/english/guidetext.html>.

<sup>148</sup> See the “WA Guidelines and Procedures including the Initial Elements,” as of July 2014, available in: <http://www.wassenaar.org/wp-content/uploads/2015/06/Guidelines-and-procedures-including-the-Initial-Elements.pdf>.

<sup>149</sup> See the Best practices, Guidelines and Procedures webpage of the WA, available in: <http://www.wassenaar.org/best-practices/>.

<sup>150</sup> See for instance, the six criteria mentioned in §4 of the MTCR Guidelines or the seven criteria mentioned in §4 of the AG Guidelines and the nine factors for consideration provided in §4 of Part 2 of the NSG Guidelines or, the criteria for the transfers of enrichment and reprocessing facilities, equipment and technology therefore as listed in §6 (a) of Part 1 of the NSG Guidelines.

Second, another element that is ubiquitous in the guidelines of the different regimes is the possibility to apply catch-all controls for non-listed items that are or may be intended, in their entirety or in part, for a controlled end-use. This issue relates to the very nature of the dual-use problem. The factor of ‘intent’ or otherwise how a certain item will be used points to the fact that control lists do not cover all the dual-use items but only the most sensitive ones. A relevant example can be drawn from the MTCR. According to its provisions complete rocket systems -including ballistic missile systems, space launch vehicles, and sounding rockets-capable of delivering at least a 500 kg payload to a range of minimum 300 km are under control. However, in paragraph 2 of its Guidelines it is made clear that “particular restraint will be exercised in the consideration of transfers of any items in the Annex, or of any missile, whether or not in Annex, if the government judges on the basis of all available, persuasive information [...] that they are intend to be used for the delivery of WMD and there will be a strong presumption to deny such transfers”.

A third element that appears quite commonly in the framework of regimes is a kind of re-transfer or re-export provision whereby the recipients of controlled items and technology undertake to provide sufficient assurances that in case of a future re-export the same conditions will apply as those required by the supplier for the initial transfer. In certain instances, the consent of the original supplier may be necessary for any further transfer of the items to another country. Last, consultation mechanisms and information exchange procedures are laid out in an effort to resolve possible implementation problems, verify alleged violations of the guidelines and especially to avoid situations where a participating State authorise an essentially identical transaction already denied by another supplier country (the ‘no-undercut principle’).

**The structure of the control lists:** Most regimes make a differentiation between most and least sensitive items. The NSG as explained above maintains two different lists corresponding to and governed by Part 1 and Part 2 of its Guidelines. Roughly speaking, regardless of the differentiation between the ‘trigger list’ for nuclear transfers and the dual-use list for nuclear related dual-use transfers, all controlled items are inherently dual-use in nature. The EU dual-use list groups ‘trigger list items’ as category 0 items while the rest are classified under other categories according to their function<sup>151</sup>. The WA establishes a consolidated list separated in two sections containing dual-use and munitions items respectively<sup>152</sup>. In addition to this, it determines subsets of sensitive and most sensitive dual-use items to which special attention should be drawn. The EU regulation relies on the WA dual-use section for establishing and keeping abreast its dual-use list. In practice, the EU list includes entries adopted by other

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<sup>151</sup> The Annex I of the Regulation, the so-called dual-use list is divided into nine categories plus category zero items which integrates mainly the NSG trigger list items. In fact, the categorisation in nine categories follows largely the classification adopted by the WA dual-use list. Annex II contains all these items for which an EU General Export Authorisation (GEA) applies and Annex III provides model forms for individual and global authorisations as well as for brokering. Last, Annex IV is a subset of Annex I including the most sensitive items and technologies for which an authorisation is required for their transfer also within the EU.

<sup>152</sup> WA, *List of Dual-Use Goods and Technologies and Munitions* (WA-LIST (15) 1 Corr.1) as amended of April 2016, available in: <http://www.wassenaar.org/wp-content/uploads/2016/04/WA-LIST-15-1-CORR-1-2015-List-of-DU-Goods-and-Technologies-and-Munitions-List.pdf>.

regimes only when these are not precisely included in the WA list. The AG list is separated in 5 sections controlling chemical precursors, pathogens and toxins as well as related equipment and software<sup>153</sup>. In practice, the AG lists include materials, items and technologies controlled under the BWC and the CWC with some additions of further civil items considered as having some potential for misuse<sup>154</sup>. Finally, the MTCR Equipment, Software and Technology Annex sets a main distinction between ‘category I items’ of greatest sensitivity and ‘category II items’ of lesser sensitivity<sup>155</sup>. For the transfers of category I items, the MTCR Guidelines make clear that there should be a strong presumption to deny authorisations regardless of the purpose of their export.

**The content of the control lists:** What are the criteria used for including an item on the lists? First, the understanding of ‘dual-use’ provided in the frameworks of WA and the NSG hint at an element of a critical contribution (see ‘major or key element’ and ‘major contribution’) for the development of WMD or other military uses. Most importantly, the WA sets also some general criteria for evaluating the eligibility of a dual-use item to be controlled<sup>156</sup>:

- a) the foreign availability outside the participating States
- b) the ability to control effectively the export of goods
- c) the ability to make a clear and objective specification of the item and,
- d) if the item is controlled by another regime.

In relation to the last factor, the WA clarifies that “items controlled by another regime should not normally qualify to be controlled by the WA unless additional coverage proves to be necessary according to the purposes of the WA, or when concerns and objectives are not identical<sup>157</sup>.”

Second, the level of coordination between the different regimes in terms of composition of the lists seems to be low. The EU list of dual-use items incorporating the different regimes’ lists provides some representative examples. For instance, hot isostatic presses with close characteristics are subject to controls under the WA (2B004), the MTCR (2B104) and the NSG (2B204). Also, machine tools with slightly different technical parameters are controlled under two distinct entries (2B001b. and 2B201a.) pursuant to controls set by the WA and NSG respectively. Such entries originating from different regimes and having similar or even identical technical parameters are normally acknowledged in the dual-use list by references to other relevant controlled entries. Experts participating in the negotiations under the different

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<sup>153</sup> In particular, the AG lists are structured as follows: a) chemical weapons precursors; b) dual-use chemical manufacturing facilities and equipment and related technology and software; c) dual-use biological equipment and related technology and software; d) human and animal pathogens and toxins; e) plant pathogens.

<sup>154</sup> The Australia Group Control lists are available in the webpage:  
<http://www.australiagroup.net/en/controllists.html>.

<sup>155</sup> MTCR, *Equipment, Software and Technology Annex* as of October, 2014, available in:  
<http://www.mtcr.info/english/annex.html>.

<sup>156</sup> See footnote in the WA document specifying the ‘Criteria for the Selection of Dual-use Items’ available in:

[http://www.wassenaar.org/controllists/2005/Criteria\\_as\\_updated\\_at\\_the\\_December\\_2005\\_PLM.pdf](http://www.wassenaar.org/controllists/2005/Criteria_as_updated_at_the_December_2005_PLM.pdf).

<sup>157</sup> Ibid.

regimes, attribute this weakness to achieve a tighter level of coordination to the lack of established procedures as well as the absence of fundamental criteria against which dual-use items could be evaluated. Moreover, MECR do not always share the same participating members thus, the coordination could be an even more challenging process.

Third, the inclusion of a dual-use item on the control lists depends largely on its technical specifications and capabilities. In fact, normally, the regimes set very specific thresholds for the controlled items. Also, as suggested in chapter 3.4.2, dual-use items may associate with both conventional arms and WMD. The MTCR offers some easily perceived examples in support of this twofold argument. In principle, items covered under the MTCR such as missiles and rockets are traditionally considered as military items and they are capable of delivering both conventional and nuclear and bio-chemical weapons. Nevertheless, MTCR items and relating technologies may also have civil applications for instance in the aviation industry. Furthermore, Space Launch Vehicles (SLVs) and sounding rockets are used by the European Space Agency for space research and exploration. Unmanned Aerial Vehicles (UAVs) are a great example of a product originally developed for military purposes and subsequently utilised for diverse civil applications (from recreational to human security purposes). In that regard, the MTCR controls only certain types of UAVs and most certainly those being capable of delivering at least a 500 kg ‘payload’ to a ‘range’ of at least 300 km. Despite this, UAVs with specifications under the ones mentioned above can be also controlled provided that they bear some specific characteristics such as an autonomous flight control, navigation capability and an aerosol dispensing system/mechanism with a capacity greater than 20 litres (for the precise specifications see entry 19.A.3. of the MTCR).

**Terminology used in the control lists:** Most interestingly, terminology and explanatory notes used by MECR in the control lists and related annexes are usually very similar. On top of this, terms and notes specified by the MECR are subsequently endorsed and embedded in the national and regional control lists. This is definitely the case for the control list and the definitions of technical terms used at the EU level. It also implies that the source of sometimes controversial provisions resides in decisions taken in the framework of regimes. Consequently, studying the terms and notes relating to research activities and defined originally by the regimes could be of interest to the study.

The previous chapters relied on the dictionary definition of technology “as the practical application of knowledge in a given area”. Under this understanding, equipment, software and know-how are all technological expressions. However, dictionary definitions or, ‘common understanding’ are not necessarily identical with legal definitions of terms used in export controls and any other legislation. The MECR and the EU regulation build their lists on the basis of four categories: a) equipment b) materials c) software and d) technology<sup>158</sup>.

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<sup>158</sup> In fact, the WA and the dual-use regulation categorise the items in:

- a) systems, equipment and components
- b) test, inspection and production equipment
- c) materials
- d) software
- e) technology

Under this categorisation, all regimes understand invariably technology as “the specific information necessary for the ‘development’, ‘production’ or ‘use’ of a [controlled] product<sup>159</sup>. Technology may take the form of ‘technical data’ or ‘technical assistance and software is defined as “a collection of one or more ‘programmes’ or ‘micro-programmes’ fixed in any tangible medium of expression”. The fact that technical assistance falls within the scope of such regimes and subsequently within the scope of national export controls is particularly interesting from a research point of view. Researchers should be vigilant not only when transfer or export controlled materials, equipment, data and software but also when they provide technical assistance. Activities like training and consulting services are mentioned explicitly among the forms that technical assistance may take and are chiefly conducted by scientists and researchers.

‘Development’ shall mean technology related to all stages prior to serial production, such as: design, design research, design analyses, design concepts, assembly and testing of prototypes, pilot production schemes, design data, process of transforming design data into a product, configuration design, integration design, layouts.

‘Production’ shall mean all production stages, such as: product engineering, manufacture, integration, assembly (mounting), inspection, testing, and quality assurance.

‘Use’ shall mean as operation, installation (including on-site installation), maintenance (checking), repair, overhaul and refurbishing.

‘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.

‘Technical assistance’ may take forms, such as: instruction, skills, training, working knowledge, consulting services. ‘Technical assistance’ includes oral forms of assistance. ‘Technical assistance’ may involve transfer of ‘technical data’.

The question that comes out here is when technology and software are controlled. All regimes clarify that the export of technology which is ‘directly associated’ or ‘required’ for the ‘development’, ‘production’ or ‘use’ of controlled items should be under scrutiny and should be controlled according to the provisions in each category.

What ‘directly associated’ means -a wording used by the MTCR and NSG- is not defined. Instead, the WA clarifies that ‘required’ technology “refers only to that portion of technology which is peculiarly responsible for achieving or exceeding the controlled performance levels, characteristics or functions and such required technology may be shared by different

<sup>159</sup> The MTCR Equipment, Software and Technology Annex, (Introduction, Definitions, Terminology part, 13) defines technology as “the specific information which is required for the ‘development’, ‘production’ or ‘use’ of a product. The information may take the form of ‘technical data’ or ‘technical assistance’”. The WA List of Dual-Use Goods and Technologies and of the Munitions List, (Definitions section, 220) defines technology as “the specific information necessary for the ‘development’, ‘production’ or ‘use’ of a product. The information may take the form of ‘technical data’ or ‘technical assistance’”. The exact definition is used also in the lists of the AG.

products”<sup>160</sup>. One can assume that the phrasing ‘directly associated’ warrants a similar interpretation. In any case, determining whether a given technology or software is critical enough to bring an export authorisation must require a certain level of technical expertise by the implementing national authorities.

A subsequent question is whether there are any exemptions. First of all, “technology which is the minimum necessary for the installation, operation, maintenance (checking) or repair of those items which are not controlled or whose export has been authorised” falls out of the scope of controls unless it is specified otherwise. Most interestingly, controls do not apply to technology that is ‘in the public domain’, constitutes ‘basic scientific research’ or is the ‘minimum necessary information for patent applications’. This provision, endorsed by all MECR, is the only occasion where scientific research is directly addressed<sup>161</sup>.

‘In the public domain’ is defined invariably by MECRs as: “technology which has been made available without restrictions upon its further dissemination”<sup>162</sup>. ‘Basic scientific’ research is defined accordingly to the definition given by the Frascati Manual and explained in chapter 2 of the study. It is further noted that copyright restrictions do not remove technology or software from being ‘in the public domain’. Similarly, software which is ‘generally available to the public’<sup>163</sup>, ‘in the public domain’ or, the “minimum necessary ‘object code’ for the installation, operation, maintenance (checking) or repair of those items whose export has been authorised shall be excluded from the controls”<sup>164</sup>.

The ‘public domain’ exemption suggests the providence of the legislator to avoid unnecessary controls of information and technology that is already widely available relieving regulators and exporters from undue administrative burden. Basic scientific research is to be published and can be in principle harmless if not applied for specific uses. It seems that such provisions were adopted bearing also in mind the preservation of ‘academic freedom’ and above all the free circulation of information. However, their practical implementation in today’s environment is particularly cumbersome for two reasons. First, there is no strict distinction between basic and applied research and second, information can be easily released and rapidly spread into the ‘public domain’ prior to being evaluated as harmless or not.

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<sup>160</sup> WA, *List of Dual-Use Goods and Technologies and Munitions*, 217.

<sup>161</sup> See for instance the General Technology Note in the WA List of Dual-Use Goods and Technologies, 2.

<sup>162</sup> The public domain information is also defined invariably by all regimes in the Definitions part of their control lists: See for instance, the Definitions Part of the WA List of Dual-Use Goods and Technologies, 201.

<sup>163</sup> ‘Generally available’ to the public shall mean:

“Software sold from stock at retail selling points without restriction, (by means of over-the-counter transactions, mail order transactions, electronic transactions and telephone call transactions) and, designed for installation by the user without further substantial support by the supplier”. See for indicatively, Software Controls in the Control List of Dual-use Biological and Equipment and Related Technology and Software as of July 2015, available in:

[http://www.australiagroup.net/en/dual\\_biological.html](http://www.australiagroup.net/en/dual_biological.html).

<sup>164</sup> See for instance the General Software Note in the Annex of the NSG Guidelines List of Nuclear-Related Dual-Use Equipment, Materials, Software, and Related Technology, iii, available in: <http://www.iaea.org/sites/default/files/publications/documents/infcircs/1978/infcirc254r9p2.pdf>.

As regards technology controls, another provision endorsed by all MECR clarifies that technology directly associated to a controlled item will be subject to as great degree of scrutiny and control as will the item itself, to the extent permitted by national legislation<sup>165</sup>. This second part of the note is quite meaningful. It seems that the wording ‘to the extent permitted by national legislation’ acknowledges that technology controls can be curved within certain limits. Setting licensing procedures for the exchange of information or, intercepting for instance, the electronic transfer of information are controversial measures undertaken only in exceptional cases as provided by the national law of each country. It arises that the MECR set the general framework for implementing technology controls. Each participating State has the discretion to decide upon the severity of such technology controls.

**What is the role of MECR towards research?** The Guidelines of the regimes do not pay any special attention in clarifying the role of export controls *vis-à-vis* research activities. However, they mention that the laid out provisions are not designed to impede international cooperation<sup>166</sup>. Logically, international cooperation includes R&D activities taking place in both industrial and academic context. The AG refers directly to Article X of the BWC and Article XI of the CWC proclaiming the treaties’ providence to avoid hampering the international exchange of scientific and technical information and use of dual-use material and equipment for peaceful purposes. Accordingly, the dual-use lists adopted by the regimes reflect a precaution to exclude equipment and technologies if they relate to peaceful or protective purposes<sup>167</sup>.

As explained above, multilateral export regimes call State actors to take on national measures which subsequently bring legal obligations for private actors such as exporting firms and their employees and hence, it is only indirectly that individual actors and organisations are subject to such multilaterally agreed provisions. Logically, academia and research institutions are not excluded by such export control provisions unless it is mentioned otherwise. In that regard, certain international arrangements provide ‘best practice’ documents addressed directly to economic operators. The NSG ‘Good Practices for Corporate Standards to Support the Efforts of the International Community in the Non-proliferation of WMD’ and the WA ‘Best Practice Guidelines on Internal Compliance Programmes’ set forth main principles and certain standards to be achieved by corporations. Clearly, such guidance documents do not have legal binding force but they influence to some extent what undertakings are expected to have in place in respect to compliance with export controls. Again academia and research

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<sup>165</sup> See for instance article §4 of the MTCR guidelines: “the transfer of design and production technology directly associated with any items in the Annex will be subject to as great a degree of scrutiny and control as will the equipment itself, to the extent permitted by national legislation”.

<sup>166</sup> See for instance the wording in NSG Guidelines Part 2: “The Guidelines are not designed to impede international co-operation as long as such co-operation will not contribute to a nuclear explosive activity, an unsafeguarded nuclear fuel-cycle activity or acts of nuclear terrorism”.

<sup>167</sup> For instance, entry 1.A.4. of the WA dual-use list (see pages 5-6) controls protective and detection equipment and components, other than those specified in military goods controls. However, the notes of the same entry clarify that equipment limited by design or function to protect against hazards specific to residential safety and civilian industries such as mining, quarrying, agriculture, pharmaceuticals, medical, veterinary, environmental, waste-management or, food industry shall be excluded.

community are not specifically addressed in these documents. At least, one can argue that compliance models tailored to industry may constitute a source of inspiration for research settings as well.

Last, technology controls -as defined by related notes and provisions- concern activities and processes in which, traditionally, the involvement of researchers can be very likely. On top of that, the regimes do not provide any specific guidance with regards to the implementation of the ‘basic scientific research’ and ‘in the public domain’ decontrols for research organisations and academia. Therefore, one could seek for a methodology or other guidance tool for evaluating sensitive research in the respective national implementing laws.

### **3.6 The problem of agreeing on a common understanding of ‘dual-use’**

Prior to focusing on the constraints posed by the European trade control system in the conduct of research, it is prudent to examine what ‘dual-use’ might mean. The study grapples with what can be called as the ‘dual-use problem’: peaceful uses versus military uses; free trade versus restrained trade; free research versus restricted research. In line with this, one of the secondary questions set in chapter 1 requires to define what dual-use research means in the export controls context. Such a task presupposes to clarify in the first place the ‘dual-use’ term.

Undoubtedly, the ‘dual-use’ concept must have concerned to some extent any scholar working in the export controls field. However, this is not solely a matter of academic interest. Failure to agree on a clear dual-use definition may result in misunderstandings within the export controls community and confusion among professionals working directly or indirectly in the non-proliferation area<sup>168</sup>. On top of that, it may be the source of legal ambiguities and eventually, it may result in a weakness of those subject to export controls to understand properly the dual-use problematic and comply with the obligations set in the related law. Quite recently, the discussion on the dual-use concept has been set high on the agenda within the EU circles also due to the review process of the EU trade control system that is underway. Is there an appropriate definition for dual-use goods in the EU Regulation? How broad such a definition should be and what sort of controls may include? Do the MECR or other international laws provide for a clear definition to be used universally? The following section seeks to explore how commonly the dual-use term is interpreted in the non-proliferation community and how differently is understood in different contexts.

There are mainly three different contexts where the term ‘dual-use’ can be encountered:

- the non-proliferation and export controls area;
- the synergies between military/defence and civil industry and,
- the research ethics discourse (chiefly in life sciences).

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<sup>168</sup> See for instance the paper discussing conceptual problems -including the dual-use definition- affecting the non-proliferation community: Renaud Chatelus et al., “Non-proliferation community: Do we really speak the same language?” Paper presented at the IAEA Safeguards Symposium, Vienna, 20-24 October, 2014.

Irrespective of this categorisation, the adjective ‘dual’ refers to the dual nature of an item and most commonly describes items having apart from civil uses some potential for military uses, too.

In the international non-proliferation law with either legally (‘hard’ law) or politically binding force (‘soft’ law) there is no single definition of dual-use. ‘Dual-use items’ are explicitly mentioned or merely denoted by legal texts illuminating quite often different aspects of the concept. Neither the international non-proliferation treaties nor the UNSCR 1540 do explicitly use the term. It is clear though that the resolution 1540 refers to the dual-use items when states that “*the Security Council is gravely concerned by the threat of illicit trafficking in nuclear, chemical, or biological weapons and their means of delivery, and related materials which adds a new dimension to the issue of proliferation [...] and poses a threat to international peace and security*”. The UNSCR 1540 does not omit to define also what ‘related materials’ shall mean: “materials, equipment and technology covered by relevant multilateral treaties and arrangements, or included on national control lists, which could be used for the design, development, production or use of nuclear, chemical and biological weapons and their means of delivery”.

Also, as Q. Michel and A. Viski have noted<sup>169</sup>, the dual-use term from 2002 onwards has been repeatedly used by the UN General Assembly in its resolutions inviting the UN Member States to enact legislation and exercise effective control over the transfers of arms, military equipment and dual-use goods and technologies<sup>170</sup>.

The definitions provided by the export control regimes are rather heterogeneous. Each regime looks at the dual-use problematic through its own lens highlighting those aspects that are most relevant for the given regime. The NSG for instance, connects dual-use items to “certain equipment, materials, software and related technology that could make a major contribution to ‘a nuclear explosive activity’, an ‘unsafeguarded nuclear fuel cycle’ or ‘acts of nuclear terrorism’ without defining further the term<sup>171</sup>. The Wassenaar Arrangement provides that “dual-use goods and technologies to be controlled are those which are major or key elements for the indigenous development, production, use or enhancement of military capabilities”<sup>172</sup>. Simply put, the WA maintains a holistic approach in its definition without making any direct reference to WMD uses. Reasonably, dual-use goods may contribute in the development or

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<sup>169</sup> Quentin Michel, and Andrea Viski, “Dual-Use: an undefined term?”, Presentation prepared for the 3<sup>rd</sup> ESARDA Export Control Working Group, Ispra, Italy, 13 November 2013.

<sup>170</sup> There is a whole series of UN General Assembly Resolutions addressing disarmament, arms control and non-proliferation and referring to dual-use export controls. Under these resolutions, UN member states are invited to provide -on voluntary basis- information on such legislation and controls to the Secretary General and through which to all UN Member States with a view to enhancing the mutual understanding and the confidence among themselves. It must be noted that the reported information concerns essentially conventional weapons and dual-use items related to such weapons. See the UNODA webpage: <http://www.un.org/disarmament/convarms/NLDU/>.

<sup>171</sup> See the Guidelines INFCIRC/254, Part 2 of the NSG, available in: <http://www.nuclearsuppliersgroup.org/en/guidelines>.

<sup>172</sup> See the “Criteria for the selection of Dual-Use goods, including Sensitive and Very Sensitive items” in the WA website: <http://www.wassenaar.org/control-lists/>.

enhancement of military capabilities fit for both conventional and ‘mass destruction’ weapons. That said, it is noteworthy that the WA definition does not make any explicit reference to the possibility of dual-use items to assist in the development of WMD. The AG uses the dual-use term in its control lists and Guidelines without clarifying elsewhere how ‘dual-use’ should be understood<sup>173</sup>.

At the European level, the dual-use regulation (Article 2) stipulates that dual-use goods shall mean:

*“items, including software and technology, which can be used for both civil and military purposes, and shall include all goods which can be used for both non-explosive uses and assisting in any way in the manufacture of nuclear weapons or other nuclear explosive devices”*.

It seems that the European perception of ‘dual-use’ builds upon two distinctions: civil versus military purposes and non-explosive versus explosive nuclear uses. While both contrasts describe items that can be used for both peaceful and non-peaceful uses, the definition falls short of providing a clear understanding. Does the duality refer exclusively or primarily to items and technologies that could contribute to the design, development, production or use of WMD as the UNSCR 1540 suggests?<sup>174</sup> Does the adjective ‘military’ refer to dual-use items relating to conventional weapons as well? Why ultimately biological and chemical weapons or simply WMD in general are not explicitly mentioned in the definition? A thorough examination of the provisions of the Regulation confirms that the main driver of the EU dual-use controls is to impede the proliferation and use of WMD by unlawful actors. As a result, one could expect that the main focus is on items and technologies that have primarily civil applications albeit can potentially contribute to the development of WMD and in certain instances to conventional weapons. Given the absence of a common definition for dual-use goods at European or international level, dual-use controls are largely list based.

Clarifying the dual-use concept requires taking into account what is actually on the lists. However, if one tries to decode the dual-use problematic on the basis of the control lists he will find himself in front of a challenging situation for mainly two reasons. First, the examination of the lists demands high technical expertise. It is characteristic that the compilation of lists is considered as an arduous task for those experts involved in the technical discussions in the framework of the multilateral regimes. Second, the items concerned represent a great variety of technologies transcending very different types of technology. Indicatively, the EU dual-use list incorporates a wide spectrum of goods and

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<sup>173</sup> I refer mainly to the titles: ‘lists of dual-use equipment, software and related technology in either biological or chemical field’ and ‘list controlling dual-use chemical manufacturing facilities’. Also, the AG ‘Guidelines for Transfers of Sensitive Chemical and Biological Items’ use the term dual-use when describing the regime’s no-undercut policy, available in: <http://www.australiagroup.net/en/guidelines.html>.

<sup>174</sup> In the recitals of the dual-use regulation (§15) the definition of ‘related materials’ provided by the UNSCR 1540 is recalled verbatim. However, the definition of dual-use items as provided by the Regulation in Article 2 does not refer explicitly to materials related to nuclear, chemical and biological weapons.

technologies ranging from metals, alloys and ceramic material to machines tools and industrial equipment and from telecommunications equipment to optical sensors and satellite navigation systems. Controlled items are certainly not limited to the NSG ‘trigger list items’ or chemical and biological agents. Hence, it seems that dual-use trade controls have a broad coverage of critical commodities. It should not be overlooked that the EU relies on the WA list as a basis for compiling its dual-use list. The WA as the successor of the CoCom has in all likelihood maintained a broad scope for its dual-use list not strictly confined to WMD proliferation<sup>175</sup>.

The second occurrence of the ‘dual-use’ resides in the interactions between military/defence and civil industry. From this perspective, the term is used to describe technologies and items that originate from either military or civilian industry and can have applications in whichever area. As Gallart mentions historically there is a shift of focus from R&D outputs derived from military industry and applied for civilian purposes (spin-off) to technological developments occurring elsewhere in the economy and exploited for the benefit of military production (spin-in)<sup>176</sup>. As a result, policy-makers at European and national levels who are not directly concerned by proliferation objectives perceive the dual-use problematic as a question of how to better develop synergies between defence and civil industries exploiting thereby the potential of dual-use research for reinforcing innovation. For instance, the European Commission Communication ‘Towards a more Competitive and Efficient Defence and Security Sector’ suggests ways to better exploit synergies between civil oriented and defence associated research for boosting the European defence sector and enhancing the Common Security and Defence Policy (CSDP)<sup>177</sup>. Among the actions set is to enhance the coordination between the security theme of the 7<sup>th</sup> Framework Programme for Research and Technological Development (FP7) and other defence related research activities in the EU<sup>178</sup>. Promoting and funding dual-use research in cyber security, CBRNE detection and space exploration has been already the focus of different initiatives and it is expected to grow further also with the follow-up of the FP7 under the last framework programme for funding innovative research in the EU, the ‘Horizon 2020’<sup>179</sup>. However, as noted in the Communication, the H2020 has an exclusive focus on civil applications and thus, the Commission will need to establish

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<sup>175</sup> Simply put, as a British officer has remarked the WA dual-use controls are not about WMD proliferation. Extract from the conversations during the “King’s College London Event on Intangible Technology Controls in Industry and Academia,” March 29, 2016, London.

<sup>176</sup> Jordi Molas-Gallart, “The Political and Economic Context of European Defense R&D,” *University of Sussex Electronic Working Papers Series* 52 (2000): 2.

<http://www.sussex.ac.uk/Units/spru/publications/imprint/sewps/sewp52/sewp52.html>.

<sup>177</sup> EU Commission, *Communication to the Council and the European Parliament: Towards a more Competitive and Efficient Defense and Security Sector*, (COM(2013) 542 final), Brussels, 2013.

<sup>178</sup> From the EU Commission Communication *Towards a more Competitive and Efficient Defense and Security Sector*, 11: “There is an on-going coordination between the Security Theme of the 7<sup>th</sup> Framework Programme for Research and Technological Development and European defense research activities. Work has so far concentrated on CBRNE and has recently also addressed cyber defense in the context of CSDP and its synergies with cyber security”.

<sup>179</sup> Ibid: “Within Horizon 2020, the areas of ‘Leadership in Enabling and Industrial Technologies’ including the ‘Key Enabling Technologies’ (KETs) and ‘Secure Societies’ (Societal Challenge), offer prospects of technological advances that can trigger innovation not only for civil applications, but also have a dual-use potential.”

complementary channels to benefit defence and security R&D<sup>180</sup>. As a consequence, when EU experts mention that a percentage of about 30% of the FP7 had a dual-use focus, they do not refer necessarily to controlled dual-use technologies. A subsequent question to consider here is to what extent different professional communities understand the dual-use problematic in the same way.

Logically, there should be a correlation between technologies included in the dual-use lists and the dual-use technologies stemming from the interactions between civil and military applications. As described in chapter 3.4.3, the control of an item as dual-use is based on specific technical parameters and the potential risks posed by a given transaction. In this sense, a question such as whether a product has been initially developed by a defence or civil industry is a relevant one but not the most important. In practice, technologies and equipment developed originally for military uses but having civil applications or the reverse can be controlled under arms control, dual-use export controls or other security related instruments or, it may not be controlled at all. From an export control perspective, defining dual-use on the basis of such a criterion could be rather impossible for three reasons. First, within large diversified firms, it is common for R&D to be conducted for both military and civil goals. Second, at the moment there is no mapping of the dual-use industry at least at the EU level. Third, the inclusion of an item on a dual-use list relates to certain technical standards rather than a mere distinction on the basis of who is the economic operator or the organisation conducting research and trade activities each time.

The third occasion where the dual-use term can be found is in the area of research ethics. Again, in this context, ‘dual-use’ has been used to qualify research that can be exploited, yet not strictly for both civil and military purposes. The term seems to be broader and may refer to further risks touching upon cyber security, human right considerations and civil liberties. Here are some examples of such research dealing with issues of dual nature and relying sometimes on dual-use technologies: vulnerability studies uncovering details on critical infrastructure; research projects developing software applications that could be misused as cyber weapon; research utilising behavioural profiling, data merging or mining that can be misused for stigmatisation, or discrimination purposes if fall to malicious actors. Given the lack of a universal understanding of ‘dual-use’ in the international law, one would not expect to find one single definition in codes of conduct and literature pertaining to the ethical discourse<sup>181</sup>.

Biotechnology represents a ‘dual use dilemma’ in which the same technologies can be used legitimately for human betterment and misused for bioterrorism.

*The ‘Fink Report’, 2004, 15*

<sup>180</sup> Ibid: “While the research and innovation activities carried out under Horizon 2020 will have an exclusive focus on civil applications, the Commission will evaluate how the results in these areas could benefit also defense and security industrial capabilities.”

<sup>181</sup> Johannes Rath, Monique Ischi and Dana Perkins, “Evolution of Different Dual-Use Concepts in International and National Law and its Implications on Research Ethics and Governance,” *Science and Engineering Ethics*, (2014): 770.

Nevertheless, there is one field where the term dual-use research is known and most notably, has been defined rather precisely: in life sciences and especially in biosafety and biosecurity area<sup>182</sup>. Advances in biology lie in the very heart of the dual-use problematic since “almost all biotechnology in service of human health can be subverted for misuse by hostile individual or nations”<sup>183</sup>. In fact, much ink has been spilled over the role of ‘dual-use research’ and there is already a vast literature examining the so called ‘dual-use dilemma’ in life sciences<sup>184</sup>. Given the special role of emerging bio-technologies, the potential threat of terrorist attacks as manifested with the anthrax mailings and the recurrent debate over the conduct or publication of sensitive research, it comes as no surprise that biotechnologies have caught so much attention recently.

If one turns the eyes across the pond, he will encounter a definition of ‘dual-use research of concern’ (DURC) as follows:

*“Research that based on current understanding can be reasonably anticipated to provide knowledge, products, or technologies that could be directly misapplied by others to pose a threat to public health and safety, agriculture, plants, animals, the environment or material”.*

This definition is given in a flagship report entitled ‘Biotechnology Research in an Age of Terrorism’, known also as the ‘Fink report’ by the name of Gerald R. Fink the chair of the authoring committee. The committee’s main task was to evaluate the potential security risks - warfare and terrorism- relating to technology and knowledge utilised in the biological field and, to identify ways for balancing security and scientific openness while addressing such risks. The outcome of this initiative was a set of recommendations for the oversight of biological research through existing regulatory frameworks and biosafety practices as well as new instruments. For example, the report discusses existing criteria for identifying most sensitive agents and toxins (‘select agents’) and determines ‘experiments of concern’ such as those aimed at rendering vaccines ineffective. While the relevance of international and national non-proliferation law and norms is acknowledged in this report, export controls are not seen as the most adequate measure for controlling sensitive biological research. This is an observation resulting also from other studies on bio-security and considering export controls as only one piece of the puzzle<sup>185</sup>.

Apart from the USA, the ‘dual-use research’ and DURC are not unknown terms in Europe and internationally. The dual-use research term is used frequently in the framework of initiatives addressing biosafety and biosecurity issues. For instance, in Europe, the European

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<sup>182</sup> Tucker clarifies that “biosafety governance seeks to keep scientific personnel safe from accidental exposures to the hazardous biological agents they are working with and to prevent accidental releases of pathogens from the laboratory that could threaten public health and the environment whereas biosecurity concerns the deliberate theft, diversion, or malicious release of pathogens for hostile purposes”. See Tucker, *Innovation, Dual Use, and Security, Managing the Risks of Emerging Biological and Chemical Technologies*, 49.

<sup>183</sup> National Research Council (USA), *Biotechnology Research in an Age of Terrorism, ‘The Fink Report’*, (Washington, D.C.: The National Academy Press, 2004), preface.

<sup>184</sup> See footnote 6.

<sup>185</sup> See Tucker for instance.

Biosecurity Awareness Raising Network (EUBARnet) undertakes research and further activities aimed at raising awareness of life scientists on biosecurity and dual-use research<sup>186</sup>. The DURC term is used also by the World Health Organisation in documents relating to security and safety standards in life sciences research. The WHO' webpage states that: "Dual use research of concern (DURC) is life sciences research that is intended for benefit, but which might easily be misapplied to do harm"<sup>187</sup>. In sum, it comes out that different professional communities understand the dual-use problem from their own perspective. This is not problematic so long as discussions taking place in different areas acknowledge the varying understandings and implications of the dual-use problem and try to cope with them in a concerted way. Non-proliferation and especially export control policies are formed largely in isolation from the biosafety and biosecurity discourse and vice-versa. As mentioned in the Fink report there is no culture of working with the national security community among life scientists as currently exists in the fields of nuclear physics and cryptography<sup>188</sup>. The underdevelopment of the verification and monitoring system of the BWC may connect to this problem, as well.

### 3.6.1 Defining 'dual-use' and 'dual-use research': a way forward

'Dual-use research of concern', 'sensitive research', 'contentious research', 'proliferation sensitive research'. Which adjective describes better 'dual-use research' and how finally the latter shall be defined?

Generally speaking, the dual-use term refers to any item and technology which can satisfy more than one goal at any given time<sup>189</sup>. In politics, the term is used to connote items and technologies that can have both military and civil applications. In fact, in all three contexts discussed above, the understanding of 'dual-use' lies primarily in the capability of the so-called dual-use knowledge and technologies to contribute to both peaceful and non-peaceful activities. However, the precise understanding provided in different contexts is not identical. From an economic and technological development perspective the term denotes the potential of certain technologies to further both civil and military or defence applications and, the need to develop synergies between defence and civil industry. From an ethical perspective, the term will connote the imperative to curb any type of research activities which can be misused.

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<sup>186</sup> The EUBARnet operates with financial support from the 'Prevention of and Fight against Crime Programme' of the European Commission (DG Home Affairs). It is Coordinated by Landau Network Centro Volta and partnered by the Faculty of Science and Technology of the University of Coimbra, the Department of Animal and Human Biology of the University of Turin, the Faculty of Science and Technology of the University of Uppsala and the Department of Biology of the University of Milan. Website: <http://www.eubarnet.eu/>.

<sup>187</sup> As the WHO website highlights "the possibility that dual use research might result in misuse, either intentionally or accidentally, is a long-standing concern of science. The issues are broad and encompass not only research and public health, but also security, scientific publishing and public communications, biotechnology and ethics and wider societal issues," retrieved from: <http://connection.ebscohost.com/c/articles/97178210/evolution-different-dual-use-concepts-international-national-law-implications-research-ethics-governance>.

<sup>188</sup> National Research Council (USA), *Biotechnology Research in an Age of Terrorism*, 85.

<sup>189</sup> Definition of dual-use technologies from Wikipedia, available in: [http://en.wikipedia.org/wiki/Dual-use\\_technology](http://en.wikipedia.org/wiki/Dual-use_technology).

Finally, from a non-proliferation point of view the focus will be on how to exclude unlawful actors from taking advantage of mighty technologies and weapons. Logically, each professional sees through the lenses of his expertise or experience and certainly all must agree on the necessity to further the peaceful development of dual-use technologies.

In the non-proliferation area, protecting the international community from the adverse consequences inherent to the use of WMD is not only an ethical concern. It is also a legal issue bearing consequences for those individuals, organisations and States who do not abide by the law. Consequently, establishing a universal legal definition of dual-use items and technologies could be of help for the orderly functioning of export controls and the non-proliferation system in general. This is not to say that a well-thought definition will solve magically all complexities nested in the export control system. Legal systems warrant a thorough examination given that they represent complete legal constructions. Yet, appropriate definitions are ‘the alpha and omega’ in building effective laws. Defining the dual-use concept is one thing to do. Establishing a set of criteria for compiling dual-use lists, in accordance with what is suggested by such a definition, is the next thing to consider. As the aforementioned discussion showed, export control norms and regulations seem to lack certain clear-cut criteria for assessing what needs to be included on the lists. Therefore, a certain level of coordination between the export control regimes should be achieved.

Agreeing on a common approach at the EU and international level can be important for another reason, too. Although legal definitions and criteria are not meant to last for ever, contracting or stretching the dual-use concept occasionally could be detrimental for the credibility of the export controls in general and may lead to a low level of compliance by the stakeholders involved. At the same time export control frameworks should be dynamic and adaptable to new conditions. In the EU for instance, the review of the dual-use regulation is in process and policy-makers are currently thinking if the ‘human security’ approach is in consistency with the concept of dual-use export controls. In relation to this, Article 8 of the regulation stipulates that non-listed dual-use items may be prohibited or require an export authorisation for reasons of public security and human rights considerations<sup>190</sup>. Some EU Member States interpret this article as a legal basis for implementing controls in exports for example of surveillance technologies intended for internal repression by public authorities in third countries. The WA has recently introduced controls on technologies that can be used for mass-surveillance, monitoring, tracking, tracing and censoring and these amendments are to be incorporated in the EU list. On top of this, the European Parliament has urged for the inclusion of human rights considerations in the framework of the dual-use regulation despite

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<sup>190</sup> Also arms export controls pursuant to the Common Position 2008/944 include among the criteria for evaluating arms exports the human right records of the recipient country and the respect of the international humanitarian law (Article 2). Member States are required to take into account such criteria also when they have serious grounds to believe dual-use items listed in the regulation will be used by the armed forces or internal security forces or similar entities in the recipient country (Article 6).

the existence of other legal frameworks addressing human rights concerns such as the ‘anti-torture’ regulation<sup>191</sup>.

As it is the case with dual-use items, the term ‘dual-use research’ needs to be clearly defined. In the same way that virtually any item (*e.g.* a knife or a table) can be used as a murder weapon, if somebody has the intention to do so, almost any scientific area may have some potential for misuse. Depending on the context, ‘dual-use research’ might mean: (a) research originally developed for military purposes and subsequently adapted for civil applications and vice-versa (b) research that can be potentially misapplied for a variety of purposes including proliferation of WMD (c) research that can make a major contribution to proliferation or other military purposes. Therefore, ‘dual-use research’ could be defined as follows:

‘Dual-use research’ could be defined as these ‘scientific and technological activities’ involving items, technologies and software restricted under the relevant export control law. It concerns primarily civil research that is integral to the design, construction, use and delivery of Weapons of Mass Destruction and in some instances of conventional weapons.

The definition refers solely to these research activities falling specifically within the scope of export controls law but not to all research of dual-use nature. It is only the export of certain items and technologies that requires an export authorisation and may result to legal sanctions for the violators. Given that a wide range of activities including training and consulting services (see technical assistance controls) can be under scrutiny, the term ‘scientific and technological activities’ (STA) as defined in part 2.1 is used. It must be reminded that STA is a broad term agreed upon at international level and including R&D activities, as well.

Second, the definitions adopted in the framework of MECR point to an element of a critical contribution for the development of military capabilities. The definition denotes this element with the use of the adjective ‘integral’. What ‘integral’ might mean and how one can assess potential risks at the stage when a research project is designed or developed is not that straightforward.

Third, dual-use research may associate with technologies and items capable of contributing to the development of both WMD and conventional weapons. In line with the content of the dual-use control lists, the definition includes also items relating to arms controls and military end-uses.

To conclude, the definition enables to entrench the scope of dual-use research and sows the seeds for building a methodology to assess most ‘sensitive’ research activities.

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<sup>191</sup> EU, *Council Regulation (EC) No 1236/2005 concerning trade in certain goods which could be used for capital punishment, torture or other cruel, inhuman or degrading treatment or punishment* Official Journal of the European Union (L200), Brussels, 2005.

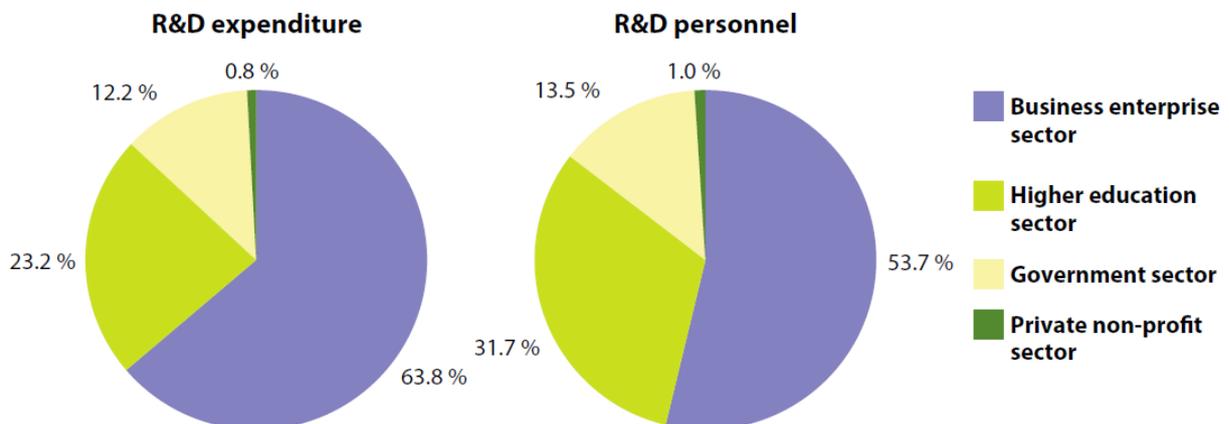
## 4. Restricting the Diffusion of Dual-Use Research in the EU

This chapter explores the potential implications of the EU legal framework for the smooth conduct of research as well as specific problems inherent to the implementation of technology controls in either industrial or academic context. The chapter offers also a snapshot of the R&D activities in the EU including an overview of the ethics review and classification policies applying for ‘Horizon 2020’ funded research.

### 4.1 The landscape of research in the EU today: funding sources, ethics review and classification of information

According to Eurostat, the period from 2002 till 2007 the gross domestic expenditure on R&D was averaged at around 1.8% of the overall GDP of the EU member States<sup>192</sup>. In 2009 the R&D intensity increased to 1.94% and has continued to grow marginally since 2011 reaching 2.02% in 2013. This was mainly a combined effect of the overall GDP falling tendency and efforts of the EU governments to offset the impact of economic crisis by increasing public R&D investment. As the figure II shows, the EU expenditure in R&D is made up of business enterprises with 63.8%, higher education with 23.2%, government organisations with 12.2% and private non-profit organisations with just 0.8%. The percentages of R&D personnel employed by each sector follow a similar course to R&D expenditure with one exception. The higher education sector represents a higher percentage compared to the R&D expenditure in this area. This is an expected observation given that the higher education sector employs frequently unsalaried students and researchers.

**Figure II: R&D expenditure and personnel by sectors of performance, EU-28, 2013 (%) by Eurostat<sup>193</sup>**



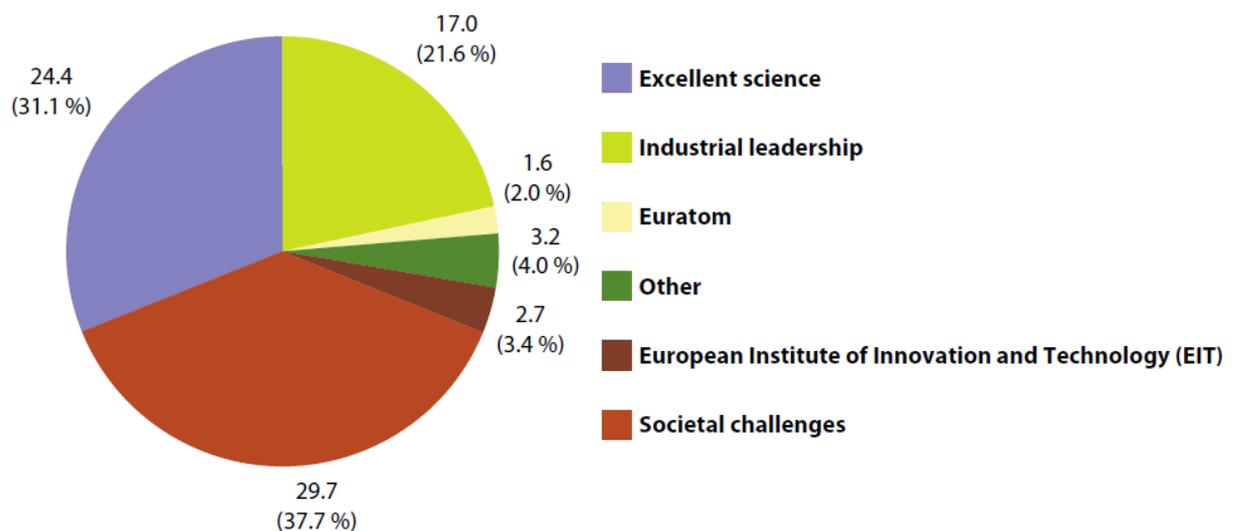
(\*) Data for business enterprise sector and private non-profit sector are estimates.

<sup>192</sup> See figures 1, 3 and 19 and related analysis: “Europe 2020 indicators-research and development”, as of March, 2015, retrieved from: [http://ec.europa.eu/eurostat/statistics-explained/index.php/Europe\\_2020\\_indicators\\_-\\_research\\_and\\_development](http://ec.europa.eu/eurostat/statistics-explained/index.php/Europe_2020_indicators_-_research_and_development).

<sup>193</sup> Ibid, figure retrieved from: [http://ec.europa.eu/eurostat/statistics-explained/index.php/File:R%26D\\_expenditure\\_and\\_personnel,\\_by\\_sectors\\_of\\_performance,\\_EU-28,\\_2013\\_%28%25%29.png](http://ec.europa.eu/eurostat/statistics-explained/index.php/File:R%26D_expenditure_and_personnel,_by_sectors_of_performance,_EU-28,_2013_%28%25%29.png).

The sources of funding of R&D activities concerned are not clarified in the schemes above. Yet, one could assume that the contribution of EU funds into carrying out such R&D activities must be considerably high especially for the higher education and government sectors. The total amount allocated to research activities under the various EU research framework programmes from 1987 till 2013 reached up to almost 120 billion Euros<sup>194</sup>. Under the last ‘EU Framework Programme for Research and Innovation, Horizon 2020 other 80 billion Euros will be made available over the years from 2014 to 2020<sup>195</sup>. Interestingly enough, EU funds are expected to fuel the business sector as well. Around 15% of the EU budget for H2020 will be directed towards innovative research undertaken by SMEs<sup>196</sup>.

**Figure III: Horizon 2020 budget breakdown by main areas of priority (EUR billion)<sup>197</sup>:**



One could reasonably wonder whether projects with security implications and in particular dual-use aspects are identified from the phase of funding and initial planning. Generally speaking, the H2020 and other related Union funding instruments are subject to the financial and procedural rules applicable to the general budget of the Union pursuant to the Regulation

<sup>194</sup> For the FP budget from 1984 till 2013 please see: [http://ec.europa.eu/research/fp7/index\\_en.cfm](http://ec.europa.eu/research/fp7/index_en.cfm).

<sup>195</sup> For general information on the H2020 and its budget please see: <http://ec.europa.eu/programmes/horizon2020/en/what-horizon-2020>.

<sup>196</sup> EU Commission, *Communication to the European Parliament and the Council, the European Economic and Social Committee and the Committee of the Regions: Horizon 2020-The Framework Programme for research and innovation* (Com(2011) 808 final), Brussels, 2011, retrieved from: [http://ec.europa.eu/research/horizon2020/pdf/proposals/communication\\_from\\_the\\_commission\\_-\\_horizon\\_2020\\_-\\_the\\_framework\\_programme\\_for\\_research\\_and\\_innovation.pdf](http://ec.europa.eu/research/horizon2020/pdf/proposals/communication_from_the_commission_-_horizon_2020_-_the_framework_programme_for_research_and_innovation.pdf).

<sup>197</sup> “Europe 2020 indicators-research and development”, figure retrieved from: [http://ec.europa.eu/eurostat/statistics-explained/index.php/File:Horizon\\_2020\\_budget\\_breakdown\\_%28EUR\\_billion%29.PNG#file](http://ec.europa.eu/eurostat/statistics-explained/index.php/File:Horizon_2020_budget_breakdown_%28EUR_billion%29.PNG#file).

966/2012<sup>198</sup>. Most importantly, the EU Regulation 1291/2013 establishing the H2020 determines the main principles underpinning this funding scheme<sup>199</sup>. Open access to scientific publications resulting from publicly funded research is one of these important principles enshrined under Article 18. Also, Article 19 §1 sets that “all the research and innovation activities carried out under H2020 shall comply with ethical principles and relevant national, Union and international legislation, including the Charter of Fundamental Rights of the European Union and the European Convention on Human Rights and its Supplementary Protocols”. In §2 of the same Article it is clarified that research and innovation activities carried out under Horizon 2020 shall have an exclusive focus on civil applications. This element may have repercussions for research proposals associating with military and defence related projects. Further, certain fields of research involving for instance human cloning or the modification of human genome shall be considered as non-eligible for financing. For those proposals involving dual-use material, equipment and information or intending to produce outcomes of dual-use nature there is no specific reference in the set of regulations administering the H2020 and other related funding schemes.

The policy imprinted in the H2020 builds on two elements for dealing with sensitive types of research: classification of sensitive information and ethics review of proposals. As it will be highlighted later in the study, trade control laws set an export authorisation requirement for transfers of certain dual-use technology and, therefore, data and information requiring classification due to proprietary or security concerns do not always coincide with what is covered under trade control requirements. Yet, the probability for research involving classified information to intersect with dual-use export requirements could be considered as high.

#### **4.1.1 Exploitation and dissemination of research results**

The Horizon 2020 should support the achievement and functioning of the European Research Area in which researchers, scientific knowledge and technology circulate freely<sup>200</sup>. Also, the participation of legal entities established in non-EU countries should be promoted<sup>201</sup>. In this context, the EU Regulation 1290/2013 lays down the general rules for participation and dissemination of research results under the H2020 and related funding programmes including provisions for transferring and licensing the results of EU funded research<sup>202</sup>. The spirit of the

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<sup>198</sup> EU/EURATOM, *Regulation No 966/2012 of the European Parliament and of the Council on the financial rules applicable to the general budget of the Union and repealing Council Regulation (EC, EURATOM) No 1605/2002*, Official Journal of the EU (L 298), Brussels, 2012, retrieved from: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2012:298:0001:0096:en:PDF>.

<sup>199</sup> EU, *Regulation No 1291/2013 of the European Parliament and of the Council establishing Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020) and repealing Decision No 1982/2006/EC*, Official Journal of the EU (L 347), Brussels, 2013, retrieved from:

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:347:0104:0173:EN:PDF>.

<sup>200</sup> Ibid, Article 5 and consideration 1.

<sup>201</sup> Ibid, Article 27.

<sup>202</sup> EU, *Regulation No 1290/2013 of the European Parliament and of the Council of 11 December 2013 laying down the rules for participation and dissemination in Horizon 2020 - the Framework*

regulation is that the dissemination of results achieved under the H2020 shall be free and that open access shall be the applicable rule for scientific publications originating from H2020 research. However, it is acknowledged that the free dissemination of results may be subject to restrictions due to protection of intellectual property, security rules or other legitimate interests, under the terms and conditions laid down in the grant agreement<sup>203</sup>.

Furthermore, where results are capable of commercial and industrial applications, the researcher(s) owing those results may examine the possibility to protect them<sup>204</sup>. Transferring the ownership or licensing the research results is possible provided that the conditions set in the grant agreement are respected. In certain instances such as research with a potential to address major societal challenges, exploitation obligations may permit licensing only on non-exclusive terms. Also, Article 44 provides that “the Commission or the relevant funding body may object to transfers of ownership or to grants of an exclusive licence to third parties established in a third country not associated with Horizon 2020, if it considers that the grant or transfer is not in accordance with the interests of developing the competitiveness of the Union economy, or is inconsistent with ethical principles or security considerations”.

Concerning confidentiality of research results in particular, recital 16 of the regulation 1290/2013 affirms that the handling of confidential data should be governed by all relevant Union law including the EU institutions’ internal rules such as the Commission Decision 2001/844<sup>205</sup>. Under this Decision, information must be classified if its unauthorised disclosure could adversely impact the interests of the EU or of one -or more- of its Member States. Pursuant to these internal rules, the European Commission (DG Migration and Home Affairs) has published a set of guidelines aimed at backing the evaluation of research proposals under H2020 and the classification of research results<sup>206</sup>. The objective of that document is to assist the national experts charged with the security scrutiny of H2020 proposals, to inform applicants on how information should be classified and to help Commission staff to decide about the sensitivity of a call for proposal<sup>207</sup>. This guidance relies on two parameters for classifying research undertaken under the H2020: the main subject of research (*e.g.* research relating to CBRN risks and explosives) and the type of research pursued (*e.g.* specific guidelines for the design or manufacture and operation of sensitive

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*Programme for Research and Innovation (2014-2020) and repealing Regulation (EC) No 1906/2006*, Official Journal of the EU (L 347), Brussels, 2013, retrieved from: [https://ec.europa.eu/research/participants/portal/doc/call/h2020/common/1595113-h2020-rules-participation\\_oj\\_en.pdf](https://ec.europa.eu/research/participants/portal/doc/call/h2020/common/1595113-h2020-rules-participation_oj_en.pdf).

<sup>203</sup> Ibid, Article 43.

<sup>204</sup> Ibid, Article 42.

<sup>205</sup> EU Commission, *Decision (2001/844/EC, ECSC, EURATOM) amending its internal Rules of Procedure*, Official Journal of the EU (L 317), Brussels, 2001, retrieved from: [https://www.google.it/search?q=Commission+Decision+2001/844/EC&ie=utf-8&oe=utf-8&gws\\_rd=cr&ei=vfQfV5\\_NBajfgAb80oTgAw](https://www.google.it/search?q=Commission+Decision+2001/844/EC&ie=utf-8&oe=utf-8&gws_rd=cr&ei=vfQfV5_NBajfgAb80oTgAw).

<sup>206</sup> DG Migration and Home Affairs, *Guidance: Guidelines for the classification of research results*, Brussels, 2015, retrieved from:

[http://ec.europa.eu/research/participants/data/ref/h2020/other/hi/secur/h2020-hi-guide-classif\\_en.pdf](http://ec.europa.eu/research/participants/data/ref/h2020/other/hi/secur/h2020-hi-guide-classif_en.pdf).

<sup>207</sup> The guidance concerns solely protective measures to be taken to preserve the confidentiality of some research results. Other aspects such as data protection, ethical issues, dual-use are covered in other parts of the evaluation procedure of H2020 proposals.

technologies, threat assessment and vulnerability studies). Among these sensitive areas a few topics such as research on explosives, CBRN preparedness, intelligence surveillance and digital security may relate also to dual-use concerns. According to the Commission Decision 2001/844, there are mainly four levels of classification applying to the dissemination of confidential information in the EU:

- EU TOP SECRET: This classification shall be applied only to information and material the unauthorised disclosure of which could cause exceptionally grave prejudice to the essential interests of the European Union or of one or more of its Member States<sup>208</sup>.
- EU SECRET: This classification shall be applied only to information and material the unauthorised disclosure of which could seriously harm the essential interests of the European Union or of one or more of its Member States.
- EU CONFIDENTIAL: This classification shall be applied to information and material the unauthorised disclosure of which could harm the essential interests of the European Union or of one or more of its Member States.
- EU RESTRICTED: This classification shall be applied to information and material the unauthorised disclosure of which could be disadvantageous to the interests of the European Union or of one or more of its Member States.

The provisions quoted above stress the fact that finding the right equilibrium between the need for free access to scientific information and requirements for restricting the availability of sensitive information and data is a recurrent issue when conducting research. The following example illustrates the current EU approach towards this problem. The ‘Commission Recommendation on access to and preservation of scientific information’ proclaims that scientific publications and research data should be available free of charge with a view to enabling their use and reuse<sup>209</sup>. Especially public funded research should be widely disseminated facilitating thereby societal engagement as well as improving the capacity of business -SMEs in particular- to innovate. Establishing clear rules and institutional policies for dissemination, open access and licensing of publications and further developing e-infrastructures for disseminating scientific information are among the main actions set in this recommendation. The ultimate goal is to contribute towards the development of an economy based on knowledge and innovation. At the same time, the recommendation sets that concerns in relation to privacy, trade secrets, national security, legitimate commercial interests and intellectual property rights shall be duly taken into account<sup>210</sup>.

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<sup>208</sup> EU Top-secret is not used for the security scrutiny of research proposals.

<sup>209</sup> EU Commission, *Recommendation on access to and preservation of scientific information*, (C(2012) 4890 final), Brussels, 2012, retrieved from: [https://ec.europa.eu/research/science-society/document\\_library/pdf\\_06/recommendation-access-and-preservation-scientific-information\\_en.pdf](https://ec.europa.eu/research/science-society/document_library/pdf_06/recommendation-access-and-preservation-scientific-information_en.pdf).

<sup>210</sup> Ibid, 6.

### 4.1.2 Ethics review and dual-use issues

Currently, under the H2020, dual-use issues are addressed mostly in the framework of the ethics appraisal taking place in different stages in the life of a research project, from the submission of the research proposal till the accomplishment of the project<sup>211</sup>. As part of the self-assessment conducted at the proposal stage, the applicants are required to fill in an ethics table answering inter alia whether their research involves dual-use items in the sense of the Regulation 428/2009 or other items for which an authorisation is required. As figure IV shows, questions 8, 9 and 10 of the ethics table relate broadly to dual-use concerns. Human and animal protection, data protection and privacy, environment protection and safety are further issues addressed in the ethics appraisal. With regards to research activities to be carried out outside the EU, the applicants must confirm that the proposed research is compatible with the Union and international legislation and could have been legally conducted in one of the EU Member States. If according to the self-evaluation a dual-use issue relates to the proposal, the applicants shall explain the actions already taken or planned to be taken for dealing with such issues. The ‘participant portal’ for submission and evaluation of H2020 projects provides guidance to applicants for completing the ethics self-assessment including explanatory notes on ‘dual-use’, ‘exclusive focus on civil applications’ and ‘risk for misuse’ of the generated outcomes.

**Figure IV: The ethics issues table**<sup>212</sup>

<b>Section 8: DUAL USE (see explanatory note)</b>	YES/NO	Page
<b>Does your research involve dual-use items in the sense of Regulation 428/2009, or other items for which an authorisation is required? If yes, please specify how this is dealt with in the project.</b>		
<b>Section 9: EXCLUSIVE FOCUS ON CIVIL APPLICATIONS (see explanatory note)</b>	YES/NO	Page
<b>Does research have an exclusive focus on civil applications? Please specify</b>		
<b>Section 10: MISUSE (see explanatory note)</b>	YES/NO	Page
<b>Does this research have a potential for misuse of research results?</b>		

At a second stage, all submitted proposals are evaluated by the independent experts selected by the Commission for this purpose. The ethics review consists of the pre-screening and the screening phase. The pre-screening concerns all the proposals with no declared ethics issues

<sup>211</sup> The Ethics Appraisal procedure concerns all activities funded in Horizon 2020. Security concerns were addressed also in the FP7 in the context of ethics review; however dual-use concerns as understood by the Regulation were not clearly defined and included in the appraisal.

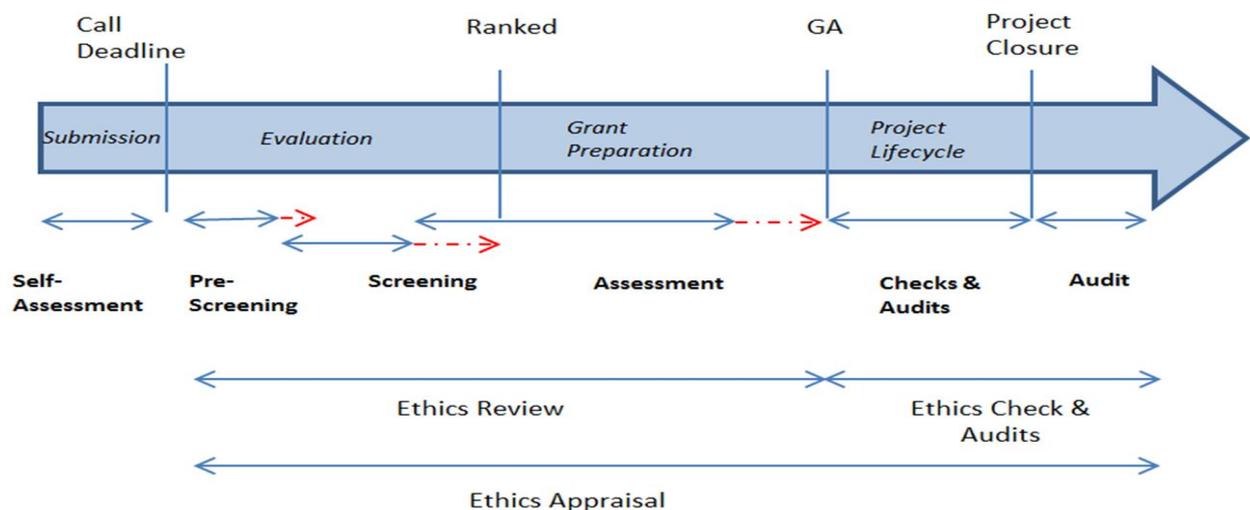
<sup>212</sup> Presentation by the Graham Willmott, Head of Unit Innovation and Industry for Security, DG Migration and Home Affairs, 55th meeting of the Dual Use Coordination Group, September 24, 2015, Brussels.

and that can either get an ethics clearance or be submitted to the screening phase for further consideration. The screening process concerns proposals with at least one confirmed ethical issue and it is carried out during the scientific evaluation or soon after. Each proposal must be screened by at least two independent ethics experts and it shall be given a status as follows:

- Ethics-clearance: The proposal is clear and the Grant Agreement can be finalised.
- Conditional ethics clearance: The applicant has to comply with the requirements set by the ethics experts. These obligations will be included in the grant agreement as contractual obligations.
- Ethics assessment recommended: For proposals raising complex ethical issues (*e.g.* research involving human embryonic stem cells) the screening panel can recommend an ethics assessment to be done by the Commission responsible staff (DG for Research and Innovation) prior to the signature of the grant agreement.
- No ethics clearance: Negative ethics opinion.

For those research proposals involving dual-use issues special clauses -committing for instance the researcher to get any required export authorisation- shall be included in the grant agreement. At a later stage and as long as the grant preparation is complete and the agreement signed, ethics checks and audits will take place during the lifecycle of the project as well as upon its closure.

**Figure V: The ethics appraisal scheme for evaluating research projects funded under H2020<sup>213</sup>**



<sup>213</sup> Presentation by Isidoros Karatzas, Head of the Ethics and Research Integrity Sector, DG for Research and Innovation, available in the JRC internal website, “Connected”.

## 4.2 Technology controls in the EU: the legal framework

The Regulation 428/2009 ‘setting up a Community regime for the control of exports, transfer, brokering and transit of dual-use items’ or simply the dual-use regulation is the cornerstone of the EU legal framework governing trade in dual-use items. The Regulation establishes a *sui-generis*, albeit not flawless system which constitutes one of the most comprehensive and modern export control system universally. As implied by the analysis in chapter 3, the EU draws on the MECR for determining main principles and items controlled under the EU trade control system. This is anticipated all the more due to the fact that EU Member States have undertaken to observe export control norms and non-proliferation principles set at international level. As a corollary, the EU system is faced with weaknesses and problems arising in the framework of international regimes. Especially as regards technology controls, the Regulation is mainly confined to incorporating provisions adopted by the MECRs.

**The scope of the legislation:** To begin with, the Regulation clarifies that ‘dual-use items’ shall include items as well as technologies and software<sup>214</sup>. In fact, Article 2 §2 affirms that “the transmission of controlled software or technology by electronic media, including by fax, telephone, electronic mail or any other electronic means to a destination outside the European Community” constitutes an export. “Making available in an electronic form such software and technology to legal and natural persons and partnerships outside the Community” shall be also controlled. This additional element of the definition intends to affirm that both possibilities of ‘active’ and ‘passive’ transmission of information are potentially licensable actions. Sending an e-mail to a receiver(s) located outside the EU borders exemplifies an active case of transmission. Uploading data or software in a server which is potentially accessible by foreign nationals is an example of a passive transmission<sup>215</sup>. It is also clarified that ‘oral transmission of technology when described over the telephone’ may constitute an export.

‘Export’ shall mean:

[...]

(iii) transmission of software or technology by electronic media, including by fax, telephone, electronic mail or any other electronic means to a destination outside the European Community; it includes making available in an electronic form such software and technology to legal and natural persons and partnerships outside the Community. Export also applies to oral transmission of technology when the technology is described over the telephone;

*Article 2 §2 of the Regulation (EC) No 428/2009*

<sup>214</sup> See the recital 8 and the definition of ‘dual-use’ in Article 2 §1.

<sup>215</sup> L. Stefan notes that it is not clear-cut whether ‘passive transmission’ concerns only deliberate acts or unwitting acts may also constitute a breach of the export control law. The Hungarian licensing authority encourages concerned firms to apply for global licenses so as to be safe from any possible breach of the law. See: Lazlo Stefan, “Intangible Technology Controls in Hungary”, in *European Dual-Use Trade Controls: Beyond Materiality and Borders*, ed. Odette J. Prevot and Quentin Michel (Brussels: P.I.E. Peter Lang, 2013), 116.

The disclosure of technical data can take place by both tangible and intangible means of transfer. Sharing information through electronic mails and uploading software on websites are examples of intangible transfers. However, exporting handbooks or CD-ROMs by regular post would indicate a tangible transfer of technology and it is generally treated as a physical export. The provision of technical service includes working knowledge and any other technical service provided by a person on the spot or in oral form enabled by telephone.

Therefore, one could assume that the main applicable difference implied by this distinction is the active involvement of a natural person for the transmission of usually ‘unrecorded’ technology. The whole discussion relates to the distinction between explicit knowledge codified in a book, manual or hard disk and implicit knowledge contained mainly in somebody’s mind and being acquired through hands-on practice and experience<sup>216</sup>. Reasonably, the provision of technical assistance may entail the release of technical data and thus, the two forms of technology transfers do not necessarily take place separately. The reasons why somebody opts for one or another mode of transmission will depend not only on the available options but also on his perception of what is easier or safer in order to achieve a given objective (*e.g.* criminal for malicious actors and economic for industrial operators). Different modes of transferring technology are available in today’s world and it seems that all of them are potentially controlled if certain conditions are met.

**Provision of technical services outside the EU:** The Annex I of the Regulation, the so-called ‘dual-use list’ specifies that the term technology concerns both technical data and technical assistance and, repeats their respective definitions established in the framework of MECR<sup>217</sup>. However, Article 7 stipulates that “the Regulation does not apply to the supply of services or the transmission of technology, if that supply or transmission involves cross-border movement of persons”. In practice, Article 7 seeks to clarify that the cross-border movement of persons intending to supply technical assistance abroad shall not be regulated under the regulation. During discussions in the responsible EU committees, namely the Council Working Party on Dual-Use Goods (DUWP) and the Commission Dual-Use Coordination Group (DUCG), some Member States have warned that a strict interpretation of Article 7 could practically lead to a situation where one can evade export controls simply by hand-carrying a controlled technology to a non-EU destination. Moreover, some Member States suggest interpreting Article 7 on the basis of a distinction between information contained in somebody’s mind and hand-carried technology.

To remedy this loophole, the Council Joint Action 2000/401/CFSP<sup>218</sup> covers partly the provision of technical assistance when the latter relates to certain military end-uses<sup>219</sup>.

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<sup>216</sup> On the distinction between explicit and implicit knowledge see section 3.1.

<sup>217</sup> See the section of Annex I entitled as ‘Definitions of the Terms Used in this Annex’.

<sup>218</sup> EU Council, *Council Joint Action (2000/0401/CFSP) concerning the control of technical assistance related to certain military end-uses*, Official Journal of the EU (Law 159), Brussels, 2000, available in: <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32000E0401&qid=1462654146181&from=EN>.

<sup>219</sup> With the entry into force of the Treaty on the Functioning of the European Union (TFEU), Joint Actions and Common Positions are not any more available policy instruments for the exercise of

Article 2 of the Joint Action provides that “technical assistance shall be subject to controls where it is provided outside the European Community and it is intended, or the provider is aware that it is intended for use in connection with WMD or missiles for the delivery of such weapons”. Also, Article 3 of the Joint Action stipulates that the Member States may control technical assistance also in cases where the latter relates to military uses other than those referred to in Article 2 and is supplied to an embargoed destination. In other words, the Joint Action provides the possibility for applying catch-all controls in the very way as Article 4 of Regulation does for dual-use goods.

(a) ‘technical assistance’ means any technical support related to repairs, development, manufacture, assembly, testing, maintenance or any other technical service, and may take forms such as instruction, training, transmission of working knowledge or skills or consulting services;

(b) ‘technical assistance’ includes oral forms of assistance;

*Article 1 of the Joint Action 2000/401/CFSP*

Therefore, in the EU, technology controls connect with two separate legal frameworks with differing legal power. Actually, the Regulation imposes in first place a license requirement for the transfers of controlled technical data through tangible and intangible means whereas the Joint Action sets under control the provision of technical assistance on a case by case basis, namely when there is a clear suspicion for use in connection with WMD or other certain military applications. In practical terms, the Regulation and the regulation have different legal weight. The former is directly applicable throughout the EU while the latter may require the enactment of national legislation by the Member States<sup>220</sup>. The source of this inconsistency lies in an old-aged dispute over the scope of the Common Commercial Policy as defined in the EU treaties. In its Opinion 1/94, the Court of Justice ruled that the supply of services involving the cross-border movement of natural persons does not fall within the scope of the CCP. No matter what reasons lie underneath, the twofold legal basis for implementing technology controls adds complexity to an already complex legal construct and represents a peculiar approach.

**Provision of technical services within the EU:** What is not explicitly addressed by the Regulation is the provision of technical services within the EU. Contrary to the USA where a ‘deemed export’ takes place when controlled information is accessed by or made available to

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CFSP by the Council of Ministers. However, the Council can now simply adopt a decision of general nature -not necessarily addressed to particular persons- and having the same legal weight as the abolished Joint Actions.

<sup>220</sup> Although a Joint Action constitutes a legally binding act and Member States shall be committed to taking the measures required for its implementation, it emanates primarily from intergovernmental decision-making and not after a Commission’s proposal. In practice, an EU Regulation constitutes much more a ‘hard law’ instrument rather than a Joint Action or a Council Decision as superseded after the amendment of the Treaties.

foreign nationals within the American territory, the EU has not established such a provision. However, Article 22 provides that an authorisation shall be apply for transfers also within the EU where it is known –by the ‘exporter’ or the authority- that an item is to be used outside the Union in connection with a WMD end-use. The actual implementation of such a provision is puzzling, especially when it comes to intangible transfers. The most credible scenario would concern the case where a licensing authority has intelligence or a trainer or professor suspects that information to be released in a conference may be exploited by a member in the audience for an illegitimate purpose.

However peculiar, the logic underpinning technology controls within the territory of a State is understandable. What would be the added value of prohibiting EU nationals from sharing knowledge with foreign nationals abroad when these are allowed to come in the EU and acquire sensitive knowledge? As Rebolledo observes “the structure of technical-scientific knowledge in a given State could be described as a system with inflows (imports of ITT and immigration of foreign students, technical experts and researchers seeking scientific knowledge) and outflows (exports of ITT and emigration of national technical experts and scientific researchers seeking scientific knowledge abroad) where changes in one function would probably affect the other one”<sup>221</sup>. Furthermore, preventing specialised teaching or training of certain nationals in disciplines relating to nuclear activities has been pursued internationally at the highest level. The UN Security Council Resolutions 1874 (2009) and 1737 (2006) call upon all States to exercise vigilance and prevent specialised training of North Korean and Iranian nationals, within their territories or by their nationals, of disciplines with nuclear relevance<sup>222</sup>. Consequently, there are instances where students originated from certain nationalities may be deprived of their right to follow sensitive courses in universities of the EU Member States and of all States adhering to the international law.

In the EU, the ‘NLA in combating the proliferation of WMD and their delivery systems’ acknowledge the risks relating to the exploitation of knowledge and technology for malicious purposes and recommend stepping up cooperation in terms of consular vigilance in order to tackle this problem<sup>223</sup>. In fact, the EU Member States address such concerns mainly through visa screening procedures and other student vetting systems. However, one should not forget that visa policies and procedures fall primarily within the national discretion and common

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<sup>221</sup>Vicente Garrido Rebolledo, “Intangible Transfers of Technology and Visa Screening in the European Union”, *EU Non-Proliferation Papers No. 13, EU Non-Proliferation Consortium* (2012): 6, retrieved from: [http://www.sipri.org/research/disarmament/eu-consortium/publications/EUNPC\\_no%2013.pdf](http://www.sipri.org/research/disarmament/eu-consortium/publications/EUNPC_no%2013.pdf)

<sup>222</sup> See §28 of the UN Security Council Resolution 1874, (2009) available in: <https://documents-dds-ny.un.org/doc/UNDOC/GEN/N09/368/49/PDF/N0936849.pdf?OpenElement> and §17of the UN Security Council Resolution 1737, (2006), available in: <https://documents-dds-ny.un.org/doc/UNDOC/GEN/N06/681/42/PDF/N0668142.pdf?OpenElement>.

<sup>223</sup> The relevant discussions take place at the Council Committees, namely the Working Party on Non-Proliferation (CONOP) and the Working Party on Global Disarmament and Arms Controls (CODUN). It is also at Council’s level where efforts to enhance cooperation and establish synergies between the different policy actors concerned are launched (for instance, collaboration between the Dual-Use, the Research and the Visa Screening Working Parties).

standards at the EU level have not been achieved so far. It comes out that such initiatives could be complementary to export controls.

**Applicable exemptions in the controls of technology transfers:** It is prudent to examine some further provisions illuminating the applicability of export controls in technology transfers. The Annex I of the dual-use regulation includes three main notes offering clarifying the general cases where technology and software is either controlled or decontrolled.

**NUCLEAR TECHNOLOGY NOTE (NTN)**

-To be read in conjunction with section E of Category 0-

A. The ‘technology’ directly associated with any goods controlled in Category 0 is controlled according to the provisions of Category 0.

B. ‘Technology’ for the ‘development’, ‘production’ or ‘use’ of goods under control remains under control even when applicable to non-controlled goods.

C. The approval of goods for export also authorizes the export to the same end-user of the minimum ‘technology’ required for the installation, operation, maintenance and repair of the goods.

D. Controls on ‘technology’ transfer do not apply to information ‘in the public domain’ or to ‘basic scientific research’.

**GENERAL TECHNOLOGY NOTE (GTN)**

-To be read in conjunction with section E of Categories 1 to 9-

A. The export of ‘technology’ which is ‘required’ for the ‘development’, ‘production’ or ‘use’ of goods controlled in Categories 1 to 9, is controlled according to the provisions of Categories 1 to 9.

B. ‘Technology’ ‘required’ for the ‘development’, ‘production’ or ‘use’ of goods under control remains under control even when applicable to non-controlled goods.

C. Controls do not apply to that ‘technology’ which is the minimum necessary for the installation, operation, maintenance (checking) or repair of those goods which are not controlled or whose export has been authorised.

D. Controls on ‘technology’ transfer do not apply to information ‘in the public domain’, to ‘basic scientific research’ or to the minimum necessary information for patent applications.

**GENERAL SOFTWARE NOTE (GSN)**

Categories 0 to 9 of this list do not control ‘software’ which is any of the following:

A. Generally available to the public by being:

Sold from stock at retail selling points, without restriction, by means of:

Over-the-counter transactions;

Mail order transactions;

Electronic transactions; or

Telephone call transactions; and

Designed for installation by the user without further substantial support by the supplier;

B. 'In the public domain'; or

C. The minimum necessary 'object code' for the installation, operation, maintenance (checking) or repair of those items whose export has been authorised.

*\*For the full text please see the Annex I of the Regulation*

**When technology is controlled?** How 'technology' and related terms ('required', 'development', 'production', 'use') shall be understood is discussed in part 3.5. It must be reminded that for each category in the Annex I of the Regulation there are different sections referring to:

- A. systems, equipment and components
- B. test inspection and production equipment
- C. materials
- D. software and
- E. technology

This means that technologies that fall under control are specified for each category and the abovementioned notes provide essentially some general clarifications. The first interesting provision stipulates that technology can be under scrutiny regardless of whether or not it is applicable to controlled items. This will essentially mean that controlled technology brings a license requirement even when exported to be used in connection with an uncontrolled item. This is very relevant for activities undertaken by researchers. The benevolent scientist preparing a publication or conducting a research will not have any intention to contribute to the construction of a weapon or to the conduct of any outlaw activity. However, according to the export control law the very act of transferring or making available controlled methods, data or know-how abroad is licensable. Also, such a provision suggests that a controlled technology transfer might not take place in conjunction with the consignment of a controlled item.

**When is technology exempt?** Having clarified these, both the Nuclear Technology Note (NTN) and the General Technology Note (GTN) list the main instances where transfers of technology exempt from the trade controls:

First, the minimum technology which is necessary for the installation, operation, maintenance (checking) or repair of those items that are not controlled or whose export has been authorised falls outside the scope of controls<sup>224</sup>. Likewise, the General Software Note (GSN)

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<sup>224</sup> The language used in NTN is slightly different most probably because of the sensitive nature of technology in question requiring an authorisation for any export; "the approval of goods for export

clarifies that the minimum necessary ‘object code’ for the installation, operation, maintenance (checking) or repair of those items whose export has been authorised should not be controlled. One could consider that these decontrol notes refer to basic or already broadly available technology and software required for the mere installation and operation of non-controlled or authorised items. Second, as referred in all three notes, ‘public domain information’, ‘basic scientific research’ and software ‘generally available to the public’ are excluded from the scope of technology and software controls.

#### **4.2.1 Further important provisions in the EU Regulation**

**The EU catch-all mechanism:** The dual-use regulation follows the paradigm of multilateral regimes and provides also for end-use controls. Technology controls are not exempt from such a possibility. In practical terms the export of items and technologies not included on the lists may require an authorisation if they are intended for a WMD or a military end-use<sup>225</sup>. Article 4 of the Regulation, the EU ‘catch-all’ mechanism specifies that an authorisation may be required where:

- i.) the items in question are or may be intended, in their entirety or in part, for a WMD end-use
- ii.) the items in question are to be transferred to an arms embargoed destination and they relate to military end-uses as specified by the national military lists (and consequently by the EU military list as well)
- iii.) the exporter is aware or has grounds to suspect that the items which he proposes to export are or may be intended for any of the end-uses prohibited in points i.) and ii.).

Reasonably, such a provision targets items with close technical parameters to the controlled ones. To offset imbalances, Member States implementing a catch–all control and/or issuing an export denial are in principle required to report such measures to the European Commission which in turn notifies the other Member States. It must be also noted that the EU dual-use list consolidating the control lists of all four major export control regimes should be understood as the lowest common denominator. This means that Member States have the possibility –and some of them have done so- to apply controls on the basis of national control lists, based often on stricter criteria.

**Intra-EU controls:** The dual-use regulation establishes controls also within the EU for certain most sensitive items and technologies as specified in its Annex IV pursuant to Article 22. The Annex IV is a sub-set of the dual-use list (Annex I). It is separated in Part I listing items for which a National General Export Authorisation could be established and Part II

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also authorizes the export to the same end-user of the minimum ‘technology’ required for the installation, operation, maintenance and repair of the goods”.

<sup>225</sup> A military end-use shall mean one of the following (see Article 4 of the Regulation 428/2009):

- incorporation into military items listed in the military lists of Member States;
- use of production, test or analytical equipment and components therefor, for the development, production or maintenance of military items listed in the abovementioned lists;
- use of any unfinished products in a plant for the production of military items listed in the abovementioned lists.

containing entries for which there is no such possibility<sup>226</sup>. Simply put, Part II of Annex IV sets a stricter framework since no trade facilitation is available.

An authorisation shall be required for intra-Community transfers of dual-use items listed in Annex IV. Items listed in Part 2 of Annex IV shall not be covered by a general authorisation.

*Article 22 §1 of the Regulation (EC) No 428/2009*

The reasoning underpinning this provision appears in the considerations of the Regulation where it is stated that “pursuant to and within the limits of Article 30 of the Treaty and pending a greater degree of harmonisation Member States retain the right to carry out controls on transfers of certain dual-use items within the Community in order to safeguard public policy and security” (recital 12). Article 22 has repeatedly received criticism during discussions at the EU committees on the impact of intra-EU controls on the functioning of the Single market and the smooth conduct of economic activity in Europe.

**Trade facilitations:** Nevertheless, the EU regulation provides some trade facilitations with a view to reducing or lifting unnecessary burden easing thereby the conduct of lawful trade activities. Article 9 lays down three ‘general’ types of export authorisations:

- Union General Export Authorisations (EU GEAs)
- National General Export Authorisations (NGEAs)
- Global Export Authorisations

The Union GEAs are automatically granted in the name of the EU (formally the issuing authority is the EU) albeit no tangible license is issued. Exporters based in any EU Member State and fulfilling certain conditions as determined in Annex II of the Regulation can simply resort to this facilitation for trading certain dual-use items to prescribed destinations representing key trade partners of the EU that implement comprehensive export control systems<sup>227</sup>. The beneficiary exporters need to notify the first use of this authorisation to the competent authorities of the Member State where they are established and subsequently note its use in the export declarations. It must be said that Regulation 1232/2011 amended the dual-use regulation by introducing five new possibilities for which a Union GEA could be applicable<sup>228</sup>.

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<sup>226</sup> Roughly speaking Part 1 of Annex IV includes a selection of:

- stealth items, software and technology;
- explosives and related technology;
- acoustics equipment software and technology;
- cryptographic software, technology and equipment and,
- MTCR items, software and technology.

<sup>227</sup> The first-established UGEA (EU001) concerns export to key trade partners as follows: Australia, Canada, Japan, New Zealand, Norway, Switzerland, (including Liechtenstein) and United States of America. It concerns all items listed in Annex I with the exclusion of all items specified in Annex IV plus some further exemptions as set out in Annex IIg of the Regulation.

<sup>228</sup> Apart from the classic EU001 (see footnote above) five more subtypes are available to lawful exporters for certain dual-use items under certain conditions laid out in the corresponding annexes of the regulation:

The national GEAs are based on the same principle: all exporters established in an EU Member State may take advantage of such licenses for a given selection of dual-use items destined to certain countries. Contrary to EU GEAs, NGEAs will be established on the initiative of a given Member State on the basis of its national law and they will be available only to those exporters located in this very Member State. This could create a state of unfair competition between companies operating in different EU Member States<sup>229</sup>. It is not strange therefore that some Member States question the added value of NGEAs given also the possibility for adopting -always at national level- global licenses for eligible exporters. In any case, article 9 §4 (b) of the Regulation obliges Member States to notify the Commission immediately after any adoption or modification of NGEA. The Commission in its Communication on the review of the regulation suggests the idea of introducing a system for the regular review of the NGEAs with a view to exploring the possibility to extend their application at European level<sup>230</sup>.

Last, global authorisations are granted to one specific exporter and it may concern multiple countries of destination and multiple end-users. Again certain conditions apply for the global licenses which are established and governed under national law. Article 12 §2 of the Regulation specifies that among the criteria that shall be taken into consideration when assessing an application for a global license is the implementation of compliance measures by the applicant.

Reasonably enough, all these types of general authorisations release as much the export of equipment and materials as of technology and software from further administrative burden. Global and General Licenses –either national or Union- are granted to exporters being aware of such facilitations and compliant with the specific conditions. Such facilitations do not overcome entirely though, hurdles set by intra-EU controls and constraints posed in the smooth communication of firms with subsidiaries and clients established in least precarious destinations. The Commission’s Communication to the Council and the European Parliament on the review of the EU export control system suggests a further shift towards open licensing through for instance the introduction of additional EU GEAs<sup>231</sup>. Among the ideas set out is the introduction of new Union authorisations for ‘intra-company technology transfers’ relating to R&D purposes as well as for ‘intra-EU transfers’ and ‘large projects’ releasing single cross-border projects from unnecessary licensing by different MS authorities. Despite the practical difficulties in implementing new types of EU GEAs, such a perspective could

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EU002 – export of certain dual-use items to certain destinations (see Annex IIb)

EU003 – export after repair/replacement (see Annex IIc)

EU004 – temporary export for exhibition or fair (see Annex II d)

EU005 – telecommunications (see Annex IIe)

EU006 – chemicals (see Annex II f)

<sup>229</sup> The problem of creating an uneven playing field owing to the establishment of NGEAs has been identified by the Commission already with the issuance of the Green Paper “The dual-use export control system of the European Union: ensuring security and competitiveness in a changing world,” the first step taken towards the review of the regulation (see §6.6 of the Green Paper).

<sup>230</sup> EU Commission, *Communication* (COM(2014) 244 final), 2014,7- 8.

<sup>231</sup> *Ibid*, 8.

enhance the efficiency of the EU trade control system surmounting at the same time obstacles described above.

### 4.3 The nexus between researching and exporting

According to the foregoing analysis there are mainly three cases where an exporter may be required to apply for an export authorisation:

- transferring equipment and materials;
- transferring technical data or software and,
- providing technical assistance.

The three types of exports are not disjoint. For instance, the export of an item may include the transfer of technical data and/or require the provision of technical assistance. Also, export control requirements concern anyone dealing with dual-use items, software and technology coming from either industrial or academic environments. Drawing on this categorisation, Table V summarises the main possible scenarios for which an export licence may be required in the context of a research organisation. The section below offers some comments on the plausibility and implications of the different scenarios presented in the table and of their variations.

**Table V: Export control scenarios in a research context**

Scenarios					
<i>I. Transfers of equipment and materials</i>		<i>II. Transfers of technical data and software</i>		<i>III. Provision of technical assistance</i>	
<i>Tangible means</i>	Provision of equipment, materials  ( <i>e.g.</i> under international collaborations)	<i>Tangible &amp; intangible means</i>	Sharing data/ software by electronic means  ( <i>e.g.</i> e-mail, upload on web-sites) or by post	<i>Intangible means</i>	Provision of technical services in third countries  ( <i>e.g.</i> specialised trainings & conferences)
	Decommissioning of reactors and dismantling of labs  ( <i>e.g.</i> selling or giving away used equipment)		Publishing scientific research  ( <i>e.g.</i> in printed or e-versions)		Oral provision of assistance from the EU  ( <i>e.g.</i> consulting services)

I. Providing equipment/materials to non-EU countries under an international collaboration project might bring a license requirement. Activities such as the decommissioning of nuclear reactors or the dismantling of labs may also involve an export authorisation if the items in question are to be sent abroad<sup>232</sup>.

The first scenario includes cases where a company contracts a university or research centre to develop and deliver items such as prototypes and model equipment of dual-use relevance. In the EU, such a transaction would be subject to an authorisation depending on the technical parameters and the final destination of a given export. If the item is controlled and the partner firm is located outside the EU, it is the responsibility of the research organisation to apply for an export authorisation. Transfers of items in the framework of collaborations with other universities and research institutes established abroad may also involve export authorisations. Likewise, donating, withdrawing or selling used equipment to recipients outside the EU may be subject to an export authorisation. On top of that, research organisations need also to meet certain safety standards and procedures when transferring most dangerous controlled items such as fissile material and radioactive equipment.

Overall, one could assume that exporting controlled equipment and materials is not the most frequent or threatening activity undertaken by universities and research organisations. For example, the transfer of fissile material and most sensitive dual-use equipment is strictly overseen by the national nuclear regulators and the IAEA. Also, for bio-chemical laboratories the quantities of bio-agents and chemical substances required for research purposes will not pose generally a direct risk for misuse. In sum, whenever research organisations send controlled items outside the EU a license will be required. However, it must be noted that the outcome of scientific research may concern innovative items that are not always included in the lists.

II. Posting software numerical codes on websites or sending information via e-mails outside the EU are licensable activities. Publishing the results of sensitive research might also entail export control implications.

According to the second scenario, a university or research institution may transfer controlled technical information and software as a result of a contractual relation with one or more firms established in a destination outside the EU. Such a transaction may require an export authorisation unless the information in question falls in the public domain or constitutes basic scientific research. The engagement of a firm in scientific activities could imply the practice oriented character of a research<sup>233</sup>. As Q. Michel notes, for some EU Member States, industries do not conduct 'basic research' because the aim thereof is always to develop a

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<sup>232</sup> Please note that for the export of most sensitive items specified in the Annex IV of the Regulation, a license is required also for transfers within the EU.

<sup>233</sup> Royalties paid to researchers and their parental institutions for the utilisation of research results point to practice oriented research work that is potentially licensable on the grounds of non-proliferation imperatives.

marketable product<sup>234</sup>. A variant of this case could concern the informal exchange of data and information between scientists located in the EU and their colleagues established in other countries. Nevertheless, in practice setting the transfers of technology by electronic means under and the authorisation process is cumbersome and it will definitely demand the increased awareness from the part of the researchers. Moreover, verifying whether a decontrol applies is not that straightforward, in the absence of specific guidance on the interpretation of the ‘public domain’ and ‘basic research’ exemptions at European and international level.

A subsequent question is whether publishing the results of sensitive research either in printed or electronic versions is subject to export controls. In that regard, in a recent case -the famous research on the transmissibility of avian influenza- the competent licensing authority imposed an authorisation requirement for the publication of research of dual-use concern. As it will be shown later in the study applying export control principles to the publication of research activities can be quite impractical. Most importantly, it might be seen as an inhibitor to the progress of science or a violation of the academic freedom.

III. Providing technical assistance on site or by electronic media and even, presenting sensitive information in a seminar/training taking place abroad might bring a licence requirement as well.

The third scenario concerns cases where technical assistance is provided either through the physical presence of an EU person in a third country or by distance (oral transmission from the EU). Again the supply of technical assistance can take place in the framework of a contract or under less formal exchanges when for instance, a researcher provides advice to industry for free or discusses controlled information with scientists located outside the EU borders. A variation of this scenario includes the case where a professor performs seminars or trainings containing sensitive information outside the EU. Today, with the increasing flows of scientific and technical staff and the operation of international establishments in various countries represents, such a possibility could represent a quite common type of activity. To conclude, in a research environment technology transfers are much more likely to take place rather than the outflows of physical items. Besides, scientific institutions produce primarily knowledge and they do not possess facilities for large scale production<sup>235</sup>.

#### **4.3.1 Implementing technology control in an academic environment**

This part provides further examples illustrating whether traditional export control principles can be easily applied to swiftly changing environments in general and to research contexts in particular. For example, in the event of lectures and seminars conducted by EU nationals abroad and releasing sensitive information, the ‘exporters’ that is to say an EU expert or a

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<sup>234</sup> Michel Quentin, *The European Union Dual-Use Items Control, Comment of the legislation article by article*, (DUV5Re3) (European Studies Unit, University of Liege, 2014), 16, available in: [http://local.droit.ulg.ac.be/jcms/service/file/20150107145152\\_Vademecum-DUV5Rev3-2-2015-.pdf](http://local.droit.ulg.ac.be/jcms/service/file/20150107145152_Vademecum-DUV5Rev3-2-2015-.pdf).

<sup>235</sup> It goes without saying that usually research organisations are able to develop model products and prototypes which can be used afterwards by firms for the mass production of marketable products.

professor, will not normally be aware of a possible requirement to apply for an export authorisation. Similarly, in the case of sensitive training within the EU, the educational staff will not be in position to check beforehand the security clearance of whoever is present in the audience. Presumably, internal mechanisms should be in place rendering lecturers and trainers aware of the possible risks and advising them on whether to apply for an export authorisation or not. Student vetting schemes applied by some EU Member States can be an indispensable tool furthering export control objectives as well.

Interpreting and enforcing export control provisions when dealing with technology transfers can be a true challenge. Intangible Transfers of Technology (ITT) do not 'respect' borders and thus, border controls are meaningless. Particularly, the verification of end-users and end-destinations is challenging not least due to the fact that sensitive information can change holders without leaving commercial invoices and customs declarations. Verifying whether an export does take place and identifying the end-user and end-destination is equally problematic even in cases where no controversial publications are in question. The simple exchange of electronic correspondence containing dual-use information between scientists established in different countries may be subject to controls. In the era of advanced ICT tools and extensive reliance on internet connectivity applying controls in intangible transfers is an intricate issue. Furthermore, failure to implement accompanying measures concerning for instance physical protection and cyber security aspects can undermine the effectiveness of ITT controls. The ascent of cloud computing services provides a telling example of how export control implications can be accentuated when new technological developments come into play.

**Exporting to Clouds:** Cloud computing or in short 'Cloud' can be defined as the service of providing computational capacity over the internet. The Cloud users "rent" capabilities such as data storage, computer processing and software applications, from cloud providers utilising "clouds" of on-line resources (networks, servers, storage, applications and services). There are mainly three distinct service models of cloud computing:

There are generally three distinct service models of cloud computing<sup>236</sup>:

- I. Software as a Service (SaaS) - the client uses provider's applications (mainly industry –standard software packages) running on cloud infrastructure
- II. Platform as a Service (PaaS) - the client deploys onto the cloud infrastructure, applications created using programming languages and tools supported by the provider
- III. Infrastructure as a Service (IaaS) – the client deploys and runs arbitrary software including operating systems and applications with the support of fundamental computing resources provided by the cloud such as processing, storage and networks

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<sup>236</sup> Peter Mell and Timothy Grance, *The NIST Definition of Cloud Computing, Recommendations of the National Institute of Standards and Technology*, Special Publication 800-145, US Department of Commerce, 2011, 2-3, retrieved from: <http://nvlpubs.nist.gov/nistpubs/Legacy/SP/nistspecialpublication800-145.pdf>.

All the service models referred above relate to the issue of transferring data, software and services over the internet. Outsourcing IT services and transferring data and software across borders through the internet is not a new idea, especially for multi-national and large companies. However, cloud computing is an innovative IT paradigm in that it enables the rapid and elastic provision of computational capacity (data storage, computer processing and software applications) over the internet, on a ‘pay-as-you-go’ mode<sup>237</sup>. In practical terms, private and public organisations can benefit from the agile usage of advanced IT services reducing at the same time the IT infrastructure cost. Naturally, research organisations and universities are among those using cloud services and thus, researchers may inadvertently violate export control requirements in case they rely on cloud services for exchanging, storing or processing controlled data in the framework of their research. Cloud computing services rely on distributed networks of servers programmed to search for the fastest and cheapest transmission routing or processing time, and located anywhere an internet connection is available. This practically implies that a cloud computing environment is characterized by a constant shifting of data locations and that data allocations generally occur without the knowledge of cloud users.

From an export control standpoint, deciding whether an export authorisation is required can be particularly cumbersome since controlled data may be temporarily stored, routed or processed from different locations. Indeed, a wide range of ‘players’ from IT administrators to employees of multinational companies located beyond the EU territory may gain access to sensitive information. Additionally, as it is the case with almost any issue pertaining to the non-proliferation realm, safety and security aspects such as the physical protection of the servers and cyber security need to be dealt with, as well. In relation to this, a number of security, privacy and trust challenges (*e.g.* the secure management of virtual resources, limitations in providing granular access controls and audit trails for regulatory and forensic purposes) are yet to be addressed<sup>238</sup>.

**Cloud users versus cloud providers:** To complicate the issue more, defining who acts as exporter each time –the cloud user or the cloud provider- is not that straightforward. In fact there are different responsibilities connecting with the role of each actor. On the one hand, in the EU, some Member States suggest that it is in principle the data owner (user of service) who is responsible to comply with export controls legislation and obtain a license, if

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<sup>237</sup> For an insight into the novelties of the cloud computing see: Dustin Owens, “Securing Elasticity in the Cloud,” *Queue-Visualization* 8 (2010): 1-10, retrieved from: <http://dl.acm.org/citation.cfm?id=1794516>.

<sup>238</sup> For a comprehensive analysis of the security, privacy and trust challenges inherent to the cloud see: Robinson et al. N., *The Cloud: Understanding the Security, Privacy and Trust Challenges*, Report prepared by RAND Europe, time.lex and the University of Warwick for Directorate General Information Society and Media, EU Commission, 2010 in: [http://cordis.europa.eu/fp7/ict/security/docs/the-cloud-understanding-security-privacy-trust-challenges-2010\\_en.pdf](http://cordis.europa.eu/fp7/ict/security/docs/the-cloud-understanding-security-privacy-trust-challenges-2010_en.pdf).

necessary<sup>239</sup>. However, most of the time data allocations occur without the knowledge of cloud users. Hypothetically, cloud users could choose from a variety of options as follows:

- identify cloud providers relying solely on servers located in the EU
- ask for assurances on the part of cloud providers that their data will not be accessed outside the EU for instance, by unauthorised IT administrators
- apply for a license for specific end-users and locations abroad
- Encrypt sensitive data prior to uploading to the clouds

Yet, there is no official guidance at national or European level on which option shall apply. On the other hand, cloud providers based in the EU may also have export control responsibilities to the extent that they benefit their cloud users located abroad with capabilities resulting from controlled software and applications. Up to this moment, the issue of responsibility for cloud services are yet to be clarified in the EU.

**Multiple jurisdictions:** Article 9§2 of the Regulation spells out that export authorisations shall be granted by the competent authorities of the Member State where the exporter is established. The natural or legal person or partnership which takes such a decision -usually the cloud user- shall apply, if necessary, for an export authorization in the Member State where the respective person or partnership is established or resident. However it is unclear what shall apply in the case where several legal jurisdictions are involved. For instance, in a hypothetical case where, a European company uses cloud services provided by a US cloud-provider that relies on servers located in Singapore and India, which country's export control legislation is applicable for possible scenarios? In the EU different MS have acknowledged the complexity of this issue. Indeed, at least one case is known where an EU company had to apply for a license from the country's authorities where the servers were located in order to download data originally uploaded from this very same company. The problem of multiple jurisdictions is also relevant to transfers of and access to data through personal laptops or other storage devices carried with by individuals when travelling abroad.

The pervasive character of these issues entrenching physical borders and national jurisdictions might demand international collaboration and reach of a consensus most probably at the level of multilateral regimes. A number of options are available for due consideration.

#### **4.3.2 Do export controls clash with the academic freedom?**

Leaving aside the difficulties stemming from the actual implementation of the export control provisions, the restriction of research activities and the control of information flow seems to be at odds with certain principles as these instilled in the culture of research and the academic life in particular. The principle of 'academic freedom' proclaims the right of teachers and students to freely express their opinion and conduct their research<sup>240</sup>. The 'Magna Charta

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<sup>239</sup> Information retrieved thank to the engagement of the author in the discussion at the level of the Dual-Use Coordination Group.

<sup>240</sup> Encyclopedia Britannica and dictionaries define academic freedom as "the freedom of teachers and students to teach, study, and pursue knowledge and research without unreasonable interference or

Universitatum' enunciates that "freedom in research and training is the fundamental principle of university life" and, that "the mutual exchange of information and documentation and frequent joint projects [...] are essential for the steady progress of knowledge". To that effect, "each university must -with due allowance for particular circumstances- ensure that its' students freedoms are safeguarded, and that they enjoy concessions in which they can acquire the culture and training which is their purpose to possess"<sup>241</sup>. More broadly, the academic freedom is linked to the freedom of speech as defined in the UN Universal Declaration of Human Rights<sup>242</sup>. If researchers, students and educational staff are entitled to the same rights as all citizens, one might wonder why is there a special need for enshrining academic freedom as a fundamental value in the academic environment.

In practice, the academic freedom relates to the autonomy and self-governance of academic institutions but above all concerns the right of teachers and students to pursue any form of knowledge without unreasonable interference or restriction from law, institutional regulations, or public pressure. Professors and researchers at the highest level of education are considered to be modulators of the information flow. As a result, different authorities may attempt to exercise control over the education and the carriers of knowledge and they have done so in the past. As Karran neatly notes, knowledge is created by challenging orthodox ideas and beliefs and, due to the nature of their work, academics are more naturally led into conflict with governments and other seats of authority<sup>243</sup>. The conviction that science must be free of any constraints set by the State, the church or other institutions had led to the consolidation of the academic freedom to teach, learn and (in German *Lehrfreiheit*) and subsequently, the freedom to conduct research (*Freiheit der Wissenschaft*) already since the beginning of 19<sup>th</sup> century. In periods of sharp confrontations between opposing ideological currents such as the cold-war times social sciences, arts and humanities face a higher risk of intervention compared to natural sciences.

Legally speaking, the term is not enshrined in the international 'hard' law. However, it is hardly a negligible fact that academic freedom is set and defined in the UNESCO

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restriction from law, institutional regulations, or public pressure. Its basic elements include the freedom of teachers to inquire into any subject that evokes their intellectual concern; to present their findings to their students, colleagues, and others; to publish their data and conclusions without control or censorship; and to teach in the manner they consider professionally appropriate. For students, the basic elements include the freedom to study subjects that concern them and to form conclusions for themselves and express their opinions". See Encyclopedia Britannica website:

<http://www.britannica.com/topic/academic-freedom>

<sup>241</sup> See the fundamental principles that should govern the vocation of universities as proclaimed by the Magna Charta Universitatum, Bologna, 1988.

<sup>242</sup> UN General Assembly, *Universal Declaration of Human Rights*, 1948, retrieved from:

<http://www.un.org/en/universal-declaration-human-rights/>

<sup>243</sup> Terrence Karran, "Academic Freedom in Europe: Reviewing UNESCO's Recommendation," *British Journal of Educational Studies* 57 (2009): 191, retrieved from:

<http://onlinelibrary.wiley.com/doi/10.1111/j.1467-8527.2009.00430.x/abstract>.

Recommendation concerning the Status of Higher-Education Teaching Personnel<sup>244</sup>. The UNESCO's Recommendation in Article 6 §27 spells out that:

*“the principle of academic freedom should be scrupulously observed. Higher-education teaching personnel are entitled to maintaining of academic freedom, that is to say, the right, without constriction by prescribed doctrine, to freedom of teaching and discussion, freedom in carrying out research and disseminating and publishing the results thereof, freedom to express freely their opinion about the institution or system in which they work, freedom from institutional censorship and freedom to participate in professional or representative academic bodies.”*

Further, the EU Charter of Fundamental Rights –a legally binding document throughout the EU- defines that “the arts and scientific research shall be free of constraint and academic freedom shall be respected<sup>245</sup>”. In the H5N1 case (see section 4.4) the researcher advocated that the imposition of an authorisation requirement on his research should be regarded as an infringement of the academic freedom. Indeed, the defense line used the example of the German constitution for supporting this argument. Article 5 §3 of the German basic law forseees that “Arts and sciences, research and teaching shall be free”<sup>246</sup>. It is also noted that “the freedom of teaching shall not release any person from allegiance to the constitution”. Alike, the Greek Constitution provides that “art and science, research and teaching shall be free and their development and promotion shall be an obligation of the State”<sup>247</sup>. Again, it is also clarified that the academic freedom and the freedom of teaching shall not exempt any citizen from his or her duty of allegiance to the Constitution (Article 16 §1). The above analysis suggests the academic freedom is a protected principle under both the European and national law. Also it arises that the application of academic freedom is not unlimited. More particularly, national and international security concerns are traditionally seen as areas justifying special measures and exceptions and they may take precedence over other less compelling objectives at a given moment. As Oosterlinck observes, academic freedom automatically includes academic responsibility, both for the university as a whole and for the

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<sup>244</sup> UNESCO, *Recommendation concerning the Status of Higher-Education Teaching Personnel*, 1997, available in: [http://portal.unesco.org/en/ev.php-URL\\_ID=13144&URL\\_DO=DO\\_TOPIC&URL\\_SECTION=201.html](http://portal.unesco.org/en/ev.php-URL_ID=13144&URL_DO=DO_TOPIC&URL_SECTION=201.html)

<sup>245</sup> See in particular Article 13 of the Charter of Fundamental Rights of the European Union (2012/C 326/02) Official Journal of the EU, 2012. The Charter is considered as a modern codification including 'third generation' fundamental rights, such as data protection, guarantees on bioethics and transparent administration. The Charter applies only to decisions taken by the institutions and bodies of the EU with due regard for the principle of subsidiarity and national decisions only when implementing EU law. For more information see the following link: [http://ec.europa.eu/justice/fundamental-rights/charter/index\\_en.htm](http://ec.europa.eu/justice/fundamental-rights/charter/index_en.htm).

<sup>246</sup> Deutscher Bunderstag, *Basic Law for the Federal Republic of Germany* as of November 2012, retrieved from:

[https://www.bundestag.de/blob/284870/ce0d03414872b427e57fccb703634dcd/basic\\_law-data.pdf](https://www.bundestag.de/blob/284870/ce0d03414872b427e57fccb703634dcd/basic_law-data.pdf)

<sup>247</sup> The Constitution of Greece as revised by the parliamentary resolution of May 27<sup>th</sup> 2008 of the fifth Revisionary Parliament, available in: <http://www.hellenicparliament.gr/en/Vouli-ton-Ellinon/To-Politevma/Syntagma/>.

individual professor or researcher<sup>248</sup>. Yet, security or other concerns should not be used as disguise or excuse for encroaching rights and freedoms vested already centuries ago.

Everyone has the right to freedom of opinion and expression; this right includes freedom to hold opinions without interference and to seek, receive and impart information and ideas through any media and regardless of frontiers.

*Article 19, UN Universal Declaration of Human Rights*

Last, setting the information flow and the transfers of technology under control brings to fore concerns about the protection of personal data and the security of communications. Insofar that the investigation of criminal acts justifies the waiver of data privacy, intercepting communications may be exceptionally permitted also on the basis of export control objectives. In the EU Member States, normally the prior permission of the public advocator will be required for taking such an action. Civil liberties are guaranteed by the constitutional law in every democracy governed by the rule of law<sup>249</sup>. The ‘public domain’ exemption indicates the very intention of the legislator to protect such civil liberties. However, as it is the case with the ‘basic research’, the implementing details of this decontrol may differ from country to country within and beyond the EU borders.

As analysed in various instances in the study, ‘common-sense’ terms may need to be specifically defined or, require further clarifications when applied in the context of export controls. The EU regulation repeats the definition as established in the framework of export control regimes: “technology derived from the public domain should be understood as information and technical knowledge available without any restrictions upon further dissemination”. Further, copyright clauses do not remove technology from ‘in the public domain’.

### **4.3.3 Implementing technology controls in an industrial context**

Technology controls may apply to both scientific and industrial contexts. A question to be explored is whether industry and academia are confronted with the same challenges. Contrary to academic research which thank to its ‘fundamental’ character would be most of the time excluded from the scope of controls, research activities undertaken by firms are much more likely to be subject to export controls. Technology transfers in an industrial environment may include supplying or selling goods and services, collaborating with subsidiaries established frequently outside the EU borders as well as R&D activities undertaken sometimes in partnership with other firms and research organisations. While multinational companies (MNCs) represent the lion’s share in terms of volume and value, SMEs may also undertake

<sup>248</sup> Oosterlinck, “The Modern University and its Main Activities,” 121.

<sup>249</sup> For instance, the German Constitution in Article 10 provides an example of how national legislation protects civil liberties regarding the smooth dissemination of information. The privacy of correspondence, posts and telecommunications shall be inviolable. Restrictions may be ordered only pursuant to a law. If the restriction serves to protect the free democratic basic order or the existence or security of the Federation or of a Land, the law may provide that the person affected shall not be informed of the restriction and that recourse to the courts shall be replaced by a review of the case by agencies and auxiliary agencies appointed by the legislature.

both exporting and R&D activities. Especially for certain areas of activity such as software development, SMEs may play an important role in respect of innovative research. Hence, export controls may affect activities of both MNCs and SMEs.

Reasonably, scenarios and related problems discussed earlier in the study are still relevant in an industrial context. To begin with, cloud computing services were mentioned above as an innovative IT model presenting export control implications. Yet, sharing information across borders over central IT systems and Shared Data Environments is a usual practice for private firms already for years<sup>250</sup>. Very often private companies need to communicate with colleagues and clients in real time across geographic boundaries and time zones in the most efficient way<sup>251</sup>. From an export control perspective, when IT models and services utilise servers and data centres located in third countries export control implications may come into play. For example, it is quite possible that IT administrators located outside the EU may have access to sensitive data and thus, certain precautions need to be taken in that regard.

If one sticks to the definition of ‘export’ as given in the Regulation, the mere transfer of controlled information or software to a location outside the EU might be considered as a licensable act. What is not explicit is what happens in the case where an EU national, an employee of a MNC for example, downloads documents, or accesses data saved on his laptop or any other data storage device during his stay abroad. A pragmatic approach would suggest that no export takes place if the content of e-mails and other sensitive information is not divulged to foreign nationals. To complex the issue more, in the previous example, the EU national who leaves the foreign country after having received controlled information may breach the export control law of this very country. It is impressive that certain companies advise their employees to delete such information as a precaution. In response to such concerns, the UK has established an Open General Export License for ‘individual use’ in order to address problematic situations where a UK national accesses to controlled military information outside the EU territory<sup>252</sup>.

Technology transfers can take place also under more straightforward cases. For instance, shipping technical data along with equipment to clients established abroad or simply, granting access to websites containing controlled information to entities based abroad might count as an export. This implies that EU firms have to apply for an authorisation even in the case where they send controlled data and information to their subsidiaries or other sub-contractors abroad. Visibly, such requirements may also affect the collaborations between firms and research institutions. One could actually argue that the more the universities seek to

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<sup>250</sup> The idea of outsourcing IT services to third-parties is not new. However, as explained in 4.3.1 cloud computing goes much further than the possibilities of traditional outsourcing of IT services.

<sup>251</sup> Spencer Chilvers, “Electronic Transfers of Technology”, Background paper presented in the 5<sup>th</sup> ESARDA Export Control Working Group Meeting, November 11-12, 2014.

<sup>252</sup> For more information on Open General Export License (access overseas to software and technology for military goods: individual use only), see: <https://www.gov.uk/government/publications/open-general-export-licence-access-overseas-to-software-and-technology-for-military-goods-individual-use-only>.

tap the results of their research into practical applications, the higher is the possibility to be faced with export control implications.

**The perspective of Member States:** The majority of Member States admit that the imposition of a licensing requirement on ITT is most of the time the result of a transaction involving the transfer of tangible items<sup>253</sup>. This is not surprising taking into account the practical challenges relating to the enforcement of technology controls. The lack of export declarations –the so-called Single Administrative Document (SAD), the inapplicability of border controls as well as a difficulty to prevent or halt an ITT at the time when it does take place seem as insurmountable challenges. Thus, the detection of ITT is normally the result of post-audit controls, specific intelligence information or, of controls in physically transported tangible items. Even in this case of intangible technology transferred via tangible means (*e.g.* stored in a CD or USB driver), a breach to ITT law can remain untraceable. In addition to this, EU Member States may interpret the Regulation’s provisions differently or establish complementary legislation at national level.

The legal and practical challenges in implementing technology controls have been acknowledged also by the Wassenaar Arrangement. The 2006 ‘WA Best Practices for Implementing Intangible Transfer of Technology Controls’ set the main lines around which controls on ITT should be enforced<sup>254</sup>. The participating States to the WA agreed to proceed along three main lines:

- i. designing national laws with clear definitions on ITT subject to export controls;
- ii. promoting awareness of ITT controls and self-regulation by industry and academia and,
- iii. taking steps that enable post-export monitoring and lead to enhanced compliance by stakeholders such as implementation of regular compliance checks and dissuasive penalties.

The WA’s best practices do not only suggest actions to be taken at national level but they also hint at the interference between export controls and research since they call for the

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<sup>253</sup> The European Commission launched a survey in 2011 aimed at identifying challenges and potential discrepancies in the implementation of ITT and catch-all controls during the first years after the adoption of regulation 428/2009 (information retrieved from Greek authorities). 21 Member State participated to the survey by replying -with a varying degree of detail to a rather comprehensive questionnaire. The results revealed inter alia that only two of the participating MS were used to differentiate between licenses for goods and licenses for technologies, just a few had ever received an application for intangible transfers and about half of the total had not had till then any experience in enforcing ITT controls at all. Despite this, 18 of the respondent states indicated that they had already included ITT in the scope of their awareness raising programmes. In this regard, some Member States had undertaken some more far-reaching initiatives such as an action plan targeting the research community (Germany), a task force to address specifically the issue of ITT (Finland) and the draft of codes of conduct along with research institutions (Netherlands and the United Kingdom). Although the situation may have been altered in the years followed, the survey still provides a picture of the state of implementation of ITT controls in the EU.

<sup>254</sup> WA, *Best Practices for Implementing Intangible Transfer of Technology Controls*, WA Plenary 2006, retrieved from: [http://www.wassenaar.org/wp-content/uploads/2015/06/ITT\\_Best\\_Practices\\_for\\_public\\_statement\\_2006.pdf](http://www.wassenaar.org/wp-content/uploads/2015/06/ITT_Best_Practices_for_public_statement_2006.pdf).

implementation of record keeping activities and internal-compliance programs from both industrial and academic actors. Even though one could take for granted that everybody - individuals, firms and researchers- are potentially concerned by export controls, the explicit references to academia reveal the increasing realisation of the role that the latter could play in the effective implementation of ITT controls. This envisaged role connects with the nature of academic research today and may reflect certain responsibilities for academic and research community in general.

#### **4.4 Setting the publication of dual-use research under the authorisation process: the ‘virus H5N1’ case**

At this point, it is useful to examine a recent case that brought to the fore the export control implications of publishing dual-use research. The analysis emphasises the different approaches followed in the EU and the US as well as the elusive distinction between basic and applied research.

##### **4.4.1 The background:**

The H5N1 case originates in 2011 and relates to two different research projects with similar objectives undertaken by Dr. Yoshiro Kawaoka for the University of Wisconsin (USA) in collaboration with the University of Tokyo (Japan) and Dr. Ron Fouchier for the Erasmus Medical Centre of the Erasmus University (Netherlands). The controversial manuscripts were submitted for publication in the well-established journals ‘Nature’ and ‘Science’ respectively and both explored the transmissibility of H5N1 avian influenza in mammals<sup>255</sup>. The findings were ground-breaking in that the experiments conducted in ferrets proved that the airborne transmission of the virus H5N1 among mammals is possible when certain mutations in the strain of virus occur. The submission of the manuscripts to the peer-review process was followed by an unprecedented debate and publicity on whether in the first place the research results should have been published and most fundamentally, if such experimental work should have ever taken place<sup>256</sup>. Quite interestingly, the handling of the issue followed two

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<sup>255</sup> The avian influenza A (H5N1) or as it is commonly known the ‘bird flu’, is a highly pathogenic virus affecting mainly chickens and other farm birds. This A (H5N1) virus subtype first infected humans in 1997 during a poultry outbreak in Hong Kong SAR, China. Most recently, a pandemic of the bird flu broke out in 2003 and spread from Asia to Europe and thenceforth incidents have been reported from Middle East and Africa to North America. The avian influenza can be spread to people, but is difficult to transmit from person to person. In fact, almost all people with H5N1 infection have had close contact with infected birds or H5N1-contaminated environments. When people do become infected, the mortality rate is about 60%. Information retrieved from the WHO’s website available in: [http://www.who.int/influenza/human\\_animal\\_interface/avian\\_influenza/h5n1\\_research/en/](http://www.who.int/influenza/human_animal_interface/avian_influenza/h5n1_research/en/)

<sup>256</sup> Indicatively see few of the many articles in scientific news websites and blogs referring to the case: Jeneen Interlandi, “Contagion: Controversy Erupts over Man-Made Pandemic Avian Flu Virus,” *Scientific American Magazine*, as modified of December 9, 2011, retrieved from:

[http://www.scientificamerican.com/article/contagion-controversy-erupts/;](http://www.scientificamerican.com/article/contagion-controversy-erupts/)

Katherine Harmon, “What Really Happened in Malta This September When Contagious Bird Flu Was First Announced?,” *Scientific American (blog)*, December 30, 2011, retrieved from:

[http://blogs.scientificamerican.com/observations/what-really-happened-in-malta-this-september-when-contagious-bird-flu-was-first-announced/;](http://blogs.scientificamerican.com/observations/what-really-happened-in-malta-this-september-when-contagious-bird-flu-was-first-announced/)

Martin Enserink, “Dual-Use Research: Dutch H5N1 Ruling Raises New Questions,” *Science (news and analysis)* 342 (2013): 178, retrieved from: <http://www.sciencemag.org/content/342/6155/178.full>.

distinct courses in the USA and the EU. In the first case the US government did not resort to the export control quiver in order to deal with the sensitive publications. Instead, the then newly established NSABB was called to give its opinion on the potential threat posed by these two publications. In contrast, in the EU, the Dutch authorities concluded that an export authorisation should be asked for the publication of the Fouchier manuscripts. The worldwide alarm and the furor caused by the whole debate led to the voluntary declaration of a moratorium on certain types of controversial experiments involving the H5N1 avian influenza virus from the side of scientists which lasted till January 2013<sup>257</sup>. In October 2014, the US government announced the temporary halt of all federal funding for selected ‘gain-of-function’ (GOF) research and called for a voluntary moratorium anew till the re-assessment of the risks and benefits relating to research altering a pathogen to make it more transmissible or deadly<sup>258</sup>.

#### 4.4.2 The timeline

The discussion in Europe concerned only the Fouchier manuscripts which are considered to be more controversial in that the described methods involved H5N1 virulence factors with actual pathogenicity in humans<sup>259</sup>. Dr. Fouchier and his team were informed by the Dutch licensing authority that the publication of manuscripts containing information controlled under the dual-use regulation required an export authorisation. This was the first time -in Europe- that a publication of a scientific work entailed an export authorisation on the basis of dual-use export controls. Fouchier applied on 24 April 2012 for a license under protest and succeeded in obtaining three days later. Finally, the much-debated manuscript and the accompanying one assessing the likelihood of a mutated H5N1 to arise spontaneously in nature- were published in *Science* in June 2012, almost one month after the publication of Dr. Kawaoka’s paper in *Nature*. For the record, all articles are now accessible on line for free<sup>260</sup>.

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<sup>257</sup> “In a letter published online today (23-01-13) by *Science* and *Nature*, 40 researchers declare that the studies should restart now that scientists, government officials, and the public have had time to debate the need for the research and impose new safety measures. ‘The aims of the voluntary moratorium have been met in some countries and are close to being met in others,’ they write, and researchers ‘have a public-health responsibility to resume this important work’”. Extract from ‘*Science Insider*’ news website available in:

<http://news.sciencemag.org/people-events/2013/01/h5n1-researchers-announce-end-research-moratorium>

<sup>258</sup> Indicatively see: Jocelyn Kaiser and David Malakoff, “U.S. halts funding for new risky virus studies, calls for voluntary moratorium,” *Science Insider*, as of October 17, 2014, retrieved from: <http://www.sciencemag.org/news/2014/10/us-halts-funding-new-risky-virus-studies-calls-voluntary-moratorium>; US White House, “Doing Diligence to Assess the Risks and Benefits of Life Sciences Gain-of-Function Research,” as of October 17, 2014, retrieved from:

<https://www.whitehouse.gov/blog/2014/10/17/doing-diligence-assess-risks-and-benefits-life-sciences-gain-function-research>.

<sup>259</sup> US National Science Advisory Board on Biosecurity (NSABB), *Findings and Recommendations* March 29-30, 2012, 4, retrieved from:

[http://osp.od.nih.gov/sites/default/files/resources/03302012\\_NSABB\\_Recommendations\\_1.pdf](http://osp.od.nih.gov/sites/default/files/resources/03302012_NSABB_Recommendations_1.pdf).

<sup>260</sup> Sander Herfst et al., “Airborne Transmission of Influenza A/H5N1 Virus Between Ferrets,” *Science* 336 (2012): 1534-1541, retrieved from:

<http://www.sciencemag.org/content/336/6088/1534.abstract>;

The issue however went on; Dr. Fouchier took legal action against the decision of the Dutch authorities to require a license<sup>261</sup>. The case brought to the District Court in Harlem which published on 23 September 2013 its decision: the claim of Dutch authorities to set an authorisation requirement for the publication of the study was justified by the related law that is to say the EU Regulation. Shortly after the ruling of the court, it became known that Fouchier filed an appeal against the court decision and the European Society for Virology (ESV) sent a letter to the then President of the European Commission, J. M. Barroso expressing *inter alia* its concern to maintain the free exchange of scientific information in the interest of animal and public health<sup>262</sup>.

Finally, on 18 July 2015 the Appellate Court in Amsterdam adopted a rather unexpected ruling; the appeal was unfounded and what is more, the decision of the District Court should be annulled<sup>263</sup>. The reasoning of this decision has as follows: the researcher was granted an authorisation to publish his research without any restrictions or conditions. According to the Court an appeal is well-founded only if an eventual remedy can bring the applicant in a better position with regard to the contested decision. The researcher did not suffer any damage – apart from legal fees- and hence, no legal ruling can be requested solely on the basis of significance for possible future cases. Therefore, the Appellate Court concluded that the competent authorities should not have accepted the administrative appeal filed by the researcher and the case should not have been heard before the District Court of Haarlem. The Appellate Court’s decision does not contribute to the actual issues at stake in the H5N1 case. However, it affirms, in a way, the logic embraced by trade controls: the imposition of a licensing requirement does not necessarily equate to a prohibition of an export.

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Colin A. Russell et al. “The Potential for Respiratory Droplet–Transmissible A/H5N1 Influenza Virus to Evolve in a Mammalian Host,” *Science* 336 (2012), p. 1541-1547, retrieved from:

<http://www.sciencemag.org/content/336/6088/1541.full>;

Masaki Imai et al. “Experimental Adaptation of an Influenza H5 HA Confers Respiratory Droplet Transmission to a Reassortant H5HA/H1N1 Virus in Ferrets,” *Nature* 486 (2012): 420-428, retrieved from: <http://www.nature.com/nature/journal/v486/n7403/full/nature10831.html>.

<sup>261</sup>As it is the case with many countries, the appeal process for export control cases in Netherlands may entail different steps and legal procedures. The first is the administrative appeal where the competent authority can re-consider its original decision. Then, there is the judiciary appeal which could be examined at the first instance by the Court of Haarlem, at the second instance by the Appellate Court in Amsterdam and finally the Supreme Court of Netherlands may adjudicate a case. During these different stages the tribunals have the possibility to refer the case to the European Court of Justice for a preliminary ruling. The final decision remains with the national court to be taken.

<sup>262</sup>In the letter, the ESV took a balanced stance by underlying the need to carefully consider the potential benefits and risks linked to the conduct of research handling viruses, fungi and bacteria listed in the dual-use regulation. They highlighted the implications of setting hundreds of scientific manuscripts to a screening process which could avoidably lead to serious delays for scientific publications or in some case to the disruption of the free dissemination of data sometimes critical for enhancing preparedness against threats in public health. Moreover, the ESV noted their willingness to provide scientific advice to law officers at least till the establishment of more permanent mechanisms for the assessment of dual-use research.

<sup>263</sup>The decision of the Appellate Court of Amsterdam was published in the website of the Netherlands Judiciary on July 15, 2015 (in Dutch), retrieved from:

<http://uitspraken.rechtspraak.nl/inziendocument?id=ECLI:NL:GHAMS:2015:2913&-keyword=ECLI%3aNL%3aGHAMS%3a2015%3a2913>.

#### 4.4.3 The litigation<sup>264</sup>

Regardless of this outcome, the arguments presented in the original adjudication of the case by the District Court are of interest from an academic and policy point of view. As described in the court's reasoning underpinning the verdict, the overall debate on imposing an authorisation requirement for the publication of the manuscripts was centred around the 'basic scientific research' and 'in the public domain' exemptions. On the one hand, Dr. Fouchier supported that the overarching objective of such a scientific enterprise was to acquire new scientific and technical knowledge about the fundamental genetic principles governing the airborne transmission of H5N1 in mammals. The project is not primarily directed towards a specific practical aim or objective and thus, the basic research exemption should be applicable. Moreover, the plaintiff argued that all methods described in the manuscripts have been already available in the existing literature since the techniques to genetically modify the influenza viruses have been first published in 2000. Likewise, the mutations described have been firstly occurred and identified in the course of 20<sup>th</sup> century following the outbreak of global pandemics. Therefore, the researchers only used publicly available information in a systematic way in order to verify whether the avian influenza could be transferred via the respiratory route in mammals. In addition, they have been the first to identify certain mutations that might lead to such a contingency in the future relying again on existing knowledge. As a consequence, the research belongs to the public domain.

On the other hand, the Dutch Ministry of Foreign Affairs supported its claim to impose a license requirement by specifying the entries in Annex I of the regulation under which technology related to H5N1 is controlled and also opposed the arguments about the applicability of the exemptions. The two manuscripts pose a threat since they provide information that could be used for the production, development and use of the virus as a bio-weapon, they advocated. The manuscripts do not constitute necessarily basic scientific research because even if the overall objective could be reasonably considered as general and fundamental, the experiments undertaken during the individual phases had rather practical objectives. The first manuscript shows what mutations are required for rendering the virus transmissible by air and the second describes where these mutations already occur in nature and what strains are already fairly close to the required number of mutations. Moreover, the fact that the methods used were already known does not imply that the steps taken and the results obtained are not new at all and therefore the study does not necessarily belong to the public domain. The fact itself that the manuscripts were approved for publication in these journals hints at the special character of the research.

The court settled the dispute by dismissing the allegations of the plaintiff. The court affirmed that it is indisputable that H5N1 virus is a controlled pathogen under item 1C352 of the

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<sup>264</sup> This section draws from the reasoning underpinning the District Court's decision as published on September 23, 2013 in the website of the Netherlands Judiciary (in Dutch), retrieved from: <http://uitspraken.rechtspraak.nl/inziendocument?id=ECLI:NL:RBNHO:2013:8527>.

Annex I of the Regulation and that technology relating to this item is equally controlled under entry 1E001<sup>265</sup>. Besides, this was acknowledged by both sides.

Entries of the dual-use regulation under which H5N1 is controlled:

**1C351 (Materials):**

Human and animal pathogens and ‘toxins’, as follows:

a. Viruses, whether natural, enhanced or modified, either in the form of ‘isolated live cultures’ or as material including living material which has been deliberately inoculated or contaminated with such cultures, as follows:

[....]

4. Avian influenza virus, which are:

a. Uncharacterised; or

b. Defined in Annex I(2) EC Directive 2005/94/EC (O.J. L 10 14.1.2006, p. 16) as having high pathogenicity, as follows:

1. Type A viruses with an IVPI (intravenous pathogenicity index) in 6 week old chickens of greater than 1,2; or

2. Type A viruses of the subtypes H5 or H7 with genome sequences codified for multiple basic amino acids at the cleavage site of the haemagglutinin molecule similar to that observed for other HPAI viruses, indicating that the haemagglutinin molecule can be cleaved by a host ubiquitous protease;

**E001 (Technology):**

‘Technology’ according to the General Technology Note for the ‘development’ or ‘production’ of equipment or materials specified in 1A001.b., 1A001.c., 1A002 to 1A005, 1A006.b., 1A007, 1B or 1C.

On what it concerns the dispute over the basic scientific research and publicly available information the court opposed the arguments of the plaintiff. Exemptions should be interpreted restrictively and in the light of the main purpose of the Regulation which is above all the prevention of proliferation of WMD<sup>266</sup>. In other words, the judge weighed the risks against the benefits and decided that an authorisation requirement is justifiable. The exemption of the basic research is not applicable because demonstrating how a strain of influenza can be adapted to be transmissible in mammals is a practical goal. Moreover, even

<sup>265</sup> Currently, with the Commission Delegated Regulation (EU) 2015/2420, the updated Annex I lists the ‘avian influenza’ virus under entry 1C351 and related technology remains controlled under 1E001. See EU Commission, *Delegated Regulation (EU) 2015/2420* amending Council Regulation (EC) No 428/2009, Official Journal of the EU (L 340), Brussels, 2015, 79-80; 89, retrieved from: [http://trade.ec.europa.eu/doclib/docs/2016/january/tradoc\\_154129.2015-2420.pdf](http://trade.ec.europa.eu/doclib/docs/2016/january/tradoc_154129.2015-2420.pdf).

<sup>266</sup> According to the Court, the main considerations underpinning the dual-use regulation are non-proliferation objectives. Recitals three and 15 provide for the establishment of an effective common export control system in compliance with the multilateral commitments of the EU Member States and the obligations set by UNSCR 1540 whereby the interests of non-proliferation should take precedence over other concerns.

though the methods used in the study to generate mutant viruses are not novel, Fouchier and his team took steps and made choices that led to entirely new outcomes. Nevertheless, the court accepted that imposing an authorisation requirement to publications of dual-use concern can be, to some extent, detrimental to scientific research mainly due to subsequent delays in the publication of the scientific work and/or restrictions in accessing the most sensitive findings. The importance of adequate and effective monitoring of proliferation sensitive activities must be however a higher priority according to the judges. Last, the objection of the claimant that such an approach could lead to the asymmetric implementation of export controls since no other EU Member States would have required a license for a similar case was dismissed as a hypothetical argument that could not be substantiated.

#### 4.4.4 The American reaction

The publication of the opinion of NSABB concerning both Kawaoka's<sup>267</sup> and Fouchier's works preceded the decision of the court in Harlem. In the USA, both cases are considered as DURC and thus, the NSABB the advisory board for the oversight of research in life science was called to assess the imminent risks stemming from the publication of the studies already in the fall of 2011<sup>268</sup>. The board reached two important conclusions: first, the experiments conducted indeed "confirmed that H5N1 has the potential to become mammalian transmissible and thus poses a threat of future pandemic" and second, the manuscripts should be published in a redacted version "with the omission of certain details that could enable the direct misuse of the research by those with malevolent intent"<sup>269</sup>.

The goal was to deliver the critical information about the H5N1 potential for pandemic spread while minimizing the possible risk that the information could be used for nefarious purposes.

*NSABB, Findings and Recommendations, 1*

Due to the issues at stake (public health and public security), in February 2012 the WHO convened a technical consultation with the participation among other experts of doctors Fouchier and Kawaoka in order to clarify the key issues relating to the studies<sup>270</sup>. First, the WHO panel of experts recognised the potential for misuse of the results achieved and

<sup>267</sup> Although the Kawaoka's research relied on different methods from these described in Fouchier studies it also reached to similar findings concerning the transmissibility of H5N1 in mammals.

<sup>268</sup> Following the first review, "the NSABB recommended that the general conclusions highlighting the novel outcome be published, but that the manuscripts not include the methodological and other details that could enable replication of the experiments by those who would seek to do harm". From the US National Institutes of Health website, "Press Statement on the NSABB Review of H5N1 Research," as of December 20, 2011, retrieved from:

<http://www.nih.gov/news/health/dec2011/od-20.htm>.

<sup>269</sup> NSABB, *Findings and Recommendations*, 2012, 1, retrieved from:

[http://www.nih.gov/about/director/03302012\\_NSABB\\_Recommendations.pdf](http://www.nih.gov/about/director/03302012_NSABB_Recommendations.pdf).

<sup>270</sup> World Health Organisation (WHO), "Report on technical consultation on H5N1 research issues," Geneva, February 16-17, 2012, retrieved from:

[http://www.who.int/influenza/human\\_animal\\_interface/mtg\\_report\\_h5n1.pdf?ua=1](http://www.who.int/influenza/human_animal_interface/mtg_report_h5n1.pdf?ua=1);

For more information see also the relevant WHO webpage:

[http://www.who.int/influenza/human\\_animal\\_interface/avian\\_influenza/h5n1\\_research/en](http://www.who.int/influenza/human_animal_interface/avian_influenza/h5n1_research/en).

methods used in the studies. However, taking into account that the H5N1 continued to pose a great risk for causing a future pandemic -at least back at the time of discussions- they urged for the full disclosure of the manuscripts<sup>271</sup>. The redaction option is not a viable option, they noted. With a view to dealing with the dual-use problem, the idea of a mechanism ensuring the selective access only to those having a legitimate interest to sensitive research was tabled. It was accepted though that this was a tricky issue requiring time and further consultations with stakeholders from other communities most probably at international level. Therefore, the launch of such a mechanism could be considered as an appropriate initiative to take on in the future.

Second, the participating experts examined specific questions relating to physical security and safety: What were the laboratory biosecurity standards observed during the conduct of the experiments? Were the modified viruses and related samples of H5N1 kept in safe locations? Is there a need for re-considering and enhancing the level of biosafety for such experimental works? The committee's participants did not contend any breach of the existing biosafety and security conditions applying to such type of research (BSL3+)<sup>272</sup>. However, they called the competent authorities to re-evaluate the biosafety and security standards that should apply to related research in the future. In the interim, particular attention must be drawn in raising awareness of scientists about potential risks and communicating to the society the added value of such research endeavours.

Finally, the NSABB convened again in March 2012 to review the newly revised manuscripts in the light also of the opinion provided by the WHO<sup>273</sup>. The NSABB Findings and Recommendations report is accessible in the web and describes the final deliberations on the issue taken place on 29-30 March, 2012. The Board reversed its stance and concluded that in spite of the fact that the manuscripts still raise dual-use concerns the benefits for publishing the work outweigh the risks. The majority of the Board's members recommended the full communication of the revised Kawaoka's paper. Concerning the Fouchier study in a 6 to 12 decision the NSABB concluded that the manuscripts could be communicated but some further clarifications should be made prior to the publication.

#### **4.4.5 Lessons learned and further remarks**

Controlling the publication of research on the basis of existing export control provisions is not a straightforward issue. It exemplifies both practical difficulties and a weakness of the legal framework to clarify some fundamental issues.

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<sup>271</sup> According to the committee's overview the dissemination of the controversial research findings could offer significant benefits to global health. The findings could be used to improve sensitivity of public health surveillance, facilitate the early detection of potentially pandemic H5N1 strains, and might aid the development of vaccines and other countermeasures.

<sup>272</sup> Biosafety level 3+ corresponds to 'enhanced containment laboratory' for safeguarding high risk pathogens and toxins. See Peter Clevestig, *Handbook of Applied Bio-Security for Life Science Laboratories*, (Stockholm: SIPRI, 2009), 10.

<sup>273</sup> The degree of revision done by the authors is rather unclear. From the context, one may assume that the revision was not extensive. Instead, it seems that the revisions were limited to eliminating certain terminology and highlighting the added value of the research in question.

## **Lesson I: The implementation of export controls *vis-à-vis* the publication of dual-use Research is inextricably linked to practical and legal challenges**

Given the potentiality the publication of research to constitute a form of ‘export’, certain issues need clarification. Who must be considered as the exporter and who the end-user of any given publication? For example, during the peer review process the academic might send an article containing technical knowledge of dual-use nature to the editor and the editor could then make available such information to the evaluators. According to the export controls ‘philosophy’ the issue of location is very crucial and thus, if both the editor and the reviewers are established in non-EU countries more than one export authorisations might be required. That said it is unclear if the legal responsibility must be borne by the original expeditor of the sensitive information *i.e.* the academic or by the editor or whether both should share it. Moreover, the publication of a research work would basically mean the unhindered dissemination to anyone having access to the Journal’s website or a certain library regardless of the country where he/she is based.

For physical exports, Article 2 of the Regulation considers as ‘exporter’ any natural or legal person or partnership holding the contract with the consignee in a non-EU country and having the power to determine the sending of the item out of the customs territory of the EU. For electronic transfers, the same article considers as ‘exporter’ any natural or legal person or partnership that decides to transfer or make available controlled software or technology to a non-EU destination. However, normally, neither the academic nor the editor and the evaluators hold a transfer contract and even if the academic signs a publishing contract it will be difficult to exclude consignees established in certain countries. From the point of view of intangible transfers, both the academic and the editorial board may transfer controlled information and the problem of the end-user stands also here as an inextricable question.

‘Exporter’ shall mean any natural or legal person or partnership:

(i) on whose behalf an export declaration is made, that is to say the person who, at the time when the declaration is accepted, holds the contract with the consignee in the third country and has the power for determining the sending of the item out of the customs territory of the Community. If no export contract has been concluded or if the holder of the contract does not act on its own behalf, the exporter shall mean the person who has the power for determining the sending of the item out of the customs territory of the Community;

(ii) which decides to transmit or make available software or technology by electronic media including by fax, telephone, electronic mail or by any other electronic means to a destination outside the Community.

Where the benefit of a right to dispose of the dual-use item belongs to a person established outside the Community pursuant to the contract on which the export is based, the exporter shall be considered to be the contracting party established in the Community.

*Article 2 §3 of the Regulation (EC) No 428/2009*

In the H5N1 case, the Dutch government set an authorisation requirement for the export of the manuscript to a US-based peer-reviewed journal. In that sense, a physical export was taking place from the EU to the US. The stated end-use was publication in a scientific journal and the academic was considered as the exporter given that the author holds the right to withdraw the article any time before the publication. One could argue that the aim of the authorisation was actually to block the release of the information in general, worldwide until the evaluation of the risks and benefits associated with the study was completed. This way the competent authorities used the time in order to decide on a crucial issue and also, rendered the scientists aware of the dual-use potential of their work. Nevertheless, if the ESV is right in its estimations, Dutch scientists alone publish an average of 100 manuscripts per year containing information about pathogens listed in the Annex I of the regulation. Setting all these manuscripts to the approval of the competent authorities can be cumbersome for both licensing officers and scientists.

### **Lesson II: The applicability of the ‘basic scientific research’ exemption is contentious**

The interpretation of exemptions applicable to research activities is a challenging issue due to ambiguities in the legal framework at the European and international level. The ‘H5N1 case’ demonstrates this problem. On the one hand, the researcher’s argumentation was that the purpose of research was solely to explore mammalian transmissibility of an influenza strain and thus, the manuscripts justifiably fall within the basic research realm. On the other hand, the Dutch authorities supported their stance to impose an export authorisation by highlighting that making the H5N1 airborne is a practical goal and thus, the exemption is not applicable. From the Court’s reasoning one could deduce that the Dutch authorities resorted to the definitions of basic and applied research as provided in the OECD’s ‘Frascati Manual’ to make his case in the court<sup>274</sup>. It should be reiterated that both the multilateral regimes and the EU regulation draw from the understanding of basic and applied research as originally established in the said manual. In fact, both refer solely to the definition of basic research without clarifying further the concept. According to ‘Frascati Manual’, the main difference between basic and applied research is that the latter is directed primarily towards a specific practical aim or objective. Apparently, such a general criterion is open to different interpretations and it is not of help to regulators and practitioners dealing with the dual-use problematic.

The distinction between basic and applied research merits some further discussion. Generally speaking, ‘basic research’ is a poorly defined term that takes different nuances depending on the given circumstances under which it is used. The paper of Calvert and Martin provides an interesting summary of the different characteristics conferred to basic research as recorded in interviews with scientists coming mainly from physics and biology as well as policy makers<sup>275</sup>. At an epistemological level, basic research can be unpredictable, novel, and theoretical or it may describe things in reductionist terms. It may also be curiosity driven,

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<sup>274</sup> The ‘Frascati Manual’ is not explicitly mentioned in the Court’s reasoning. However, it is the sole source where internationally accepted definitions for both basic and applied research are provided.

<sup>275</sup> A number of 49 professionals were interviewed on their understanding of basic research.

oriented to benefit social welfare or without any practical usefulness at all. The basic research concept can embody contrasting elements and, virtually for almost any of the characteristics conferred to it there will be some evidence for their relevance to applied research, too. As Calvert and Martin observed already 15 years ago, the concept of basic research is characterised by complexity, flexibility and adaptability making it a persistent and long lasting term used regularly in the various interactions between scientists and policy-makers<sup>276</sup>. At the same time, this element of flexibility means that what constitutes basic research may depend to a large extent on the perception of whosoever speaks.

From an export control perspective, it seems that the ‘basic research’ concept connotes the exceptional character of research and aims at protecting its role in advancing science and society. Simply put, it saves scientists from undue hindrance in the conduct of lawful research and public authorities from a high volume of unnecessary export control applications. However, in practice, using the basic research term may increase the nebulous landscape of export controls for both ‘exporters’ and export control authorities for a number of reasons.

First, the boundaries between basic and applied research are indiscernible and are bound to become even more so due to the intensification of collaborations between universities and corporations. More particularly, basic research is publishable but applied research can be published as well. Private firms do not only produce greater numbers of publications but they also embark on collaborative publications with universities or other public research organisations. The ‘paper-patent’ divide which has been long used to signify the basic-applied boundary is becoming increasingly less appropriate<sup>277</sup>. Also, whereas basic research is generally not intended towards commercialisation, for certain emerging technologies the time lapse from very basic research to the production of marketable products is very short.

Furthermore, collaborations between universities and private corporations are increasingly favoured by governments and industry. In relation to this, public funding is not directed exclusively to public institutions and basic research. As a consequence, researchers can adapt the objectives of their projects in order to receive funding and thus, there is usually room for manoeuvring from knowledge of a more general and fundamental nature to practical applications. This factor implies that the institutional locus and the public or private funding of research activities cannot be a sufficient criterion for defining basic research. This is vividly illustrated in the responses of some of the participants in the study of Calvert and Martin: “if you walk into a laboratory how do you know whether they are doing basic or applied research?” “The sequencing of the human genome undertaken by a private initiative it would be basic research if it was being done in a university for non-profit purposes<sup>278</sup>.”

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<sup>276</sup> Jane Calvert and Ben R. Martin, “Changing Conceptions of Basic Research?” Background Document for the Workshop on Policy and Measurement of Basic Research (Falmer, Brighton: SPRU - Science and Technology Policy Research, University of Sussex, 2001), 22-23, retrieved from: <http://www.oecd.org/sti/sci-tech/2674369.pdf>.

<sup>277</sup> Ibid, 20.

<sup>278</sup> Ibid, 9.

Second, interpreting basic research on the basis of internationally accepted definitions established and analysed in the ‘Frascati Manual’ and the ‘Manual for Statistics on Scientific and Technological Activities’ is a rather challenging task<sup>279</sup>. The Frascati Manual highlights four characteristics in order to clarify the basic scientific research concept:

- First, the performer of research may not know about actual implications when doing the research;
- Second, the results of basic research are not generally sold but are usually published in scientific journals or circulated to interested colleagues;
- Third and most importantly -from the point of view of non-proliferation- occasionally, basic research may be classified for security reasons;
- Fourth, basic research can be distinguished to ‘pure’ and ‘oriented’. This subdivision is suitable due to the admitted fact “that basic research can be oriented or directed towards some broad fields of general interest, with the explicit goal of a broad range of applications in the future<sup>280</sup>.”

Pure basic research is carried out for the advancement of knowledge, without seeking long term economic or social benefits or making any effort to apply the results to practical problems or to transfer the results to sectors responsible for their application.

Oriented basic research is carried out with the expectation that it will produce a broad base of knowledge likely to form the basis of the solution to recognised or expected, current or future problems or possibilities.

*‘Frascati Manual’, 78*

At the other end of the spectrum, applied research involves considering the available knowledge and its extension in order to solve particular problems. As clarified in the Frascati Manual, the results of applied research are intended primarily to be valid for a single or limited number of products, operations, methods or systems. Further, applied research gives operational form to ideas and, the knowledge or information derived from it is often patented and it may be kept secret<sup>281</sup>. Also, certain research endeavours may require investments in both basic and applied research in different phases of a project and the private sector may conduct basic research with a view to preparing for the next generation of technology objectives<sup>282</sup>. Overall, there are many conceptual and operational problems associated with the concept of basic and applied research as defined in international manuals and legal texts and their usefulness for trade controls is questionable.

<sup>279</sup> OECD, *Frascati Manual*, 75-82; UNESCO, *Manual for STA*, 17-30.

<sup>280</sup> *Ibid*, 77.

<sup>281</sup> *Ibid*, 78.

<sup>282</sup> The Frascati Manual refers to research on ‘fuel cell technology’ as a case in point. Such research is basic as it does not have a particular use in view and, it could be considered as “oriented basic research”. See OECD, *Frascati Manual*, 78.

That said, a reasonable question would be where the H5N1 research actually falls. Should it be considered as (oriented) basic research or as applied research? Following the applicability of patenting and specific utility as a part of the definition of applied research, one could argue that since neither Kawaoka's nor Fouchier's works produced patents or were commercially oriented, they are to be considered basic research.

### **Lesson III: Export Controls: one option among others**

The US authorities did not resort to trade controls in order to deal with the controversial manuscripts presumably because they have a distinct approach to interpreting the basic scientific research exemption. Otherwise, one could assume that although both research works were submitted to leading US based journals, the export control authorities could have claimed that the publication by these journals requires an export authorisation since it amounts to an export from the US to unauthorised destinations and end-users. To this end, the editorial boards of the two Journals would have been required to ask for an export authorisation from the Department of Commerce. Regardless of this hypothetical case, the US approach provides for a further mechanism to be considered. Research proposals and manuscripts of 'dual-use concern' can be evaluated by an advisory committee specially devised to assess sensitive scientific proposals and production of dual-use nature in life sciences. Such a committee should be composed of experts coming from all different authorities concerned and it would bring together the research and the security communities (*e.g.* intelligence, national security authorities, and public health and bio-safety experts). In the USA this role is entrusted to NSABB, the federal advisory committee addressing issues related to biosecurity and dual use research at the request of the United States Government<sup>283</sup>.

As highlighted in the 'Fink report', almost all biotechnology in service of human health can be subverted for misuse by hostile individual or nations<sup>284</sup>. This premise about the dual-use potential of bio-technology led the authoring committee of the Fink report to recommend the creation of 'an advisory board for biodefense' and eventually to the foundation of the NSABB. The same report stresses the importance of overseeing dual-use research already in the phase of planning instead of screening completed research works ready for publication. In this regard, the recommendation 'Review of Plans for Experiments' in the Fink report determines seven classes of experiments that could have a high potential for misuse. Among them categories four and five 'experiments that would increase transmissibility of a pathogen' and 'experiments that would alter the host range of a pathogen' seem to match with the main objectives pursued in the H5N1 research.

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<sup>283</sup> From the NSABB website: "The NSABB has up to 25 voting members with a broad range of expertise including molecular biology, microbiology, infectious diseases, biosafety, public health, veterinary medicine, plant health, national security, biodefense, law enforcement, scientific publishing, and other related fields. The NSABB also includes non-voting ex officio members from 15 federal agencies and departments". Retrieved from: <http://osp.od.nih.gov/office-biotechnology-activities/biosecurity/nsabb>.

<sup>284</sup> National Research Council (USA), *Biotechnology Research in an Age of Terrorism (The Fink Report)*, preface.

The increased domestic and international expenditure in basic and applied public health and bioterrorism defence research will inevitably create an increased number of research activities that raise concerns about misuse.

*'Fink Report', 2004, 109*

As prophetically mentioned in the conclusions of the 'Fink report' the number of dual-use research experiments in bio-science is expected to get higher for two main reasons: first, scientists need to know what exactly makes certain microbes pathogenic and virulent in order to produce appropriate vaccines and second, the funding spent on bio-defence is anticipated to continue increasing in the future in the US and globally due to the importance of preparedness for the public health security<sup>285</sup>. The importance attached to dual-use research in life sciences is also evidenced by the fact that 'dual-use research of concern' (DURC) has been first defined in this context.

It is worth being reminded that the definition implies correctly that it is not all dual-use research that poses an imminent and perceivable threat but only the most sensitive one. What most sensitive means exactly is left apparently for the NSABB to decide upon and certainly includes research that can be 'directly misapplied'.

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<sup>285</sup> Ibid, 109.

## 5. Monitoring Dual-Use Research in the US: A Genuine Approach?

The H5N1 case demonstrated not only the legal and practical challenges in controlling the publication of dual-use research but also the varying approaches adopted by the US and EU authorities in monitoring dual-use research in general. This chapter intends to provide a brief overview of the American trade control system placing particular emphasis on certain aspects relating to the control of dual-use research. As a pioneer in designing and enforcing trade controls the USA operate probably the most comprehensive and sophisticated system for controlling strategic goods. Given also the genuine approach adopted for the control of dual-use research, the US system represents a fitting case to discuss.

### 5.1 Brief overview of the legal framework

The U.S. government operates a complex system of export laws and implementing regulations “as a means to promote national security interests and foreign policy objectives”<sup>286</sup>. More particularly, increasing national security by limiting access to the most sensitive U.S. technology and weapons, promoting regional stability and the respect of human rights, preventing the proliferation of weapons and technologies -including WMD- to unlawful end-users and supporters of international terrorism as well as complying with international commitments (*e.g.* international export control regimes, UN Security Council sanctions and the UNSC resolution 1540) are the main objectives pursued through trade controls<sup>287</sup>. The following implementing regulations are the cornerstones of the US policy in dealing with strategic export controls of military and dual-use goods as well as other items included in sanctions and embargoes lists:

- the International Traffic in Arms Regulations (ITAR) governing the transfer and export of inherently military technologies is administered by the Directorate of Defence Trade Controls at the Department of State<sup>288</sup>.
- the Export Administration Regulations (EAR) setting the rules for the transfer and export of commercial dual use - including less critical military- equipment, materials

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<sup>286</sup> This wording is used in different training presentations provided by the US authorities in various occasions and it can also be found in the website of the DOS presenting an overview of the US export control system, available in:

<http://www.state.gov/strategictrade/overview/index.htm>.

<sup>287</sup> Ibid.

<sup>288</sup> See 22 CFR 120-130 where the number in front of the abbreviation indicates the general ‘Title’ in the Code of Federal Regulations (CFR) followed by the ‘Parts’ and paragraphs corresponding to a given regulation. Please note that the CFR is the codification of all permanent federal regulations - known also as administrative law- published in the Federal Register by the executive departments and agencies of the federal government of the US. The CFR is divided into 50 titles that represent broad areas subject to federal regulation. The federal regulations draw their legal basis from relevant federal statutes enacted by the Congress (see the US Code). The *Arms Export Control Act* (AECA), the *Atomic Energy Act*, the *Export Administration Act* (EAA), the *International Emergency Economic Powers Act* (IEEPA) and the *Trading with the Enemy Act* are the main examples of statute law underpinning export related regulations. The CFR is published by the US Government Publishing Office (GPO), and can be found in the following link:

<https://www.gpo.gov/fdsys/browse/collectionCfr.action?collectionCode=CFR>.

and technologies is administered by the Bureau of Industry and Security (BIS) at the Department of Commerce<sup>289</sup>.

- the Office of Foreign Assets Control (OFAC) in the Treasury Department administers regulations prohibiting certain transactions with countries subject to trade sanctions and embargoes<sup>290</sup>.

Moreover, the provision of nuclear assistance and nuclear equipment for peaceful purposes may bring specific requirements -an authorisation or reporting obligation- lying within the competence of other departments and agencies of the US government. For instance, the National Nuclear Security Administration (NNSA), a semi-autonomous agency within the Department of Energy, controls the provision of unclassified nuclear technology and assistance<sup>291</sup> while the US Nuclear Regulatory Commission (NRC) is an independent agency regulating the export and import of certain nuclear facilities, equipment and material<sup>292</sup> on the basis of the Atomic Energy Act of 1954 and its amendments.

This study focuses on dual-use aspects and therefore, the EAR provisions are of high relevance to this analysis. Title 15, Part 738.1 of the CFR clarifies the structure and the scope of the EAR list that is known as the Commerce Control List (CCL). Simply put, “the CCL sets out the combinations of dual-use goods and destinations for which an exporter must obtain a license from the BIS. The CCL provides also main reasons for control for each item ranging from counter-terrorism to national security and regional stability”. As part 730.6 clarifies, some control entries intend to restrict access to sensitive items by countries or persons that might apply such items to uses inimical to U.S. interests. Furthermore, “a relatively small percentage of exports and re-exports subject to the EAR require an application to BIS for a license. Many items are not on the CCL, or, if on the CCL, require a license to only a limited number of countries. Other transactions may be covered by one or more of the License Exceptions in the EAR. In such a case no application need be made to BIS”<sup>293</sup>. As it is the case with the EU list, the CCL draws mainly from the WA list and it uses the same division in 10 general categories (nuclear, materials processing, aerospace and propulsion *etc.*) arranged by 5 groups (materials, software, equipment *etc.*) However, as Rosanelli has noted, each State implements the guidelines and lists agreed in the framework of the multilateral regimes quite discretionary allowing for national foreign policy considerations and national commercial and security interests to be expressed<sup>294</sup>.

Quite interestingly, the EAR (Part 730.3) adopts a rather distinct and flexible approach in clarifying the term ‘dual use’ and its relation with the items covered under the CCL: “In essence, the EAR concern any item warranting control that is not exclusively controlled for export, re-export, or transfer (in-country) by another agency of the US Government or

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<sup>289</sup> Ibid, 15 CFR 730-774.

<sup>290</sup> Ibid, 31 CFR 500-599.

<sup>291</sup> Ibid, 10 CFR 810.

<sup>292</sup> Ibid, 10 CFR 110.

<sup>293</sup> Ibid, 15 CFR 730.7.

<sup>294</sup> Rosa Rosanelli, *US Export Control Regulations Explained to the European Exporters: A Handbook* (Liege: University of Liege, 2014), 12.

otherwise excluded from being subject to the EAR [...]. Thus, items subject to the EAR include purely civilian items, items with both civil and military applications (including terrorism or potential WMD-related), and items that are exclusively used for military applications but that do not warrant control under the ITAR”<sup>295</sup>. Items that are not specifically catalogued in the CCL under an Export Control Classification Number (ECCN) yet they are subject to EAR are designated as EAR99 items<sup>296</sup>. Items falling within the jurisdiction of ITAR receive stricter treatment and thus, the issue of identifying the right commodity jurisdiction is quite important pending also of a greater degree of harmonisation between the rules applying to ITAR and those applying to EAR control entries<sup>297</sup>. In this regard, the intended use after the export is not relevant in determining the applicable jurisdiction. This means that if an item is listed on the US Military List (USML), it will be subject to ITAR, even if the exporter claims a de facto civilian-use<sup>298</sup>. Another related problem is that items of dual-use nature may be included in the USML, an issue encountered also in the EU context (see section 3.4.2). In certain instances a similar or practically identical item may be controlled under both jurisdictions. The ongoing Export Control Reform (ECR) intends to remedy *inter alia* this problem shifting also the focus from a ‘design intent’ to a ‘performance specification’ based USML<sup>299</sup>. In case of doubt, exporters may apply for a commodity jurisdiction determination to the Department of State that has the jurisdictional authority to decide whether an article is defence related or not. For EAR specific questions, an advisory opinion request may be submitted to BIS.

The system of the US export controls stands out for the far-reaching scope of the legislation, the extraterritorial character of certain provisions and the commitment of the US authorities to promote a transparent, accountable and effective licensing system for sensitive products

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<sup>295</sup> Wording used in the Part 730.3. In the same section, is defined also what dual-use shall mean: “an item that has civil applications as well as terrorism and military or WMD-related applications”.

<sup>296</sup> Most commercial products, falling under the jurisdiction of the CCL, are designated as EAR99 and generally they will not require a license to be exported or re-exported. However, for exports of EAR99 items to an embargoed or sanctioned country, to a party of concern, or in support of a prohibited end-use, the exporter may be required to obtain a license. The ECCN is a five character alpha-numeric designation used in the CCL to identify controlled items.

<sup>297</sup> Indeed, one of the main objectives set by the ongoing Export Control Reform initiated by the Obama Administration in 2009 is first to enhance coherence and streamline the different applicable rules and then establish gradually a thoroughly revised system on the basis of the ‘four singles’ strategy, meaning:

- A *Single List* for items subject to varying levels of restrictions
- A *Single Information Technology (IT) System* to submit and process license applications
- A *Single Primary Enforcement Coordination Agency*
- A *Single Licensing Agency* for dual-use, munitions and embargoes

Information retrieved from presentations by Steve Emme (DOC) and Anthony Dearth (DOS) in the framework of the 3<sup>rd</sup> Annual Conference: “Impact of Export Controls on Higher Education & Scientific Institutions”, 7-9 June 2015, Washington DC.

<sup>298</sup> Rosanelli, *US Export Control Regulations Explained to the European Exporters*, 13.

<sup>299</sup> Aircrafts, gas turbines engines as well as satellites and related parts and components are notable examples of entries previously controlled under the ITAR and now having migrated in the recently created 600 and 500 series under the CCL.

and technologies<sup>300</sup>. The most striking examples of the pervasive character of US provisions concern the application of the ‘deemed exports’ and the ‘de minimis’ rule.

More particularly, Part 734 of the EAR defines the different forms of ‘export’ covered under the US dual-use trade controls system. An export means the actual shipment or transmission of controlled items out of the United States, or release of controlled technology or source code to a foreign national in the US. A ‘release’ of controlled technology can take place through training, oral exchange, practical demonstration or even visual inspection. In other words, the disclosure or transfer of export controlled software and technical data to a foreign individual inside the US is ‘deemed’ to be an export to the home country of the foreign individual gaining access to such controlled technology<sup>301</sup>. In the case of a research institute or a university, foreign students, visiting scientists as well as foreign nationals employed in certain R&D and manufacturing activities may be confronted with restrictions and export authorisation requirements for entering US laboratories, using US technology or, taking courses and trainings during their stay in the US.

Part 734 provides also the definition of ‘re-export’ as the actual shipment or transmission of items subject to the EAR from one foreign country to another foreign country. Following the deemed export notion, any release of technology or source code subject to EAR to a foreign national of another country is a ‘deemed re-export’ to the home country or countries of the foreign national. Consequently, recipients of US technologies are required to respect the deemed re-export rule and accept re-export clauses as provided in the licensing conditions.

The impact of the extraterritorial reach of US regulations can be even higher if one considers another US-specific rule, the ‘de minimis US content’. First of all, the main rule is that all US-origin items remain under control no matter whether they are located in the US territory or not. In addition to this, according to Part 734.3 foreign made commodities -including software- that incorporate more than a certain percentage (in terms of value) of controlled US-origin content shall be also subject to US trade controls<sup>302</sup>. In addition, derivative technologies, meaning certain foreign-made goods that are direct product of US origin technology or software are subject to EAR, too<sup>303</sup>. The so called ‘contamination principle’ is a pervasive concept in the US trade controls in general. For foreign-made items incorporating

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<sup>300</sup> Rosanelli, *US Export Control Regulations Explained to the European Exporters*, 3-4.

<sup>301</sup> According to the US legislation as a ‘foreign person should be considered any foreign government, any foreign corporation or organization that is not incorporated or organized to do business in the U.S. and any individual who is not a U.S. citizen or lawful permanent resident of the US (green card holder), see training presentation by Worcester Polytechnic Institute (WPI) available in: [http://www.wpi.edu/Images/CMS/OSP/WPI\\_Export\\_Control\\_Slides-web\\_training.pdf](http://www.wpi.edu/Images/CMS/OSP/WPI_Export_Control_Slides-web_training.pdf).

<sup>302</sup> The contamination principle also applies also for exports of derivative technologies that are foreign made commodities produced based on US-origin technology or software or made by a plant or major component of a plant located outside the EU yet being a direct product of US technology and software. This provision applies only to a limited number of proscribed destinations for national security purposes. See Rosanelli, *US Export Control Regulations Explained to the European Exporters*, 26.

<sup>303</sup> In that regard, according to 734.3 certain commodities produced by any plant or major component of a plant located outside the US but that is direct product of US origin technology or software are subject to EAR, as well (see 734.3.9(5)).

military components regulated under the ITAR, their re-export will demand the prior approval of the US Department of State regardless of the percentage of the embedded technology. For former ITAR entries having been removed to EAR a ‘zero de minimis rule’ would continue to apply if the foreign item into which they are being incorporated is to be exported to a country subject to a US embargo.

## **5.2 Confronting dual-use research through export controls**

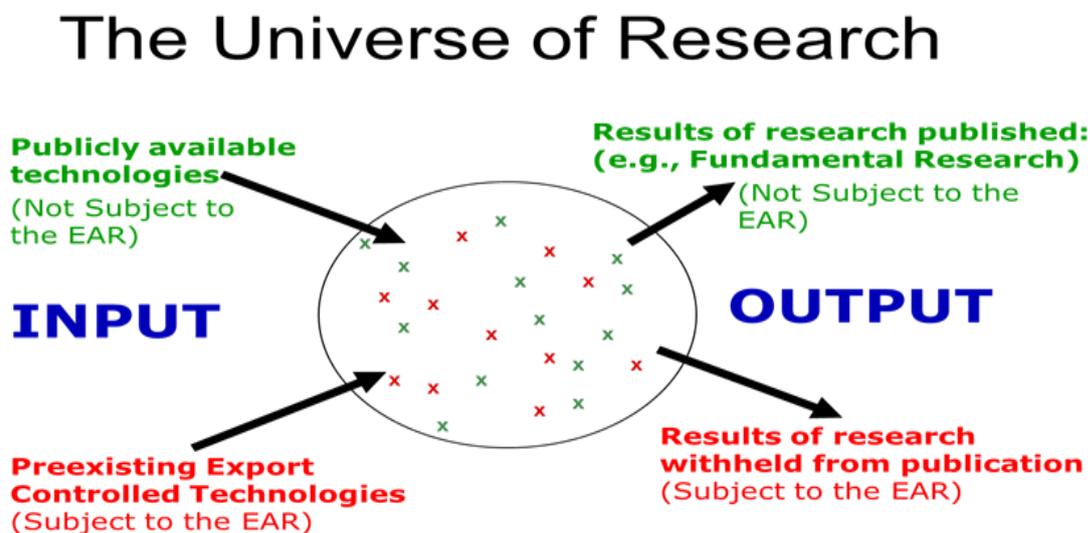
As it was shown in the discussion of the H5N1 case in section 4.4, the US authorities may set the publication of sensitive life science research to a risk-benefit assessment by the competent national board, namely the NSABB. Therefore, a pre-publication review might be among the available options used for monitoring publications of DURC in the US context. Most importantly, the US government did not have the legal basis to control the said scientific work pursuant to trade controls. In the view of the BIS, Kawaoka’s work did not require any export authorisation given that the technologies/methods used were publicly available prior the conduct of this research<sup>304</sup>. Also, the results produced were eligible for publication in scientific journals -no proprietary or security classification clauses were applicable- and therefore, the publication fulfilled the criteria to be treated as ‘fundamental research’ (this is the term used in the US regulations for exempting research activities from the scope of controls). Shipping, possessing or receiving ‘select agents and toxins’ in the USA -in that case high pathogenic strains of avian influenza- as well as handling such controlled pathogens in a laboratory environment is subject to biosecurity and biosafety rules as required by the US government<sup>305</sup>. This approach departs from the practice followed by the Dutch authorities. Fouchier’s research relied also on published methods and reached similar conclusions to Kawaoka’s work. However, according to the Dutch licensing authority, Fouchier took entirely new steps and came up with innovative results of applied nature thus warranting, an export authorisation in order to get published. At this point, it is prudent to further discuss the US approach *vis-à-vis* the H5N1 research and the dual-use research in general.

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<sup>304</sup> Conclusion confirmed by the presentation and subsequent discussion with Alexander Lopes, Director of the Office of Non-proliferation and Treaty Compliance, BIS, DOC in the 7<sup>th</sup> ESARDA Export Control Working Group, December 3-4, 2015.

<sup>305</sup> For instance, the “Uniting and Strengthening America by Providing Appropriate Tools Required to Intercept and Obstruct Terrorism Act” of 2001 (USA PATRIOT Act) and guidance such as the “NIH Guidelines on Research Involving Recombinant DNA Molecules are notable examples of security and safety rules applying to federally funded bio-technology research in the US. For an overview of the US biosafety and security governance measures for sensitive life science research please see: Jonathan B. Tucker, *Innovation, Dual Use, and Security*, 49-55.

Figure VI: Dealing with the dual-use research in the US context<sup>306</sup>



The approach of the US authorities is described vividly in the figure above. If one distinguishes between inputs to a research and outputs, there are two possibilities for the trade controls to come to play. The first one concerns the case where existing controlled items, technical data or software are used as inputs in the research. This means that researchers dealing with such controlled commodities will need to comply with export and deemed export obligations applying each time. Deemed export rules in particular may require export authorisations to be in place for foreign nationals working in a laboratory and/or accessing controlled information. The second possibility concerns the case where outcomes generated by a given research are subject to proprietary or other restrictions. If information relating to such research is withheld from publication due to other security controls or proprietary reasons an authorisation requirement shall apply in case of ‘export’ of EAR controlled items, technologies and software. The distinction between inputs and outcomes of research has raised the question whether the outcomes of fundamental research could be subject to export controls. The issue has been discussed in various occasions such as during the open consultation for the reform of the US system, especially with regards to ITAR controlled items<sup>307</sup>.

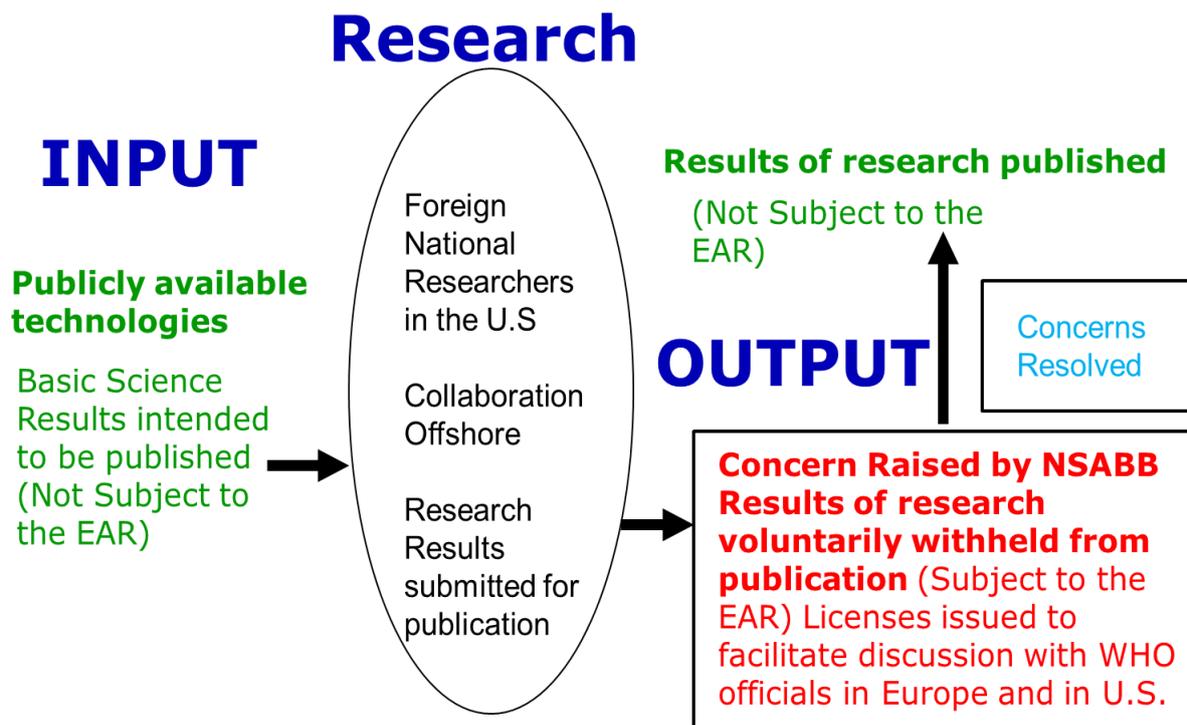
The US approach was exemplified in the H5N1 case. According to the US authorities no ‘export’ took place in the course of the project and also, the results of the study were intended for publication in a scientific journal confirming thereby the fundamental character of the

<sup>306</sup> Figure from the presentation “The Nexus between Strategic Trade Controls and Academic Research” offered by Alexander Lopes, US DOC, in the 7th ESARDA Export Control Working Group, December 3-4, 2015.

<sup>307</sup> The definition of fundamental research as enshrined in the ITAR and the overall interpretation of the fundamental research exemption by the Department of State is not identical with the one adopted in the EAR provisions. For an insightful analysis please see the report of the US Defense Trade Advisory Group (DTAG) on the different interpretations of the fundamental research exemption: DTAG, Department of Defense, Directorate of Defense Trade Controls, May, 2013, retrieved from: [https://www.pmdtc.state.gov/DTAG/documents/plenary\\_May2013\\_FundamentalResearch.pdf](https://www.pmdtc.state.gov/DTAG/documents/plenary_May2013_FundamentalResearch.pdf).

research in question. Only when certain information was withheld from publication after the first opinion by the NSABB, export authorisations were granted to those scientists and experts who participated in the deliberations at the WHO level. Therefore, the interpretation of the fundamental research exemption is central in understanding why Americans apply trade controls this way.

**Figure VII: The US approach towards the H5N1 case<sup>308</sup>**



**The fundamental research exception:** The US government maintains an elaborate and distinct approach on the issue of fundamental research and public domain exemptions compared to their counterparts in Europe. In practice, the underlying logic clarifying what qualifies as ‘fundamental research’ and what is ‘published information and software’ is spread in different paragraphs of Part 734 including the questions and answers in the Supplement No 1 to the Part in question. To begin with, Part 734.8 of the EAR clarifies what ‘information resulting from fundamental research’ shall mean:

*“basic and applied research in science and engineering, where the resulting information is ordinarily published and shared broadly within the scientific community. Such research can be distinguished from proprietary research and from industrial development, design, production, and product utilization, the results of which ordinarily are restricted for proprietary reasons or specific national security reasons as defined in § 734.11(b)”.*

<sup>308</sup> Presentation by A. Lopes, “The Nexus Between Strategic Trade Controls and Academic Research,” US DOC, 7<sup>th</sup> ESARDA Export Control Working Group, Ispra, December 3-4, 2015.

This definition derives from an old national Directive established in the cold war context; however its main ruling has some bearing today: “the products of fundamental research shall remain unrestricted to the maximum extent possible and, for federally funded research warranting security controls classification should be the main applicable rule”<sup>309</sup>. Today, the nature of threat is different but the foregoing definition is still quite relevant. It seeks to protect the free conduct of scientific research acknowledging at the same time that both basic and applied research may be exempt from export controls on the condition that the research is publishable.

In the same paragraph of Part 734 it is suggested that the institutional locus is not a sufficient criterion for defining fundamental research. Instead, fundamental research can be undertaken by organisations as follows:

- Universities;
- Federal Agencies or Federally Funded Research and Development Centres (FFRDCs) within any appropriate system devised by such an agency to control the release of information;
- ‘Corporations or any other type of organisations to the extent that researchers are free to make scientific and technical information resulting from the research publicly available without restrictions or delay based on proprietary concerns or specific national security controls.

In all three instances, research stops being considered as fundamental when its results are subject to prepublication preview due to proprietary reasons, patent rights or other specific national security controls as explained in Part 734.11(b)<sup>310</sup>. In the same logic, the initial transfer of information from an industry sponsor to university researchers is not considered as fundamental research where the parties have agreed that the sponsor may withhold from publication some or all of the information so provided<sup>311</sup>.

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<sup>309</sup> Back at the time the acquisition of advanced US technology by the Soviet Bloc represented a major threat and US universities and federal laboratories were ‘a small but significant target of the Eastern Bloc intelligence gathering effort’. In the same document it was acknowledged that ‘the strength of American science requires an environment conducive to creativity, an environment in which the free exchange of ideas is a vital component’. National Security Decision Directive (NSDD) 189, *National Policy on the Transfer of Scientific, Technical and Engineering Information*, September 1985, retrieved from: <http://fas.org/irp/offdocs/nsdd/nsdd-189.htm>.

<sup>310</sup> Part 734.11(b) clarifies that government-sponsored research may be subject to specific national controls. Examples of such controls include requirements for prepublication review by the Government, with right to withhold permission for publication; restrictions on prepublication dissemination of information to non-U.S. citizens or other categories of persons; or restrictions on participation of non-U.S. citizens or other categories of persons in the research. Information resulting from research that is consistent with these national controls will continue to be eligible for publication under the ‘fundamental research exemption (see also Questions E1 and E2 in the Supplement NO. 1 to Part 734).

<sup>311</sup> The Part 734.8 clarifies also that prepublication review of research by a sponsor with the purpose to ensure solely that a publication would not inadvertently divulge proprietary information or compromise patent rights does not affect the ‘fundamental’ status of research so long as the review causes no more than a temporary delay in publication of the results.

**The rationale of deemed exports:** Contrary to technology that arises during or results from fundamental research and is intended to be published, the inputs used to conduct such research (pre-existing information, equipment and software) may be subject to trade controls according to the provisions of EAR. This is particularly burdensome if one thinks of deemed exports. American universities and research organisations have to consider who has access to what inputs within the US. Interestingly enough, the US government has opted for a liberal interpretation of the deemed export rule although the debate is ongoing<sup>312</sup>.

More specifically, Part 772 provides the definitions of technology and related terms which are generally identical to the known definitions established in the framework of multilateral regimes: “technology means the specific information for ‘development’, ‘production’, or ‘use’ of a product and it takes the form of ‘technical data’ or ‘technical assistance’”<sup>313</sup>. The fact that any technology ‘used’, *i.e.* any information necessary for the “operation, installation, maintenance, repair, overhaul and refurbishing” of a product may be subject to the EAR renders the implementation of deemed export rule a quite challenging task. Presently, the definition of ‘using’ controlled technology is understood as the combined information necessary for the operation, installation, maintenance, repair, overhaul and refurbishing of a product. Thus, if any one of these functions is not involved, the overall activity is not subject to regulation. In part, thanks to this interpretation based on the use of the conjunction ‘and’ instead of ‘or’, “almost all recent research activity conducted in the nation's universities has been exempted from export controls<sup>314</sup>.”

In 2005, the efficacy of such interpretation was challenged in a report of the Office of Inspector General (OIG) that looked also critically to the definition of ‘foreign national’<sup>315</sup>. The OIG recommended BIS to revise the definition of ‘use’ in Section 772.1 of the EAR and base the requirement for a deemed export license on a foreign national's country of birth and not on the country of citizenship or permanent residency, as it is currently the case. Following this, the BIS launched a public consultation seeking for comments from those potentially affected by such a revision of the regulatory framework, *i.e.* the industry and the academic communities<sup>316</sup>. The public comments received were such that led the BIS to withdraw the proposed rulemaking (2005) and establish a federal advisory committee with the task to

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<sup>312</sup> John Krige, “National security and academia: Regulating the international circulation of knowledge,” *Bulletin of Atomic Scientists* 70 (2014): 46, retrieved from: <http://bos.sagepub.com/content/70/2/42>.

<sup>313</sup> Please see chapter 3.4.2 whereby all regimes invariably understand technology as “the specific information necessary for the ‘development’, ‘production’ or ‘use’ of a product”.

<sup>314</sup> US Deemed Export Advisory Committee (DEAC), *The Deemed Export Rule in the Era of Globalisation*, report for the Secretary of Commerce, 2007, 83, retrieved from: <https://www.fas.org/sgp/library/deemedexports.pdf>.

<sup>315</sup> US DOC, BIS, Office of Inspector General, *Deemed Export Controls May Not Stop the Transfer of Sensitive Technology to Foreign Nationals in the US*, Final Inspection Report No. IPE-16176, March 2004, retrieved from: <https://www.oig.doc.gov/OIGPublications/IPE-16176.pdf>.

<sup>316</sup> US DOC, BIS, *Advance notice of proposed rulemaking for the Revision and Clarification of Deemed Export Related Regulatory Requirements*, Federal Register Vol. 70, No 58 (Proposed Rules), March, 2005, retrieved from: <http://fas.org/sgp/news/2005/03/fr032805.html>.

review and provide recommendations on the deemed export policy (2006)<sup>317</sup>. The Deemed Export Advisory Committee (DEAC) in a landmark report adopted a critical stance with regards to the value of deemed exports as implemented presently and suggested a seven step decision processes for controlling deemed exports.

Leadership in science and technology today is a globally shared and highly interdependent perishable asset.

*The Deemed Export Rule in the Era of Globalisation, 2*

In the report's findings and recommendations part, the DEAC underlines that the deemed export rule has become increasingly irrelevant to the prevailing global situation. An average of 900 deemed export licenses are submitted to BIS per year of which a high percentage is often requested by a limited number of US companies and, till 2006 there has been only one case brought to trial for violation of the deemed export law<sup>318</sup>. Also, the criteria for assessing the potential threat posed by a foreign national are rather superficial since they consider only the current citizenship or legal permanent residency and not the place of birth and full background of the foreigner. In relation to this, there appear to be escapements to the existing regulatory regime (think of researcher with dual citizenship) and the foreign availability of targeted technologies is not consistently taken into in the application of the deemed export rule. Last, many academic and industrial organisations appear to be unaware of such rules.

In addition to these observations the report identifies shortcomings concerning the overall functioning of the export control policy. The CCL is too all-encompassing and the existing regulations are excessively complex and often vague. As an example the committee refers to the distinction between technology used for performing fundamental research and the results of such research. The report also challenged the rationale of 'use technology' and of the fundamental research exemption. For the latter, the DEAC highlighted that the existing definition leaves open what is in fact meant by the wording 'ordinarily published' and who is qualified to make such a determination<sup>319</sup>.

The report ends with two main recommendations: the replacement of the deemed licensing process with a simplified new process and the extension of the educational outreach programme already conducted by BIS. In support of these recommendations, the report puts

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<sup>317</sup> US DOC, BIS, *Withdrawal of Advance Notice of Proposed Rulemaking for the Revision and Clarification of Deemed Export Related Regulatory Requirements*, Federal Register Vol. 71, No 104 (Proposed Rules), May, 2006, retrieved from: <https://www.gpo.gov/fdsys/pkg/FR-2006-05-31/html/E6-8370.htm>;

US DOC, BIS, *Establishment of Advisory Committee and Clarification of Deemed Export-Related Regulatory Requirements*, Federal Register Vol 71, No. 98 (Notices), May 2006, retrieved from: <https://www.gpo.gov/fdsys/pkg/FR-2006-05-22/html/E6-7778.htm>.

<sup>318</sup> According to the report the vast majority of the deemed export license requests is eventually approved while less than one percent is actually rejected. However, this cannot constitute a strong criticism given that the purpose of export controls is in the first place to monitor sensitive activities and not to prohibit them.

<sup>319</sup> US DEAC, *The Deemed Export Rule in the Era of Globalisation*, 28, retrieved from: <https://www.fas.org/sgp/library/deemedexports.pdf>.

forward a seven step decision process and determines actions required for underpinning this new construct. Among the specific actions suggested is the creation of a category of ‘Trusted Entities’ for which facilitations may apply as well as the annual review of the controlled list by independent experts.

It is worth noting that the committee experts, half of them distinguished academics, examined two further tools as an alternative to a new deemed export policy. The first was to rely solely on and adapt the existing security classification system. The second was to use the visa system as the sole control. The former idea was rejected due to concerns for a possible over-classification diluting the effectiveness of the system while the latter was also discarded partly on grounds that such a task would further burden an already challenged visa processing system<sup>320</sup>. The conviction that ‘deemed exports’ should be handled ‘at the border’ through the visa application review and partly through existing classification policies has been long shared by the American Association of Universities (AAU)<sup>321</sup>.

**Publicly Available Information:** Part 734.3(b) also clarifies what does not fall in the scope of EAR. The first exemption concerns items or technologies that are exclusively controlled for export and re-export by US agencies and departments other than BIS. This refers to regulations and controls administered and implemented by the DOS, the DOE, or the NRC as explained in section 5.1. In addition, unclassified information in the form of patent applications exported abroad is regulated by the Patent and Trademark Office and, EAR items sold, leased or loaned by the Department of Defence to a foreign country or international organisation are excluded from EAR provisions as well. The second exemption concerns mainly printed books, pamphlets and publications that shall not be subject to trade controls. Last but not least, the third exemption excludes ‘publicly available technology and software’ -except certain encryption software- that:

- A. Are published or will be published
- B. Arise during, or result from, fundamental research
- C. Are educational
- D. Are included in certain patent applications

A. According to Part 734.7, the main rule for deciding whether the information is ‘published’ in the sense of EAR has as follows: Information and software available for general distribution to any member of the public or to a community of persons interested in the subject matter for free is considered as published. Also, information and software for general distribution at a price that does not exceed the cost of reproduction and distribution is still considered as public. Information released in periodicals, books, print, electronic or any other

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<sup>320</sup> For a full explanation of the arguments used for rejecting these alternatives see: *The Deemed Export Rule in the Era of Globalisation*, 30-31.

<sup>321</sup> See for instance the presentation by the Council on Governmental Relations (COGR) and Association of American Universities (AAU), 2008 commenting the DEAC report in the following link: <https://www.aau.edu/WorkArea/DownloadAsset.aspx?id=1552>.

media or at an open conference<sup>322</sup> or, being available at libraries open to public and university libraries are all considered as eligible forms of publication. According the Part 734.7 (4.iii) submitting papers to domestic or foreign editors or reviewers of journals, or to organizers of open conferences or other open gatherings, with the understanding that the papers will be made publicly available if favourably received is exempt. Whereas this provision is based on the imperative to protect the free dissemination of information and exclude information already available, the question touched upon in section 3.5 of the study is also valid here: what does apply in the case where one publishes controlled or sensitive information solely with the intent to circumvent the controls?

B. The definition and the importance of the fundamental research exemption is discussed in section 5.2 of this study. The supplement No. 1 to the Part 734 provides some further guidance with regards to specific contingences that may occur. Most notably, it is clarified that informal scientific exchanges are not subject to control as long as they concern information arising from fundamental research. Industry-university collaborations are also excluded insofar as the sponsor is not allowed to withhold from publication any of the information that he provides to the researcher. However, application abroad of personal knowledge or technical experience acquired in the US constitutes an export subject to EAR.

C. 'Educational information' that is released by instruction in catalogue courses and associated teaching laboratories of academic institutions is not subject to EAR. In other words, educational information that is generally available (neither classified nor proprietary) is not controlled. In the event of a lecture releasing recent and as yet unpublished results originating from laboratory research, still no license requirement will apply (see question C3 in the supplement No.1). However, such a provision does not lift any contractual commitments undertaken by the lecturer in the framework of research funded by the government. Also, as the supplement No.1 to Part 734 clarifies providing controlled information in the framework of proprietary courses shall not be considered as educational information and thus, it will not qualify for this exemption. It comes out also that training provided by industry organisations is excluded from the scope of educational information concerned by this exemption.

D. This exemption concerns mainly information exchanged for the filing of a patent application between the American Patent Trade Office and a foreign inventor.

In sum, the general rule is that information arising during, or resulting from, fundamental research or, is generally available is excluded from the scope of controls. If for some reason, a research is subject to prepublication review and certain information might be withheld from publication then it ceases to qualify as fundamental. Likewise, information and software that is free of access restrictions (not classified) or available at a regular price -not exceeding the cost of reproduction and distribution should be considered as publicly available. Determining

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<sup>322</sup> A conference or gathering is considered as open if all technically qualified members of the public are eligible to attend and attendees are permitted to take notes or, otherwise make a personal record (not necessarily a recording) of the proceedings and presentations.

an export control risk or license requirements on the basis of the absence of proprietary and publication restrictions seems to be a quite peculiar approach (see following section 5.3).

With a view to better understanding the providence of the US government to minimise the impact of export provisions affecting potentially constitutional freedoms, it is necessary to provide some background information on this issue. In the past, the publication of information and most particularly of software source code had been a matter of legal dispute. In the *Bernstein v. United States* legal case, Professor Bernstein sued the US Federal Government for having imposed a license requirement for the publication of encryption software<sup>323</sup>. In 1995, Daniel Bernstein, at that time a doctoral candidate at the University of California, Berkley managed to develop a method for encrypting and decrypting data<sup>324</sup>. The Department of State claimed that the export of the source code, the paper describing the method as well as the instructions for programming a computer to operate the source code should be considered as a munition subject to arms controls. Therefore, Bernstein was not able to post his ‘Snuffle’ algorithm on the internet and share it with his colleagues. The District Court judged that source code was speech protected by the First Amendment of the Constitution. In 1999, the Ninth Circuit Court of Appeals confirmed the decision of the District Court of California and concluded that the EAR provisions in point -the regulation of encryption source code was transferred meanwhile under the EAR jurisdiction- constitute “an impermissible prior restraint on speech since they vest boundless discretion to government officials to decide on the publication of such software”. To conclude, it is useful to remember that the overall debate over the protection of freedom of speech as enshrined in the US Constitution and the successive legal reviews by the courts in the Bernstein case have played some role in subsequent amendments to and interpretation of EAR provisions *vis-à-vis* ‘published information’ and fundamental research exemption.

### **5.3 An assessment of the US approach *vis-à-vis* research**

The US system seeks to solve many of the export control issues potentially arising in a research setting. Indeed, it sets a thoroughgoing framework for dealing with research involving dual-use items and technologies. At the same time the net of provisions relating to research activities stands out for its complexity. Although the intention is to address as many contingencies as possible, the applying rules are sometimes spread in different sections or not clear enough exacerbating an already complex construct.

The observations included in the DEAC and the OIG’s reports challenging the interpretation and current implementation of the deemed export rule merit due consideration. The peculiar

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<sup>323</sup> All the Information for the case derives from: Court of Appeals Decision, *Bernstein v. US Department of Justice et al.* No. 97-16686, 1999, retrieved from: <http://caselaw.findlaw.com/us-9th-circuit/1317290.html>.

<sup>324</sup> For the whole series of legal and administrative decisions relating to the Bernstein case more information can be retrieved from the website of the Electronic Frontier Foundation: <https://www.eff.org/cases/bernstein-v-us-dept-justice>.

A further interesting reading of the first decision of the District Court can be found in: Patrick Ian Ross, “Bernstein v. United States Department of State,” *Berkeley Technology Law Journal* 13 (1998): 406-416, retrieved from: <http://scholarship.law.berkeley.edu/cgi/viewcontent.cgi?article=1180&context=btlj>.

understanding of the term ‘use technology’, the possible escapements to the existing implementation practice (*e.g.* dual nationality) and the low numbers of deemed export authorisations indicate a difficulty in implementing an inherently complex concept. Concerns over the control of deemed re-exports pertain to this discussion as well. The question is how US authorities can be assured that industry and most interestingly, research organisations are aware of and comply with such rules. Given the political and economic weight of the US, allied governments and economic operators have a vested interest in respecting the US approach. It can be assumed that no government would like to be considered as furthering unlawful trade of sensitive technologies and no firm would like to be banned from the US market. A subsequent issue concerns how foreign users and potential exporters of US origin technologies comply with rules originating from a different jurisdiction. In practice, recipients of US technologies may be required to sign a sort of end-use statement undertaking not to use a controlled item for purposes other than those agreed or provide such an item to any third party without prior permission.

The distinction between inputs (information, technology, software) used in performing research and outcomes produced by the same research is rather contentious especially with regards to deemed exports. “In the simple case of a fundamental research study, the “output” (or report resulting from research) is not subject to the existing deemed export regulatory regime, but knowledge relating to the use of laboratory equipment used in prosecuting that same research (the “input”) may be subject to such control”<sup>325</sup>. The distinction between inputs used to conduct research and outcomes of research relates closely to the question of what qualifies as fundamental research and also when a research starts to be considered as fundamental.

The interpretation of fundamental research as mirrored in different US provisions is of central importance for the control of dual-use research. The US legislation is not restricted in repeating the definition of fundamental research as set forth in the framework of multilateral regimes. The fundamental research concept may include both basic and applied research undertaken by any type of research organisations. Academic research does not fall necessarily outside the scope of controls and industrial research does not require always an export authorisation in order to be published. This is in line with the role and nature of research in today’s world.

However, the US definition of fundamental research is not perfect either. The intent to publish the results of research among the scientific community is the sole criterion for defining fundamental research. Fundamental research is understood in the absence of restrictions due to proprietary or national security reasons and thus, the non-public character of the research may connote an export control risk. On the one hand, patent rights and proprietary restrictions connected with a research may imply an innovative achievement or a company’s competitive advantage with regards to formulas, processes, and methods used in the R&D phase. Therefore, if this innovative element is linked to a controlled item an export authorisation may be required for the transfer of related technical information or the item

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<sup>325</sup> US DEAC, *The Deemed Export Rule in the Era of Globalisation*, 80.

itself. On the other hand, the fundamental research exemption does not take into account a different contingency; what about fundamental research achieving a breakthrough discovery of dual-use concern for which no proprietary or security restrictions are applicable or sought? This was the case in point with the H5N1 studies. In addition, what shall apply in the case where a scientist or a firm's employee publishes a sensitive research outcome with the intent to render it public and thus, not controlled? Logically, most of the time a company does not have an interest to publish commercially valuable information but the point is that the current practice may allow escapements to the rules. Admittedly, a single regulatory framework might not be in a position to effectively address all possible issues and, export controls are not the only available tool for controlling sensitive research.

In sum, the logic underpinning US trade controls is not to restrict knowledge transfers unduly. First, technology and software that are unclassified or generally available to the public are not subject to EAR. One could say that classification schemes and export controls are compatible and complementary to each other. Indeed, the EAR clarifies that research that respects the specific national controls may still be considered as fundamental. Second, proprietary rights are used as a safeguard to monitor and catch export control sensitive research. However, not all proprietary information has some relevance to export controls. This way different but quite often intertwined purposes are served: furthering national security and international peace and stability as well as protecting commercially valuable information and technologies are all mirrored in the functioning of US trade controls.

## **6. Compliance: Designing Strategies - Adapting Policies - Developing Models**

Ensuring compliance with the non-proliferation system is a crucial issue towards the attainment of non-proliferation objectives concerning essentially the enhancement of security and peace worldwide. Apparently, a first issue concerns the allegiance of States to the non-proliferation system as this is expressed with the signing and ratification of non-proliferation treaties and further undertakings assumed in the framework of bilateral agreements and politically binding arrangements. A second issue concerns whether States stick to the rules and enforce the requisite measures so that to achieve true compliance with the non-proliferation system in practice. The international system in general lacks an international governance and it is composed by States which may try to evade the rules and satisfy their own interests at the expense of non-proliferation objectives very much in the same way as individuals may violate or abrogate an agreement. For instance, non-compliance may be a deliberate effort of a State to pursue a covert nuclear weapons programme or to enable the transfers of dual-use items to proliferant States and/or outlaw organisations through funding or any other means. Non-compliance can be also a result of the weakness of a State to pursue the necessary measures guaranteeing the secure handling, storage and transfer of controlled material and equipment.

It follows that State commitments bring direct or indirect obligations for private actors and compliance measures seek to eliminate the possibility for infringements perpetrated by both State and non-State actors. This chapter emphasizes what non-State actors could do in order to meet their ever increasing responsibilities as laid down in the dual-use export control laws and in line with the expectations of society. Given that firms and public research organisations operate in an environment entrenched by rules and obligations set by governments the role of the latter in stimulating, encouraging and promoting compliance and self-regulation efforts is crucial.

### **6.1 Complying through the implementation of Internal Compliance Programmes**

The elusive nature of export controls lies partly in the far-reaching impact of the provisions and partly in the inherently dual nature of the controlled items. Export control provisions may demand the assumption of a more proactive and responsible role from the side of non-State stakeholders. Although this is not always explicitly demonstrated or sufficiently elaborate in the export control legislation, the engagement of exporters and their collaboration with the government is an important prerequisite for the effective implementation of trade control laws. Exporters including research and academia should be encouraged to embed the concept of compliance not just in their procedural arrangements but also in their own mind-sets<sup>326</sup>. In the EU, Article 4 §4 of the Regulation requires from

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<sup>326</sup> F. Sevini et al. “Nuclear Suppliers’ Enhanced Export Control Compliance and Communication with Authorities,” Proceedings of 37<sup>th</sup> ESARDA Annual Meeting, Publications Office of the

exporters to notify the competent authorities in the case where they are aware that a non-listed item they intend to export will be used for the development of WMD or other military uses as specified in paragraphs 1 to 3 of the same article (catch-all clause). Moreover, Article 4 §5, known also as ‘the suspicion clause’ provides that a Member State may adopt or maintain legislation allowing the imposition of an authorisation requirement if there is a - logically convincing- suspicion by the exporter that a non-listed item would be used for WMD purposes.

If an exporter is aware that dual-use items which he proposes to export, not listed in Annex I, are intended, in their entirety or in part, for any of the uses referred to in paragraphs 1, 2 and 3, he must notify the authorities referred to in paragraph 1, which will decide whether or not it is expedient to make the export concerned subject to authorisation.

A Member State may adopt or maintain national legislation imposing an authorisation requirement on the export of dual-use items not listed in Annex I if the exporter has grounds for suspecting that those items are or may be intended, in their entirety or in part, for any of the uses referred to in paragraph 1.

*Article 4 §4 and §5 of the regulation*

428/2009

These provisions may seem well-anticipated or even common sense. If one knows that the item he produces will be used in connection with an illegal weapons program he will be expected to notify the competent authorities about such a contingency and not proceed further with the export of the item in question. Codifying such patterns of responsible behaviour into law and setting penalties for non-compliance enhances the power of deterrence of export control regulations. Besides, the introduction of such provisions is indicative of the intention of the legislator to emphasize on the responsibilities and the role that exporters could play in the oversight of sensitive trade activities. For example, exporters will be normally well-positioned in providing information to feed the risk analysis or a possible investigation conducted by the competent authorities, As Sevini notes, the highly technical nature of dual-use controls implies that, sometimes, only manufactures and users can easily assess whether their products meet the specifications of the control lists<sup>327</sup>. Besides, under Article 9 §2 of the EU regulation exporters are required to supply the competent authorities with complete information in particular on the end-user, the country of destination and the end-use in order to get an individual or global authorisation.

Firms and research organisations may be the first embankment before the release of a good or technology to an unlawful end-user. The adoption of ICPs is very important in this regard since they contribute to both the prevention and detection of export control violations<sup>328</sup>.

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European Union (2015): 614, retrieved from: <http://bookshop.europa.eu/en/esarda-37th-annual-meeting-proceedings-pbLCNA27342/?CatalogCategoryID=fKcKABst.9kAAAEjqJAY4e5L>.

<sup>327</sup> Ibid, 609.

<sup>328</sup> For an introduction to the role of ICPs see: South East and Eastern Europe Clearinghouse for the Control of Small Arms and Light Weapons (SEESAC), Internal Compliance Programmes, 2011.

Their usefulness can be greatly discerned when it comes to the control of ITT posing export control risks. The competent authorities may rely heavily on compliance measures and reporting done internally and sometimes voluntary by these companies committed to keeping track of all potentially sensitive information flows. Indeed, little would be effectively possible without informed, collaborative and compliant suppliers and exporters<sup>329</sup>. The WA Best Practices for Implementing ITT Controls' agreed back in 2006 recommend "the imposition of a requirement on industry, academia, and individuals to keep records, for an appropriate period of time, that clearly identify all controlled technology transferred, the dates between which it was transferred, and the identity of the end-user of all intangible transfers of technology for which licenses have been issued that may be inspected by, or otherwise provided to, export control authorities upon request". Given the practical and legal implications pertaining to the monitoring of ITT, internal measures are considered to be as an appropriate tool for responding to such export control challenges. For instance, record keeping and more comprehensive technology control plans seek to ensure that no risky ITT will take place and inadvertent or intentional attempts to transfer controlled technology will not remain undetected by either the company itself or the State authorities conducting compliance checks in the company in regular intervals.

In an ideal world, every company should have a compliance system in place with a view to conforming to the obligations set by the export control regulations. Despite the envisaged benefits, the implementation of ICPs does not constitute a legally binding obligation in most EU Member States. Yet, the practice shows that their implementation is taken into consideration during the examination of a license application.

Generally speaking, licensing authorities of different Member States expect from firms to have a sort of internal compliance mechanism albeit they do not necessarily require a full-fledged ICP. It is also recognised that compliance of SMEs poses a harsh challenge taking into account that numerous such firms are not even aware of their export control obligations. Licensing officers have a reasonable anticipation from exporters to know the technical specifications and the possible uses of the items to be exported as well as the identity of their customers including their respective business activities and needs. In turn, the competent authorities may take every possible step to render exporters aware of export control requirements, notify any amendments or new legislation introduced and, to provide assistance for the assessment of a doubtful transaction. For instance, the Business Danish Authority clarifies that "it is the responsibility of the exporter to make sure that their product is to be used in a civilian and peaceful context and to investigate whether specific exports of a product, a technology or technical assistance are subject to the export control rules". They add also that "although the responsibility for the decision rests with the exporter there are good opportunities for receiving advice and guidance from relevant authorities"<sup>330</sup>. The same approach is valid also in the USA where various government authorities provide guidelines

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<sup>329</sup> Sevini et al. "Nuclear Suppliers' Enhanced Export Control Compliance and Communication with Authorities," 607.

<sup>330</sup> Danish Business Authority webpage on exporter's responsibilities, retrieved from: <https://danishbusinessauthority.dk/exporters-responsibilities>.

on what an ICP should cover clarifying, though, that the implementing decision is the sole responsibility of the individual companies. For instance, the US DOC has published comprehensive guidelines aimed at assisting companies to develop or improve their ‘Export Management and Compliance Program’ (EMCP) as ICPs are often called in the other side of Atlantic<sup>331</sup>.

### **6.1.1 ICPs: a legally binding or a highly recommended instrument?**

For some scholars and export control practitioners, internal compliance mechanisms should remain a non-legally binding requirement. Internal compliance is largely seen as a voluntary expression of the intention of the exporter to adhere to non-proliferation and other security imperatives. In another words, the company’s hierarchy first and then all employees involved should see some merit in complying with trade controls if the effective implementation of ICPs is the purpose. Apart from that, it is often argued that implementing such programmes brings on additional costs and thus, a legally binding provision for introducing ICPs would pose an overwhelming economic burden to small and medium sized exporters, the backbone of the entrepreneurial activity in Europe. In relation to this, most Member States take into account the size of the firm and the degree of sensitivity of its activities when assessing an exporter’s compliance system. For instance, the UK expects from large companies and regular exporters of controlled technology to have more formalised and comprehensive procedures, Hungary emphasizes the need for proportionate compliance measures and Denmark is careful not to harm the economic sustainability of small enterprises due to the imposition of adverse compliance requirements.

In addition, certain licensing officers highlight a crawling risk in setting formal ICP requirements: “ICPs could become a vague checklist that does not have much bearing on the culture of the company itself”<sup>332</sup>. Indeed, given the absence of EU wide guidelines for implementing ICPs and of certification procedures for compliant exporters, the mere fulfilment of formal checklists could result to unnecessary administrative burden for exporters and increased workload for the export control authorities. One could argue that is on the part of regulators to set benchmarks or minimum required standards for adopting ICPs usable by different types of exporters enabling thereby the consistent evaluation of such measures by the competent national authorities.

Establishing compliance requirements and a certification process for exporters (‘suppliers’) and end-users (‘recipients’) respectively of controlled items, software and technology is not completely unknown in the field of EU trade restrictions. The Directive 2009/43/EC is a

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<sup>331</sup> US DOC, BIS, *Compliance Guidelines: How to develop an effective Export Management and Compliance Program and Manual*, 2011, retrieved from: [http://www.bis.doc.gov/index.php/forms-documents/doc\\_view/7-compliance-guidelines](http://www.bis.doc.gov/index.php/forms-documents/doc_view/7-compliance-guidelines).

<sup>332</sup> The information provided here derives from a survey on the implementation of ICPs and the interpretation of Article 12 of the dual-use regulation. The survey was conducted by the DG Trade in May 2011 and gathered responses from 16 Member States. The results were presented and further discussed in the framework of the DUCG (information retrieved from the Greek authorities). Although certain information might have changed since 2011, the survey is a good basis for drawing general conclusions on compliance practices followed by different EU Member States.

relevant example<sup>333</sup>. More particularly, the transfer of defence articles may be subject to restrictions also within the EU due to a Member State's essential security interests or on grounds of public policy or public security according to Articles 36 and 346 of the TFEU<sup>334</sup>. With a view to mitigating the impact of such restrictions on the internal market, the European Commission proposed, and the European Parliament and Council adopted the Directive 2009/43 "setting common rules and simplified procedures for the transfers of military equipment and its components to EU destinations". In practice, the directive sets out a license system allowing Member States to publish general licenses granting direct authorisation to compliant suppliers for the transfer of certain defence articles to certified recipients within the EU. Such licenses will be linked to certain conditions on the part of the suppliers such as a registration requirement prior the first use and record keeping obligations<sup>335</sup>. The certification of the recipients will be based on certain criteria proving their reliability (*e.g.* relevant industrial activity in defence products, commitment to compliance at senior level and implementation of ICPs).

Member States shall designate competent authorities to carry out the certification of recipients established on their territory of defence-related products under transfer licences published by other Member States in accordance with Article 5(2) (b).

*Article 9 §1 of the Directive 2009/43/EC*

In this regard, a subsequent Commission Recommendation draws from 'best practices' followed by certain Member States in this area and details minimum standards and common rules for the certification and monitoring of defence undertakings to be considered as 'eligible recipients' of controlled defence-related technologies<sup>336</sup>. The guidance elaborates the criteria referred to in article 9 of the Directive 2009/43 for assessing the reliability of recipients, clarifies the powers of competent authorities for monitoring compliance (*e.g.*

<sup>333</sup> EU, *Directive 2009/43/EC of the European Parliament and the Council setting common rules and simplified procedures for the transfers of military equipment and its components to EU destinations*, Official Journal of the EU (L 146), Brussels, 2009.

<sup>334</sup> The Directive covers only certain defence-related products and their components derived from the EU Common Military List and specified in the Annex of the said Directive. Exceptionally, 'contracting authorities' (within the meaning of Article 1 of the Directive 2004/18/EC) purchasing defence-related products for exclusive use by the armed forces of a Member State may be entitled to receive such items without being certified. The Directive simplifying the transfers of defence-related items within the EU was set in force on 30<sup>th</sup> of June 2012.

<sup>335</sup> The directive provides also for global authorisations at request of a supplier. Article 7 specifies the cases where an individual license may be required:

- (a) the request for a transfer licence is limited to one transfer;
  - (b) it is necessary for the protection of the essential security interests of the Member State or on grounds of public policy;
  - (c) it is necessary for compliance with international obligations and commitments of Member States;
- or,
- (d) a Member State has serious reason to believe that the supplier will not be able to comply with all the terms and conditions necessary to grant it a global transfer licence.

<sup>336</sup> EU Commission, *Recommendation on the certification of defence undertakings under Article 9 of Directive 2009/43/EC*, Official Journal of the EU (L 11), 2011.

inspection visits and audits) and spells out the cases where corrective measures and suspension or revocation of certificates will be required. What is particularly interesting here is the Annex of the Recommendation containing detailed guidance on the key issues to be taken into consideration by the competent authorities when evaluating the compliance performance of the recipients. The Annex constitutes a useful source of guidance for companies willing to deploy internal compliance measures. The core compliance areas enumerated in this guide are as follows:

- Organisational, human and technical resources allocated to the management of transfers and exports
- Chain of responsibility
- Internal audits
- General awareness raising
- Physical and technical security
- Record-keeping and traceability of exports and transfers

A plausible question here is whether a certification process or at least some common compliance standards could be established in the framework of dual-use export controls, as well. The certification of the recipients of dual-use commodities established outside the EU cannot be considered as a realistic scenario for practical and political reasons. The reverse that is to say the certification of compliant dual-use exporters based in the EU, could be an option; yet not the most fitted one. The scope of the Directive differs from the objectives of the dual-use regulation. The focus is on intra-EU transfers and defence articles. The number of companies concerned is considerably lower and the items in question of a more specific nature compared to the high number of exporters and the diverse range of products affected by dual-use export controls. Therefore, the certification of defence undertakings is a more straightforward and less resource-intensive process in relation to the certification of dual-use exporters<sup>337</sup>. That said, the establishment of minimum compliance standards could provide further impetus and useful assistance to exporters in meeting their ever increasing export control obligations.

In spite of the fact that the adoption of ICPs is not considered as a legally binding obligation, there is much talk in the EU circles about the implementation of Article 12 §2 of the Regulation stipulating the following:

*“When assessing an application for a global export authorisation Member States shall take into consideration the application by the exporter of proportionate and adequate means and procedures to ensure compliance with the provisions and objectives of this Regulation and with the terms and conditions of the authorisation”.*

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<sup>337</sup> In fact, even this ostensible simpler effort to eliminate obstacles, by creating essentially a common market in defence-related products, was not that successful. Rosanelli notes that national implementation was highly unharmonised, a fact that created doubts to European companies as regards the benefits of becoming certified. See Rosa Rosanelli, “Arms Export Controls- Setting Common International Standards,” in *Modelling Dual-Use Trade Control Systems*, ed. Odette Jankowitsch-Prevor, Quentin Michel and Sylain Paile-Calvo. (Brussels: P.I.E. Peter Lang, 2014), 115.

It seems that the wording ‘proportionate and adequate means and procedures to ensure compliance’ leaves some space to different interpretations. On the one hand, there are scholars and policy-makers arguing that the article 12 alludes to a need for Member States authorities to require the implementation of ICPs by any exporter taking advantage of global licences. On the other hand, ICPs are not mentioned explicitly in the Regulation and some Member States challenge that ICPs are a necessary condition for the issuance of a global licence. Even though most Member States do not require specifically the implementation of ICPs for issuing global licenses, different Member States argue that: “ICPs or similar measures must be taken into consideration when assessing an application for global licenses, but Article 12 does not require ICPs to actually be put in place”<sup>338</sup>. Presumably the varying interpretations of article 12 are indicative of the way that internal compliance and ICPs are perceived by different Member States.

Furthermore, it seems that there is some degree of variation in practices followed by different EU Member States *vis-à-vis* internal compliance. For instance, some Member States attach also compliance requirements to general licenses other than global (NGAs, EU GEAs). Among them just few attach compliance requirements to individual licenses as well. In addition, the EU Member States rely on various means for monitoring the implementation of ICPs. In most countries the assessment of ICPs takes place under regular audits and sometimes through checks in the phase of the authorisation process or under the registration of new exporters.

In the same fashion, the specific form of requirements varies among different Member States. It may range from general criteria to be taken into account during the evaluation of an application to specific requirements laid down in the national law that is the most unlikely case. It is noteworthy that two of the very few Member States that used to have an ICP requirement enshrined in their national law, namely Poland and Hungary, they are going to withdraw such an obligation or, they have already done so. In Poland, exporters of dual-use items were required to implement ICPs according to ISO 9000 standard. Practically, this meant that a certified ICP had to be in place even for a single transfer of dual-use items. This was deemed as too restrictive especially for SMEs. Besides, this approach was departing from the obligations set in the Regulations and could possibly discourage exporters from applying for an export authorisation<sup>339</sup>. As a result, since May 2012, the law does not contain any longer such a requirement<sup>340</sup>. However, the Ministry of Foreign Affairs that is the advisory body engaged in the licensing process does take into account the implementation of ICPs prior to granting global licenses. In Hungary, the adoption of ICPs had been a legally binding obligation already for years before the entry into force of the dual-use regulation. However, under future legislation being currently in the pipeline, the implementation of ICPs

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<sup>338</sup> See footnote 332.

<sup>339</sup> Information acquired after communication with Irena Kołakowska, expert at the Security Policy Department of the Polish Ministry of Foreign Affairs.

<sup>340</sup> It is noted that a certified ICP is still required for the transfers of defense articles. See the official note presenting the reasoning for the amendment of the law available in (polish): <http://www.sejm.gov.pl/sejm7.nsf/druk.xsp?nr=229>.

will remain a prerequisite only for the issuance of global licences. The Hungarian authorities deem that the conditions requiring the implementation of ICPs with regard to any type of authorisations have significantly changed<sup>341</sup>. The international environment has been evolved and the degree of awareness of exporters of dual-use items has been increased. Persistence to the fulfilment of rigid formal ICP requirements could mean unnecessary burden for both exporters and licensing authorities.

The lack of a homogenous approach on ICP requirements should not be seen as insufficient attention to compliance by the competent authorities. Germany for instance does not have a specific legal binding requirement in place for ICPs and nor does the UK. However, both Member States have published comprehensive guidelines and best practices for the implementation of ICPs by industry and both assess the ability of exporters to comply with export control rules during the application process<sup>342</sup>. In this regard, Member States may rely on more flexible and general provisions on restricted trade for the screening of compliant exporters during the assessment of an export application. For example, in Germany again, the general criterion on the ‘reliability of the applicant’ included in the Foreign Trade and Payment Act provides the legal basis for assessing the compliance status of dual-use exporters prior to granting an export authorisation<sup>343</sup>. Especially, for the granting of global licenses, the German export control authority investigate by means of written communication and on-site audits the adequacy of internal controls implemented by potential beneficiaries of such facilitations<sup>344</sup>.

It turns out that the ICPs are understood -at least in the EU- as comprehensive procedures demanding increased investments in resources for both exporters and public administration. Member States prefer to maintain a flexible stance meaning that they strongly advise exporters to implement internal controls without setting explicitly legally binding requirements. In practice though, all governments do take into account the implementation of compliance measures by exporters. This way, EU authorities accept implicitly the voluntary

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<sup>341</sup> Information acquired communication with the Head of the Hungarian licensing authority, Dr. L. Stefan, as of 1 April, 2015.

<sup>342</sup> UK Department for Business, Innovation & Skills, Export Control Organisation (ECO), *Compliance Code of Practice*, March, 2012, retrieved from: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/341998/10-668-codepractice-compliance.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/341998/10-668-codepractice-compliance.pdf).

German Ministry for Economic Affairs and Energy, Federal Office for Economic Affairs and Export Control (BAFA), *Internal Compliance Programmes: Internal Export Control Systems*, June 2012, retrieved from: [http://www.bafa.eu/bafa/en/export\\_control/publications/export\\_control\\_icp.pdf](http://www.bafa.eu/bafa/en/export_control/publications/export_control_icp.pdf).

<sup>343</sup> The reliability of the exporters of restricted items will be assessed against certain criteria specified in the “Principles of the Federal Government for evaluating the reliability of exporters of war weapons and arms-related goods” as of 25 July, 2001 (document in German), retrieved from: [http://www.ausfuhrkontrolle.info/ausfuhrkontrolle/de/vorschriften/zuverlaessigkeit\\_ausfuhrverantwortlicher/index.html](http://www.ausfuhrkontrolle.info/ausfuhrkontrolle/de/vorschriften/zuverlaessigkeit_ausfuhrverantwortlicher/index.html).

The main principles set concern the designation of staff responsible for export controls, the organisation of training for all employees involved, the definition of the chain of responsibility along the organisational structure of a company and the appropriate supervision to ensure that the predicted workflow is followed and ICP is functional (BAFA, “Internal Compliance Programmes” 2012, 11).

<sup>344</sup> German Ministry for Economic Affairs and Energy, BAFA, *Internal Compliance Programmes*, 10.

character of internal compliance measures and differentiate to some extent between full-fledged ICPs and other less comprehensive compliance mechanisms such as record keeping and export screening procedures. To conclude, maintaining some degree of flexibility in tuning ICP obligations and setting minimum standards at the EU level for implementing complete ICPs should not be seen as incompatible. Indeed, this could be a way forward for boosting export control compliance in the EU. The practice shows that different Member States have taken such actions at their respective jurisdictions by providing guidelines with key principles and basic elements to be incorporated and function in any ICP regardless of the exporters' size. For example, Denmark has developed standardised ICPs adaptable -with certain restrictions- to the situation of the exporter involved<sup>345</sup>.

### **6.1.2 What is finally ‘an internal compliance system’?**

Although it would be more accurate to talk about internal compliance systems instead of internal compliance programmes the latter is most commonly used in Europe. ICPs reflect essentially procedures and mechanisms performing different functions and having as a common goal the fostering of a company's compliance with the export control law. As it will be explained later, such systems are usable for research organisations, too.

An internal compliance system is an arrangement in which a company ensures that it is completing legal transactions, obeying the regulations enacted by the government, and fulfilling company export policies. Internal compliance systems typically include a set of procedures that company officials must satisfy before an item leaves the company. Such procedures include a thorough investigation of the buyer and end-user prior to the shipment of a purchased item off-site.

*By the Institute for Science and International Security (ISIS)<sup>346</sup>*

**What are the motives behind the introduction of ICPs by companies?** Tangible benefits, compliance with legislation, fear of penalties and other liability costs, self-promotion of the organisation and furtherance of non-proliferation and other security objectives are the main drivers for adopting an ICP. More particularly, a sound compliance system paves the way for establishing a partnership between authorities and exporters. This ‘trusted relationship’ may be translated to palpable advantages for exporters in terms of simplified export procedures as discussed above. Moreover, it is such the nature of the export control law that exporters are required to keep a watchful eye on the legislation and pursue internal compliance measures. In relation to this, direct compliance requirements are also foreseen in the EU law. Article 20 of the dual-use Regulation sets a direct obligation for exporters and brokers of dual-use items to keep detailed records for at least 3 years and in accordance with the national law or practice in force in the Member State where they are established.

Failure to comply with the rules would mean administrative or criminal sanctions and other arduous consequences such as temporary suspension of exporting activities, lifting of trade

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<sup>345</sup> See footnote 332.

<sup>346</sup> Definition retrieved from the Institute for Science and International Security available in: [http://exportcontrols.info/key\\_elements.htm#models](http://exportcontrols.info/key_elements.htm#models).

facilitations and blockade from markets. Member States may draw on different legal sources for enforcing effective, proportionate and dissuasive penalties against any export control violations. Such provisions may derive from national export control law or other corporate and civil law. In any case, article 24 of the Regulation provides the legal basis by stipulating that “each Member State shall take appropriate measures to ensure proper enforcement of all the provisions of this regulation”.

Each Member State shall take appropriate measures to ensure proper enforcement of all the provisions of this Regulation. In particular, it shall lay down the penalties applicable to infringements of the provisions of this regulation or of those adopted for its implementation. Those penalties must be effective, proportionate and dissuasive.

*Article 24 of the regulation 428/2009*

Especially, for European firms the threat to lose markets in the US in case of poor compliance with obligations stemming from the US export control system is considered as a dissuasive factor. Also, falling short of requisite compliance standards or losing face due to lax implementation of the rules may harm the a company’s good name and have implications for the whole country’s exporting activities. For example, negative media attention can inflict a major blow to a company’s reputation. “Even if a company is merely suspected of carrying out illegal export activities, its reputation in foreign trade may be tarnished”<sup>347</sup>.

As some export compliance officers note fear and greed are frequently the two main motives driving compliance efforts of exporters. However, enhancing a company’s corporate social responsibility and contributing to a safer and more secure world should not be underestimated. Companies and their employers may commit themselves to non-proliferation and national security imperatives once they realise what is at stake. No matter what is the motive behind (economic, moral, sense of responsibility) ICPs are arguably considered as an essential component of a company’s trading strategy. In practice, exporters have strong interests to comply with the rules and export control authorities do take into account and encourage the implementation of such programmes. Table VI offers a summary of the benefits envisaged from the implementation of ICPs for both authorities and exporters.

**Table VI: Benefits stemming from the implementation of ICPs**

Reasons for requiring and implementing ICPs		
<i>For export control authorities:</i>	<i>For organisations:</i>	<i>Overall objective:</i>
Increased possibilities for identification of export control issues	Increased possibilities for informal inquiries	Exchanging of information and ‘learning from each other’

<sup>347</sup> German Ministry for Economic Affairs and Energy, BAFA, *Internal Compliance Programmes*, 7.

Release of administrative work for non-cases	Economic benefits ( <i>e.g.</i> simplified procedures)	Reducing operational costs
Ensuring compliance with challenging legislation ( <i>e.g.</i> ITT controls)	Saving organisations from infringements and enhancing social responsibility	Furthering non-proliferation and foreign policy and security objectives
Identification of reliable exporters and optimisation of risk assessment	Detecting risky areas at an early stage and preventing risky transfers from taking place	Operating risk-based controls

What are main principles promoted by implementing ICPs and what are the ‘standard’ elements of an ICP? The ‘European Code for Export Compliance’, a private initiative undertaken by the ‘European Institute for Export Compliance’ highlights the main principles underpinning the operation of any robust export compliance system:<sup>348</sup> a.) Transparency b) Compliance c) Accountability d) Consistency and e) Effectiveness. An appropriate compliance system shall guarantee the transparent management of exporting activities, the delegation of clear responsibilities among the staff, the consistent pursuance and achievement of the set policies and objectives as well as the efficient and responsible use of the available resources. In the same code, ‘export compliance’ is defined as a specialised multidisciplinary framework providing support to organizations in managing export risks avoiding thereby legal and administrative sanctions, financial losses as well as reputation deterioration. It is also clarified that “export compliance covers all activities of import and export of goods and/or services, tangible and intangible assets (including the transfer of means of payment), that somehow are subject to regulations applicable to transactions between two different states/jurisdictions”. This is not strange given that most of the time compliance systems in either academic or industrial organisations deal with the whole spectrum of export/import regulations.

Monitoring and maintaining Export Compliance is [...] one of the most important methods for an organization to maintain its ethical health, support its long-term prosperity, and preserve and foster its values and avoid or mitigate any potential legal criminal proceedings.

<sup>348</sup> The ‘EU Code of Export Compliance’ (EU-CEC) is an initiative of a private organisation named as the ‘European Institute for Export Compliance’ (EIFEC) and providing export compliance guidance to public and private organisations. In alliance with its ‘European Universities Network for Export Compliance’ (EUNIFEC), EIFEC promotes the culture of sound export compliance practice, and accredits third parties to perform and enhance compliance professional activities. In doing so, it has also established the said code of conduct, an export compliance register for organisations and self-employed individuals engaged in the implementation of the EU Export control policy and even a certification process for compliant exporters. The EU-CEC can be accessed via this link: [http://www.exportcompliance.eu/docs/eu\\_cec.pdf](http://www.exportcompliance.eu/docs/eu_cec.pdf). For more information see the EIFEC website: <http://www.exportcompliance.eu/index.php/en/about-eifec>.

With regards to the specific elements of an ICP, guidance provided by government authorities in Europe and USA emphasize on the same key compliance components with slight differences each time (see figure below).

**Figure VIII: “the internal compliance cycle”**



1. *Management Commitment*: Commitment to compliance at senior level is important for symbolic and practical reasons or otherwise it is where compliance starts and most probably ends; if the senior management of an organisation is unaware of export compliance or does not see some added value in introducing an ICP, there will not be many chances for verifying and enhancing the export compliance status of the organisation. Generally speaking, senior management’s commitment to compliance raises awareness within the organisation and it is the first step towards the creation of an export control culture<sup>349</sup>. In practical terms, most of the time it is a senior manager or the members of the directory board who carry any liabilities in the event of a breach of the civil or corporate law. For all these reasons, commitment to compliance by senior management should be expressed in written with a ‘compliance statement’ and shall be communicated to all employees (e.g. published to the organisation’s intranet or sent by e-mail). The compliance statement should be signed by a person high in

<sup>349</sup> Sophany Ramaen, Filippo Sevini, Christos Charatsis, Michel Quentin, *JRC Technical Note on Strengthening Strategic Export Controls by Internal Compliance Programs*, Publications Office of the EU, Nuclear Security Unit, ITU, 2014, 7.

the hierarchy (e.g. by the ‘Chief Executive Operator’ in large firms) and it may be referred to in the organisation’s mission statement.

2. *Appointment of a person in charge*: As it is the case with every management system, the responsibility for the operation of an ICP should lie with one individual nominated as the ‘Export Compliance Manager’ (EMC). The Wassenaar Arrangement ‘best practice guidelines on ICPs’ refer to the person supervising the development and functioning of a compliance programme as the ‘Chief Export Control Officer’ (CECO) pointing out also that he should be a senior representative director or other individual of corresponding status<sup>350</sup>. The EU Code of Conduct use the term ‘Export Compliance Officer’ (ECO) and further variations can be found. What is clear is that the seamless operation of an ICP requires the designation of a person as responsible for the development, implementation, monitoring and evaluation of the export control system always in conformity with the legislation and the needs of the organisation. Large exporters producing or trading regularly dual-use items or other controlled items have often several export control officers established in different business units and reporting centrally to the chief compliance officer. Export control responsibility will be assumed either as a stand-alone task by a dedicated structure *i.e.* an ‘Export Control Unit’ or as an additional task by an existing unit (e.g. a structure dealing with compliance in other areas). For some exporters –especially small and medium sized- the senior manager signing the compliance statement may be identical with the principal manager monitoring export compliance. Despite this, all available guidance highlights the importance of the independence of compliance managers. “The main aim should be to protect export control staff, as far as possible, from any conflict of interests. There is, for example, a higher risk of conflicted interests if export control employees are also responsible for sales and marketing. For this reason, the export control department should be structured so that it is as independent as possible”<sup>351</sup>. Arguably, the fewer staff is available the more possibilities for conflict of interests may arise.

3. *Risk assessment*: ‘Risk assessment’ can be seen as an ongoing process taking place in different phases of the ‘compliance cycle’. At first, introducing an ICP structure may demand a first ‘mapping’ of an organisation’s sensitive activities, products and services against export control risks. A more thorough evaluation and rating of the products, parts and components, software and technology will take place in the phase of export screening procedures where specific risks are identified and mitigating measures are adopted. ICPs operate in a dynamic environment where risks should be determined or re-evaluated constantly and thus, export compliance depends on the evolving legal framework and the activities of a company or a research organisation undertaken each time.

4. *Written policy and manual with procedures*: Once a first risk evaluation has been conducted a formal compliance programme should be drafted. A written compliance

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<sup>350</sup> WA, *Best Practice Guidelines on Internal Compliance Programmes for Dual-Use Goods and Technologies Guidelines*, 2011, 3. Retrieved from: <http://www.wassenaar.org/guidelines/docs/2%20-%20Internal%20Compliance%20Programmes.pdf>

<sup>351</sup> German Ministry for Economic Affairs and Energy, BAFA, *Internal Compliance Programmes*, 2012, 17.

programme will include and elaborate the main principles endorsed in the compliance statement. As a rule of thumb the main compliance policy explaining why export compliance is important and how it will be achieved in a given organisation should be clear, short and must be communicated to and easily perceived by all staff. Apart from employees directly concerned with the exporting process, the scope of controls is such that employees involved in design, development, engineering, research, purchasing, and maintenance and after sales service may also have a role to play in the view of export controls<sup>352</sup>. An ICP will include normally a compliance manual clarifying in greater detail the chain of responsibility, the step-by-step procedures to be taken in response of an export control risk as well as the rules and principles governing the functioning of the ICP: Who is responsible for what action? What procedures/mechanisms are applicable for given ‘export scenarios’? How often and towards whom export control trainings should be performed? What are the standard operational procedures for dealing with a violation or a suspicion of violation? How often should audits take place and by who? How often or under what circumstances should the ICP be revised? Compliance manuals are expected to provide also information sources made available by export control authorities or other private entities and research institutes providing commentaries and insights in the area of export control.

**Figure IX: “Drawing up an internal compliance manual”<sup>353</sup>**



5. *Pre to post export screening*: Export screening procedures refer to checks to be performed by the designated employees in the pre-export and where applicable post-shipment phase in accordance with the export control manual and the related law. Export screening is the core of an ICP and it may include all these actions required for the verification and mitigation of

<sup>352</sup> Ramaen et al., *Strengthening Strategic Export Controls by Internal Compliance Programs*, 7.

<sup>353</sup> Figure from presentation “Elements of a Successful Export Management and Compliance Program” offered by T. Andrukonis (US BIS) at the 3rd Conference on the impact of export controls on higher education and scientific institutions, organised by the Association of University Export Control officers (AUEO), June 7-9, 2015, Washington DC.

export risks in conformity with the obligations set in the legislation. In the pre-licensing phase it is determined whether an item to be shipped is subject to any export restrictions. The classification of exported items, software and technologies must be done on the basis of applicable export regulations at European and national level including dual-use lists, sanctions/embargoes lists, military lists and where relevant other applicable lists by non-EU countries. Exporting firms are required anyway to conduct a rating of their products in order to attribute them the appropriate code according to the Harmonised System Code (HSC), the common customs language administered by the WCO. As part of this process exporters could also identify items regulated under dual-use export controls<sup>354</sup>. Admittedly, product classification can be time consuming and expensive depending on the product portfolio and the number of items to be rated whereas small exporters may not even be aware of export control implications<sup>355</sup>. Export control authorities may provide support and in some cases on-line tools for assisting exporters with the classification of their products.

What is to be exported is not the only question to ask; the end-use and end-user of an export are equally important factors as much as the final destination and the routing of an export<sup>356</sup>. Given this, the plausibility of the stated end-use (*e.g.* recipient's activities shall justify a given export) and the reliability of the end-user and/or of any middlemen involved in the export (lawfulness of recipients) are important factors to consider in assessing an export case. In addition, there might be some sources of suspicion usually called as 'red flags' to seek for. The Wassenaar Arrangement has published a non-exhaustive list of questions to be taken into account during the risk assessment of an export<sup>357</sup>:

1. Do you know your customer? If not, is it difficult to find information about him/her?
2. Is the customer or the end-user tied to the military or the defence industry?
3. Is the customer or the end-user tied to any military or governmental research body?
4. If you have done business with the customer before - is this a usual request for them to make? Does the product fit the business profile?
5. Does the customer seem familiar with the product and its performance characteristics or is there an obvious lack of technical knowledge?
6. Is the customer reluctant to provide an end-use statement or is the information insufficient compared to other negotiations?

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<sup>354</sup> In the EU, there is also the Customs Combined Nomenclature (CCN), a system of classification based on the HSC and defining in greater detail the exporting products. Dual-use items have their own coding system which does not always correspond to the CCN classification attributed to a product. In practical terms, for each CCN there is not necessarily one corresponding dual-use code making the correlation between the two systems a challenging exercise.

<sup>355</sup> Ramaen et al., *Strengthening Strategic Export Controls by Internal Compliance Programs*, 9.

<sup>356</sup> In relation to the end-use/end-user assessment Article 9 §2 of the EU regulation specifies that "exporters shall supply the competent authorities with all relevant information required for their applications for individual and global export authorisation so as to provide complete information to the national competent authorities in particular on the end-user, the country of destination and the end-use of the item exported. The authorisation may be subject, if appropriate, to an end-use statement".

<sup>357</sup> WA website, "List of Advisory Questions for Industry agreed at the 2003 Plenary". Retrieved from: [http://www.wassenaar.org/wp-content/uploads/2015/06/Final\\_Questions\\_for\\_Industry.pdf](http://www.wassenaar.org/wp-content/uploads/2015/06/Final_Questions_for_Industry.pdf).

7. Does the customer reject the customary installation, training or maintenance services provided?
8. Is unusual packaging and labelling required?
9. Is the shipping route unusual?
10. Does the customer order an excessive amount of spare parts or other items that are related to the product, but not to the stated end-use?
11. Is the customer offering unusually profitable payment terms, such as a much higher price?
12. Is the customer offering to pay in cash?

Non-listed items may undergo export restrictions as provided by the catch-all clause of the Regulation. Such restrictions will depend on the final destination, the end-use and end-user of the export transaction and this is also why pre-export checks have an extra usefulness. In the case of a doubtful transaction or suspicious case national authorities shall be consulted for further advice<sup>358</sup>. Whenever an authorisation is applicable certain conditions may apply including the provision of end-user assurances. As a consequence, in the post-shipment phase further checks and documentation may be required ensuring the delivery of a given item to a specific end-user in the quantity specified in the customs declaration and the conditions attached in the export license. For research organisations that do not export goods regularly the focus of screening procedures would logically be on transfers of technology as well as the provision of technical assistance.

6. *Information and training*: This is another important component of a compliance system and a first step towards the establishment of an export control consciousness among the employees of an organisation. It is also an ongoing effort demanding sometimes considerable resources. As the European Code of Export Compliance mentions organisations need to update their ‘export compliance knowledge-base regularly’ and certainly, when a change in legislation or an update in the lists is adopted<sup>359</sup>. Promoting awareness and providing trainings on a regular basis are of fundamental importance for the actual implementation of an ICP. Providing handy information in the right websites, targeting appropriately selected staff for training and communicating effectively export control risks can substantially upgrade the use of the tools and procedures being part of an ICP. In the author’s view, no compliance system will ever be effective unless it is underpinned by a strong communication strategy<sup>360</sup>.

7. *Record keeping*: Record keeping procedures is a prerequisite under the EU regulation and it is mentioned also in the Wassenaar Arrangement ‘Best Practice Guidelines on ICPs’. Export related documents may include export licenses, end-use certificates, invoices and

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<sup>358</sup> In fact, certain countries such as the US, they publish a ‘denied parties list’ or other ‘watch’ lists prohibiting or setting additional license obligations for given export transactions with entities prescribed under the lists.

<sup>359</sup> EIFEC, The ‘EU Code of Export Compliance, 12.

<sup>360</sup> This statement is a product of the author’s experience in designing information sessions and communicating export control objectives during his service at the JRC.

records of electronic transfers. Export compliance officers and private companies offering compliance solutions advise their client organisations to document every e-mail, phone-call or hard-copy relating to an export control case. This approach is beneficial in many ways to the compliance system of an organisation: it may benefit auditing procedures to take place in a later stage and the risk assessment of future export transactions. Most importantly, in the event of an unintended violation a database containing export records may prove the exporter's bona fide or compliance integrity saving or alleviating the organisation from severe legal consequences. Ideally, an electronic system should be in place for the effective registration of the cases. What data should be retained, by who and for how long, it should be also clarified in the ICP manual as well.

8. *Compliance monitoring and auditing*: With a view to identifying and resolving inconsistencies between written procedures and their actual implementation, an ICP should provide for a performance review process to take place in regular intervals. Auditing could be done internally or outsourced to a third party and in any case should include clear objectives and reviewable items to be evaluated. Ideally, auditors must not be involved in the export controls chain of responsibility and they should be educated about the peculiarities of export controls. For small exporters, self-auditing will inadvertently represent the only option. The results of the auditing may reveal areas requiring improvement and lead to the re-assessment or modification of certain procedures set in an ICP manual. Performance indicators may be established in order to measure and evaluate the effectiveness of an ICP.

9. *Handling potential violations*: Specific procedures for reporting and dealing with suspected export control violations should be established and made known to all staff potentially involved. The triptych 'report-respond-correct' is of central importance in identifying and handling export control violations. First, clear instructions and escalation processes should be provided in the ICP manual. According to the US DOC, a safe environment should be ensured for employees raising questions and concerns about export compliance including an anonymous reporting mechanism<sup>361</sup>. Second, investigation procedures on the basis of set criteria and timeframes may be also available. Third, corrective actions including a possibility for voluntary disclosure to competent authorities, disciplinary measures and positive rewards for non-compliant and compliant employees respectively would be predicted as well.

## **6.2 Government – Exporters: from a regulation-based relationship to the establishment of a partnership**

As explained in section 6.1 the introduction of ICPs is of interest to both authorities and exporters. Heretofore, the focus was on actions to be taken on the part of exporters. However, enhancing compliance with export control requirements should be part of a wider strategy of export control authorities to establish a trusted relationship with the exporters. This effort

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<sup>361</sup> Presentation "Elements of a Successful Export Management and Compliance Program" by T. Andrukonis (US BIS) at the 3<sup>rd</sup> Conference on the impact of export controls on higher education and scientific institutions organised by AUEO, June 7-9, 2015, Washington DC.

could comprise facilitating measures for reliable exporters, establishment of formal and informal channels of communication between the two parts as well as the provision of guidance and support such as trainings, guidelines and on-line tools readily available for registered or potential exporters of dual-use items and technologies.

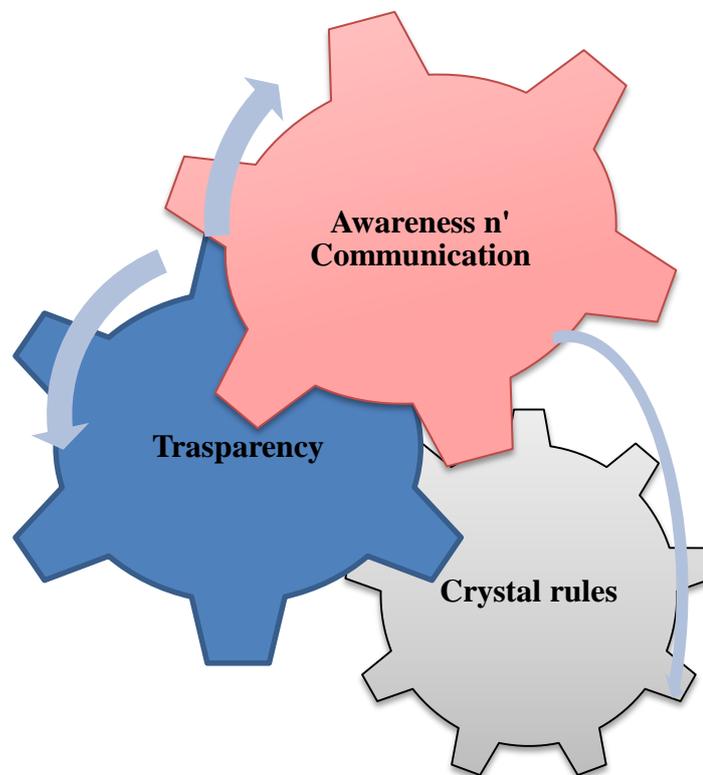
Effective State control of exports is only possible if all stakeholders, including manufacturers of critical goods, exporters, engineers, recognise the need for such controls and support them with all resources available to them. A close, trust-based partnership between industry and the authorities is vital if we are to achieve our shared objective.

*German Federal German Ministry for Economic Affairs and Energy, BAFA 2012, 7*

Although the establishment of a trusted partnership and the attainment of a culture of open collaboration is a two-way relationship, regulatory authorities may have to establish the basis and the necessary conditions for the engagement of the private sector. Besides, export control authorities have anyway an interest to identify and reach out regular and potential exporters of dual-use technologies. In that respect, the role of authorities is similar to that of compliance officers trying to establish and consolidate an export control consciousness within an organisation. Communicating effectively the cause and main drivers behind the implementation of export controls such as non-proliferation and other security imperatives is an important element of awareness raising activities requiring a continuous effort on the part of authorities.

Second, promoting transparency of the licensing process by publishing for instance licensing data and clarifying applicable procedures to the extent permissible due to security limitations could further enhance trust to the authorities and export control processes in general. To that end, certain EU members States publish licensing data (*e.g.* the total number of general or individual authorisations by destination) through annual reports to the national parliaments or in the websites of the competent authorities. The degree of detail and the practices for collecting data may differ from State to State and actually, this is one of the reasons why the EU Commission could make only approximate estimations when publishing licensing data concerning the state of play of export controls in the EU. As part of an open, safe and effective communication plan, export control authorities could commit themselves not to disclose sensitive information or ‘trade secrets’ to unauthorised persons when processing export applications or, requiring information for risk assessment purposes. Establishing secure mechanisms for the exchange of such information between exporters and authorities could be a further option. A transparent and open decision-making including public consultations with stakeholders so as to give the word to the exporters is requisite for establishing communication channels and succeeding in non-proliferation objectives.

**Figure X: Establishing a trusted partnership between regulators and exporters**



Finally, it should not be overlooked that a comprehensive and robust legal framework could enhance both the effectiveness and the credibility of a trade control system. Setting clear rules and export control procedures as well as making available the requisite guidance and support to exporters could reinforce the collaboration between the two edges of the spectrum, represented by exporters and authorities. The design above illustrates vividly the interrelationship between the three main prerequisites for establishing a partnership between regulators and exporters and promoting export compliance.

### **6.3. Toward standardisation?**

As discussed in section 6.1.1, the certification of ‘eligible exporters’ may constitute an option albeit not always the most desirable one. On the contrary, setting certain common standards for compliance with dual-use export controls may be a more fitted solution. In this case it should be up to the competent authorities to verify and monitor the compliance status of an exporter (*e.g.* through audits) prior to granting an individual authorisation, a general license or allow other simplified export procedures. Unlike other domains such as the regulation of nuclear energy or chemical agents, no law-based institution exists that oversees and sets international standards for strategic trade controls<sup>362</sup>. Existing guidance by different EU

<sup>362</sup> Sevini et al. “Nuclear Suppliers’ Enhanced Export Control Compliance and Communication with Authorities,” 607.

Member States and the Annex of the Recommendation ‘on the certification of defence undertakings’ are valuable sources of inspiration for establishing common guidelines at the EU level.

Nevertheless, establishing standards, certification procedures and systems for securing the whole ‘supply chain’ may pose another risk. As compliance professionals often stress there is a plethora of compliance programmes and systems originating from both governments and specific industry sectors concerning different aspects of the supply chain without being, however, mutually recognised and coordinated. “Cross governmental or cross industry implications are not usually considered when creating a new compliance system or standard, thus leading to likely duplication of compliance activities and confusion in areas not directly involved in the original concept of the programme or standard”<sup>363</sup>. Indeed, the potential burden is quite high if one considers the existence of adjacent systems set to deal with a variety of compliance obligations not strictly related to trade controls. In the EU for instance, the discussion to connect the Customs Authorised Economic Operator system (AEO) with export compliance requirements under Article 12 of the Regulation has been so far fruitless<sup>364</sup>.

International standards for implementing management systems provide an insight into how efficient compliance systems should look like at least in terms of generic management. In that respect, the International Organisation for Standardisation (ISO), the world’s largest developer of international standards provides -with ISO 19600- useful guidance for operating effective compliance systems in any organisational context<sup>365</sup>. Organisations have to operate in an increasingly regulated environment; apart from legally binding regulations, organisations may commit themselves to voluntary but internationally accepted standards and practices concerning almost every aspect of the functioning of an organisation. Such standards may include from technical requirements for the production of safe and quality products to best practice guidelines for good governance. ISO 22000 group of standards addressing food safety issues<sup>366</sup>, ISO standards for the storage and transfer of certain

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<sup>363</sup> Martin Palmer, “Improving the Integrity of the Global Supply Chain: Working with Compliant Business Partners,” *Strategic Trade Review* 1 (2015): 118.

<sup>364</sup> The EU AEO system takes into account main aspects:

- Compliance with customs legislation and taxation rules and absence of criminal offences related to the economic activity
- Appropriate record keeping
- Financial solvency.
- Proven practical standards of competence or professional qualifications
- Appropriate security and safety measures.

For more information see the EU Taxation and Customs Union website, available in:

[http://ec.europa.eu/taxation\\_customs/customs/policy\\_issues/customs\\_security/aeo/aeo\\_en.htm#what\\_is](http://ec.europa.eu/taxation_customs/customs/policy_issues/customs_security/aeo/aeo_en.htm#what_is)

<sup>365</sup> The International Organization for Standardization (1946) is an independent, non-governmental membership organization with a long tradition in establishing internationally accepted standards. It has 162 member countries represented by their national standards bodies and it has published over 19.500 international standards in operation so far. For more information see the webpage of the organisation: <http://www.iso.org/iso/home/about.htm>.

<sup>366</sup> ISO 22000 - Food safety management, retrieved from:

dangerous goods<sup>367</sup>, ISO 26000 on social responsibility<sup>368</sup>, ISO 9000 for quality management<sup>369</sup> and ISO 31000 for risk management<sup>370</sup> are but few examples of famous ISO standards. ISO standards “provide a presumption of conformance with specific regulatory requirements” and in some instances are referenced by national regulations and UN recommendations<sup>371</sup>.

As Makowicz suggests the establishment of ISO 19600 as a benchmark for implementing effective compliance systems may have some usefulness from a non-proliferation point of view, too<sup>372</sup>. According to ISO 19600 standards, ‘compliance’ means meeting all of an organisation’s compliance obligations and hence, non-proliferation and more specifically export control requirements are one of these areas that can be dealt within the framework of a compliance management system. Organisations can voluntarily agree to adopt and abide by such standards and authorities may embrace standardisation by directly referring to or incorporating such standards into law. It follows that if it is judged as useful 19600 standards can be directly referenced to export control law at national, European or international level and competent authorities could take into consideration such standards when evaluating the effectiveness of compliance measures adopted by the exporters of dual-use goods.

Bearing in mind the key export compliance components referred to in section 6.1.2 and drawing from the main principles for effective compliance systems highlighted in ISO 19600 standards a more elaborate method for establishing and operating ICPs can be set. From the preamble it must be said that the compliance function should be as much independent as possible, it should have direct access to the top management or governing body and shall be given appropriate authority and adequate resources. Above all, continual monitoring and improvement is *sine qua non* for any management system devised to be efficient and effective. In that respect, every management project is set and implemented in four steps and therefore, it may be useful to determine four main phases for establishing and operating an ICP. The ‘PDCA cycle’ of continual improvement, also known as the “Plan-Do-Check-Act” principle, is the concept underpinning this four-phased management process and is referenced

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<http://www.iso.org/iso/home/standards/management-standards/iso22000.htm>.

<sup>367</sup> For an example see ISO/TC 197 in the field of systems and devices for the production, storage, transport, measurement and use of hydrogen, retrieved from:

[http://www.iso.org/iso/home/standards\\_development/list\\_of\\_iso\\_technical\\_committees/iso\\_technical\\_committee.htm?commid=54560](http://www.iso.org/iso/home/standards_development/list_of_iso_technical_committees/iso_technical_committee.htm?commid=54560).

<sup>368</sup> ISO 26000 – Social Responsibility, retrieved from:

<http://www.iso.org/iso/home/standards/iso26000.htm>.

<sup>369</sup> ISO 9000 - Quality management, retrieved from:

[http://www.iso.org/iso/home/standards/management-standards/iso\\_9000.htm](http://www.iso.org/iso/home/standards/management-standards/iso_9000.htm).

<sup>370</sup> ISO 31000- Risk Management, retrieved from:

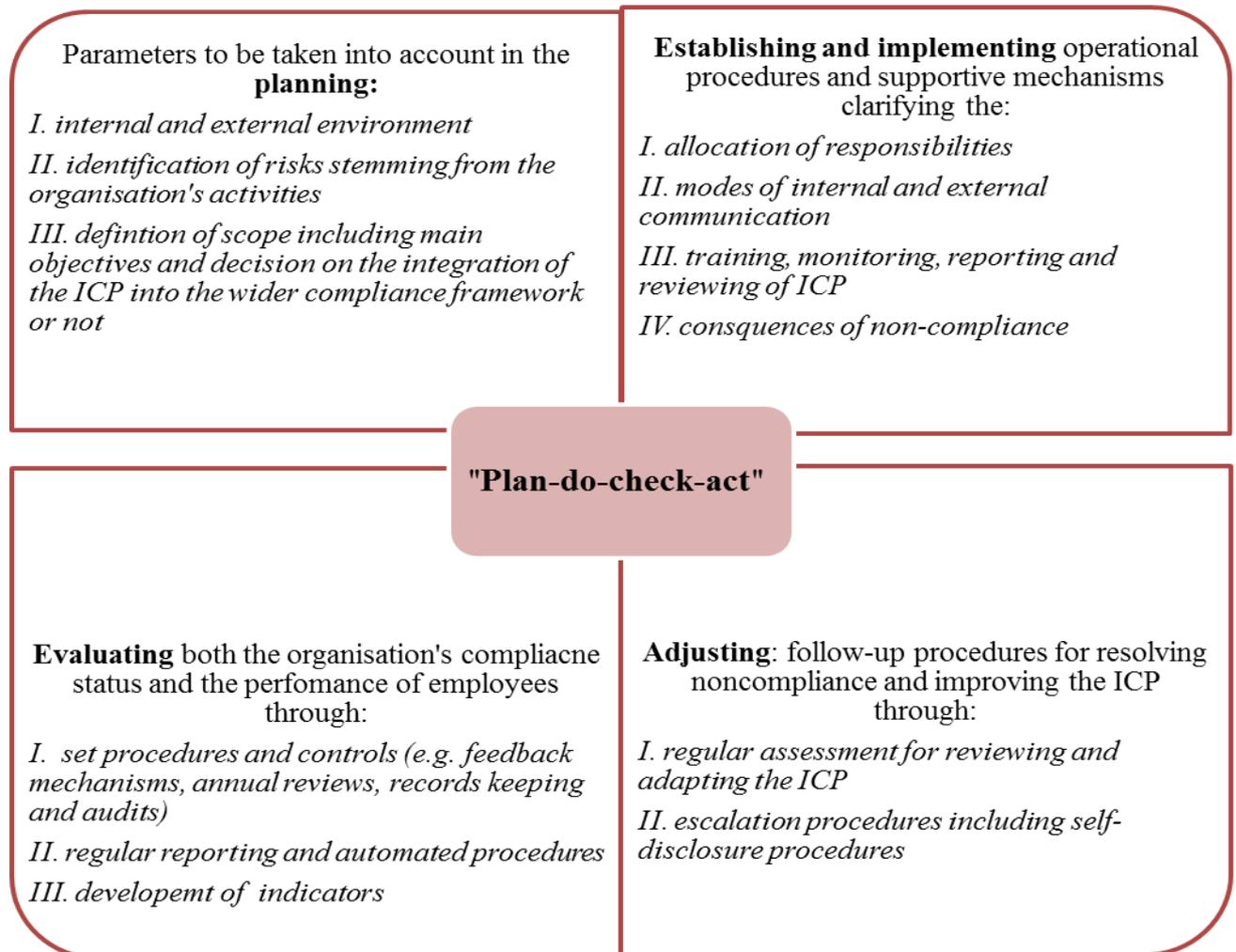
<http://www.iso.org/iso/home/standards/iso31000.htm>.

<sup>371</sup> For more information on the role of ISO standards in policy making please see the section of ISO website “Using and referencing ISO and IEC standards to support public policy” as of 2014, retrieved from: <http://www.iso.org/sites/policy/index.html>.

<sup>372</sup> Bartosz Makowicz, “ISO 19600 as Benchmark for Management of proliferation within an Integrated Compliance Management System,” *1540 Compass* 8 (2015): 27-30, retrieved from: <http://cits.uga.edu/uploads/1540compass/1540PDFs/compass%288v2%29.pdf>.

also in ISO 19600<sup>373</sup>. The terms compliance system, or shorter ICP are interchangeably used in the following section.

**Figure XI: A method for adopting and operating ICPs**



*I. Planning:* Understanding the external and internal context of an organisation is the first step. An organisation should examine the requirements set in the related law as well as the broader conditions shaping its role and mission. An ICP will not be applied in a vacuum and thus, the identity of the organisation is certainly an important factor to take into account. Thereafter, a first identification of the export control risks stemming from the specific activities and transactions of the organisation would be necessary. The current organisation's functioning including institutional processes and activities needs to be evaluated against the legal obligations and any voluntary commitments undertaken by the organisation. The

<sup>373</sup> The PDCA cycle was originally developed by Walter Shewhart in 1940s, and it was popularized in 1950s by W. Edwards Deming. For an analysis of the evolution of the PDCA Cycle see: Ronald Moen and Clifford Norman, "Circling Back: Clearing up myths about the Deming cycle and Seeing How it Keeps Evolving," Quality Progress, American Society for Quality, 2010, retrieved from: <http://www.westga.edu/~dturner/PDCA.pdf>.

ultimate goal for this phase will be to clarify the scope of the export compliance system setting main objectives and priorities as well as taking into account any limitation underlying its functioning. In addition, a central question to ask to be posed here is whether the export compliance system should be a stand-alone structure or incorporated in the existing compliance system of an organisation. Proliferation risks might be handled within an integrated compliance management framework or a separate ‘non-proliferation management system’<sup>374</sup>. In this regard, ISO 19600 clarifies that the recommended standards are compatible with any management system and can be combined with other ISO standards such as those for risk management (ISO 31000), auditing (ISO 19011) and social responsibility (ISO 26000). No matter what option is deemed as more beneficial for each organisation, an ICP would logically necessitate some degree of central coordination.

*II. Establishing and Implementing:* The second phase concerns how the ICP will operate in practice. This is the core process in setting up and operating an ICP. It includes not only the establishment of main rules and standard operational procedures to be followed but also decisions on the specific mechanisms required for rendering the export compliance policy effective and the compliance procedures operational as described in the export compliance manual. The management of the organisation may rely on existing tools and channels where possible introducing new mechanisms only when there is no other more advantageous alternative. The allocation of responsibilities to management and other staff in higher and lower levels, the modes of internal and external communication as well as the details for training, monitoring, reporting and reviewing the system will be clarified at this stage. Furthermore, according to ISO 19600, any outsourcing of the organisation’s activities does not absolve the organisation from subsequent compliance obligations. Due diligence *vis-à-vis* the compliance performance of third parties should be part of any compliance system and, from an export control standpoint, the verification of the identity of suppliers, clients and contractors is anyhow an important aspect of the risk assessment. As soon as all the decisions have been taken, the procedures have been established and the programme has been set in detail, the ICP will be tested in practice.

*III. Evaluating:* Ideally, as explained in section 6.1.2, the export compliance manual should envisage a monitoring process for evaluating the compliance status of an organisation and the *modus operandi* of the ICP *per se*. A problematic situation may be the result of neglect or deliberative abuse and it may indicate a defect of the system. To that effect, certain controls and procedures shall be established evaluating both the performance of the employees and the effectiveness of the compliance system itself. The evaluation process would rely on reporting mechanisms, annual reviews, internal and external audits promoting thereby the constant evaluation and improvement of the compliance system. The compliance course of the organisation should be tracked –through record keeping- and evaluated against certain criteria and principles. In that regard, the development of indicators may represent a useful action to take up. Such indicators could measure if and how feedback mechanisms are used, what are the employees’ perceptions for the compliance system as well as the frequency of contacts

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<sup>374</sup> Makowicz, “ISO 19600 as Benchmark for Management of Proliferation within an Integrated Compliance Management System,” 28.

with regulators and the percentage of employees receiving training<sup>375</sup>. Also, detaching incompatible roles and responsibilities and inserting automated processes where possible is a key issue to consider. Evaluation measures should be also subject to periodical assessment for ensuring their continuing effectiveness and adherence to the evolving needs and requirements of the organisational and external context.

*IV. Adjusting:* Once certain needs or weaknesses have been identified follow-up actions shall be taken in order to improve the system and response to new or other less urgent risks. Given also that risks may be dynamic and the external environment may change rapidly, the system may need to be adapted in order to address new risks and needs. In any case, at the beginning the programme will fulfil certain priorities as decided in phase I. ISO 19600 clarifies that the risk-based approach to compliance management does not mean that for low risk situations, non-compliance is acceptable. Instead, organisations can initially direct attention and resources to higher risks having as ultimate goal to cover all compliance risks. It is also for this reason why a systematic risk assessment and monitoring of the ICP shall be conducted. Although corrective actions may be required including the redesign and improvement of certain elements of the system, failure to prevent or detect a one off noncompliance does not necessarily hint at an ineffective compliance system. Incidents of misconduct or actual violation of the law shall be reported to the top management and the competent authorities under the escalation processes and in the time frame predicted in the manual.

#### **6.4 Infusing an export compliance culture**

National guidance in the EU and the US emphasize the idea of incorporating export compliance in the culture of exporting organisations. Establishing and maintaining a culture of integrity and compliance is also mentioned in the ISO 19600 whereby compliance culture is defined as “values, ethics and beliefs that exist throughout an organisation and interact with the organisation’s structures and control systems to produce behavioural norms that are conducive to compliance outcomes”. Therefore, it seems that the ultimate goal of every compliance effort should be the development of a culture of awareness and responsibility within a given organisation. As discussed in chapter 2.3 organisational culture constitutes an integral part to the identity of every organisation and can be defined as “the shared, tacit assumptions that have come to be taken for granted and that determine the members’ daily behaviour”<sup>376</sup>. It comes out that the concept of culture emphasizes the role of human factor and it has some pertinence to all different aspects of compliance. For instance, the behavioural patterns of management and employees can be most or least conducive to risks relating to security and safety and stemming from activities involving hazardous materials

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<sup>375</sup> Examples of indicators mentioned in ISO 19600. For more information on the development of indicators and their categorisation into activity indicators, reactive and predictive indicators please see ISO 19600 standards.

<sup>376</sup> Professor Edgar Schein provided first this definition for introducing a now widely used model of organisational culture. Afterwards, the IAEA relied on this model for developing the concepts of nuclear safety and security. Information drawn from presentation done by Andrea Viski in the context of the seminar on export control technical issues: “Enhanced Dialogue and Best Practices for Export Compliance,” organised jointly by the European Commission Joint Research Centre and the US DOE Argonne National Lab in Ispra, Italy, April, 22-23 2015.

and equipment. However, introducing new nuggets into and, changing the culture of an organisation requires time. The question on how to instil and consolidate a culture of responsibility should not be addressed only by organisations and individuals. Compliance efforts can be further enhanced or influenced by initiatives undertaken by states, international organisations and the civil society notably through the establishment of codes of conduct or certain standards to be achieved by individuals and organisations concerned<sup>377</sup>.

The concept of culture is well known and developed in certain areas such as in the nuclear safety and security. In fact, the need for a cultural basis for nuclear safety was conceived first<sup>378</sup>. The IAEA in its ‘Implementing Guide on Nuclear Security Culture’ published as report No 7, refers to the interface between the two disciplines clarifying differences and similarities. Safety culture is defined as “that assembly of characteristics and attitudes in organizations and individuals which establishes that, as an overriding priority, protection and safety issues receive the attention warranted by their significance”<sup>379</sup>. The nuclear security culture is defined as “the assembly of characteristics, attitudes and behaviour of individuals, organizations and institutions which serves as a means to support and enhance nuclear security”<sup>380</sup>. While both disciplines have as a common goal to protect human lives, society and the environment by considering the risk of inadvertent human error, the nuclear security places additional emphasis on deliberate acts. In that regard, the subordinate objectives of nuclear safety and security can be in some instances mutually exclusive. “For example, while for safety purposes it may be desirable to identify and quantify the amount and types of radiological/nuclear materials in a specific area or facility, from a security perspective this disclosure could increase the attractiveness of the site as a prospective terrorist target”<sup>381</sup>. Apart from the nuclear safety and security, the role of culture has some bearing also for those aspects covered under the CBRN initiatives, such as mitigation of and preparedness against risks related to chemical, biological, radiological and nuclear materials and agents. In this regard, the discussion in conceptualising and promoting a common and sustainable CBRN security culture is a recurrent topic in the relevant fora. As I. Khirpunov mentions building a security culture remains largely isolated in the different CBRN silos without sufficient horizontal communication. Therefore, ways to identify synergies and promote concerted cooperation should be stepped up<sup>382</sup>.

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<sup>377</sup> For instance, the Boticelli Project is such an example of an initiative launched by AREVA and other mostly nuclear related firms. The Project aims at bringing together compliant exporters willing to abide by and implement commonly agreed industry best practices.

<sup>378</sup> Terry Kuykendall, Igor Khripunov, “Examining the Interface Between Nuclear Security Culture and Nuclear Safety Culture,” *1540 Compass* 8 (2015): 34, retrieved from: <http://cits.uga.edu/uploads/1540compass/1540PDFs/compass%288v2%29.pdf>.

<sup>379</sup> IAEA, “Nuclear Security Culture: Implementing Guide” (IAEA Nuclear Security Series No 7), Vienna, 2008, 5, retrieved from: [http://www-pub.iaea.org/MTCD/publications/PDF/Pub1347\\_web.pdf](http://www-pub.iaea.org/MTCD/publications/PDF/Pub1347_web.pdf).

<sup>380</sup> *Ibid*, 3.

<sup>381</sup> Extract from Kuykendall and Khripunov, “Examining the Interface Between Nuclear Security Culture and Nuclear Safety Culture,” 35.

<sup>382</sup> Igor Khripunov, Arthur Eyzaguirre, Jessica Alcorn, “A Blueprint of CBRN Security Culture,” *1540 Compass* 2, (2012): 11, retrieved from:

In spite of the usefulness of culture for complying and achieving security and safety goals, similar attention has not been drawn in the area of trade controls. As pointed in the section 3.4, non-proliferation objectives and other security imperatives are furthered through a number of instruments in nuclear, biological and chemicals areas. These instruments include physical protection and safety measures as well as trade controls. Taking this into account, it is surprising that the discussion on applying a culture of responsibility has captured –in varying degrees- security and safety aspects but not trade controls. A. Viski has highlighted this paradox and borrowing from the concept of nuclear security culture suggests a definition of ‘Strategic Trade Control Culture’ as follows: “the assembly of characteristics, attitudes, and behaviour of individuals and institutions which serves as a means to support and enhance non-proliferation through strategic trade controls”<sup>383</sup>.

One could further rely on the nuclear security culture for identifying the main features underpinning a culture of compliance in any given field. Drawing from the organisational culture, the model of the nuclear security culture pinpoints four main requirements for creating and boosting a culture of responsibility in an organisation. First of all, security culture is founded on a belief that a credible threat exists and that (nuclear) security is important. Second, some overarching principles such as motivation, leadership, commitment and responsibility should guide decisions and behaviour throughout the organisation. Third, effective management systems prioritising security and ensuring good and quality governance through well-developed policies, procedures and practices should be in place. Last, the behavioural patterns of top management and personnel should promote and enhance security through inclusive decision making, effective communication, vigilance and adherence to procedures. A questioning and responsible attitude on the part of the employees and a strong and exemplary behaviour on the part of leadership and management can be considered as key issues in establishing a security culture.

Although a culture of security can be clarified and further enhanced through national and international initiatives, the responsibility for achieving such a goal rests primarily upon the organisations and individuals. Personal dedication, accountability and understanding of all individuals engaged in any activity that has a bearing on the security of nuclear activities are important prerequisites for developing a strong nuclear security culture<sup>384</sup>. The active, visible, consistent and sustained commitment of the governing body, top management and middle management towards a common standard of behaviour is also highlighted in ISO 19600 as a requirement for developing a compliance culture. Essentially, all the elements and procedures described in the IAEA guidance for promoting and enhancing a nuclear security culture are linked with the key elements required for implementing effective compliance systems. This premise is supportive to the conclusion that the ultimate goal of an internal compliance system is the establishment and enhancement of a culture of responsibility, a culture of compliance. The deriving outcome is that ‘compliance culture’ is not another fuzzy term.

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<http://cits.uga.edu/uploads/1540compass/1540PDFs/compass2-03-khripunov.pdf>.

<sup>383</sup> Andrea Viski, “Building Strategic Trade Control Culture: Toward a New Phase in Nonproliferation,” *1540 Compass* 8 (2015): 39.

<sup>384</sup> IAEA, “Nuclear Security Culture: Implementing Guide,” 5.

Although it has different aspects it relates to certain characteristics enabling the creation and furtherance of a culture of integrity and responsibility in a given organisation.

## **7. Looking into Internal Compliance Measures Implemented in Different Research Settings**

Chapter 6 theorised the concept of export compliance emphasizing also the objective of achieving a culture of compliance in a given organisation. Furthermore, chapter 6 described the necessary steps and key elements for building and implementing ICPs on the basis of available guidance and standards provided by European and US export control authorities and the ISO organisation. The focus has been mainly on firms exporting items and technologies through tangible means albeit the measures discussed cover intangible transfers of technology and provision of services, too.

Given the ultimate objective of the study that is the elaboration and test of a basic method for identifying risks and designing compliance systems in a research context, this chapter intends to show how export compliance is perceived and implemented in different organisational settings: Section 7.1 concerns industrial R&D and firms' exporting activities, section 7.2 explores compliance practices followed by universities in the US and the EU and finally, section 7.3 examines the compliance system implemented by a US and a European research organisation. The main intent is to shed light in some fundamental or particularly challenging aspects concerning the design and implementation of export compliance systems.

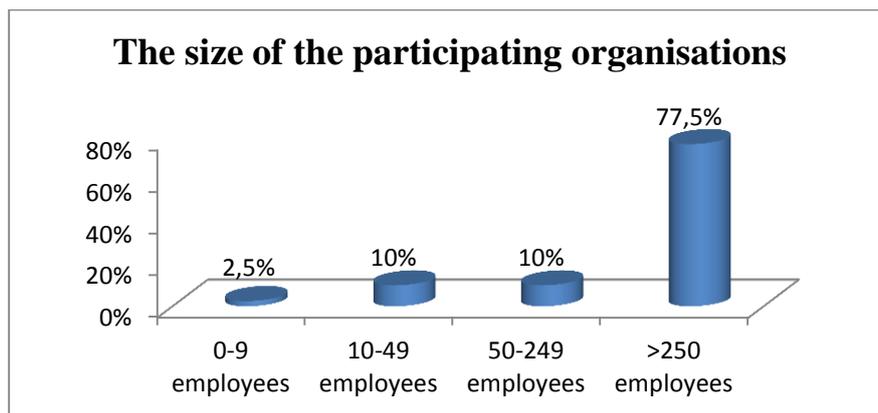
### **7.1 Complying with trade controls in an industrial setting**

This section aims at presenting how different corporations deal with export controlled activities in practice. In doing so, current approaches, attitudes and practices *vis-à-vis* internal compliance including challenges and limitations are identified. The analysis examines certain aspects of export compliance in industrial settings. First, organisational and operational issues are addressed: what are the required resources for implementing an export compliance programme? How are duties and resources allocated to specific departments? What are the most resource-intensive tasks? Is it advisable to deal with export compliance through a stand-alone function or not? What are the corporate/institutional policies and departments that might be involved in the implementation of ICPs? Second, risk assessment practices followed by different organisations are discussed: What are the tools and methods used most commonly for identifying sensitive transactions? Third, it is examined how corporations comply with requirements to monitor technology transfers and especially intangible ones. This aspect is particularly interesting all the more due to the relevance of technology transfers to scientific activities. Fourth, the connections between academic research and industrial research are discussed not least due to the fact that different types of research may relate to distinct export control provisions and exemptions. This is not an exhaustive study of all key elements relating to the implementation of ICPs. For instance, the establishment of indicators for monitoring the effectiveness of ICPs or of mechanisms for correcting non-compliance are not of interest in this analysis.

The following analysis draws mainly from the results of an online survey which ran from December 9, 2015 to January 8, 2016<sup>385</sup>. In addition, supplementary interviews were conducted with industry representatives with a view to clarifying certain aspects of the issues in question. The survey was addressed to a total of 60 professionals working as export control officers in various exporting firms -operating in the EU- and public affair consultants representing such companies in the pertinent European industry associations and unions<sup>386</sup>. The target was to reach out to a satisfying number of export control practitioners so as to acquire a sample reliable enough for the purposes of this chapter. The goal was to explore how exporters of dual-use technologies comply with the EU regulation and ensuing national legislation in practice.

### 7.1.1 Organisational identity

The survey gathered a total of 40 replies, a rather good response rate for the purpose of this chapter. The sample is made up mainly by large organisations (77%), a rather anticipated outcome given that ICPs are implemented primarily by large multinational companies undertaking exporting activities from different countries to diverse destinations. However, SMEs are also represented as well (22%). Almost all the respondents export items and/or technologies to both EU and non-EU destinations while 87% export also to the US.

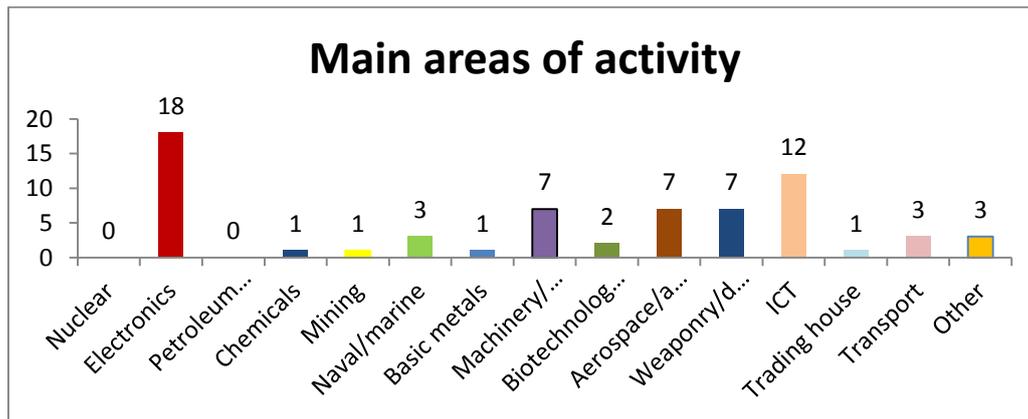


The gathered data provide an insight into the compliance practices followed by companies operating mostly in the electronics, ICT, machine tools and aerospace/aviation sectors (in ranking sequence). Among the first things that the respondents were called to reply was their motivation for implementing compliance measures. Not surprisingly, administrative sanctions (*e.g.* fines, temporary suspension of exporting activities, lifting of trade facilitations) and reputational damage were the two most important motives gathering 32% and 22% respectively. Corporate Social Responsibility and criminal sanctions topped the replies as the least important drivers for implementing ICPs. This is also meaningful given that the case law in the EU has hardly to show any export control violations punished with imprisonment, and thus, a relation may exist between the low deterrence of criminal sanctions and their low ranking in the survey. It must be noted that criminal sanctions may involve both economic

<sup>385</sup> The survey was carried out in an anonymous way, the answers were provided on a voluntary basis and the data were treated in accordance with the applicable rules in the EU.

<sup>386</sup> Among the responding companies there is one conducting activities in the EU without maintaining a department in any of the EU Member States.

finances and imprisonment but proving criminality and bringing cases to the court seems to be quite a challenge<sup>387</sup>. In any case, economic sanctions such as suspending the exporting activities or business activities in general of a company or, imposing a fine seem to be effective deterrents. Additionally, certain factors are not disconnected; reputational damage and Corporate Social Responsibility is such an example. However, the way practitioners perceive and classify each motive may be indicative of the most prevailing attitudes encountered in an industrial context. Last, differences can be traced between SMEs and large companies. For SMEs, criminal sanctions and corporate responsibility stand as a medium driver for implementing compliance measures.



### 7.1.2 Compliance structure and resources

The great majority (87%) of the companies implement a formal ICP aimed at dealing with export control requirements whereas the rest implement a sort of individual compliance measures such as guidance material for sensitive exports and record keeping procedures<sup>388</sup>. The responses to the question whether export compliance is dealt with by a stand-alone system or not were divided with the positive exceeding slightly the negatives. 71% of those not possessing a stand-alone export control system address export compliance in the framework of a broader compliance system dealing with a variety of requirements, mainly import regulations, staff codes of conduct and safety rules. The rest delegates export compliance tasks to another department such as the Logistics department.

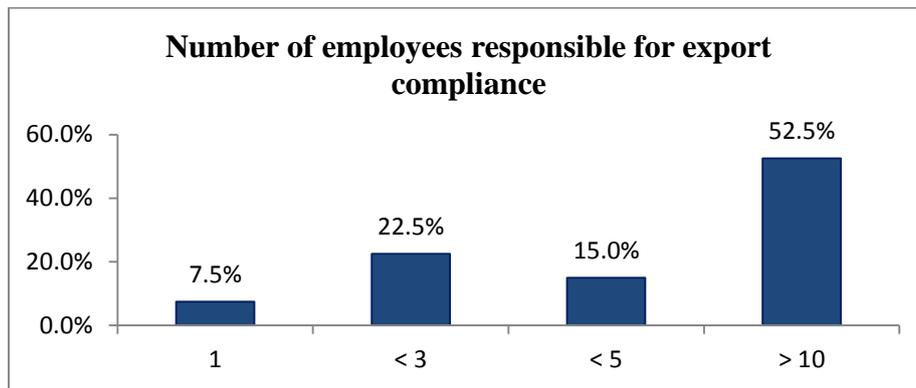
Depending on their organisational structure and the delegation of roles, the function assuming the overall responsibility for export compliance is the CEO or the board of directors in 53% of the firms. For the rest 22%, the Head of Export Compliance is the main responsible and 20% delegates the responsibility to another manager at senior level. Also, 67% of the

<sup>387</sup> For an analysis of the challenges in enforcing and prosecuting export control violations please see: Sibylle Bauer, “WMD-Related Dual-Use Trade Control Offences In The European Union: Penalties and Prosecutions,” *EU Non-Proliferation Papers No. 30, EU Non-Proliferation Consortium* (2013): 1-15, retrieved from:

<http://www.sipri.org/research/disarmament/eu-consortium/publications/nonproliferation-paper-30>.

<sup>388</sup> One organisation (a trading company) replied that it does implement neither a formal ICP nor any sort of internal compliance mechanisms and thus, was not allowed to proceed further with the survey.

respondents fully agree with the statement “the employee with main responsibility for export control compliance has direct access to top management (*e.g.* COE and governing board)”.



Generally speaking, the majority (52%) of the responding organisations delegate export control roles to more than 10 employees. However, most of the time only a rather low percentage of staff assigned such a role is solely responsible for export compliance<sup>389</sup>. For SMEs the corresponding percentage is considerably lower (22%). The high number of employees contributing to export compliance tasks is a reasonable outcome, if one considers the high number of large enterprises participating in the survey. High numbers of employees must be translated to considerable resources dedicated to payroll and indeed, this is the situation depicted in the survey: 55% of the respondents chose staff expenses as the most costly aspect of their compliance mechanisms. Expenses for IT systems (*e.g.* for risk assessment, rating of items and recordkeeping) scored very high as well: 32% selected them as the most costly factor. The majority of export compliance officers consider training costs as a low to medium cost while half of them listed auditing as the least costly aspect of an ICP<sup>390</sup>. The figures are very similar for both large and medium sized enterprises.

### 7.1.3 Risk assessment and further operational issues

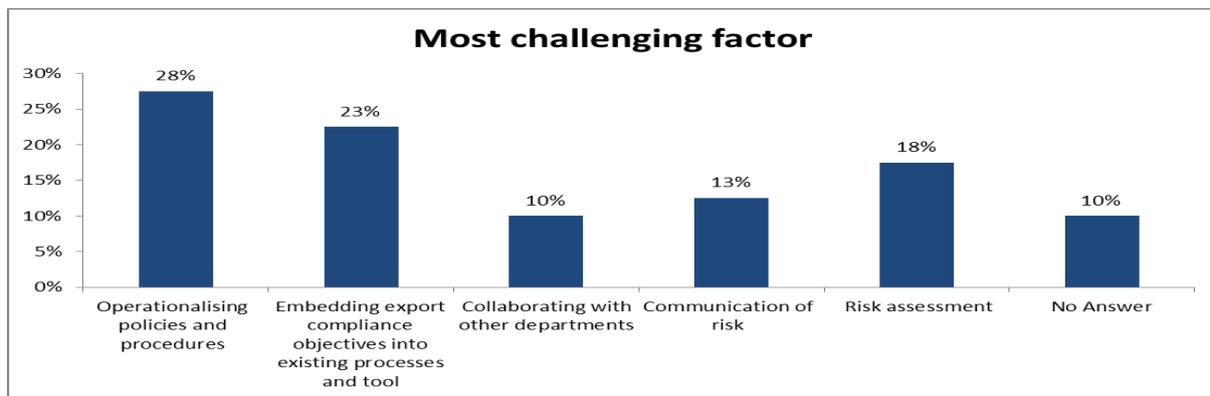
This section is particularly useful since it elucidates the different ways that companies of different sizes perceive challenges relating to the implementation of compliance systems. The section also exemplifies the different tools and practices used for identifying export control risks stemming from a given transaction.

The first question concerned the main challenges encountered in developing and implementing compliance mechanisms and fully-fledged ICPs. Although the replies are distributed in a quite balanced manner among the different available options, certain trends are identifiable. Operationalizing corporate policies and procedures and embedding export control objectives into existing processes and tools appear to be the most important

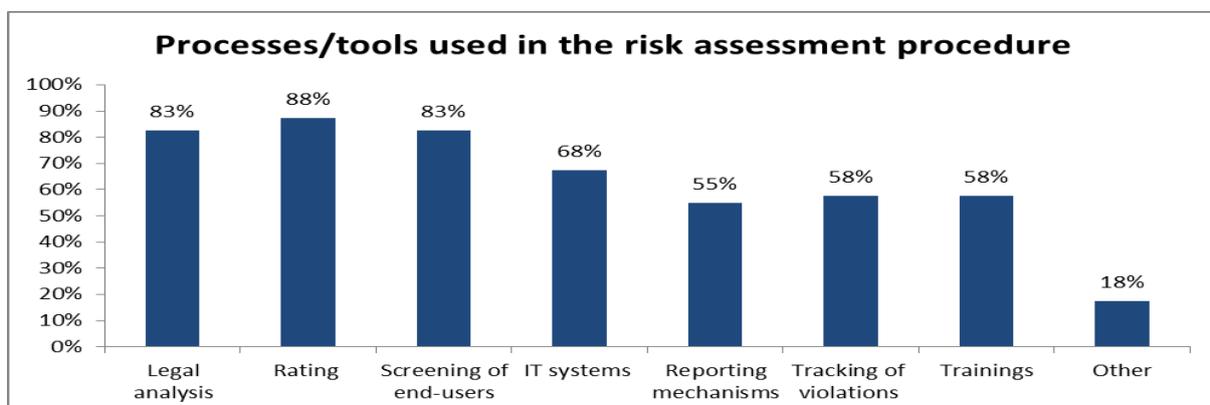
<sup>389</sup> There is the exception of some large companies having globally from 30 to 100 employees solely concerned with export compliance. One can assume that these companies export mostly controlled items and technologies and have subsidiaries in many countries.

<sup>390</sup> Auditing is usually addressed as in the context of broader auditing checks and this could indeed imply lower costs. Training costs might concern again staff costs plus material required for such and working hours invested. However, the questionnaire had no specific question on the criteria used for estimating compliance costs.

challenges. Actually for SMEs, the latter is the most important challenge presumably because smaller companies do not necessarily establish formal policies and procedures. The risk assessment process ranks in the third position as the most important challenge. This is particularly the case for SMEs, 33% of which chose risk assessment as the most challenging issue as opposed to 13% of large companies. Collaborating with other departments and communicating the risk to top management and all employees potentially concerned appear to be the least challenging issues. Reasonably, for firms investing resources to export compliance there must not be a great difficulty in communicating the importance of export control issues to top managers. The survey also illustrates some more sector specific trends. For instance, firms operating in weaponry/defence sector see communication of the risks as the least important issue.



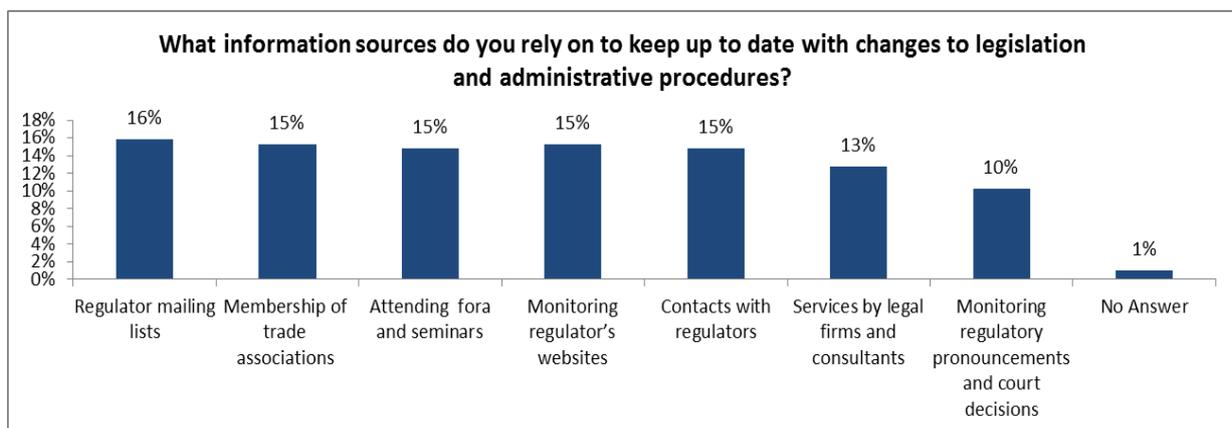
The second question concerned the processes and tools used in the risk assessment process. Rating exporting items and technologies against controlled lists, screening end-users and third parties against ban lists and analysing legal requirements are the methods used most commonly in the risk assessment. As far as it concerns the tools utilised, IT systems to manage, store, easily retrieve and share information were referred by 67% of respondents. Reporting mechanisms for notifying suspect cases, tracking of past violations as well as trainings are further sources feeding information to the risk assessment procedure for most of the firms. All the tools and processes achieve higher scores among large enterprises.



Most interestingly, some firms were willing to provide further information on the methods employed in assessing export control risks. For instance, one compliance officer singled out the specific steps followed in implementing a risk assessment process within an organisation.

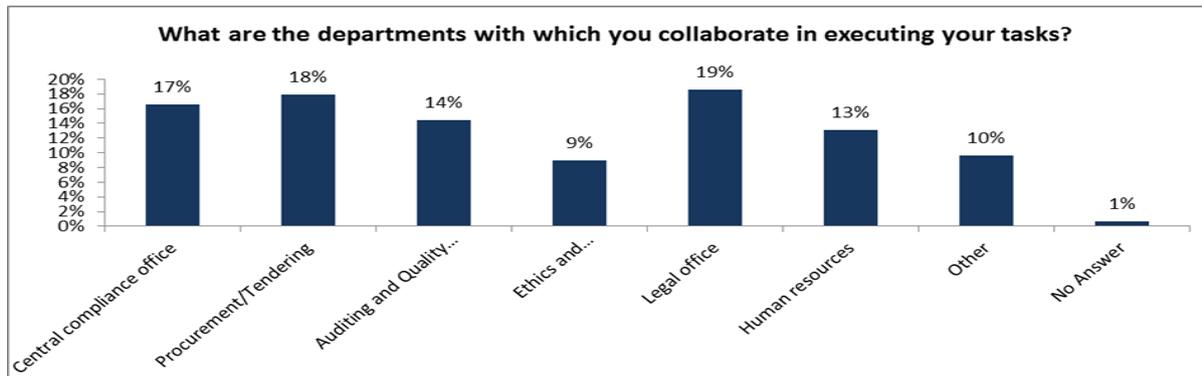
Building risk profiles (based on sensitive items, end-user/ end-use analysis, economic means of payment *etc.*) and identifying areas of risk are the first steps to be taken. Then, quantifying and prioritizing the risks and, identifying ways to address them are the next steps to take. Ultimately, implementing the necessary risk mitigation measures is the final step. Quite a few officers referred to self-assessment as a means used during the risk analysis. In practice, customers are required to fill out self-assessment forms which are then reviewed and classified by the export control officers. Also, risk assessment may involve contacting the customs authorities, asking for further information including patterns of sensitive transactions, routes and destinations. Enhanced risk mitigation measures may be foreseen for shipments going to sanctioned destinations.

Third, the participating practitioners were asked to list the information sources on which they rely so as to keep up to date with changes to legislation and administrative procedures and requirements. Despite the different resources and needs, retrieving information is enabled through a variety of tools for both SMEs and large enterprises. Subscribing to the authorities' mailing lists, attending export control fora and seminars and drawing information as members of trade associations and chambers of commerce are widespread practices especially among large firms. Monitoring regulators' websites, maintaining direct contacts with the licensing authority and participating to export control seminars are very common methods also for SMEs. It is also worth noting that 74% of the large firms and 22% of the SMEs rely also on private consultants and legal firms for dealing with export control requirements.



Fourth, the participants were called to answer what are the departments with which they collaborate in executing export compliance tasks. The legal office is the option gathering the most replies in the aggregate data. The Procurement and Tendering department rank first among the SMEs while the Central Compliance Office is among the first options in both large and medium sized enterprises. It seems also that companies -depending on their structure and needs- may collaborate with several other departments. Management processes relating to production, supply and sales of products such the Supply Chain Management, the Customer Relationship Management and the Product Life Cycle Management might have some relevance to export control tasks. Especially sales and customers support was quoted by quite a few practitioners. Moreover, the departments responsible for quality management, risk management and Corporate Social Responsibility and naturally, for R&D activities are further examples mentioned by few participants. Another question relevant to the previous

one was the following: “Can you identify other corporate policies that re-inforce export compliance?” Ethics rules (*e.g.* staff codes of conduct) and procedures for IT security are the two options gathering the majority of responses, 67% and 52% respectively. Quality management standards and classification policies for managing confidential information follow them with equal percentages each (45%). The procedures and checks established pursuant to the Authorised Economic Operators system (AEO) administered by customs authorities in the EU were referred to also as a ‘reinforcing policy’ in one case.



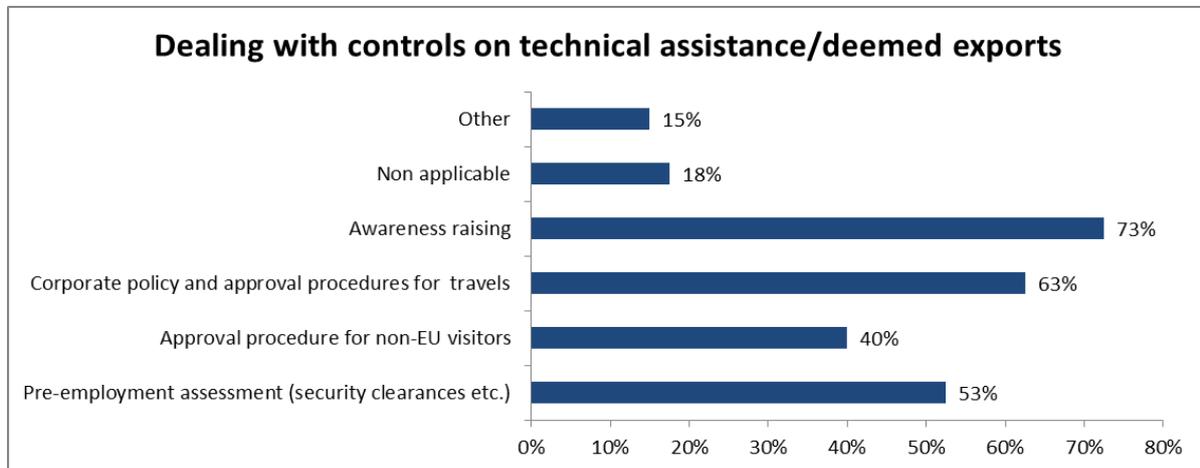
#### 7.1.4 Monitoring Intangible Transfers of Technology

Complying with technology transfer requirements is considered to be as a major challenge and an issue of particular interest to this study. Generally speaking, large firms seem to be quite active in identifying and mitigating technology transfer risks. Technology transfers represent an important part of firms’ business activities. Furthermore, quite often companies have anyhow an interest in controlling the sort of information that is released due to trade secrets and exclusive proprietary rights. If one thinks of the broad definition of technology as established in the framework of the multilateral regimes, corporations may transfer controlled technology in a number of occasions<sup>391</sup>. Transferring technical data to customers, sharing information with subsidiaries or collaborators abroad, and even sending data in the phase of tendering may be subject to licensing. Moreover, providing technical services outside the EU and releasing US origin information inside the EU may be subject to control under the EU Joint Action 2000/401 on the provision of technical assistance and the extraterritorial application of US deemed export controls, respectively. It must be reminded, however, that the EU technical assistance controls apply only in a narrow range of circumstances -military end-use- and deemed exports concern only US-origin technologies. Companies maintaining activities in particularly sensitive sectors and/or exporting technologies with military and defence applications such as aerospace and aviation may implement internal controls of very exhaustive nature.

Therefore, the survey seized the opportunity to explore the practices adopted by industry towards this issue. The first question was about the provision of technical assistance and the implications of deemed exports. 17% of the firms replied that they are not concerned by these

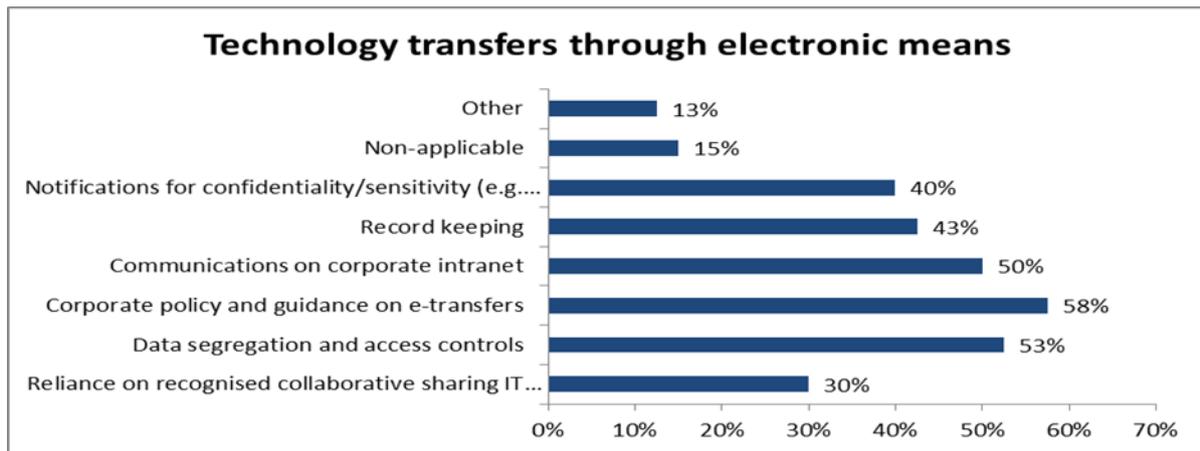
<sup>391</sup> It is reminded that technology is understood as the specific information necessary for the development, production or use of a product. The term information includes both technical data and technical assistance.

issues. Reasonably enough, the percentage of non-concerned firms is higher among SMEs (33%). Awareness raising activities are by far the most common tool referred to by most of the responding companies. Approval procedures for business travels abroad and pre-employment checks are among the elements used most in monitoring export related activities as well.



A few respondents referred to the different tools and management systems utilised in addressing tangible and intangible technology transfers. The release of export controlled information on-site is addressed mainly through the so-called ‘Technology Control Plans’ (TCPs) monitoring who has access to what information and ensuring that sensitive information is not exported to unauthorised users either on-site or abroad. Certain officers emphasized the role of visitor and travel management systems in operating effective TCPs. The application of deemed export/re-export rule may be translated into separate production lines or zoning excluding foreign employees from accessing certain US-origin technologies and information to use such technologies.

With regards to technology transfers enabled through electronic means, the responses are quite distributed among the different options suggested. However, the majority of firms have established a corporate policy and guidance for dealing with sensitive technology transfers. Data segregation and access controls as well as communications on the corporate intranet are among the practices used often for ensuring that sensitive information is not released to unauthorised users. Some export control officers highlighted the importance of monitoring planned technology transfers at an early stage so as to obtain required export licenses before such transfers take place. Relying on secure file transfer protocol and reliable file sharing platforms and, providing training to selected employees dealing with technology transfer most often are further tools mentioned.



With a view to understanding better the actual implementation of internal controls and evaluating the results of the survey, further inquiries were addressed to experienced compliance managers working for two leading MNCs. The following remarks concern, in the first place, companies exporting primarily controlled items and technologies and investing a lot of resources to export compliance. To begin with, such companies operate comprehensive corporate policies for dealing with technology transfers. The implementation of internal compliance policies requires the delegation of export control tasks to managers and local staff appointed in different units or business departments. Responding to the inquiries of employees concerned with export issues, approving export related transactions and submitting applications whenever an export authorisation is necessary are among their main responsibilities.

Second, in terms of risk assessment, prior to proceeding to any 'export' of technology certain information should be retrieved and analysed:

- the full description of the technology;
- the country of origin and any country that may exercise export control jurisdiction;
- the different places where technology will be moved to or accessed from;
- the end-uses and end-users relating to the transaction;
- the volume and value of export and,
- the involvement of any third parties in the provision or use of technology.

The rating of all exporting technologies demand both the attribution of the right Harmonised System Code and the verification of the export control classification number according to the respective lists applying for each jurisdiction when more than one are involved. The survey showed that for tangible goods a 'controlled item marking' is implemented by some companies. While the rating of items can be easily outsourced to customs brokers the classification of a technology requires *per force* an internal assessment. Internal assessments of potentially controlled items and technologies rely on tools and software provided either by external companies or developed in-house for this purpose<sup>392</sup>. Screening end-users and third

<sup>392</sup> In one case, a compliance officer described the system operated by his/her company as a 'tool' combining applicable legislation and corporate policies enabling thereby automatic export control objectives to be incorporated into companies processes and procedures. Whereas for intangible

parties against watch-lists and lists of restricted or sanctioned entities and individuals is integral to the risk assessment and due diligence process, as the survey confirms as well.

Furthermore, corporate policies can be quite exhaustive by covering all different occasions where a controlled technology transfer may take place and establishing export procedures to be followed. The interviewed officers confirmed that their firms' policies include physical exports of technologies, electronic technology transfers as well as transfers of hand-carried technology. For instance, travelling with laptops containing controlled data abroad can be subject to prior permit given that certain countries require an export authorisation for the export from or return of such data to the home-country of the employee<sup>393</sup>. In fact, in one case the company's policy provides for a special permit for taking IT equipment during business abroad. Another common practice confirmed also by the survey is that firms may require from their staff to use only the approved corporate file sharing platform for e-transfers. Yet, access restrictions may still apply since an export authorisation may be granted only for use by certain individuals located to certain destinations. In addition, different corporate policies set that transferring controlled data through e-mails should be as a last resort practice.

Given that governmental polices on technology transfer are still in development and therefore, sometimes incomplete, exporting firms may choose to undertake more strict and comprehensive rules than those explicitly provided in the law. This way they show in practice an attitude of responsibility and prevent inadvertent violations of the export control laws. For instance, so far there has been no formal guidance at the EU or at national level with regards to technology temporarily stored or accessed in servers abroad (see also chapter 4.2.2)<sup>394</sup>. However, and judging from the two inquires, the practice shows that corporate polices may address such a possibility. The responsible staff in collaboration with the IT department should be aware of the location of servers and data sharing applications used and report any export control issue, as appropriate. Last, keeping auditable records for each controlled technology transfer represents another main principle included in corporate policies and besides, it constitutes a formal requirement in the relevant law.

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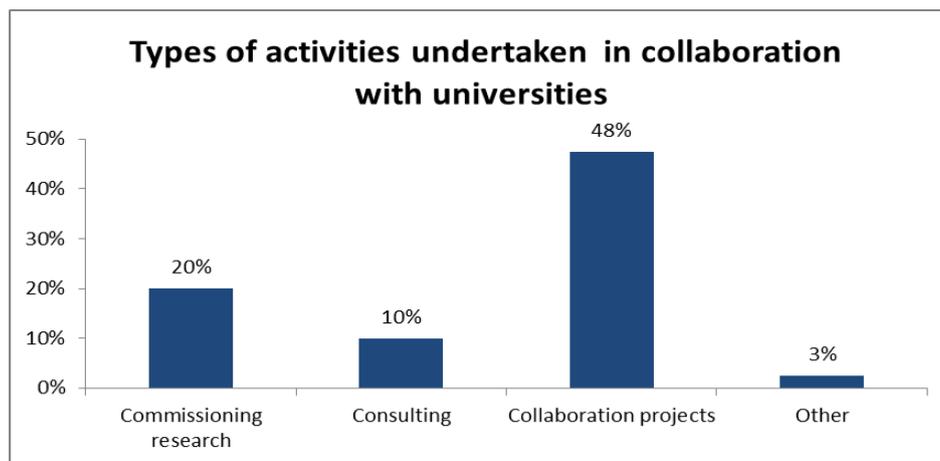
transfers an 'internal working council' is in charge for providing advice or ruling on the identification, classification and safeguarding of controlled information.

<sup>393</sup> The US is the most known case of a State requiring an authorisation also for controlled data contained in a laptop. On the contrary, the EU has not established a common rule on that issue. Article 7 of the dual-use regulation stipulates that cross-border movement of persons is not subject to export controls. For some Member States this provision implies that information contained in somebody's mind shall not be controlled. However, if an individual carries with him controlled information in a tangible electronic medium a license may be applicable. In sum, what shall apply in the case where controlled information is carried by an individual in tangible form such as laptops, USB flash drivers and portable hard disks has yet to be clarified (see also section 4.2).

<sup>394</sup> The issue has been discussed at the level of DUCG many times and interpretations of the applicable rules have been offered by certain Member States. However, common guiding rules have not been established so far.

### 7.1.5 Relations with academia and other research organisations

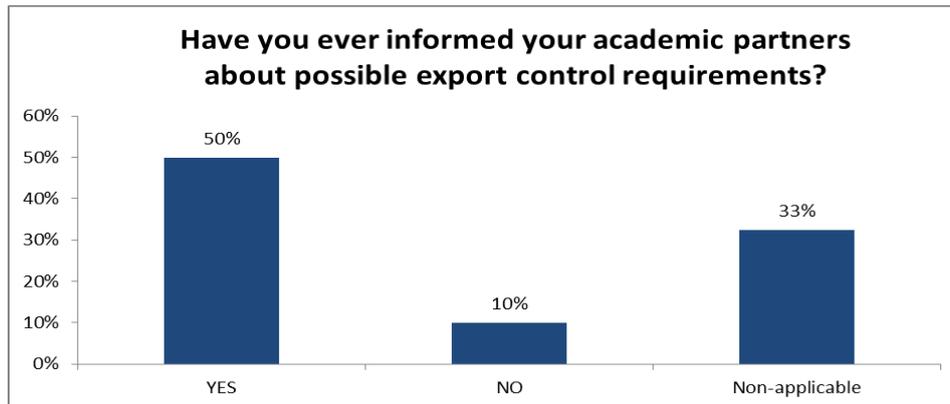
The concluding section of the survey was dedicated to the relations between industry and academic/research institutions. 57% of the respondents confirmed that they undertake research in collaboration with academia. Furthermore, 61% of those maintaining such relations with academia replied that export controls affect their cooperation with universities and other research institutes. For SMEs the picture is different since only 33% collaborates with academia and none of them sees export controls impacting this cooperation. The types of activities undertaken most commonly in partnership with academic and research organisations can be collaborating in joint projects, commissioning directly research to universities and, to a lesser extent requiring advice on given scientific issues.



The participants were also asked to explain how export controls affect their collaboration with academia. Most of them pointed out that technology transferred in the course of collaborative projects may be subject to an export authorisation. To quote just few of the officials, “we apply export controls in the same way as for other collaboration projects” and, “export licences are sometimes required to enable us to share data with research partners located outside the country of establishment.” Moreover, technology developed may be controlled and thus, subject to authorisation. Information classified due to proprietary or security reasons warrants certain assurances and may require export authorisations as well. In that view, it might be also necessary for companies to ensure that their partners can only access those parts of their information systems that relate directly to the project in question and/or for which an export authorisation has been granted. “We have less flexibility when cooperating with research institutes based on certain destinations and, the US export controls may influence our decision to collaborate with some institutes due to deemed (re)exports,” as another practitioner pointed out.

Quite interestingly, one official referred to the attitudes encountered in an academic context *vis-à-vis* export compliance. Sometimes research institutes are not aware of export control issues and researchers challenge the applicability of export control provisions as pursued through non-disclosure agreements. The survey asked export control officers to answer whether they have ever informed their academic partners about the applicability of export controls when transferring technologies, items and software. Half of the participants replied

that indeed they have done this before. It appears that industry may have also an important raising awareness role to play in enhancing compliance in a research environment.



Furthermore, a few officials stressed that collaborative projects either with subsidiary companies or with key suppliers may be obstructed due to delays in obtaining all the necessary licenses<sup>395</sup>. In that regard it is not only the interaction with academia that can be affected by export controls but also industrial R&D taking place within the framework of a multinational company. One officer referred to the lack of general licenses aimed at facilitating collaborative efforts both internally (within company) and with key suppliers. In that regard, the UK Export Control Organisation (ECO) pre-publishes a number of general licences which any exporting firm can make use of as long as it fulfils the specific conditions and is registered in the licensing database (SPIRE) set up for this purpose<sup>396</sup>. The idea to introduce new general licenses for intra-company transfers and large projects quite probably at the EU level is a long-lasting demand of the economic operators. Actually, the issue has been discussed in various occasions and studies in the past<sup>397</sup>.

This doctoral study discussed the distinction between basic research and applied research in several occasions. Therefore, the survey participants were called to reply whether they

<sup>395</sup> To quote an officer, “In these cases, governmental approvals are needed to legitimately exchange export control data, even when such entities are controlled by the mother company and are covered by the mother company's ICP that is tailored in accordance to EU/US standards. Export license requirements have the potential to delay research projects.”

<sup>396</sup> The (ECO) provides the possibility for using an OGEL allowing –subject to certain conditions- the export of dual-use technologies and software from the UK, or any other EU member state, where the exporter is established in the UK. For more information on the different types of general licenses available in the UK and their terms of use please see the website of the UK government in the following link:

<https://www.gov.uk/government/collections/open-general-export-licences-ogels#dual-use-open-general-export-licences>.

<sup>397</sup> See for instance the Green Paper and the Staff Working Document report published as part of the consultation towards the review of the EU system: EU Commission, *Green paper: The dual-use export control system of the European Union: ensuring security and competitiveness in a changing world* COM(2011) 393 final, Brussels, 2011, retrieved from:

[http://trade.ec.europa.eu/doclib/docs/2011/june/tradoc\\_148020.pdf](http://trade.ec.europa.eu/doclib/docs/2011/june/tradoc_148020.pdf); EU Commission, *Staff Working Document, Strategic export controls: ensuring security and competitiveness in a changing world- A report on the public consultation launched under the Green Paper* SWD(2013) 7, Brussels, 2013, retrieved from: [http://trade.ec.europa.eu/doclib/docs/2013/february/tradoc\\_150459.pdf](http://trade.ec.europa.eu/doclib/docs/2013/february/tradoc_150459.pdf).

conduct basic scientific research in the meaning of the EU regulation and, if yes, why. 25% of the participants replied that there are instances where they conduct basic research. If one extrapolates this figure to those undertaking research in partnership with the academia, the percentage rises to 43%. One could assume that companies have an interest in maintaining market leadership and their competitive advantages or to develop further their market position by investing in basic research and preparing the next generation of innovative technologies. In that sense, it is a meaningful fact that certain companies refused to provide further information on the instances where they conduct basic research. In one specific case the compliance officer said explicitly that this is secret information and, in another case, the reason referred to was ‘striving for technology leadership’. Another interesting reply was the following: “the company maintains R&D facilities. Such facilities have the freedom to conduct basic research. The results of their scientific activities can be exploited by the company after further developments or can be provided to universities or research entities to nourish academic discourse.” Last, one export control manager said that they conduct basic research only to the extent that this is a requirement of a government or an EU funded work programme. Last, one officer provided the example of legal studies commissioned to universities so as to understand better the obligations of transport sector in relation to export controls. Following this, a reasonable question to ask was whether there are cases where firms publish the results of their R&D activities in journals or other scientific publications. 42% of all firms questioned replied that they occasionally publish the results of their research<sup>398</sup>.

In sum, the foregoing figures are useful in different ways. First, they confirm that firms undertake basic research and sometimes also publish the results of such research nourishing thereby the state of knowledge and public wellness. Second, they indicate that the interactions between academia and industry may be affected by export controls. It comes out that having a clear legal framework for determining where export controls apply as well as raising awareness within scientific organisations on possible export control issues could be of help. A hypothetical example could be helpful here: a pharmaceutical company conducts research for the development of a vaccine against a high pathogenic virus. In the course of the research the firm relies on inputs provided from and/or achieved through cooperation with a university. The exchanges concern technology that is necessary for the development, production and use of a listed virus. Are these exchanges bound to be subject to an export authorisation? Will the company be free to publish the outcomes of the research if it so decides ? This is a hypothetical case concerning a particular field of research but it is also an eloquent example of the issues at stake.

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<sup>398</sup> If one extrapolates this figure to those collaborating with the academia the percentage will soar up to 74%.

## **7.2 University based research and trade controls**

Discussing export compliance in a university setting is a challenging issue. Various experts and public authorities both in the US and the EU point out a number of difficulties in communicating export control risks and imperatives to the academic and scientific community. Officials from the DOC have noted that the initial efforts of US authorities - about 15 years ago- to reach out to a university audience were unsuccessful<sup>399</sup>. Only when they contacted those higher in rank (deans, faculty presidents), were they effective in building bridges of understanding and communicating trade control objectives to scientific staff and students. Hungarian licensing authorities were confronted with a similar attitude and a negative predisposition towards governmental controls of sensitive research during awareness raising seminars conducted in the past years in selected universities<sup>400</sup>.

This is rather anticipated if one thinks of the distinct mind-set and practices pertaining to scientific research. Export controls are ostensibly at odds with the principles of academic freedom and independence of scientific work. On top of this, scientists may be unaware of export control risks and thus, they do not always realise how their work could connect to acts of WMD proliferation. Some of them will not be willing to carry further administrative burden and compliance checks if they do not see some merit in this. At the same time universities embark more and more often on partnerships with corporations and an increasing number of research projects are designed with a practical aim in view. As chapter 2 suggests tapping academic research into practical applications and furthering knowledge-based economies is favoured by governments and industry and, universities see in that an opportunity for funding their research programmes. Beside this, connecting the ‘universitatum world’ with the industrial world is not just about fundraising or commercial purposes. It might be also the means of responding to societal needs and translating a better understanding of the world to tangible benefits. This evolution takes place in an environment wherein the exchange of data and the flows of international students and professors is as high as ever. It is characteristic that quite a few universities organise and offer either free of charge or upon payment on-line courses and degrees and, operate international campuses in different countries or continents. Consequently, export control issues are intensified in such a context. This chapter intends to explore whether universities in the US and the EU are aware of export controls as well as what are their compliance practices for coping with the export control problem.

### **7.2.1 An insight into university export compliance in the US**

US Universities are known to be pioneers across all university core missions -teaching, research, knowledge transfer and international outlook<sup>401</sup>. The USA is also a country with a

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<sup>399</sup> Discussion with the Director of Office of Non-Proliferation and Treaty Compliance, A. Lopes, December 3, 2015.

<sup>400</sup> Discussion with Head of the Hungarian licensing authority, Dr. L. Stefan, September 24, 2015.

<sup>401</sup> If one looks for instance at the Times Higher Education World University Rankings or, the QS World University Rankings for 2015-2016 US universities such as the Massachusetts Institute of Technology, the Harvard, the Stanford University and the California Institute of Technology dominate the top 10 worldwide. Rankings available in:

long tradition in protecting intellectual property rights and implementing security controls especially for federally funded research. At the same time trade control legislation is generally considered as having a broader reach compared to the European one. In the US context, trade controls are openly seen to serve different objectives and the discussion is not limited to non-proliferation concerns. In addition to national security and international security objectives, protecting the US economic and technological advantages is a relevant aspect as well. Industrial espionage is an issue to consider in that regard. In various presentations and reports, US authorities stress that more than 56 foreign nations have been identified as collectors of US proprietary information and technologies. Among them 13 countries appear to be particularly aggressive collectors of U.S. proprietary economic information and critical technologies<sup>402</sup>.

For many reasons, one could argue that US research institutions represent the one edge of the spectrum in terms of export compliance as opposed to EU universities that seem to be either unaware or less proactive. The analysis of the situation in the US relies on two different sources of information. The first is the insight acquired by the author during a conference organised by the Association of University Export Control Officers (AUECO), in June 2015<sup>403</sup>. This was the third annual conference organised by AUECO and gathered representatives from colleges and universities, speakers from government as well as private organisations specialised in global trade management and e-customs solutions. While this was just one of the numerous export control events and trainings offered to export compliance practitioners in the US, some remarks may be suitable here. The second source of information is the public university websites discussing exports compliance and providing documentation and advice to their staff for being compliant.

**Overview of university compliance in the US:** To begin with, the conference gathered export control compliance managers coming from over than 160 leading US universities such as the University of Stanford, the Princeton University, and the Columbia University. All

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<https://www.timeshighereducation.com/world-university-rankings/2016/world-ranking#!page/0/length/25;>

[http://www.topuniversities.com/university-rankings/world-university-rankings/2015#sorting=rank+region=+country=+faculty=+stars=false+search=.](http://www.topuniversities.com/university-rankings/world-university-rankings/2015#sorting=rank+region=+country=+faculty=+stars=false+search=)

<sup>402</sup> Presentation by A. Lopes (US DOS), “The Nexus Between Strategic Trade Controls and Academic Research,” December 3-4, 2015, Ispra;

For an overview of the impact of economic espionage in the US see indicatively (and its subsequent ones): US National Counterintelligence Center, *Annual Report to Congress on Foreign Economic Collection and Industrial Espionage*,” 1997, retrieved from:

[https://www.ncsc.gov/publications/reports/fecie\\_all/FECIE\\_1997.pdf](https://www.ncsc.gov/publications/reports/fecie_all/FECIE_1997.pdf).

<sup>403</sup> The AUECO in collaboration with the University of Virginia, the Virginia Polytechnic Institute and State University (Virginia Tech) and the George Mason University organised the third annual conference discussing export control compliance for universities and research organisations from 7 to 9 June 2015, in Washington DC. Presentations were offered by experienced university compliance officers, law experts as well as government officials from the Department of State, the Department of Commerce, the Department of Energy, the Department of Homeland Security and the Department of Treasury. Visual Compliance and Amber Road, private organisations offering global trade management and e-customs solutions, were the main sponsors of the conference. Information on the 3<sup>rd</sup> Annual Conference is available here: <http://www.cpe.vt.edu/2015export/>.

Information on the role and work of AUECO can be found in this link: <http://aueco.org/>.

these universities implement internal compliance measures and invest resources in so-called ‘Export Management and Compliance Programmes’. This commitment of US academic institutions to export compliance may be attributed to various factors: increased awareness thanks to outreach activities by the US authorities; technological leadership and high intensity of knowledge transfers and, the rigorousness of the US export control law. This last element works in re-enforcement with a quite robust stance of authorities in enforcing export controls. During the three days of the conference, a number of university compliance officers referred several times to the verification or suspicion of export control violations as the main reason having led their institutions to adopt an export compliance strategy. It comes out that the preventive power of the US export controls towards universities is significant.

Despite that, it is estimated that from around 31.460 licences processed by BIS in 2014 only few concerned academic and research institutions<sup>404</sup>. In connection to this, there are not many known cases of violations involving academics. The website of the University of Pittsburgh refers to the most known export control violations recorded in the recent past<sup>405</sup>. The cited cases include both tangible and intangible transfers of controlled equipment and technology as well as the implementation of a catch-all control for equipment falling under EAR99 and sent to a restricted organisation specified in the Entity List. In 2009, the Georgia Institute of Technology made accessible restricted information to users in 36 countries, including China and Iran, by uploading such information on its servers. This is a telling example of an export control violation involving ‘intangible transfers’. In 2004, a Professor of Texas Tech University received a 2 year prison sentence and a denial of his export privileges for a period of ten years for having illegally exported a controlled pathogen (the causative agent of human plague) to Tanzania. The most known case is probably the one concerning J. Reece Roth, Professor Emeritus at the University of Tennessee. Between January 2004 and May 2006, Professor Roth engaged in a conspiracy to transmit export controlled technical data subject to the ITAR to graduate students from China and Iran<sup>406</sup>. Although Roth claimed he was ignorant of the regulations, in practice he was warned on a number of occasions, including by university counsel, that the technology may have been controlled. Professor Roth was convicted in a four-year sentence.

The BIS Office of Export Enforcement (OEE) publication ‘Do not Let This Happen to You’ refers to further cases of violations and it notes also the role of Voluntary Self-Disclosures (VSD). Most of the VSD cases are closed with the issuance of a warning letter, some require no action and only very few lead to administrative sanctions. During 2014, the OEE opened a

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<sup>404</sup> According to US authorities only a small percentage of licenses concern US universities and research organisations. For the total numbers of licenses processed, approved and denied please see Statistics of 2014 License Authorisations in the BIS website: [https://www.bis.doc.gov/index.php/forms-documents/doc\\_view/1266-2014-statistical-analysis-of-bis-licensing](https://www.bis.doc.gov/index.php/forms-documents/doc_view/1266-2014-statistical-analysis-of-bis-licensing).

<sup>405</sup> For more information please consult the website of the University of Pittsburgh, available in: <http://www.export.pitt.edu/export-violations>

<sup>406</sup> US DOS (BIS), Office of Export Enforcement, “Do not let this happen to you, Actual Investigations of Export Control and Anti-boycott Violations,” 2015, 53, retrieved from: [http://www.bis.doc.gov/index.php/forms-documents/doc\\_view/1005-don-t-let-this-happen-to-you-071814](http://www.bis.doc.gov/index.php/forms-documents/doc_view/1005-don-t-let-this-happen-to-you-071814).

total of 312 VSD cases and closed a total of 213 VSD cases. Over half of these VSD cases were closed with the issuance of a warning letter, while nearly a third were closed with ‘no action’ or ‘no violation’ and, around three percent, were closed with the issuance of administrative sanctions<sup>407</sup>. The role of VSD in the implementation of compliance systems was underlined also during the conference. In case of an export violation, the implementation of compliance measures is among the factors taken into account in the prosecution of such violations and may attenuate an applicable penalty. US universities see in that a further motive for being proactive and complying with export controls.

**Organisational and risk assessment aspects:** With regards to organisational and operational aspects of export compliance in US academic settings, it could be difficult to build general patterns and draw conclusions applying to all universities. The organisational structure may differ from one university to another and so does the scope of research activities concerned. This also implies that different universities employ compliance systems in a way that better fits their needs and identity. No matter where the export compliance function is placed, integrating export control objectives throughout the organisation is a key to implementing effective compliance systems. Mark Peters, an experienced compliance officer at Oregon State University (OSU) has noted that “for a standalone export compliance system, it would be very difficult to get the user’s attention; however, if presented as part of shipping or dangerous goods compliance it receives much more attention and buy in. Additionally, researchers appreciate having the obstacle to research packaged together with a method to comply with all applicable regulations and move on their work”<sup>408</sup>. What’s more, by working with other compliance operations, a university compliance officer develops a network that can provide insights into what institutional operations or specific projects may need attention from an export controls perspective. “These partner compliance departments become ‘gate keepers’ looking for problems and referring them to the export compliance staff”. Moreover, other compliance officers highlight a difficulty to estimate staff hours and resources dedicated in assessing export control risks due to this involvement of staff from different departments.

Generally speaking, the Export Control Office (ECO) of an American University deals with the whole spectrum of prohibitions and restrictions from arms controls in defence related articles to controls of dual-use commodities and technologies and, from trade sanctions to anti-boycott and anti-corruption regulations. According to Mr. Peters, an export compliance programme takes about 2 years to get integrated into a US academic institution. The main challenge is creating awareness of the program and communicating to the faculty and staff the importance to seek assistance when an issue arise. The long time to implement a compliance system has as much to do with the traditional culture of openness in academia as with the complexity of the material.

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<sup>407</sup> Ibid, p.9.

<sup>408</sup> Discussion in the margins of the AUECO conference and e-mail exchange with M. Peters, compliance officer at Oregon State University (OSU).

The AUECO has provided some guidance –a sort of basic model- for assessing a university’s institutional structure, core competences and scope of activities against export control risks<sup>409</sup>. The main idea is to assess different aspects of each parameter referred above against given risk descriptors. For instance, the institutional structure of a university includes processes for budget allocation, compliance, purchasing, shipping and international travel. The extent to which such processes are centralized or distributed (risk descriptor) may indicate a higher or lower risk. The physical location(s) is also a relevant characteristic in this evaluation. According to the model, centralised procedures imply a lower risk.

The second parameter concerns research policies and core competencies of a research institution. For instance, a university implementing a policy of non-involvement to military/ defence related research or, refusing to undertake research involving non-disclosure agreements may be confronted with lower export control risks. Determining whether controlled or sensitive items (*e.g.* EAR and ITAR items and select agents) relate to the university core competences is part of the risk assessment, too. Focusing efforts on primary areas of concern such as nuclear, engineering, and biotechnology is a plausible practice to follow. Visibly, universities operating nuclear facilities and using special nuclear material face a higher possibility to be concerned by export controls. In author’s view, the evaluation of the sensitivity research warrants an in depth and thorough examination given that less evident research activities (*e.g.* software simulating certain processes) may be also exploited by a proliferator or malevolent user for malign purposes and might be included in the scope of trade control lists. As M. Peters neatly notes, providing more and deeper education to researchers on export control issues represents a great way to mitigate export risks associating with a given discipline.

The third parameter that determines an export control risk is the scope of international activities undertaken by a university. Again here, every type of activity (collaborations, field research, operation of international campuses, student exchange programmes, online and distance learning) undertaken by a university can be classified as of low, moderate or high risk depending on a given risk descriptor. For instance, field research using EAR99 equipment shipped by a freight forwarder to low risk countries is considered as low risk activity. However, field research in a high risk country involving hand carried equipment that is not EAR99 may be of high risk. It can be concluded that one needs to correlate the results of risk assessment for different parameters (*e.g.* core competences within the scope of international activities involved) in order to identify and address specific export control risks.

M. Peters suggests a practical way for addressing first the most urgent risks and turn then attention to other less evident or urgent areas of concern within an institution. Simply put, “using a sliding scale, based upon research subject, amount of foreign participation and

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<sup>409</sup> D. Brady, E. Peloso and G. Rowold -university compliance officers and members of AUECO- have built a risk assessment tool for classifying a university’s institutional structure, core competencies and scope of international activities as of low, moderate or high risk. The tool was originally produced for use at the 54<sup>th</sup> Annual Meeting of the National Council of University Research Administrators (NCURA), November 3, 2012.

international collaboration along with reviewing funding source requirements allows for areas of greatest exposure to be reviewed first.”

**Technology Control Plans:** Monitoring technology transfers poses probably the harshest challenge in implementing an export compliance system. In that regard, and given the extra complexity of the US export controls (think of deemed exports), it is interesting to see what measures are taken by the US universities in response to such legal requirements. A term used quite often when the discussion touches upon intangible transfers of technology is ‘Technology Control Plans’ (TCPs). Industrial operators have been implementing such measures for years as a means to protect classified, proprietary, and export-controlled information. In fact, TCPs are explicitly required or recommended by federal guidance and regulations dealing with sensitive information released during or produced by defense-related R&D<sup>410</sup>. In addition, the application of TCPs is a widely used export compliance practice adopted by all major US universities. The University of Washington (UW), for example, defines a TCP as an internal compliance document prepared by the responsible lead researcher and stating the type of export-controlled information associated with a research project as well as measures to be taken to ensure that access to export-controlled information is duly managed, and signed<sup>411</sup>. The approval of such TCPs lies normally with the university Export Control Office (ECO) that in the case of the UW is the Office of Sponsored Programs. Generally speaking, a TCP should deal with all different aspects of security and establish level access controls to laboratories, IT services and data<sup>412</sup>:

- physical security (*e.g.* security perimeter, safe storage and restricted access);
- information security (marking of e-documents, secure file transfer method *etc.*);
- specific procedures for any export authorisations required;
- personnel screening and foreign visitors’ checks;
- training of authorised persons prior to receiving access rights;
- and record keeping.

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<sup>410</sup> The National Industrial Security Program Operating Manual (NISPOM) and the ITAR are such examples. For an introduction to the role of TCPs see: Michael Swansburg, “Technology Control Plan,” *Counterintelligence News and Developments* 1, 2000, available in: [https://www.disam.dscam.mil/pubs/v.23\\_1/swansburg.pdf](https://www.disam.dscam.mil/pubs/v.23_1/swansburg.pdf)

<sup>411</sup> The UW website clarifies when a TCP is required:

- Projects or activities involve the receipt of Sensitive Unclassified Information (SUI) from an outside party or sponsor, such as via a nondisclosure agreement or sponsored research agreement;
- Projects or activities are not considered Fundamental Research;
- Projects or activities involve technology and software associated with export-controlled equipment.

For further information please consult the following link:

<https://www.washington.edu/research/?page=ecrTCP>.

<sup>412</sup> See for instance presentation by Mary Beran (Georgia Tech) and David Brady (Virginia Tec): “Using Technology Control Plans in Export Compliance,” University of Pennsylvania (Office of Research Services), available in:

<http://www.upenn.edu/researchservices/Export%20Controls%20Conference/Mary%20Beran%20&%20David%20Brady%20-%20Using%20Technology%20Control%20Plans%20in%20Export%20Compliance.pdf>.

Furthermore, several presentations made available in the Universities' websites include 'management commitment to export compliance' as an essential element of an effective TCP. The University of Virginia (UOV) stipulates in its export control policy that "Faculty members wishing to use (or authorize students or staff to use) controlled technology or work on a project intended to generate controlled technology, regardless of funding source, must develop a TCP"<sup>413</sup>. The TCP should be adapted to the specific needs and implications of a given project and receive approval by the OEC. The OEC may decide that a TCP is not required for instance in the case where a project involves merely tangible transfers of EAR-controlled items, does not concern controlled source code or proprietary technical information and the research is to be conducted exclusively in the US. Similar procedures for monitoring sensitive projects involving intangible transfers of information are implemented by several US Universities. One could say that TCPs are like targeted ICPs incorporated in broader export compliance management systems.

**Further Common Elements:** The investigation in the websites of different US universities showed certain elements that are in common for most of them. First, the majority of the US universities take export compliance quite seriously and to that effect, they have adopted a proactive stance. More particularly, several US Universities provide basic information on US export control regulations, guidance manuals and policy statements. The UOV that was referred above is such an example of a university having established quite comprehensive policies and procedures. For example, the UOV policy on sanctions requires that: "all University activities that are to be conducted in, involve the participation of parties located in, or will benefit a sanctioned country be reviewed and authorized in advance by the ECO." Also, the UOV's public website provides information on questions such as when the ECO should be contacted, what does apply for laptops and other electronic devices hand-carried abroad, what classes or courses may be impacted by export controls and also, what is the fundamental research exemption and how should be understood in practice<sup>414</sup>.

Second, quite often the university policy on export control emphasizes both the commitment to abide by the applicable laws and the need to respect the academic freedom and the open dissemination of the research results. For example, the University of North Carolina at Pembroke (UNCP) has included an extract from the Faculty Handbook in its export control policy stating: "It is the policy of the University to support and encourage full freedom, within the law, of inquiry, discourse, teaching, research, and publication for all members of this institution's academic staff. The University will not penalize nor discipline members of the faculty because of the exercise of academic freedom in the lawful pursuit of their respective areas of scholarly and professional interest and responsibility." In the same logic, the University of Washington seeks to comply with federal laws and regulations governing

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<sup>413</sup> See the website of the UOV: "FIN-043: Managing Exports of Controlled Technology to Foreign Persons and Destinations in Support of Research and Scholars," available in: <http://uvapolicy.virginia.edu/policy/FIN-043>.

<sup>414</sup> For further information consult the website of UOV dedicated to export compliance and the section of frequently asked questions, available in: <http://export.virginia.edu/>.

exports and ensure that such compliance is consistent with the University's open academic environment<sup>415</sup>.

Third, in the US university setting, primary responsibility for export compliance rests with the lead researchers for grants or contracts –known usually as Principal Investigators (PIs) - who shall be in position to identify risks and inform personnel involved in their research for such risks. Also, there must be an Export Control Office raising awareness and assisting the PIs in their responsibilities. Reviewing collaboration agreements and contracts, determining whether a technology to be used in connection with a research project is controlled, performing risk assessment and record keeping procedures are among the responsibilities of such an office. It might be the case that this role is entrusted to the Office of Sponsored Research or the University legal service depending on the structure of the university in examination. In any case, an institutional official will be in charge of the overall coordination and implementation of the compliance system and certainly legal expertise is *sine qua non* for the operation of such a system. Also, a mechanism for reporting and verifying possible violations is normally in place. For documented or validated violations escalation procedures may be foreseen. Investigations of export control issues demand review at senior level (*e.g.* Provost/Vice Chancellor for Academic Affairs) as it is the case for the policy statements committing universities to abide by the export control regulations.

Fourth, the definition and applicability of the Fundamental Research Exemption (FRE) is an issue of central importance in related policies and information made available in the university websites. The criterion used invariably for deciding whether scientific and technical information resulting from a project or activity qualifies for the FRE is the absence of restrictions on publication or other restriction on the dissemination of such information on the part of sponsors<sup>416</sup>. For instance, the Harvard T.H. Chan School of Public Health clarifies in its export control website that the FRE does not apply with regards to transmissions of material goods. It also points the cases where the FRE is 'destroyed'<sup>417</sup>. If the university accepts any contract clause that forbids the participation of foreign persons, that gives the sponsor a right to approve publications resulting from the research, or otherwise, operates to restrict participation in research and/or access to and disclosure of research results, the FRE ceases to apply. In fact, most universities provide extensive guidance including examples and practical advice to their researchers for taking advantage of the FRE. As the UNCP export control policy sets, it is to the benefit of the university to pursue its mission in a manner that is consistent with all applicable regulations while making reasonable efforts to maximize opportunities where the FRE can be claimed. Negotiating with research sponsors the removal

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<sup>415</sup> See the policy statement in the UW website available in:

<https://www.washington.edu/research/?page=ecr>.

<sup>416</sup> See for instance the guidance provided on the Oregon State University, University of California (Berkeley) and Massachusetts Institute of Technology websites, available in:

<http://research.oregonstate.edu/export/fundamental-research-exemption>;

<http://www.spo.berkeley.edu/policy/exportcontrol.html>;

<http://osp.mit.edu/compliance/export-controls/research/fundamental-research>.

<sup>417</sup> Information drawn from the Harvard T.H. Chan School of Public Health website, available in:

<http://www.hsph.harvard.edu/export-controls/fundamental-research/>.

or modification of contract provisions and publishing research papers prior to attending a conference abroad are such ways suggested by many US universities for invoking the FRE.

To conclude, the investigation in the websites of different US universities confirmed that a great number of them have established export control policies and procedures including specific guidance and special websites dedicated to compliance with export controls and sanctions law. It would not be an exaggeration to say that information published in such websites provides a good insight into the US export control legislation as well as the ways that the latter is interpreted and implemented in a research context. Of course, different universities may publish more or less detailed information, adopt most or least elaborate procedures and invest resources according to their core competences and needs.

### **7.2.2 An Insight into university practices in the EU**

The study relied on two sources of information for verifying the state of play with regards to university export compliance in the EU, namely web-based research and direct inquiries to academics working for different European universities. In relation to the latter, an inquiry was addressed to a total of 160 professors and senior academics being involved in the evaluation of research proposals under the H2020. After a brief introduction to the main objectives of dual-use trade controls and the role of the EU regulation, the academics were called to answer whether:

- I. they are aware of dual-use issues and the requirements set in the EU regulation
- II. they know what is the state of play (awareness, compliance) with regards to such issues in their respective institutions
- III. there is somebody in their institution taking care of possible export control issues

The ultimate aim was to verify the level of awareness in different EU universities, contact those employees or departments in charge of export compliance and explore further sources of information in their university websites. The published ‘lists of experts’ containing the names of the external evaluators of research proposals in the framework of H2020 were utilised for selecting a suitable sample<sup>418</sup>. The sample is made up of academics representing mainly applied sciences and coming from a variety of EU countries. The selected experts participate in the evaluation of proposals falling mainly under the specific area of H2020 ‘industrial leadership’ and concerning research disciplines such as nanotechnology, advanced materials, biotechnology, advanced manufacturing and processing, and space. A total of 28 replies were collected representing universities from Austria, Belgium, Denmark, France, Germany, Hungary, Italy, Poland, Portugal, Spain, Sweden and the UK. Although the response rate does not permit to draw safe inferences for the overall situation in the EU, the findings are indicative of practices followed and problems arising in the EU context. The evaluation of the results can be found in the following section.

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<sup>418</sup> The lists are available by DG Research and Innovation in the Participants’ Portal under the section Reference Documents, retrieved from: [http://ec.europa.eu/research/participants/portal/desktop/en/funding/reference\\_docs.html#h2020-expertslists-excellent-erc](http://ec.europa.eu/research/participants/portal/desktop/en/funding/reference_docs.html#h2020-expertslists-excellent-erc).

**The Findings of the Survey:** Half of the academics replied that they do not know about the issues in question. The rest replied that they are partly aware of the dual-use concept and linked problems. In fact, 25% of the academics are aware of the dual-use regulation in particular whereas only 14% of their respective institutions implement a sort of compliance mechanism such as ethics committees on dual-use research and provision of related information on the universities' websites.

First, the level of awareness of dual-use issues among the evaluators of H2020 proposals does not appear to be high. This does not imply necessarily a flaw in the evaluation process since only some of the evaluators are also in charge of the ethics screening. The rest are concerned with other aspects such as the evaluation of scientific and technical parameters of the proposals. Quite interestingly, two of the respondents provided more specific information on their role as ethical reviewers. Both of them acknowledged that the dual-use regulation is one of the instruments used in the evaluation of proposals. "Checking the potential risks of research proposals involving transnational cooperation and technologies of dual-use concern are among the tasks entrusted to the reviewers," the first evaluator said. The other evaluator stressed that in all evaluations he was involved there was no concrete dual-use concern. Several reasons are likely to have contributed to this fact. To quote his words, "maybe, the most important is that the call topics I was involved were mostly at a very early stage of the innovation chain, not being fundamental research, but always at quite Low Technology Readiness Levels (TRL)". He also pointed out that "although it is clear that in most cases future innovation branches may also include non-peaceful applications, the calls and also the principles of H2020 agenda make clear that civil purposes are targeted". As a result "the proposals really focus on civil applications when discussing the potential impact and innovation of research". Exploring the potential of a research project to contribute to non-peaceful applications is a useful action to take from an early stage. However, determining whether there is a high probability of an export control risk to materialise is particularly challenging given that the evaluators are not export control trained and the applicable legislation is not always clear-cut.

A remark concerning the role of TRLs is pertinent here. Generally speaking, the TRLs are a nine-step scale for assessing the readiness of a given technology to be used for practical purposes. The TRLs metric was first developed by NASA scientists in 1970s and adopted by the Air Force Research Laboratory as a means of evaluating the readiness of technologies to be incorporated into a weapon or other type of system<sup>419</sup>. In fact, there are several –slightly varying- TRL scales used by governments and managers to select mature technologies for

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<sup>419</sup> The amended TRL scale used by the National Aeronautics and Space Administration (NASA) can be found in the following link:

[https://www.nasa.gov/directorates/heo/scan/engineering/technology/txt\\_accordion1.html](https://www.nasa.gov/directorates/heo/scan/engineering/technology/txt_accordion1.html);

See also: Ricardo Valerdi and Ron J. Kohl, "An Approach to Technology Risk Management", paper prepared for the Engineering Systems Division Symposium, MIT, Cambridge, MA, March 29-31, 2004, 2.

inclusion in their programs. The ‘Build in Canada Innovation Program’ is such an example of a public funding scheme using the TRLs metric<sup>420</sup>.

**Table VII: TRLs according to the Work Programme 2014-2015 of H2020<sup>421</sup>**

Technology Readiness Levels according to H2020 rules	
TRL-1	Basic Principles Observed
TRL-2	Technology Concept Formulated
TRL-3	Experimental Proof of Concept
TRL-4	Technology Validated in Lab
TRL-5	Technology Validated in Relevant Environment (industrially relevant environment in the case of key enabling technologies)
TRL-6	Technology Demonstrated in Relevant Environment (industrially relevant environment in the case of key enabling technologies)
TRL-7	System Prototype Demonstration in Operational Environment
TRL-8	System Complete and Qualified
TRL-9	Actual System Proven in Operational Environment (competitive manufacturing in the case of key enabling technologies; or in space)

In practice, the TRL scale ranges from the idea (level 1) to the full deployment of the product in the marketplace (level 9). More specifically, the first level is the lowest one and concerns ‘basic research’ relating to a technical field (*e.g.* fundamental investigations and related studies). The second level concerns applied research such as analytical studies and experimentation for formulating a technology concept and/or applications. In the H2020 context, wherever a call for proposals refers to or requires a specific TRL, the TRL scale specified in the General Annexes to the H2020 Work Program must be used. According to the evaluator, the TRLs are utilised also as a means for assessing whether dual-use risks connect to a specific proposal.

Second, it is rather worrying that half of the respondents seem to be unaware of the dual-use concept in general and export controls in particular. Certainly, it is not each and every researcher or university concerned with export controls but justifiably, one cannot be responsible if he or she is not aware of the existence of a problem. In some cases, the

<sup>420</sup> More information on the BCIP can be found here:

<https://buyandsell.gc.ca/initiatives-and-programs/build-in-canada-innovation-program-bcip/program-specifics/technology-readiness-levels>.

<sup>421</sup> See the H2020 Work Programme 2014-2015, *General Annexes*, 29, retrieved from:

[http://ec.europa.eu/research/participants/data/ref/h2020/wp/2014\\_2015/annexes/h2020-wp1415-annex-ga\\_en.pdf](http://ec.europa.eu/research/participants/data/ref/h2020/wp/2014_2015/annexes/h2020-wp1415-annex-ga_en.pdf).

responses were quite unexpected. Academics dealing with nanotechnologies or conducting research in electric propulsion replied ‘we are not concerned’ or even ‘we do not know about the issues in question’ or, ‘we do not do nuclear research’. Moreover, it was revealed that scientists working for institutions known to implement export compliance measures, they might be still unaware of dual-use issues. Being responsible in the conduct of research is also a matter of personal consciousness but such findings may indicate a need to step up awareness raising activities undertaken by both academic institutions and regulatory authorities.

Third, the survey shows that quite often universities address dual-use issues in the framework of ethics committees and codes of scientific conduct. Generally speaking, universities may adopt codes of ethical conduct covering from scientific fraud and ethical conduct of research to issues such as conflicts of interest and corruption<sup>422</sup>. Especially for life science research involving for instance, clinical trials and animals testing further guidance and universal codes of conduct are provided by international organisations, university networks and national academies of science<sup>423</sup>. The survey also suggests that the establishment of some kind of ethics committee or advisory body overseeing the implementation of such codes of conduct or other regulations and guidelines is a quite common practice in a research context. In Portugal, the University of Coimbra (UC) has established an ethical commission in charge of the screening of proposed projects requiring clinical trials<sup>424</sup>. However, till now dual-use has never been an issue for research and studies carried out in the Faculty of Pharmacy of UC.

In Belgium, the University of Leuven (KUL) has set up separate committees in charge of different aspects of research such as medical ethics, social and societal ethics, laboratory experimentation, data privacy, scientific integrity and most interestingly dual-use research<sup>425</sup>. KUL researchers rely on existing mechanisms for getting approval for certain types of research, reporting claims concerning current or past incidents or asking advice. In practice, the University offers a flowchart to advise researchers when they need to contact the different committees in place (see the Annex at the end of the study).

The public website of the Ethics Committee on Dual-Use Research (EC DU) draws from definitions and information used in the H2020 sources for discussing dual-use research. Therefore, one could assume that awareness of export control issues is owed partly to

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<sup>422</sup> One example is the Code of Conduct governing research in the University of Roma ‘Tor Vergata’ available in:

[http://web.uniroma2.it/modules.php?name=Content&action=showattach&attach\\_id=13032](http://web.uniroma2.it/modules.php?name=Content&action=showattach&attach_id=13032).

<sup>423</sup> Indicatively one could consult the following:

WHO, *Responsible Life Sciences Research for Global Health Security, A Guidance Document*, 2010, Geneva, retrieved from:

[http://apps.who.int/iris/bitstream/10665/70507/1/WHO\\_HSE\\_GAR\\_BDP\\_2010.2\\_eng.pdf](http://apps.who.int/iris/bitstream/10665/70507/1/WHO_HSE_GAR_BDP_2010.2_eng.pdf).

Royal Netherlands Academy of Arts and Sciences, *Improving Biosecurity, Assessment of Dual-use Research*, 2013, retrieved from: <https://www.knaw.nl/shared/resources/actueel/publicaties/pdf/advies-biosecurity-engels-web>.

<sup>424</sup> The webpage of the ethics commission can be consulted in the following link:

<http://www.uc.pt/fmuc/orgaosconsultivos/comissaoetica>.

<sup>425</sup> The relevant information can be found in the KUL website, available in:

<https://www.kuleuven.be/english/research/integrity/committees>.

initiatives undertaken under the Horizon 2020 and explained in chapter 4.1. An application form for requesting approval by the dual-use committee is also available in its public website<sup>426</sup>. The applicants are called to provide a short description of the project that is already submitted or about to be submitted for funding including also the sponsor's description. For research involving cross border transfers, researchers are required to declare how they conform to the imperatives set by the dual-use regulation. Researchers must also clarify whether their research is subject to 'military ethical standards' or otherwise, has potentially military applications. In that regard, pathogen-related research, autonomous robotics, drones and specific laser technologies are mentioned as examples of potentially sensitive research. In case of research funded by military organisations further information is required. Depending on the source of the funding the assessment of the committee may have either an advisory or a binding character. For instance, for projects funded under the H2020 and relating EU funding schemes the final approval rests on the EU funding body. Instead, for research funded through internal and federal funds the opinion of committee will be binding.

The University of Uppsala in Sweden constitutes another example of academic institution addressing export controls in the context of the broader ethics discussion. The CODEX website run by the Swedish Research Council in collaboration with the university's centre for Research Ethics and Bioethics addresses different types of concern relating to broad areas of science<sup>427</sup>. Dual use research is mentioned in connection with natural sciences. The website offers an overview of the legislation including links to non-proliferation Treaties and the UNSCR 1540, national laws administered by the Swedish Agency for Non-Proliferation and Export Controls, the EU regulation and sanction regulations. While the website provides a good insight into the logic and main issues relating to export controls, it is highly probable that no formal procedure or mechanism addressing export control concerns exists. It comes out that it is the sole responsibility of the researcher to identify such an issue and ask for an authorisation as required by the law.

Fourth, there must be a relationship between proactive university compliance stance and vigorous implementation of trade controls involving for instance in-reach activities towards the academia by the regulatory authorities. For instance, universities established in Members States known to dedicate increased resources to export controls such as Germany and the UK appear to be in general better informed compared to universities originating from other Member States. The validity of this argument requires further evidence and it does not imply an inadequate implementation of export controls by other Member States. For example, the survey showed that universities based in Member States such as Belgium, Portugal and Sweden can be aware of export controls as well.

Another interesting remark is that even in cases where the evaluators were aware of the dual-use problematic and stated with most or least certainty that their respective institutions take

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<sup>426</sup> The form can be accessed in the following link:

<http://www.kuleuven.be/ethicsatarenberg/page.php?FILE=subject&ID=676&PAGE=1&LAN=E>.

<sup>427</sup> University of Uppsala website, "CODEX: rules and guidelines for research: Dual-use research" retrieved from: <http://www.codex.vr.se/en/teknat4.shtml>.

care of such issues further inquiries to the Universities were most of the time unsuccessful. Additionally, certain responses in the survey and further contacts with university officers suggest that the EU universities have become aware of export control issues only recently. In addition, for certain universities it is clear that specific policies addressing such concerns will not be introduced. In the words of a legal officer, “we are unlikely to have a large number of projects concerned by dual-use requirements and therefore, we would intend to consider them on a case-by-case basis rather than put in place an explicit policy or process”.

**The UK’s Approach by Alpha Project:** With a view to completing the analysis of the situation in the EU a special reference must be done to the situation in the UK. The Higher Education Guide and Toolkit on Export Controls drafted by the Project Alpha of the King’s College of London (KCL) and the Association of University Legal Practitioners constitutes a good basis for discussing different aspects of the UK system<sup>428</sup>. The document was prepared with support from the UK’s Export Control Organisation (ECO) and offers an analysis of the UK legislation affecting potentially the activities of academic institutions. Also, it provides advice and specific tools such as fictitious case studies, flowcharts, models of policy statements and examples of ‘red flags’ for addressing export control issues and complying with the applicable laws in a university setting. This is probably one of the very few initiatives taken with the support of an export control authority in the EU and providing detailed guidance to academic institutions<sup>429</sup>.

Three remarks are relevant here. First, the document provides an insight into the approach of the UK authorities concerning all different aspects of export controls. What does the term ‘export’ comprise according to the UK interpretation? What might be considered as technology ‘necessary’ for the development, production and use of a controlled item? The Guide discusses also the decontrols for information ‘in the public domain’ and ‘basic research’ on the basis of the Export Control Order of 2008. Whereas both the UK legislation and the Guide do not go too far in relation to what is already known by the EU regulation, certain issues are clarified. For instance, item, information, technology or research is not in the public domain if<sup>430</sup>:

- needs to be bought from a supplier who controls the supply;
- requires registration;
- is restricted for access by certain people only; or

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<sup>428</sup> The Higher Education Guide and Toolkit on Export Controls and the ATAS Student Vetting Scheme, drafted in partnership by the Association of University Legal Practitioners and Project Alpha of King’s College London and with support of Export Control Organisation and the Foreign and Commonwealth Office, (April 2015) can be consulted in: <http://www.projectalpha.eu/academia>.

<sup>429</sup> In addition to the guide by the Alpha project, the British licensing authority has published specific guidance on the topic: UK Department of Business, Innovation and Skill (BIS), Export Control Organisation, *Guidance on Export Control Legislation for Academics and Researchers in the UK*, 2010, available in:

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/68680/Guidance\\_on\\_Export\\_Control\\_Legislation\\_for\\_academics\\_and\\_researchers\\_in\\_the\\_UK.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/68680/Guidance_on_Export_Control_Legislation_for_academics_and_researchers_in_the_UK.pdf)

<sup>430</sup> The Higher Education Guide, 17.

- is subject to Government and Ministry of Defence security classifications (e.g. commercially confidential information, Official Secrets Act, etc.).

Second, it is clarified that the public domain and basic research exemptions do not apply in the case of an end-use or sanctions control<sup>431</sup>. It could be interesting to know if such an interpretation is shared by all EU Member States. Different Member States have acknowledged that applying catch-all controls in the context of research activities involving transfers of items and technologies is a plausible case<sup>432</sup>. However, it is not clear whether the implementation of a catch-all control impairs the applicability of decontrols. This could potentially mean the unlimited discretion of a licensing authority to decide on the dissemination of any scientific information or technology. In response to this, section 8 §1 of the UK Export Act (2002) stipulates that any interference of protected freedoms must be no more than is strictly necessary<sup>433</sup>.

It should be also reminded that end-use controls are implemented on the condition that the exporter has been informed by the competent authority or he is aware that an item, technology, software or service is to be used in connection with a WMD purpose outside the EU. In the UK practice, transfers of technology and software also within the UK are included in the scope of end-use controls where the transferor knows or has been informed that the technology is intended to be used outside the EU for such a purpose<sup>434</sup>. This means that for example, teaching in the context of a university course may fall within the purview of an end-use control.

Third, another means for addressing proliferation concerns in the UK context is the Academic Technology Approval Scheme (ATAS) operated by the Foreign and Commonwealth Office. The ATAS is a student vetting scheme for nationals who originate from countries other than the UK, EEA, or Switzerland and wish to study in a British university<sup>435</sup>. In practice, ATAS certificate seeks to ensure that individuals who apply to study certain sensitive subjects do not have links to WMD programmes. ATAS certificates are required in addition to the normal visa procedures for certain post-graduate courses. It is the responsibility of the University to assign the appropriate Joint Academic Coding System (JACS) code and inform the applicant students if an ATAS requirement applies for their course program.

It should be noted that in the EU, non-proliferation concerns are dealt with in the framework of student visa procedures. For short stays -up to three months- the common visa procedures

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<sup>431</sup> Certain provision of Articles 6, 7, 10, 11, 12 and 19 of the Export Control Order supplement the catch-all provision of the Regulation by clarifying the specific cases where a transfer or export of non-listed items, software, technology or service may require an authorisation. See the Export Control Order 2008, retrieved from:

[http://www.legislation.gov.uk/uksi/2008/3231/pdfs/uksi\\_20083231\\_en.pdf](http://www.legislation.gov.uk/uksi/2008/3231/pdfs/uksi_20083231_en.pdf).

<sup>432</sup> This was for instance the opinion of the Member States that participated at the 7<sup>th</sup> ESARDA Export Control Working Group.

<sup>433</sup> UK Export Control Act 2002, 5-6, available in:

[http://www.legislation.gov.uk/ukpga/2002/28/pdfs/ukpga\\_20020028\\_en.pdf](http://www.legislation.gov.uk/ukpga/2002/28/pdfs/ukpga_20020028_en.pdf).

<sup>434</sup> See Article 10 of the Export Control Order 2008.

<sup>435</sup> For more information on ATAS see the webpage of the UK government:

<https://www.gov.uk/guidance/academic-technology-approval-scheme>.

for the Schengen Area apply<sup>436</sup>. However, for longer stays, applicants are required to follow the procedures set at national level (normally a resident permit will also be required in addition to a valid visa). In practical terms, the extent to which a non-proliferation screening takes place may vary from country to country. For instance, certain Member States appear to be quite proactive by proceeding to inter-service consultations between visa issuing authorities (such as consulates and embassies) and other security agencies -including export control authorities- prior to approving visa applications<sup>437</sup>.

**Examples of University Compliance Practices in the UK:** It is useful to take a look at the ways whereby UK universities respond in practice to requirements set in the legislation. The section draws mainly on information available in the websites of renowned British universities undertaking multidisciplinary research and promoting innovation through partnerships with industry and other research organisations<sup>438</sup>. First of all, as it was shown also in the survey, ethics committees and policies for research integrity are in place. This is particularly the case for research involving humans and clinical trials with human tissue or, using personal data of individuals<sup>439</sup>. For instance, the Cambridge University has four School-level Research Ethics Committees and in addition, some departments, faculties and institutes also have their own local committees. In relation to this, funding organisations such as the Economic and Social Research Council (ESRC) may require from universities to have some sort of internal mechanism for ethical review of all research funded under their frameworks.

We believe that deciding what to research is a matter for the individual researcher or research group. This belief reflects the value we accord to the principle of academic freedom, enabling the pursuit of academic enquiry subject to the norms and standards of scholarly undertaking, without interference or penalty. This freedom [...] will ensure that our strong core disciplines flourish.

*Oxford Research Strategy*<sup>440</sup>

Export Controls are among the issues addressed by the main research policies on approval procedures for sponsored research and collaboration agreements with third organisations. For instance, the webpage of the Imperial College London has a specific section with the heading ‘non-standard factors’ that can affect the normal application process or contract negotiation

<sup>436</sup> For more information on the Schengen Area visa policies see the website of DG Home:

[http://ec.europa.eu/dgs/home-affairs/what-we-do/policies/borders-and-visas/schengen/index\\_en.htm](http://ec.europa.eu/dgs/home-affairs/what-we-do/policies/borders-and-visas/schengen/index_en.htm).

<sup>437</sup> Information drawn from discussions with Member State representatives in the margins of the 55<sup>th</sup> Dual-Use Coordination Group meeting, 24 September, 2015.

<sup>438</sup> The websites of the University of Cambridge, University of Oxford and the Imperial College of London were used as a source of information.

<sup>439</sup> See for instance the webpages of the Imperial College London Research Ethics Committee: <http://www.imperial.ac.uk/research-ethics-committee/purpose-of-icrec/>; the University of Cambridge Research Ethics webpage <http://www.research-integrity.admin.cam.ac.uk/research-ethics> and the Central University Research Ethics Committee (CUREC) of the Oxford University: <https://www.admin.ox.ac.uk/curec/>.

<sup>440</sup> Information retrieved from the website of the Oxford University, available in: <https://www.ox.ac.uk/about/organisation/strategic-plan/research?wssl=1>.

and, which may delay the Institutional Authorisation to submit the application or execute the agreement, if not established and considered in the early stages of proposal development. Among these factors is ‘research that can be used or modified for military purposes’<sup>441</sup>. In addition, the Research Office provides further guidance on the issue of export controls. This is the case also with other Universities such as Cambridge and Oxford.

In practice, the Universities under examination offer basic information on the legislation, examples of controlled items, and make special references to end-use controls. The Oxford for instance, clarifies that the research service has registered on the University’s behalf in SPIRE so that licence applications and queries can be submitted and that, individual researchers can also directly register on SPIRE<sup>442</sup>. In addition, the university websites provide links to the consolidated UK control list of dual-use and military items as well as the guidance provided by the UK government and the Higher Education Guide.

Export control issues are dealt with mainly by officers from the legal or technology transfer departments and staff from research offices. Contacts with officers from the legal and research services confirmed that presently there are not comprehensive policies and internal controls on export compliance. As R. Boyle notes "in Cambridge responsibility lies primarily within departments and with researchers, partly because Cambridge is quite decentralised and also because the export control regime is very technical -only the actual researchers may know if their experiments might be captured by the controls". Some universities such as the Imperial College of London operate central research compliance offices dealing with legal, ethical and scientific aspects in certain areas of research such as healthcare. It is worth wondering whether existing mechanisms such as central research offices could assume a more proactive role in ensuring compliance with export controls. In any case, raising awareness through websites and information seminars for scientific and administrative staff as well as providing points of contact for export control queries are among the initiatives increasingly taken by many British universities<sup>443</sup>.

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<sup>441</sup> See relevant information in: <http://www.imperial.ac.uk/research-and-innovation/research-office/preparing-a-proposal/non-standard-factors/>.

<sup>442</sup> Information retrieved from the University of Oxford webpage offering “Guidance on Export Control Legislation”, available in: <https://www.admin.ox.ac.uk/researchsupport/contracts/export/>.

<sup>443</sup> See indicatively, information provided by the University of Birmingham: <https://intranet.birmingham.ac.uk/as/registry/policy/programmemodule/programmes/exportcontrols.aspx> and, the export controls policy of the University of Surrey in: [http://www.surrey.ac.uk/policies/export\\_controls\\_policy.htm](http://www.surrey.ac.uk/policies/export_controls_policy.htm).

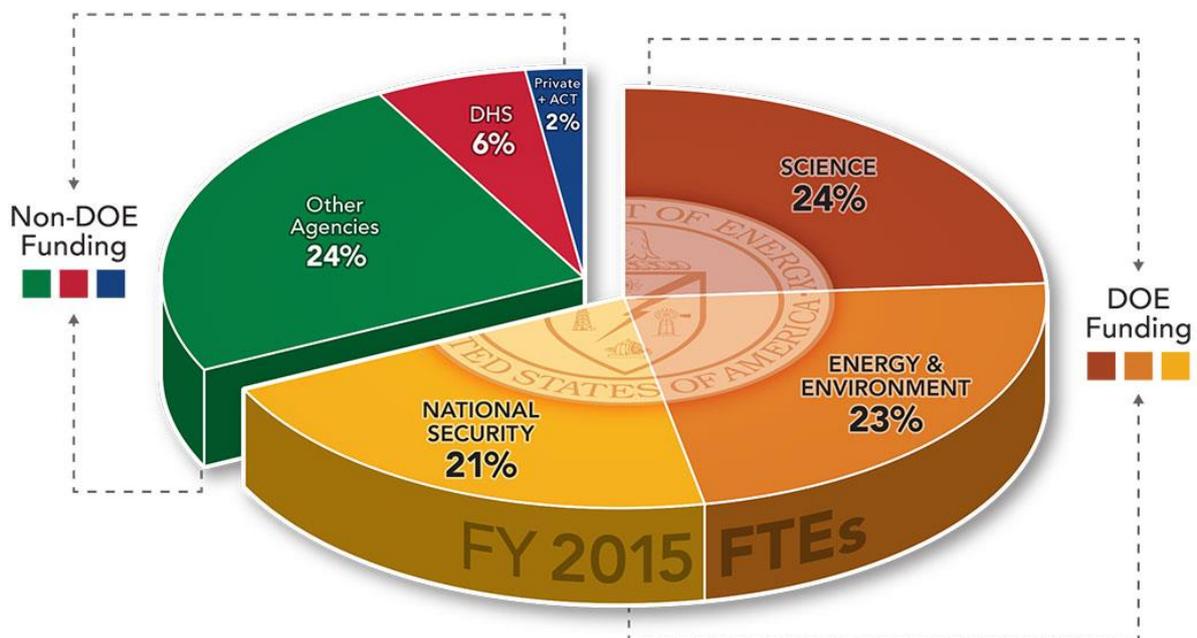
### 7.3 Other research organisations

This section analyses the cases of two non-university research organisations in the US and Germany with a view to elucidating what are the export compliance strategies adopted and practices implemented pursuant to export control laws.

#### 7.3.1 The Pacific Northwest National Laboratory (PNNL)

**The Identity of the Organisation:** The PNNL was founded in 1965 and is operated since then by Battelle the world’s largest non-profit R&D organization<sup>444</sup>. It is one of the 10 U.S. Department of Energy national laboratories managed by DOE's Office of Science<sup>445</sup>. It conducts innovative research in a variety of disciplines from environmental molecular sciences and biotechnology to security including cyber security and non-proliferation matters. PNNL operates research facilities in different locations in the US territory such as in Washington and Oregon and its main campus is located in Richland (Washington). It undertakes research for and collaborates with government agencies, universities and industry. Its R&D expenditure for fiscal year 2015 was \$955 million and made up of funding sources including the DOE, other federal, State and local agencies, universities and industry sponsors. Around 4.300 scientists, engineers and non-technical staff are employed in its premises and the number of visiting scientists and other users was 2000 for 2013.

**Figure XII: Sources of R&D expenditure for fiscal year 2015<sup>446</sup>**



<sup>444</sup> Battelle headquartered in Columbus (Ohio) has managed and operated PNNL for DOE and its predecessors since the Laboratory's inception in 1965.

<sup>445</sup> There is a total of 17 National Laboratories managed for the account of DOE. The Office of Science is the steward for 10 of them. More information can be found on the website of the US DOE, Office of Science, available in: <http://science.energy.gov/laboratories/>.

<sup>446</sup> PNNL website: About PNNL Business Facts, Fiscal Year 2014, retrieved from: <http://www.pnnl.gov/about/facts.asp>.

**Export Compliance Practice at PNNL<sup>447</sup>:** The PNNL Export Control Office (ECO) was formally set up in 2009 with the task of reviewing all the activities of the organisation requiring an export control clearance. The realisation of the importance of operating an internal export compliance system originated from contacts and communications with the competent regulatory authority. With regards to organisational and operational aspects, the ECO employs currently 4 fulltime staff members including the manager and receives support from at least 8 other employees from the legal, property, contracts and procurement departments. PNNL's compliance office resides in the Safeguards and Security Services Division (SSSD) and it represents a stand-alone function. The overall responsibility for export compliance lies with the legal department whereas the day-to-day supervision of export related tasks is assumed by the ECO manager. It is estimated that the full development and operation of the compliance policies and procedures took about two to three years from the moment of the initial inception of the system. This seems to be in accordance with what section 7.2.1 suggests for the US universities.

The PNNL's capabilities cover different points in the spectrum of scientific activities from basic to applied research and export controls do affect its collaboration with industry and academia (joint projects, licensing invention/patents and consulting services). In fact, the PNNL has applied for different types of authorisations pursuant to military, dual-use, nuclear and sanction controls. Concerning risk management practices, a useful way for assessing the risks and identifying priority areas is at the phase of planning of a new research project. Many companies operate a 'Gate Review Process' that is a conceptual and operational road map for moving a new project from idea to launch. Researchers getting engaged in such a process need to contact the security, legal and export control services prior to entering into a formal collaboration with an industry partner. This way potential export control risks are assessed at an early stage.

A. Rittel, export compliance manager at PNNL considers that making the staff aware of export compliance and training them on the occasions requiring contacting the ECO for further advice is a key element for the proper functioning of the system. In relation to this, particular attention has been paid to training activities. The ECO conducts routinely training seminars upon request by the lab personnel and whenever is deemed as necessary. Export control modules and objectives have been incorporated into the annual security refresher -an electronic awareness raising course- and general awareness brochures dealing with a range of compliance matters. In addition, an export control website available internally and a video series freely accessible in the 'YouTube' can be consulted for drawing further information on export controls. On top of that, commitment statements by lab directors and videos having as spokespersons officers high in rank increase the consciousness that export compliance does matter for the organisation.

When it comes to technology controls a variety of tools are utilised for monitoring sensitive transfers. Security clearances for hiring new staff, approval procedures for foreign visitors and travels abroad as well as access controls, and specific procedures for IT security are all

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<sup>447</sup> Information retrieved after communication with Alan Rittel, export control manager at PNNL.

included in the quiver of the export compliance strategy. The implementation of export compliance measures is underpinned by policies and accompanying material such as an export control manual for lab personnel and an export guidebook for export control staff. Although a lab procedure exclusive to export compliance does not exist, export control requirements are embedded in the major activities in which PNNL is involved such as international shipping and foreign national visits. Not surprisingly, the implementation of the deemed export rule represents a quite challenging issue in a research organisation employing several foreign scientists for accomplishing its research portfolio. The application of the fundamental research exclusion is done on the basis of the intent to publish the results of a scientific research. Also, it requires assessing any security implications of a given publication and the close collaboration between the export control officers and the researchers.

The PNNL is working to set a higher standard in export compliance and non-proliferation by considering all available means. It also recognizes that it must increase visibility of PNNL's export control compliance program and step up compliance efforts in certain respects. For instance, implementing stringent compliance practices such as preferentially procuring from and subcontracting with companies that maintain strong export compliance programs and, considering inclusion of export control objectives in key management documents are such initiatives under consideration<sup>448</sup>. Although the US authorities have not published best practices and specific standards for national laboratories, quite similar approaches are implemented across the DOE lab complex. In relation to this, there is also the Office of Safety and Security Policy operated by DOE and overseeing the safety and security policies and procedures implemented by different national laboratories. Export control policies are not explicitly mentioned among the areas dealt with by this office<sup>449</sup>.

### **7.3.2 The Helmholtz Zentrum of Berlin (HZB)<sup>450</sup>**

**The Identity of the Organisation:** The 'Helmholtz Zentrum Berlin für Materialien und Energie GmbH' (HZB) is a member of the Helmholtz Association. The latter is made up of 18 centres representing Germany's largest scientific research community with activities throughout Europe and worldwide. Each year, thousand scientists and researchers come to the Helmholtz Centres from all over the world to work on the large-scale scientific facilities and instrumentation that these centres provide. In some cases, this equipment is the only one of its kind in the world. Although legally independent, representatives from federal and Länder government participate in the external decision making body –the senate- coordinating *inter alia* in which areas public money should be allocated. One could reasonably expect that the largest German research association performing cutting-edge research in a variety of areas takes precautions against export control risks. For that case study the spotlight is on HZB.

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<sup>448</sup> Information from presentation” by Kevin Whattam, “Enhancing Export Control Awareness at PNNL, at 5<sup>th</sup> ESARDA Export Control Working Group Meeting, November 11-12, 2014, Rome, Italy.

<sup>449</sup> Information retrieved from the website of Office of Science, DOE, available in: <http://science.energy.gov/laboratories/>.

<sup>450</sup> Information drawn from the official websites: [https://www.helmholtz-berlin.de/zentrum/index\\_en.html](https://www.helmholtz-berlin.de/zentrum/index_en.html) and, [http://www.helmholtz.de/en/about\\_us/die\\_gemeinschaft/facts\\_and\\_figures/](http://www.helmholtz.de/en/about_us/die_gemeinschaft/facts_and_figures/).

**Table VIII: The Helmholtz Association at a glance**

<i>The Helmholtz Association</i>	
<i>N° of research centres:</i>	18 throughout Germany
<i>International offices:</i>	Brussels, Moscow, Beijing
<i>Scope of research activities:</i>	1. Energy, 2. Earth and Environment, 3. Health, 4. Aeronautics, Space and Transport, 5. Key Technologies, 6. Structure of Matter
<i>N° of employees: (2013 figures)</i>	38,036 of which 14,734 are scientists
<i>N° of foreign scientists: (2014 figures)</i>	7,476 work at the Helmholtz Centres
<i>Budget: (2015 figures)</i>	€4.24 billion (2/3 from public sponsors)
<i>N° of publications: (2014 figures)</i>	13,549 in ISI or SCOPUS-indexed scientific journals
<i>N° of patents:</i>	An average of 400 patents each year
<i>Revenue from collaborations with industry:</i>	About 2,000 collaborative projects with industry with revenues of appr. €158 million
<i>Revenue from licensing agreements:</i>	€14.2 million from about 1,400 licencing agreements

The main areas of activity of HZB relate to the exploration and test of new materials and complex material systems that help to face challenges such as energy conversion and efficient use of energy and resources in information technology. To that effect, HZB operates two large-scale facilities for basic physics research on the structure and function of matter: the research reactor BER II for neutron experiments and the third generation synchrotron radiation source BESSY II including a number of state-of-the-art laboratories and user facilities. This research infrastructure is used by researchers from universities, foreign research institutions and industry. Indeed, the two HZB campuses -Wannsee and Adlershof-

welcome each year about 3,000 visiting scientists<sup>451</sup>. Although HZB work has exclusively a focus on peaceful applications, the dual-use nature of certain facilities and equipment used and the high number of collaborations and exchanges with foreign scientists and universities may pose some security risks including export related ones. HZB acknowledging this contingency implements a number of safety and security measures including export compliance procedures.

**Table IX: The identity of the Helmholtz Centre Berlin (HZB)**

<i>The Helmholtz Zentrum Berlin (HZB)</i>	
<i>N<sup>o</sup> of employees:</i>	1,114
<i>Visiting scientists:(including trainees and PhD students)</i>	3,000
<i>Campuses:</i>	Berlin-Wannsee and Berlin-Adlershof
<i>Budget:</i>	€146 million Euros (2015)
<i>Partners:</i>	About 400 German and international universities, research institutes, and companies

**Export Compliance Organisation at HZB<sup>452</sup>:** In HZB, export compliance is considered as a stand-alone function and it is coordinated by a legal advisor setting the main policies and procedures to be followed by all staff concerned and, supervising the work of the different employees in charge of export compliance. The legal advisor reports directly, at senior level, to the Administrative Director who bears the overall responsibility for export compliance. Nonetheless, the day-to-day execution of export related tasks is dealt with mainly by staff in the Purchasing and Materials Logistics department. Indeed, the legal advisor and the responsible staff from the Purchasing and Materials Logistics –a total of three people- they are assigned as Export Control Officers (ECOs). As it is the case with other organisations, the ECOs are not solely concerned with export compliance and they collaborate with colleagues from other departments as appropriate. The Legal Office, the Personnel and Social Matters Department and the Compliance Management Office are the most common examples of other services contributing to export compliance objectives. In addition, the User Coordination Department takes into account export control requirements when implementing approval procedures with regards to the access and use of the HZB facilities by external researchers.

<sup>451</sup> For many research questions, it is a huge advantage to be able to study different material samples using both neutrons and synchrotron radiation: By combining these two complementary methods, a more complete picture of matter is obtained.

<sup>452</sup> Information retrieved from interviews with Dr. Ulrike Behrns, assistant to the Administrative Director and legal advisor on export compliance at HZB.

Last but not least, the scientists themselves are called to provide their expertise and clarify possible implications of their research.

How does the management of a research institution become aware of trade control requirements and perceive export control risks is always an interesting question to ask. Not surprisingly, at HZB the issue of trade controls came to the forefront after an audit conducted by the German customs back in 2007. Thence, a rudimentary compliance mechanism was introduced relying mainly on an electronic system for the monitoring and, approval where appropriate, of all transfers of materials and equipment outside Germany. At the time an e-system for approving visits of foreigner scientists was also set in place. However, this preliminary effort was not backed up with formal export control policies setting main principles and procedures to be followed.

Since 2013 a formal compliance system has been established at HZB and the task to enhance internal compliance controls is seen as an ongoing effort. For tangible transfers, the electronic system in place deals with requirements set in the different legal frameworks: transport and safety rules; import regulations and reporting obligations under the Additional Protocol to Safeguards agreements and naturally, export requirements for dual-use equipment and technology<sup>453</sup>. According to ECO, HZB conducts mainly fundamental research and the number of formal applications for exports to non-EU countries is limited. For 2014, a total of 300 exports were reviewed at the HZB from which 60% concerned transfers within the EU and the rest exports to non-EU destinations. Most of the time, the activities of the HZB involve temporary exports (*e.g.* for repairs), transfers of samples and materials and only rarely transfers of listed dual-use equipment. In fact, for 2014 there has been no license for dual exports whereas in 2015 there was just one authorisation. The risk identification and mitigation concerns in-house activities, activities undertaken abroad as well as screening of cooperation agreements with firms and other research institutions. For dubious cases formal inquiries may be submitted to the German licensing authority. In fact, four formal inquiries to BAFA have been recorded in 2014 and two in 2015.

Concerning transfers of technology, HZB implements internal controls for visiting guests and official travels to non-EU countries. Export control risks are assessed mainly through existing procedures. For example, approval procedures for travels abroad have been established. In the near future, an information sheet regarding information sharing and export risks will be introduced in an electronic workflow required for getting approval for travels abroad. In relation to this, a handbook assisting HZB staff to assess potential risks relating to travels in non-EU countries will be introduced as well. As it is the case with many research establishments access of visiting scientists and employees to certain laboratories or buildings is subject to prior approval and access controls. The screening procedures may differ

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<sup>453</sup> In practice, researchers are required first to read information about possible applicable export rules. A pop-up window appears in case of transfer to EU countries- and the applicant has to declare whether an export control issue relates to their transfer. The reason for this is Annex IV that concerns only a limited number of particularly sensitive items and for which a different procedure applies. If there is no such issue then they can proceed with the electronic workflow. Otherwise and in case of exports to non-EU countries, the application is subject to further review by the responsible ECO.

depending on the duration of the guests' stay in the institution. Internal controls apply also for accessing data through the intranet. For example, visitors are able to access only the guest network while employees have normally full access to HZB intranet. As discussed above, HZB has in place a user system allowing external researchers to access its facilities. This is for instance the case for beam-time applications (time allocated to researchers for use of a beam of photons from BESSY II source)<sup>454</sup>. The evaluation of applications concerns as much scientific and technical aspects as security (*e.g.* trade control and sanction requirements) and safety issues (*e.g.* radiation protection rules).

Maintaining high standards of compliance requires increasing the level of awareness and cultivating a culture of compliance. With a view to living up to this challenge, HZB relies on its intranet webpage, internal notes and training sessions for communicating export control objectives. The trainings are half-day seminars taking place once a year and their thematic extends to a broad range of matters such as anticorruption, regulations for publicly funded research and other compliance requirements. The implementation of the export compliance system is monitored and the results are reported once a year to the Administrative Director who evaluates the overall progress and decides for further improvements. Depending on the identified areas of concern ad hoc trainings conducted by the German licensing authority may be scheduled. This possibility is offered by BAFA to every research establishment requesting such training. The ECO singled out the need to ensure proper information sharing and raise awareness as a constant challenge given the dynamic context of the organisation (flows of PhD students, trainees and visiting researchers). Also, striking a balance between the freedom of research and export control regulations is a particularly challenging task given the lack of common criteria to interpret the basic research exemption. Integrating export control objectives to existing procedures and offering regular trainings seem to be a key to establishing a sound internal compliance system in a research setting.

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<sup>454</sup> The evaluation of applications for beam-time is entrusted to the HZB Scientific Selection Panel and it involves the scientific and technical assessment of the submitted work as well as a risk assessment. Regular access at HZB is free of charge for national and international academic users. Private sector researchers can use the HZB facilities provided that the research is in collaboration with an academic partner from a university or research organization. However, industry users and any users who do not wish to publish their results of HZB experiments in the public domain they need to purchase beam-time. Information retrieved from: [https://www.helmholtz-berlin.de/user/beamtime/types-of-beamtime\\_en.html](https://www.helmholtz-berlin.de/user/beamtime/types-of-beamtime_en.html).

## **8. Tailoring ICPs to the Needs of Research Organisations: the Case of the European Commission Joint Research Centre**

This chapter suggests how the risk identification process can take place in practice so as to design compliance measures tailored to research organisations. The intent is to use the Joint Research Centre as a test case for elaborating and completing a model risk assessment to be applied in the initial phase of development of an ICP. As section 6.3 suggests such a risk assessment can be considered as a necessary condition for implementing effective compliance mechanisms. The Joint Research Centre is a European Commission Directorate General (DG) having a distinct role compared to all others. Its primary objective is to conduct research with a view to backing the EU policy making. This way the JRC does not only provide independent scientific and technical input to the other DGs but also has an impact on innovative research carried out in a variety of fields from nuclear security to safety standards and from environmental research to cyber security. From its foundation under Article 8 of the EURATOM Treaty as the Joint Nuclear Research Centre in 1958 till today's multidisciplinary research work, many things have changed except this: the JRC's contribution to the nuclear safety and security in Europe and beyond<sup>455</sup>.

As the Commission's in-house science service, the Joint Research Centre's mission is to provide EU policies with independent, evidence-based scientific and technical support throughout the whole policy cycle. Working in close cooperation with policy Directorates-General, the JRC addresses key societal challenges while stimulating innovation through developing new methods, tools and standards, and sharing its know-how with the Member States, the scientific community and international partners.

*JRC Mission Statement*<sup>456</sup>

Today, the organigram of the JRC comprises seven research Directorates, three Directorates coordinating the overall operation of the JRC plus the Board of Governors and the assistants to the Director General<sup>457</sup>. The three policy support Directorates are the following: **A. Policy**

<sup>455</sup> “After consulting the Scientific and Technical Committee, the Commission shall establish a Joint Nuclear Research Centre. This Centre shall ensure that the research programmes and other tasks assigned to it by the Commission are carried out. It shall also ensure that a uniform nuclear terminology and a standard system of measurements are established. It shall set up a central bureau for nuclear measurements”. See Article 8 §1 of the Treaty Establishing the European Atomic Energy Community (also known as EURATOM or EACC) as of March 2010, retrieved from: [http://europa.eu/eu-law/decision-making/treaties/pdf/consolidated\\_version\\_of\\_the\\_treaty\\_establishing\\_the\\_european\\_atomic\\_energy\\_community/consolidated\\_version\\_of\\_the\\_treaty\\_establishing\\_the\\_european\\_atomic\\_energy\\_community\\_en.pdf](http://europa.eu/eu-law/decision-making/treaties/pdf/consolidated_version_of_the_treaty_establishing_the_european_atomic_energy_community/consolidated_version_of_the_treaty_establishing_the_european_atomic_energy_community_en.pdf).

<sup>456</sup> ‘JRC in brief’ from the JRC’s Science Hub website, retrieved from: <https://ec.europa.eu/jrc/en/about>.

<sup>457</sup> The JRC has recently undertaken (April 2016) a major reorganization with a view to streamlining and modernising its model of governance. For instance, all the nuclear related Units will come under

**Support Coordination, B. Resources and C. Ispra Site Management.** The seven research institutes are listed below (the numbering follows the organigram of the JRC):

**D. The Institute for Reference Materials and Measurements (IRMM)** develops advanced measurement standards and provides state-of-the-art scientific advice concerning measurements and standards for EU policies.

**E. The Institute for Transuranium Elements (ITU)** contributes to an effective safety and safeguards system for the nuclear fuel cycle. It also undertakes research associated with technological and medical applications of radionuclides/actinides.

**F. The Institute for Energy and Transport (IET)** seeks to ensure sustainable, safe, secure and efficient energy production, distribution and use and, it fosters sustainable and efficient transport in Europe.

**G. The Institute for the Protection and Security of the Citizen (IPSC)** contributes to a variety of EU policies ranging from global stability and crisis management to maritime security and fisheries management and from the protection of critical infrastructures to digital security. The IPSC performs also statistics and information analysis for the evaluation of the effectiveness of policies and to enhance financial stability.

**H. The Institute for Environment and Sustainability (IES)** conducts research concerning the protection of the environment promoting thereby the efficient and sustainable management of natural resources at global and continental scale.

**I. The Institute for Health and Consumer Protection (IHCP)** undertakes research in the areas of food, consumer products, chemicals and public health by contributing to the set and harmonisation of safety standards.

**J. The Institute for Prospective Technological Studies (IPTS)** provides science-based evidence concerning the socio-economic, scientific and technological impact of certain EU policies.

The JRC employs over 3000 people coming from throughout the EU and bringing their skills and talents to work on scientific activities meant to underpin the EU policy-making process. About two thirds of the staff are scientists or work on scientific projects, 21% carry out administrative or support activities and 2% work in nuclear decommissioning and waste management.

The JRC budget is made up by funds from the EU's framework programme for research and innovation, Horizon 2020, for its non-nuclear work and by the EURATOM Research and Training Programme for its nuclear work. Further income is generated by the JRC through additional work for Commission services, and contract work for third parties such as regional authorities and industry. In practical terms, one may distinguish between 'institutional' projects funded directly by the H2020 and the EURATOM budget and 'competitive' ones

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the roof of one Institute. Yet, the main areas of work and competence will remain as described in the doctoral study.

funded under contracts with other Commissions DGs, research organisations, governments and firms.

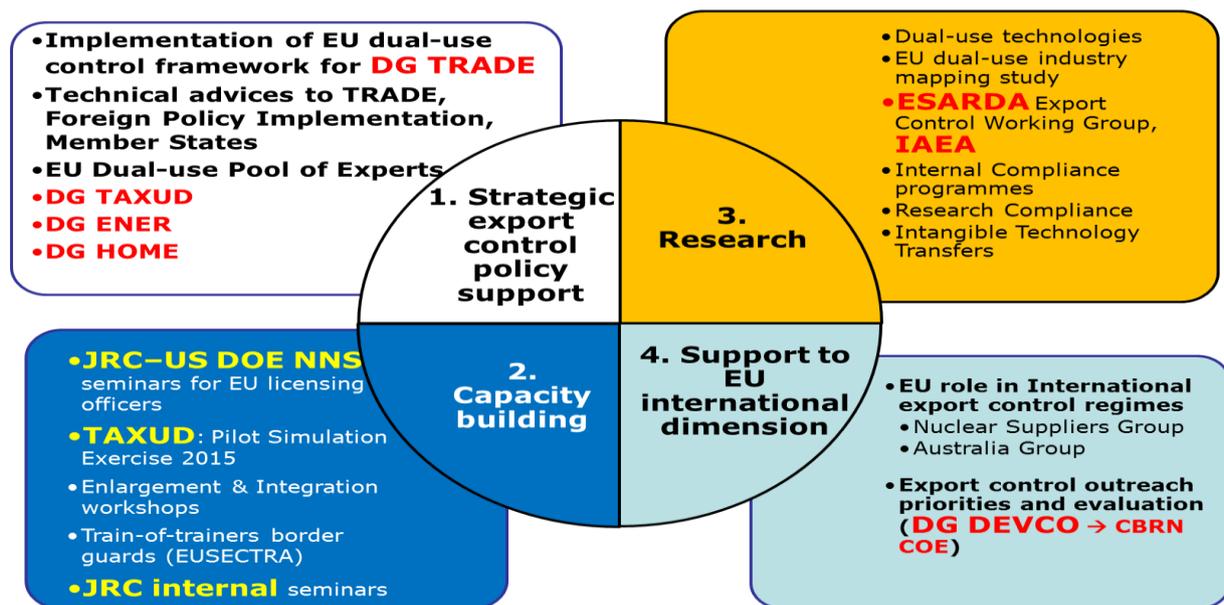
**Table X: The Joint Research Centre in a nutshell**

<b>The Joint Research Centre in a nutshell</b>	
<i>(2014 figures)</i>	
<i>N° of JRC sites</i>	5 plus the Headquarters and Directorates in Brussels
<i>Scope of research activities and policy support:</i>	1. Economic and Monetary Policy 2. ICT and Cyber Security 3. Energy and Transport 4. Environment and Climate, 5. Agriculture and Global Food Security 6. Disaster Risk Reduction 7. Health and Consumer Protection, 8. Nuclear Safety and Security 9. Nuclear Decommissioning
<i>N° of employees:</i>	3,055 of which 77% work on scientific projects
<i>Temporary staff (contractual agents, grant-holders, SNEs, trainees)</i>	About 40% of the staff
<i>Budget:</i>	€374 million
<i>JRC revenue (indirect actions for Commission services and contracts with third parties):</i>	€72,8 million
<i>N° of publications:</i>	689 books and articles in peer reviewed periodicals
<i>N° of patents granted:</i>	21

## 8.1 The dual role of the JRC *vis-à-vis* export controls

As F. Sevini has noted, the JRC has a special role to play in respect of trade controls, a role of ‘dual nature’<sup>458</sup>. The organisation is a provider of expertise for the ‘dual-use’ policy making as well as a holder and potential exporter of controlled technology. The Strategic Export Control team was established in 2009 by the Nuclear Security Unit (NSU) and it is the most indicative example of the mutli-disciplinary support provided by the JRC in the area of trade controls. STREX competence concern four main areas: policy support; capacity building; research and, EU outreach.

### **Strategic Export Control Project (2015)**



For instance, the STREX team provides ad-hoc technical and legal support to DG Trade with regards to the implementation of the dual-use regulation (*e.g.* draft of guidelines for harmonised implementation, technical studies). STREX activities include the organisation of scientific conferences (ESARDA Export Control Working Group) and trainings for licensing and customs officers coming from the EU and partner countries as well as the planning and evaluation of EU outreach activities promoting export control objectives in non-EU countries. Also, developing statistical methods and tools for estimating the impact of trade controls on economic activity as well as identifying and analysing licensing data and patterns of dual-use trade are further areas where the JRC contributes to through the project ‘Strategic Trade Analysis for Non-Proliferation’.

Despite this multifaceted role of JRC support, the organisation could be more actively engaged in the policy formulation and technical back-up required in the export controls area. Trade controls have not only legal aspects to be clarified; they are also a highly technical area requiring expertise be it for understanding and drawing up the control lists or clarifying the export control implications of innovative technologies. Such expertise is widely available in

<sup>458</sup> Presentation by F. Sevini, C Charatsis, “Strategic Export Control Awareness and Compliance at the JRC,” 7<sup>th</sup> ESARDA Export Control Working Group, December 3-4, 2015, Ispra.

the different JRC Institutes and combined with the JRC's experience in policy support could benefit the operation of the EU trade control system and the international non-proliferation system in general. Currently, apart from the regular support provided by the JRC during the deliberations of the DUCG and the DUWP, JRC scientists may participate and back the EU delegation in the meetings of international export control regimes and most notably at the NSG and the AG plenaries<sup>459</sup>. From a compliance point of view, the JRC is a research institution and thus, it should act in conformity with the trade control laws as any other research or exporting organisation. Indeed, as part of the European Commission, the JRC should 'lead by example' ensuring that research conducted in its premises meets strict safety and security standards including trade control requirements. On top of this, third-party due diligence should be shown with regards to tasks funded or carried out by the JRC in collaboration with other organisations.

For this doctoral study, the focus is on the role of the JRC as a research organisation that should abide by the export controls law. What are the JRC's particular characteristics having some relevance from an export compliance perspective? First of all, the identity of the JRC as an organisation conducting research in nuclear, biological and chemical fields may raise export control related questions. Dual-use trade controls concern a variety of technologies such as ICT equipment (from ultra-wideband equipment and frequency hopping radios to encryption software), electronic equipment (from neutron generators, frequency changers and mass spectrometers to optical sensors and inertial gyros), machine tools (from coating equipment and vacuum pumps to melting furnaces and isostatic presses) let alone hazardous materials such as natural and depleted uranium, pathogenic agents and chemical precursors. Many of these materials, related software and technologies are used or most rarely developed by the JRC's institutes for research purposes. Therefore, one could ask whether such items are being exported to destinations abroad and also, who is able to access sensitive technical data and equipment used or developed during JRC research.

Second, Article 8 of the EURATOM Treaty sets out that the activities of the Centre may, for geographical or functional reasons, be carried out in separate establishments. This is a long standing characteristic of the JRC. The bulk of its research activity takes place in Ispra (Italy) but research institutes have been established also in Belgium (Geel), Germany (Karlsruhe), Netherlands (Petten) and Spain (Seville). At the same time, the headquarters including also the central Policy Support Coordination and Resources Directorates are located in Brussels. This dispersion of research and supporting activities albeit limited to the EU territory may pose further challenges from an export control standpoint. Also, in executing its research programme, the JRC works with about 1000 partners worldwide. Even though the majority of its partners are EU based, the JRC maintains over 200 international cooperation agreements with partners in Africa, North and Latin America -including Caribbean- Asia and Eastern

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<sup>459</sup> The EU is a founding member of the Australia Group; the Commission has the status of observer in the Nuclear Suppliers Group while there is no official role of the EU in the Wassenaar Arrangement and the Missile Technology Control Regime (MTCR).

Europe<sup>460</sup>. Furthermore, the JRC welcomes a large number of visitors in its premises each year for conferences, collaboration activities and trainings.

Third, contrary to much more developed institutional policies and procedures for safety and security implemented by the JRC, similar attention has not been fully drawn to export compliance. The JRC lacks of a formal comprehensive export compliance system. The main internal compliance practice followed is the conduct of awareness raising seminars in selected institutes. That said, in a period of two years three such seminars took place one in the Nuclear Decommissioning Unit (Ispra), one in ITU (Karlsruhe) and one in IHCP (Ispra) on the initiative of the Nuclear Security Unit and the STREX team. Basic export compliance rules and procedures exist mainly for those institutes undertaking nuclear related research and most notably the ITU. Actually, the ITU took some concrete steps for introducing export compliance procedures back in 2014, following communications from the German licensing authority on possible ITT issues and preventive measures. In any case, nuclear scientists are more accustomed and receptive to security controls compared to their colleagues in other fields where the relevance of dual-use trade controls is less evident. That said, as a result of awareness raising efforts, scientists also from other fields contact STREX for advice on export control issues pertaining potentially to their work.

## **8.2 Applying the risk identification method in the JRC setting**

Developing an export compliance strategy requires taking those steps described in the first phase of the ‘Plan-Do-Check-Act’ cycle. The objective is to elaborate and test the basic method suggested in section 6.3 with the aim to identify export control risks in the context of a research organisation. In addition, further intrinsic characteristics impacting potentially the institutional identity and thus, the compliance strategy of the organisation should not be missed out. The perception of employees towards compliance in general, the commitment of the senior management to compliance in the running of the organisation as well as the level of awareness of export control issues are such supplementary factors to consider in the phase of the ‘inception’ of an export compliance system. The culture permeating the relations between the employees of an organisation is another aspect to consider albeit not easily quantifiable.

To begin with, the ISO 19600 standard sets that “the organisation should identify compliance risks by relating its compliance obligations to its activities, products, services and relevant aspects of its operation”. Following this, compliance risks should be analysed “by considering causes and sources of non-compliance, the severity of their consequences, as well as the likelihood that non-compliance and associated consequences can occur”. This approach is in alignment with what chapter 6.3 suggests. Building on that suggestion, one could single out three main steps to be taken at the phase of inception and planning of an export compliance system:

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<sup>460</sup> Information retrieved from JRC official webpage, “Working with us”, available in: <https://ec.europa.eu/jrc/en/working-with-us>.

- I. explore the export control requirements that the organisation has to or voluntarily commits itself to comply with;
- II. identify potentially sensitive research activities undertaken by the organisation;
- III. assess the institutional policies and procedures of the organisation as well as any other specific aspects (*e.g.* culture) having some bearing for export controls.

Establishing a comprehensive compliance system from scratch is not an easy task. One should start by evaluating the risks stemming from the specific identity, activities and external environment of an organisation prior to designing a compliance strategy. The ultimate goal would be the establishment and implementation of an efficient and effective export compliance management system well-integrated in the structure of a given organisation. For this study, the main intent is to explore what is the initial process for identifying areas of risk and designing a compliance system fitted to the needs of a research organisation. This process could be considered of utmost importance since it allows the verification of possible risks and the implementation of mitigating measures. The JRC as a public cross-border organisation conducting research in a variety of disciplines constitutes a relevant case study for reasons explained above. In other words, this exercise can be seen as a feasibility study aimed at providing an insight into possible challenges and options for designing an internal control system tailored to the risk profile and the needs of the JRC.

### **8.2.1 Introductory remarks**

*I. The Regulatory framework:* As a research establishment, the JRC is subject to the specific rules applying in the respective national jurisdictions where its different institutes operate. This is valid for export control and other safety and security obligations. The EU regulatory landscape on export controls was presented in chapter 4. Although the dual-regulation sets the foundations and the main principles of a common trade control system, the implementation and actual enforcement of trade control provisions is conferred to national authorities that have also the discretion to take additional national measures and laws. To complicate the situation further, the applicability of extraterritorial provisions of legislation adopted by other countries may be another issue to consider. As discussed earlier, complexity increases in a research setting and thus, clear guidance can be of great help to researchers striving to fulfil different compliance requirements.

*II. The sensitivity of research:* Evaluating the sensitivity of the research undertaken by a research organisation requires taking into account first, whether controlled materials, equipment, technologies and software are being used or developed in a laboratory and second, if such goods are shared with non-EU nationals or transferred abroad. This way one could correlate the sensitivity of research per se with the amount of foreign involvement so as to identify an export control risk. An unpredictable outcome of a research activity may also pose a risk to the extent that it relates to a controlled item or has high potential to be misused due to ethical or other concerns. Evaluating each and every project of the JRC can be too cumbersome and besides this, the results of research can be frequently unpredictable. This is also why certain measures such as awareness raising seminars and trainings aimed at creating

a culture of responsibility are necessary steps to consider in the framework of a compliance system. It follows that identifying potentially sensitive projects in the work programme of the JRC and, asking from the responsible scientific staff to clarify both the technical parameters and the amount of international participation involved is a plausible way to proceed.

*III. The export related processes:* Generally speaking, the organisational structure and the values shaping the culture of an organisation are unique elements determining the identity of an organisation. Figuring out how an organisation is structured as well as identifying processes relating to export controls is an important parameter to consider prior to implementing an ICP. For instance, a good question to ask is whether the JRC implements a centralised model of governance or not. Despite the allocation of the research portfolio to different institutes and locations, central coordination is exercised by the policy support Directorates and the Director General according to the main policies and rules set by the competent EC DGs and services. Most importantly, the way that certain policies and procedures function may pose a risk and therefore, assessing such procedures against export control objectives is a necessary action to take. Proposals for tackling risks and integrating export control objectives to existing processes could be the outcome of such assessment. Studying the practices followed by the JRC and interviewing the staff involved in the operation of export related processes is the way to proceed for accomplishing this step.

Following the method suggested above, sections 8.2.2 to 8.2.4 intend to show how risk identification can take place in practice by applying the main steps in the JRC context. The Nuclear Security and the Chemical Assessment and Testing Units were chosen for testing the method described above. Each unit represents distinct areas of research namely nuclear and chemical and both Units have been exposed -although with varying success- to export control objectives thanks to awareness raising initiatives undertaken during the past years by STREX. Also, both Units were quite accommodating in furthering the purposes of this study. The first step is to assess the sensitivity of research -determined by both the nature and the scope of such activities- bearing always in mind the legal requirements set in the trade control law. The second step is to explore what institutional processes are already in place for dealing with 'export' related issues. Whereas the sensitivity of research may differ for each Unit, the institutional procedures being applied must be largely common for both. Presumably at the end of the process, one would be able to answer what sort of risk mitigation measures need to be established and through what institutional processes and mechanisms.

### **8.2.2 Determining the sensitivity of research**

With a view to identifying sensitive research activities, the author relied on the JRC web-based 'project browser' listing the active work packages including their defining parameters<sup>461</sup>. For a targeted search, the project browser provides the option to filter by Unit, responsible officer, main DG concerned, source of funding involved and period of activity. This tool is accessible only to JRC staff and it provides *inter alia* information concerning the following aspects of every JRC work package:

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<sup>461</sup> In the JRC jargon, the term 'project' is used to describe work packages including both institutional direct actions and competitive activities.

- the general description
- the key orientation and main policy area to which a work package relates
- main funding DG and types of collaboration involved (*e.g.* competitive or institutional)
- the stakeholders involved (European Commission DGs plus external beneficiaries)
- the type of activities involved (*e.g.* instrumentation and hardware, monitoring, verification and surveillance, methods and testing, education and training)
- the main deliverables (including published reports and articles)

It comes out that the project browser provides a good source of information for evaluating the sensitivity of the research portfolio. Such a task demands to draw on expertise of the responsible researchers and officers in order to understand in the first place what technology, equipment and materials a given project entails and contend whether an export risk is relevant. Nonetheless, the project browser does not provide all the details that could be useful for performing a complete risk assessment. For instance, information concerning procurement or exporting activities and other third parties involved in the execution of a research project is not mentioned.

### **A. The Nuclear Security Unit (NSU)**

The NSU undertakes research in areas such as non-destructive analysis of nuclear materials, development of technologies for monitoring, containment and surveillance of nuclear activities, verification and detection technologies, analysis of open-source information and satellite imagery in support of the implementation of non-proliferation treaties and safeguards agreements and of course, research on trade control issues. Such activities include the provision of technology, instruments, technical services and training to inspection agencies, States and operators. In addition, the Unit operates the European environmental radioactivity emergency notification and information exchange systems<sup>462</sup>. In practice, the research portfolio of the NSU could be divided into four thematic areas -closely intertwined each other- plus limited activities in nuclear waste management and decommissioning:

1. Detection for nuclear security
2. Implementation of safeguards agreements
3. Other actions supporting non-proliferation objectives
4. Environmental monitoring and emergency preparedness

For this case study, Dr. Paolo Peerani, a former NSU scientist and presently Head of Unit (HoU) in the Nuclear Decommissioning Unit was asked to make a first classification of potentially sensitive projects taking into account both factors the nature of research per se and the international exchanges involved. The outcome was a compilation of activities presenting some interest from an export control perspective and originating from all four areas. Then,

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<sup>462</sup> See also information provided in the NSU and JRC public websites, available in:  
<http://npns.jrc.ec.europa.eu/structure/01-structure.htm>;  
<https://ec.europa.eu/jrc/en/about/institutes-and-directorates/jrc-itu/organisation>.

the responsible scientists, the so-called ‘project leaders’ were asked to provide their perception and clarify the potential export control risks relating to their work. It turns out that projects flagged as sensitive under the first evaluation do not necessarily involve transfers of controlled items and technologies subject to an export authorisation. The detailed analysis has been made available to the management of the JRC.

## **B. The Chemical Assessment and Testing Unit (CAT)**

The work of CAT focuses on human exposure to chemicals by providing databases, detection methods and risk analytical tools for a number of areas including consumer products, medical devices and food contact materials. Indeed, the Institute hosts the EU Reference Laboratory for Food Contact Materials. In practical terms, the laboratory seeks to offer harmonised testing methods for food packaging materials and kitchen utensils, cosmetics, and textiles. The Deputy HoU, Dr. Diana Rembges provided her insight in identifying most sensitive work-packages that could have some dual-use interest. The nature of research including equipment, material and processes used or developed in Unit’s laboratories was the main criterion used for the selection. Then, the responsible ‘project leaders’ were interviewed with a view to clarifying potential risks and perceptions *vis-à-vis* export controls. From the preamble, it became clear that exporting items, travelling with equipment or providing trainings abroad do not represent currently a major part of the Unit’s activities. In the past, transfers of controlled materials –mostly temporary exports of chemicals- were a quite common activity of the Unit. The detailed analysis has been made available to the management of the JRC.

### **8.2.3 Institutional processes relating to export risks**

The risk identification process requires correlating the applicable legislation, the sensitivity of research -including both particularly sensitive areas of research and activities involved- and the institutional processes relating to the conduct of such research. Taking into account the different activities covered under the trade control law –tangible and intangible exports of items and technologies- as well as the possible export scenarios described in chapter 4.3, one could draw up a list with all types of activities encountered in a research setting and having some relevance to export control requirements:

- Exporting
- Contracting with international partners
- Patenting
- Publishing
- Electronic exchanges
- Hiring staff and receiving visitors
- Traveling abroad

Naturally, different types of activity are not disjointed from each other. For example, contracting with non-EU partners may involve travelling, sharing data through electronic means and even patenting innovative outcomes of research. Quite interestingly, for almost every type of activity, the JRC has in place institutional processes and specific tools that

could be adapted for accommodating and promoting export control objectives. The table below summarises the main activities potentially posing an export control risk, the institutional processes and tools relating to such activities as well as the Directorates that coordinate or set the main policies to be followed for each activity.

**Table XI: Potentially controlled activities versus institutional processes**

<b>Types of activities</b>	<b>JRC Institutional processes</b>	<b>Main Units concerned</b>
<i>I. Exporting and importing:</i>	<ul style="list-style-type: none"> <li>- Procedures for exports/imports, dangerous goods/ donations/ withdraws etc.</li> <li>- Procedures for fissile and radioactive material/ equipment</li> </ul>	C.3 Assets and Logistics  A.4 Nuclear Safety and Security ‘Comitato Materiali Fissili e Radioattivi’
<i>II. Contracting:</i> <ul style="list-style-type: none"> <li>- Collaborating with/ outsourcing to international partners</li> <li>- Procurement</li> <li>- Staff employment contracts</li> </ul>	<ul style="list-style-type: none"> <li>- Approval procedures and risk assessment of projects, and legal support</li> <li>- Screening (early warning system), approval</li> <li>- Background checks and other security processes</li> </ul>	A.5 International, Interinstitutional and Stakeholder Relations/ B.6 Legal Advice/ B.4 Budget, Accounting and Competitive Activities B.5 Finance and Procurement C.2 Safety and Security/ B.2 Human Resources
<i>III. Patenting:</i>	Approval procedures and advice	Unit for Intellectual Property and Technology Transfer under deputy DG
<i>IV. Publishing:</i>	PUBSY publication system	A.2 Planning, Evaluation and Knowledge Management
<i>V. Electronic exchanges:</i>	ICT security procedures	C.2 Safety and Security B.7 Information and Communication Technologies
<i>VI. Foreign visits:</i>	Security procedures for EU and non-EU visitors, employees etc.	C.2 Safety and Security
<i>VII. Travels abroad:</i>	Mission approval scheme (MIPS)	B.7 Information and Communication Technologies

In the JRC context, certain aspects are dealt with at central level by the policy support Directorates and the competent EC DGs and therefore, main policies and rules to be followed are common for every Institute. That said, the different Institutes and their Units have some leeway to implement or introduce certain procedures for meeting a given objective taking into account their needs and the specific legal requirements stemming from the national jurisdiction to which they belong. The focus for this case study is on Ispra site and more specifically on the selected Units and their respective Institutes, the Institute for Transuranium Elements (ITU) and the Institute for Health and Consumer Protection (IHCP). However, it should be noted that the ITU with all its Units except the NSU is based in Karlsruhe and hence, practices followed by the NSU in Ispra might not be indicative of the situation in Karlsruhe. The results of this exercise might point to one of the following possibilities for the state of play concerning export compliance in the JRC:

- a. *unaware* (no export risk is perceived as credible)
- b. *reactive* (export risks generally known and addressed when a case arises)
- c. *proactive* (export risks incorporated in institutional processes and dealt with from an early stage)

**Exporting and Importing:** The risk identification could concern both exporting and importing aspects for two reasons: first, import procedures are handled by the same staff and departments in an organisation and second, import requirements may indirectly imply a potential risk in the case of a future export. Therefore, an internal compliance process should address both aspects. The JRC as part of the European institutions enjoys a special status including certain privileges and immunities<sup>463</sup>. For the Ispra site, the Italian government has promulgated a law setting the main principles governing its relations with the JRC<sup>464</sup>. This law incorporates and clarifies the rights and the duties of the JRC as set in the EURATOM Treaty and more specifically, the Protocol on the Privileges and Immunities (PPI). According to PPI, “the Union shall be exempt from all customs duties, prohibitions and restrictions on imports and exports in respect of articles intended for its official use”<sup>465</sup>. For instance, in terms of customs duties, the JRC is excluded from paying the Value Added Tax. The same applies for imports and exports restrictions in respect of the Union’s publications. Article 4 of the PII clarifies also that goods imported under this status cannot be afterwards released, whether or not in return of payment, in the territory of the importing country except under conditions set by the government of that country.

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<sup>463</sup> Pursuant to Article 343 of the TFEU and Article 191 of the ‘Euratom’ Treaty, the European Union and the EURATOM shall enjoy in the territories of the Member States such privileges and immunities as are necessary for the performance of their tasks.

<sup>464</sup> Law No 906, Official Journal of the Italian Government 212, 1960, available in: <http://www.gazzettaufficiale.it/eli/id/1960/08/31/060U0906/sg;jsessionid=FLh6GOPvPXcqDYoECS9MJw.ntc-as1-guri2a>

<sup>465</sup> Protocol on the Privileges and Immunities of the European Union, Treaty Establishing the European Atomic Energy Community (EURATOM or EACC) as of March, 2012, 100.

The Community shall enjoy in the territories of the Member States such privileges and immunities as are necessary for the performance of its tasks, under the conditions laid down in the Protocol on the Privileges and Immunities of the European Union.

*Article 191 of the Treaty establishing the European Atomic Energy (EURATOM)*

It is probably due to this ‘extraterritorial’ status of the JRC that certain procedures have been established. The JRC operates its own customs affairs office that is part of the Assets and Logistics Unit (C.3). In fact, the work of this internal service is supported by a local Italian Customs Office established in the JRC site<sup>466</sup>. An Italian customs officer is employed permanently and he is the one who controls whether the documentation accompanying the transport of goods is correct for either domestic or international transfers. If necessary, the customs officers may proceed to physical checks and controls before the goods leave the ‘JRC territory’.

The Assets and Logistics Unit handles various logistics procedures including customs documentation essential for import and export of goods and takes care of VAT exemption aspects. Simply put, every item -above a certain value- entering or leaving the JRC must be inventoried and accompanied with the required customs documentation, ‘*documento di transito*’, clarifying the nature and the quantity of goods<sup>467</sup>. The JRC customs office operates as the link between the JRC staff requiring a given transfer, the external companies taking care of the transport outside the JRC and the Italian customs controlling the lawfulness of every transaction. In practical terms, for every transfer a request has to be submitted via an online tool, the ‘JRC Assets’. Indeed, each Institute has appointed a technical responsible who manages the requests for the transfer of inventoried items according to the Institute’s procedures. This is the case for both the ITU and the IHCP. The applicant has to submit the inventory code and the description of the item to be transferred, the destination as well as the purpose of the transfer<sup>468</sup>. The applicant has to select from a long list of purposes such as calibration of an instrument, repair and performance of experiments. The application form contains also a specific entry with the heading ‘other risks’ where the exporter has to declare whether the requested transfer concerns dangerous goods requiring certain safety assurances (ADR procedure applies). Most of the time, requested transfers concern temporary exports and, therefore, the applicable customs procedures are followed for either domestic (MEMORANDUM) or international shipments (CARNET ATA). Also, as the interviews with project leaders showed, in certain occasions, a temporary export may end up with the sale of equipment or sample to the recipient university or organisation. All these internal procedures do not include a specific review process for exports requiring potentially an

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<sup>466</sup> Both the JRC and the Italian customs officers were interviewed on their tasks and responsibilities.

<sup>467</sup> For transfers within the EU the T2 is the necessary transport document that must be issued by the customs whereas for exports outside the Union the T1 is issued by the central customs office.

<sup>468</sup> All JRC assets exceeding a certain value (>420 Euros), from office furniture and ICT stuff to laboratory equipment is inventoried under a certain code. In that regard, the procurement and logistics procedure could potentially play a role in identifying and tracking particularly sensitive goods such as dual-use equipment from the very beginning.

authorisation. In the case of a dual-use export to a non-EU destination, the responsible scientist has first to submit an application to the Ministry of Economic Development and furnish the subsequent authorisation along with any other necessary documents to the internal customs office.

For transfers of nuclear material (*e.g.* nuclear waste) and radioactive sources (*e.g.* X-ray devices) a different process applies. A request is submitted to a special committee the ‘*Comitato Materiali Fissili e Radioattivi*’ (CMFR) ensuring compliance with the national and international rules in force (*e.g.* transport notification to the Italian Nuclear Regulatory Authority, ISPRA). To that effect, the CMFR operates special registers of nuclear material, radioactive sources and X-ray machines and deals with all notification and accountancy obligations set in the national legislation and IAEA safeguard agreements. Whereas the CMFR is in charge of authorising the acquisition, disposal, transport and handling of such equipment as well as of verifying compliance with the applicable legislation (including record keeping and trainings for holders of radioactive sources), dual-use authorisations are not included in the mandate of the Committee. During the interviews with the project leaders it came out that dismantling of laboratories and donations of equipment is a plausible issue for both the NSU and the CAT Units. Old equipment may be sold, end to a scrap yard, exchanged with new one (a discount will apply for the purchase of new equipment) or donated to a partner organisation. Again, there are certain procedures (*procedura di riforma*) requiring approval by a special committee after a request signed by the technical responsible, the HoU and when necessary by the Director.

**Contracting with international partners:** As explained in the introductory section of chapter 8, JRC activities are categorised into direct actions funded under its institutional budget and competitive activities funded by other Commission DGs and external stakeholders, plus till recently indirect actions funded by the H2020. This means that, in certain cases, the JRC signs collaboration agreements with a variety of partners such as public organisations and governments, international organisations, universities and firms. The execution of such agreements may include shipment of equipment as well as provision of technical assistance, software and data to the requesting parties. From an export control perspective, a risk could be addressed during both the initial decision-making phase and all along the execution process of a given project.

Concerning the decision-making, institutional and competitive activities are proposed at Unit level and require the approval of the Institute’s Director. In that regard, it is interesting that for competitive activities a risk assessment process takes place. The purpose of such risk assessment is to inform the decision-making process of any possible risks and anticipate the impacts of such risks. In practical terms, the responsible project leader has to fill in a document in which he or she identifies possible risks, related causes and controls in place. He has also to assess the likelihood that such risks will be materialised and their potential impact. The Annex to the risks assessment document provides examples of risks, impacts and mitigating/ aversion measures. The risks suggested relate *inter alia* to the JRC’s independent status, public safety, third party liability, confidentiality of results and data protection and,

external license requirements such as for building a facility. Export issues are not referred to explicitly among the possible risks. The potential impacts of such risks include negative publicity, loss of trust by the JRC customers and reputational damage. The remedy measures include early reporting at the planning phase, introduction of quality/approval system and final approvals by the Director. For institutional projects, a similar risk assessment is not presently in place.

The execution of an institutional or competitive activity may involve tangible and intangible transfers of materials and technologies under subcontracting with third parties. As far as it concerns procurement, purchases of low value (>15.000 Euros) are dealt with at Unit level. For purchases above a certain threshold, the applicable procedure entails prior planning, approval at Unit level and an internal request to Unit B.5 dealing with the finance and procurement needs of the JRC. The JRC, as part of the European Commission, has to follow certain internal regulations ensuring transparency, financial accountability and certain quality management procedures.

Despite the lack of an internal compliance programme, the JRC applies approval procedures for different types of agreements concluded pursuant to its working programme. For instance, for non-monetary agreements with external organisations the workflow requires pre-approval by the Institute's Director as well as approval at central level by the International, Interinstitutional and Stakeholder Relations Unit (A. 5). Also, the Unit B.6 provides legal advice with regards to a variety of aspects that may relate to export control requirements:

- site agreements and the application of privilege and immunities;
- international collaboration and agreements with third parties in nuclear research;
- contracting and subcontracting for competitive activities and,
- procurement and contractual issues such as disclosure of information.

The Commission operates also an Early Warning System for activating a red flag about third parties that are likely to pose a threat to the financial interests of the Commission. Till today the role of B.6 has been mainly reactive to the very few export related issues that have been raised. For nuclear matters, also Unit A.4 on Nuclear Safety and Security provides coordination for nuclear related projects. As suggested in chapter 7, the extent to which different departments are aware of export control issues is a re-enforcing factor for export compliance. Should the competent staff become aware or follow training on export controls, possible issues can be identified and filtered already in the phase of planning by the policy support and scientific Directorates.

**Patenting and Technology Transfers:** The JRC has the right to protect and disseminate the results produced during its research activities in a fair and equitable treatment for both the Union and other parties involved. For JRC direct actions funded under the specific Framework Programme implementing the H2020, the rules described in section 4.1 for the dissemination and confidentiality of H2020 research results still apply.

The JRC should continue to generate additional resources through competitive activities, including participation in the indirect actions of Horizon 2020, third party work and, to a lesser extent, the exploitation of intellectual property<sup>469</sup>.

*Council Decision 2013/743/EU, 967*

In addition to this, for nuclear activities funded under the Research and Training Programme of EURATOM, Article 12 of the EURATOM provides that<sup>470</sup>:

*“Member States, persons or undertakings shall have the right, on application to the Commission, to obtain non-exclusive licences under patents, provisionally protected patent rights, utility models or patent applications owned by the Community, where they are able to make effective use of the inventions covered thereby.”* In relation to this, Article 24 of the EURATOM stipulates that:

*“Information which the Community acquires as a result of carrying out its research programme, and the disclosure of which is liable to harm the defence interests of one or more Member States, shall be subject to a security grading system to be enacted with the adoption of a security regulation by the Council.”*

On the basis of these Articles and, given that Article 26 of the dual-use regulation states that the Regulation does not affect the application of the EURATOM, there is a debate over the applicability or not of export licence requirements on information owned and developed by the Commission in the execution of its EURATOM research programme. The author’s interpretation is that it is indisputable that the Commission and the JRC in particular has the right to protect and make available the results of its EURATOM related research under license agreements. This is in alignment with the letter of the law and the spirit of the Treaty for furthering nuclear research in the Union. Indeed, the Commission has implemented Article 24 of the EURATOM with the adoption of regulation No 3 determining the security grading (e.g. top secret, secret, confidential, restricted) and the security measures that shall apply for EURATOM Classified Information (ECI)<sup>471</sup>. However, it is not absolutely clear whether security considerations dealt with in the framework of the dual-use regulation can be addressed through such a security grading system seeking to protect ‘the defence interests of the Member States’. In any case, the JRC would be expected to comply even voluntary with a

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<sup>469</sup> Council Decision, *Establishing the Specific Programme Implementing Horizon 2020 - The Framework Programme for Research and Innovation and Repealing Decisions 2006/971/EC, 2006/972/EC, 2006/973/EC, 2006/974/EC and 2006/975/EC*, Official Journal of the EU (L 347), 2013, 967.

<sup>470</sup> Article 12 clarifies also that: “The Commission shall grant such licences or sublicenses on terms to be agreed with the licensees and shall furnish all the information required for their use. These terms shall relate in particular to suitable remuneration and, where appropriate, to the right of the licensee to grant sublicenses to third parties and to the obligation to treat the information as a trade secret.”

<sup>471</sup> Council Regulation No 3 Implementing Article 24 of the Treaty Establishing the European Atomic Energy Community, Official Journal of the EU 017, 1958, 0406 – 0416.

regulation intending to ensure that the transfer of export controlled technology is duly monitored.

Regardless of the applicability of the dual-use regulation and ensuing national legislation to EURATOM activities, for non-nuclear related activities an export control clearance would be still relevant. In that regard, the JRC Intellectual Property and Technology Transfer Office with the assistance of the Legal Advice Unit (B.6) could play an important role in applying systematic export control checks before entering into a license agreement. The JRC creates most of the IP rights of the Commission and thus, it has developed expertise in the identification, protection, and management of IP assets. Indeed, the JRC IP and Technology Transfer Office has the role of the Central Intellectual Property Service of the Commission<sup>472</sup>.

**Publishing (approval procedure under PUBSY)<sup>473</sup>:** JRC publications be it power point presentations, technical and policy related reports or, articles contributions, monographies, articles in peer-reviewed journals, literally everything has to pass through an electronic workflow, the so-called PUBSY authorisation process<sup>474</sup>. The PUBSY management system allows the screening and registration of all publications with JRC authorship. This way, the system facilitates the archive of JRC publications as well as the monitoring, evaluation and reporting of all JRC outputs.

Under the authorisation process, JRC employees have to apply through the PUBSY online tool in order to take prior approval and register any scientific work drafted during their service in the JRC<sup>475</sup>. In fact, JRC staff has to make a draft registration request prior to

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<sup>472</sup> The European Commission creates, procures, acquires, and disseminates intangible assets on a regular basis, in particular copyright works such as text, sounds, videos, images, software and data. More information on the role of the JRC Intellectual Property & Technology Transfer Office can be found on the JRC public website in the following link:

<https://ec.europa.eu/jrc/en/research/crosscutting-activities/intellectual-property>.

<sup>473</sup> Information drawn mainly from the PUBSY Guidelines (version February, 2016), available in Connected, the EC intranet.

<sup>474</sup> There categories of publications are based on the categorisation of the JRC work programme deliverables as follows:

- Scientific reports for policy-making (scientific reports feeding a policy-making process)
- Scientific outputs (*e.g.* books and monographs, article contributions, peer-reviewed articles in indexed and non-indexed Journals, PhD theses)
- Technical outputs (technical reports on: technical systems and prototypes engineered or patented by the JRC; validated methods; reference materials, databases/software and datasets)
- Material for training and JRC conferences (*e.g.* oral and poster presentations and proceedings)
- Public information documents (brochures and leaflets, newspaper articles etc.)
- External study reports (outputs of contracts produced by JRC and external entities)
- JRC working documents (*e.g.* assessment and management documents, operational review)

<sup>475</sup> The PUBSY management process is composed of seven main steps supported by the workflow application as below:

1. Submission by the Applicant of a request for authorisation to release an output. The request can be submitted by any JRC staff member.
2. Approval by the Applicant's Head of Unit (HoU) to release the output.
3. Validation for authorisation by the Applicant's Institute Publications Officer (IPO).

releasing any JRC output such as presentation, talk, or scientific poster in a non-EC conference. The authorisation process requires the approval of the HoU and of the Institute's Director. The Institute's Programme Officer (IPO) assists the Director with the evaluation of the applications taking also care of issues from such as applicable templates, metadata resources and registration details. The final registration is handled by the PUBSY team.

With a view to safeguarding sensitive or confidential information on the basis of Commission Decision 2001/844/EC, scientists are called to declare whether a given document should be marked as 'limited distribution' or classified as 'EU restricted' or otherwise, made accessible to everybody. JRC staff is advised not to use excessively the limited distribution marking allowing access only to the authors and those involved in the approval process for a certain period of time. Requests to access such documents are reviewed by the PUBSY team on the basis of the 'need to know principle'. In any case, documents marked as 'EU restricted' cannot be even attached to the PUBSY request<sup>476</sup>. The Open Access Policy (OAP), namely the free of charge online access to scientific information for any user is being currently applied by the JRC as provided also in the framework of H2020. The OAP applies from the moment that a JRC scientist decides to make available for publication the results of his or her research and therefore, it should not be seen as contradictory to EU's classification policy. The details for the dissemination and exploitation of research results are arranged normally in the contract or the grant of the given research.

Most importantly, certain outputs may be marked as 'sensitive' already at the planning phase. The ultimate responsibility for assessing the sensitivity of an output to be published lies with the Institute's Director. It is in this phase where security and export control concerns may be taken into account. In the NSU for example, such an assessment against export control implications has taken place before. Presently, in the PUBSY workflow, there is no communication to the applicants of possible export control issues relating to their work. In that regard, the Head of the Planning, Evaluation and Knowledge Management Unit (A.2) has been informed by the STREX on the possible need to address export control issues in the PUBSY workflow.

**Electronic Exchanges and IT security:** ICT Security in the JRC Ispra site is dealt with by Unit on Safety and Security (C.2). The Unit B.7 Information and Communication Technologies along with DG Informatics (DIGIT) set the main rules and provide the overall

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4. Authorisation by the Applicant's Director to release the output.
  5. Flagging the request as ready for registration by the Applicant (the request must be flagged as ready for registration when the output has been released).
  6. Validation for registration by the Applicant's IPO.
  7. Registration of the output by the PUBSY Team.

The first four steps must be completed before the output can be released to a publisher or to a customer.

The last three steps must be completed as soon as the output has been published in its final version in any format and after the output has been delivered.

<sup>476</sup> Documents with higher level of classification (EU Confidential, EU Secret and EU Top Secret) cannot be registered to PUBSY and require certain handling under other security systems.

coordination of the local security offices in each JRC site. In this regard, the experience of ICT experts could be utilised for setting clear guidance on sharing information online that could require an export authorisation. Although the JRC as part of the EC implements enhanced security measures (*e.g.* secured e-mails and secured transferred protocols for particularly sensitive information), technical issues such as the identity of cloud providers and the locations of servers utilised may need to be re-examined in view also of export control requirements. The Ispra Local Information Security Officer has become aware of the export control problem thanks to the efforts of the STREX team. Besides, in the past he was asked to provide his insight into technical issues relating to the provision of cloud services and having some importance from an export control angle.

**Security System for Visitors and Employees:** The DG Human Resources and Security (HR) sets the main policies and internal procedures for the safety and security of the Commission's infrastructures and the staff using and operating such facilities and premises. In Ispra site, the Unit on Safety and Security (C.2) implements a comprehensive net of measures taking into account as much international rules as national legislation. For instance, the JRC applies access controls relying on about 200 badge readers and a zoning policy ranging from least sensitive premises (white) to most sensitive (red). In fact, the local security office is in charge of all different aspects of security from the handling of confidential information to cyber security and from the transport of hazardous material within the JRC site to security clearances for JRC employees. According to the JRC intranet, the main tasks of the JRC Security Office are as follows:

- physical protection of sites
- physical protection of nuclear installations
- stand-by-duty service at the JRC sites (24 hours/7 days)
- provision of a security clearance service
- management and storage of EU Classified Information
- briefing staff before going on mission to dangerous countries
- provision of a VIP protection service
- training of JRC staff on the applicable security provisions

From an export control perspective, the most important issue is who has access to what premises, IT systems and information. In that regard, the Security Office implements its own 'technology control plan' for employed staff and visitors through an online tool, the SECPAC. A different degree of scrutiny applies on the basis of nationality, the duration of stay in the JRC and types of access required. For instance, for Third Country Nationals (TCN) -term used in the EC jargon- the host Unit is required to ask the security office opinion. The process may involve a minimum documentation, the CV of the individual as well as his or her criminal record<sup>477</sup>. The outcome of the risk assessment may have an impact on the access rights granted to an employee including default IT accounts, access to internet/intranet and use of PCs. For longer stays of TCN, the Unit for Security Intelligence

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<sup>477</sup> For data privacy reasons, all information required is exchanged through secure electronic mails.

& External Liaison in Brussels may need to be consulted as well. In practice, the opinion of the security office is required for every visitor, group of visitors or new employee. The whole process is facilitated by local supporting officers being in charge of compliance with security and safety rules applying in JRC different facilities.

**Approval Scheme for Travels:** JRC staff travelling anywhere in the EU or beyond with the aim of performing trainings, lectures, presentations *etc.* has to submit a request in a workflow known as the ‘Mission Processing Scheme’ (MIPS). Any professional travel or, ‘mission’ as named in the European Commission jargon, should be screened by the Paymaster Office according to procedural and financial rules and approved by the HoU and the Institute’s Director. The MIPS workflow does not include specific approval procedures or guidance with regards to export controlled information possibly released during such travels.

**Other Related Policies:** In the JRC context, there is a variety of policies and established procedures that could benefit the functioning of an export compliance system. It has been made already reference to policies for the confidentiality and dissemination of the JRC research results. JRC polices for quality management as well as ethics and integrity standards are further examples of reinforcing policies. The JRC as integral part of the European Commission is bound to meet the Internal Commission Standards and follow the rules applying for the EU officials. To that effect, the Organisational Development Unit (B.1) has put in place an Integrated Management System (IMS) for consolidating all management systems in the JRC into one coherent framework. Risk management tools, internal and external audits, ISO certified procedures are measures implemented by the different JRC Directorates in accordance with Commission’s prerequisites for enhancing the effectiveness, accountability and transparency of the organisation.

Furthermore, all JRC staff shall abide by the staff regulations including commitments on ethics and integrity<sup>478</sup>. Each EC DG has an ‘ethical correspondent’ to whom possible complaints or incidents of noncompliance can be reported. Available guidance includes rules and procedures on whistleblowing, a JRC code of conduct and other documents on scientific integrity for research fellows and grant-holders. Respecting existing policies on security and conducting research responsibly is a constant refrain in all these documents. Presumably, referring to the role of export controls in such documents and introducing an export compliance system underpinned by further management processes could be a useful initiative to take on in the future.

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<sup>478</sup> See in particular Title II, Articles 11-26a of: EU, EURATOM, *Regulation No 1023/2013 for amending the Staff Regulations of Officials of the European Union and the Conditions of Employment of Other Servants of the European Union*, Official Journal of the EU (L 287), 2013.



## 8.2.4 Preliminary conclusions of the risk assessment

The targeted risk assessment for the NSU and the CAT brought out some interesting issues that need to be highlighted.

First, correlating research activities and potential export control risks for a Unit's work programme composed of more than 40 active work-packages which in turn contain individual projects –as it is the case for the NSU- is not an easy task. Also, it should be noted that some projects are close to end or have already completed certain deliverables and new ones are about to be introduced. This is a reminder that a research programme is a dynamic structure. New projects are being initiated quite often and therefore, the risk assessment is an ongoing process. This task could be better accomplished through a systematic risk assessment in the framework of an export compliance system. In relation to this, the scientist or manager involved in the selection of 'sensitive' projects needs to have not only the full picture of the activities undertaken by the Unit but also a good understanding of export control issues. In fact, the better informed he or she is the more meaningful the selection of projects will be. Therefore, providing export control training to whoever undertakes the risk assessment process and to scientific staff can be a useful action to be taken.

Second, the initial screening and the subsequent risk assessment of work-packages was based on both criteria sensitivity of research per se and international involvement. For instance, project 666 includes provision of trainings and access to nuclear facilities (PERLA, PUNITA, AS3ML *etc.*) to external users such as students and researchers. The said project was not considered as 'sensitive' since it does not enable intangible transfers of controlled technology or direct access and use of nuclear plants and facilities by foreigners. The use of both factors can be of great benefit. The risk assessment suggested that projects involving a great amount of international collaborations such as capacity building for enhancing nuclear safety and security do not necessarily entail transfers of controlled equipment and knowledge. The reverse is also possible: particularly sensitive research for instance, on new techniques for non-destructive analysis do not necessarily involve exporting regularly such methods or items outside the EU.

Third, the beneficiaries of the research of both Units are mainly international organisations, national public authorities as well as EC DGs and EU organisations. Research commissioned by governments to research organisations is not excluded from the scope of export controls; instead it may entail certain sensitivities and non-disclosure clauses. That said, transfers requested by certain partners such as the IAEA or national customs authorities could hardly ever pose a credible export control risk. A more interesting issue to assess is whether research conducted in the framework of agreements with such public organisations includes subcontracting and collaborations with other parties especially research organisations and firms established outside the EU. However, according to the case studies, it seems that most of the time NSU and CAT research involve transfers within the EU. Exploiting the research results for commercial purposes under patents and license agreements is another activity that may allude to an export control risk and it is included in the scope of activities of the NSU.

Fourth, activities undertaken by both Units showcase that research can be ‘of dual-use nature’ in different ways. The research undertaken by CAT on the effects of new drugs and psychotropic substances is a telling example. The study on the effects of nuclear incidents in the framework of emergency and preparedness initiatives provides an example of a NSU research that could be misused. More broadly, data repositories, classified studies and other potentially sensitive information tools can be the outcome of research undertaken by the two Units. Also, during the interviews D. Rembges noted that whereas focusing on controlled dual-use equipment and materials commonly used in laboratories is one important parameter, exploring the dual-use potential of new methods and technologies can be equally useful. A relevant example is the use of additive manufacturing technologies for ‘replicating’ human tissue, a technology that has been already tested (not in the JRC).

Fifth, with regard to institutional processes, each Institute has assigned to a technical officer the task to take care of transfer requests for every item leaving the JRC in accordance with the applicable rules and procedures. For most sensitive items such as chemical agents and nuclear equipment the responsible employees are well-informed. This is owed partly to the awareness of scientists and partly to the fact that certain procedures are in place for transfers of particularly sensitive items and dangerous goods such as fissile material, radioactive sources and gas tanks pursuant to safety and security regulations at national and international level. For other dual-use items that do not fall in the aforementioned categories and may require an export authorisation, it seems that the responsibility to inform ‘exporters’ lies with the internal customs office and the Italian authorities. Also, certain administrative departments such as the Legal Advice Unit (B.6) and the Human Resources Units of nuclear-related Institutes have developed an attitude conducive to export control objectives owing to their previous entanglement with export control issues.

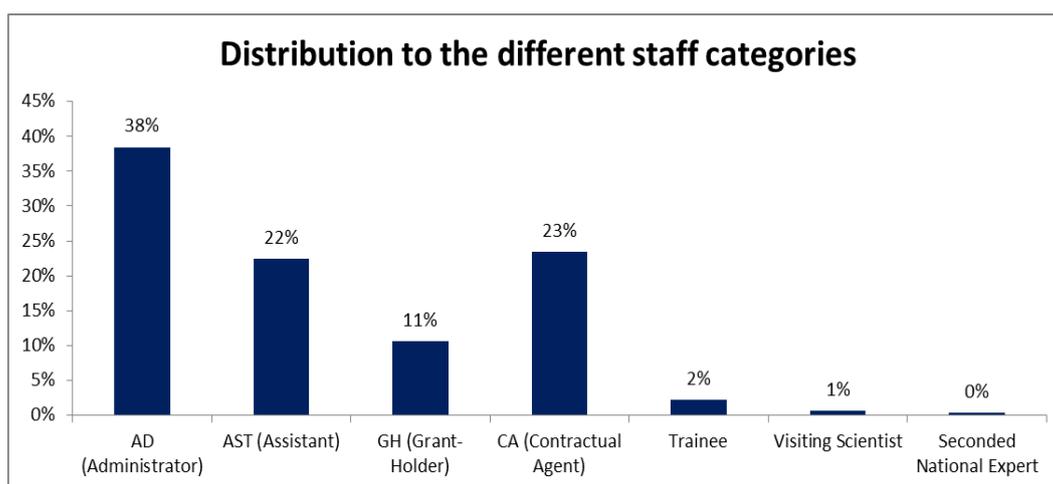
Sixth and in relation to the previous, it can be deduced that the institutional processes operated by the JRC are most of the time ‘reactive’ to export control risks, not ‘proactive’. In the past, staff dealing with customs and legal aspects has been confronted with export control issues and thus, they have become aware of such concerns. Most of the time, staff employed in administrative posts have only a vague knowledge or understanding of the dual-use requirements and the related issues at stake. This is an expected outcome to the extent that there is no formal policy on export compliance. At the end of the day, the main responsibility of being aware of export controls and applying if necessary for an export authorisation rests with the lead scientist undertaking a given research.

Last, the NSU and CAT scientists interviewed for these case studies are aware of the existence of dual-use trade controls and the security implications of their research thanks to previous interfaces with STREX activities and their own capacity as researchers working for the EC. This is particularly true for NSU scientists because of the sensitivity of nuclear research. However, this general awareness does not imply that the Units’ researchers are always in a good position to realise how export control issues might entangle in their research given also the lack of dedicated export control training.

### 8.3 Complementing the risk identification method

From December 9, 2015 till January 22, 2016 a JRC-wide online survey was launched with a triple aim. The first objective was to provide a broader picture of the JRC activities and the potential export control risks stemming from such activities. The second was to assess the preliminary results of the case studies discussed above against the situation illustrated in the survey and the third was to explore attitudes and the level of awareness towards security and export control matters. Statistical analysis can be seen as a supplementary tool to the more elaborate risk assessment method described above. It might further inform the risk assessment process and especially, in the case where online tools such as the JRC web-project browser are not in place it represents a useful action to take first so as to identify potential areas of risk.

The population concerned by the survey is all JRC staff (3.050 employees) working in all different sites and the responding sample represents about 10% of the total population (312 employees), statistically speaking a very good sample for making inferences about the whole population. The majority (61%) of the respondents belong to permanent staff categories (administrators and assistants) whereas temporary staff (mainly ‘contractual agents’ and ‘grant- holders’) is represented with about 37%<sup>479</sup>.



Also, a good percentage of the respondents (18%) concerns project leaders meaning employees that are in position to have deep knowledge of the nature of research and the types of activity involved in their work. The JRC work (scientific and administrative) is supervised by more than 70 HoUs having the full view of activities undertaken in their respective Units. The survey gathered the views of 15 HoUs with regards to export control concerns.

The risk identification method described in section 8.2 relied on the JRC project browser for identifying potentially sensitive research activities in NSU and CAT. This tool can be used for mapping all JRC activities undertaken by different institutes and their constituent Units and having some interest from a dual-use angle<sup>480</sup>. Already the core competence of each Unit

<sup>479</sup> About 2% of the participants did not provide an answer in that question.

<sup>480</sup> In fact, back in 2008, SIPRI was commissioned to assess the JRC work programme against its dual-use potential by conducting a preliminary mapping of JRC activities. This effort relied on an

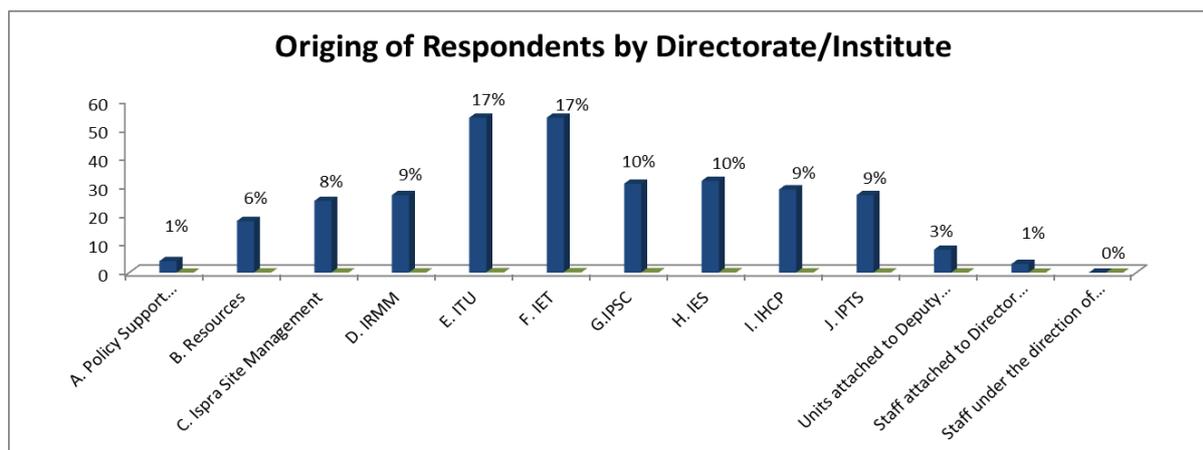
(main areas of research) may hint at potentially sensitive activities. In that regard, the preliminary evaluation done for this study came up with a number of candidate Units for testing the risk identification method. For instance, one could easily suspect that a Unit developing standards for nuclear safety and security or modelling the behaviour of chemical substances under certain circumstances may have some dual-use relevance. Then, on the basis of the description of each project, most sensitive projects need to be singled out as it was done in the CAT and NSU case studies. For this study the purpose was to carry out an academic exercise and not to apply the risk identification method to all potentially sensitive Units. The whole process and particularly the selection phase of sensitive projects drew on JRC available technical expertise and officers having a global picture of the activities undertaken by the chosen Units. Reasonably, the risk assessment can be benefited by identifying scientists or managers closely involved to the activities of a selected Unit. In addition, a research organisation may need to seek assistance from the regulatory authority in order to acquire a better understanding of technologies concerned by export controls or, to use external expertise on export controls, dual-use technologies and weaponisation processes.

The scope of dual-use export controls is such that it might be necessary to engage experts having a nuclear, bio-chemical and probably an electronics related background in the risk assessment process. For example, the author opted for a nuclear and chemical research Units and hence, relied on a nuclear engineer and a chemist for the case studies. Units that were considered as relevant in the first selection, appear also in the survey among the most sensitives. However, as it was underlined oftentimes in the study, export control risks may stem from a broad area of research activities. This was also exemplified in the survey. For instance, for a non-specialist, the IES could be seen among the least sensitive Institutes. However, as the survey showed and as discussions with scientists confirmed, some IES Units may use instrumentation or technologies that are of dual-use nature and in addition, their research may demand a lot of travelling abroad for experiments and testing purposes. It turns out that the role of technical expertise is of chief importance for the risk assessment process in all phases of implementing export compliance measures. Chapter 8.3 provides an overview of the potential sensitivity of JRC activities as illustrated in the survey. The accuracy and broader applicability of the results could be checked against available JRC expertise and experience so as to draw safe conclusions for the overall sensitivity of the research portfolio. The most complete way to carry out such a task would be by implementing the risk identification method as described in chapter 8.2.

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online tool that was in place at time. However, the focus was to identify areas where JRC expertise could be drawn upon to back the implementation of EU export controls. This approach is in support of the dual role of the JRC towards export controls. However, the existence of technical expertise of dual-use relevance does not necessarily imply an export control risk and today, a large number of the identified projects have been completed or suspended.

### 8.3.1 Identifying areas of sensitivity and expertise: a mapping exercise



The survey provides a good representation of most JRC Directorates and scientific Institutes. The role of Institutes is interesting in that they may be confronted with export control issues when conducting their research. The policy support Directorates could have a different role to play. They could act as ‘gate keepers’ providing administrative/legal support and catching potentially problematic transactions and activities relating to a sensitive research project.

The first section of the survey contained nine questions providing a number of examples of dual-use goods. In broad terms, these examples covered all ten categories of the Annex I of the Regulation. The participants were asked to clarify whether they use or develop any of the suggested materials and technologies for their research activities. The respondents were allowed to refer to other examples of dual-use goods falling in the suggested categories and relating to their research. The categorisation is shown in the table below<sup>481</sup>. Quite interestingly, with very few exemptions such as rockets, rocket propulsion systems and water tunnels all suggested options were marked by the respondents in varying percentages. Table XII collects the most ‘popular’ options from each category. The fact that all these different types of materials, equipment, and related software exists in the JRC laboratories, does not mean that such items fall always within the controls thresholds or that are being exported. In any case, for this fist mapping, it was deemed as necessary to have an all-encompassing picture. Already the existence of dual-use equipment is a good risk indicator for identifying Units undertaking particularly sensitive research and, having expertise that is not to be shared broadly. The specific outcomes of the survey including figures and conclusions for each Institute have been made available to the management of the JRC for further consideration.

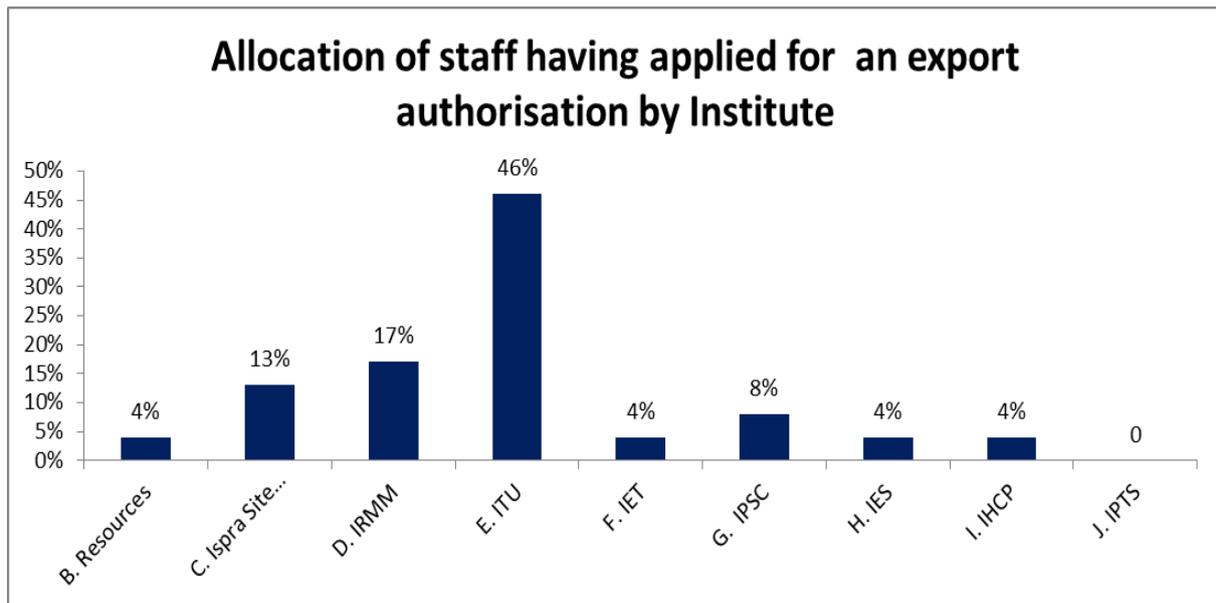
<sup>481</sup> Dr. F. Sevini helped the author to identify examples of materials, equipment and related technology that could be of relevance to JRC research activities.

**Table XII: Categories of dual-use equipment involved in JRC research**

Broad Categories	Most Selected Options
I. Nuclear fuel cycle related material and facilities	19% replied yes
II. Special material other than nuclear	Metals and alloys; Toxic chemicals; Graphite and ceramic materials; Composite materials; Fibrous and filamentary materials
III. Industrial materials processing equipment	Vacuum pumps; Ovens, crucibles and melting furnaces; Pressure transducers; X-ray and ultrasonic test equipment; Environmental test chambers; Machine tools
IV. Electronic equipment	Mass spectrometers; Signal analysers, signal generators and synthesizers; X-ray generators; Solid state switches
V. Certain types of computer ( <i>e.g.</i> ruggedized)	7% replied yes
VI. Telecommunication equipment	Cryptographic systems, equipment and components; Cryptographic and intrusion software; Mobile phone interception or jamming equipment
VII. Lasers/ sensors and navigation/ avionics equipment	Lasers; Pressure sensors; Thermal imaging and night vision cameras; Global Positioning Systems
VIII. Marine and naval equipment	Pressure housings and pressure halls;
IX. Aerospace and propulsion equipment	Unmanned Air Vehicles ( <i>e.g.</i> drones flying longer than 30 minutes)

### 8.3.2 Transferring and exporting dual-use goods, technical data and software

The second section of the survey explored whether potentially sensitive dual-use goods are exported to non-EU countries or otherwise what ‘type of exporting activities’ are involved in the conduct of JRC research. Learning whether JRC scientists have been already required to apply for an export authorisation is a plausible question to ask. About 8% of the participants replied that they have applied for an export authorisation at least one time in the past. Not surprisingly, the Directorates primarily concerned are the ITU, the IRMM and the Ispra Site Management. The IPSC, the institute with dual relevance to export controls has also two entries in the survey. Finally, the IHCP and IET have from one case to refer each.



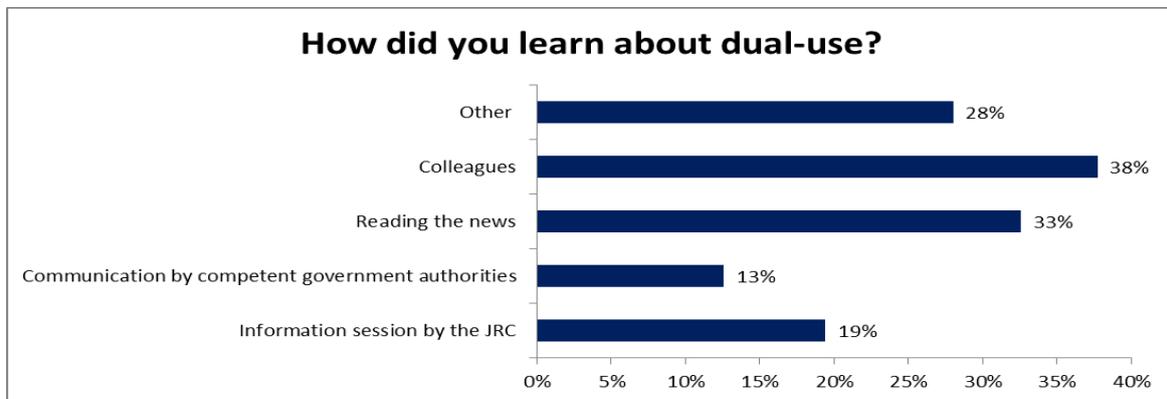
In the ITU context, past export authorisations concerned mainly transfers and exports of nuclear material and of other sensitive material such as UO<sub>2</sub> epitaxial films to both EU and international destinations. The Institute is also an importer of dual-use materials, equipment and software. As a result end-use/end-user statements have been signed by ITU staff in several occasions. With a view to identifying further areas of concern, the participants were required to answer whether they ship potentially controlled equipment, provide technical assistance or share software and data mentioned to either EU or non-EU destinations. The first question included also dismantled or old equipment that might be sent as a donation abroad. 10% of the respondents stated that they ship such items abroad. These transfers and exports are destined mainly to the EU 28 and other countries of the European Economic Area and the US. Japan scored also quite high whereas China and Russia received very low percentages. Other destinations mentioned include Sub-Saharan countries and Mexico.

Furthermore, 9% replied that they provide technical services to both EU and non-EU destinations. Such activities concern mainly the US and Japan and to a lesser extent Russia and China. Also, partner countries from the Eastern and Southern Europe, Asia, Middle East, Africa and Latin America are recipients of technical assistance under the Instrument for Nuclear Safety Cooperation (INSC) and the CoE Initiative. Last, just 5% of the participants replied that they share technical data and software with partners abroad. Again the most part of such transfers concern exchanges with US partners, and to a lesser extent Japan and Russia. The respondents referred to Turkey, Israel, Mexico and Cuba as further recipients of technical information. The majority of the employees sharing technical data and software use e-mails and phone calls for such transfers. Also, a relatively high percentage makes software available for download in JRC web-sites.

### **8.3.3 Awareness and attitudes towards export compliance**

The third section of the survey looked into the level of awareness and attitudes *vis-à-vis* export controls and export compliance in the JRC. The participants were called to answer whether they are aware of dual-use export controls pursuant to the EU regulation. A quite

impressive percentage of the JRC staff (49.7%) replied that they are indeed aware of the regulation and the requirement to apply for an export authorisation when transferring dual-use materials and technologies abroad. Among temporary staff, the percentage of those knowing about dual-use export controls falls to 38%.



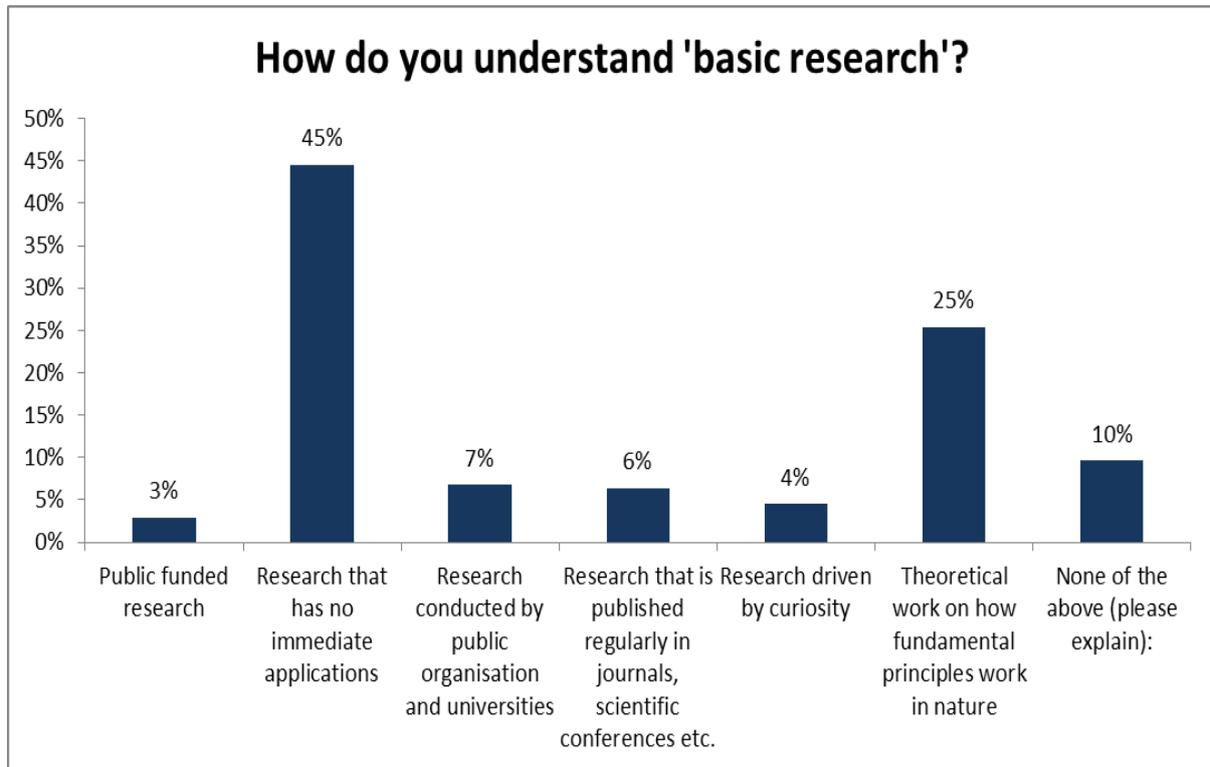
The questionnaire contained another related question exploring the level of awareness of dual-use research and dual-use goods in general. The majority of the participants (56%) responded that they were aware of the dual-use issues already before taking the survey. There are different sources whereby the JRC staff may learn about export controls. These concern mainly contacts with colleagues, reading the news as well as information sessions organised by the JRC. Also, an important percentage learned about dual-use export controls after communication by the competent government authorities<sup>482</sup>. Other recorded responses are ‘studies on that issue’, ‘self-education for work purposes’, ‘external trainings’, ‘information from NGOs’, and ‘common sense’.

Quite interestingly, JRC employees have become aware of the dual-use problematic in many different ways including previous employment either in private or public sector (nuclear regulatory authorities or previous position in the EC). There were also responses as follows: “on my own duty, as project leader working with nuclear materials”, “learning by experience (having occasionally dealt with or worked on dual-use items over 20 years)” and, “we have to specify that our services can be exported”. In addition, the Legal Advice Unit (B.6) appears to take well into account export requirements, as the responses of its employees illustrate: “this is part of my duties” and “yes, I work on legal aspects of collaboration agreements”. This outcome confirms the conclusion drawn in section 8.2.4, that compliance with export controls is part of the running of the organisation.

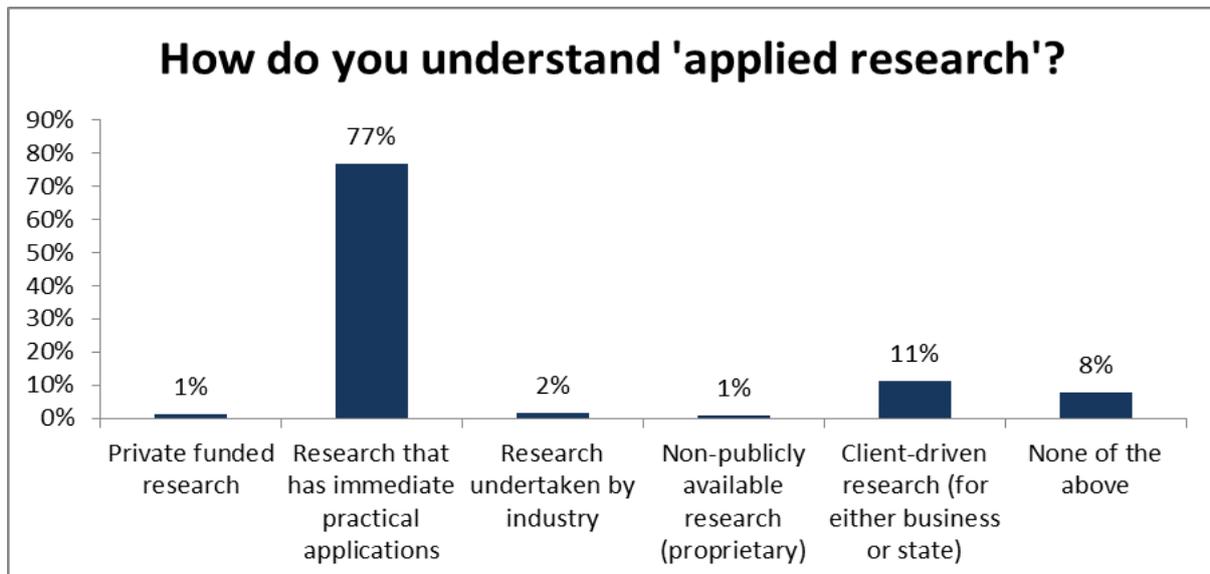
All the participants were willing to share their understanding of terms ‘basic scientific research’ and ‘applied research’ on the basis of a number of options provided. Research that has no immediate applications is the option that scored first (44%), followed by the option ‘theoretical work on how fundamental principles work in nature’. Research conducted by public organisations and universities was the third most popular response followed by the

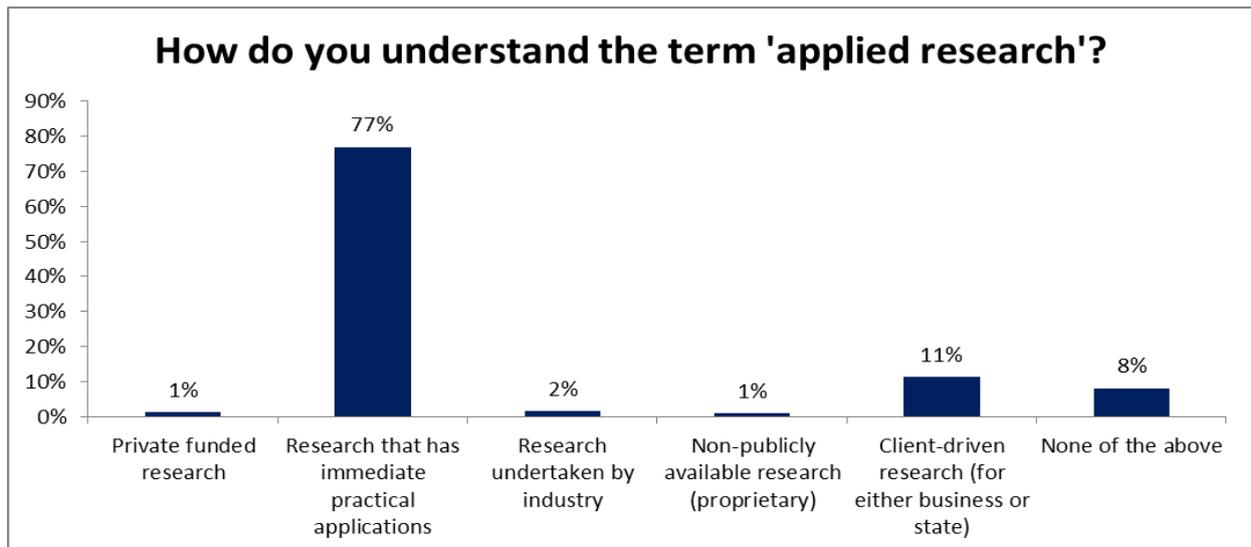
<sup>482</sup> The respondents had a chance to select more than one options for that question. Therefore, despite the imbalance of the specific percentages, the ranking is still indicative of the main sources of information.

criterion used by the US authorities for defining 'fundamental research' namely, 'research that is published regularly in journals, scientific conferences *etc.*



Reversely, applied research is understood primarily as research that has immediate practical applications (77%) and it can be often client-driven research (11%). The funding source was hardly referred as a defining characteristic for either basic or applied research.





Some of the free text responses provided by the JRC researchers present particular interest and point to issues already discussed in this study, most or least extensively. Some respondents stressed the difficulty to provide a widely applicable definition of the basic research. Others pointed out that there might be connections between basic and applied research. Most interestingly, one respondent differentiated between basic and applied research on the basis of the TRL scale. According to him, research belonging to low TRLs (I-II) is basic whereas research being at TRL III and above must be considered as applied.

Basic research comprises both theoretical and practical research to understand and explain fundamental principles in nature, but also in culture and human interaction.

Applied research has immediate practical applications and it uses or adapts to a large degree pre-existing knowledge for developing a fit-for-purpose solution.

*Indicative definitions as provided by the respondents*

When it comes to the JRC research activities, 39% of the respondents categorise their research as applied, 27% as mixed and only 5% as basic, a rather anticipated outcome given the nature of JRC activities.

With regards to the prevailing attitudes, the participants were asked to rate two statements. The majority (58%) of JRC employees agree or strongly agree that "the diffusion of research results and processes may be exceptionally restricted on the grounds of international and national security concerns". A higher percentage (63%) agrees or strongly agrees that 'showing due diligence with regards to security implications of their work is an important parameter to be taken into account when conducting research.' Although, the first statement touches upon a delicate issue that may be perceived quite negatively in a research environment, JRC staff adopts a rather receptive stance.

Last, the participants asked whether they would see as useful the possibility to follow training on the dual-use export controls. A significant number (46%) replied that they would like to receive training on that topic.

## 8.4 Building the ‘risk profile’ of the JRC: an overview

The risk identification method requires correlating legal obligations, the sensitivity of research and the institutional processes in place for identifying the level of risk relating to the operation of an organisation. The foregoing sections exemplified how this can be done in the practice and what the possible challenges are. The section below offers some main conclusions with regards to the risk profile of the JRC.

**The legal obligations:** First of all, the Italian government by force of the legislative decree 96/2003 specifies certain aspects of the EU Regulation such as the conditions for using general authorisations and the applicable sanctions for different types of violation of the export control law<sup>483</sup>. The law does not set any specific requirement for exporters to apply internal measures. However, it stresses that transfers of controlled technology and software over the internet shall be subject to authorisation (Article 15). It is also interesting that the law provides for specific sanctions depending on the type of infringement. For instance, omission of record keeping procedures is punished with a fine from €15.000 to €90.000. The unauthorised transmission via internet or other electronic means of listed items is punishable by imprisonment up to 2 years plus economic fines. Indeed, the law provides for the ‘seizure’ of the website containing controlled information. The provision of technical assistance in connection to a military end-use may bring imprisonment up to 2 years, while where a WMD end-use is in view the penalty may increase to 4 years. These provisions bear some importance given that a research organisation such as the JRC ‘exports’ in principle technologies and technical services.

### Sensitivity of research and types of activity involved:

- Almost all JRC Institutes may use or, in some cases develop potentially controlled equipment, methods and software;
- Certain Institutes and Units appear to be facing a higher degree of sensitivity from an export control angle (ITU, Ispra Site Management, IRMM and IHCP);
- JRC collaborates mostly with government authorities. JRC has a rather limited number of competitive projects and therefore, export control risks may be attenuated. However, the formal collaborations with international organisations and governments do not necessarily imply that export control requirements are not applicable;
- 8% of the participants replied that they have applied for an export authorisation in the past (includes previous working experience too);
- Technology transfers and license agreements for software represent a source of concern;
- Dismantling laboratories and sale/ donation of equipment represent a possible area of concern;

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<sup>483</sup> Legislative Decree No 96 "Implementation of certain provisions of Regulation (EC) no. 1334/2000 setting up a Community regime for the control of exports of dual-use technologies, as well as' technical assistance intended for military purposes, in accordance with Article 50 of the law 1 March 2002, no 39, Official Gazette 102, 2003, retrieved from: <http://www.camera.it/parlam/leggi/deleghe/03096dl.htm>

- The overall sensitivity of the research undertaken by the organisation could be evaluated as medium. There are clearly sensitive types of research but ‘exporting’ activities are most of the time limited to intra-EU transfers.

#### Existing processes for addressing export control risks:

- Export compliance is indirectly part of the day-to-day running of business. The survey showed that a non-negligible percentage of staff has applied for an export authorisation in the past. However, export compliance is not dealt with in a systematic way fostering a culture of compliance and preventing risky transactions from happening.
- There are different institutional processes in place (customs office, personnel screening, contract review, patents and technology transfers office) ensuring conformity with security rules and other applicable regulations. However, the risk assessment does not take into account by default export control issues.
- The JRC’s overall stance could be characterized as reactive. As past experience showed, the JRC complies with export controls without implementing a comprehensive export compliance strategy but relying mainly on the awareness of its employees.

#### Attitudes and level of awareness:

- Permanent staff is better positioned in terms of awareness compared to temporary staff. About half of the participants replied that they are aware of the dual-use regulation.
- 63% agree that showing increased responsibility with regards to security implications of their work is an important parameter.
- 46% would like to receive training on export controls. Generally speaking, the more an institute is concerned with the topic, the more merit is seen in following training.
- JRC staff seems to be generally aware of dual use export controls. However, this does not mean that they realise how their work relates to export control risks.

**Concluding remarks:** The EC Joint Research Centre is a sui generis organisation. It is part of an international institution of specific legal nature and its functioning is underpinned by legally binding intergovernmental agreements, the European Treaties. This fact implies certain opportunities and challenges from an export control point of view. Most notably, thanks to the proximity of JRC to the EU policy-making and its active engagement in issues relating to security and non-proliferation, JRC is well positioned in terms of awareness of export compliance issues. In fact, JRC scientists may know about export controls for a number of reasons such as:

- awareness raising seminars conducted in the past by the STREX team
- in their capacity as responsible scientists working for the EC

- the proximity of JRC to EU policy-making and JRC's active involvement in issues relating generally to security and particularly to export controls
- the sensitivity of their research or past incidents of non-compliance

At the same time, the JRC staff may feel immune to risks relating to export controls. This is to some extent justified. NSU scientists for instance, work for the accomplishment of non-proliferation objectives and the recipients of their research are mainly government authorities and international organisations working again in the fields of nuclear security and safety. However, to the extent that JRC collaborations and subcontracting include provision of equipment and technology to research institutes and universities in non-EU countries or, have commercial aspects certain precautions need to be taken. One should not forget that end-use undertakings, sanction restrictions and especially controls of intangible transfers of technology require showing due diligence and taking up concrete actions so as to minimise the possibility for the organisation to contribute inadvertently to a sensitive transaction. Moreover, it should be reiterated that certain equipment and technologies require an authorisation also for transfers within the EU.

Second, the fact that JRC employees are generally aware of dual-use trade controls does not imply that they also realise how their work may connect to export control risks. The shift of export controls towards an all-encompassing and modern approach means practically that the term 'export' covers different possibilities and also, the export compliance concept includes a number of concerns stemming from interrelated but different legal frameworks. Reasonably, one needs to go through an 'initiation process' and follow related training for becoming familiar with and understand better the logic and the implications of export controls. This need for training concerns both scientific and administrative staff and should be underpinned by a broader strategy for coordinating different policies, procedures and setting tangible compliance targets. In that regard, particular attention needs to be paid to temporary staff. It is a very common and useful practice for the JRC to employ scientists under contracts of determined duration. In addition, temporary staff needs to acquire a general understanding of export controls and comply with the applicable rules and procedures.

Third, the JRC as part of the European Commission could take advantage of established procedures and mechanisms as well as quality management practices for addressing and integrating export compliance into existing structures. Section 8.2.3 discussed the institutional processes being currently in place and relating to export control issues. In relation to this, the analysis suggested simple measures that could be taken in order to establish a compliance system and foster a culture of responsibility and export compliance. Whereas, as said above, such initiatives need to be part of a broader strategy, at the same time it must be ensured that researchers are not overburdened with bureaucratic procedures and overly strict internal rules.

An export compliance system equipped with certain policies and procedures could initially target those Institutes undertaking research in areas of high dual-use potential such as the ITU (nuclear safeguards and security), the IRMM (nuclear safety and standards) and the IHCP (bio-chemical) and then expand to cover other sensitive areas. In fact, a compliance system

could be launched as a pilot programme in one of the Institutes, tested for a certain period of time, improved and then expanded at JRC-wide level. Once the system is fully operative, an ECO, an export control responsible could be appointed in each institute for questions and assistance in the preparation of an export application if necessary. The overall coordination and monitoring of the system should be entrusted to a central export compliance function. As long as certain quality management principles are respected, the specific location of the export compliance function in the organigram of the organisation has little importance.

**Table XIII: A SWOT analysis for the JRC**

<i>Strengths</i>	<i>Weaknesses</i>	<i>Opportunities</i>	<i>Threats</i>
Established security policies & approval procedures	Lack of an export compliance system	Back up the policy formulation in the area of trade controls	Different legal frameworks applicable
Modern model of governance	Lack of an export compliance culture	Proximity to the EU policy making	Nature of activities (sensitive fields, applied research)
Lawful partners	Different locations (fragmentation of activities)		International collaborations
Part of the European Commission (good governance practice)			Flow of researchers

### **8.5 ‘Refining’ the risk identification method (SPO)**

This part intends to evaluate and further elaborate the risk identification method as tested in the JRC context. In doing so, the analysis shows what worked well and most importantly what was missed out. The ultimate goal is to draw conclusions with regards to whether such a method represents a useful practice to follow in different organisational environments, and mainly in research organisations and universities.

First of all, the core idea of the risk identification method is (1) to assess the sensitivity of research undertaken by an organisation and (2) to evaluate the operation of institutional policies concerned by export-related activities keeping in mind (3) the obligations set in the law. At the end of the process one should be in place to evaluate the imminence of export control risks to occur given the sensitivity of research and the capabilities of the organisation to deal with such risks. This way the organisation will be able to set up a fit for purpose export control system by adapting existing procedures and introducing new ones only where deemed as necessary. The abbreviation SPO can be used for naming this basic method: S stands for Sensitivity, P for Processes and O for obligations.

The test case of the JRC showed that in fact there is also a step (0) to be taken prior to applying the core steps of the SPO: the analysis of risks at ‘macro-level’. This step involves a first analysis of the risk profile of the organisation in general and it addresses the following aspects:

- *Organisational structure:* How central is the model of governance of an organisation? Generally speaking, the more decentralised an organisation is, the more difficult will be to identify risks and implement common mitigation procedures. For instance, the constituent units may follow different policies and procedures warranting different actions. In addition, the different locations where an organisation operates is a relevant issue to consider.
- *Type of research:* What are the key competences of an organisation? Does the organisation undertake mainly basic or applied research? Is it active in proliferation related disciplines or defence related research? These are all plausible questions to ask here.
- *Main Partners:* What are the sectors of origin for the collaborators (public authorities, industry, academia, defence related *etc.*) of an organisation and what percentage of the funding sources they represent?
- *Scope of activities:* How international is a research organisation and, what types of activities are involved in the conduct of its research (travelling, provision of services on site, operation of int. campuses, patenting *etc.*)
- *Level of awareness:* Are there indications about the level of awareness and the patterns of behaviour pervading the interactions between the employees of an organisation?

Reasonably, this introductory risk assessment does not need to be in depth –this rests upon the next steps of the SPO- but it is necessary for providing the background information required for understanding the organisational context. This approach was followed also for the JRC in the introductory section of chapter 8. The outcome of such preliminary evaluation could be that the organisation is not concerned at all by export control issues (think of a university providing mainly undergraduate courses and maintaining limited research activities in disciplines relating to humanities for instance). If this is not the case the following step is the evaluation of risks at ‘micro-level’.

This step (1) includes the evaluation of sensitivity of research and could conclude that the research activities of a given organisation are of low, high or medium risk. The assessment of the sensitivity of research requires taking into account what technologies are used or developed and what activities are involved in such research. The legal obligations and the control lists are the factors against which the risk assessment takes place. The question raised here is which units, departments or faculties should be chosen for this assessment. Ideally and depending on the resources available each unit could conduct the risk assessment for each own portfolio and activities. Alternatively, one could start by selecting departments or units potentially most vulnerable to export control risks. It is at this stage where the launch of an

online survey could provide further evidence for identifying areas of concern and selecting most sensitive units.

The initial selection and the assessment of the sensitivity of research should be based on the collaboration between a legal expert knowing the regulatory framework of export controls and a technical expert or manager having deep knowledge of the research portfolio. A potential problem could be the case where a university or organisation is such a decentralised structure that the manager does not have a complete picture of the undertaking activities. The JRC case study represents an academic exercise. In that regard, the author lacked the required resources and expertise for conducting the risk assessment for all sensitive units. Also, for reasons of consistency with the method as described in this part the online survey should have already been conducted in the phase selection of most sensitive units and not as a supplementary action taken at the end of the SPO. The general objective of this phase is to determine whether the research undertaken by the selected units and accordingly by the organisation as a whole could be regarded as of low, medium or high risk. It goes without saying that the process allows also to draw conclusions concerning the specific challenges and sources of risk stemming from the activities of the organisation.

The next step (2) requires considering the existing institutional policies and procedures relating directly or indirectly with export control issues. Exploring whether export control risks are taken into account or addressed by internal policies and processes within the selected Units is of central importance for suggesting improvements and integrating export control objectives where necessary. What the potential aspects connecting to export controls are was illustrated vividly in the JRC test case as well as the case studies discussed in chapter 7. Definitely, the logistics and the legal departments could have a more active role to play with regards to export compliance. Also, the case study illustrates the accompanying measures that could benefit export compliance and foster a culture of responsibility such as staff regulations, codes of conduct and ethics committees and certainly, security related policies and measures. The result of such an institutional assessment would help one to answer whether the organisation can be considered as (a) unaware (b) reactive or (c) proactive. It is noted that an organisation may generally comply with export control requirements even in the case where it does not implement a formal compliance system.

At the final phase (3), one could rely on the results of the assessment for both the sensitivity of research portfolio and the responsiveness of an organisation to export control concerns so as to design effective and efficient compliance procedures improving an organisation's management system, reducing the compliance costs and eliminating any undue burdens. It is reminded that the integration of such policies and measures to the broader compliance and management system of the organisation would lead to significant benefits as well as other positive side effects. Such benefits include the thoroughgoing sustainability of the export compliance structure, the incorporation of proliferation risks into an aggregated risk portfolio,

the reduction of costs and complexity through convergence of structures, higher efficiency and avoidance of disputes over competencies<sup>484</sup>.

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<sup>484</sup> Makowicz, "ISO 19600 as Benchmark for Management of proliferation within an Integrated Compliance Management System," 30.

## 9. Main Findings and Conclusions: the Interfaces between Research and Export Controls

### 9.1 A policy perspective

*The role of knowledge:* The knowledge is the driving force for both scientific and economic development. In other words, it is the vehicle to personal and societal advancement. At the same time the knowledge can be also exploited for malign purposes. In relation to this, the proliferation of WMD can be considered in its very essence as a ‘problem of knowledge’. The dual nature of knowledge and the security environment in which knowledge diffuses pose certain challenges and require the attainment of fine balances.

Building a WMD requires three main elements: (1) special material (2) technological equipment (explicit knowledge) and (3) technical expertise (implicit knowledge)<sup>485</sup>. One can argue that among the three, the element posing the greatest difficulty to get acquired is tacit knowledge<sup>486</sup>. Consequently, it is not strange that trade controls cover both tangible and intangible technologies in the scope of controls. In today’s environment, the globalisation of the labour power and the rapid pace of technological advancement may accentuate the risk of diffusion and use of sensitive knowledge –including tacit- by proliferant states and outlaw organisations or individuals. Considering the level of expertise and tacit knowledge required to master a technology as well as the extent to which such a technology is becoming deskilled is an important factor for evaluating what items and technologies need to be included on the control lists<sup>487</sup>.

Tucker goes further by arguing that different types of technologies warrant specific governance measures. Such governance measures may range from legally binding regulations (*e.g.* statute-based export controls) to soft-law (*e.g.* government guidelines and self-regulatory mechanisms by industry and academia) and, other informal measures such as (*e.g.* codes of conduct and ethic committees)<sup>488</sup>. This doctoral study provides further support to this argument. In broad terms, each area of proliferation concern (nuclear, biological and chemical) may associate with a distinct weaponisation process implying specific limitations and opportunities in terms of measures to be taken. Chapter 3.1 offers further examples of the distinct technological parameters connecting to each proliferation area.

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<sup>485</sup> The means of delivery is an important but not a necessary condition for ‘building’ an effective WMD. Generally speaking, their types may vary from simple and commonly available items such as a lorry or, spray planes to advanced technologies such as missiles and drones. It comes out that the impact of an attack involving a WMD will depend on the destructive power of the weapon itself as well as the capacity of the means of delivery.

<sup>486</sup> J. Tucker offers a further interesting distinction between personal tacit knowledge and communal tacit knowledge. The personal tacit knowledge can be conveyed from one person to another through a master-apprentice relationship whereas the communal tacit knowledge might reside in an interdisciplinary team of specialists each of whom has skills and expertise relevant to a particular facet of a technology. Visibly, getting access to communal tacit knowledge can be even harder than acquiring personal tacit knowledge. See Tucker, *Innovation, Dual-Use and Security*, 2012, 23.

<sup>487</sup> Tucker uses this criterion (‘ease of misuse’) as one of the parameters determining the tailored measures required for the control of a given technology.

<sup>488</sup> Tucker, *Innovation, Dual-Use and Security*, 2012, 75.

In that regard, emerging bio-technologies seem to pose different risks compared for instance, to nuclear technology for technical and legal reasons. In the case of biological weapons, the basic science relevant for civilian uses is essentially the same as that relevant to military and especially, terrorist applications<sup>489</sup>. At the same time the lack of a verification system at the level of the BWC may have played some role in the perception of the bio-related proliferation as a stand-alone case. There are several factors suggesting that bio-technologies warrant a specific set of control measures. The study discusses some of them: the definition of dual-use research designed to address sensitive research in life sciences; the cost-benefit analysis between public health preparedness and security as demonstrated in the analysis of the H5N1 case study; the founding of a special board in the US for dealing with bio-security issues and dual-use research; the temporary halt of funding by the US government for gain-of-function research; the several initiatives for biosafety and security by European public authorities and universities (*e.g.* codes of conduct, ethics committees, the European Biosecurity Awareness Raising Network) and, the extensive literature on the dual-use dilemma. It seems therefore, that export controls represent only one ‘ingredient’ from the blend of measures targeting sensitive dual-use research. This approach could be valid also for the other areas of proliferation concern or specific technologies.

What are the obligations of scientists and research organisations stemming from the international non-proliferation framework and how are these reflected in the trade controls system of dual-use items of the EU?

***The Non-proliferation Treaties:*** The responsibility to devise suitable mechanisms for coping with proliferation concerns lies primarily with State authorities. The non-proliferation treaties commit States to enacting and implementing legislation at their respective jurisdictions. It follows that all individuals should abide by such national implementing laws and consequently, researchers are not excluded from this obligation. For instance, the signatory States of all treaty systems declare their commitment to facilitate international cooperation and promote the development of peaceful applications of bio-chemical and nuclear technologies in economic and scientific field. In that regard, one could say that scientists have an indirect obligation to promote the peaceful development of nuclear, biological and chemical technologies within the limits set by the treaties.

***The Multilateral Export Control Regimes:*** The MECRs are international voluntary arrangements committing participating states to pursue commonly agreed goals. Again, if one tries to identify direct obligations posed by the MECRs for exporters and more particularly for public research institutes and academia, he will have a great difficulty to list any. The export control regimes set the main norms and control lists that should be embodied in the national legislation. Understanding what is controlled and why is an issue of chief importance for two reasons. First, it helps one understand (1) what sort of items are targeted by the regimes or otherwise, how the ‘dual-use’ term is understood from an export control point of

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<sup>489</sup> US National Research Council, *Biotechnology Research in an Age of Terrorism (Fink Report)*, 82.

view. Second, the content of the control lists is important also because it hints at (2) types of research potentially concerned.

With regards to the first point, the WA has a broader scope compared to the other regimes. Its dual-use list unfolds on the basis of nine categories covering a wide range of technologies<sup>490</sup>. Given that, the WA sets forth some specific criteria for selecting dual-use items that can be controlled:

- Foreign availability outside the participating States.
- The ability to control effectively the export of the goods.
- The ability to make a clear and objective specification of the item.
- Whether an item is controlled by another regime.

If each area of proliferation concern (nuclear, biological and chemical) associates with a distinct weaponisation process implying specific limitations and opportunities in terms of measures to be taken, the same can be applicable for specific technologies controlled under the regimes. This would be particularly applicable to the WA dual-use list, given its broad character and variety of controlled technologies. The validity of this argument would require further analysis by technical experts. Whereas only items falling within certain thresholds are controlled, identifying related controlled technology could pose a greater difficulty.

Concerning the second point, section 3.6 discussed and compared the varying definitions of ‘dual-use’ at international and European level. Based on that discussion, the section suggests an all-encompassing definition of ‘dual-use research’ or otherwise, of ‘export controlled research’:

‘Dual-use research’ could be defined as these ‘scientific and technological activities’ involving items, technologies and processes restricted under the relevant export control law. It concerns primarily civil research that could be integral to the design, construction and use of Weapons of Mass Destruction and in some instances of conventional weapons.

Although this definition was built for the purposes of the thesis, it could function as a basis for understanding when export controls interfere with research activities. This is all the more important due to the fact that different professional communities understand the dual-use problem from their own perspective. For example, the non-proliferation community may look at the dual-use problem from an export control standpoint. The scientific community may see only the ethical implications connecting to dual-use research. Therefore, it can be argued that the governance of dual-use research and the control measures governing trade in dual-use items represent two distinct areas that cross each other at certain points. The first point of contact is exporting dual-use materials and equipment in the framework of research activities. The second point of contact is much more intriguing and it lies in the heart of scientific

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<sup>490</sup> The main categories are as follows: 1. Special Materials and Related Equipment; 2. Materials Processing; 3. Electronics; 4. Computers; 5. Telecommunications and Information Security; 6. Sensors and Lasers; 7. Navigation and Avionics; 8. Marine; 9. Aerospace and Propulsion.

activities. Whereas the inclusion of technology transfers within the scope of controls can be considered as justified, it can also be proven highly problematic. In relation to this, the MECRs set the general framework for implementing technology controls. Each participating State has the discretion to decide upon the strictness of such technology controls.

To begin with, all regimes understand invariably the term ‘technology’ as the specific information necessary for the development, production or use of a product. Technology may take the form of technical data and technical assistance. It is also established that controlled technology means technology ‘directly associated’ or ‘required’ for the development, production or use of the items specified in the lists. The WA clarifies that ‘required’ technology “refers only to that portion of technology which is peculiarly responsible for achieving or exceeding the controlled performance levels, characteristics or functions of a controlled item. Reasonably, as regards know-how and knowledge in general, it is mostly the individual possessing such knowledge who could be able to determine each time whether information is controlled or not. To complex the issue more, technology remains under control even when exported to be used in connection with a non-controlled item or end-use. This may have far-reaching consequences for research activities. To use a real life example, Fouchier in the H5N1 case was exploring the transmissibility of a lethal various -known to affect up to that moment poultry- with a view to exploring the risk of a pandemic among humans.

Nonetheless, all MECRs clarify that technology directly associated to a controlled item will be subject to as great degree of scrutiny and control as the item itself to the extent permitted by national legislation. Hence, it can be assumed, that the discretion of authorities to control the transfers of technology is not unlimited. Actually, the regimes set some decontrols in relation to technology transfers: ‘basic research’ and ‘public domain information’ must be excluded from the scope of controls. Visibly, it is meaningless to control information that is already broadly available. Also, for quite understandable reasons basic scientific research and public domain information should be free of constraints.

***The European Trade Control System:*** The European system is founded on the same main principles and control lists as the regimes. This is not to say that the EU Regulation 428/2009 does not establish a distinct framework taking into account the peculiarities of the EU construction and the increased needs for consultation and coordination procedures. However, in broad terms and as far as it concerns technology controls the EU system is limited to repeating the definitions set in the framework of the regimes.

First of all, ‘exporting’ technology through tangible or intangible means from the EU to a destination outside the Union is within the scope of the Regulation. However, the provision of technical assistance outside the EU is regulated by the Council Joint Action 2000/401 and only in respect of WMD end-uses and other military uses to embargoed destinations. As regards the provision of technical assistance within the EU, the Regulation does not provide for a sort of deemed export as it applies in the US. This is not necessarily a weakness given also the problems linked to the implementation of the deemed export rule in the US context. The regulation provides the legal basis to control transfers of items including technology also

within the EU on the condition that the final destination is outside the Union and the end-use connects to the production, use or development of WMD.

Second, except the definitions provided in the framework of regimes, the ‘basic scientific research’ and ‘in the public domain’ exemptions are not further clarified in the Regulation. The study demonstrated that the use of the current universal definition of basic research is problematic in the trade controls context. Whilst the demarcation line between applied and basic research is not clear-cut the ‘institutional locus’ and the funding source of a given research can only be indicative. Moreover, what constitutes public domain information is not evident either. What is sorely lacking is some guidance on how these ‘fundamental’ exemptions shall be applied in practice.

The adoption of a practical rule or a methodology for assessing the nature of controlled information could be of help. Such a methodology should definitely take into account the sensitivity of a given research, its main purpose and its readiness to reap practical benefits. Already from chapter 2, it was suggested that R&D is an evolving process with different phases ranging from the establishment of general principles, theories and laws to the application of such knowledge to a specific problem and ultimately the actual application of such results at industrial level. In that regard, the TRLs scale could help authorities and researchers to evaluate ‘the level of maturity’ of a given research project to deliver practical applications. However, the usefulness of such a tool for evaluating the sensitivity of a dual-use technology requires further examination and studies of a technical nature. It is noted that the ethics review taking place in the framework of Horizon 2020 use the TRLs metric as an informal means for assessing the potential dual risks posed by research proposals.

***The US interpretation of the decontrols:*** The analysis of the H5N1 case study illustrates *inter alia* the divergent approaches between the US and the EU. It seems that the same type of research may be considered in the American context as ‘fundamental’ while in the European as ‘export controlled’. The US system offers a rather crystal-clear approach. It clarifies that information arising during or resulting from fundamental research exempts from the controls. This implies a distinction between inputs used for and outputs generated from a research. The inputs -including both items and technology- can be subject to control as long as they do not constitute publicly available information. In addition, the fundamental research exemption concerns information that is intended to be published and shared broadly within the scientific community. It comes out that there is an underlying relationship between public domain information and fundamental research.

In practice there are two basic safeguards enabling the US authorities to identify research that could also be controlled from an export control perspective:

- Classified information due to security reasons (in the framework of federally funded research)
- Information that is withheld from publication due to proprietary reasons (*e.g.* pre-publication reviews by a private partner)

The question that remains to be answered is what applies for fundamental research achieving an innovative outcome of dual-use concern for which no proprietary or security restrictions are applicable or sought. In that case, it can be argued that other governance measures may represent a more fitted option rather than trade controls.

The US system sheds light also on the issue of the public domain information. Through an extensive list of examples the EAR specify the cases when information shall be considered as publicly available. For instance, information published in periodicals, books, hand-outs, electronic, or any other media available for general distribution either for free or at a price not exceeding the cost of reproduction and distribution still qualify as public domain information. Likewise, information released in the context of a conference or other gathering is considered as basic as long as all technically qualified members are permitted to participate and take notes of the proceedings and presentations notwithstanding a registration fee reasonably related to the cost or, other limitations due to eligibility criteria and availability of places. Again, the EAR does not clarify what shall apply in the case where a scientist or a firm's employee publishes a sensitive research outcome with the intent to render it public and thus, not controlled. Logically, most of the time a company does not have an interest to publish commercially valuable information. In addition, the threat posed by individuals having the lawful right to access controlled data is not an issue dealt with primarily by export controls. Furthermore, one should not overlook that a regulation cannot foresee every possible contingency and hence, certain issues may require consideration on a case by case basis.

***Assessing the role of trade controls vis-à-vis research:*** Contemplating the role of dual-use trade controls in respect of research activities, it can be argued that trade controls are not coined to oversee dual-use research. The inclusion however of technology transfers in the scope of controls brings *de facto* the issue to the fore of export controls policy making. Moreover, technology controls as a security measure set on the agenda of discussion the attainment of fine balances between the freedom to conduct research and the limits that may be set due to security reasons. The basic scientific research and public domain exemptions seek reasonably to unleash non or less sensitive information from unnecessary restraints as well as to protect the unhindered dissemination of information and conduct of research.

Researchers are required to apply for an authorisation to the extent that they send tangible controlled items abroad as any other 'exporter'. What is less clear is what applies for technology transfers that are in the core of research activities and difficult to be controlled. In that regard, the distinction between inputs to research that can be controlled as long as they are not in the public domain and outputs of research to be published freely seems to be meaningful. Then a second issue is the interpretation of basic research exemption. In practice, as regards the publication of sensitive research, a policy-maker may have to choose among three options:

- I. The American paradigm: The definition of fundamental research in the US albeit not perfect provides a plausible path for identifying potentially export controlled technology. On the negatives, the fact that what constitutes proprietary information is

not necessarily export controlled. Conversely, what is sensitive or controlled is not always classified or proprietary. In any case, a researcher or research organisation will have some latitude to negotiate contract terms and maintain the right to publish the full content of a research. Also, at the time of the conclusion of a contract, one cannot be certain for the sensitivities relating to a given research project. On the positives, the US definition provides a practical rule for determining what qualifies as fundamental research and what shall be under further examination. This criterion emphasizes the role of pre-publication reviews undertaken by federal agencies and industry for security and proprietary reasons.

- II. A methodology for defining basic research: The second option suggests setting some criteria or developing a sort of methodology capable of evaluating effectively the sensitivity of a given technology. The readiness of a technology to be used for practical objectives may not be the sole criterion for practical and substantial reasons. The risk assessment shall take into account the sensitivity *per se* and the overall objective of a given publication. It comes out that the engagement of the academic and scientific community in general is a necessary condition for the implementation of such a rule. In fact the finding of a methodology or the establishment of certain criteria for determining basic research should be the product of a consultation between the trade controls community and the academia. The study shows that in either US or EU context the input of researchers in clarifying the nature and the impact of their research is crucial. For example, the analysis of the case studies for the HZB and the PNNL illustrate vividly that presently the risk assessment of a research project relies on the collaboration between the export control officers knowing in depth the obligations set in the regulations and the responsible scientists knowing in depth the technical implications of their work.
- III. Maintaining the status quo: This option suggests that one continues using the definition of basic scientific research as Europeans do. The Dutch authorities for instance, have made clear that their approach *vis-à-vis* the publication of dual-use research has not been changed after the legal dismissal of the H5N1 case. Given the absence of a clear distinction between basic and applied research, it seems that the monitoring of sensitive publications pursuant to export controls represents an ad hoc measure or more precisely a tool of last resort. In that regard, certain Member-States interpret that the process of making a research available for publication abroad can be subject to an authorisation. This is a peculiar logic and means practically that submitting a publication containing controlled data or methodologies in a Journal or a publishing house outside the EU requires an export authorisation. Furthermore, trade controls allow for implementing catch-all controls when a WMD or other military use is in view. In relation to this, certain Member States argue that the publication of research is not exempt from the scope of end-use controls. However, it is doubtful that the publication of dual-use research could point to a WMD end-use unless there is specific information from an intelligence service. In addition, measures granting in principle wide discretion to authorities to control the free dissemination or flow of

information are not perceived positively. Therefore, the third option appears to be the least advisable.

***Other governance measures:*** The importance of other tools that could function in synergy with export controls was highlighted in different occasions in the study. Section 4.2 stresses for instance, that the structure of technical-scientific knowledge in a given State is a system with inflows and outflows and therefore, monitoring the release of information also within a State can be justified. However, traditional export control concepts and their variations (*e.g.* ‘deemed exports’) have certain limitations. In that regard, visa screening policies and student vetting schemes could offer certain assurances with regards to who has access to what courses and technologies within a given State.

Another security measure that could function complementarily to export controls is systems for the classification of sensitive information. The Section 4.1 discusses the classification policies applying for EU funded research. Stepping up efforts for consistent and rigorous application of classification policies could indirectly benefit export controls. In that regard, the American paradigm relies on classification policies for identifying potentially export controlled research. It comes out that a rigorous classification policy for sensitive publicly funded research could be of benefit to the export control system of a country.

Addressing dual-use research at its earliest stages is quite important for both practical and security reasons. The study provided an insight into the ways whereby dual-use research is addressed presently at the phase of evaluation of research proposals under the Horizon 2020. Research proposals of broader dual-use nature may hint at export controlled research. Hence, informing researchers for the implications of ‘exporting’ items and technical knowledge to certain end-users and end-destinations already at the phase of planning offers an extra layer of assurance. It can be deduced that the role of funding organisations in identifying dual-use research is important at least in two ways: it benefits the detection of export related research from an early stage and it seeks to ensure that certain classification rules will apply for particularly sensitive research.

Pre-publication reviews by editorial boards of scientific journals are among the possible measures that could offer a better oversight of dual-use research. In the US, certain Journals in life sciences have taken initiatives for screening potentially sensitive research. This could represent a further option for safeguarding dual-use research. However, as it was explained above, addressing a ‘problematic’ research at an earlier stage through ethics reviews and funding schemes, for instance, represents a more desirable route.

Patenting Organisations such as the European Patent Office and the World Intellectual Property Organisation could have a role to play in the screening of potentially sensitive applications for patents. In the US for instance, the BIS has delegated authority under the Export Administration Act to the American Patent and Trademark Office (PTO) for approving exports and re-exports of controlled technology contained in patent applications.

Ethics committees on dual-use research and codes of conduct are indicative examples of self-regulatory measures that could definitely include export control concerns in the array of the

issues addressed in a research setting furthering thereby the attainment of non-proliferation and export control objectives.

## **9.2 Complying with export controls**

In chapter 1, the methodology part of this study puts forward a basic hypothesis to be explored:

Given the peculiarities of academic research and the challenging application of export controls in technology transfers, the implementation of internal compliance programmes by research organisations could be a compelling and feasible response to heightened proliferation concerns.

The first half of the study (chapters 2, 3, 4, 5) sheds light on the characteristics of the academic and research environments, the legal obligations stemming from the application of export controls law as well as the interfaces between export controls and research activities. In doing so, the study responds to the question why internal controls represent an essential, a compelling initiative to take up so as to deal with export control imperatives. The second half of the study provides evidence on how internal compliance can be achieved in practice. The analysis in chapters 6, 7 and 8 provides evidence that internal controls are suitable means for dealing with export control risks in either academic or industrial context. It can also be argued that export compliance systems can be benefited by broader compliance systems furthering adherence to different security objectives and requirements set either internally or externally.

With regards to the element of ‘necessity’, chapters 4 and 5 stressed the breadth and width of trade control provisions and the implications of the inclusion of technology transfers in the scope of the controls. One would say that everything can be controlled when certain conditions are met and the inclusion to export control systems of flexible mechanisms such as end-use controls is a telling example. Even the possibility to deny access to sensitive courses for students originating from certain nationalities is envisaged under sanction provisions of the international law. In that regard, traditional export control principles pose certain limitations.

As a matter of fact, the notions of exporter and end-user are generally incompatible with the nature of intangible transfers of technology. In addition, border controls enforced by customs authorities are pointless in the case of intangible transfers over the internet or other electronic means. Public authorities have acknowledged such limitations by stressing the role of record keeping procedures and other internal controls for achieving compliance with controls of technology. In that regard, internal compliance measures addressing different security aspects such as Technology Control Plans represent a useful practice to follow. It comes out that the role of enforcement authorities is restricted to ex-ante and ex-post verifications checks and audits with regards to the monitoring of technology transfers.

Furthermore, chapter 6 provides evidence that export control authorities promote a transition from a regulation based relationship with exporters to the establishment of a trusted relationship. This shift is the result of the realisation that export control objectives cannot be pursued satisfactorily without the engagement of exporters. Whereas this can be true for any regulatory framework, the nature of export control risks and the scope of related legislation requires from exporters to act to some extent as regulators. Exporting companies need to consider the nature of their work and introduce where necessary risk assessment procedures including end-use and end-user plausibility and ‘third-party diligence’ checks. Likewise, research organisations may need also to assess the nature of their research against export control objectives including tests for evaluating research’s readiness to deliver practical applications. Although personal liability is important, such goals require further review mechanisms to be in place such as internal procedures for advice, training and overall monitoring purposes.

Last, the control of information flow can be seen as contradictory to civil liberties and academic principles well entrenched into the patterns of human culture. Again, internal compliance mechanisms could respond to such a challenge. Internal processes are to be designed from inwards and in consistency with both quality management practices and specific needs of an organisation. In other words, internal controls as tailor-made measures reflecting the needs of researchers and the peculiarities of a specific organisational environment are bound to face less resistance from the recipients of such initiatives. Besides, the ultimate goal of an ICP should be the infusion of ‘a culture of compliance’ throughout the organisation. The section 6.3 advocates that this should not be seen as an idealistic unenforceable approach. There are concrete ways to pursue such a goal: inclusive decision-making, leadership commitment and effective management systems are the main elements for creating an export compliance culture.

With regards to the element of feasibility, chapters 7 and 8 confirmed that the implementation of export compliance measures and formal ICPs is a widespread practice for both industrial and research organisations, especially as regards large ‘exporters’. However, the analysis highlighted a striking difference between European universities having started only lately to discuss export compliance and Americans implementing compliance systems since some years. This divergence can be the result of differences in legal obligations, available resources, nature of research undertaken and cultural characteristics. However, it suggests a need for European export control authorities to render universities aware of their responsibilities with regards to export compliance and encourage them to adopt compliance measures. In turn, universities need to assume a more active role in promoting values that could have some bearing for their function as responsible organisations conforming to security imperatives.

The risk identification method (SPO) seeks to facilitate research organisations in identifying potential risks stemming from their activities and designing effective mitigating measures. The method was tested in the context of a non-university organisation undertaking research in a variety of disciplines. Although, the main idea underpinning its functioning is applicable to any exporting organisation, it will be useful to test the SPO in different universities so as to

conclude on its pertinence to academic environments. The different lessons learned from the application of SPO are listed below:

- The SPO requires relying equally on both legal and technical expertise. In fact, a meaningful initial selection of units potentially concerned by export controls could lead to savings in resources and it is subject to the availability of both technical and legal expertise.
- The whole process can be substantially benefited by utilising expertise already available in the organisation. In other words, an ‘insider’ should undertake the responsibility of applying the SPO method.
- The threat perception and the communication of the risk are of chief importance already from the phase of identification of possible risks. Highlighting too much the consequences of non-compliance or presuming that export risks are the most imminent or important for the activities of the organisation is not advisable.
- Having a clear mandate from the top management of the organisation demonstrating the importance of the internal compliance process is a necessary condition for mobilising and involving the right people within the organisation.
- Where to place the export compliance structure is not of utmost importance also because each organisation has a quite unique organisational structure. Integrating the compliance function in the broader management model of the organisation and embedding export control objectives in existing policies and procedures is instead crucial. In that view, synergies with other security procedures and policies need to be sought.
- Good management and good compliance practice are interrelated and benefit each other.

### **9.3 The governance of dual-use research and the role of trade controls: exploring possibilities**

How would it be possible for a system of norms, rules and decision making procedures to avert the diffusion of proliferation-sensitive knowledge and safeguard it from misuse?
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*A system of monitoring:* Export controls are striving to respond to challenges posed in a constantly changing environment. Technological advancements as well as individuals and organisations acting at global level are the main changing factors shaping an increasingly interconnected international environment. In relation to the first factor, trade controls seek to respond to technological challenges by operating a monitoring system of intangible transfers of technology. As regards the second factor, trade controls are moving sluggishly from State-centric approaches towards a strategy engaging more actively key stakeholders such as industry and academia. The study alludes to two crawling risks in implementing comprehensive trade control systems. While, modern trade controls seek to address as many sensitive transactions as possible, they do not necessarily clarify how this will be achieved in practice. Second, whereas the role of non-State players in furthering export control objectives

is widely acknowledged, this is not highlighted in the related legislation. In that concurrence, what exactly trade controls seek to achieve with regards to the oversight of dual-use is not clear.

***‘Insider’ and ‘external’ threats:*** The Fink report when discussing the role of biotechnology notes that “given the nature of research and the development enterprise, it is unrealistic to think that biological technologies and the knowledge base upon which they rest can somehow be isolated within the borders of few countries”<sup>491</sup>. One could argue that the governance of dual-use research comprises different measures and trade controls represent just a means for safeguarding dual-use research among others. This is perfectly right but one important element should not be missed out here. Although traditionally trade controls have not been crafted for coping with the problem of sensitive research, their functioning is to some degree entangled with that issue. Most importantly, trade controls as legally binding measures represent a unique opportunity in that they may contribute to an increased awareness of the dual-use problem by the scientific community and lead also to a more active compliance practice on the part of universities and research organisations.

Furthermore, trade controls focus primarily on threats stemming from a foreign State or individual. In that view, they address primarily external threats to be materialised beyond the borders of the ‘supplier State’. Thus, the factor of nationality and national borders is of chief importance for a trade control system. The application of the deemed export rule and controls for intra-State transfers are probably exceptions confirming the general rule. However, monitoring effectively ITT demands departing from the traditional consideration of trade controls. In relation to this, trade controls can be greatly promoted by the application of other complementary initiatives such as systems for the classification of information, physical security measures and ethics reviews. One should not forget that a national of a ‘supplier county’ -to speak in old-fashioned terms- can always have access to a research laboratory and misuse certain information if decides to assist an unlawful activity (from State proliferation to terrorist attacks). In that regard, the role of trade controls is to eliminate such a possibility by working in mutual reinforcement with other security measures. In sum, any single system of norms, laws or voluntary rules cannot address and tackle all the possibilities. The realistic contemplation of the world suggests that different asymmetric factors need to be taken into account including human irrationality.

***A strategy for implementing effective controls:*** If defining to the extent possible a clear cut legal framework is of utmost importance, adopting a pragmatic and weighted approach in implementing rather ambitious and comprehensive export control provisions is equally necessary. The pragmatic element shall reflect the inevitability of diffusion and the pace of technological advances. The ‘weighted’ element concerns a cost-benefit calculation that shall be taken into account when implementing trade control provisions. For the industrial world, the calculation will definitely include the economic impact of any measures in relation to the security issues at stake. For the academic world, the calculation will also take into account any economic costs involved but it will focus primarily on the need to preserve the

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<sup>491</sup> US National Research Council, *Biotechnology Research in an Age of Terrorism (Fink Report)*, 18.

unhindered conduct of research and its role as carrier of wellness to societies. To the extent that universities are moving closer to industrial R&D and *vice-versa* the calculation may need to be adapted accordingly. Self-governance measures and ICPs are such initiatives enabling adherence to export controls and providing room for manoeuvring between the different considerations involved. Reasonably, self-governance measures should operate in conjunction with other top-down initiatives in order to respond to the various challenges described above.

***The self-governance option:*** The study argues that industry and academia should assume a more active role in furthering non-proliferation and security objectives in general. Self-regulatory measures could act complementary to controls undertaken by the government. Scientists are usually better positioned to know the implications of their research work and in any case governmental measures should transfer ownership to scientific staff in the same way that reforms in public administration depend on the perception of civil servants in order to be effective. Recipients of most or least controversial changes should see some merit and assume ownership of new initiatives if the latter are to be successful. There are already various initiatives such as ethical reviews, codes of conducts and guidelines steering scientists on how to deal with the dual-use problem in either nuclear or bio-chemical fields. However, generally speaking such efforts do not take into consideration export controls issues at least in a comprehensive way. Acknowledging the pertinence of export controls is a first step to take; responding to export control challenges in a research environment is the next step to consider.

The study suggests that tackling dual-use research should be based on four main elements:

- pragmatic and weighted approach in implementing technology controls
- Synergies between available mechanisms
- Engagement of key stakeholders and collaboration among very different communities
- A mixed approach including self-regulatory and legally binding measures

The section below seeks to clarify the role and the possible initiatives to be taken by different stakeholders at different levels emphasizing the role of trade controls in relation to dual-use research.

***International level:*** Whereas all treaty systems, stress the need to protect the development of peaceful applications in bio-chemical and nuclear technologies they do not specify ways to achieve this in practice. On top of that, the international law takes time to evolve and non-proliferation treaties have proved to be quite inflexible legal constructs. Therefore, it rests upon the signatory states to decide along with the treaties' implementing organisations about the measures to be taken in that regard. Promoting international cooperation and monitoring new scientific developments and related challenges is pertinent to the role of such organisations. The IAEA, for instance, provides a wide range of technical support to its Member States and has been active in developing international standards for nuclear safety and security. The role of such implementing bodies towards the development of common standards on export compliance may merit some consideration.

The UNSC resolution 1540 as a legally binding instrument promoting efforts to enforce and coordinate internationally trade controls and physical protection measures may provide a framework whereby certain initiatives highlighting the ‘dual’ role of the research and academic community could be taken. Such initiatives could range from a statement of the 1540 committee acknowledging the need to comply with trade controls in whatever context either academic or industrial to more concrete actions such as conferences on the nexus between research and trade controls. More broadly, discussions in different UN organisations could take up the issue of dual-use research making clear also the role of trade controls. For instance, for bio-related research the WHO may offer the right setting for such a discussion bringing thereby closer the research and security communities.

The MECRs are less rigid structures compared to the treaty systems and represent the salient framework where international trade control norms are first discussed and devised. It is therefore worth wondering whether deliberations at the level of regimes could lead to the establishment of common guidelines or standards for technology transfers. Given the nature of trade controls today, the MECRs could take initiatives for engaging the academia and industry in the trade control policy-making highlighting also the role of such stakeholders in achieving a safer and more secure international environment. In fact, certain regimes, and most notably the WA have set ‘best practices’ acknowledging also the importance of internal compliance measures for both academia and industry.

Last, as the study highlighted, another example of international organisation that undertakes work of relevance to export control objectives is the ISO organisation developing standards for compliance systems. Other international frameworks such as the OECD might have an important role to play in promoting responsible standards for the conduct of dual-use research.

**European level:** From the preamble, it must be said that the EU Regulation is the product of an intergovernmental process facilitated and coordinated by the Council and Commission committees and approved by the European Parliament. Despite its legal binding nature and direct applicability throughout the EU, the implementation and enforcement of the Regulation is left upon the 28 Member States and it may require enacting further national legislation. As Q. Michel has neatly said, the regulation functions to some extent as a directive to be enforced in 28 different jurisdictions. Given this, the nature of the provisions of the regulation cannot be too specific and the establishment of supplementary measures such as EU-wide guidelines could be seen for certain aspects as the most preferred option.

A clear legal framework especially when it comes to technology transfers, the provision of further trade facilitations (*e.g.* general licences) and the establishment of common compliance standards could probably provide more impetus to exporting organisations for pursuing export control objectives. Whereas such initiatives can also be taken at national level, the craft of common rules and guidelines at European level could largely promote a more rigorous and harmonised implementation of trade controls in the EU. Making for instance, explicit references in the Regulation to internal compliance measures as an important aspect to be taken into account in the evaluation of all types of export control applications could be

an interesting option to consider. Developing EU-wide guidelines for implementing effective compliance systems and monitoring ITT represent a further possibility.

Above all, the thesis highlighted the possible ways for interpreting the decontrol notes and dealing with the applicability of technology controls to research activities. What may represent the most beneficiary and commonly accepted pathway to follow it will be the result of consultation between the EU Member States and the Commission. In any case, a more proactive stance of the EU in the regimes, coordinated closely with its Member States, could potentially contribute to the clarification of long-standing problems at a more universal level.

**National level:** As it appears most of the Member States have not adopted additional legislation or guidance for clarifying the application of technology controls at national level<sup>492</sup>. Pending a possible tightening of technology controls around common guidelines and, subject also to limits set by available resources, Member States may have to invest in outreach activities towards European industry and academia. In turn, industry and scientific organisations and their professional associations could enhance initiatives undertaken by public authorities.

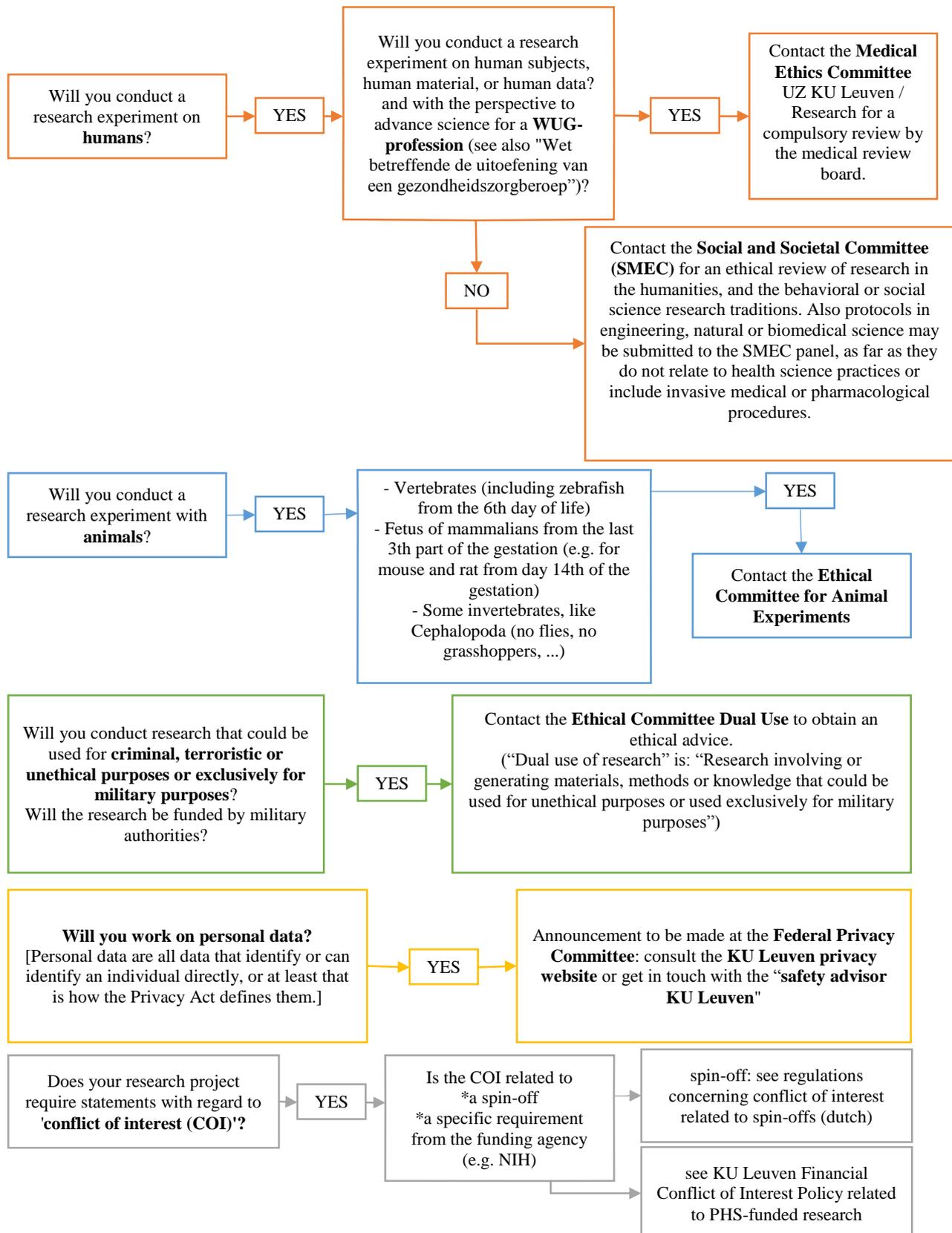
Higher education policies are generally determined at national level and hence, certain actions may need to be taken at that level bearing also in mind export control objectives and implications. Establishing new mechanisms or legislation for the oversight of dual-use research may require synergetic actions to be taken by institutions such as National Academies and research councils.

To conclude, trade controls create obstacles and bottlenecks to anyone aspiring to contribute to activities that could undermine the national and international security and most importantly, they offer a means of protection against WMD related risks. Given their legally binding nature, the violation of trade controls brings legal consequences and therefore, they also have a preventing function. The aim of trade controls is not to hinder the economic activity, control the flow of information or impose obstacles in the conduct of research. However, there are instances where certain research activities may be subject to monitoring by government authorities and to self-regulatory measures by the research community. Indeed, an instinct of accountability and self-governance has been developed since long time ago with regards to particularly sensitive types of research. Threat perception is a matter of utmost importance for implementing compliance measures and adhering to trade controls. At the end of the day, the ‘public opinion’, politicians and individuals tend to become concerned only when a threat has been materialised. The role of the study is *inter alia* to remind that internal compliance measures and trade controls is about being anticipatory and assuming to the extent possible a stance impenetrable to risks. The A. Q. Khan’s illicit network is probably the most known case of misuse of industry facilities for proliferation purposes. This case is a reminder that export control risks do not pose a vague, distant threat. Simply put, the more precautions one takes the better armoured will be against a risk.

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<sup>492</sup> Q. Michel et al., *European Dual-use Trade Controls beyond Materiality and Borders*: P.I.E. Peter Lang, 2013.

## ANNEX: compliance mechanism implemented at the KUL: decision tree<sup>493</sup>



<sup>493</sup> Scheme retrieved from the KUL website, available in: <https://www.kuleuven.be/english/research/integrity/schemes/schemeone>.

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