Emerging Technologies and Export Control Law: Challenges and Compliance Mechanisms for Research Institutions from a European Perspective

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Abstract

Horizon 2020 is the current framework program under which the European Union (EU) implements its objective of promoting scientific research, especially in the field of emerging technologies. Under the conditions of participation for Horizon 2020 projects, a cross-border transfer of information and know-how is inevitable. A Horizon 2020 project can therefore be considered a prototype for trans-boundary research undertakings. Due to the transnational provision of information, export control law is applicable. The most crucial challenges for project partners in such research undertakings are identifying sensitive projects, determining whether the technology transmitted within the particular project is subject to export control law, and complying with relevant legislation. These challenges can be met by an adequate organizational structure within the research entity in combination with an internal system based on the usage of specially created checklists at different checkpoints at critical stages of the project containing questions allowing an assessment relating to the applicability of export control provisions. The whole system is characterized by a four-eye principle which means that the assessment by a scientist laid down in those checklists is reviewed by a legal expert. Precisely through this cooperation, those challenges can be mastered. This article provides an insight into the legal structure of Horizon 2020 projects, describes the export control regimes governing the EU, introduces a potential organizational structure as well as an internal system

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meeting the above requirements, draws conclusions for international research undertakings in general, and concludes with a case study.

Keywords

European Union, Horizon 2020, trans-boundary research projects, future and emerging technologies, dual-use, export control legislation, compliance mechanism, private-public partnerships

Introduction

Science, research and innovation are essential for human progress. They not only increase the competitiveness of an economy, but also serve as drivers for, *inter alia*, the promotion of human health, safety, the protection of the environment, and prosperity in general.[2] In order to fulfil the above mentioned role, two aspects are fundamental for the exercise of science and research: freedom and transparency.[3]

From a content perspective, research must be as free as possible from, among other things, legal restrictions, in order to achieve maximum progress. This basic idea is backed by the principle of academic freedom. The modern world of research, which is characterized by global networking, worldwide information flow, and international cooperation between scientists, illustrates the importance of transparency in this field.

However, completely unregulated, free, and transparent research constitutes a considerable security risk, as research can be used specifically for the development of Weapons of Mass Destruction (WMDs). The same applies to the possibility that research results that were originally obtained with civilian intentions may be misused for military or even terrorist purposes.

The resolution of this tension between the need for deregulation in favor of scientific progress balanced with the need for control in favor of security policy considerations is the task of the respective international multilateral export control regimes and/or national regulations, whereby the optimal resolution comes close to squaring the circle, especially in research on emerging technologies. Existing literature has already dealt intensively with the challenges for international regulatory regimes regarding research in those technologically cutting-edge

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2 "Bundesbericht Forschung und Innovation 2018 – Hauptband - Forschungs- und innovationspolitische Ziele und Maßnahmen," Bundesministerium für Bildung und Forschung, <https://www.bmbf.de/pub/Bufi_2018_Hauptband.pdf>, p. 12, 96; *"Wissenschaftsfreiheit und Wissenschaftsverantwortung – Empfehlungen zum Umgang mit sicherheitsrelevanter Forschung,"* Deutsche Forschungsgemeinschaft/Leopoldina, <https://www.dfg.de/download/pdf/dfg_im_profil/reden_stellungnahmen/2014/dfg-leopoldina_forschungsrisiken_de_en.pdf>, p. 9.

3 *"Wissenschaftsfreiheit und Wissenschaftsverantwortung – Empfehlungen zum Umgang mit sicherheitsrelevanter Forschung,"* Deutsche Forschungsgemeinschaft/Leopoldina, <https://www.dfg.de/download/pdf/dfg_im_profil/reden_stellungnahmen/2014/dfg-leopoldina_forschungsrisiken_de_en.pdf>, p. 9.

areas.[4]

Internationally active research institutions, especially in the field of emerging technologies, are also confronted with challenges for scientific practice resulting from those conflicting interests. In order to achieve radical scientific breakthroughs, an international exchange of knowledge among corresponding research hotspots is almost unavoidable. The developments in the field of quantum technology are an example. The People's Republic of China and the United States are investing heavily in research and development in this area.[5] The same applies to the European Union (EU) under its Horizon 2020 research funding program that promotes cross-border research for EU Member States and with associated countries.[6] One priority of the program is the promotion of research and development in the field of emerging technologies, whereby the area of quantum technology is a lighthouse project. From a purely scientific point of view, research cooperation between Chinese, American, and European research institutions would not only be promising but also urgently required in order to accelerate innovation. However, since a large number of quantum technology applications can serve both civilian and military purposes, the provisions of the respective export control laws must be observed in these kinds of cross-border transactions in order to take into account the global security policy considerations outlined above.

In the absence of appropriate literature, this article will identify specific challenges that research institutions face in their research on emerging technologies along with potential mechanisms that can guarantee effective compliance with export control law. This will be illustrated by the example of European research projects under the Horizon 2020 framework program. However, the article will also demonstrate that the conclusions drawn in this respect can be applied to all trans-boundary projects that conduct research in those technologically cutting-edge areas.

The challenges arising from the relevance of the export control provisions as well as potential mechanisms ensuring effective compliance will be presented after a brief introduction to the legal bases of European research funding followed by a detailed description of the Horizon 2020 program and the export control regimes governing Europe. Finally, a case study will illustrate the challenges and demonstrate the implementation of said mechanisms.

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4 E.g. Mirko Himmel, "Emerging Dual-Use Technologies in the Life Sciences: Challenges and Policy Recommendations on export control," SIPRI, Nonproliferation and Disarmament Papers No. 64, September 2019; Kolja Brockmann, "Challenges to Multilateral Export Controls: The Case for Inter-Regime Dialogue and Coordination," SIPRI, December 2019.

5 Jeanne Whalen, "The quantum revolution is Coming and Chinese Scientists are at the Forefront," *Washington Post*, August 18, 2019.

6 Associated Countries, according to Article 7 Regulation (EU) No. 1291/2013: Iceland, Norway, Albania, Bosnia and Herzegovina, North Macedonia, Montenegro, Serbia, Turkey, Israel, Moldova, Switzerland, Faroe Islands, Ukraine, Tunisia, Georgia, and Armenia. See "Associated Countries," European Commission, <https://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/3cpart/h2020-hi-list-ac_en.pdf)>.

The Funding of Scientific Research within the European Union

The European Union is an international association composed of 28 Member States. The Treaty on the Functioning of the EU (TFEU) and the Treaty on the EU (TEU) establish the EU's constitutional basis in which the common objectives of the EU and its Member States are anchored. In addition to objectives such as the realization of the European Internal Market, the EU also has a mandate for activities like the promotion of scientific research. The latter is being accomplished via so-called framework programs that set the general conditions for research funding by the EU.

Horizon 2020 is the EU's current framework program and has a funding volume of approximately EUR €77 billion (equivalent to approximately USD $87 billion) and focuses *inter alia* on research concerning future and emerging technologies.[7]

I. Legal Framework for Funding of Scientific Research within the EU

Article 179 (1) of the TFEU sets the tone for the funding of scientific research within the EU:

> *"The Union shall have the objective of strengthening its scientific and technological bases by achieving a European research area in which researchers, scientific knowledge and technology circulate freely, and encouraging it to become more competitive, including in its industry, while promoting all the research activities deemed necessary by virtue of other Chapters of the Treaties."*

This article will explain how these objectives are fulfilled by giving a concise overview of the essential legal bases for funding cross-border scientific research within the EU. This should provide guidance especially to those readers who are unfamiliar with the relevant provisions of EU law.

It should be noted at the outset that in the context of a Horizon 2020 project, three levels of regulations have to be distinguished:[8]

1. Level One: The fairly abstract articles of the TFEU which state the above-mentioned objectives and enact the adoption of a framework program, represent the top level;

2. Level Two: At this level the more specific regulations of the particular framework program come into play;

3. Level Three: At the third and last level, the most specific provisions governing the particular Horizon 2020 project in detail, namely the Grant Agreement (GA) and Consortium Agreement (CA), must be observed. Those rules constitute the essence and implementation of the requirements set by the two levels mentioned above.

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7 Article 6 (1), Regulation (EU) No 1291/2013.

8 Other sources define even more levels of regulations. For example see Matthias Ruffert, "Artikel 182 AEUV," in *EUV/AEUV*, eds. Christian Calliess and Matthias Ruffert (Munich: C.H. Beck Verlag, 2016), recital 1.

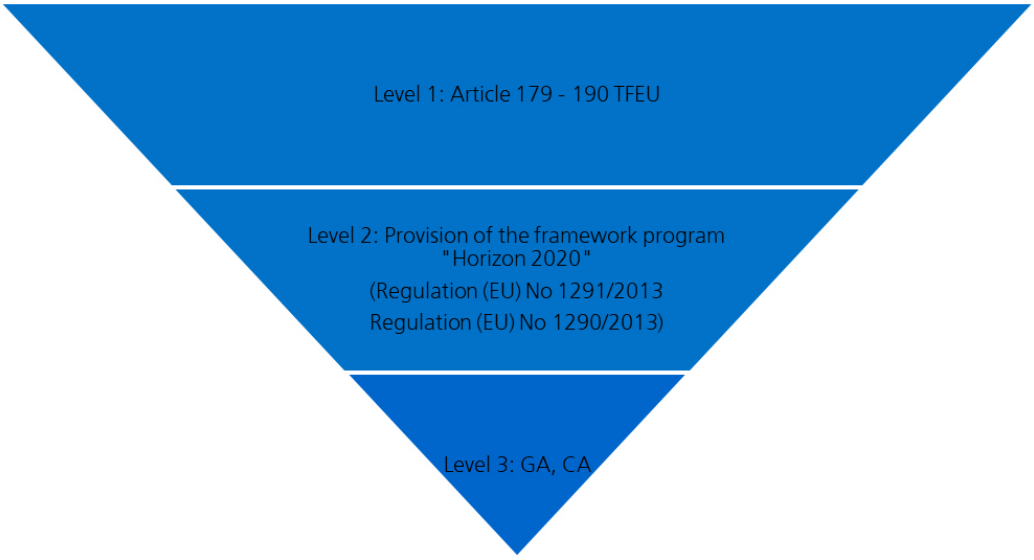

Illustration 1. Hierarchy of provisions concerning a Horizon 2020 project

1. Rules Set by the TFEU (Level One)

The TFEU sets out its regulatory regime for research, technological development, and space within Title XIX, Articles 179-190 of the TFEU.[9] The most crucial aspects for accomplishing the goals outlined in Article 179 of the TFEU, and thus funding cross-border scientific research, are contained in Article 182 of the TFEU.

This provision first stipulates that a corresponding multi-annual framework program must be adopted by particular organs of the EU and delineates the obligatory content of such a program. The framework program should set out the scientific and technological objectives to be achieved by the repertoire of measures referred to in Article 180 of the TFEU as well as their relevant priorities.[10] In addition, it is necessary to indicate the broad lines of such activities, the maximum overall amount, details of the EU's financial contribution, and the respective shares in each of the activities provided for.[11]

Second, the Article 182 (3) of the TFEU governs that the implementation of the framework program shall be executed through specific programs developed within each activity. This defines the detailed rules for implementation, duration, and provision for the means deemed necessary.

In summary, the relatively abstract provisions of the TFEU lay out the objective for funding

9 "Space" refers to both to the promotion of research and to increasing the competitiveness of industry in this area. See Hans-Heinrich Trute and Arne Pilonik "*Artikel 189 AEUV – Raumfahrtpolitik*," in *EUV/AEVU*, ed. Rudolf Streintz (Munich: C.H. Beck Verlag, 2018), recital 2,3.

10 Matthias Ruffert, "Artikel 182 AEUV," in *EUV/AEUV*, eds. Christian Calliess and Matthias Ruffert (Munich: C.H. Beck Verlag, 2016), recital 4.

11 Ibid.

scientific research within the EU, list the available measures to achieve the set goals, and crucially stipulate the need for and the content-related specifications of a framework program.

2. Provisions Set by the Funding Framework Horizon 2020 (Level Two)

The framework program for research funding based on Article 182 of the TFEU and runing from 2014 to 2020 is called Horizon 2020 and is the eighth of its kind. Horizon 2020 was adopted by means of a Regulation (Regulation (EU) No 1291/2013 – hereafter: Regulation Horizon 2020), which constitutes a directly applicable act that is binding on all EU Member States. The provisions of the framework program at issue represent the implementation of the rules set by the TFEU.

It is worth noting that on January 1, 2021, the ninth framework program of this kind will be launched under the name Horizon Europe. According to the adoption timeline published by the EU, the Council and European Parliament are currently negotiating and will subsequently adopt the program.[12]

a) Objectives and Priorities of Horizon 2020

Article 5 (1) of Regulation Horizon 2020 sets out the general objective of the eighth framework program of the EU and thus implements the requirements contained in Article 182 (1) of the TFEU:

> *"The general objective of Horizon 2020 is to contribute to building a society and an economy based on knowledge and innovation across the Union by leveraging additional research, development and innovation funding and by contributing to attaining research and development targets, including the target of 3 % of GDP for research and development across the Union by 2020. It shall thereby support the implementation of the Europe 2020 strategy and other Union policies, as well as the achievement and functioning of the European Research Area (ERA)."*

This general objective is to be achieved by means of three mutually reinforcing priorities which are enumerated in Article 5 (2) of the Regulation Horizon 2020: 1) excellent science, 2) industrial leadership; 3) societal challenges. The main objective of "industrial leadership" is to enhance industrial research and therefore competitiveness of the European industry in key enabling technologies.[13] The goal of the priority "societal challenges" is to find ways in which a variety of politically pressing research topics, ranging from climate change to demographic change or security-related issues, can be tackled and solved.[14]

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12 "Horizon Europe - The Next Research and Innovation Framework Program - The Commission's Proposal for Horizon Europe, Strategic Planning, Implementation, News, Related links," European Commission, <https://ec.europa.eu/info/horizon-europe-next-research-and-innovation-framework-programme_en>.

13 Henning Eikenberg, "*Artikel 182 AEUV – VIII. Horizont 2020*," in *Das Recht der Europäischen Union*, eds. Eberhard Grabitz, Meinhard Hilf, and Martin Nettesheim (Munich: C.H. Beck Verlag, 2019), p. 14; "Program Building of Horizon 2020,"Federal Ministry of Education and Research," 2019, <https://www.horizont2020.de/einstieg-programmstruktur.htm>.

14 Ibid.

In considering the priority of "excellent science" and its mission of creating an environment where groundbreaking research can thrive, it becomes clear that the writers of Regulation Horizon 2020 recognized the importance of research and the funding of projects in the field of future and emerging technologies.

The significance of research in that area lies in achieving progress and solutions to scientific challenges of all kinds as well as sowing "seed[s] for future industrial leadership and for tackling society's grand challenges."[15] It therefore also reinforces the other two pillars of Horizon 2020. The European Commission's 2018-2020 work program, which complements the framework program, reflects this important role as one main priority is explicitly the promotion of future and emerging technologies (FET) and the establishment of an appropriate research environment.[16]

The work program distinguishes three areas for the promotion of FET-projects into which potential undertakings can be divided. The first and financially most heavily-funded branch is called FET Open. As the name implies, it is without thematic restrictions and thus supports all "early stage science and technology research exploring new foundations for radically new future technologies by challenging current paradigms and venturing into new unknown areas."[17]

The second area is FET Proactive. In contrast to the already presented branch, it is thematically restricted and "features a selection of ambitious emerging technology topics derived from extensive consultation and advice from the FET Advisory Group" that embrace undertakings related to research on areas such as artificial organs, environmental challenges, and high-performance computing.[18]

The third branch covers so-called "lighthouse projects" and is called FET Flagship. Two examples of such flagship projects include quantum technology as well as research concerning the human brain.[19]

In conclusion, one of the main focuses of the Horizon 2020 framework program is research in the field of future and emerging technologies.

b) Rules of Participation Concerning Horizon 2020 Projects

A second set of rules has been put into place to regulate participation in Horizon 2020 projects as well as the direct relationship between donors and project participants. Article 9 of this

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15 "Work Programme 2018-20, 2. Future and Emerging Technologies," European Commission, <https://ec.europa.eu/research/participants/data/ref/h2020/wp/2018-2020/main/h2020-wp1820-fet_en.pdf>, p. 4.

16 "Horizon 2020 – Full Text of the Work Programme 2018-20,"Delegation of the European Union to China," <https://eeas.europa.eu/delegations/china/35899/horizon-2020-%E2%80%93-full-text-work-programme-2018-20_en>.

17 "Work Programme 2018-20, 2. Future and Emerging Technologies," European Commission, <https://ec.europa.eu/research/participants/data/ref/h2020/wp/2018-2020/main/h2020-wp1820-fet_en.pdf>, p. 6.

18 Ibid, p. 4.

19 Ibid, p. 4. For further details on the different project clusters, please refer to the respective work program, which is cited in the footnotes.

Regulation (Regulation (EU) No. 1290/2013 – hereafter: "Regulation on Participation") sets out the minimum requirements with exceptions only possible under strict conditions. In principle, there must be at least three legal entities involved, all of which must be established in different Member States or associated countries and legally independent of each other.

"Legal entity" within the meaning of the Regulation on Participation is defined as any natural person or any legal person created and recognized as such under national law, Union law, or international law, which has legal personality and which may, acting in its own name, exercise rights and be subject to obligations (Article 2 (1) No. 13 of the Regulation on Participation). The commonality of the potential participants is thus their legal capacity.

As a result of this broad definition, publically-funded entities such as non-university research institutions, universities, and colleges can be suitable project partners as well as industrial research entities. Moreover, it opens the field for private-public partnerships. The fact that the founders of the framework program also had private-public partnerships on their minds is clearly expressed in Regulation Horizon 2020 (Article 25 of Regulation Horizon 2020, as well as Recital 40). It is expected that this type of collaboration will increase the impact of funded projects and synergies when financial resources from the framework program and those of the private sector are brought together in key areas. Private-public partnerships can therefore have a significant impact on reaching Europe's wider competitiveness goals, leveraging private investment, and helping to tackle societal challenges.

It should be noted that as a Horizon 2020 project participant, not only those legal entities who are established in one of the EU Member States come into consideration, but also those who are established in so-called associated countries in the meaning of Article 7 of Regulation Horizon 2020. Whether a third country is a so-called associated country is governed bilaterally between the EU and the country concerned. This aspect is of significant relevance looking at Horizon 2020 projects from an export control perspective as a transfer to a Non-Member State is usually dependent on much higher requirements than an intra-Community transfer of goods between Member States.

The last requirement is the independence of project participants. According to Article 8 of the Regulation on Participation, participants shall be regarded as independent of each other where neither is under the direct or indirect control of the other or under the same direct or indirect control as the other.

c) Interim Result

In conclusion, the EU's eighth framework program focuses on and promotes, *inter alia*, projects in the field of future and emerging technologies within the pillar of scientific excellence. Moreover, private-public partnerships on the basis of the hoped-for greater impact of funding in terms of achievement of objectives are allowed and desired. In practice, private-public research partnerships in the fields of emerging technology are common within the EU.

3. Legal Structure of "Horizon 2020 Projects" (Level Three)

After the provisions of the above mentioned Regulations clarified the articles of the TFEU, a further specification is made at this level regarding the execution of the concrete project.

At this level, the external relationship between the EU and the project partners and the internal relationship between the project partners are now contractually regulated.[20] In order to take sufficient account of these dual objectives, two different treaties, namely the Grant Agreement and the Consortium Agreement, are drafted and agreed upon.

a) The Grant Agreement (GA)

The GA essentially regulates the external relations between the EU (typically the European Commission) and the project participants. The negotiations for the project participants are carried out by the so-called coordinator which is determined by the participants from among their ranks. In this respect, there is no established catalogue of selection criteria. The coordinator is often the initiator of the research undertaking or alternatively the project participant with the most appropriate administrative capacity. This coordinator has the task of communicating between the project partners and the EU, receiving EU funds and distributing them to the consortium participants, as well as coordinating the exchange of information between the consortium and the EU. The coordinating function does not bring any superior legal position with it. Rather, in a consortium, all project partners stand side by side on an equal footing, irrespective of any role allocation within the concrete project.

In terms of content, all Horizon 2020 GAs are strongly influenced by a Model Grant Agreement (hereafter MGA) created by the EU.[21] This MGA consists of a so-called core text as well as attachments.

The core text is divided into seven chapters.[22] These contain, in addition to a general introductory chapter, *inter alia* sections on the actions to be taken to implement the project, details of the grant, the rights and obligations of the project participants, and the division of beneficiaries' roles and responsibilities. In more detail there are provisions governing, amongst other things, proper implementation, involvement of third parties, the administration of the grant, intellectual property rights, as well as gender equality, ethics, export, conflicts of interest, confidentiality, security-related obligations, and data protection.

The attachments contain, in addition to the technical description of the project, a definition of the role and contribution of each participant for the implementation of the undertaking and the budget as well as the forms required for reporting.

b) The Consortium Agreement (CA)

The CA regulates the relationship between the project partners during the implementation of the funded project and thus the so-called internal relationship of the consortium. Article 24 (2) of the Regulation on Participation commits the project participants to conclude such an agreement to regulate their rights and obligations to each other while at the same time complying with the

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20 Philipp Rupprath, "Die Rechte an den Ergebnissen aus Forschungs- und Entwicklungsprojekten im Siebten Forschungsrahmenprogramm," PhD diss, Westfälische Wilhelms-Universität Münster, 2010, p. 99.

21 "Horizon 2020 Programme – AGA Annotated Model Grand Agreement, Version 5.2, June 26, 2019;"European Commission; <https://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/amga/h2020-amga_en.pdf>.

22 Ibid.

GA.

The CA regularly includes clauses regarding the internal organization of the consortium, the distribution of EU funding, rules on dissemination, use and access rights, arrangements for settling internal disputes, and liability, indemnity, and confidentiality agreements.[23]

Unlike the GA, the CA has no official EU model. But in the *Guidance on How to Get Your Consortium Agreement*, the Commission fulfills its obligation under Article 24 (2) of the Regulation on Participation and issues a guideline.[24] Based on this guideline, the private sector has developed its own templates for a CA.[25] The best known is the DESCA template, which was created by various parties from science and industry.[26] Among others, Fraunhofer-Gesellschaft as the leading organization for applied science and research in Europe was part of the core team which created the DESCA template.[27]

II. Interim Conclusion

At this point, it should be concluded that every Horizon 2020 project is regulated in detail by the GA and the CA which are based on the specifications of the framework program and which, in turn, derive from the TFEU standards.

The decisive criterion for the eligibility of research projects under the Horizon 2020 program is that several project partners from several countries cooperate with each other to enable an international exchange of know-how, resources, and technologies. This international exchange and especially the collaboration of project partners in private-public partnerships acts as catalysts for progress in research and science in general. It is precisely this cross-border and mutual provision of technology and know-how that opens the scope for export control law.

Legislation Governing European Export Control

One of the fundamental principles of the European Union is the basic doctrine of conferral of competences. This means that the EU can only take regulatory action in those areas in which the sovereign Member States have transferred the corresponding competence to the EU.

In principle, the cross-border transfer of goods is to be assigned to the common commercial

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23 This list corresponds to Art. 24 (3) of the Regulation on Participation.

24 Ulf Johann, "Kapitel 8 Öffentliche Förderung von F&E-Projekten mit mehreren Teilnehmern," in *Verträge über Forschung und Entwicklung*, eds. Hans-Peter Rosenberger and Sebastian Wündisch (Munich: Carl Heymanns Verlag, 2018), p. 319.

25 Ibid.

26 "DESCA 2020 Model Consortium Agreement," DESCA, <http://www.desca-2020.eu/>.

27 Ulf Johann, "Kapitel 8 Öffentliche Förderung von F&E-Projekten mit mehreren Teilnehmern," in *Verträge über Forschung und Entwicklung*, eds. Hans-Peter Rosenberger and Sebastian Wündisch (Munich: Carl Heymanns Verlag, 2018), p. 319.; Philipp Rupprath, "Die Rechte an den Ergebnissen aus Forschungs- und Entwicklungsprojekten im Siebten Forschungsrahmenprogramm," PhD diss, Westfälische Wilhelms-Universität Münster, 2010, pp. 109-110.

policy of the Union (Art. 206 et seq. TFEU) and the EU has therefore the exclusive competence in this area pursuant to Art. 3 (1) lit. e of the TFEU. In this respect, however, narrow exceptions apply, for example in Art. 346 (1) lit. b, (2) of the TFEU, which, in turn, leaves room for national regulations.

For this legal reason, a combination of European and national regulations exists in Europe to prevent the proliferation of WMDs and the transnational transfers of goods and technologies that pose a security threat:

The cross-border transfer of dual-use-goods, technology, and software is regulated at the EU level. The authoritative document on export controls is Regulation No. 428/2009 which is list-based and directly applicable in each Member State. According to Art. 346 (1) lit. b), (2) of the TFEU, however, the transfer of conventional armaments (including the associated technology and software) remains within the competence of the individual Member States. To this extent, corresponding national regulatory regimes exist which are also list-based.

Finally, it should be noted that most Member States, as well as the EU itself, are members of the relevant multilateral export control regimes and therefore updates and adjustments to the list items are made at regular intervals in accordance with those multilateral treaties.[28,29]

Challenges Arising from Export Control Provisions when Realizing a "Horizon 2020 Project

Knowing that a Horizon 2020 project requires according to the Regulation on Participation the cooperation of at least three legal entities from different Member States or associated countries, a cross-border transfer among those participants concerning technology and know-how is almost inevitable.

This mutual cross-border provision of technology and know-how means that export control law applies. The following paragraphs explain the role of the participants in such a project as well as a potential mechanism to tackle the challenges ahead.

The key challenges, especially for research projects related to future and emerging technologies, are as follows: First, to identify and filter sensitive projects from the mass of uncritical research undertakings; second, to determine whether the exchanged technology or know-how can be assigned to a specific list-item of the relevant export control regimes; and third, to comply with these provisions where applicable.

28 The EU is a member of the Australia Group and is an Observer in the other export control regimes.

29 Mirko Himmel, "Emerging Dual-Use Technologies in the Life Sciences: Challenges and Policy Recommendations on Export Control," SIPRI, Non-Proliferation and Disarmament Papers No. 64, September 2019, p. 3.

Identifying Critical Horizon 2020 Projects

I. Description of the Challenge

Under the Horizon 2020 framework program, research projects can be funded in all conceivable disciplines and consequently be provided with the financial means to enable their actual implementation. In the field of future and emerging technologies this is illustrated by the funding area of FET Open which does not provide for any thematic restrictions or specifications and therefore only the radical novelty of the idea pursued is decisive for eligibility for funding.

However, the Commission makes it clear that only research projects which pursue purely civilian applications should have access to funding under Horizon 2020. The intention of a purely civilian application is therefore the decisive criterion.[30] Initially, this excludes research directly oriented towards military purposes from funding.

It should be noted, however, that it is typical in research that the intention at the beginning of a project and the actual output are not necessarily congruent. Consequently, research projects can be initiated with a purely civilian objective and be eligible for funding under Horizon 2020, but the goods and technologies actually achieved and exchanged within the international consortium can nevertheless be classified as armaments or dual-use goods under the relevant export control regimes. This means that, despite the Commission's guidance note and the researchers' civilian intentions, it is not possible to generally decline a potential security threat from Horizon 2020 projects. Therefore, every cross-border transfer of technology and goods within a Horizon 2020 project must be examined for whether it contributes to proliferation or distribution of WMDs or whether there is a risk of misuse for military or terrorist purposes.

For these reasons, the first challenge is to identify potentially sensitive Horizon 2020 projects that may pose a security threat and filter them from the masses of uncritical research undertakings. This is a crucial issue as this is the first step to ensure ultimate compliance with export control legislation and prevent armaments as well as dual-use-goods and technologies from being internationally distributed without the proper authorization.

II. *Mastering the Challenge*

Mastering this challenge can be accomplished by implementing the following mechanisms and instruments.

1. Implementing an Appropriate Organizational Structure

Especially for research institutions - both industrial and academic - that reach a certain size and therefore carry out a multitude of different research projects in a wide scientific range, an appropriate organizational structure is required to master the challenge of identification.

A decentralized structure based on a clear hierarchy is a potential and promising instrument to get an overview of all research projects within the institution, which is the first step to ensure proper identification. This applies for the industrial sector and public academic research

30 "Guidance Note — Research with an Exclusive Focus on Civil Applications," European Commission, <https://ec.europa.eu/research/participants/data/ref/h2020/other/hi/guide_research-civil-apps_en.pdf>.

facilities alike.

A member of the executive board of the non-university research institution or the president of the university should typically be at the top of such a hierarchy as he or she is ultimately responsible for compliance with export control legislation.[31,32,33]

Since a single person can hardly have an absolute view of all projects and processes within the facility, the research institution should be divided into smaller organizational units according to their scientific orientation and provided with their own department head who is considered part of middle management. In turn, the head of each unit is accountable to the person in charge (e.g. the member of the board or the executive management or the president of the university) and assumes responsibility for ensuring that the export control laws within the small departments are observed. For each of these small organizational units, an export control officer should also be appointed to assist the department head in the implementation of appropriate measures as well as the actual researcher in matters relating to export control law.

Only this chain of command can ensure that all research projects are examined on the basis of whether export control regulations apply. In parallel, legal expertise should be available at any time, typically from the legal department or a special research and knowledge transfer office of the research institution.

In addition to providing legal advice and support, the responsibilities of those legal experts should include the provision of training, lectures or presentations, and circulating newsletters and the like on a regular basis. Through the latter, the awareness, familiarity, and expertise of the academic personnel can be maintained or improved as there can be considerable differences in this respect.

2. Introduction of an Internal System

To ensure that future and emerging technologies falling under the scope of export control law are identified, an internal system should be introduced which guarantees that crucial research projects containing security-relevant technologies are brought into the compliance process.

It should be noted that at various points in almost all phases in connection with a Horizon 2020 project, a transfer of technology and know-how relevant under export control law can take place. This is also a challenge that the internal system has to master.

In the following section, the author presents a possible internal system that meets the above

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31 "*Handbuch Exportkontrolle und Academia*," Bundesamt für Wirtschaft und Ausfuhrkontrolle, Berlin, February 2019, pp. 97-82.

32 Ibid.

33 According to the "Principles of the Federal Government of Germany to Test the Reliability of Exporters of Weapons of War and Armaments-Related Goods (*Grundsätze der Bundesregierung zur Prüfung der Zuverlässigkeit von Exporteuren von Kriegswaffen und rüstungsrelevanten Gütern*)," German Federal Government, Berlin, July 25, 2001, the designation of a member of the executive board of the research facility as the responsible person is obligatory. Moreover, that person is accountable for export control compliance and personally liable for violations of export control law. A violation can therefore lead to fines or even imprisonment.

mentioned requirements and relies on a checklist-based screening procedure. In order to make the display more comprehensible, this is to be done within the standard workflow of a Horizon 2020 project.

Each Horizon 2020 project starts with a call for proposals by the responsible EU organ. Following the call for proposals, potential project partners emerge and contact each other to evaluate and discuss the feasibility of the undertaking. At this stage it should be examined from a legal point of view whether a so-called Non-Disclosure Agreement (NDA) should be concluded in order to ensure the confidentiality of each institution's sensitive data that might be exchanged during this early correspondence. Moreover, it should be analyzed whether, within the framework of these discussions between the potential project partners, export control-relevant technology and/or know-how might be transferred across borders. In that regard, a first checkpoint should be introduced at this stage. This is accomplished by having a specially designed checklist filled out by the responsible scientists which raises questions on the nature and intended uses of the information that is exchanged at that stage as well as on the receiving research partner and the country of destination. Subsequently, this checklist has to be sent to the internal legal department for further assessment. By reviewing the answers and results, a conclusion can be made by the legal department about whether the exchanged information must be considered as sensitive technology from an export control perspective. Such a checklist procedure based on a "four-eye principle" with the involvement of scientists and the insitutions' legal departments should ensure that through the combined expertise in the respective areas, the identification of whether a technology is covered by the scope of export control law or not can succeed.

As already mentioned, this interaction is of particular importance in the field of emerging technologies in order to correctly identify critical research projects as well as make an accurate determination about whether the transferred technology is of export control relevance. If the review of the legal department reveals that there are no obligations under export control law, it can be pursued without further ado.

However, if through the process red flags are identified, one should consult with responsible authorities, discuss further procedures, and take the necessary steps.

In the further course and as soon as the discussions solidify regarding the intention of the execution of the project, the coordinator is determined. This is, as described above, one of the potential participants in the project who will be responsible for communicating with the EU institutions and for other administrative as well as coordination tasks. At this point, it becomes necessary to differentiate selectively. This distinction depends on the position of the project partner within the undertaking.

If the project participant has been designated as coordinator, they must sensitize the other project partners regarding questions of export control law and *inter alia* request their technical data and to merge these to the extent that they are necessary for the official proposal preparation. Concurrently, the coordinator sends the already introduced checklist to the other project partners in this phase, which like the above mentioned questionnaire should check the export control relevance of the information sent to the coordinator for the preparation of the proposal. If the result indicates the need for action, prior to the transfer of the information, compliance with the relevant regulations is required. In the event that a project partner does not send the checklists or otherwise fails to comply on this issue, the coordinator himself has no independent authority

or right to enforce the project partner's cooperation on the matter.

However, the consortium as a whole often has the legal ability to exclude the affected project partner from the undertaking (after a written notice by the coordinator and the expiration of a 30-day period without remedial action by the project partner concerned) due to breaches of substantial contractual obligations.[34] It should also be borne in mind that the particular project partner transferring sensitive information cross-border must be treated as the exporter and therefore as the responsible entity according to European export control provisions. This applies to universities, non-university research institutes, and industrial research entities alike. These statements are in line with the proposition above that the coordinating function does not bring any superior legal position with it.

If the project participant is only a "normal" project partner and not the coordinator, the last mentioned step can be omitted partially. In such a case, the project partner has to complete one of those checklists and hand it over to the coordinator so as to contribute to the creation of the proposal.

Next, the completion and submission of the official proposal takes place, in which the tasks, the project partners, and goals are described. Afterwards, contract negotiations regarding the GA and the CA begin. If the proceedings are positive, project approval by the EU stands at the end of these phases. As soon as the project approval has taken place, the actual research activities begins.

In this context, it should be noted that Article 37.3 of the GA contains an export clause and stipulates that "one must comply with national, European and international export control regulations." Furthermore it determines that "before the beginning of the research activity, the coordinator must submit to the responsible EU organ a copy of any export or transfer licenses required under EU, national or international law."

The existence of Article 37.3 of the GA demonstrates that in most cases, only through the carrying out of actual research activities does an export control-relevant exchange of technology take place. The transfer of sensitive technology before the approval is granted (see above – e.g. when exploring potential project partners or preparing the proposal) is rare.

The hallmark of a comprehensive and functional system, however, is to have oversight over every possible transfer of technology and know-how, and thus of every action relevant to export control law, and to install corresponding control points.

Therefore, after submitting the proposal but before beginning the actual research actions - usually for the first time, in exceptional cases again - a checklist must be completed. If the

34 According to Article 4.2 of the DESCA-model, the exclusion of a project partner from the consortium is possible in case of violation of a substantial obligation from the GA or CA. Article 37.3 of the GA-model contains the obligation that activities involving dual-use goods or dangerous materials and substances must comply with applicable EU, national, and international law and that before the beginning of the activity, the coordinator must submit to the Commission a copy of any export or transfer licences required under EU, national, or international law. Another consequence in case of non-compliance with Art. 37.3 GA is the reduction of the grant.

project partner was appointed coordinator, they must send this checklist to the other participants and ensure that they are processed. The results of all these questionnaires should be obtained by the coordinator and summarized in an interim report.

Conversely, "normal" project participants must send the checklist to the corresponding coordinator. The corresponding interim report is then sent to the Commission.

As far as the project continues to move forward according to the proposal and the interim report, no further export control checklist-based screenings are necessary until the end of the project. However, if changes in the project occur, be they technical or with regard to the occupation of the consortium, a new export control inspection may need to be carried out by using the same checklists.

In summary, the regular queries via checklists mean an increased onus on scientists in their everyday life, and might even be perceived as an obstacle to scientific practice and academic freedom. However, these interventions are to be regarded as justified in view of the underlying outstanding global and national security policy interests. It is only through the regular interplay of scientific and legal expertise that the challenge of identification can be mastered effectively.

3. *Other Mechanisms to Identify Critical Research Projects*

Another potential mechanism that can contribute to the identification of security-relevant projects are the procedures that are intended to guarantee their compatibility with ethical concepts.

In Germany, for example, the Deutsche Forschungsgemeinschaft (German Research Foundation) requires the creation of framework conditions for ethically responsible research. The establishment of an internal so-called Kommission für Ethik sicherheitsrelevanter Forschung, meaning Commission for Ethical Safety-relevant Research, represents the preferred mode. This process is in line with the ethical code of conduct required by the EU.

Horizon 2020 projects require a special process to ensure compatibility with ethical concepts.[35] Already in the application phase, the potential participants have to carry out a self-assessment in order to assess the ethical relevance of the particular research project.[36] The result is then passed on to an independent group of experts and/or qualified staff in a special panel who may carry out another screening and assessment depending on the results of the self-assessment.[37] At regular intervals, checks and audits can be carried out by this independent body as well.[38]

Consequently, the requirements of national conduct correlate with EU provisions since the internal commission for ethical safety-relevant research already discusses the ethical aspects of the present project in a phase prior to commencement of the actual research activity which

35 "Funding & Tender Opportunities – Ethics," European Commission, <https://ec.europa.eu/research/participants/docs/h2020-funding-guide/cross-cutting-issues/ethics_en.htm>.

36 Ibid.

37 Ibid.

38 Ibid.

can also be considered as the self-assessment required under the EU ethical code of conduct.

In this commission, it makes sense to also include an expert in export control law as a constant member of this panel, who can also refer to the legal problems in discussions with the scientists and, if necessary, initiate legal action to ensure compliance with export control legislation.

III. *Lessons Learned and Conclusions for Large Trans-Boundary Research Projects*

The lessons learned from the above are:

- Although only research projects that pursue a purely civilian application are eligible for funding under Horizon 2020, the actual output of those projects that is to be internationally transferred might still be classified as armaments or dual-use-goods or technology and therefore pose a security threat;
- Identifying and filtering potentially sensitive research projects from the masses of uncritical projects is crucial for ultimately complying with relevant provisions;
- An adequate organizational structure, an internal checklist-based screening system, as well as procedures to ensure the compatibility of research projects with ethical concepts, are mechanisms to mitigate the risks and master the challenge.

Moreover, it should be clarified that those lessons drawn from the paragraphs above can be applied to large trans-boundary research projects in general.

The challenge of identifying and filtering sensitive projects from the masses of uncritical research undertakings is very much alike for every research institution participating in many different trans-boundary research undertakings at the same time. General answers to whether certain research projects due to the sector or discipline they are assigned to are not subject to export control provisions are hardly possible. Rather, case-by-case decisions are necessary to take into account all of the situation's particularities. As explained above, the researchers' intention at the beginning of the undertaking can only be an indicator but, according to European legislation, can never be the decisive criterion. Since the risks and challenges are identical in this regard, the mechanisms explained are also adequate measures for research institutions involved in large trans-boundary research projects.

Determining Whether Future and Emerging Technologies are Relevant under Export Control Law

I. Description of the Challenge

The next important challenge is to ensure an accurate determination whether a specific future and emerging technology developed in a Horizon 2020 project is subject to export control law.European export control regulations apply when either the exporter has been informed by competent authorities that the intended use of the goods and technologies in question is in connection with certain weapons or other armaments (Article 4 (1), (3) of Regulation (EG) No. 428/2009), or the purchasing country or the country of destination are subject to an arms embargo (Article 4 (2) of Regulation (EG) No. 428/2009), or the goods or technology

to be transferred are listed in the annexes of the relevant export control regimes (Article 3 of Regulation (EG) No. 428/2009).

Consequently, if Article 4 of Regulation (EG) No. 428/2009 is not applicable in the specific situation – this being the regular case, - it all comes down to the question whether the good or technology at issue is listed. If the latter is the case and the other requirements are fulfilled, export control laws are applicable. However, this alternative has a crucial weakness, since those lists can only reflect the state of the art at the time of enactment or at the most recent update of the regime. Due to the rapid progress in research and development, these lists cannot keep up with the scientific state of the art. It could be said that in some situations the lists are often already outdated at the time of their release.

This leads to significant difficulties in the area of future and emerging technologies because of their groundbreaking character. In particular, it could lead to a strictly literal approach: Because of rapid innovation in the field, an explicit listing of future and emerging technologies can be excluded. One could therefore argue that export control law does not apply because of a lack of listing. Consequently, even critical technologies that pose a threat to security and/or might further the proliferation of WMDs could be transferred worldwide without export control authorization and thus without fear of sanctions under European and Member States' law.

II. Mastering the Challenge

If no export authorization is required according Article 4 of Regulation No. 428/2009 in the situation in question, there are two possibilities from the exporter's point of view according to the current legal situation: one could follow either the literal or a purposive approach.

It is clear that a literal approach is preferable from an exporter`s point of view whose only goal is to keep bureaucracy as low as possible and avoid any kind of sanction.

But this way of conduct is inefficient looking at the broader doctrines and principles underlying the export control law and should be rejected based on the following reasons:

First, it ignores the circumstances of individual cases, including the potential uses for malevolent purposes of the good and technology in question. Second, a purely literal and thus very narrow interpretation would undermine the meaning and purpose of export control law.

The aims of export control law are to the prevent proliferation of WMDs and the distribution of goods and technologies capable of posing a threat to global security interest. In order to meet these goals, a more purposive approach is required. Accordingly, the decisive factor should be whether comparable goods and technologies are covered by the relevant lists. If this is the case, the competent authority should be contacted in order to obtain a correct evaluation of the good or technology to be transferred and assess potential risks. This requires close cooperation between scientists, legal experts, and competent authorities. This cooperation is also ensured by the potential mechanisms introduced in the previous chapter.

Ultimately it is up to the exporter which approach to choose in the specific situation. Therefore, it should be the responsibility of the European or Member States' legislator to tackle this issue in order to secure comprehensive export controls on emerging technologies. One option could be setting a legal framework obligating the exporter to take the comprehensive approach.

Another option could be to add a specific item to the lists of relevant export control regimes generally covering emerging technologies in certain sectors. In this respect, the United States could be used as a role model. The U.S. has responded to this challenge by initiating a procedure for purposed rulemaking regarding emerging technologies.[39] Until the actual enactment of list classifications, the Bureau of Industry and Security (BIS) has the authority to subject certain technologies to export controls "in specific circumstances or on case-by-case bases."[40] This is a very promising step to meet this challenge.

In Europe however, a procedure realizing one of those options has not taken place yet. Therefore, emerging technologies seem to be the Achilles' heel for European export control.

III. Lessons Learned and Conclusions for Large Trans-boundary Research Projects

From the above analysis, the following lessons can be learned:

- Due to the cutting-edge character of emerging technologies, an explicit listing in the relevant export control regimes can be excluded. This might seduce exporters to a literal approach on European and Member States' legislation meaning that when there is no requirement for export authorization under Article 4 of Regulation (EG) No. 428/2009 because of the lack of listing, export control law is not applicable;

- There are two options to ultimately tackle this challenge but this requires action by the European and respective the Member States' legislator: Option one is the obligation of exporters to a comprehensive approach screening the relevant lists for comparable goods and technologies to the emerging technology at issue. Option two is the addition of a specific classification covering emerging technologies in general.

As explained in this section, the European list-based export control regimes are not perfectly suited for comprehensively subjecting emerging technologies that pose a threat to security interests to export controls.

The challenge, however, is identical for every exporter involved in a large trans-boundary research project that is subject to a list-based export control regime. If there is a specific list item covering emerging technologies, the challenge has already been tackled by the relevant legislator. If this is not the case, a comprehensive approach by a responsibility-conscious exporter is the only way to minimize the risk underlying the challenge.

Complying with Export Control Law

I. Description of the Challenge

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39 "Review of Controls for Certain Emerging Technologies," Bureau of Industry and Security, Department of Commerce, Washington D.C., November 19, 2018.

40 Adrienne Braumiller, Vicky Wu, Megan Mohler, "United States Export Control Reform Act and Emerging Technologies," Braumiller Law, August 15, 2019, <https://www.braumillerlaw.com/united-states-export-control-reform-act-and-emerging-technologies/>.

In the event that a concrete Horizon 2020 project is classified as potentially sensitive by the above mentioned internal screening system and - given the regular case - could be assigned to a classification on a relevant export control regime list after an adequate legal determination, export control law applies.

Following from this is the urgent requirement to comply with export control regulations and therefore to initiate the licensing of exports. This administrative task of licensing is still within the competence of Member States' authorities despite of the shift of competences to the EU concerning the transfer of dual-use goods and technologies explained earlier.[41]

The challenge during this stage is to apply the regulations of the export control regimes properly.[42]

II. Mastering the Challenge

In order to meet the challenge, a clear distribution of responsibilities in this regard within the organizational structure of the research institution is required.

While the export of dual-use goods to embargoed countries (often by way of separate EU Regulations) is prohibited at the EU level, the same applies at the national level to conventional armaments. This distinction can also be traced back to the shift of competences between the Member States and the EU. In such a case the exporter must ensure compliance with these provisions. But this scenario is almost negligible since embargoes on Member States or associated countries are highly unlikely.

However, if the technology at issue is listed in the Annexes of national and European export control legislation and thus must be considered security-relevant (or for any other legal reason is subject to authorization), the role of the exporter and respectively its legal department will be to start an appropriate interaction with competent authorities by notifying them about the transfer at issue as well as submitting all relevant documents in order to obtain authorization.

III. *Lessons Learned: Conclusions for Large Trans-Boundary Research Projects*

Lessons learned from the above are:

- When a Horizon 2020 project is filtered and identified as sensitive and the technology deriving from this specific undertaking must be classified as listed in the annexes of the relevant export control regimes, export control regulations are applicable and compliance is required;

- A clear distribution of responsibility within the organizational structure concerning the interaction with competent authorities, meaning, among others, initiating the licensing

41 Mirko Himmel, "Emerging Dual-Use Technologies in the Life Sciences: Challenges and Policy Recommendations on Export Control," SIPRI, Non-Proliferation and Disarmament Papers No. 64, September 2019, p. 3.

42 European Regulation 428/2009 does not include sanctions for violations of its provisions. This is again within the competence of EU Member States. Member State laws contain sanctions for violations of national and European export control law. The sanctions reach from financial penalties to incarceration.

process, is necessary, to ensure compliance from an administrative perspective.

Again, these challenges and methods of mastering them are not necessarily exclusive to Horizon 2020 projects as they can be found and applied in any trans-boundary research undertaking.

IV. Interim Result

In summary, it should be noted that the project participants themselves are considered exporters and therefore are accountable for the creation of an environment that meets the above mentioned requirements.

In order to master the different challenges and ultimately comply with export control legislation, the combination of an appropriate organizational structure and a working internal screening system is necessary. All those instruments rely upon but also ensure the collaboration of scientific personnel and legal experts since it is crucial that all stakeholders have a sense of awareness for the questions of export control law and have access to legal expertise where needed.

Implementing all these measures into everyday academic life inevitably leads to an additional financial burden for research institutions. However, this is significantly less severe than the possible sanctions for violations of export control law.

Moreover, the conclusions drawn can be applied to large trans-boundary research projects in general. The risks and the underlying challenges arising in scientific undertakings regarding research in the area of emerging technologies are identical as shown above. Therefore, the introduced measures and systems can also be used in large trans-boundary research undertakings to ensure ultimate compliance with export control regulations.

Case Studies

The following is a case study that is based on an actual, already completed Horizon 2020 project, but has been modified in certain aspects.

I. Scenario

A research project funded under Horizon 2020 was designed to (further) develop neutron and gamma ray detection and identification systems and technologies to achieve effective container inspection at border controls.

This project fell into the funding category FET Open, as radically new ideas and approaches should be implemented. The consortium was made up of around 20 project participants, both from industry and the public academic sector, established in various EU Member States, so it could be qualified as a private-public partnership. Each of the participants contributed to the success of the project through various different efforts. The role of the project participant established in Germany was merely to carry out tests on the mechanisms developed by other participants and to compile reports that summarized the test results obtained.

After completion, the latter were to be sent to the coordinator in France.[43] However, no devices were developed or exported. Before the start of the scientific activity, it was not apparent that the conduct of the tests would lead to results of export control relevance. However, this changed in the course of the implementation of the project. The actual test results achieved, which would be sent to France by way of those reports at issue, eventually developed a certain bearing that made the applicability of export control law possible.

II. Handling

Now the role of the project participant established in Germany shall be examined.

The practical application of the just introduced organizational structure and internal system, in the present constellation, is as follows:

First, the challenge of identification must be mastered.

Due to the circumstances mentioned above, it can be assumed that material relevant for export control has not been transferred either in the phase of exploration by the project partners on the feasibility of the project or in the run-up to the preparation of the proposal. Since such sensitive transfer was not expected or intended during the implementation of the project either, Article 37.3 of the GA, which requires the gathering of relevant export licenses prior to the commencement of concrete research activities, was not applicable and thus had no consequences.

Nevertheless, the checklists mentioned several times had to be completed at these critical points, but led to no need for action from the exporting project participants. The fulfillment of this screening obligation was ensured by the export control officer in the responsible research unit according to the preferred decentralized organizational structure.

However, since a change occurred in the output of the research project with regard to the actual results achieved, another checklist-based screening should be carried out according to the system presented above. The screening must take place before the reports are sent to the French coordinator.

After processing the checklist by the responsible scientist and review by the legal department, the following picture emerged: By definition, technology is qualified in the sense of the German/ European export control law as specific information which is required for the development, production, or use of goods. The fact that the results contained in the report are required for the use of the detection and identification of neutrons and gamma rays and that none of the possible exemptions (informational cannot be considered as basic research or in the public domain, nor as the minimum necessary information for a patent application) is to be assumed in the present case..

Due to the nature of the results as being related to an instrument of detection, as well as the means and substances used in those systems, the classification as armaments and thus the

43 According to Article 9 of the Regulation on Participation, the coordinator and thus the recipient of those reports could also be established in associated countries. For a listing see footnote 6 or 20. In such a case, the technology transfer would have to be qualified as an export under national and European export control law and not as an intra-community transfer, which in turn would lead to increased requirements.

applicability of the national export lists can be excluded. The assessment of the technology as a dual-use good, however, is further within the range of the possible. Thus, the first step of the challenge of identification was successfully completed. Through this checklist-based screening, a potentially sensitive project was filtered from the masses of harmless undertakings.

Moreover, since the sending of those reports was within the responsibility of the German project partner, it was his task to ensure compliance for this potentially sensitive transfer as he must be considered as the exporter according to export control law.

Now the challenge of achieving an accurate determination whether the information falls under the scope of export control law has to be tackled. In this case, the purposive approach should be applied and therefore assessed whether comparable goods or technologies are listed.

In particular, a listing according to 1E201, 1C233, 1E001, or 1A004 of Regulation (EC) No. 428/2009 (hereafter; Regulation on the Transfer of Dual Use Goods) was conceivable. If a listing on this regulation is to be affirmed, then the transmission of the test results would qualify as an intra-Community transfer under Article 22 of the Regulation on the Transfer of Dual-Use Goods, which in turn would require a permit.

However, due to the new nature of the technology, the lack of explicit listing and the associated uncertainty regarding the export control relevance of the test results, it was now necessary to contact the competent authority in order to make a correct assessment as to whether the technology at issue could actually be assigned or compared to a listed good.

Long and intensive correspondence between scientists, the legal department, and the competent authority was now be necessary to resolve this matter. During that period of time, a listing was even considered to be predominantly probable by the competent authorities. In the end, however, it was concluded that, given all the technical details, a listing was not evident and the technology could be transferred to France via those reports with no further permits being required.

Consequently, after the challenge of identification"was mastered, no further action was required by the German project participant.

Conclusion

Due the nature of Horizon 2020 projects, a cross-border transfer of technology and know-how is guaranteed. The challenges arising from the subsequent applicability of export control law must be tackled by each of the project partners and the consortium as a whole. Research in the field of future and emerging technologies intensifies those challenges in particular, as the groundbreaking character of those technologies increases the difficulties of identifying critical projects and technologies and subsequently complying with relevant export control legislation.

By having an appropriate organizational structure as well as an internal system which meet the above mentioned requirements in place, these issues can be properly addressed. Introducing such an internal system is within the responsibility of each project partner as soon as a cross-border transfer becomes necessary. An internal system relying on checklist-based screenings

at crucial stages within the project implementation process in conjunction with an appropriate organizational structure present a potential mechanism with which a project partner can live up to their role as a responsible exporter.

Moreover, the conclusions drawn in this article can be applied to trans-boundary research projects in general. This being said, all the risks and challenges described can be found not only in Horizon 2020 projects but also in every other large trans-boundary research undertaking, especially when conducting research on emerging technologies. Consequently, the potential compliance mechanisms can also be used as adequate measures to ensure compliance with export control law in those situations as well.

In conclusion, this article provides a guideline for research institutions to resolve the tension of conflicting interests in the best possible manner and thereby create an environment where scientific research can thrive and coexist in harmony with export control compliance.