Revising export control lists

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1 Introduction

An export control system is one of a range of mechanisms that states can employ to govern the security concerns tied to goods and technology[I]. It is a tool that has been used by states as long as states have existed, in conjunction with sanctions, embargos, interdictions, and intelligence activities. Put simply, export controls control the transfer out of a state of objects and knowledge of potential security concern. Any export control system must contain a list of items to control, a way of controlling the export, and a method of enforcing compliance with the system. Of these various parts of the export control system, perhaps the most under-studied are the lists of items under control. How did these items get onto (or off of) the lists? How is an item on a list related to an object that is actually exported? Who has a say in what is listed or not?

This report addresses these questions by providing an analysis of the processes states go through to modify the lists they employ in their export control systems. The lists are often intricate, and while some are updated yearly, others go many years between modifications. While some items on the lists may be added by a single state or region, the majority of them derive from multilaterally agreed lists that have been in place for decades. Understanding how these lists change is a key part of both being involved in the process and being able to critique the process. This document aides that understanding.

Section 2 provides an overview of the export control system, including a brief history of the role of export controls in state development and international affairs, and the major parts of a functioning system. The second half of the section draws out the importance of lists in the export control system, and how the lists are always interpreted in multiple ways by different people (companies, regulators, other states, academics, etc).

Section 3 goes through each of the major export control regimes— the Wassenaar Arrangement, Nuclear Suppliers Group and Zangger Committee, Australia Group, and Missile Technology Control Regime—outlining each one's reasons for formation, political structure, and structure of its lists. In addition, a brief discussion of CoCom is included, as it provided a template for the other regimes. The section concludes with a discussion of academic assessments of the effectiveness of these different multilateral arrangements.

Section 4 opens up the multilateral process through which the lists are maintained. It is a complex process that transcends all levels of government, and can involve a diverse range of non-government stakeholders. Most of the items under export control, however, have their basis in the multilateral control lists, so this section is divided into the process used at each of the multilateral regimes.

Finally, Section 5 outlines the broader assumptions that our contemporary export control system rests on, and how those assumptions—such as the controllability, definability, and target-ability of controls—are coming up against increasingly difficult challenges.

[I] "Technology" here is used as it is used in the multilateral export control arrangements, to mean specific information necessary for the development, production or use of a product. The information takes the form of technical data or technical assistance.

2 The purposes of export controls and the role of lists

To understand the current system of export controls, the importance of the lists to that system, and the way the lists change, it is important to have an appreciation of the system's historical development. Lists of items to be controlled in trade have served many purposes and many rationales have been used to justify maintaining them (as well as discarding them). We begin, therefore, with a brief look at this history. Following from that, we outline the current structure of a standard export control system. A key element in that system, and the focus of this study, are the lists of items to be controlled, which we discuss next. The section concludes with a comment on the importance of recognizing how these lists must exist in many different environments (from international negotiations to a bureaucratic office to a commercial factory and an academic institution), and will be understood and interpreted in different ways in each of those environments. Maintaining export control lists, therefore, is a process that needs to involve representatives from all of the communities that are affected by the controls.

Traditionally, export controls are seen to serve one or more of the following purposes for a state:[1]

- Ensuring domestic supply of controlled items: often in times of war, states would prohibit the export of scarce resources necessary for the war effort
- Preventing foreign supply of controlled items: if the supplying state has an item of military or security value for a state or individual that wants it
- Promoting a particular foreign policy: for instance, an economic embargo on a state because of its ideological views

Each of these purposes have been served to varying degrees at different points in time, but today's system is predominantly about the prevention of foreign supply and matters relating to foreign policy (which are tied to where foreign supply is desirable). Within these broad purposes, there are many other reasons why states might want to support an export control system, such as:[2]

- Channelling trade to peaceful activities and away from illegitimate activities
- Imposing delays and adding costs to illegitimate programs
- Creating a level playing field for businesses exporting controlled items in different countries
- Making transparent trade in controlled items, making it easier to track emerging areas of concern
- Legitimizing trade in items that have the potential to raise public concern
- Giving industry incentives and tools to police itself while also providing political cover to companies should licensed trade be misused
- Symbolising and giving meaning to norms of non-proliferation and peace

With all of these purposes, it is perhaps better to think of export controls as less about 'control' in the traditional sense, and more as a 'trade enabler'. We could either not trade at all in the broad range of items of potential security concern, or we could have a system that works to ensure the peaceful uses of these items through state licensing, channelling, and

transparency. Contemporary export controls are, on the whole, more focused on this latter characterisation. Perhaps the best evidence for this is the recently agreed text of the United Nations Arms Trade Treaty.[3] The treaty explicitly calls for states to implement national control systems (Article 5.1) for the purposes of eradicating illicit arms trade.

This was not always the case, however. In fact, such a way of thinking about export controls has really only taken hold in the last two decades.

2.1 A brief history of lists that control trade in militarily significant items

Single state prohibitions of trade in militarily significant technology have a long history. Selling to enemies not only weapons, but also ship supplies like pitch, sails, and other aids to war-- what today we call 'dual-use' technology--was seen as an abhorrent act, worthy of ridicule in places as public as the theatre in ancient Greece.[4] It was generally accepted then as now that you do not provide an enemy with the means to kill you.

It wasn't until the creation of the nation-state through the Peace of Westphalia treaties, however, that we find specific examples of states coming together to jointly agree on items that were acceptable to prohibit in trade. It was common for one state to issue a proclamation that certain items, when destined for a particular location, were subject to seizure. These were usually broad denotations, such as "arms, munitions, and naval supplies," and usually only existed in times of war. This system worked not through a framework of export controls so much as through blockades of enemy ports. They therefore could stop all trade, regardless of origin.

The objects that were stopped were routinely called 'contraband'. This was the thinking laid out in 1654 by Hugo Grotius in his famous *On the law of war and peace*, which has provided the basis for much of the international law of the sea in the centuries since.[5] Grotius quickly saw that the success of a law about interdiction depended on the ability to distinguish what types of goods were being shipped and whether they might aid a military. To that end, Grotius divided all goods into three broad categories: those which are "useful only in war," those "of no use at all in war," and those "of use both for war and in peace." Items in the first category are things to be controlled in times of war, the second are to be freely traded at all times, and the third are controlled based on the state of the war. Those things useful in war came to be known as absolute contraband, while those with 'ambiguous use' were called conditional contraband.

States who were not party to the war understandably did not want their shipments blocked, or at the very least, wanted to have some say in what was and was not contraband. This desire became more pronounced at the end of the 19th Century, and attempts to create common lists of controlled items were major discussion points at both the 1899 and 1907 Hague Peace Conference, though neither was successful reaching agreement.

These multilateral efforts to harmonise the types of goods and technology that were allowed to be controlled in international trade final came to fruition in the *1909 Declaration of London*

Concerning the Laws of Naval War.[6] With this development and the subsequent events of World War I, countries began to shift their understanding of the purpose of export controls.

The *1909 Declaration of London* contained three lists that directly mirrored the classification system espoused by Grotius almost three hundred years earlier: absolute contraband; conditional contraband; and a free list. The Declaration, however, failed spectacularly when it came to implementation, mainly because states were allowed to move items from less restrictive to more restrictive lists unilaterally, and over the course of World War I, essentially all trade became contraband.

During the Interwar period, it was the League of Nations that attempted to take over export control matters. In line with the League's larger goal of general disarmament, Article 23(d) of the Covenant stated that the League of Nations was entrusted with "the general supervision of the trade in arms and ammunition with the countries in which the control of this traffic is necessary in the common interest." The League initially tried to develop a global licensing and transparency mechanism for trade in arms and war materials during the 1919 Convention for the Control of the Trade in Arms and Ammunition.[7] As with the League in general, however, this convention suffered from the United States' failure to ratify it. In 1925, another Convention, this one "for the Supervision of the International Trade in Arms and Ammunition and in Implements of War", also suffered from lack of ratification by many nations.

Both of these conventions, however, were trying to develop international consensus over a new form of trade control, both in the way states imagined the international environment in which consensus happened, and the way they imagined the items to be controlled. While earlier attempts at control were international only in the sense of the coordination of lists, these conventions tried to also coordinate licensing, and thus the ability to bring global pressure onto a recalcitrant state by communal denial of trade. A justification for this rested on the growing view that states by themselves were incapable of preventing the trade in arms and munitions to unstable regions of the world, and international administration of controls was the solution. Such was the argument presented in the historical survey conducted for the 1924 Conference for the Control of the International Trade in Arms, Munitions and Implements of War:

> …it is pre-eminently in the interest of civilisation that the international traffic in arms should be subjected to control by international action. It is unnecessary to elaborate the reasons for this opinion. Every Member of the Assembly is doubtless aware of the grave and sordid scandals connected with the trade in arms.[8]

The United States, seen by many as the key state needed for the conventions to gain legitimacy, was also the one presenting the largest bottleneck to this international effort, stating blatantly that its primary objection to these efforts was that they were setting up "not a provision for a general limitation of armament but the creation of a system of control by the signatory Powers of the traffic in arms and munitions."[9] This role of the United States in particular was to radically change after the end of World War II, as it was the primary actor pushing for the development of the Cold War Coordinating Committee for Multilateral Export Controls, CoCom.

While these efforts did not eventually create the desired international licensing system, which would have helped world disarmament, they did succeed in promoting the constant peacetime

usefulness of national export control systems, as documented by a League of Nations assessment shortly before World War II.[10]

While it may seem obvious, there was a key difference between these permanent systems and their predecessors: they no longer dissociated between peace and war for their existence.

This had major ramifications for the way controlled items were themselves imagined. The concept of contraband relied on the distinction between war and peace to determine whether the lists were applicable at all. In this light, it is not surprising that we no longer see controlled items referred to as 'contraband'. In 1919, they were simply called 'arms of war', though still divided into categories similar to conditional and absolute contraband. The draft convention that came out of the 1924 Conference contained what very much looked like lists of absolute and conditional contraband. By 1925, however, the list developed for the Convention began to be categorized not only by the conditions of an item's use, but also by the general characteristics of the item itself, such as 'arms', 'vessels', and 'aircraft'. If there was a common unifying theme that tied the lists together during this period, it was an emphasis on the items all being arms of war. This unifying theme, however, was not to last the transition to the Cold War.

After World War II, the United States began meeting informally with states in Europe to draw up lists of items to be controlled in trade with the Soviets. While part of the justification for this system rested on a desire to prevent another war, the main justification was the containment of Soviet expansion.[11] This 'containment' way of thinking about the items to be controlled led to them being called 'strategic goods', and provided a clear need for multilateral cooperation to address the problem. But the problem was not war as much as it was an ideological battle between capitalism and communism. This expanded remit of export controls led to their use as tools for economic warfare, denying communist states access to advanced goods and technology in general, not only those with military significance.[12]

These initial lists were part of the Coordinating Committee for Multilateral Export Controls (CoCom), as described below. During the Cold War, other multilateral export control lists were developed around specific weapons of mass destruction (WMD). The Nuclear Suppliers Group and Zangger Committee complimented the atomic lists from CoCom, the Australia Group developed lists for chemical and biological items, and the Missile Technology Control Regime specifically addressed items for the delivery of WMD.

These later multilateral arrangements were not focused as much on the need to contain communism as to prevent the proliferation of WMD. As the Cold War wound down, this non-proliferation justification for export controls gained momentum. But while thinking of the purpose of export controls as instruments of non-proliferation works well for the WMD-based multilateral arrangements, it is an unsatisfying rationale for CoCom's successor, the Wassenaar Arrangement, which maintains lists of non-WMD arms and dual-use goods and technologies. Instead, Wassenaar has replaced CoCom's conception of listed items as 'strategic goods' with a conception that they have the potential to destabilise regions of the world. Wassenaar's purpose is to help prevent 'destabilising accumulations' of controlled items through promoting responsible transfer controls within participating states.

As we can see, states have used export controls for a wide range of purposes. Moreover, while a state may provide the appearance of a common export control system, it is important to

remember that different subsets of controlled items might have very different reasons for why they are on the control list, as well as the purpose they serve.

2.2 Parts of an export control system

While export control systems that states and regions employ are often large and complex, the basic parts of all systems are fairly simple to understand. Essentially, an export control system rests on three assumptions:

- It is possible to define items to be controlled
- It is possible to know from whom the items should be controlled
- It is possible to actually control the items

Each of these assumptions is addressed by a different part of the export control system: the lists, the licensing process, and compliance mechanisms.

2.2.1 Lists

Lists form the basis of export controls, and define the items to be controlled. There are often several lists involved in a state export control system. Most often these are dissociated into military or munitions lists and dual-use lists. As a general rule, items on the munitions list are specifically designed for military use, while those on the dual-use list are generally not designed for military use, but may nevertheless be used for military or terrorist purposes. Lists are often based on or even mirror international lists agreed to within the various multilateral export control arrangements.

There are also often lists of restricted places or people to whom items may not be exported. Known terrorist groups or states under embargo for violating international laws are examples of the types of places and people that might appear on these lists. While not the focus of this study, deciding who gets on and off these lists is also an important question.

2.2.2 Licensing

When exporting an item on the lists, companies must apply for a license. Rarely are the products[i] a company exports directly defined on a list. For instance, one does not find listed "triple head panoramic driver displays", but instead "ground vehicles and components therefor, specially designed or modified for military use" or "electronic equipment specially designed for military use". One also does not find "infrared cameras" on the EU dual use list, but instead "Imaging cameras incorporating non space-qualified non-linear (2-dimensional) infrared focal plane arrays based on microbolometer material having individual elements with an unfiltered response in the wave length range equal to or exceeding 8 000nm but not exceeding 14 000nm". It is up to the licensing officers to decide whether the thing on the license application matches a definition on a list. This is not always a simple matter, as we will see in Section 2.3.2

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[i] I use the term "products" here to dissociate the things exported from the definitions on the lists, which I call "items". "Products" could be tangible or intangible goods or technology.

The licensing process is also the point where decisions are made on whether the item should actually be exported. The point of the whole system is to enable a state or region to carry out one or more of the reasons for export controls[I], and the licensing decision is where that happens. While most licenses will likely be approved, when circumstances change, the ability to prevent the export of listed items is the system's reason for being. This, of course, assumes that companies apply for licenses rather than just exporting their products, and that export controls are a valid policy tool for the types of problems in which states and regions employ them.

The speed and scale of the licensing process is directly related to the structure and content of the lists. Lists that are either very general in their definitions or very closely linked to the way companies describe their products will likely have very short licensing times, as it is easier to see where on the lists products fall. More general lists, however, would also have a higher volume of license applications. While more detailed lists might reduce the number of applications, and therefore the licensing burden on the export control system, that burden is shifted to the need to more continuously update the lists the licensing officers use to reflect the changing nature of the technology.

The licensing process also has a direct impact on the list modification process. Should a licensing officer find the lists too unclear when determining where a product should fit, she or he may suggest a change to the lists. Likewise, if companies want faster licensing times or more clarity on where their products fall on the lists (and thus the likelihood that license applications will be approved), they might suggest changes to the lists.

2.2.3   Compliance

Lists and licenses would have little value if companies did not adhere to them when exporting their products. A compliance programme is therefore needed to ensure companies adhere to regulations. This programme usually involves customs officers verifying the license status of products as they are shipped, fines or other punishments for violators, and training programmes for companies.

Different states and regions take different approaches to compliance. Some favour instilling fear in companies should they be found to be exporting products without licenses. Others take a more collaborative approach to compliance, making sure companies have appropriate training and developing tools to make navigating the licensing process simpler, especially for small businesses that are primarily focused on production of dual-use products for non-military uses. Usually, some combination of these two approaches is employed.

As with licensing, one difficulty of the compliance process rests on the lists. More detailed lists provide more room for companies to argue that their item is not contained in the lists, but also make it more difficult for companies to understand the lists and whether their item is controlled.[II] More general lists, however, would require more companies to be involved in the export control system, increasing the burden on the compliance officers.

[I]   These are to preserve domestic supply, prevent foreign supply, or to send a foreign policy message.

[II]   That is, unless the lists were to name specific products of specific companies as being controlled. This is highly unlikely to occur, however, given the extreme effort needed to maintain the lists and the ease with which companies could move items off the lists by re-naming them.

2.2.4 Multilateral harmonization

Each of these aspects of the export control system, while implemented at the state or sub-national level, are also harmonized at the multilateral level, at least for those participants in multilateral export control arrangements. Harmonisation is achieved to different degrees for different parts of the system.

Lists are harmonised almost verbatim by participating states, sub-national units like Flanders, and regions like the European Union, though they may be translated from the English used for the multilateral versions. It is generally accepted that, while states and regions may not remove items from the multilateral lists when constructing their own, they may add items.

Licensing and compliance programmes are harmonised through the creation of "Best Practices". These commonly agreed ways of handling a particular aspect of an export control system include topics like effective enforcement, controlling intangible technology, and determining what counts as destabilising accumulations of controlled items.[13]

2.3 The importance of lists

It is important to recognise that the lists used in the export control system are just that → lists of items. Each item in turn can be defined by certain parameters. There is work that needs to be done to draw any connection between the text on a list and an object being exported. This simple point has important ramifications that are often lost because people automatically equate an item on an export control list with an object being exported.

2.3.1 The difference between an object and its description

There is no such thing as a "militarily significant object" outside of a political, economic, social, and linguistic context. When is it militarily significant? To whom? And what is the 'it' we are talking about? That last question is where lists come in.

Imagine that you were presented with an object you had never seen before. How would you determine if it has military significance, or is of security concern? You might look it over, but likely you will quickly look for writing about the object. You might want to know who made it, what they called the object, what they say its purpose is, and find out some specifications on it. All of these words and numbers start to create for you the *context* in which the object has meaning. You will quickly find yourself no longer looking at the object itself (or in many cases, you may have never seen it in the first place), and instead relying on what other people have said about the object. These descriptions, therefore, have a great amount of power.

How you hear about the object, from whom, and what it is they tell you will likely shape your impression of the military or security significance of the object much more than just looking at it. When we craft definitions of objects, we are not just describing the things; we are actually creating them in meaningful ways.

How many of us, for instance, have ever actually seen the effects of Sarin gas? Most of the time, it is the definitions of the objects and the descriptions of what they can do that make them real for us.

To differentiate between the object exported and the description of the object, it is useful to refer to the description of the object as an *item*, such as an item on a control list. When states modify export control lists, they are reshaping what we think of as an object of security concern by changing the wording of an item. That new item must then pass through several acts of interpretation to be equated with an actual object being exported. Whether the lists are satisfactory or need to be changed depends on these acts of interpretation.

2.3.2   The ways lists of items are interpreted

There are several places where interpretation occurs. An obvious place to start is the fact that the lists are originally produced in English by the multilateral export control arrangements. Except for the few countries that use English in their legislation, the lists need to be translated. In the case of European countries, that translation occurs at the EU level, though the translated versions are distributed to state delegation members for concurrence. The effect of these interpretations on the lists is not inconsequential. As an example, when the lists are translated into Russian, the text on unmanned aerial vehicles (Wassenaar Dual-List item 9.A.12, EU Dual-Use List item 9A0012) would cover their definition of model aircraft as well, so there was agreement at Wassenaar to add a decontrol note for model aircraft.[I] Another example, this one from the Munitions List, concerns controls on parachutes (ML10.h.). Before the entry was rewritten in 2009,[14] the text of the Wassenaar Lists included an item for parachutes used by "rangers", an American term, along with parachutes used by "paratroopers", a British term. The current lists have removed both of these terms in favour of a mutually acceptable term, "parachutists".

Another place where interpretation occurs is when a company applies for a licence. The company must first work with export control officials to determine the equivalence between the object being exported and a definition on the list. The export licencing officer must then decide if the definition of the object on the export license application corresponds to an item on the lists.

At the point of export, there is another moment of interpretation. The customs official (or an electronic version of one for intangible exports) is confronted with the object, and must determine if it matches the approved license application. There are decisions made here about what category and list an export might fall under, and whether it has the properties defined on the control lists. It is possible, for example, that the lists might provide too much ambiguity, such that an item might be listed in several categories.

Other places where interpretations occur include any time that the lists are used outside of the export control system. For instance, a human rights group may interpret the lists to decide if they adequately cover items that might be used for human rights abuses. Other government

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[I]   Note that this decontrol note does not appear in the EU list. This will be discussed in more detail when describing the European involvement in list modifications.

departments might use the lists to justify, or question, the export control system or a particular policy.

At each of these places of interpretation, there is an opportunity to say that the object exported either does or does not match an item on the lists. It is therefore by passing, or not passing, these interpretation tests that the lists' adequacy is judged. States themselves recognise that these interpretations occur, and that they are non-trivial matters. This is clearly demonstrated by the fact that the Nuclear Suppliers Group, Australia Group, and Missile Technology Control Regime (MTCR) all have "handbooks" that in the interpretative process between the definition of an item and an object being exported. The fact that only the MTCR Handbook is publicly available may suggest that states value some of the ambiguity in the public item definitions, as making them any more defined in public may overly aid in the proliferation of weapons of mass destruction.

How changing interpretations lead to changing lists

If an act of interpretation results in an equivalence between the lists and the object exported, but someone thinks they should not be equivalent, then there is a need for the lists to change. Similarly, if an object is deemed not equivalent to an item on the lists, but someone believes it should be so, there is also a need for the lists to change. In the first case, the desire is to modify the lists to decontrol an object. In the latter case, the desire is to modify the lists to control an object.

> Who thinks the lists need to change, and who has the capability to change it? These are difficult questions, and cut to the heart of the transparency and accountability of the lists modification process.

At a purely technical level, the latter question—who has the capability to change the lists—can be answered by saying it is the national governments. These are the units that have the veto power within the multilateral export control arrangements, and they are the units that can unilaterally change the lists (but only to make them control more, not less).[I] Such an answer misses, however, the whole process that leads up to these decisions, and therefore the answer to the first question of who think the lists need to change.

Broadly speaking, those who think the lists might need to change may be anyone with a stake in the export of the object. This can include, but is not limited to, the following groups:

- Licensing officers
- Customs officials
- Companies, either those that produce the object, or their rivals
- Security and defence officials in the exporting state
- Parliament
- Officials in other states
- NGOs with interests in the objects exported
- Other bureaucrats charged with making the lists work within the political system

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[I]   The EU can also modify the lists.

Whether or not each of these groups are involved in the modification process depends on their ability to voice their concerns. There is no formal channel, for instance, for NGOs to veto a list modification within the Wassenaar Arrangement.

If one of the groups does not have a voice, their dissatisfaction can still have an impact if their exit from the system has a negative impact on the other actors. For example, if a company cannot voice its disapproval of a product being added to the controls, but can move its business to another region with more favourable controls, the effect could be more damaging to the state.

The question for an effective export control system then becomes: how can it ensure, in the list modification process, the voice of those actors whose exit from the system would be deleterious to the state? This, in turn, raises the issue of which actors carry enough power with the state to make their exit a matter of concern. On the one hand, it is those actors who should have a seat at the table, and on the other hand, the state should strengthen and weaken the exit impact of actors it does and does not value.

2.3.3   The move to positive control lists

There is currently much discussion and action on making the lists into more "positive" lists, where controlled items are described 'using objective criteria rather than broad, open-ended, subjective, or design intent-based criteria.'[15] An example of the latter is the current Munitions List of the Wassenaar Arrangement, or the UN Register on Conventional Arms. Items are grouped in broad categories, such as 'ground vehicles', 'vessels (surface or underwater)', or 'electronic equipment' that are 'specially designed for military use'.   This is in contrast to what can be considered a very "positive" approach to controlling dual-use night vision goods by defining specific components to control, such as a 'Non-"space-qualified" non-linear (2-dimensional) infrared "focal plane arrays" based on 'microbolometer' material having individual elements with an unfiltered response in the wavelength range equal to or exceeding 8,000 nm but not exceeding 14,000 nm.'[I]

What value is there in making the lists more positive?

The major arguments in favour of positive lists are that they make it easier for the exporter to decide whether an item to be exported is controlled, and that they control only those specific items deemed to be of security concern.

The major arguments against positive lists are that they must be constantly updated to stay abreast of technological developments, and that their specificity means they must be very complicated if they are going to cover all items of security concern.

Both the positive and broad list approaches require significant bureaucracies to effectively enact. With a positive list, the bureaucracy is more about maintaining the list, whereas a broad list needs more people to interpret the lists during licensing.

A positive list is considered more transparent than a broad list, but this transparency works both for and against the goal of ensuring security. A very specific description of an item

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[I]   This text is found on the Wassenaar Dual-Use List, item 6.A.2.a.3.f.

controlled could be essentially a blueprint for the item. Listing it, then, would essentially be making the blueprint available to the world (since the lists themselves are public). There is, then, an argument for keeping the lists broad when the resources and skills to make an item are readily available in areas that are of security concern to the state.

2.3.4 Lists are not objective

The use of the word "objective" deserves a special comment. In normal language, when we say something is "objective", we mean that it is true in all contexts. In political contexts, objectivity is used as a way to curtail debate. If something is objective, it is not up for political negotiations. Calling the export control lists objective, then, has great political value, as it gives the impression that somehow we have found a way to identify the goods and technologies that, *by their very nature*, are dangerous.

But if we look at the history of export control lists, we see that they are continually changing. Items are being added, removed, and modified as technology advances, the political dynamic shifts, and the ways of incurring violence change. Horses, once a vital part of any advanced military, are nowhere to be found in most battles today.

Moreover, given the discussion above about the relationship between an object and its description, it should be clear to the reader that there is no such thing as an objective definition. Definitions are the result of a process of negotiation between state-sponsored experts, each of whom are trying to find ways of describing something that are both easy to understand and yet not a blueprint, concerned both about whose security will be at risk and whose economy might be impacted by controls. The result of these negotiations is a list of items that can be agreed to at the multilateral level; no small accomplishment, given that many of these export control arrangements contain states who are economically and sometimes militarily opposed.

Having provided a brief history of export controls, an articulation of the structure and range of purposes of export controls, and the importance of lists, it is now time to look at the structure of the multilateral export control arrangements and the lists they maintain.

3 Structure of the Multilateral System

The system of export controls that many of the world's major producing states have in place today rely on multilateral arrangements concerning what should be controlled and how. These multilateral arrangements each focus on a different set of goods and technology. The Wassenaar Arrangement addresses issues with trade in conventional arms and dual-use items. The Nuclear Suppliers Group handles nuclear issues. The Australia Group maintains lists and common practices for trade in chemical and biological items. And the Missile Technology Control Regime is concerned with the trade in missiles that are capable of delivering weapons of mass destruction. Each of these, in turn, has a basis in the major multilateral arrangement during the Cold War, the Coordinating Committee for Multilateral Export Controls, or CoCom.

This section provides an overview of each of these multilateral arrangements, including their reasons for formation, their political structure, and the structure of the lists they maintain. A list of the current participants in each regime, and a map of the participants can be found in the SIPRI Yearbook.[16]

There is at least one significant difference that sets CoCom and the Wassenaar Arrangement apart from the other multilateral arrangements. The impact on a country's economy of export controls of most WMD-related technology is marginal. Many of these technologies, if exported at all, are done so in small quantities. Controlling knowledge about how to design, produce, and use these technologies has wide acceptance from most if not all of those who are affected by the controls. In contrast, the impact from conventional dual-use technology—that covered by CoCom and Wassenaar—often has a significant effect on national economies, because the text of the lists can be interpreted as covering significant proportions of the number of items exported generally from a country.
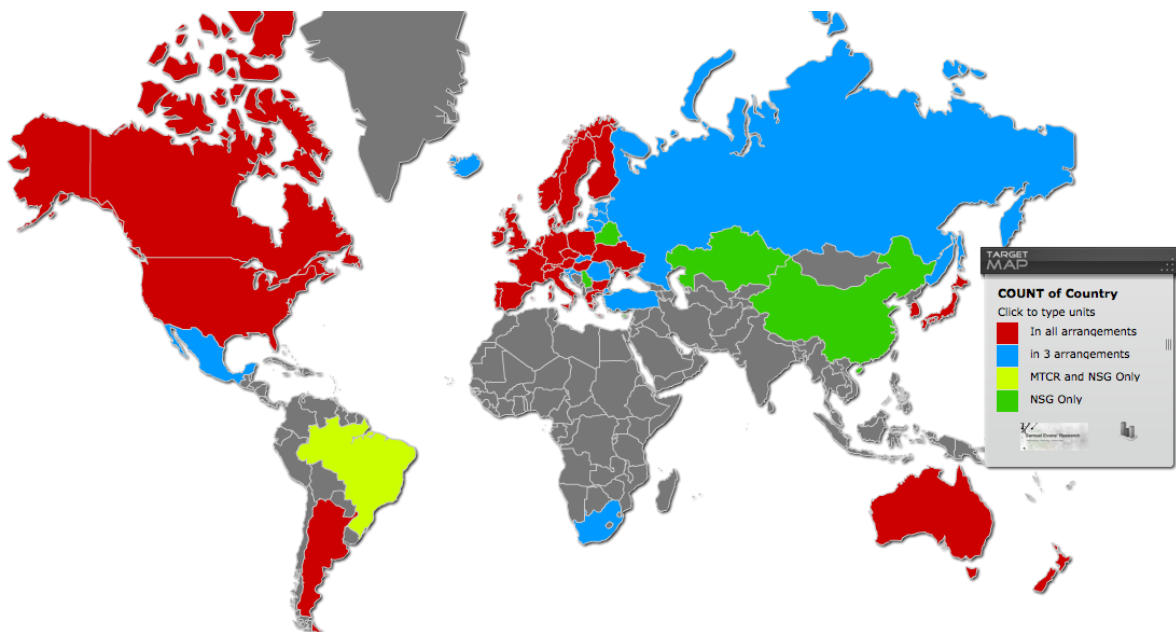

Figure 1 - State membership in multilateral export control arrangements

3.1 CoCom

3.1.1 Reasons for formation

The international harmonisation of export controls further developed out of World War II with the establishment of CoCom (the Coordinating Committee for Multilateral Export Controls) in 1950. CoCom focused on drawing together like-minded states ('the West') to control the flow of technology to a common adversary ('the communist bloc').[I]

At the end of World War II, there was initially no consensus on whether further institutionalisation (or even maintaining the current level) of domestic and multilateral export controls was necessary.[17]

It was the idea of communism, as much as the physical act of war, that states sought to contain. Such a broad imagined threat had the potential to justify the control of nearly all trade. The dilemma in developing these broad controls, from the US side, was that the US wanted to export technology to Europe to help it rebuild under the Truman Plan after WWII, but these states needed to ensure that these exports, as well as other exports from Europe, did not continue on to Communist states.[18] From the European side, the dilemma was more about the need to tread gingerly and secretly on any arrangement to control trade, as any public announcement might jeopardize the delicate negotiations among them and instigate a Soviet retaliation.[19]

Unlike the thorough embeddedness of the Conference for the Reduction and Limitation of Armaments within the League of Nations framework, the negotiations on this new international control system had little direct link to the newly formed United Nations.[II] Instead, the US tried to closely tie it with the North Atlantic Treaty Organization (NATO), since the US could tie European military assistance to the requirement for multilateral licensing for any trade in these items outside of NATO. Actually embedding this export control system within NATO, however, was not seen as prudent by the British as it would turn away needed neutral countries such as Sweden and Switzerland.[20] In addition NATO was seen as a military organization, whereas this new multilateral export control system was seen as more of an "economic embargo".[21]

In 1950, Belgium, Canada, France, Italy, Norway, the United States, and the United Kingdom established the Coordinating Committee for Multilateral Export Controls (the day-to-day working body), along with the Consultative group (the less-frequent political body).[22]

[I]   While CoCom never published any documents of its own, it was generally agreed that it was directed at Communist states, as highlighted by the following quote from Cupitt, Richard T., and S. R. Grillot. 1997. "COCOM Is Dead, Long Live COCOM: Persistence and Change in Multilateral Security Institutions." British Journal of Political Science 27 (3), p. 394:

An examination of the lists of proscribed destinations by British, Dutch and US authorities, however, indicated that the targets of COCOM controls in the mid- 1980s were Afghanistan, Albania, Bulgaria, Cambodia, Czechoslovakia, Cuba, the German Democratic Republic, Hungary, Laos, Mongolia, North Korea, the Peoples Republic of China, Poland, Romania, the Soviet Union and Vietnam.

[II] The United Nations was generally more concerned about the need for sharing information about armament levels rather than controlling trade.

3.1.2 Political structure

CoCom had a formal secretariat with a great deal of power. It resided in the US embassy in Paris, and it was generally acknowledged that the Americans had significant leverage over what was decided there. Unlike the later multilateral arrangements, CoCom had the authority to actually license exports from member states. If, say, France wanted to export a controlled computer to China, it would first have to get approval from CoCom. States still had their national export systems; CoCom was an additional layer on top of them.

CoCom had three main purposes: to establish and review the lists of technologies; to review and approve licenses to export controlled items; and to co-ordinate national enforcement of export controls.[23] All of the activities at CoCom used as their foundation the construction and maintenance of the lists. "Deciding which technologies were on the lists was the major task of CoCom and was the one which caused the most disagreements among members."[24]

CoCom had four types of meetings: licensing meetings, Executive Committee meetings, working groups, and High Level Meetings. The licensing meetings were attended by licensing experts from various delegations—usually from their Paris embassies—and were held once a week. They focused on licensing issues, and the perception that they were unable to process applications fast enough was a factor in the 'Core List' revision in 1990–1991.

The Executive Committee was made up of policy level officials and met twice yearly "to consider broad policy issues and to establish or review the progress of CoCom's ad hoc working groups".[25] This is sometimes referred to as the Consultative Group.[26] Working groups contained mostly technical experts and considered issues such as "trade among CoCom members, the streamlining of the control lists, and the harmonization of national enforcement procedures", and thus either used or modified the lists.[27]

The High Level Meetings (HLM) began in 1982, and were attended by sub-cabinet level delegates. Their purpose was to "inject political vigor into and develop political support for the multilateral control process,"[28] and thus represent a clear strengthening of the hierarchical framing, with its emphasis on further institutionalising the idea that control was the appropriate framing of the dual-use problem. The 1982 HLM, at least from the US perspective, had three initiatives: the expansion of the lists, improvements in enforcement, and the strengthening of CoCom's institutional structure.[29] The 1990 HLM had four initiatives, three of which involved the lists directly: to override the list review process in place at the time; to remove entire categories of technology from the lists; to replace the Industrial List with a much more selective Core List; and to change from viewing Eastern Europe as a target of control to viewing it as a collaborator in controlling.[30] Much of this was a direct result of the fall of the Soviet Union and the Warsaw Pact.

3.1.3 Structure of lists

Instead of considering the items as contraband as done pre-WWI, or as arms of war as done in the Interwar years, the items to be controlled were generally called 'military' and, more poignantly, 'strategic goods'.[31] There were divided into three main lists: the Atomic List; the Munitions List; and the Industrial List. The Munitions List was largely equivalent to the absolute contraband lists, and the Industrial List was the successor of the conditional contraband lists. These lists were never made public by CoCom.

Throughout CoCom's existence, the lists of controlled items was modified at least every few years, both to reflect new technological advances and the political/economic balance participating states—mainly the US—were trying to reach.[32] Most of these changes were made to the Industrial List. Before the Korean War, there was much debate on controlling items that were seen to have little military relevance.[33] After the Korean War, controls were expanded as a period of economic embargo settled in. "This was done on the grounds that Soviet economic and military power were synonymous".[34] However, the revisions to the lists in 1954 and 1958 saw significant reductions in the items controlled. The lists remained largely as they were for the next twenty years, but became increasingly controversial among members as global trade grew and requests for exceptions to export mounted.[35]

As the lists became more complex, further qualifications were needed on what constituted an item on the list. Why was this happening? Michael Mastanduno, a scholar who has extensively studied CoCom, argues that this was due to conflict between two different perceptions of the relationship between technology trade and (inter)national security.[36] According to one view—'economic warfare'—controls would be broadened to include any technology that would strengthen the economy of an adversary. "The assumption here is that because military power is ultimately dependent on an economic base, quantitatively and qualitatively, trade that significantly enhances the economy of an adversary indirectly enhances its military power and thus should be prohibited in the interest of national security." This was the view that the US took, particularly in the 1949-1958 and 1980-1984 years, when it saw its relationship with the Soviet Union as more politically confrontational.

According to the other view, strategic (security) aims could be met by controlling only the technologies that made a "direct and significant contribution to an adversary's military capabilities." This view would include technologies deemed to be purely 'military', but also those which had commercial as well as specific military uses, and Mastanduno refers to it as a 'strategic embargo'. This was the view preferred by European members of CoCom, Mastanduno argues, because they, unlike the US, did not see themselves in an arms race with the Soviet Union and they had a greater economic interest in East-West trade. Many European members of CoCom held this view from the beginning, and after 1958 they were able to convince the US to relax the controls, or at least they were able to thwart many attempts to broaden the controls. This often meant that the text on the lists got longer because they were more narrowly focused.

3.1.4   Reasons for disbanding

By the time CoCom disbanded in 1994,[37] 17 states—commonly described as NATO minus Iceland, plus Japan and Australia—were members. With the fall of the Berlin Wall, much of the justification for the maintenance of the multilateral export control system seemed to fall as well. Many states were keen to shed the American dominance over their exports for the last forty years, though there was also general agreement that the need for multilateral harmonization of lists and sharing of information and best practices was still a useful exercise. As such, the general structure of CoCom became untenable, but the general sense that parts of if should live on was shared.

CoCom ended where it started, at a High Level Meeting in Wassenaar, a small town outside of The Hague, in The Netherlands, on 31 March 1994.[38]

3.2 Wassenaar Arrangement

3.2.1 Reasons for formation

Between 1994 and the end of 1995, the members of CoCom—plus Austria, Finland, Ireland, New Zealand, Sweden, and Switzerland, and, by 12 September 1995, Russia, Hungary, Poland, and the Czech and Slovak Republics—set about to rethink how to co-operate on international export controls. They held a series of meetings, called the New Forum, have been described as "a bit of a 'talk about export controls and see the world' sort of organisation, really."[39] While the relevance of controlling goods and technologies that were a threat was still seen as a laudable goal, what they were a threat *to* was open for question. Preliminary discussions about moving to a North/South divide were jettisoned early on. Instead, states involved in the New Forum started to imagine it as a kind of custodian for maintaining the emerging world order, though it was not clear at the time what that order was. In terms of export controls, a threat to this order consisted of a state acquiring an accumulation of goods and technology that might destabilize a region of the world. This is precisely the language used by the multilateral export control arrangement that emerged from the New Forum negotiations, the Wassenaar Arrangement on Export Controls for Conventional Arms and Dual-Use Goods and Technologies.

According to its founding document, the *Initial Elements*,[40] the Wassenaar Arrangement has been established in order to contribute to regional and international security and stability, by promoting transparency and greater responsibility in transfers of conventional arms and dual-use goods and technologies, thus preventing destabilising accumulations.

It does so by focusing on enhancing cooperation to prevent the 'threats to international and regional peace and security which may arise from transfers of armaments and sensitive dual-use goods and technologies where the risks are judged greatest.' Founded in 1996 and still in existence, Wassenaar, unlike CoCom, is not directed at "any state or group of states and will not impede bona fide civil transactions." Also unlike CoCom, it is open to any states to join (though their membership must be approved by all current members), and it does not have authority to approve licenses to trade in controlled items; instead it provides a mechanism for reporting such trade to other members of the Arrangement. To carry out its purpose, Wassenaar Participating States (as they are officially called) meet on a regular basis, exchanging, on a voluntary basis, information that will enhance transparency, including information on transfers and denials to transfer. They also continually assess the overall functioning of the Arrangement and develop guidelines and procedures for Participating States to use in various aspects of export controls. In doing so, all decisions are reached by consensus.

3.2.2 Political structure

Like CoCom but unlike any of the other regimes, Wassenaar has a Secretariat and a physical space, on the 5th floor of 12 Mahlerstraße in Vienna, Austria.[41] This aids in its many meetings, and in maintaining an institutional history of prior list modifications and the justifications used for making those modifications.

In addition to the Secretariat, there are five main bodies that are made up of delegates from the Participating States and that meet on a regular basis in Vienna: the Expert Group; the General Working Group; the Plenary; the Licensing and Enforcement Officers Meeting, and the Vienna Points of Contact. Each of these is described below.

Expert Group

The Expert Group (EG) is the body within Wassenaar that does most of the negotiation with regards to the modifications made to the Munitions List and Dual-Use List. Its nearest parallel in CoCom was the working groups that used to review the lists. During the course of a year, the EG usually meets in two formal sessions—in March-April and September—and one informal session in June-July.[42] The sessions are usually two weeks long, and can involve anywhere from a half dozen to all of the Participating States. The informal sessions are strictly that, informal; they are not administered by the Secretariat, and there is a 'no-tie' policy.[43]

The EG is chaired by a representative of a Participating State, selected on a rotating alphabetical basis. Some countries decide to pass on chairing the EG, as a technical background and a command of technical English are seen as necessary in aiding understanding when discussion moves too far off topic.[44] Informally, the Chair is asked to serve for two years as opposed to the one year term for Chairs of the General Working Group (GWG) and Plenary. This is because many Chairs learn a lot in their first year that they can then apply to making their second year run more smoothly. "It's a far tougher job [than the chair of the GWG or Plenary], and it's a job that requires all of the diplomatic skills of the others, but substantive technical skills as well."[45]

Countries send varying numbers of delegates to the EG meetings. Some rarely send any, such as Latvia, Luxembourg, and Malta. Others, like Canada and Sweden, send one or two, occasionally supplemented by more when they are submitting a proposal. Large delegations, typically the US, Britain, and Russia, will send 10 or more delegates.[46] These delegates usually come from the Ministries of Defence, Trade, or Foreign Affairs, depending on the country. There are also delegates from industries, but they are always brought in as part of a State delegation, and must as such represent the interests of the State rather than their company. It should be pointed out that if the industry representatives are at a Wassenaar meeting, it is most likely because their company's interests and those of the State line up with one another. They are seen as technical experts on a particular item under debate and are usually brought in only for the part of the meeting that discusses their technology.

General Working Group

The General Working Group (GWG) is the internal body that discusses matters that are more policy-related. They normally meet in May and October for only a few days. GWG meetings are usually attended by higher-level representation than at the EG, but generally not as high as the ambassadorial level of the Plenary.[47] The Chair of the GWG rotates yearly in reverse alphabetical order, thereby preventing a continuous follow-on between the GWG and the Plenary. There was not much interaction between the GWG and EG before the 2003 Assessment Year. They were seen as being separate, with the GWG focusing on political matters and the EG focusing on technical matters. Since then, however, there has been increasing cross-over between the two.[48]

The GWG is the place where much of the groundwork is laid for the other text outputs of the Arrangement, such as the 'Statements of Understandings', 'Elements for. . .', and 'Best Practices' documents. Statements of Understandings are seen as 'first steps' to either an Elements document or a Best Practice. For example, in 2001 the GWG developed the Statement of Understanding on Intangible Transfers of Software and Technology, which stated, in one paragraph, that transfer of controlled technology poses a risk, regardless of the medium of transfer. In 2006, the GWG developed the Best Practices for Implementing Intangible Transfer of Technology Controls, which lays out, over the course of two pages, how States should go about trying to control these types of transfers. It is therefore a more complicated document, and is based on the common understanding to which they had previously agreed. While the GWG does not itself make modifications to the lists, it does clarify the boundaries of the lists by producing a document on 'intangible technology' or a *Statement of Understanding on Control of Non-Listed Dual-Use Items*.

Plenary

The Plenary meets for two days once a year, usually in the first week of December. As noted above, this is where all of the formal decisions for the Arrangement are taken. Everything from budgetary decisions for the functioning of the Secretariat to deciding on the documents that come out of the GWG, to approving the modifications to the lists by the EG, must be squeezed into these two days. Moreover, the people making the decisions will likely not have been involved directly in the EG or GWG. They will have been briefed about the developments over the past year, and may have—such as in the US case— actually been overseeing the entire process, but this will be the first trip of the year to the Secretariat for the majority of them. The purpose of the Plenary is for Participating States to give either their political approval to the work of the EG and GWG, or if a State is not able to give its approval, for it to make a political statement as to why it cannot do so. There is almost an art to deciding which proposals will not result in one State or another having to make a political statement about a list change. A major unspoken objective of the EG is to sort out all of the political matters regarding a list change before it reaches the Plenary.

LEOM

There are two other significant bodies of the Wassenaar Arrangement. The first is the Licensing and Enforcement Officers Meeting (LEOM). The LEOM is a forum in which licensing and enforcement officers discuss issues which are directly germane to their responsibilities in their State, including how to implement the Elements and Best Practice documents that come out of the GWG. The licensing officers are the people who actually decide whether a technology presented for export has sufficient characteristics to be matched to a piece of text on the Dual-Use (or Munitions) List. The enforcement officers are customs officials who have to make a similar assessment of the characteristic of the technology in order (a) to decide if a license is needed if it does not have one, or (b) to ensure that the license is valid. The LEOM also provides advice to the GWG. The chair of the LEOM does not rotate like the chairs of the other groups, because

> a lot of countries don't seem to have somebody who can deal with that issue well. . . Instead each year we try to recruit someone who is knowledgeable on the substance, who's got leadership skills, and has good English.[49]

Vienna Points of Contact

Finally, there are the *Vienna Points of Contact* (VPoCs, pronounced 'v-pocks'). These are usually people from the State's Embassy or Mission in Vienna who meet with the Secretariat on a monthly or bi-monthly basis to handle more of the administrative side of the Arrangement, such as budgeting, maintaining the building, etc. These people are, in a way, technical experts of a different nature.[50] Vienna is a city where many international organisations are based, in particular many international security organisations, such as the International Atomic Energy Agency (IAEA), the Organization for Security and Cooperation in Europe (OSCE), and the United Nations (UN). A single VPoC will likely go to a few if not all of the organisations to perform similar duties, and thus provides a linkage between them. For many of the smaller countries, the VPoC may be the only person who ever attends any of the Wassenaar meetings. For some of the larger countries, such as Russia and Japan, the VPoC serves as the head of delegation to the EG and GWG. The VPoCs also serve as official communication channels with the State, and are used by national delegations to the EG and GWG to get the official line from the State if the negotiating situation changes during a meeting.

EU Involvement

The EU does attend Wassenaar meetings, but as part of the delegation of the state that currently holds the European Presidency.[i] While the EU does not ostensibly have a vote, the Participating State is expected to carry the concerns of the EU in the technical negotiations process. As one state delegation member put it:

> It means you have one arm tied behind your back. You're not just having to look at [the state] requirements for something, you're having to look at the EU requirements as well. This is something that [the state] has to be very careful about. We could lose our autonomy in Wassenaar.[51]

It is not a direct party of Wassenaar, and efforts in the past to have the current delegation that currently holds the EU Presidency speak with an EU voice have received negative feedback from other members.

3.2.3   Structure of lists

The Arrangement has two main lists—the Dual-Use List and Munitions List—and two subsets of the Dual-Use List: the Sensitive List (SL) and the Very Sensitive List (VSL). These are arranged hierarchically by the level of control each warrants, with the Munitions List having the most control, then the VSL, SL, and common Dual-Use List. The VSL and SL are sublists of items on the Dual-Use List. Unlike CoCom, all of these lists are only adopted at national discretion. Russia and the Ukraine actually view the Dual-Use list, not as a control list, but as a reference list.[52]

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i   If the current Presidency is held by a state that is not a member of Wassenaar, such as Cyprus, the EU remains part of the previous Presidency's delegation.

The Munitions List (ML) is fairly straightforward, consisting of 22 categories. Items on the list include:

ML1-2*. Smooth-bore weapons…*

ML3*. Ammunition and fuze setting devices…*

ML4. *Bombs, torpedoes, rockets, missiles, other explosive devices and charges and related equipment and accessories…*

ML5*. Fire control, and related alerting and warning equipment, and related systems, test and alignment and countermeasure equipment…*

ML6*. Ground vehicles and components…*

ML7*. Chemical or biological toxic agents, "riot control agents", radioactive materials, related equipment, components and materials…*

ML8*. "Energetic materials" and related substances…*

ML9. *Vessels of war (surface or underwater), special naval equipment, accessories, components and other surface vessels…*

ML10*. "Aircraft", "lighter-than-air vehicles", "Unmanned Aerial Vehicles" ("UAVs"), aero-engines and "aircraft" equipment, related equipment, and components…*

ML11*. Electronic equipment, "spacecraft" and components…*

ML12*. High velocity kinetic energy weapon systems and related equipment…*

ML13*. Armoured or protective equipment, constructions and components…*

ML14*. 'Specialised equipment for military training' or for simulating military scenarios…*

ML15*. Imaging or countermeasure equipment…*

ML16*. Forgings, castings and other unfinished products, specially designed for items specified by ML1.to ML4., ML6., ML9., ML10., ML12. or ML19…*

ML18*. Production equipment and components…*

ML19*. Directed Energy Weapon (DEW) systems, related or countermeasure equipment and test models…*

ML20*. Cryogenic and "superconductive" equipment…*

Most of these items, in order to fall in the Munitions List, need to be 'specially designed for military use'. However, they do not have to be 'finished products' (*ML16*). In addition to those technologies of direct use in military operations, the Munitions List also controls:

> **ML17**. *Miscellaneous equipment, materials and libraries, as follows, and specially designed components therefor: . . .*

> **ML18**. *Equipment for the production of products referred to in the Munitions List, as follows:*

>> *a. Specially designed or modified production equipment for the production of products controlled by the Munitions List, and specially designed components therefore;*

>> *b. Specially designed environmental test facilities and specially designed equipment therefor, for the certification, qualification or testing of products on the Munitions List. ...*

> **ML21**. *"Software" as follows: . . .*

> **ML22**. *"Technology" as follows: . . .*

ML17 contains a random assortment of technologies that do not fit neatly into the other categories. *ML18* is an extremely broad category, covering any tool specially designed to produce any technology that is listed on the list. While these technologies may have non-military applications, if they are 'specially designed' to produce technologies controlled by the Munitions List, then they are controlled. What constitutes being specially designed for military use is an interesting question, and is an active area of discussion within the Arrangement at the time of writing this report.

The Dual-Use List

The Dual-Use List, however, is much more complex. It is composed of ten categories, with each category divided into five sections, as noted in *Table 1* and *Table 2*.

Category 1 – Advanced Materials
Category 2 – Material Processing
Category 3 – Electronics
Category 4 – Computers
Category 5 – Part 1 – Telecommunications
Category 5 – Part 2 – "Information Security"
Category 6 – Sensors and "Lasers"
Category 7 – Navigation and Avionics
Category 8 – Marine
Category 9 – Aerospace and Propulsion

Table 1 - Categories of the Wassenaar Arrangement Dual-Use List

A – Systems, Equipment, and Components
B – Test, Inspection, and Production Equipment
C – Materials
D – Software
E – Technology

Table 2 - Sections of the Wassenaar Arrangement Dual-Use Categories

Later categories are also meant to build on earlier ones. Thus, Category 9 (Aerospace & Propulsion) may control an 'unmanned aerial vehicle', but the gyroscope in it may be controlled in Category 7 (Navigation and Avionics), and the circuitry used to make the gyroscope may be controlled in Category 3 (Electronics). The list also has two sub-lists: the Sensitive List and the Very Sensitive List. The Sensitive List is for "key elements directly related to the indigenous development, production, use or enhancement of advanced conventional military capabilities whose proliferation would significantly undermine the objectives of the Wassenaar Arrangement".[53] The Very Sensitive List has almost the same requirements, "key elements essential for the indigenous development, production, use or enhancement of the most advanced conventional military capabilities whose proliferation would significantly undermine the objectives of the Wassenaar Arrangement".[54]

Guidelines for the Drafting of Lists

When deciding how to structure the lists during the New Forum (1994-1996), the Drafting Group came up with a set of guidelines. These *Guidelines for the Drafting of Lists*[I] were revised in 2007-2008.[55] The first thing to note about the current version of the Guidelines is Section III.1, the 'General Principle' used in drafting control text. It begins by laying out the difference between the Dual-Use List and the Munitions List:

[I] Hereafter referred to as *Guidelines*

> *There is a difference in approach to controls specified in the Dual- Use List from those specified in the Munitions List. Controls in the Dual-Use List rely on greater specificity for the controlled items and are evaluated against the agreed selection criteria. The nature of military goods requires less specificity.*

This clearly shows the boundary between dual-use and military items. Having something be 'specially designed for military use' is sufficient to have it be military. Dual-use items, on the other hand, do not have this overriding parameter, and as such their ambiguities must be negotiated with more 'specificity' in order to find 'criteria' that each state can 'agree' to. Section III.3. of the *Guidelines* describes in some detail the need for clarity in the Dual-Use List, which further supports this claim.

> *For the Dual-Use List, clear and objective specifications should include control parameters known by industry and associated control thresholds or technical characteristics/performance. Control text should break out the overall specification into clearly identified characteristics and the combination in which they are to be met. …*

Finally, this section argues that "[s]ubjective controls, which are based on end-use, should be avoided. A subjective control is a control that treats an item differently if it is used for a different purpose." This is essentially negating the 'designed for a purpose' parameter that delineates dual-use and munitions items. If something is specially designed for military use, it is automatically controlled. If something is not specifically designed for military use, this guideline says that the Arrangement should not care what it is actually designed for, only that it could have a military significance.

Validity Notes

Wassenaar and the other multilateral arrangements do not have a general 'sunset clause', which would require each item on the list to be removed or reassessed after a set period of time. Instead, on occasion, Wassenaar will use a *Validity Note*, which is a sunset clause that can only apply to a particular item. *Validity Notes* are used, when, for example, they know the text must be changed immediately, but have not had time to fully consider the impact of the new language. In 2012, there were three active Validity Notes covering mobile communications interception (item 5.A.1.i), information security without using cryptography (5.A.2.a.7), and a particular type of semiconductor laser (6.A.5.d.1.d.1.d).

3.3 Nuclear Suppliers Group and Zangger Committee

3.3.1 Reasons for formation

Within the world of nuclear weapons, states are divided into those that currently possess nuclear weapons and those who do not. The purpose of an export control system for nuclear items is to prevent the proliferation of states that have or can make nuclear weapons. This is in contrast to conventional items covered by the Wassenaar Arrangement, where, while there is still a concern about the spread of the technology, that concern is often not shared amongst all

states. In conventional items, states can and often do trade advanced weapons goods and technology with states that do not have them. Export controls there serve as a means to monitor that trade, whereas export controls in nuclear items are in place to prevent trade of nuclear weapons-enabling items to non-Nuclear Weapon States.

In 1968, the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) was created. It came into force in 1970. Nearly every country in the world is party to the Treaty, with notable exceptions of India, Israel, North Korea, and Pakistan. While parties that signed the Treaty agreed '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 for peaceful purposes, unless the source or special fissionable material shall be subject to the safeguards requited y the Article [III.2].' None of these items were actually defined in the NPT, however, and there were differing interpretations in use at the time.[56]

As noted in the official history of the Zangger Committee, [I] "Between 1971 and 1974, a group of 15 States - some already parties to the Nuclear Non-Proliferation-Treaty (NPT), others prospective parties - held a series of informal meetings in Vienna chaired by Professor Claude Zangger of Switzerland." These states were seeking to reach a common understanding on definitions for "equipment or material especially designed or prepared for the processing, use or production of special fissionable material," as described in the NPT, and also on the conditions and procedures states should use to govern the export of those items. That list was finally adopted in 1974, and is referred to as the "Trigger List", and was deposited with the IAEA as INFCIRC/209.[57]

There are several reasons why there was need for another nuclear-focused multilateral export control. As Robert Mozley notes, "The United States had reservations about the completeness of the Zangger list and also about the absence from the formulating committee of some nations, such as France, which could not be represented because they did not sign the NPT."[58] Also, the detonation of nuclear weapons by India had a major impact that current controls were not doing enough. To rectify this, states who were producing or able to produce nuclear products met in London in 1974 and formed the Nuclear Suppliers Group (NSG).[II]

3.3.2 Political structure

There are 38 members of the Zangger Committee.[III] The European Commission is permanent observer. The Committee meets on an ad hoc basis, the last time in 2009. Decisions are made by consensus.

There are currently 46 participating states in the NSG.[IV] The European Commission and the current chair of the Zangger Committee are also permanent observers.

[I]   website: http://www.zanggercommittee.org

[II] website: http://www.nuclearsuppliersgroup.org

[III] Argentina, Australia, Austria, Belarus. Belgium, Bulgaria, Canada, China, Croatia, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Kazakhstan, Republic of Korea, Luxemburg, The Netherlands, Norway, Poland, Portugal, Romania, Russian Federation, Slovakia, Slovenia, South Africa, Spain, Sweden, Switzerland, Turkey, Ukraine, United Kingdom and United States.

[IV] Argentina, Australia, Austria, Belarus, Belgium, Brazil, Bulgaria, Canada, China, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Kazakhstan, Republic Of Korea, Latvia,

The NSG holds a Plenary every year in the country of the rotating chair. At the Plenary, states can decide if they would like to set up any technical working groups for the following year to discuss list modifications, procedural matters, information sharing, or transparency activities. These working groups often consist of technical experts from a range of government ministries (e.g. defence, commerce, energy) Plenary meetings usually consist of report from any technical working groups that have completed their work, or from the chair on outreach activities.

In addition to the Plenary, the NSG also has a Consultative Group, which meets twice a year and is tasked to hold consultations on issues associated with the Guidelines on nuclear supply and the technical annexes. The Information Exchange Meeting happens just before the Plenary and serves as a venue to discuss developments relevant to the Group. The Licensing and Enforcement Experts Meeting also meets then.

The Permanent Mission of Japan in Vienna serves as a minimal secretariat, coordinating the distribution of documents among participants, sending notifications of meetings schedules, and providing any assistance needed for the various units in the NSG.

The NSG is closely tied to the International Atomic Energy Agency (IAEA). For example, no transfer of Trigger List items to Non-Nuclear Weapons States may take place unless the recipient State has full-scope IAEA safeguards on all its nuclear activities.

3.3.3   Structure of lists

The Zangger Committee maintains the 'Trigger List' of 'especially designed or prepared equipment or material for the processing, use or production of special fissionable material', as noted by the Nuclear non-Proliferation Treaty, Article III.2(b). Exporting items on the Trigger List would 'trigger' safeguards enforced by the International Atomic Energy Agency (IAEA). This list is published by the IAEA as INFCIRC/209.[59] Dual-use items are not contained on the Trigger List.

The NSG maintains a set of Guidelines for Nuclear Transfers and Guidelines for Nuclear-Related Dual-Use Equipment, Materials, Software and Related Technology, which include lists of items to monitor. The Guidelines are published by the International Atomic Energy Agency (IAEA) as INFCIRC/254, Part 1 and 2. It wasn't until 1978 that the NSG first made publicly available these lists (and the Guidelines as a whole).

As noted in *The Nuclear Suppliers Group: Its Origins, Role and Activities*,[60] "The NSG and the Zangger Committee differ slightly in the scope of their Trigger Lists of *especially designed or prepared* (EDP) items … Concerning the scope of those lists, the Zangger list is restricted to items falling under Article III.2 of the NPT. The NSG Guidelines, in addition to covering equipment and material, also cover the technology for the development, production and use of the items on the list."

The NSG and Zangger lists also differ markedly in that NSG controls dual-use items, while Zangger does not, precisely because Zangger cannot list anything that is not especially

Lithuania, Luxembourg, Malta, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Russian Federation, Serbia, Slovakia, Slovenia, South Africa, Spain, Sweden, Switzerland, Turkey, Ukraine, United Kingdom, And United States.

designed and prepared for nuclear weapons development or use. There is close cooperation between the NSG and the Zangger Committee on the review and amendment of the Trigger Lists. It should also be noted that, while the Zangger Committee and NSG were established in the 1970s, CoCom had been controlling nuclear items since at least 1954.

The NSG has recently completed a thorough list review process begun in 2010. The final revised lists should appear shortly through the IAEA.

In 2004, the NSG adopted a "catch-all" mechanism in the NSG Guidelines, to help states establish a national legal basis to control the export of nuclear related items that are not on the control lists, when such items are or may be intended for use in connection with a nuclear weapons programme.

NSG Handbooks

The NSG has two handbooks that it uses to help member states translate between the item definition on the lists and objects actually exported. Neither of these handbooks is publicly available, and both of them are produced for the NSG by the United States Government. The US National Nuclear Security Administration produces *A Handbook for the Nuclear Suppliers Group Trigger List Annexes*,[I] and the US Department of Energy produces *A handbook for the Nuclear Suppliers Group Dual-use Annex*, LA-13131-M.[II]

3.4 Australia Group

3.4.1 Reasons for formation

While the Wassenaar Arrangement is addressing a problem of transparency in the international trade of the items on its lists, and the Nuclear Suppliers Group is addressing a problem of proliferation of nuclear weapons, the Australia Group is focused on the problem of preventing the illegitimate use to the items on its lists.

International efforts to establish the abhorrence of the use of chemical and biological weapons can be traced to a 1675 agreement between France and Germany to prohibit the use of poison bullets.[61] The 1874 Brussels Convention on the Law and Customs of War prohibited the employment of poison or poisoned weapons, and the use of arms, projectiles or material to cause unnecessary suffering. The Hague Peace Conferences of 1899 and 1907, and the 1925 Geneva Protocol established the foundation for broad global prohibitions on chemical and biological weapons.[62] This norm was significantly strengthened with the creation of the Biological, and Toxiological Weapons Convention (BTWC) in 1972, and the Chemical Weapons Convention (CWC) in 1993.

Primarily in response to the use of chemicals in the Iran-Iraq War, a group of 15 states[III] met in the Australian Embassy in Brussels in 1985 to develop a multilateral arrangement to harmonize

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[I]   Which has the IAEA document number INFCIRC 254 1 HB

[II]   IAEA document number INFCIRC 254 2 HB

[III]   Australia, Belgium, Canada, Denmark, France, Germany, Greece, Ireland, Italy, Japan, Luxembourg, the Netherlands, New Zealand, the United Kingdom, and the United States. The European Union has also been an observer since the beginning.

control of chemical items.[63] Originally known as the Brussels Club,[64] this group became the Australia Group (AG),[I] and initially it was assumed that the Group would be a temporary body until the CWC was put into force.[65] Currently, the Group meets on a regular basis[II] at the Australian Embassy in Paris. Initially formed only to address chemical weapons concerns, the Group expanded its remit in 1990 to include biological items as well.[III] Its aim is to prevent the flow of dual-use technologies that could be used for chemical and biological weapons and weapons-programmes. It does this not only through transfer controls, but also through "the exchange of intelligence and other information concerning procurement activities of suspected proliferators."[66]

3.4.2   Political structure

The Chair of the Australia Group is always Australia, and for the past many years, has been Robert Mathews.

The AG currently has 40 Participating States plus the European Commission. The Group has no budget, standing bureaucracy, or permanent office building, meeting usually at the Australian Embassy in Paris[IV] and using the Embassy's secretarial services when needed. It operates by consensus, and is always chaired by Australia. Plenary meetings occur once a year.

The Australia Group is closely connected with the Chemical Weapons Convention, and sees itself as the "principle instrument" for addressing the threat posed by chemical weapons.[67] The Group also provides a means for states who are party to the Biological Weapons Convention to develop effective export control systems that help ensure compliance with Article I (prohibiting development, production, stockpiling, or otherwise acquiring and storing biological agents and toxins, or related biological weapons or equipment) and Article III (ensuring states prevent the transfer of material which might assist the manufacture, or any means of acquiring, biological weapons).

The Australia Group also has close connections to the Biological Weapons Convention. The Group was seen as a means to implement the non-transfer commitment in Article III of the BWC.[68] The role of export controls in ensuring trade in controlled items is only done with legitimate end users also helps to satisfy Article IV of the Convention.

While the Australia Group does not have an Experts Group akin to the Wassenaar Arrangement, it has convened expert advisory bodies when there are emerging technologies of interest, such as the body convened in 2008 to monitor synthetic biology,[69] and since broadened to other emerging technologies.[70]

[I]   website: http://www.australiagroup.net

[II]   At first it met bi-annually, but switched to annual meetings. Alexander Kelle, "CBW Export Controls: Towards Regime Integration?," in Non-Proliferation Export Controls : Origins, Challenges, and Proposals for Strengthening, ed. Daniel Joyner (Aldershot, England: Ashgate, 2006), 101–118, http://www.loc.gov/catdir/toc/ecip0615/2006018466.html.

[III]   Including "human and animal pathogens, ten toxins, associated genetically modified items, and dual-use equipment that could be used in producing biological weapons." Edward M. Spiers, A History of Chemical and Biological Weapons (London: Reaktion, 2010), 99.

[IV]   Every year except the first year (which was in Brussels), or in 2005, when it met in Sydney to commemorate its 20th anniversary. See http://www.australiagroup.net/en/publications.html

3.4.3 Structure of lists

Initially, the Core List only contained five precursor chemical items and no biological items.[71] There was an additional "Warning List" that states could use as a guide if they wished to selectively implement further controls on exports of items 'potentially useful as chemical warfare agent precursors'.[72] In 1991, Australia Group members agreed to include all of the items on the Warning List in their export control systems as well.[73] In 1990, AG participants agreed to also focus on biological items, amended the lists accordingly in 1992.[74] The Australia Group today maintains six control lists: Chemical weapons precursors; Dual-use chemical manufacturing facilities and equipment and related technology; Dual-use biological equipment and related technology; Biological agents; Plant pathogens; and Animal pathogens.

The AG control lists for chemical items are harmonized with the provisions of the Organization for the Prohibition of Chemical Weapons (OPCW), which is the enacting body for the Chemical Weapons Convention.[75] The lists are organised differently within each body, however. As Robert Mathews, long-time chair of the Australia Group, noted when the CWC opened for signatories, the types of items each body focuses on are similar, but they do so for different reasons.[76] The Australia Group's objective is "to use licensing measures to ensure that exports of certain chemicals, biological agents, and dual-use chemical and biological manufacturing facilities and equipment, do not contribute to the spread of [chemical and biological weapons."[77] As such, the Australia Group's lists do not include the agents themselves, only precursors and equipment, facilities, software and technology. The CWC's objectives are "to provide assurance to each State Party to the CWC that the other States Parties to the CWC are complying with their obligations under the CWC, including not to produce chemical weapons." As such, the CWC lists include chemical agents as well as precursors. The Australia Group controls some items that are not on the CWC lists, including precursor chemicals "which are early in the production process and/or are widely produced in industry (and hence not considered suitable for effective monitoring under the CWC)."[78] These items are clearly noted in the Group's list,[79] and were included "because they are either known or suspected to have been sought for CW purposes."[80]

This is an important point. Functioning in a more reactive mode, the chemical side of the Australia Group lists could control a much larger portion of the 75 million organic and inorganic chemical substances that are known,[81] but the Members have chosen instead for focus on items known to have been sought or used to develop actual weapons. The Australia Group's concern in monitoring international trade is to prevent the ability to produce chemical or biological agents in sufficient quantity for incorporation into weapons. The lists have changed on an almost yearly basis since 2002, but because of their narrow focus, they remain small.

In 1990, the Australia Group Members agreed to expand controls, which they did in 1992, to cover biological agents and toxins, and dual-use equipment needed to make them in significant quantities. Initially, eighteen bacteria, four rickettsia, 25 viruses, and fourteen toxins were on the lists, along with fermenters, centrifuges, aerosol chambers, and filter and freeze-drying equipment.[82] Further item have since been added.

In 2002, the Australia Group instituted a 'catch-all' provision in its *Formal guidelines governing the licensing of sensitive chemical and biological items',* which was made public in 2004.[83] This was the first time a catch-all provision had been public added within a multilateral export

control arrangement. Additionally in 2002, the AG implemented controls on intangible technology transfers.[84]

There have been general been general concerns expressed by non-members about items on the lists that are not also on the CWC Schedules. As Alexander Kelle notes:

> *From the point of view of critics of the AG's activities in the chemical realm, it is not only the controls on manufacturing equipment that they regard as contravening the letter and spirit of the CWC but also the fact that 24 of the 63 precursors on the AG list are not listed on any of the CWC's three schedules on chemicals. This gives the appearance that the AG chemical weapons precursor list covers a wider area than the CWC schedules and, one could argue, in conjunction with its application to CWC state parties, runs counter to Article XI of the CWC.[85]*

While this view might be set aside as a misunderstanding by those within the Group, it has lead states who are party to the CWC but not members of the Australia Group to publicly question the motives of Australia Group members in continuing the controls of non-CWC-listed items.[86] This is another example of why it is important to for states to identify and engage with the many different ways in which the lists are interpreted and used in contexts both within and outside export controls.

Australia Group List Handbooks

The Australia Group, like the NSG and MTCR, produces several handbooks for use in interpreting between the item definitions and objects actually being exported. Like the NSG and unlike the MTCR, they are for internal use only, and not available publicly. There are three handbooks: one for Chemical Weapons Precursors (AG CWP HB); one for Dual-use chemical manufacturing facilities, equipment, technology, software (AG DU CHEM HB); and one for Dual-use biological equipment, technology, software (AG DU BIO HB).[87]

3.5 Missile Technology Control Regime

3.5.1 Reasons for formation

In 1987 an informal export control arrangement called the Missile Technology Control Regime (MTCR)[I] was formed to control missile and unmanned air vehicle systems capable of delivering weapons of mass destruction (WMD). It was the result of the seven initial states (Britain, Canada, France, the Federal Republic of Germany, Italy, Japan, and the United States) agreeing to formally harmonize their lists of missiles and unmanned aerial vehicles (UAVs) capable of deploying both conventional and nuclear weapons.[II] This was, at the time, a loophole in existing controls, which only covered nuclear-specific missiles and UAVs.[88] The MTCR was open from the beginning to anyone who wanted to join, and concerted efforts were made in particular to appeal to the USSR, China, Egypt, and Argentina. Indeed, one of the driving factors in its formation was the collaboration between Egypt and Argentina on developing long-range missiles,[89] and the general proliferation of missile systems.[90]

[I] website: http://www.mtcr.info

[II] Confusingly, this is was "dual-use" means in the contexts of the MTCR.

3.5.2 Political structure

The MTCR members agree to adhere to a set of guidelines (the MTCR Guidelines) on the control of items listed in its Equipment, Software and Technology Annex. As with the other contemporary arrangements, the MTCR does not make decisions on what licenses should be approved; rather, it outlines how that approval process should be done by states. All MTCR decisions are taken by consensus, and MTCR partners regularly exchange information about relevant national export licensing issues in the context of the Regime's overall aims. A Plenary Meeting is held annually and chaired on a rotational basis. The location of the Plenary is the country currently chairing the MTCR. Technical Experts Meetings, Information Exchanges, and Licensing and Enforcement Experts Meetings are also held annually. While the arrangement has no Secretariat, regular communication is conducted by Point of Contact (POC) meetings in the French Ministry of Foreign Affairs (MFA) in Paris. There are also Reinforced POC (RPOC) meetings to have preliminary discussions on non-technical matters, though with updates on the status of technical proposals, and are usually held in April in the French MFA in Paris.

The MTCR has Technical Experts Meetings (TEM) that meet one or more times each year to discuss any technical proposals states have to change the lists.

Each year, the French MTCR PoC updates a Compendium of Regime decisions, which are shared with Regime Partners.

3.5.3 Structure of lists

Initially, the MTCR only listed "ballistic missiles capable of delivering nuclear weapons," defined as missiles "capable of delivering at least a 500kg payload to a range of 300km."[91] In 1993, the MTCR also began listing missiles capable of delivering chemical and biological weapons. The lists were divided into two categories, which still exist today. Category I items include complete rocket systems (including ballistic missiles, space launch vehicles and sounding rockets) and unmanned aerial vehicle systems (including cruise missile systems, target drones and reconnaissance drones) with capabilities exceeding a 300 km/500 kg range/payload threshold; production facilities for such systems; and major sub-systems including rocket stages, re-entry vehicles, rocket engines, guidance systems and warhead mechanisms.

Category II items include rockets systems and UAVs that are not covered in Category I, but which still have a maximum range equal to or greater than 300km. This category also includes dual-use items that have non-exclusive applications in missile development, production, and use.

Like the Wassenaar Arrangement, the MTCR categories are divided into five sections:

    A. Equipment, Assemblies, and Components
    B. Test and Production Equipment
    C. Materials
    D. Software
    E. Technology

Software and technology that is "in the public domain"[I] is not controlled, nor is "basic scientific research."[II]

Catch-all

In 2003, MTCR Partners amended the Guidelines to require all Partners to have catch-all export controls.[92] These controls form the basis for controlling the export of items not included on a control list when they may be intended for use in connection with delivery systems for WMD other than manned aircraft. Additionally, consistent with the Guidelines, Partners are to exercise particular restraint in consideration of any items on the Annex or of any missiles (whether or not on the Annex) if the exporting government judges that they are intended to be used for WMD delivery – and such exports are to be subject to a strong presumption of denial.

Emerging Technologies

In 2009, the United States raised the issue of how to control emerging technologies relevant to the MTCR during its information exchange. New technological areas that were flagged for concern included electron and laser welding, satellite navigation receivers, low-accuracy gyros and accelerometers and ball bearings.

MTCR Annex Handbook

The MTCR is unique among the multilateral arrangements in having a public handbook that helps explain items on its lists.[III] It explains what MTCR-controlled equipment and technologies are, how they are used, how they work, who produces them, what other uses they may have, and what they look like, including images. The Handbook does not cover all items in the Annex, "only those technologies most critical to missile design and production." The latest Handbook available was release in 2010, and corresponds to the 2009 MTCR Annex. As the Handbook is produced by the United States Government, it is not an official MTCR document, though it resides on the MTCR website.

[I]   The MTCR defines technology "in the public domain" as being made available without restrictions upon its further dissemination. (Copyright restrictions do not remove "software" or "technology" from being "in the public domain".)

[II]   The MTCR defines "basic scientific research" as "experimental or theoretical work undertaken principally to acquire new knowledge of the fundamental principles of phenomena or observable facts, not primarily directed towards a specific practical aim or objective."

[III] http://www.mtcr.info/english/MTCR_Annex_Handbook_ENG.pdf The Nuclear Suppliers Group has *A Handbook for the Nuclear Suppliers Group Dual-Use Annex* LA-13131-M, but it is for official use only.

4 The Revision Process

The process of modifying export control lists can take anywhere from days, in the case of putting an item on a national or regional list, to years, in the case of multilateral list changes.

The revision processes for all of the lists are not just about judging the military significance of an item under consideration. They are, importantly, actually constructing the item as they debate it, drawing out its technical boundaries and also defining it in such a way that a wide range of security, economic, political, linguistic, and other concerns are balanced in the process. For example, in common language we could likely come to a broad agreement that a heads-up-display is a dual-use, military, or non-military item under certain conditions. If it is specially designed for military use, installed in a fighter jet, and does not interoperate with non-military systems, it would surely fall towards the military end of the scale. If it is widely used in non-military aircraft and freely available on the open market, it would fall somewhere in the dual-use or non-military end. But where do we draw the line where the non-military meets dual-use, and where dual-use meets military? Similarly, what does "specially designed" mean? These questions are often answered by focusing on particular characteristics of an item: its size, material, strength, structure, etc. But which characteristics are selected, and why? This is the question at the heart of the revision process, and it is one that will likely have a different answer for each modification to the export control lists.

In this section, we look at the ways the revision process works in each of the multilateral export control arrangements. It is a common statement in the export control community that you can divide the work of an export control system into its technical and political aspects. For example, making the list of controlled items should be seen as a technical problem, whereas deciding which licences to grant for those controlled items should be seen as a political matter. Making this demarcation is useful for several reasons. For example, it allows 'technical experts' to negotiate list modifications out of the political limelight, and it focuses the list modification questions on specific technical details rather than broad political debates.

But to divide the work of these multilateral arrangements into technical and political is to miss much of the picture about the list modification process. Yes, there is a general goal to keep decisions about modifications from becoming politically charged, but that does not mean that technical discussion are just conversations about facts. There are still a lot of factors (economic, linguistic, cultural, historical, to name but a few) that come into play in the crafting of a successful modification proposal. Here are a few questions that states are likely to ask before proposing a modification, if they hope for it to succeed:

- Has a similar proposal been made before? If so, why was it not successful?
- We are probably making this proposal because our state has some industry that produces an object that should (not) be controlled. How might industry in other states be affected by the way we (re)defined our item, and how might we ensure they support our proposal?
- Is this a good year for this, or any proposal? If there are many proposals being made, perhaps this one may have more chance of success if it 'goes with the crowd', but it

might also fall victim to a state's blanket denial because of their dissatisfaction with another aspect of the arrangement.[I]

All of these questions involve a state understanding the context within which the list modification process happens. While states may seek to keep that process apolitical, it is still very social. Given all of the delicacies that the multilateral arrangements need to navigate to modify the lists, it is almost a miracle that modifications happen at all. That they happen with some regularity, especially in the Wassenaar Arrangement, speaks highly of the strength of the modification process. The questions above only concern the actual modification process, but there is another question a state must also consider when making modifications: How will this new definition be interpreted by the range of communities that use the lists?

As noted in section 2.3.2 there are many different communities that use these lists, and the items on the lists need to be crafted in a way that serves the needs of those communities. States therefore have a responsibility for training these communities on how to interpret the lists. It makes sense, then, for a state to find a definition that requires as little training as possible to have each community find what it needs in the definition. This is a tall task for any bureaucracy, but it is made easier when the affected communities are involved in the modification process. As we will see below, those communities currently have varying degrees of access to comment on modifications before they happen.

4.1 Where proposals come from

There is no one fixed place where proposals for list modifications come from. The need to change the lists may first come to a licensing officer who notices much confusion among companies on how to interpret a list text, or it may come from a ministry of defence unit that notices new technologies are not covered by current definitions, or it may come from companies that find their products are caught under licensing obligations whereas foreign competitors can freely trade.

These examples show how there are different types of proposals, and each type tends to come from a common source, though there are always exceptions. The common types of proposals are:

- to add an item to the control lists
- to remove an item
- to modify an item's definition in light of new developments or to reduce confusion
- or to move an item from one list to another

Proposals to add items to lists are most often put forward by states themselves, and often by ministries of defence. They might also come from intelligence agencies, and sometimes even from companies who are designing new military items. Proposals to remove an item are often first envisioned by companies caught under the controls, but might also arise from states determining the item is now widely available or no longer merits control. Modification proposals might be change a definition in light of new developments (e.g. a new method to rapidly produce a formerly bespoke component), or to clarify an ambiguous term (such as "specially designed"). Finally, proposals to move an item from one list to another (e.g. from the

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[I] Several states have vetoed any changes to lists in a given year because of a larger (i.e. political) point that they wanted to make.

Wassenaar Munitions List to the Dual-Use List) generally reflect a change in degree of concern about the particular item. Modification proposals are the most common, and may originate in several ministries, companies, NGOs, or other bodies.

Regardless of who has the original idea for proposing a change to export control lists, changes may only be made by a state, or in the case of multilateral changes, a group of states. For states with active industries in one or more areas of controlled items, there are often established links between state delegations to the multilateral arrangements and those industries. These links are sometimes built by industry groups, such as Aerospace Industries Association. In the United States, the Department of Commerce has regular Technical Advisory Meetings, where industry, academia, NGOs, and other actors are given the chance to put forward possible proposal ideas. For list sections where modifications happen infrequently, proposed changes may start from a simple email or phone call to the unit within a state responsible for making the changes. The Wassenaar Arrangement provides a list of state contacts on their website.[I]

The Wassenaar Arrangement is the site of most list modifications. On any given year, the Arrangement might address 60 proposed additions, deletions, and modifications. In contrast, most of the other arrangements might only handle a few proposals each year, or only address modifications sporadically over the course of decades. As a result, Wassenaar has a much more developed process for making list modifications, often involving six weeks of discussion each year. All of the arrangements take at least one year to modify their lists.

4.2 The Wassenaar Process

The Wassenaar Arrangement proposal process typically begins with the identification of items that a State would like to change and the development of a proposal. The proposal itself has thirteen sections covering the desired changes to the text, the background for the change, a justification, the satisfaction of the *Criteria for Control* (described below), other changes that are needed, and any other information.

 List modification proposal sections:

- Submitting country
- Title of proposal
- Current text
- Proposed text
- Background
- Technical justification
- Major/Key element
- Foreign availability
- Controllability
- Controlled by another regime?
- Consequential changes?
- Proposed review date
- Other information

[I] http://www.wassenaar.org/participants/contacts.html

The first four sections are self-explanatory, though it is interesting to note that the 'Title of the Proposal' often uses a term that appears nowhere on the list. That is, the title is the common language term for the object, whereas the item's definition is often much more technical. The 'Background' section provides a rationale for the change that the proposing state thinks will be acceptable to the other states in the Arrangement. In a proposal arguing to increase the scope of control, the 'Technical justification' is usually based on the security need. For example the technical justification used in a 2007 proposal to the Arrangement for changing the control text for fibre lasers said:

> *Due to their low weight, small size and high efficiency (battery operated) the lasers present a viable method for producing a credible man-portable laser dazzle weapons. Dazzle for magnifying sights and image intensifiers would be greater and to greater ranges. Hazard distances to the unaided eye would be hundreds of metres to kilometres range for the powers available.*

In a proposal arguing for a decrease in the scope of control, the 'Justification' is usually based on the current text not meeting one of the four *Criteria of Control*, i.e.: whether the item is a key or major element for the indigenous development, production, use or enhancement of military capabilities; whether it is available from a non-Participating State; whether it is controllable; and whether it is already controlled by another multilateral arrangement.[I] For example, when debating decontrol text for satellites, it is likely that arguments were presented showing how objects with similar functions were available from non-Participating States.

The proposal is usually uploaded onto the secure information system in early March, which gives the other countries time to develop their positions on it by the first Expert Group (EG) meeting in June. Further information about particular proposals and their significance may be shared as "non-papers" amongst the delegations. During this period, the Secretariat compiles information for the Participating States on prior modifications to the same section of the list, including the reasons changes were made.[93]

At the first EG meeting, proposals are separated into groups and Technical Working Groups (TWGs) are formed. Counter-proposals may also be offered. In an average year there are roughly 60 proposals.[94] On some of them agreement is reached quickly and there is no need to form a TWG. Others may span several years of discussions. At the end of the first two-week-long EG meeting, a poll is taken to determine each state's stance on each proposal.

Over the course of the summer, States engage in informal meetings of the EG and bilateral relations to negotiate the text in an attempt to find parameters and values of those parameters that satisfy each interpretation. These "Intersessionals" often involve TWGs producing reports[II] that are fed back into the Fall EG meeting. If agreement is reached in the EG, i.e. a 'conditional agreement' is reached, then the changed text is sent to the Plenary for ratification. If agreement is not reached, the states decide whether to throw the proposal out or to continue reviewing it again the next year. There is an unspoken rule that a proposal can only be on the table for three years, after which it must be taken off and reformulated.[95]

[I]   These criteria are found in the Wassenaar Arrangement Criteria for the Selection of Dual-Use Items, available here: http://www.wassenaar.org/controllists/2005/Criteria_as_updated_at_the_December_2005_PLM.pdf

The final Criterion is 'the ability to make a clear and objective specification of the item,' which is what is done in the 'Proposed text' section of the proposal.

[II] These reports are classified as Wassenaar Restricted. Their document numbers are usually of the form WA-EG (YR) TWG XXX, here YR is the two digit year, and XXX is the specific report number.

Once the Plenary agrees to a change in the text of the lists, States must implement that change in their national controls. The time needed to do this varies from instantaneous, for countries that simply use the Wassenaar lists, to almost a year because the text needs to be translated into a different list structure or language. Thus, the time from the beginning of a proposal to its implementation in export control systems is at least one year, and often much longer. As a result, members of the EG must not only be aware of the current state of technological development, but also where it is likely to go in the time between the present and the actual implementation of the controls. In some categories, this is not too difficult, but in others, where technology is advancing generations in a few years, this can be a source of many difficulties in the Arrangement.

Example: Computer controls

The case of computer controls is a good example to show the need to keep the different list users in mind while modifying the control lists. In CoCom, the definition of a controlled computer was tied to what the perceived current level of development of computers in the Soviet Union, but the parameters used to define the computers kept changing as different computer architectures repeatedly circumvented previous control text. How would you define the core of a computer? CoCom went through several definitions that had to change on a regular basis in the 1980s, until it finally settled on defining a controlled computer based on its "composite theoretical performance" (CTP). The only problem was that CTP, which was measured in millions of theoretical operations per second (MTOPS), was a completely made up metric, designed specifically to create a controllable item. No companies used the metric, and in order to find out if their computers were controlled, they had to actually make new measurements as the computers were being made to get data that would only be used for this calculation. What had provided a very clear definition for CoCom, provided a massive headache for companies as they tried to interpret whether their products met the definition of a controlled computer.

The Wassenaar Arrangement inherited the CTP definition for computers, but by then, the definition had other problems. Computer performance, the parameter being measured, was increasing almost exponentially during the 1990s. Wassenaar control lists took around two years from proposal to implementation in state systems, during which time the performance of a computer was likely to double, but no one was sure. Participating States didn't want to overly hinder the commercial markets, so they had to play a guessing game to see how far the parameter should be set.

The major problem with the control text, however, was that, with the development of grid computing, where computers all over the world could connect to form any size super computer desired, the idea that the hardware was controllable was all but dead. While by this point everyone could pretty well interpret the list item, the thing it described was no longer meaningful. Instead, the Arrangement maintained a shell text to control the single purchase of large sets of hardware, but focused attention instead on the software needed to connect and exploit the power of networked computers.

4.3 The Australia Group Process

The Australia Group list modification proposals occur mainly at the Plenary meeting each year. There is no standard proposal process, and there are no technical expert sub-groups like there are in the Wassenaar Arrangement. Instead, advisory bodies of experts may be formed on an ad hoc basis to consider specific issues, such as synthetic biology,[96] and there is a yearly experts meetings during the Plenary to consider broader topics, such as general advances in chemical and biological agents and production technology.[97] The Australia Group, however, has considered establishing a more permanent body to address technical issues. The number of proposed modifications each year ranges from zero to under a dozen.

Proposals, when there are any, are distributed through the Australian government, and first considered at the Intersessional meeting, where policy and other issues are also discussed. During expert group meetings, industry members are sometimes present as part of Participant delegations.

As with the other arrangements, the Australia Group proposals benefit greatly from bilateral communication between governments. For example, one state may first discuss a proposal for micro-reactors with another state before submitting to the Group. Through the discussion, it comes to light that not only should technical characteristics be considered, but also the current market capacity, the ways that these reactors are integrated into the chemical industry, and the trends in advancements. In addition, one needs to consider how such an item might be added to the Common Control List.

The Australia Group lists are closely tied to the lists used by the Chemical Weapons Convention (CWC), and on the whole, the Group tries to allow the CWC to take action first, and modify its lists in accordance with changes made there. However, if timing is important and the CWC is unable to gather consensus for a modification, the Australia Group will likely try to get consensus among its members first. When the CWC was being negotiated, one concern from developing states was that the Australia Group controls would impede the normal transfers of chemicals. Article XI of the Convention addresses this issue, and states that the "provisions of this Convention shall be implemented in a manner which avoids hampering the economic or technological development of States Parties, and international cooperation in the field of chemical activities for purposes not prohibited."[98] This close linking of the CWC and Australia Group lists adds a layer of interpretation onto the lists, outside of their export control remit.

4.4 The MTCR Process

Like the Australia Group, and unlike the Wassenaar Arrangement, the Missile Technology Control Regime (MTCR) does not have an established secretariat. Instead, the French government acts as the primary point of contact for coordinating distribution of information amongst Regime Partners. Proposals are first shared electronically through the French Ministry of Foreign Affairs (MFA) in preparation for the summer Technical Experts Meeting (TEM), if held, and the November Plenary. However, Partners often share and work on proposals bilaterally before and after submitting them to the others.

As agreed at the 2002 and 2003 Plenary meetings, a Partner should volunteer to host an intersessional TEM by mid-December; the Partners then would decide by the time of the January POC meeting in Paris whether to go forward with such a meeting; the agenda for the intersessional meeting would be circulated four weeks in advance of the meeting via a 10-day silence procedure; and the only topics to be discussed would be outstanding issues from the previous Plenary and any new proposals submitted six weeks in advance of the intersessional meeting. The TEM location is not fixed, but decided on an ad hoc basis.

Proposals can come from a variety of areas, but are often lead by a Partner's awareness of the significance of a technological advance to missile or unmanned aerial vehicle (UAV) capabilities. There are generally only a few to a dozen proposals per year.

During the Plenary TEM, experts may break up into Technical Working Groups (TWGs) to address specific issues, such as Unmanned Ariel Vehicles. Unlike the Wassenaar Arrangement Experts Group (EG), the TEM often is involved in general technical discussions, and only addresses proposals if any are submitted, whereas the Wassenaar EG focuses almost exclusively on proposals. If there are any proposals under consideration at the TEM, after discussions are held the chair takes asks the position of each Partner, either in support, study reserve, or reserve. Proposals that have consensus support are sent to the Plenary for a formal decision.

Proposals are first and foremost about bringing the MTCR Annex into line with advances in delivery system technology and proliferator ingenuity. But to get the proposals passed by all the other members, the proposal should be seen to balance economic concerns with security concerns of the states involved. States work throughout the year—during the POCs, RPOC, and TEMs—to gather consensus on proposals, as consensus is needed to make any changes.

As with the Wassenaar Arrangement, any proposal that, after two years of discussion, is still unable to reach consensus, cannot be offered again.

4.5 The NSG Process

As agreed at the 2010 NSG Plenary in Christchurch, a fundamental review of the NSG control lists was conducted.[99] The review addressed both the Trigger List and the Dual-Use List in consideration of nuclear fuel-cycle activities (special fissionable material processing, use, or production) and the steps required for the design, testing, and development of nuclear explosive devices. In June 2013, the NSG Plenary in Prague agreed to the conclusion of the fundamental list review process and the approved changes agreed to date for a total of 54 items on the Trigger List and the Dual-Use List.[100] The NSG Plenary will shortly issue revised versions of IAEA INFCIRC/254 Parts 1 and 2.

Why did this review occur when it did? The most obvious reason is that the NSG had not reviewed its control lists in quite a while. The Trigger list had existed largely unchanged since the 1970s, and the dual-use list since the 1990s (when it moved over from CoCom). Changes that had been made during that time were done in a very ad hoc manner, rather than through a systematic assessment of the lists.

During a technical working group on isotopes and enrichment technology in 2009, members of the group suggested to the NSG that it undergo a revision of both lists, especially because there were control parameters that were no longer relevant. During this list review, which lasted from 2010-2013, all list medication options were on the table: adding items, removing them, and modifying them. In total, there were about 120 proposals, of which the majority were to modify items, with some focused on adding items and only a few on deleting items.[101] 54 proposals were eventually approved.[102] There were nine official sessions of the technical group, each of which took about one week. There were also a series of informal meetings where not all states were present. There were also intercessional discussions via a secure web environment. This was considered a very active process, with a "very high willingness to understand each other's proposals."[103]

Prior to 2010, there was no formalized form states would fill out to initial a list modification. The 2010 technical working produced such a form, which national governments used to submit list modification proposals.[104] These proposals consisted of:

A. Header text
    a. What theme is it?[I]
    b. Who is the originator
    c. What type of change is it (addition, deletion, modification)?
B. A short description of the change
C. The existing control text
D. The proposed control text
E. A rationale for why a change needed to be made
F. Related entries that might be impacted by the change[II]
G. What is the non-nuclear use, and what impact would the proposed change have for non-nuclear trade

In the rationale section, it was important for states to not only give their own rationale, but to provide outside scientific evidence of the claims they were making. Various rationales included: modifying the lists because of new developments in the technologies listed; enforcement experience showing loopholes in the lists that needed to be closed; harmonization with the other multilateral export control arrangements; indications from the intelligence community that countries were seeking specific equipment that was not controlled; and sanction experience.

Including a section on the non-nuclear use in these proposals serves several purposes. It brings to the fore the dual-use nature of all the items on the list. It also forces states making a proposal to grapple with a balance of control for security concerns while not overly hindering non-security-threatening applications. Overall, the 2010-2013 list review process did not result in very many decontrols. The rationale for this general outcome was that the lists should remain "non-proliferation proof", and the economic aspects could always be taken into account in the licensing process. Decontrols only occurred when the actual listing (rather than the controlling of the listed item) proved a burden on industry. While some states may have had substantial commercial concerns in the items listed, during negotiations, those commercial concerns never prevented resolution on the proposals.

[I] There were seven themes used in the list review process: isotope separation, reactors, reprocessing, weaponisation, industrial equipment, field fabrication/conversion (i.e. miscellaneous).

[II] E.g. a proposal on lasers might only address one entry, but will likely have an impact on other laser entries on the list.

While the author has spoken with several participants in the process who say the list review will now be an ongoing event, the 2013 Plenary Public Statement made no mention of this.[105] The exact process for future proposals will be worked out when the technical expert group next meets in 2014.

5 Conclusions

The revision process for multilateral export control lists varies depending on the area of technology being addressed. Parts of the lists have remained unchanged since they were first created decades ago, while others have changed on a yearly basis. In each case, however, the process of modifying the lists was one that involved negotiations about not only the items to be (de)controlled, but also the environment within which those items became security concerns. While discussions that occur within multilateral arrangements are often pitched as purely technical in nature, it is important to remember that they are intimately social as well. Understanding the political positions of other states, the considerations of how texts will be translated into native languages, and developing an atmosphere of trust and openness are only three of the many characteristics that make for successful modification processes.

But at the end of the negotiations, we are left with a list, and a system to implement that list to ensure goods and technologies of security concern are only transferred with the approval of a state. Any export control system rests on a common set of assumptions, and in this final section, we turn to an exploration of those assumptions, and when they are valid. The assumptions include:

- Define-ability: It is possible to define items of security concern, and that those definitions are stable over the period of years to decades
- Target-ability: A state is able to differentiate the groups of people it would like to transfer controlled good and technology to, and those it would not. This also assumes that the recipient groups will not turn against a state within the lifetime of the security-usefulness of the objects transferred.
- Control-ability: It is possible to prevent bad users from engaging in bad uses of controlled items by preventing access to those items

This is the way that an export control system, and those that work within it, envision the world. When the world acts under these assumptions, export controls can be considered an adequate security governance mechanism, for whatever purposes. The Wassenaar Arrangement explicitly states the define-ability and controllability assumptions in its *Criteria for the Selection of Dual-Use Items*.[106]

Export controls, however, are only one of the range of governance mechanism states use to control the access to goods and technologies of security concern. States might also use classification, embargoes, sanctions, or interdictions, to name but a few other mechanisms. Each governance mechanism carries with it its own assumptions about the items being governed, the point of governance, and the environment (political, technological, natural, etc) within which the governance happens. This is no bad thing, as any one set of assumptions is unlikely to be robust enough to handle all of the governance challenges that the real world generates.

Sitting within an ecosystem of governance mechanisms, export controls (and all other mechanisms) should be seen as useful only in certain instances, when the situation being addressed can reasonably be described using the assumptions the mechanism rests on.

The final question this report addresses, then, is "when is the export control system an appropriate mechanism to use, and when might we better achieve our ends through other governance tools?" In answering this question, I am confining myself to situations in which the assumptions upon which export controls rest are undermined, and am not addressing whether some purposes of export controls are more or less valid.

5.1 The assumptions underlying export controls

5.1.1 Define-ability

Much of this report focuses on how definitions of controlled items are created, modified, and erased. The lists of controlled items are central to any functioning export control system. A good definition needs to meet several requirements, including:

- General enough to be understandable to the range of people who need to use the lists
- Specific enough to exclude objects which are not of security concern
- Not so specific that the definition represents a blueprint for building the object
- General enough to be applicable over a time period at least as long as the time required to modify the control lists

The process of defining controlled items, then, requires knowledge not only of the particular item, but also of the contexts within which the definition will be employed. Sometimes a very general definition will be acceptable, for instance when there is a wide range of goods and technology that pose a security concern and are clearly designed for military use. At other times, a very specific definition might be needed because of the desire to control only a small subset of an otherwise pervasive good or technology, such as a computer.

In all instances, however, there is the assumption that it is both possible to define a good or technology of security concern, and that such definitions are useful in governing the negative uses of that good or technology.

5.1.2 Target-ability

At the multilateral level, none of the current export control arrangements are officially targeted at any state or group of states, though during the Cold War, CoCom was purposefully targeted at communist states, especially the Soviet Union and China. At the national level, however, the ability to selectively control who gets the goods and technology a state produces is the whole point of an export control system.

Which licenses are approved and denied depend on the particular political allegiances and technological capability deferential between the exporter and importer. It is vital, then, to be able to identify who the end users of goods and technologies are, in order for an export control system to be effective. While the identification of "good" and "bad" end users has not been the subject of this report, many states also employ lists for this purpose (e.g. a "denied persons list").

5.1.3   Controllability

If a state considers objects of security concern as clearly identifiable entities, such as a tank or a bomb, and considers its enemies as similarly easily identifiable, such as any citizen of state X, then controlling the flow of these objects to these enemies seems like a possible and useful task. Much of the assumption of controllability rests on there being clear borders around what constitutes an enemy and an object of security concern. Thus, in the papers and electronics systems used in the day-to-day operations of export controls, we find a drive towards making precise statements about who has sent what to whom.

That we can and should control the movement of items of security concern seems obvious, but only if one accepts the first two assumptions above. It is important that states recognize that these assumptions are not always valid.

5.2   The limits of export controls

There are several scenarios where export controls may not be the best tool in the security governance box. When considering whether an export control system should be modified to address new goods or technologies, new enemies, or new means of transfer, states should carefully consider whether it makes sense to assume the define-ability, target-ability, and controllability an export control system needs. Below are several examples that push against the bounds of when export controls might be better set aside in favour of other governance mechanisms.

5.2.1   Examples where goods and technologies are not definable

As already discussed above, there are many moments of translation between items defined on the multilateral export control lists and the objects actually exported. For much of the history of export controls, the objects being exported were tangible goods with few parts. Cannon, horse harnesses, and telescopes were early examples.

Goods today are much more complex. A case-in-point for export controls was the decades-long discussion on how to define a supercomputer. Original definitions were quite simple. The 1954 CoCom lists simply controlled, " Computors, electronic, other than office calculating machines." As computers became more advanced and more non-military uses were developed, decisions were made within CoCom to refine the definition to try and find the essence of the super computer. Through several attempts of trying to control based on processing power, memory structure, and means of interconnecting, at every turn, the controls were superseded by technological developments. Eventually, regulators realized that the actual physical architecture of computers was not in any real sense controllable. Instead, today's systems are controlled mainly by controlling access to the software. Another way of stating this is that they were no longer able to find the definition of a computer that would make computers actually controllable. On the whole, though, States no longer used export controls to control the distribution of computers. Instead, other governance mechanisms, namely intelligence agencies, deploy their own techniques for preventing damage from the malicious use of computers.

Another example of where it is difficult to define technology is when the technology has yet to be invented. Even during the course of the development of a particular technology, is not clear when controls should be enacted. Should states create definitions as soon as someone has an idea? Or should they wait until there is an actual prototype, or wait until production has started? As you move further towards production, it's easier to define what should be controlled, but there is a risk that by waiting too long, a large commercial market may develop or other states may acquire the ability to develop a similar object. There are not very many alternative governance mechanisms in this case outside of classifying the entire research and development process.

A correlate to the last example is the issue of creating new biological entities. The Australia Group controls "genetically modified organisms that contain nucleic acid sequences associated with the pathogenicity of any of the microorganisms in the Core List."[107] But if new organisms or components are created that do not contain those sequences, and are not determined to be pathogens, then they are not controlled. The trouble is that determining pathogenicity is a very difficult process, and it is likely that new components and organisms will be developed that will exhibit their pathogenicity only after distribution and use. While this could certainly lead to a security concern, export controls are not able to address these types of concerns because of the lack of ability to define whether a novel organism is pathogenic.

5.2.2   Examples where enemies are not known, or internal

Export controls by their very name are concerned about transfers across state lines. Internal to a state, such controls have no effect. If a citizen of that state where to misuse objects that correspond to items on the control lists, export controls would not be the appropriate governance mechanism. Within the world of export controls, the enemy is not us, it is them. This has proved a point of contention when trying to address the problem of transfers to foreign nationals who are inside of one's state. These so-called "deemed exports" fall under export controls, but not all states think that this is the most appropriate mechanism.

A key aspect of the target-ability assumption is that it is possible to not only know who your enemy is, but to be able to verify at each instance of export, that the person or entity listed as the end user on the export license is the actual end user. The identification of enemies has become more difficult as engaging malicious non-state actors (e.g. terrorists) has become a stronger focus for states. Validating end-users requires more effort, and the degree to which states put in that effort will correlate to how valid the assumption of target-ability still is.

There is another way that it is difficult to know one's enemies. Export controls are time-constrained, in that a transfer, once complete, cannot be undone. In making decisions about whether a particular trade should occur, even if perfect knowledge of the present were possible, states would still only be able to predict how allegiances might change in the future. While this is true with any type of foreign relations, the difference with export controls is that states are transferring the capability to engage in military action, and that capability may last from years to decades. It is important, then, that states ensure their export control systems are well-integrated into systems to assess the intent of end users.

5.2.3 Examples where transfers are not controllable

Even if it is possible to have a clear definition of goods and technologies of security concern, that does not necessarily mean that those items are controllable. There are several examples that show the lack of controllability for many items of security concern.

When goods and technologies are widely distributed, particularly to states outside of multilateral export control arrangements, placing licensing restrictions on them may have little if any security impact, but a definite economic detriment to the state's industry that makes that product. This is why the Wassenaar Arrangement, for instance, contains a test on foreign availability in its *Criteria for the Selection of Dual-Use Items*.[108] The test of whether something is widely distributed, however, depends on who one draws the boundaries around what the object is that is under consideration. If one were to define a thermal night vision system as any CCD receiver capable of detecting infrared wavelengths, there would be many objects caught under controls. The effort required to inform and monitor all who make these objects of their requirement under export controls would likely be too burdensome for a state to pursue, and the licensing burden if all complied would be equally onerous.

It should be noted, however, that even global distribution is not seen as a deterrent to the control of conventional military—as opposed to dual-use—items. The concern is not so much foreign availability as the need to prevent "being shot with our own weapons." Also, there are some items on other lists where control has been deemed prudent even though availability is widespread. Such is the case with the bacterium Clostridium tetani on the Australia Group's Warning List of Biological Agents for Export Control, which includes a footnote stating, "The Australia Group recognises that this organism is ubiquitous, but, as it has been acquired in the past as part of biological warfare programs, it is worthy of special caution."[I] 'Control' in these cases is associated more with monitoring the purposeful transfer of these items for to engage in developing chemical or biological weapons. If people are trading these items, that is a matter of concern for export controls. If the viruses or bacteria are propagating on their own, that is a matter of concern for health officials, not export control officials. In this case, whether export controls are a legitimate governance mechanism depends on whether the items are being traded or are already in the environment. It should be obvious that, in such cases, export controls play a small of necessary part in the broader effort to prevent the controlled items from negatively affecting societies.

Another example of things that are difficult to control are those that evolve too quickly. There is much current discussion around potential security concerns raised by the advancement of desktop 3D printers and gene synthesizers, which may lower the costs of producing many things to the point where the average consumer may be able to make a wide range of objects of concerns, including generating new objects with unknown attributes. As with computers, once the means of programming are widely distributed, novel applications are developed on a timeframe—days to weeks—that is much faster than the months to years that export controls lists need to be modified. Maintaining the ability to develop rapid countermeasures and building more robust defences are two non-export control methods states can use to prevent these malicious applications from causing significant damage.

[I]   http://www.australiagroup.net/en/biological_agents.html#f

5.3 Strengthening links with other governance mechanisms

Given the assumptions that an export control system makes—about the things it controls, the environment within which that control is possible, and the target of those controls—we can see several areas where export controls may not be the most appropriate governance mechanism to prevent the malicious use of objects of security concern. But when those assumptions do hold, and there are many cases in which they do, then the export control system is a valuable part of broader non-proliferation and other efforts by states to prevent the use of force.

By understanding the technical, political, and environmental assumptions of each of the many different governance mechanisms states might employ, it is possible to get a clearer picture of when each mechanism might best be used. This study contributes to that effort.

Endnotes

[1] For a useful guide to these different purposes, see Cupitt, Richard T. 2000. *Reluctant Champions: U.S. Presidential Policy and Strategic Export Controls, Truman, Eisenhower, Bush, and Clinton*. New York: Routledge.

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[3] http://treaties.un.org/doc/Treaties/2013/04/20130410%2012-01%20PM/Ch_XXVI_08.pdf

[4] See Aristophanes' mention of them in his 5th Century BCE play The Frogs, lines 354-371.]

[5] Hugo Grotius, *The Illustrious Hugo Grotius of the Law of Warre and Peace With Annotations. III. Parts. And Memorials of the Author's Life and Death.*, trans. Clement Barksdale, Early English Books Online (London : Printed by T. Warren, for William Lee, and are to be sold at his shop, at the signe of the Turks-head in Fleet-street, M. DC. LIV. [1654], 1654), http://eebo.chadwyck.com.ezp-prod1.hul.harvard.edu/search/full_rec?SOURCE=pgimages.cfg&ACTION=ByID&ID=99868414&FILE=../session/1190302085_15129&SEARCHSCREEN=CITATIONS&SEARCHCONFIG=config.cfg&DISPLAY=ALPHA.

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[10] League of Nations. 1938. National Control of the Manufacture of and Trade in Arms. Geneva.

[11] Cupitt, Richard T., and S. R. Grillot. 1997. "COCOM Is Dead, Long Live COCOM: Persistence and Change in Multilateral Security Institutions." British Journal of Political Science 27 (3). P. 364.

[12] Michael Mastanduno, *Economic Containment: CoCom and the Politics of East-West Trade*, Cornell Paperbacks (Ithaca, N.Y.: Cornell University Press, 1992).

[13] Wassenaar documents can be found in its compilation of Basic Documents: http://www.wassenaar.org/publicdocuments/index_BD.html.

[14] Wassenaar Arrangement, *Summary of Changes - List of Dual Use Goods and Technologies and Munitions List*, 2009, http://www.wassenaar.org/controllists/2009/Summary%20of%20Changes%20-%20Control%20Lists%202009.pdf.

[15] US Department of State. 2010. "Revisions to the United States Munitions List: Advance Notice of Proposed Rulemaking." *Federal Register* 75 (237) (December 10): 76935–76940.

[16] Stockholm International Peace Research Institute, "Annex B. International Security Cooperation Bodies," in *SIPRI Yearbook 2013: Armaments, Disarmaments and International Security*, 2013.

[17] A detailed account of this period is covered by Yasuhara, Yoko. 1991. "The Myth of Free Trade: The Origins of COCOM 1945–1950." The Japanese Journal of American Studies 4. See also Adler-Karlsson, Gunnar. 1968. Western Economic Warfare, 1947–1967. Stockholm: Alquist and Wiksell.

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[25] Michael Mastanduno, "What Is CoCom and How Does It Work?," in *The Post-Containment Handbook : Key Issues in US-Soviet Economic Relations*, ed. Robert Cullen (Boulder, Colorado: Westview Press, 1990), 86.

[26] Defense Science Board Task Force on Export of U.S. Technology, *An Analysis of Export Control of U.S. Technology – a DoD Perspective* (Washington, D.C.: Office of the Director of Defense Research and Engineering, 1976); Yasuhara, "The Myth of Free Trade: The Origins of COCOM 1945–1950."

[27] Mastanduno, "What Is CoCom and How Does It Work?," 76–77.

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[33] Yasuhara, "The Myth of Free Trade: The Origins of COCOM 1945–1950." P. 139.

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[38] Presentation by Anne-Charlotte Merrel Wetterwik to the "Export & Security Controls in the Globalised Marketplace of the 21st Century" Conference in Paris, September 21-23, 2008.

[39] Interview with British Government Officials A & B, 9 February 2007.

[40] Wassenaar Arrangement. 2011. Guidelines & Procedures, Including the Initial Elements (as Amended at the 2011 Plenary). Wassenaar Arrangement on Export Controls for Conventional Arms and Dual-Use Goods and Technologies. Available at: http://www.wassenaar.org/guidelines/docs/Guidelines%20and%20procedures%20including%20the%20Initial%20Elements.pdf.

[41] The full address is printed on page 2 of Wassenaar Arrangement. 2011. Guidelines & Procedures, Including the Initial Elements (as Amended at the 2011 Plenary):

Mahlerstrasse 12 / Stg. 5

1010 Vienna, Austria

Tel: +43 1 96003 Fax: +43 1 960031 or 2

[42] Interview with Swedish Former Government Official, 6 January 2006. There is often more than one informal session if specific proposals warrant further discussions. Discussions also occur in ad hoc fashion between small numbers of states.

[43] Interview with British Former Government Official, 8 March 2007. Initially they were not even held at the Secretariat.

[44] Interview with US State Department Official A & US State Department Official B, 11 September 2006.

[45] Interview with US State Department Official A, 28 September 2006.

[46] This information comes from informal discussions with members of various delegations at EG meetings, supplemented by a copy of the List of Participants for the 19–29 September 2005 Expert Group Meeting that I received from a source who wished to remain anonymous.

[47] Interview with Swedish Former Government Official, 6 January 2006.

[48] Ibid.

[49] Interview with US State Department Official A, 28 September 2006.

[50] Interview with Russian Government Official & British Government Official F, 28 March 2007, and Interview with Japanese Government Official, 19 June 2007.

[51] Interview with a former head of a state delegation to the Wassenaar Arrangement Expert Group, 8 March 2007.

[52] See the notes on pages 24, 28, 113, 138, and 160 of Wassenaar Arrangement. 2011. List of Dual-Use Goods and Technologies and Munitions List.

[53] Wassenaar Arrangement. 2012. "Criteria for the Selection of Dual-use Goods and Technologies for the Sensitive List." In Basic Documents, 68.

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[55] Wassenaar Arrangement. 2008. *Guidelines for Drafting the Lists*. WA-EG (07) TF 006 Rev. 01 Corr.

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