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THE FORMATION OF A EUROPEAN DEFENSE INDUSTRIAL TECHNOLOGICAL BASE:
CHANGES AND CHALLENGES

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ABSTRACT

The recent years have seen extremely rapid changes in the Defense sector due to the process of privatization of military R&D, the lack of clearly defined common threats, and the rise of the cyberspace as new domain of competition and confrontation among nations. Concurrently, the EU and its member states strengthened their cooperation in the domains of strategic industrial partnerships and export controls. In this paper, we give an overview of the main changes in the field of the Defense Industrial technological base, with particular attention to ongoing policy reaction by EU institutions

Keywords: Privatization, Digitalization, Defense Industry, Dual use, EU

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List of Abbreviations

BA: British Aerospace

BAC : British Aircraft Corporation (nationalized in 1977 and renamed BA)

BTCW: Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological and Toxin Weapons and on their Destruction

COCOM: Coordinating Committee for Multilateral Export Control

CWC: Chemical Weapons Convention

DA: Dassault Aviation

DARPA: Defense Advanced Research Projects Agency

DGA: Direction Générale de l'Armement (Army General Directorate)

DITB: Defense Industrial Technological Base

DUCG : Dual-Use Coordination Group

EU: European Union

FCAS : Future Combat Air System

GPS: Global Positioning System

ICBM: Intercontinental Ballistic Missile

MEP: Member of the European Parliament

MIC: Military-Industrial Complex

MS: Member State (of the EU)

R&D: Research and Development

SANDIE: Statistiques ANnuelles de la Défense, son Industrie et ses Entreprises (Annual Statistics on Defense, Industry and Enterprises)

SIPRI : Stockholm International Peace Research Institute

SDI: Strategic Defense Initiative

TEU: Treaty on the European Union

TFEU: Treaty on the Functioning of the European Union

UNSC: United Nations Security Council

USA: United States of America

UK: United Kingdom of Great Britain and Northern Ireland

VoC: Varieties of Capitalism

WMD: Weapons of Mass Destruction

Introduction

The relevance of the Defense Industrial Technological Base (DITB) on state building and International relations, whose analysis is at the core of this paper, has first been identified by one of Europe's founding fathers, French Foreign Minister and former Prime Minister Robert Schumann. In the eponymous declaration of the 9th of May 1950, which paved the way for the signing of the Paris Treaty establishing the European Coal and Steel Community (ECSC) one year later, he asserted that

"*The pooling of coal and steel production will [...] change the destiny of regions that have long been devoted to manufacturing munitions of war, of which they have been most constantly the victims. This merging of our interests in coal and steel production and our joint action will make it plain that any war between France and Germany becomes not only unthinkable but materially impossible*"[1]

Indeed, the decision to start the European project from coal and steel, the two materials at the core of arms production, shows the importance of industrial production in the war, as well as in the minds of the men that fought it. This was a symbolic as well as pragmatic decision, uniting the fate of a continent through common interests as well as ensuring, through a supra-national High Authority, that no arms race could drag the continent to carnage as it had in both world wars. By creating such an institution whose main tasks were oversight and coordination of industrial production, no single state could secretly initiate a rearmament drive as had happened in the 1930s, due to the management of the essential elements of the arms industry being controlled by a supranational institution representing the entirety of the Community rather than any given national leader. Furthermore, the all-powerful cartels and industrial conglomerates that had wielded a large influence in the rise of the Nazi state and in the rearmament of the German war machine and ultimately led to a conflict, were effectively dismantled and banned by articles 3 and 4 of the Treaty, in recognition of their pernicious effect in shaping state policy and increasing the likelihood of a conflict[2]. This decision to establish "the foundation of a broad and independent community among peoples long divided by bloody conflicts"[3] on the basis of economic cooperation in a sector which had previously been the root of war shows the recognition of the significance of the war industry and the need for it to be kept in check.

Warfare having historically played a crucial role in the formation of states and national identities alike, it comes as no surprise that all aspects linked to it have closely been studied by international

[1] Schumann, 1950
[2] Tooze, P.38
[3] Treaty establishing the European Coal and Steel Community, Preamble, P.1

relations and political science scholars. Following the Second World War, the role of technological advancements in conflicts was rendered evident by inventions such as German rocket missiles and the atomic bomb, which proved fundamental tools in shifting the balance of the war and would come to characterize the following decades. This gave rise to a permanent war industry whose development was necessary in times of peace, to assure a technological edge in case of a conflict. This was particularly relevant in Western countries who had to cope with the vastly superior Soviet traditional capabilities and manpower by capitalizing on their more developed industrial base, as we shall see in section II.2.1, detailing present and past strategies employed to prevent spread of military technologies, a task that became increasingly harder as military research shifted from being led by the public sector to being directed by a profit-oriented private sector, whose choices were further complicated by the rise of dual-use technologies. The ever-growing importance of this peace time war economy was famously acknowledged to the wider public in the farewell address of US President, and former supreme commander of the Allied Expeditionary Forces in Europe, Dwight Eisenhower. In it, the President recognized the role of military innovation, while warning future administrations and the wider public about the intrinsic risks of the establishment of deep ties between arms producers, military leaders and policy-makers:

"*A vital element in keeping the peace is our military establishment. Our arms must be mighty, ready for instant action, so that no potential aggressor may be tempted to risk his own destruction […] This conjunction of an immense military establishment and a large arms industry is new in the American experience […] we must guard against the acquisition of unwarranted influence, whether sought or unsought, by the military-industrial complex. The potential for the disastrous rise of misplaced power exists, and will persist. We must never let the weight of this combination endanger our liberties or democratic processes.*"[4]

The relevance of these ties in the public sphere led to more research into the role of industrial production of military equipment, and the way variations of production systems shape policymaking. These complex and interacting systems are defined "Defense Industrial Technological Base" (DITB) in extant literature, a comprehensive term which includes private, semi-private and public actors partaking in the production of defense equipment within a given country[5]. The term can be interpreted with varying degrees of inclusiveness, but for the purpose of this paper we shall adopt Dunne's classification of DITB agents into three groups which, although partly outdated due to the rise of importance of dual-use technology in the last two decades, which will be analyzed in parts 2.1 and 2.2, remains extremely pertinent[6]:

1) Agents that contribute to the production of weapons systems and lethal equipment or components thereof, from R&D to production and testing, whether this is conducted by one or several enterprises;
2) Agents that provide non-lethal yet strategic products, such as jet fuel, night-vision goggles and the like;

[4] Eisenhower, 1961
[5] Austin 1994, Pp. 27–37
[6] Dunne 1995, P.401

3) Agents that provide common products used by civilians and military personnel alike, such as food rations.

Building on Eisenhower's and Schumann's recognition of the importance of the Defense Industrial Technological Base and its ties with the military establishment for the maintenance of a stable democracy in peace time, this research will delve into the most recent developments in a field that, following the fall of the Eastern Bloc and the vast technological advancements of the past decades, has had to reinvent itself to fit an ever-changing world. At the core of the research will be the question: "**To what extent will the most recent evolutions in structures and processes of the DITB world-wide foster the establishment of a coherent and effective production strategy within the EU?**" The analysis will be presented in two parts. Firstly, we shall delve into the most recent structural evolutions, particularly the shifting roles of state and private actors in the field and its consequences on strategic production and partnerships choices. Secondly, we will analyze the processes currently impacting DITB, most notably the commercialization of military assets through the rise of so-called dual-use technologies whose civilian use occasionally exceeds its military applicability, with particular attention to the legislative and strategic challenges entailed by such an evolution; as well as the impact economic globalization has had on stretching production chains and in further limiting state's ability to control the spread of technology to non-state actors and peer competitors alike. We will conclude with a reflection over the impact the analyzed changes have had on the overall asset of the European Union's DITB, how the latter can adapt to an evolving reality, and whether the most recent proposals for further integration of defense capabilities in the Union seem to be in line with the flexibility and reactivity needs highlighted throughout the analysis. Though many of the examples analyzed will come from non-European countries, they will be revealing of recent trends whose impact is strongly felt in the EU. Furthermore, in a climate of geopolitical instability such as the current one, compounded by considerable efforts to institute a common foreign policy and common defense capabilities, the need to examine and learn from best practices applied throughout the world appears paramount.

Part I: The evolving structure of DITB

I.1)The shifting roles of the public and private sectors: a historical perspective

What is likely the most significant change in DITB in the last decades is the shift away from the kind of state-led technological developments so common to most armies prior to the Second World War, and the rising importance of few, very large, defense contractors, competing with each other for public funds. In order to analyze what consequences this shift has had on strategic partnership and production choices, why it happened in the first place, and what level of influence do private actors wield on public policy, we shall take a look back at the history of military technological development.

Most technological advancements prior to 1945 were funded and directed by state agencies, and can be reconducted to three broad models:

Adaptational Individualist Model: Earliest form of military development, it is also the hardest to define due to its ambiguous nature and timeframe. Military technology prior to the XX century was usually started by an individual's discovery of a given item or process, and state actors would in a second time apply the invention to a military context[7]. A well-known case exemplifying this is dynamite, an explosive invented in 1867 by Swedish entrepreneur Alfred Nobel for use in the construction industry. By 1888 the technology had been thoroughly studied and subsequently applied to warfare by Army Engineer Officer Edmund Zalinski, and eventually used in the Spanish-American war of 1898[8]. Many such examples of technologies originally invented by privates for civilian use and then applied to warfare by state agencies can be identified in the period. Ford's assembly line production model, allowing for quick construction of complex items proves an example of a process, rather than a technology, being applied to military use by state institutions, the Employment Service of the Department of Labor[9]. It is interesting to note how little control over their inventions and the use thereof the privates who originally developed the technology had when faced with state institutions in this timeframe: both Nobel and Ford were pacifists, with Nobel's horror by the use of his inventions leading him to establish the eponymous Peace Prize[10], whereas Ford personally tried to bring warring countries to the negotiating table in 1915.

Edisonian Model: So-called after Thomas Edison's key role in the founding of the US Naval Research Laboratory, first state-led military research institution in the US[11]. The model is characterized by the cooptation of one or more well-known personalities and the coordination between the latter and state apparatus. Therefore, most states centralized the innovation process in order to more efficiently be able to streamline the necessary funds, as well as guaranteeing secrecy. The scale of the funding changed as well, with military research now being dedicated infrastructure and employees[12], as opposed to the *ad hoc* contributions adopted under adaptational individualism. One relevant example is the foundation in 1911 of the Fritz Haber

[7] National Research Council 1999, P.88
[8] Roosevelt 1990, P.164
[9] National Research Council 1999, P.88
[10] Sohlman 1983, Pp.10-14
[11] McBride 1992, P.1
[12] Ibid, P. 25

Institut, named after Chemistry Nobel prize recipient and first director Fritz Haber[13]. This center worked in direct contact with the German military, leading to the development and field testing of chlorine gas at the battle of Ypres in 1915. This coordination allowed for more rapid feedback and quicker technological developments, as well as mass production of newly discovered technologies. Relevant examples of such a coordination is the development, and subsequent mass production of gas masks with absorbent filters, and the establishment of Pioneer Regiment 35, composed of scientists (including future Nobel laureates Gustav Hertz, Otto Hahn and James Franck) tasked to control and record the efficacy of various chemical agents for future use in warfare[14]. Despite moral issues being raised by such an active participation of science in warfare (Haber famously saying that "*during peace time a scientist belongs to the World, but during war time he belongs to his country*[15]") the efficacy of the centralized methodology appeared evident and was rapidly adopted[16].

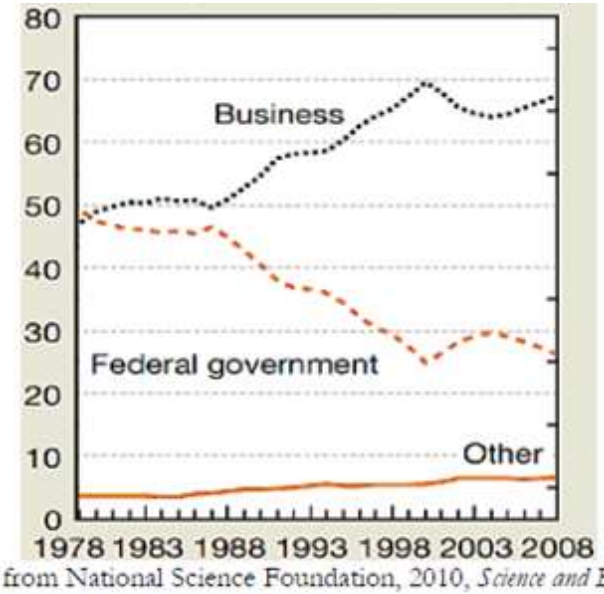
Centralized Model: In the period preceding the Second World War, a considerable rise in militarization and military expenditure can be observed in most major countries. This militarization was carried out by state-owned institutions or firms tasked with creating new technology or mass-producing existing ones. Some relevant examples are the setting up of MEFO (MEtallurgische FOrschungsgesellschaft) in Germany, a shell company tasked with producing arms in secrecy due to the limitations of the treaty of Versailles, entirely controlled by the government due to its strategic and confidential nature[17]; the setting up of the Radio Research Station in the UK in 1932, aimed at studying the usability of radio waves to detect enemy airplanes eventually leading to the invention of the Radar[18]; and the Manhattan project, aimed at studying and developing nuclear technology, under the direct control of the US Army corps of Engineers[19]. Unlike the previous model, the centralized model had direct control by state bureaucrats over all aspects of military production and research, allowing for a different scale of mobilization through the conversion of civilian factories into military ones[20]. Following the end of the war, the need for large amounts of materials subsided, and most Western countries focused on the quality of their equipment rather than the size of the army, knowing they could not compete with the Red Army in terms of sheer numbers[21].

Despite the trend of centralization that took place in the early twentieth century, and partly continued in the decades following the Second World War, defense spending gradually began to change, reflecting a global shift in funding for Research and Development (R&D) away from the public sector and into the private one. This shift and its consequences are still ongoing, making it essential to thoroughly analyze its impact on EU Member States' (MSs) strategic decision-making.

[13] Haber 1986, Pp. 20-35
[14] Ibid
[15] Herrlich 2013, P.1
[16] McBride 1992, Pp. 30-33
[17] Harrison 2000, P.139
[18] Morris 1962, P.66
[19] Jones 1985, Pp. 37–39
[20] National Research Council 1999, Pp.89-92
[21] Ibid, P.93

The trend towards privately-funded R&D gradually started in the 1980s, accelerating its pace in a significant way following the end of the Cold War: "*Commercial R&D expenditures gradually came to outpace* [Governmental] *R&D funding, and the gap between the two constantly widened in the post-Cold era*"[22]. As can be seen in Figure 1a, referring to the investments of the US federal Government as opposed to the private sector, this trend is extremely marked and shows no signs of receding so far. This trend affected all kinds of R&D in the aforementioned period; it has been thoroughly studied by economists, and explaining its root reasons goes beyond the scope of this research[23]. Suffice it to say that this trend is even more accentuated insofar military R&D is concerned, as it enables cheaper costs and quicker developments, leading most modern states to lean on civilian/commercial research for the development of military technology. Simply put, the core reason for the shift is that the private sector can ensure a greater efficiency than the previously analyzed centralized system: "*The old system of heavy, targeted* [Led by national Departments of Defense (DOD)] *funding of R&D* [...] *is gone. In its place is a reduced DOD presence* [aiming to] *capitalize upon rapidly changing market-driven products so that DOD can take advantage of the latest technologies and commercial economies of scale. The old, unique defense supplier base is too inflexible and unaffordable. It lacks the means to rapidly exploit new technologies and fails to take advantage of commercial-sector production economies*"[24]. As figure 1a highlights, the trend started from the early 1980s, concurrently to the rise to power of Margaret Thatcher and Ronald Reagan, both known for their fight on "big government" and a bureaucratic-regulatory system at the time perceived as anti-business and overly expensive. Figure 1b shows the recent evolution of funding sources in the EU.

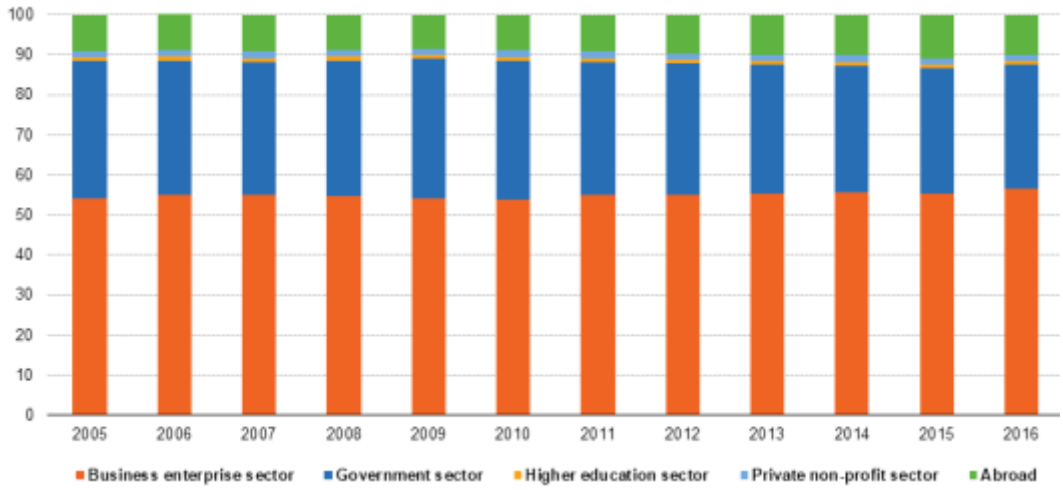
Figure 1a: Us National R&D Expenditures, by Funding Source (percentage)[25]



Source: Adapted from National Science Foundation, 2010, *Science and Engineering Indicators*

[22] Meijer 2011, P.6
[23] See: Abbot and Johnson 1996; Mallik 2004.
[24] Abbot and Johnson 1996, P.3
[25] Meijer 2011, P.7

Figure 1b: Gross Domestic R&D Expenditures, by Funding Source in the EU[26]



The pace picked up considerably during the 1990s, when the argument of the superior efficiency of civilian R&D over state-owned research institutions became widely accepted thanks to the efforts of RMA (Revolution in Military Affairs) scholars[27]. RMA scholars identified the ever-growing importance of new military technology, as well as its rapidly increasing costs due to the new role of Information and Communication Technology (ICT). Its role being highlighted by RMA scholars and military officers alike[28], the need for a paradigm shift in military R&D became apparent due to the extremely rapid times of R&D in ICT, which makes new technology outdated extremely quickly, sometimes quicker than the time DOD R&D can develop, test and approve new technologies [29]. Seeing the pace of technological development increase such further accelerated the shift to private-led military R&D. This rise in the importance of civilian firms in the military procurement market caused several problems insofar avoiding the spread of dual-use technology is concerned. It furthermore accelerated ongoing evolutions in the sector such as the fragmentation of contractors and the stretching of supply chains[30].

The shift towards civilian-led management and research in DITB has been ubiquitous, happening in almost all states around the world: interestingly, in some cases the overwhelming majority of services for the army, thus not only R&D, are equally provided by private contractors. The impact of this shift was particularly felt within the EU, where it happened at breakneck speed and had a very vast impact. France is the EU's number one military force, at least in terms of military spending and on-duty personnel[31], closely followed by the United Kingdom, whose forthcoming exit from the EU makes them a case of particular interest for our study. Both countries also have, as we shall see in the case study, a very prominent home-grown DITB with world-class competence and reputation. For this reason the French case is particularly interesting, as it proves how significant the shift from public to private military R&D was. Table 1 represents DITB agents

[26] Eurostat 2019, P.6
[27] Metz and Kiewit 1995, P.31
[28] Meijer 2011, P.3
[29] Ibid, P.8
[30] Larrieu 2013.
[31] SIPRI 2019, Pp. 1-3

in France in the period 2007-2010, exclusively focusing on Dunne's first category, that is, lethal technology producers and their respective sub-contractors. The choice to focus on this category was made so as not to include dual-use goods nor civilian producers of material occasionally used by the French Army (i.e. toilet paper producers amongst whose clients figures the armed forces). As can be seen from a first glance, the vast majority of agents, in all identified sectors, are private civilian firms, rather than public or military entities.

Overall, of the 2717 identified agents, 96% are private firms, with the only sector having less than a 90% proportion thereof being the "other" section, mostly due to the crucial role of public universities in research, and the role of the state's bureaucratic apparatus in providing services and coordinating the army's day-to-day routine[32]. In terms of numbers, it is interesting to observe how the vast majority of agents, slightly less than two-thirds, are either in the "industry" or "commerce" sector, whose main tasks are the production and maintenance of military craft, showing the extremely high number of sub-contractors involved. Despite common belief, the DITB is in fact not composed of few very large firms, but rather of several fragmented sub-contractors: "[primary] *suppliers typically engage* [several] *subcontractors, who contribute about 60 percent of the value of delivered systems*"[33].

Table 1: Number of DITB agents in France by sector of activity, 2007-10

	Industry	Construction	Commerce, transport	Specialized Activities	Other services	Total
Number of Agents	**941**	**229**	**844**	**412**	**291**	**2 717**
Number of enterprises	**938**	**229**	**843**	**381**	**209**	**2 600**
Less than 250 employees	703	180	749	319	164	2 115
More than 250 employees	224	49	88	56	44	461
Unknown number of employees	11	0	6	6	1	24
% of enterprises	***100***	***100***	***100***	***92***	***72***	***96***

Legend › *Specialized activities : Scientific R&D/ administrative and support activities*
Other services: information and communication / military financing / Training / Health care / Other.

Source › Moura 2012, P.5 - Own Translation

[32] Moura 2012, P.5
[33] Abbot and Johnson 1996, P.2

I.2) An ineffective management of DITB in the EU

To correctly understand the scale of agents involved in the production chain and the offer of services for military purpose in Europe, suffice it to say that a total 47.276 agents, private and public alike, are identified in the SANDIE database, if all three of Dunne's categories are considered[34]. This fragmentation ensures extremely high competence and quality since it capitalizes on specialization yet, as we shall see in the second part, stretches supply lines globally, and endangers the secret nature of the technologies. To further complicate the identification of relevant agents, many civilian firms find themselves as vital parts of the supply chain for Dunne's second and third category without fully realizing it, being subsidiary of other private, subsidiary companies, further adding to the ever-stretching cross-border supply lines and the fragility of the system[35].

This contributes to a European sector that is divided and confused, with little interoperability due to the opacity of available information and lack of a common defense strategy. These weaknesses are twofold: firstly, a lack of political-legal instruments able to effectively coordinate the many regional excellencies present on the Union's territory and, secondly, competing interests of the political and industrial classes within each Member State (MS)[36]. It should be noted that very significant changes were undertook under the Juncker Commission to integrate MSs' foreign and defense policies as well as, most crucially for the scope of this paper, to create a truly European DITB through the institution, in 2016, of a "*European Fund for Defense aimed at financing multinational research and development projects*"[37]. These initiatives, while commendable, do not ease the legal and institutional problems the EU has to face before disposing of a world-class DITB able to compete with its Chinese and American counterparts. Though Moro points out[38] the role of TEU's Art 41.3 in guaranteeing "*rapid access to appropriations in the Union budget for urgent financing of initiatives in the framework of the common foreign and security policy*"[39], the EU's founding treaties remain very cautious insofar defense is concerned, being one of the main prerogatives of national sovereignty. Specifically, article 296 of the TFEU, one of few to remain almost unchanged from its previous formulation as article 223 of the Treaty of Rome[40], explicitly limits the Union's ability to interfere in the DITB by stating that "*any Member State may take such measures as it considers necessary for the protection of the essential interests of its security which are connected with the production of or trade in arms, munitions and war material*"[41]. This applies to a list of components, regularly updated by the Council, whose existence since 1958 has proven an effective limitation to the EU's ability to regulate the sector in an effective and impactful manner.

The close link between national sovereignty and the defense industry creates a further obstacle for the development of a truly European DITB: due to the final consumer of all military product

[34] Moura 2012, P.2
[35] Netherlands Organisation for Applied Scientific Research (TNO) 2009, P.3
[36] DeVore and Weiss 2014, P.502
[37] Moro 2018, P. 66
[38] Ibid
[39] Treaty on the European Union 2007, Art.41, Comma 3
[40] Treaty establishing the European Community 1953, art. 223
[41] Treaty on the Functioning of the European Union 2007, Art.296, Comma 1(b)

being either the national government or, through export, other national governments, the sector sees a situation where the main customer is also the only regulator, whose power include determining what foreign customers arms can be exported to. This characteristic entails that all national government see other governments, including fellow EU MS, as potential rivals in the export of a very lucrative industry, globally worth $1822 billion in 2018, or 2.1% of global GDP[42], thus limiting the interest for a fully cooperative sharing of technologies and practices. This problem is particularly relevant to the EU, which hosts four of the nations having the largest defense budget and whose MSs, as shown by figure 2, account for over one fifth of total arms sales world-wide[43]. This intrinsic rivalry of interests among firms within MSs can in turn transform itself in a reluctance to cooperate with other MSs for fear of losing the technological edge in a given product, thus potentially having to face vast losses of profits and employment, with all the political consequences that entails for a given democratic government.

In recent years the situation seems to have improved insofar trust and cooperation amongst MSs is concerned, as shown by the various ongoing cooperative projects currently taking place, such as the recently announced Future Combat Air System (FCAS), aimed at producing a truly European combat aircraft by 2040[44]. Such an ambitious process is possible only thanks to the decision of a cooperation between Dassault and Airbus, itself one of the most celebrated successes of the EU's drive towards a unitary and competitive DTIB: "*Cross-border rationalisation of the* [European] *DTIB has made some advances through collaborative programmes as well as mergers and acquisitions. Some resulting mutual specialisations and interdependencies have been accepted between some MS in some sectors*"[45].

The trend towards an integration and greater efficiency seems to be clear, yet many aspects are still holding such a development back. Last of these needing to be mentioned is that the European market for DITB suffers the competition of foreign markets, and in particular European dependence on American-manufactured components[46]. Said dependence varies depending on the given MS's relationship with the trans-Atlantic partners and, while justified due to the historically close ties of Western European MSs and the USA, prevents the development of a home-grown defense industry in Europe.

[42] Stockholm International Peace Research Institute 2019a, P.1
[43] Stockholm International Peace Research Institute 2019b
[44] Airbus 2019
[45] Netherlands Organisation for Applied Scientific Research (TNO) 2009, P.3
[46] Fiott 2016, Pp. 8-10

Figure 2: Global share of major arms exports by the 10 largest exporters, 2014-18

Source › SIPRI Arms Transfer Database, 11th March 2019[47]

The lack of a common DITB or, indeed, of a common armament strategy, has grievous costs both in terms of efficiency/interoperability of the various MSs' armed forces, as highlighted in Table 2, and in economic terms. Interoperability is affected because, given the vastly different military equipment available to different MSs, tactical cooperation on the terrain can be hampered by technical issues, such as a given kind of airplane not being able to be launched by another nation's aircraft carriers, as well as human ones: pilots of one kind of aircraft would need extensive training before being shifted to a craft produced in a different country, thus hampering elasticity and reactivity. Each of the models represented in the table entails significant R&D, production, training and maintenance costs, significantly inflating overall costs of upwards to €130 billion, assuming a maintenance of current troop numbers and defense capability[48]. Considering that, in 2011, the defense spending of all EU MSs (excluding Denmark, not a member of the European Defense Agency, and Croatia, not yet a EU member at the time) amounted to a total of €193 billion[49], one can see how significant such a waste of resources is in impacting the EU's military spending and defense capability, while at the same time holding back a development of a European DITB, which in itself would generate funds. Such a spending, if made by a centralized, federal-style government able to avoid duplication and waste of funds, would today be the

[47] Stockholm International Peace Research Institute 2019b
[48] Moro 2018, P.125
[49] Guzelyté 2013, P.2

world's third largest closely following China,[50] yet at the time was second only to the USA's 503 billion[51].

Although most scholars seem to agree that military spending is one of the best indicators to evaluate the strength and effectiveness of a given military, in light of the afore-mentioned duplication issues highlighted in Table 2, the EU does not have a military power able to rival the Chinese, let alone the American. This is because the quality of investments is extremely important, and the EU's decentralized model is ineffective at either managing a cohesive army or establishing a functioning DITB.

Table 2: Number of active models per given category

	EU	**USA**
Tanks	14	1
Armored Vehicles	19	1
155mm Cannons	15	3
Frigates	29	4
Air-to-air missiles	13	3
Anti-ship missile	11	1
Warplanes	16	6
TOTAL	117	19

Source › *Adapted from* Moro 2018[52]. Own translation.

[50] Stockholm International Peace Research Institute 2019a, P.3
[51] Guzelyté 2013, P.2
[52] Moro 2018, P.126

Part II: Processes

After looking at the structural changes seen in the DITB, we shall now analyze the evolving processes that are underlying said changes. Specifically, by focusing on the topics of strategic partnership choices and dual-use technology management, particularly relevant subjects seeing the ongoing debate for a Future Combat Aircraft to be developed, and for EU legislation on dual-use items to be reformed. Besides being the focus of current academic and political discourse, both within and outside the EU, these issues are also exemplary of trends being unraveled by the structural shift from public- to private-led economy.

The study will be conducted through two case studies: Franco-British partnership choices in the field of aircraft production, and the analysis of the ongoing attempts to reform Regulation 428/2009 on the statute of dual-use technology. The analysis of strategic partnership choices looks at what impact private-sector defense contractors can have on national strategic decisions, and how this impacts the overall effectiveness of EU policy in the DITB; whereas the study of reforms effort will concentrate on the ability of EU-level lawmakers to effectively regulate a sector characterized by a variety of private actors and an extremely rapid evolution pace.

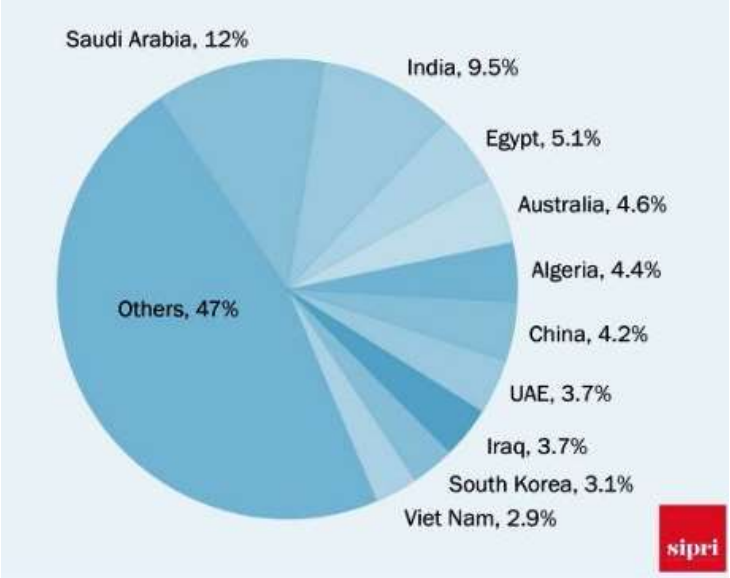
II.1) Strategic partnership choices and the significance of the private sector

This research's central aim is to examine the decision-making process states have to undergo when taking the strategically important decision as to where to produce their military craft, and how much of a role does the network of private individuals owning or controlling the DITB have on such a decision. For this purpose, the seminal work by Marc DeVore and Moritz Weiss[53] is particularly relevant, as it applies the concepts previously introduced to a modern context characterized by a dominance of actors that on occasion, as shown in Table 1, hold a *de facto* oligopoly on arms production within a given country[54]. Furthermore, the authors' choice to take as examples the United Kingdom and France, Europe's two largest military powers, puts the research in the geographic area of interest of this study. The authors chose to conduct their analysis through the lenses of a particularly relevant approach, the 'Varieties of capitalism' (VoC) theory. It is an "*analytic framework capable of explaining how differences in domestic economic institutions drive states to adapt to structural changes in distinct ways*"[55], particularly apt when trying to understand the link between industrial production and state policy in two states sharing many similarities, yet whose behaviour shows inexplicable variations. This case study appears apt to apply VoC: both states are Western democracies, victors of the second world war, nuclear-armed military superpowers with military bases abroad and a vast history of military interventions throughout the past decades. Furthermore, as of November 2019, both states are EU members, meaning they share a legislative and political framework as well. Nevertheless, despite all the similarities and supposed alignment in interests, DeVore and Weiss show how they consistently

[53] DeVore and Weiss 2014, P.497
[54] Moura 2012, Pp. 3-6
[55] DeVore and Weiss 2014, P.504

took different decisions insofar their strategic partnership choices are concerned[56]. Given VoC's stated aim of analyzing the "*impact of* [institutional] *variations on economic performance and many spheres of policy-making*"[57], it can provide extremely useful insights.

Figure 3: Global share of major arms imports by the 10 largest importers, 2014-18



Source › SIPRI Arms Transfer Database, 11th March 2019[58]

Insofar the production of complex weapons system is concerned, modern states disposing of a sufficiently large DITB, as is the case of the countries object of this case study, have three options available: Autonomous production, joint production or wholesale import. As can be deduced from figure 3, the latter option is most often discarded by developed countries having the possibility to produce their own weapons equipment for a variety of reasons, chiefly amongst which the lack of secrecy in one's military craft if this is produced and used by other countries, as well as the fact that the costs are often much greater than for self-production, whose hefty prices serve to empower local actors and firms putting money into the national economy, rather than being direct transfers as is the case with weapons import. Therefore, states with the potential and resources as the UK and France are left with two options, cooperation or autonomy. Cooperation is deemed particularly difficult given the anarchical nature of international relations, yet allows for a fragmentation of the production chain by subcontracting different stages of production to smaller and more qualified firms. Whether this increases the quality of the equipment produced is still up to debate, yet it certainly reduces costs in a very significant manner. First of all, by having specialized personnel take care of one specific aspect of production, their skills can be maximized. Secondly, as was seen in section I.2, producing one common model instead of two parallel ones halves R&D costs. Self-production on the other hand, while increasing secrecy and allowing for a

[56] Ibid, Pp.497-499; 522-524
[57] Hall and Soskice 2001, P.1
[58] Stockholm International Peace Research Institute 2019b

unique product, which is good for both its tactical use and to create revenue through export, entails much greater costs for the State[59].

The case study is conducted through the analysis of the choice in production of military aircraft. This item was chosen as it is extremely expensive and complicated to produce, being made by many advanced pieces whose own production costs and times tend to be long. Furthermore, its relatively long longevity compared to other military equipment ensures that aircraft production is a long-term investment, as showcased by the announcement at the 2019 Paris Air Show of FCAS' introduction by the 2040s[60]. These factors are a strong encouragement to state actors to cooperate with close allies to produce these crafts, since despite the evolved state of the respective DTIB of both states, they are sufficiently small that savings would have a noticeable effect on state budget. However, for very similar reasons, the firms that make up the DITB in both nations have the opposite interest, since being tasked with the production of an entire aircraft instead of simply parts thereof entails significantly greater incomes for the producing firm, who not only does not have to share its technology, know-how and profit with what are its main competitors both in the civilian and military sector (as is the case for the two largest BITD aircraft producers in the UK and France, Rolls Royce and Dassault respectively); but the payment it receives from the state is larger in the first place, as is the expected income for future exports to third countries[61]. Given that all four actors in the interaction have the same interests across borders, one would expect the outcome to be alike, with both French and British politicians imposing a collaboration over reluctant firms in the respective countries, who would rather conduct the program themselves. Yet this was not the case. In order to understand why, one has therefore to look at other differences, not at the actor level but rather at the institutional one, as highlighted by table 3.

Table 3: France's and the UK's political economies of arms procurement

Dimensions of respective national political economies	**France**	**UK**
Actors	Government and large firms	Government and large firms
Rules for how to resolve coordination problems	Etatist structure and predominance of non-market modes of interaction	Liberal market structure and predominance of competitive market arrangements
Institutions	Predominance of one meritocratic network and intermingling between leaders of public and private sector	Several competing networks and clear separation between government and large firms
Organizations	Strong role of personal and professional exchanges between DMA/DGA and large firms in the sector; presence of several semi-public firms	Weak defense procurement organization, whose only task is to monitor the functioning of the market

Source *› Adapted from* DeVore and Weiss 2014[62]

[59] DeVore and Weiss 2014, P.504
[60] Airbus 2019
[61] DeVore and Weiss 2014, P.502
[62] DeVore and Weiss 2014, P.511

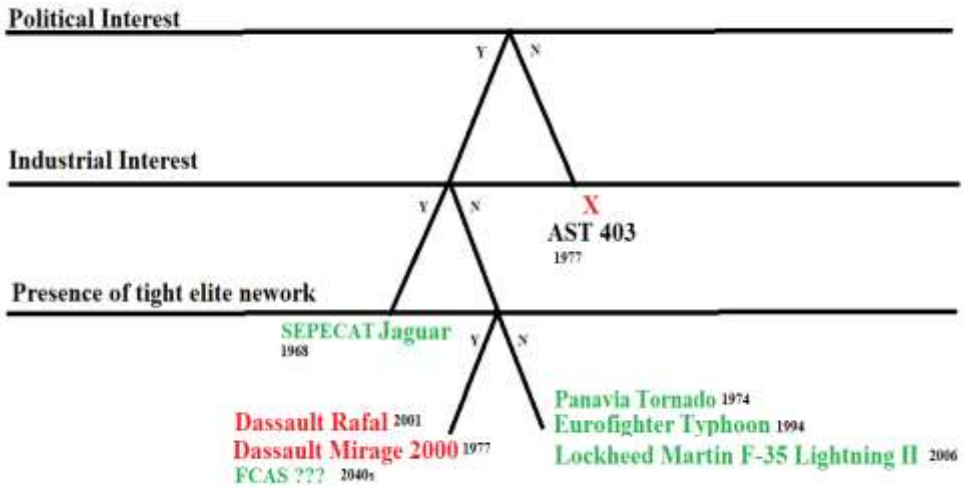
Here VoC reveals its usefulness in evaluating institutional differences and their impact on actor behaviour: "*firms' strategies are influenced by the nature of national-level institutions for coordinating economic activity. A key form of coordinating institution, particularly in sectors that produce public goods or utilities, are those that link governments and firm*"[63]. This linkage is where a key distinction between the two countries is made: whereas the UK has managed to impose the government's preference over the firms, and thus participated in cooperative aircraft designs since a 1965 report finding self-development to be too expensive[64], in France cooperation often did not take part, rather preferring the development of aircraft such as the Dassault Mirage and Dassault Rafale, under pressure from main national aircraft producer Dassault Aviation (DA). This is because French defense contractors "*possess greater institutional capabilities to shape national policies than their British counterparts, whose domestic political economy deprives them of mechanisms for non-market coordination*"[65].

As highlighted by Bourdieu[66], the French education system of "Grandes Ecoles" creates a group of highly educated elites who often lead both the private and public sector of France and, due to their tight links with each other, tend to be able to impact national policy-making. This mingling of interest is made even more problematic by the existence of the DGA (Direction Generale de l'Armement), an institution coordinating arms production in a non-market way, which allows for a direct access for French industrialists to affect national policy making. Furthermore, "*Because of the French state's predominant role in providing industrial credit for and, in many cases, owning (outright or partially) large firms, members of France's civil service elite are frequently 'parachuted' into leadership positions within corporations*"[67]. This is greatly exemplified by the case of Emile Blanc, leader of the DGA from 1983 to 1989, who was a classmate of Mr. Dassault (owner and president of DA) and who, following the end of his tenure as a civil servant, was "parachuted" to a position as CEO of SNECMA, France's semi-state owned jet engine producer[68]. The case is particularly enlightening as to why did the French state allow itself to be so heavily influenced by private agents: during his tenure as DGA secretary general, he was tasked by pro-EU President François Mitterrand to oversee France's participation to the Eurofighter program, which was supported both by the leading party and by the majority of the military establishment, of which France was a founding member under the previous presidency of Valéry Giscard d'Estaing[69]. Blanc, however, handled the negotiations poorly, demanding that "*Dassault be accorded the position of prime contractor* […]; *SNECMA should be accorded a nearly equal position with Rolls-Royce for the development of the engine's most sophisticated components;* […] *Dassault should have full control of any export sales* […] *these demands equated to France demanding half of the total work share, while purchasing less than a third of the aircraft produced*"[70]. This eventually led to Blanc withdrawing the French delegation from the initiative in 1988, later claiming that

[63] DeVore and Weiss 2014, P.498
[64] Committee to Redecide the Aircraft Industry 1966
[65] DeVore and Weiss 2014, P.499
[66] Bourdieu 1996
[67] DeVore and Weiss 2014, P.507
[68] Chambost 2007, Pp. 63-75
[69] Ibid, Pp. 65-78
[70] DeVore and Weiss 2014, P.521

avoiding this collaboration had "*saved SNECMA*"[71]. President Mitterrand shortly thereafter angrily said that the "*failure of the negotiations for a European aircraft was largely the fault of* [French] *industries that were not inclined to reach an accord*"[72]. This recognition of the enormous impact of the private sector in shaping state policies in France is troubling, particularly if considering that the level of private ownership of French DITB firms in the late 1980s was nowhere close to the levels above 90% of the present day[73].

Figure 4: Game theory tree representation of three levels of analysis



What is further troubling, and highlighted in figure 4, is that the choices not to cooperate were repeated throughout the past decades, in most cases following a similar format: the political class showed interest to cooperate with the British (and other partners, at times) to create a more cost-effective fighter craft yet, after dialogue and pressure, eventually decided to go with autonomously produced craft. Three levels of analysis are identified. The first represents the political interest of a given national leader or party for the creation of a new aircraft. As we discussed, aircraft are extremely expensive to design and produce, and almost certainly require funds to be paid in advance by the state, so as to fund the initial R&D phase. For this reason, it is almost impossible for any such project to take place without a state's active support. One such case did take place, however, allowing us to showcase the difference of the British system from its continental counterpart.

In 1977 British Aerospace (BA) started, with its private research funds, a prototype called AST.403, hoping that presenting the British Parliament with an already viable, British-made aircraft would have convinced it to fund production, thus covering any expenses incurred during the R&D phase. Despite some initial success however, by 1979 the UK had decided to found the Eurofighter program together with France and West Germany, deciding to foreclose the program despite the losses incurred by BA and Rolls Royce in the development phase of AST.403[74]. In this case, "*the*

[71] Chambost 2007, Pp.82-83
[72] Guisnel 1990, P.218
[73] Moura 2012, P.5
[74] Butler 2000, Pp. 133–5.

absence of institutional mechanisms for non-market coordination between British corporations and procurement agencies prevented industrial actors from realizing their preferences"[75]. A pattern of government overruling corporate preferences that has repeated itself several times since the 1966 report detailing the little benefits a self-made aircraft would have in face of incurred costs[76].

The second level of analysis concerns the industrial interest to cooperate with foreign firms. As previously explained, this interest is almost never present due to higher returns from national-led programs. Nevertheless, one such case did occur, highlighting the peculiarities of both states' framework: the SEPECAT Jaguar, the only case of successful cooperation in aircraft production between France and the UK since the end of Second World War, being the only time France did not withdraw from a project it had originally agreed to due to internal pressure. This is because in the 1960s, when the project was approved, Dassault had not the critical size necessary to autonomously produce a combat airplane, and France largest aeronautic company at the time, Breguet, was in financial difficulties that did not allow it to start such an ambitious project.

The British having decided two years prior to cooperate with close allies, the SEPECAT Jaguar was produced in cooperation between Rolls Royce and Breguet. Yet, once Breguet was acquired by Dassault few years later, "*French corporate preferences changed. Preferring sales of the nationally developed Mirage F1 to the collaborative Jaguar, Dassault manipulated the French government into foregoing Jaguar upgrades and exports*"[77] which eventually led to the airplane's premature dismissal, thus eliminating Dassault's Mirage's main competitor. It appears clear in this case study that "*national aircraft policies were conditioned by the structures of* [the two MSs'] *political economies, rather than domestic preference constellations or international power considerations. In France, non-market structures for strategic coordination enabled Breguet to protect the Jaguar's development from the pressures exerted by soaring costs and changing military requirements. In the UK, the absence of such institutions deprived BAC of any means of lobbying for a more advantageous outcome than playing a subordinate role to a weaker partner on a collaborative project*"[78].

The last level of analysis for this case study is the presence of what I termed "tight elite network", and the level insofar these can impact national policy. As it can be observed, in case such a network does not exist or it does not affect public decision-making, the likelihood of cooperative projects greatly increases. The Panavia Tornado and the Eurofighter Typhoon were both collaborative projects started by Franco-British initiative, yet in both cases France withdrew from the project due to pressure from within, as in the case of Blanc's opposition to the Eurofighter. The case of the Lockheed Martin F-35 Lightning II is particular, as it goes beyond the EU framework of our research. It is nevertheless worth mentioning as, despite its main components being manufactured in the USA, crucial steps in the production process happen in the UK, Italy, Netherlands and, until July 2019, Turkey as well. Being the main aircraft project in the works currently, and having been purchased to renew the air fleet of five EU countries plus Norway, is a fine example of modern aircraft manufacturing. It illustrates how production chains are being spread ever thinner, and how cooperation is the new norm in most kinds of arms production

[75] DeVore and Weiss 2014, P.520
[76] Committee to Redecide the Aircraft Industry 1966
[77] DeVore and Weiss 2014, P.523
[78] Ibid, P.517

today. If tight elite network are present, the result is bound to be one of autonomous production, as highlighted by the French choice to withdraw from the Eurofighter and Tornado cooperative projects to instead produce the Dassault Rafale and Mirage, respectively.

As a final remark, it is interesting to note the recent announcement by France and Germany of a cooperative project named Future Combat Air System (FCAS), a still-unnamed stealth fighter, supposed to substitute French Rafale and German Eurofighters by the 2040s, with the first prototype ready for test flight by 2025. This airplane has a very clear political signification as well, being supposed to become an EU-wide airplane in direct competition with the American-made F35: "*there is a need for a European solution against non-European competitors. Some nations have started concretizing their plans for procurement and defining the requirements needed for the next generation of combat air systems. Cooperation must be seen in a European context beyond the initiative launched by France and Germany. It is now time to define the project's political direction to ensure its success and preserve European technological skill and autonomy in defense*"[79]. If this cooperative project were to proceed, it would inevitably force to reconsider the theory here presented. It would not, however, be the first time France committed to a project's initial phase, and whether this promising project will go ahead remains to be seen. The European DITB would certainly benefit from a single, regionally-produced, combat aircraft, for the reasons underlined in section I.2. The FCAS provides a unique counterfactual chance: Its cancellation, or the decision by the French government to withdraw from the project, the theory presented would be strengthened, whereas in case it were to successfully enter the production line, it would disprove the relevance given to the presence of tight elite network by this research, indicating further research is needed.

Relevant data seem to indicate that, in order to achieve the kind of federal and coordinated Europe-wide DITB envisaged in this paper, states need to overcome internal differences and private interests. While tight elite networks have been individuated as a factor limiting the likelihood of international production accords, the creation of transnational elite networks across European countries could function at facilitating accords and cutting costs by creating shared interests amongst private sector agents.

Whereas the case study analyzes the difficulty in cooperation between France and the UK, various similar cooperative projects involving several EU member states did take place in the same timeframe, demonstrating that in several occasion political interests favoring absolute collective gains over private interests did triumph. A reform of the European DITB characterized by a more centralized planning of military R&D would undoubtedly be a major step in creating such transnational interests and addressing the issue of national contractors lobbying governments, by ensuring R&D decisions are taken with EU-wide effectiveness, rather than profit, as most crucial deciding factor.

[79] Airbus 2019

II.2.1) Export control mechanisms of dual use technology: from COCOM to Wassenaar

For the purpose of this paper, we shall adopt the EU Commission's definition of dual-use technology as "*goods, software and technology that can be used for both civilian and military applications*"[80]. The most concrete example of dual-use technology during the cold-war era, and its consequences, is the "space race" between the two superpowers, since the kind of heavy-load rocketry able to send material and men into space was equally capable of carrying nuclear warheads if reconverted to Intercontinental Ballistic Missiles (ICBM). Two modern examples include the Global Positioning System (GPS), originally developed by the Pentagon's Defense Advanced Research Projects Agency (DARPA) and currently employed by billions of mobile devices and civilian vehicles, vessels and craft throughout the world, and Internet, developed by the same agency and currently at the heart of the global economic and communication system[81]. With the previously discussed shift from public to private-led military R&D, controlling the use of these potentially very fruitful technologies became increasingly harder, due to some of them possessing far greater profitability for their civilian rather than military use: profit-oriented firms, therefore, had to face the choice of whether to submit to the severe restrictions and limited customer base of the defense industry, or whether to sell their products on the open market, with the risk of any given nation using their invention for military purposes.

In order to prevent losing the technological edge over the Soviet Union, whose conventional strength after the Second World War was widely regarded as superior in terms of manpower, the United States government and their European allies agreed to a series of agreements to prevent dual-use technology being exported in the Soviet Union, so as to avoid unwittingly helping Soviet military R&D. The Coordinating Committee for Multilateral Export Controls (COCOM), an innovative consensus-based multilateral organization, "*gave any member — and that member was most likely to be the United States — a veto over the export by any other member of a controlled good or technology*" [82]. Its continued existence from its founding in 1949 to its termination in 1994 "*was based on a shared understanding by its member states of the need to control the export of sensitive technologies to Communist countries in order to delay the qualitative progress of their military capabilities*"[83]. This organization did not have its base on any legal device, but rather on an understanding of shared strategic objectives of its 17 members, which included all NATO countries – except Iceland – plus Japan and Australia. This union of Western industrialized states created a de-facto, informal oligopoly with veto power over exports of military, nuclear and industrial technology to Warsaw countries[84]. This de-facto technological oligopoly was rendered possible only through the control countries enjoyed over military R&D during much of the Cold War, which was gradually eroded by the rise of private actors. Following the collapse of the Soviet Union, and thus the lack of broadly shared geopolitical threat assessment, the informal agreement was deemed obsolete, and was thus dissolved[85]. Furthermore, the multiplication of technologically capable actors outside the Western alliance, highlighted by modern China's technological

[80] European Commission 2018, P.1
[81] Meijer 2011, P.6
[82] Grimmett 2006, P.1
[83] Meijer 2011, P.4
[84] Grimmett 2006, Pp. 2-4
[85] Meijer 2011, Pp. 4-5

prowess, would have eventually rendered the agreement useless had it not been previously dissolved, since the 17 COCOM members simply did not have the capacity to prevent their firms from sharing dual-use technology, nor did they hold a monopoly over military technological development any longer.

COCOM's end did not mean the end of attempts by Western countries to control the export of military technology, it simply shifted its focus and strategy. Whereas COCOM had dedicated a list to "industrial items" whose export was to be limited, and this list included many dual-use items[86], the privatization of the sector and the concurrent rise of extremely profitable technologies such as GPS and Internet in the late 80s and early 90s required a paradigm shift. The Clinton administration pushed its Western allies to "*promote multilateral restraint in conventional arms sales and transfers of sensitive military technologies*"[87]. This idea strongly impacted the formation of a post-COCOM arrangement which constitutes the basis of the current system, widely known as the 'Wassenaar Arrangement for Export Controls for Conventional Arms and Dual-Use Goods and Technologies' (hereafter "Wassenaar Arrangement"). As the name implies, its two main focuses are conventional weapons and dual-use technology. Whereas the US technological and economical dominance in the 1949-1994 period ensured their interests and strategy for a common military technology export control prevailed, this was no longer the case, as shown by a failed attempt by the Bush administration in 1991-92 to limit Middle Eastern arms sales[88]. Most notably, opposition came from the US' closest allies in Europe, partly due to the ever-stronger ties that united them through the European integration project, thus increasing their bargaining position vis-à-vis their transatlantic partners. The Wassenaar Arrangement, entering into force in 1996, was thus severely weakened in terms of coerciveness if compared to its predecessor by the fact that "*several European states opposed a COCOM-type institution (i.e. with members' veto power) and did not want to target specific countries the same way COCOM targeted Warsaw Pact countries*"[89]. Thus, one of the main differences is that unanimity is no longer a requirement, preventing a single signatory from effectively vetoing another's exports. Furthermore, member states of the newly-born European Union insisted in the inclusion of new member states, including the Russian Federation, and member countries progressively rose to 42 despite initial American resistance to the idea of expanded membership[90]. This however created issues of enforceability, application of export controls being left to the discretion of member nations[91] and transparency, particularly concerning Russia[92]: whereas COCOM's guidelines were followed by an understanding of common goals, the enlarged membership and changed geopolitical situation made self-compliance less evident. Agreements on what goods should be controlled is also harder to come by due to the multiplication of actors and interests. So, despite many restricted items under COCOM being transposed under the Wassenaar arrangement, new technologies are harder to regulate under this framework[93], which is particularly troubling considering that the increased

[86] Ibid
[87] Grimmett 2006, P.3
[88] Ibid
[89] Meijer 2011, P.5
[90] Grimmett 2006, P.3
[91] Meijer 2011, P.6
[92] Grimmett 2006, P.6
[93] Meijer 2011, P.6

role of ICT in military strategy, and its pace of development, made innovation far quicker than ever before, demanding immediate policy responses from countries wishing to regulate their export.

To summarize, the major change from COCOM to the current framework is in a mentality shift in threat perception and an innovation in the production system. In the Cold war era, "*military technology that was driving civilian industrial development and the military was first to take advantage of new technologies, thereby controlling the civilian adaptation of these technologies at a pace that was acceptable for military priorities. In the 21st century, except for special strategic technologies, civilian R&D is often ahead in most new technology areas. In future, military applications may actually follow after civilian adaptation*"[94]. This process of shifting priorities conclusively altered states' calculation of their interests: in a game theory perspective, it reduced incentive to cooperate in a restrictive export control regime through the elimination of a serious and common military threat; and it increased the payoff to adopt a selfish strategy of allowing dual-use technology to be exported through the ever-increasing returns promised by it, both in economic and strategic terms. Furthermore, states have found themselves relying on private firms, due to their superior effectiveness in conducting R&D; limiting profitability by limiting the products defense actors are allowed to export might therefore lead to firms' lowering of expensive R&D activities, with the unforeseen consequence of a given national army losing the technological edge over a peer competitor: "*Any significant restriction on exports would likely slow corporate growth and limit the extent to which profits can be put back into research and development on next generation technology*"[95]. The increasing dependence on private firms made national armed forces more dependent to market logics than ever before, whose consequences necessitate further research, if possible by accessing primary sources.

II.2.2) Dual use technology in the European Union: control, coordination and reform

In addition to COCOM and the Wassenaar Agreement, several regulations such as the BTCW[96], CWC[97] and UNSC Resolution 1540[98] flourished in a similar time-frame, recognizing the rising importance of dual-use technology in our time. Both multilateral and regional initiatives aimed at dealing with these new challenges were initiated. Most notably, "*The EU controls the export, transit and brokering of dual-use items so the EU can contribute to international peace and security*"[99] through several regulations and institutions specifically designed for this purpose. At the core of these is the extremely detailed Regulation (EC) No 428/2009, whose list of proscribed items is regularly updated on an annual basis as newer technologies emerge to reflect controls on

[94] Mallik 2004, P.120
[95] Meijer 2011, P.9
[96] Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological and Toxin Weapons and on their Destruction, aimed at eliminating biological weapons and their precursors. Can be synthetized by easily available and legitimate compounds available on the open market.
[97] Chemical Weapons Convention. while some of the most deadly weapons known to mankind, these can occasionally be made with fairly simple compounds easily available through the open market, their main purpose being civilian use (ie as fertilizers) rather than their potential military use (ie components for military gases).
[98] 2004 resolution concerning non-proliferation of WMDs with a specific focus on limiting non-state actors' access to prohibited weapons, or the base ingredients to create these.
[99] European Commission 2018, P.1

new items or to de-control certain items, following agreement in international control regimes. It is a fine example of reasoned approach to an increasingly important subject, keeping into account the evolved nature of DITB in the EU as well as the potential for seemingly harmless items to be used for military purposes, such as in the creation of Weapons of Mass Destruction (WMD).

The EU Resolution includes well over 300 pages of extremely specific annexes listing what items are subject to limitation in its export and handling, as well as definitions of key terms. At its core the Resolution consists in the creation of a common regulatory area, notably by establishing a shared set of assessment criteria and common types of authorizations. These cover the production, transportation and brokering of items listed in the annex, and applies when dealing with any entity that is not originating or based in an EU member state. Keeping in line with the ongoing process of privatization of DITB, the regulation deals with any private partner, be it based or operating on EU territory thus enabling Member States to control transit and brokerage activities led by private actors, regardless of their nature or nationality. Another crucial aspect of the Resolution is that, besides coordinating national policies and standardizing actions to be taken, it provides a further layer of protection against misuse of dual-use technology. This is due to the fact that, in its annex, it includes internationally agreed dual-use controls such as the Wassenaar Arrangement, of which all EU countries are currently members, the Nuclear Suppliers' Group, the Missile Technology Control Regime, the Australia Group, the CWC and the BTCW. Besides recalling, and regularly updating, proscribed items under these international agreements, the regulation is further strengthened by article 4.1, informally known as the "*catch-all clause*"[100], aimed at ensuring that, even if a given item is not listed, if there is a concrete suspicion it might be used in the production, delivery or use of WMDs its export should be limited: "*if the exporter has been informed by the competent authorities of the Member State in which he is established that the items in question are or may be intended, in their entirety or in part, for use in connection with the development, production, handling, operation, maintenance, storage, detection, identification or dissemination of chemical, biological or nuclear weapons or other nuclear explosive devices or the development, production, maintenance or storage of missiles capable of delivering such weapons*"[101]. Regular reports on granted export authorizations are to be sent to the Dual-Use Coordination Group (DUCG), a committee of experts stipulated in article 23, whose task is to ensure transparency by regularly reporting to the Commission as well as examine "*any issue concerning the application of export controls with a view to practically improving their consistency and effectiveness throughout the EU*"[102]. This group is essential providing a base for a feedback, basis of the proposals for improvement of the system we shall discuss later. Similarly fundamental for the transparency as well as future improvement of the system, and further demonstrating the innovative character of the Regulation, is article 25, mandating MSs to "*inform the Commission of the laws, regulations and administrative provisions adopted in implementation of this Regulation* […] *Every three years the Commission shall review the implementation of this Regulation and present a comprehensive implementation and impact assessment report to the European Parliament and the Council, which may include proposals for its amendment*"[103].

[100] European Commission 2018, P.1; European Commission 2013, P.15
[101] European Council 2009, P.17
[102] European Commission 2013, P.6
[103] European Council 2009, P.17

The Regulation maintains the EU's core economic goal of ensuring barrierless trade and production, notably through EURATOM, by ensuring that trade within EU member states is not subject to the regulation. This however presents a potential for a weakening of the inspection regime, particularly when considering that, as per article 24, Member States are responsible to ensure proper enforcement; sanctioning; and recording of all authorizations given. A further limitation is created by art. 346 TFEU stating that EU law and treaties shall not overrule national sovereignty and security in certain cases, such as the fact that "*no Member State shall be obliged to supply information the disclosure of which it considers contrary to the essential interests of its security* [and] *any Member State may take such measures as it considers necessary for the protection of the essential interests of its security which are connected with the production of or trade in arms, munitions and war material*". While they seem to be relatively minor problems and so far export controls have been applied fairly homogenously, they could potentially cause un-solvable deadlocks were an EU member to grant unwarranted authorizations to its producers, aiming to achieve unfair advantages over fellow dual products exporting EU members. This scenario is hypothetical, yet shows the need for a transition towards a more federal system, able to effectively control enforcement of its regulations, without the potential for a given member to effectively block the system if determined to do so.

The Barroso and Juncker Commissions both showed interest in updating the Regulation's content, rather than simply updating its annex. Hereafter we will analyze the latter proposal in depth, and to follow it through the ordinary legislative procedure, looking at how the different EU institutions attempted to modify it, for what reason, and what can be inferred from these modification for the future of dual-use technology regulation in the EU.

In October 2013, the Barroso Commission published a report to the European Parliament and Council updating on the success of the previous four years of implementation, as well as proposals for an upgrade of the export control regime[104]. The report calls for improvements in the field of transparency, affirming that private actors and academia alike noticed an occasional lack of legal certainty and effectiveness of the controls[105]. More crucially for gaining an insight as to the shifting perception of ongoing strategic evolutions, such as the increasing role of ICT in warfare, the report calls for "*EU export control policy to be further harmonised and to take account of recent policy developments such as the use of ICT interception and monitoring items or 'cybertools'*"[106]. With these two, somewhat minor, exceptions, the report is overall positive on the functioning and level of implementation of the Regulation, nevertheless calling for repeated updates and encouraging MSs to provide feedback on possible improvement, calling on the EU as a whole to remain seized of the matter. There nevertheless seems to have been a change in the following years over the centrality of this extremely effective Regulation on EU's foreign and defense policy, or a lack of cohesion on the issue of dual-use technology export limitations' strategic value. For instance, the topic is never touched upon in the third and most recent report on the EU Global Strategy[107].

[104] European Commission 2018, P.1
[105] European Commission 2013, P.16
[106] Ibid, P.15
[107] European Union External Action 2019

The Juncker Commission nevertheless adopted, in 2016, a proposal calling for updating the Regulation, as is its prerogative within the ordinary legislative procedure. This proposal took into account several of the proposals made by the Barroso Commission in the previous report, such as the need for dual-technology controls to keep into account "*the prevention of the misuse of digital surveillance and intrusion systems that results in human rights violations*"[108]. This was done following the proliferation of surveillance technologies that can be used to violate human rights. In its revision to the 2009's regulation, it can be seen that article 5 is modified to include international humanitarian law violation, or any use in armed conflict. Of further particular note is the fact that the wording of reasons for the export ban is revised to include "internal repression" and "terrorism", yet another example of the EU being reactive to evolving processes, in this case the decline in inter-state conflict and the rise in intra-state violence[109]. Other changes reflect an acknowledging of problems or loopholes with the original proposal, as exemplified by article 10's rewording to redefine the definition of broker in dual-use items "*to avoid the circumvention of controls on the provision of brokering services by persons falling within the jurisdiction of the Union*"[110]. In this same sense, there is a redefinition of several terms originally in the proposal to reflect an evolved geopolitical situation. Although many of these changes are minor, it is interesting to see how many words were deemed in need of further clarification, after only 7 years from the original proposals' approval. *De facto*, such a rewording also includes slight changes to the export authorizations and to the proscribed items. For instance, the term 'cyber-surveillance technology' is defined in a narrower sense than previously, including surveillance software and lawful interception systems. These changes reflect the true strength of the original framework, as one that is able and willing to regularly update itself to keep the pacing with a rapidly evolving situation.

The proposal had its first hearing in the Parliament's Committee on International Trade, introduced by Rapporteur Klaus Buchner (Greens-European Free Alliance) on 19th December 2017[111]. The report was largely receptive to the Commission's proposal, although it proposed several changes to some articles, and introduced new ones. The report was forwarded to the Parliament which, in a plenary hearing on the 17th of January adopted the proposed amendments to the Commission's proposal and subsequently forwarded the edited text to the Council with a very large majority of 571 MEPs voting in favor, 29 abstaining and 29 voting against. Following an attentive reading of the Commission's proposal and the Parliament's amendments to it a pattern emerges indicating a tendency for the Parliament to favor more stringent Union control over the process[112].

From this analysis the initial expectation of an overall strengthening of the proposal by the Parliament, symbol of the federal aspect of the EU being the only institution directly elected from the citizens, is confirmed. We classify 56 of the 98 amendments as "more stringent", 32 as "minor changes" and only 10 as "less stringent". This is in line with other researches in the field, and what simple intuition and observation imply: the Parliament tends to be in favor of more EU

[108] European Commission 2016, P.2
[109] For futher reading on these trends see: Rosner 2019
[110] European Commission 2016, P.13
[111] European Parliament Commission on International Trade 2017
[112] The methodology applied to this comparative analysis of the two texts is detailed in the annex.

involvement, leading the path towards a more supranational institution rather than an international organization. Nevertheless, despite the Council often being criticized for its watering down of Parliament's proposals, we shall see that its own work on the Commission's proposal does present a certain degree of increased coerciveness, indicating the fact that Member States recognize the importance of tackling the issue of rapidly evolving dual-use technology. Indeed, as of November 2019 the proposal is still being debated in the trialogue characterizing the ordinary legislative procedure of the EU, following the approval by the Council, on the 5th of June 2019, of its negotiating position[113]. On the proposed changes to the regulation, which we shall henceforth analyze, the proposal is currently waiting for the Parliament to give it its second reading followed by further amendments, followed by a further second reading in the Council and, if no consensus can be achieved, the opening of the conciliation procedure.

Insofar the analysis of the Council's comments on the Commission's proposal is concerned, the same criteria and methodology explained above shall be applied[114]. Out of a total of 91 amendments made by the Council, we identify 36 as being "more stringent", 39 as being "minor changes" and 16 being "less stringent". The difference is striking and seems to partly validate expectations: only 39.5% of amendments attempt to increase the level of protection and responsibility, whereas 17.5% reduce the level of coerciveness of the proposal. This can be compared with, the 57.1% of more stringent amendments and the 10.2% of less stringent amendments proposed by the Parliament. A further linguistic observation is direly needed, since linguistic changes were included in the methodological parameters: while the majority of stringent amendments proposed by the Parliament had binding terminology, including but not limited to "shall" and "will", the Council predominant terminology, including in those cases where it made more stringent amendments, leaves more bargaining space to MSs by preferring terms such as "should" and "may".

Overall, this comparative analysis highlights three major points.

Firstly, both institutions agree on the need to update the annex and the items included in the Regulation, in light of recent technological, institutional and juridical changes.

- **Technological** changes led to the focus on ICT due to its increased role in battlefields and prevention of terrorist attacks;
- **Institutional** changes led to the focus on Small-Medium Enterprises, the term covering four of the Parliament's amendments and two of the Council's, reflecting their increased role in the ever-fragmenting DITB production chain;
- **Juridical** and political changes such as the recently approved General Data Protection Regulation (GDPR) which led to a higher focus on the protection of privacy rights and on the possibility of encryption and decryption software to be used for human rights abuses.

[113] European Council 2019

[114] In need of further attention is the fact that the Council also proposed modifications of its own to the annex, which the Parliament did not do in its first reading. In order to do a proper and meaningful comparison, aiming to look at the different approaches the two EU institutions took when working on the same text, we shall exclusively consider proposed amendments to the main body of the Resolution, aiming to analyze the annex in a future update of this paper, once the Parliament modifies the annex as well, probably during its second reading.

Secondly, both MSs and MEPs agree on more stringent regulation in dual-technology export controls, in light of its ever-increasing role. Although they, and their institutional representations in the form of the Parliament and Council, respectively, may disagree on exactly how to implement these more stringent regulations and what to tackle, the number of more stringent amendments far outnumbers the number of less stringent ones, even in the traditionally more conservative Council.

Lastly, more flexibility is included in the formulation with more frequent updates of the list and mandatory reviews on the necessity of an item remaining on the list being instituted: "*The Commission may remove items from the list, in particular if, as the result of the fast-changing technological environment, those items have become lower tier or mass market products, which are easily available or technically easily modifiable*"[115]. This higher flexibility reflects the ever-increasing path of technological development, as well as the potential strategic loss in preventing firms from earning as much as possible from dual-technology products, so they may invest in more R&D. Whereas Regulation 428/2009 provides for an effective mechanism to adding items to the list, it lacked a quick way to remove a given item from it.

Of particular interest is the EU institutions' focus on inserting cyber-surveillance technology as a new category of dual-use technology, considering that it has "*been used to directly interfere with human rights, including the right to privacy, the right to data protection, freedom of expression and freedom of assembly and association, by monitoring or exfiltrating data without obtaining a specific, informed and unambiguous authorization of the owner of the data and/or by incapacitating or damaging the targeted system*"[116]. Following repeated Parliamentarian action over the past years, the role of cybersecurity and software in conflict, and their potential to violate human rights and privacy, has been integrated into public debate. For this reason, recognizing the fact that ICT and cyber technology had been underestimated in Regulation 428/2009, the Commission decided to introduce "*new provisions to control the export of certain specific cyber-surveillance technology, in order to fill a regulatory gap identified during the export control policy review, i.e. the insufficient legal basis for control in this area*[117]". For instance, in 2014 the Commission had announced its intention to remove encryption software from the list of dual-use technologies subject to export limitation, seeing their value in protecting privacy as well as recognizing the highly competitive market encryption firms operate in, and the harm export limitations were causing if compared to competitors[118]. This intention was wholeheartedly adopted by the Parliament which adopted amendment 76 which mandates that, within 5 years of the adoption of the updated Regulation, Parliament and Council shall debate whether to entirely eliminate any limitations on cryptography[119]. This decision is in line with recent scholarship's opinion on the effectiveness of "*Dual-use export controls* [which] *can today be effective only in a limited number of situations – namely* [when a given country] *is the sole supplier or enjoys overwhelming market dominance*"[120]. For this reason, limiting encryption exports is harmful to EU firms' potential to reinvest profits in

[115] Ibid, Amendment 64
[116] Ibid, Amendment 5
[117] European Commission 2016, P.3
[118] European Commission 2014, P.8
[119] European Parliament 2018, Amendment 76
[120] Meijer 2011, P.11

R&D, might have negative effects on human and privacy rights, and is fundamentally ineffective, providing an excellent example of the EU Parliament taking action to ensure a 10-year old regulation on an ever-shifting topic remains up to date.

As can be seen, ICT can be extremely profitable for private agents, and has uses both in the civil (i.e.: banking) and defense (i.e.: sabotage) fields. It is also a field where technological and behavioral changes can happen extremely quickly, and will prove the greatest regulatory challenge for the EU, whose trialogue legislative process can at times take years, as can be seen by the fact that the Commission's 2016 proposal is still to enter its second reading phase as of November 2019.

Conclusion

The European Union as a supranational institution already enjoys several advantages over being the mere sum of its members. The case study of the reform of the dual-use regime reveals how the EU has managed to set up an effective and flexible framework, which would not otherwise have been possible at the state level due to the fragmentation of the production chain and the extreme importance of common standards to ensure common interests are maintained while at the same time the risk of unfair competition is kept at bay. The first case study, as well as table 2, clearly show the harmful consequences of a lack of cooperation at EU level, notably an incoherent policy and an ineffective spending, ensuring more money is spent by the various MSs for a lower level of overall military preparedness than other actors with similar but centralized spending.

It is our belief that the ongoing shifts in the structures and processes of DITB, notably the ever-growing reliance on fast-developing ICT technologies, will require an ever tighter coordination, as does the privatization of military R&D. This need seems to be giving the impulse for a closer cooperation at EU level, demonstrating that there is an acknowledging of a changing situation at the elite level, which would be an interesting subject of a further qualitative research on their perception. The economic case for a centralized R&D planning has been made, and is a clear incentive towards more supranational institutions within the EU, able to coordinate or direct national policies. Nevertheless, there is a further problem at the root of a lack of an effective DITB in the EU: the lack of a shared sense of unity and interests on the foreign scene.

The creation of a common strategy and common vision is paramount, since no defense strategy can exist without a truly common foreign policy. A consolidation of the, capable yet disorganized, European industrial base could bring long-lasting benefits both in terms of budget and in terms of heightened efficiency, as well as importance on the world stage. The initiatives by the Juncker Commission seem to have gone in the right way, yet much and more remains to be done. Today more than ever, the EU should come together to face the current security instability caused by US President Trump's putting into question the longevity and trustworthiness of NATO, which *de facto* guaranteed European Security under the American nuclear umbrella for the past seventy years. A paradigm shift seems to be needed for the EU to guarantee its own safety, independence and democratic values in light of the waning American presence and new, flexible threats presented by the rising importance of non-state organizations, guerrilla tactics and terrorist attacks. In order to do that, a profound reform of the EU would need to take place, including

partially revising the treaties to establish more federal-style institutions having the kind of supranational power that would be able to impose its preferences in sensible issues such as truly common foreign and defense policies. To face new challenges, new solutions are necessary, and it is time the EU restarted its integration process towards a federal system of governance.

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Annex

Hereafter I shall briefly detail the methodology applied to this comparative analysis of the two texts, wherein I classified all 98 amendments according to three categories, according to whether the level of protection is increased, decreased or remains stable.

- **More Stringent:** These amendments show the willingness of the Parliament to exercise more oversight over MSs and private agents operating in the field of dual-use technology. These have to be intended as amendments aiming at ensuring a higher level of protection. As this cannot be judged in a univocal and unbiased way, a list of criteria used to decide whether to categorize an amendment as more stringent is hereafter presented:
    - Including one or more items to the ones tackled by the Commission's text
    - Adding further requirements for either the Member States or a European institution for the application of the provision, these often include more transparency requirements;
    - Specifying deadlines in more detail, such as by substituting formulations such as "up to one year" with specific deadlines;
    - Defining terms in a more stringent fashion;
    - Linguistic changes, such as removing a "should" or "may" with "shall" and other more stringent formulations;
    - Removing exceptions;
    - Adding considerations to be kept into account when evaluating whether to grant a permission such as the occurrence of violations of human rights law, fundamental freedoms and international humanitarian law in the country of final destination"[121]
- **Less stringent:** These amendments reduce the level of protection on a given topic, or reduce Member States' and EU institutions' obligations. The same criteria as above apply as well, with two more taken into account:
    - Deletion of a provision, with no substitution thereof;
    - Proposing a topic be excluded from the provision. This is the case for almost a fourth of all changes in this sense, mostly concerning the role of cryptography such as presented in Amendment 64
- **Minor changes:** These amendments do not make the text either more or less stringent, often changing a single word, or eliminating a reference to a given legal text perceived as redundant or unnecessary. Additions of single words to lists, recalling other legal texts and grammatical changes have all been included in this category as well. A third of all minor changes concerns the inclusiveness of gender forms, since the Commission's text only used the male "he" when referring to any physical actor such as a private entrepreneur. This was substituted with the dual he/she or him/her.

[121] European Parliament 2018, Amendment 56

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