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Technology as a tool for geopolitical competition*Technology as a tool for geopolitical competition**Abstract:*

The global geopolitical situation is currently characterised by increasing competition in which technology is playing a major role. The advantage it provides is seen as a key factor in achieving superiority in confrontation. States are well aware of their technological capabilities and shortfalls and are playing a very active role in decision-making. Building capabilities is not an easy task and requires technical, personnel, financial and, above all, time resources. For this reason, it is important to prevent the other party from gaining access to one's own technologies and to make environments that foster any of these dimensions as difficult as possible. This is a clear case of weaponization whereby the management of technology becomes a tool to achieve the interests of the States.

*Keywords:**Technology, geopolitics, competition, weaponization*

***NOTE:** The ideas contained in the **Analysis Papers** are the responsibility of their authors. They do not necessarily reflect the thinking of the IEEE or the Ministry of Defence.

Resumen:

La situación geopolítica mundial se caracteriza actualmente por una creciente competencia en la que la tecnología está jugando un papel muy importante. La ventaja que proporciona se considera un factor fundamental para conseguir la superioridad en el enfrentamiento. Los Estados son muy conscientes de sus capacidades y carencias tecnológicas y están desempeñando un papel muy activo en la toma de decisiones. Dotarse de capacidades no es una labor sencilla y requiere recursos técnicos, personales, económicos y, sobre todo, tiempo. Por esta razón es importante evitar que la otra parte consiga acceso a las tecnologías propias y dificultar en lo posible los entornos que fomenten cualquiera de estas dimensiones. Se trata de un caso claro de armificación por el que la gestión de la tecnología se convierte en una herramienta geopolítica para conseguir los intereses de los Estados.

Palabras clave:

Tecnología, geopolítica, competencia, armificación.

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Introduction

Technology is a never-ending race when it comes to defence and security. It is the basis upon which offensive and defensive systems used in conflicts are developed. A more advanced offensive system can overcome an opponent's defensive capabilities, while adequate defensive systems stop potential attacks and are even a deterrent that can prevent hostilities.

Characteristic of this race, a breakthrough in offensive systems requires a parallel development of defensive systems to deal with the new threat. New devices and equipment are constantly being developed to gain an edge in terms of confrontation, and this requires ongoing technological development. It is about having a technology first or mastering it more effectively than the opponent to make the most of the advantages its use could garner in an eventual confrontation.

This situation of confrontation between parties contrasts with the paradigms that globalisation preaches in all areas. Concepts such as open innovation, patent publication and the increasing breakdown of trade barriers lead to a greater availability of similar technologies for all parties. This is a desirable scenario from the perspective of democratisation and improvement of quality of life, but when these technologies are used to attack the interests of other states, this openness of borders and availability must be questioned and logical grounds emerge for setting limitations. After all, it is logical to impose constraints to prevent a technology developed in one part of the world from being used by a foreign actor to jeopardise the interests and security of the citizens who developed it.

Furthermore, in addition to serving these purposes, these limitations can be used as geopolitical tools to respond to other types of interests such as purely technological, diplomatic or merely economic ones. Closing off traffic to technology, which is nowadays present in practically all citizens' daily lives, both to be able to acquire it and to be able to distribute it, is a mechanism that confers enormous power because of the repercussions it entails. This is explained by the dichotomy between civilian and military uses of technology having been blurred, with the same technologies that contribute to the development and improvement of the quality of life of the population used for the

production of weapons and defence systems. To this effect, a measure taken under defence and security criteria may also impact on the use of this technology for civilian purposes, and thus on the arrival of this technological development to a population group.

Technology development is an action that requires a great deal of personal and financial resources. From the training of researchers to the development of systems, this is an investment that often falls directly or indirectly on the public coffers of states, and so it is natural to establish strategies both for obtaining the technology and for developing, protecting, sustaining and financing it.

Given that the economic factor is so important, as important as possessing or having access to a technology, it is also imperative to be able to distribute and trade it. These are large investments that cannot be financed on a non-repayable basis but require a financing cycle that generates returns during the operation and use of the technology.

Under the conditions described above, there are numerous mechanisms for limiting the free traffic of technologies. Sanctions and embargoes established by international bodies are two of them, although mechanisms can also be established unilaterally by countries. In fact, almost all countries have mechanisms in place to limit the export of their technologies, allowing strategic, economic, ethical and diplomatic criteria to be applied so that they are not used for purposes contrary to the country's principles.

Sanctions

As set out by the Ministry of Foreign Affairs, European Union and Cooperation, these are "*coercive measures applied against states, non-state entities and individuals that pose a threat to international peace and security*". There are three main international bodies that impose sanctions: the United Nations, the European Union and the Organisation for Security and Cooperation in Europe.

The sanctions in force imposed by the United Nations can be consulted on their specific web page¹ where, in addition to a summary of the effects of each sanction imposed, the documentation supporting the sanction can also be found.

1 <https://www.un.org/securitycouncil/content/un-sc-consolidated-list>

In the case of the European Union, there is also a website² that includes the sanctions imposed by the United Nations, in addition to those imposed by the European Union itself.

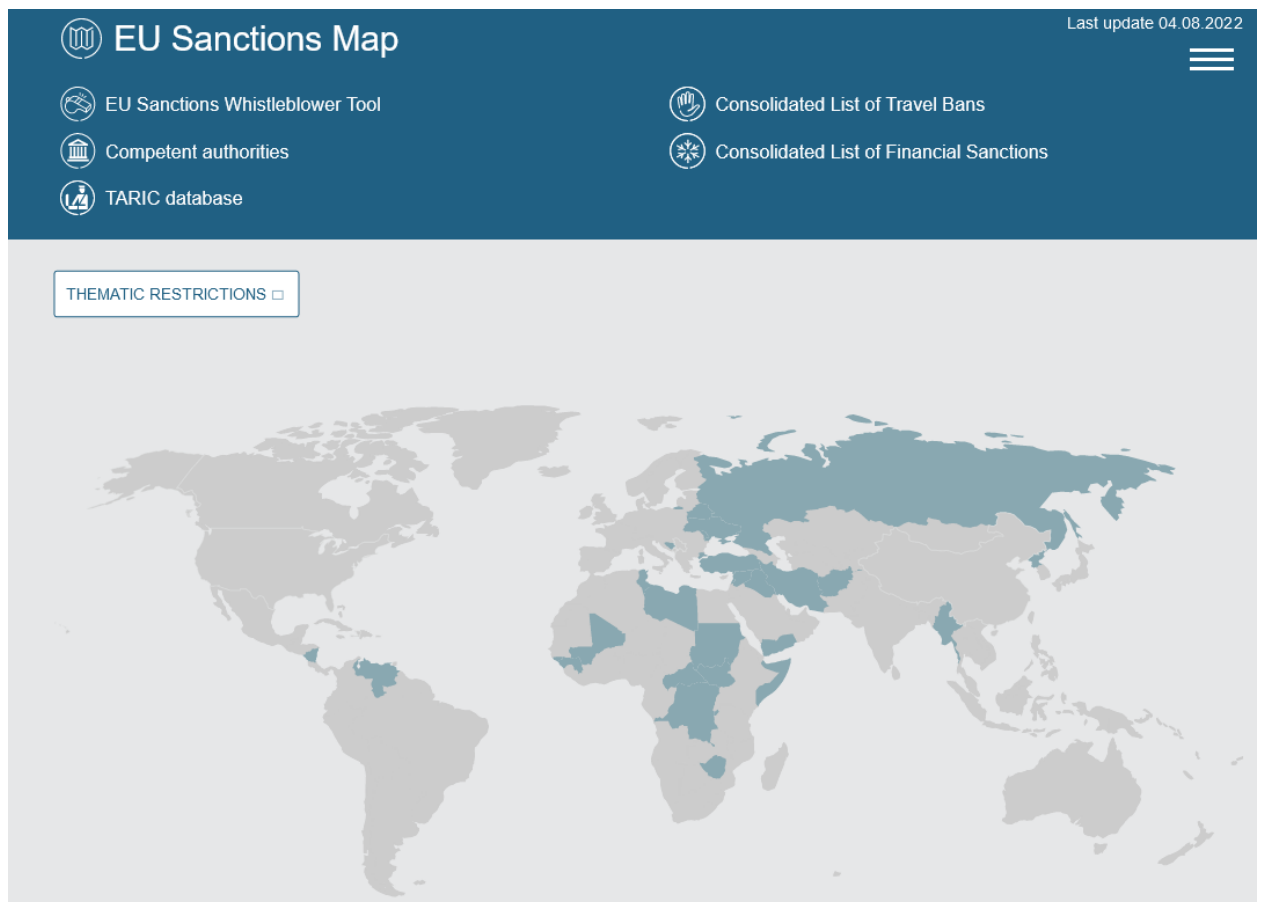


Figure 1 Map of countries sanctioned by the EU (Source: <https://sanctionsmap.eu/#/main>)

Last, in the case of OSCE, embargoes can be imposed on the purchase and sale of defence and dual-use goods.

Defence and dual-use material

The Wassenaar Arrangement³ is another international mechanism set up to "*contribute to regional and international security and stability by promoting transparency and greater responsibility in transfers of conventional arms and dual-use goods and technologies, to prevent a destabilising accumulation of these items. The aim is also to prevent these items from getting into the hands of terrorists*". There are currently 42 signatories to the

² <https://sanctionsmap.eu/#/main>

³ The Wassenaar Arrangement on Export Controls for Conventional Arms and Dual-Use Goods and Technologies <https://www.wassenaar.org/>

agreement, who are highlighted on the map in Figure 2, and who "seek, through their national policies, to ensure that transfers of these items do not contribute to the development or enhancement of military capabilities that undermine these objectives and are not diverted for such purposes". These countries commit to the application of "export controls for all items on the [Dual-Use Goods and Technology List and the Munitions List](#), with the objective of preventing unauthorised transfers or retransfers of these items". The list of products is frequently updated and is not exempt from the problems that rapid technological development and its complexity pose for legislation, as was the case, for example, in 2013, with the inclusion in the lists of intrusion and network traffic analysis technologies⁴.

Spain has an Interministerial Regulatory Board for Foreign Trade in Defence and Dual-Use Material (JIMDDU), created by RD 824/1993⁵, and the Special Register of Operators of Foreign Trade in Defence and Dual-Use Material (REOCE), created by RD 1782/2004⁶, which are responsible, among other functions, for issuing licences for the export of this type of goods.

4 RAMÍREZ MORÁN, David. *CYBERSECURITY IN THE CONTEXT OF THE WASSENAAR ARRANGEMENT*. IEEE Analysis Paper 16/2016. https://www.ieee.es/en/Galerias/fichero/docs_analisis/2016/DIEEEA16-2016_Ciberseguridad_Wassenaar_DRM.pdf

5 Royal Decree 824/1993, of 28 May 1993, approving the Regulation on foreign trade in defence and dual-use material.

6 Royal Decree 1782/2004, of 30 July 2004, approving the Regulation on the control of foreign trade in defence material, other material and dual-use products and technologies.



Figure 2 Map of countries adhering to the Wassenaar Arrangement (Source: www.wassenaar.org)

Pursuing hegemony

The indicators that have traditionally been used to attempt to compare the evolution of the main technological players are rapidly losing their relevance.

Computing is a very specific field that has gained remarkable importance in recent years vis-à-vis the exponential evolution of technology. In this field, for years, the Top500 list was a measure of hegemony in the creation of supercomputers. In fact, China developed computers with the main aim of getting to the top of this list and overshadow its rival⁷. However, in the November 2019 version, China dropped off this list by not even presenting the results of its latest developments in this field. This can either be interpreted as a change in attitude towards this indicator or the conveyance of this message if it is considered that dropping off this list is done with the intention of undervaluing it and declaring it superfluous.

But messages like the one described above are not limited to this list, since similar effects are observable via other indicators of a broader and more diverse nature. The number of

7 RAMÍREZ MORÁN, David. IS COMPUTING A GEOPOLITICAL TOOL? IEEE Analysis Paper43/2015. http://www.ieee.es/Galerias/fichero/docs_analisis/2021/DIEEEA25_2021_JOSPAR_Rusia.pdf

patents registered by universities and companies has often been used to compare different countries in terms of research capacity. However, by their nature, patents are not simply a number but they require publication of the fundamentals of relevant technological developments. This publication is open access and can therefore be used to balance the capacities of more than one actor if, in a stormy environment like the current one, it is also used as a tool for lobbying or escaping infringement of intellectual property rights, which applies not so much to patents as to other issues; or infringement of industrial property, whereby countries can ignore these principles and start developing products based on patents without compensating for licensing and exploitation rights.

When new developments on either side are no longer registered as patents, they become trade secrets, meaning they are no longer publicly visible and so an avenue for fostering international collaboration through licensing or knowledge transfer agreements disappears. Certain information which, in the scenarios of the past five years, became accessible to varying degrees through patent registration, now remains in the form of trade secrets that only the company, research centre or operators to whom it is assigned can know and exploit it for the development of new technologies and business models.

5G

5G communications technology is emerging as a fundamental tool for the new technological and social paradigms in which connectivity is most needed. It has been and still is an open battle line, mainly between the US, the EU and China, although the deployment of this technology is being treated as a geopolitical issue in many other countries. The advantages of its deployment⁸ and the relevance of choosing one of the alternatives available on the market⁹ have been reported in countless documents in a wide variety of fields.

The disadvantage attributed to the US with respect to the solutions provided by Chinese-developed 5G fuelled a movement where it was difficult to determine the motivation behind the increasingly limited deployment of Chinese devices within critical systems,

8 CORRAL HERNÁNDEZ, David. *5G, a race for hegemony and the future with a lot of benefits*. IEEE Framework Document 07/2020. http://www.ieee.es/Galerias/fichero/docs_marco/2020/DIEEEM06_2020DAVCOR_5G.pdf

9 GACHO CARMONA, Isabel. *The European Union vis-à-vis China's rise as a technological power: the case of 5G*. IEEE Opinion Paper. 23/2020. http://www.ieee.es/contenido/noticias/2020/03/DIEEEO23_2020ISAGAC_5G.html

then in less critical systems such as public employee terminals, and then its extension to communications operators across the country. All these decisions were justified by the defence of national security, which serves as a motivation for vetoing foreign equipment. This is similar to the situation that arose years ago with computer operating systems. In this case, it was actors like China¹⁰ and Russia¹¹ who limited their use for official purposes because of the risk and a certain questioning of the reliability of the technology.

The relationship between the two main players involved in the development of 5G technology is becoming increasingly complicated. In November 2020, the President of the US signed an executive order banning the purchase of shares in companies with ties to the Chinese Communist Party¹². This order placed constraints on both the purchase and sale of these assets and would be ratified by Biden in June 2021¹³. Both documents were accompanied by the list of companies including, as expected, Huawei. The content of the order justified the decision on the basis of the risk that these companies' activity posed to the security of US citizens, both at home and in their operations beyond US borders. This measure limits the ability of sanctioned companies to raise foreign funding for their activities, but only limits investment by US companies and citizens.

Further, it is additional to the measures taken by the same government against Chinese technology initiatives for several years now.

10 WINDER, Davey. *China Prepares To Drop Microsoft Windows, Blames U.S. Hacking Threat*
<https://www.forbes.com/sites/daveywinder/2019/05/30/china-prepares-to-drop-microsoft-windows-blames-u-s-hacking-threat/>

11 TUCKER, Patrick, *Russia's Would-Be Windows Replacement Gets a Security Upgrade*

<https://www.defenseone.com/technology/2019/05/russias-microsoft-knockoff-gets-security-upgrade/157310/>

12 Executive Order on addressing the Threat from Securities Investments that finance Communist Chinese Military Companies <https://www.federalregister.gov/documents/2020/11/17/2020-25459/addressing-the-threat-from-securities-investments-that-finance-communist-chinese-military-companies>

13 Executive Order on addressing the Threat from Securities Investments that finance Certain Companies of the People's Republic of China <https://www.whitehouse.gov/briefing-room/presidential-actions/2021/06/03/executive-order-on-addressing-the-threat-from-securities-investments-that-finance-certain-companies-of-the-peoples-republic-of-china/>

Microelectronics

If there is one field in which there is currently a particular sensitivity to technological dependence, it is that of electronic technologies. A recent article¹⁴ addressed this issue, describing the initiatives that international actors are undertaking in this regard. New activities along these lines are springing up all the time, including India's initiatives¹⁵.

This is a complex field, where the necessary investments are very voluminous and require a long period of time reaching several years both to produce results and to be able to monitor the degree of fulfilment of the ambition pursued. The current international market and globalisation mechanisms set a complicated scenario in which it is questioned what kind of actors, local, regional or international, should be able to access public funding and development initiatives to reduce dependency and generate sovereignty over these technologies.

Indo-Pacific

With the shift of strategic interests towards the Pacific, this playing field is also becoming a point of interest that is not exempt from actions directly related to technology.

With the signing of AUKUS¹⁶, the collaboration between the US, the UK and Australia, the long-standing Five Eyes agreement whereby the US, Canada, the UK, Australia and New Zealand share security and intelligence information is further strengthened. AUKUS also strengthens the link between the US and Australia vis-à-vis China's growing interest in the region. The agreement was signed as a mechanism to assist Australia's acquisition of nuclear-powered submarines (not weapons), although the document also mentioned *"plans for additional collaboration to enhance our joint capabilities and interoperability"*. *This will initially focus on cyber security capabilities, artificial intelligence, quantum technologies and additional underwater capabilities"*. The three countries recognised that the agreement *"would help maintain peace and stability in the Indo-Pacific"*.

14 RAMÍREZ MORÁN, David. Square millimetres of sovereignty. IEEE Analysis Paper 51/2021.

https://www.ieeee.es/Galerias/fichero/docs_analisis/2021/DIEEEA51_2021_DAVRAM_Milimetros.pdf

15 DOBBERSTEIN, Laura. India wants to quadruple electronics biz in just four years

https://www.theregister.com/2022/08/31/india_electronics_report/

16 The AUKUS agreement <https://commonslibrary.parliament.uk/research-briefings/cbp-9335/>

In contrast, and with no direct links to the above action, China is also taking steps both to strengthen its presence in the region and to generate a market for its technology, with an agreement¹⁷ signed with ten countries in the region to provide them with technological support.

The war in Ukraine

The international sanctions associated with this conflict have brought to light the dependence on technology that is the current reality of developed countries. In many cases, in response to the sanctions, international companies located in Russia have abandoned their local headquarters and terminated contracts for the supply and maintenance of the systems installed there. Faced with the difficulty of replacing this equipment, the Russian government has taken several measures to keep its infrastructures functioning. Intellectual property laws have been relaxed to limit their application to technologies for which there are no local substitutes, while the acquisition of foreign software for critical infrastructure provision was recently banned¹⁸.

Outside the IT field, the repair of one of the turbines of the Nord Stream I pipeline supplying Russian natural gas to Europe is also of great geopolitical importance. This infrastructure uses foreign technology that cannot be maintained on Russian territory, and problems arose in transit to Canada for its repair due to the imposition of sanctions limiting transactions with the Russian government. The situation was further compounded by the fact that the Canadian company had been taken over by the German company Siemens, which was also subject to international sanctions but was based in one of the countries most dependent on the proper functioning of this infrastructure.

Taiwan, currently the world's largest semiconductor producer, also imposed a ban on the sale of digital electronic processing devices to Russia and Belarus¹⁹, setting thresholds that only allow the sale of devices with a complexity similar to that of a digital wristwatch.

17 SHARWOOD Simon. China offering ten nations help to run their cyber-defenses and networks
https://www.theregister.com/2022/05/27/china_south_pacific_tech_assistance/

18 CLABURN, Thomas. *Russia bans foreign software purchases for critical infrastructure*.
https://www.theregister.com/2022/04/01/russia_bans_foreign_software/

19 MARTIN, Dylan. Taiwan bans exports of chips faster than 25MHz to Russia, Belarus.
https://www.theregister.com/2022/06/06/taiwan_chips_russia/

In the political context, this tool can be integrated into the growing diplomatic relations that are developing between the island's government and the US.

Conclusions

The importance of technology in international relations is nowadays unquestionable. Many areas are affected by the decisions that are taken and it is difficult to isolate each one from the others when major decisions need to be taken. Political, strategic, financial, industrial and market factors are interrelated. There are no perfect solutions to this intersection of interests, but rather options that respond to them in exchange for the assumption of a series of risks that include dependence, lack of hegemony and the possibility of having to backtrack when faced with possible changes in the international situation.

At present, technology plays such an important role that a situation of tense calm is developing between the actors who, in a relatively short period of time, now hold the positions of potential hegemonies. The confrontations between the US and China are the most visible movements, although there is significant interest on the part of many other actors, including the EU, South Korea, India, Japan and the UK, whose relative weight, either as a producer or as a customer, cannot be underestimated.

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