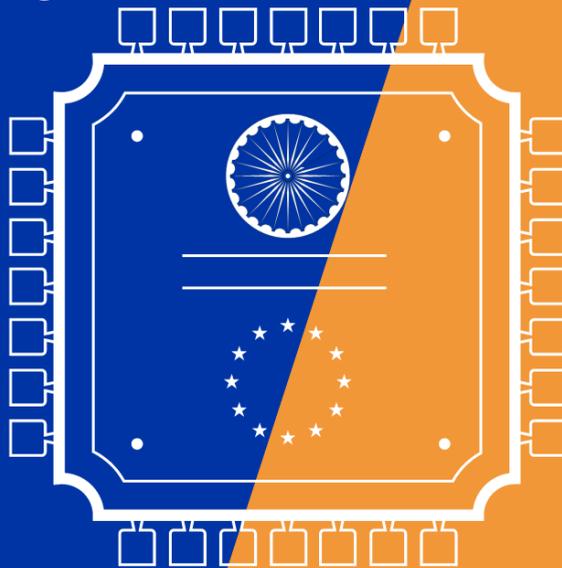


How strategic tech cooperation can reinvigorate relations between the EU and India

Vera Kranenburg
Maaïke Okano-Heijmans
(editors)

Clingendael Report



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Executive summary

Maaïke Okano-Heijmans and Vera Kranenburg (editors) | Clingendael Institute, The Hague

In an era of multipolarity, India – expected to become the world’s most populous nation soon – will be a significant geopolitical player. This necessitates European Union (EU) member states to shift their policies to engage one of the world’s largest consumer and industrial markets.

Europe and India have well-established cooperation on commercial technologies that also serve the 17 Sustainable Development Goals set by the United Nations. Cooperation between the Netherlands and India, for example, primarily focuses on water–agriculture–health technology (WAH). Technology cooperation for strategic purposes has hardly featured on the agenda, however, except in India’s relationships with France and the United Kingdom. More recently, the EU and Germany have started to invest in developing a defence and security partnership with India.

Strategic clarity and a shared narrative

In the current international and geopolitical context, there is ample reason for the two sides to deepen their ties further. Strategic clarity about the objectives and benefits of closer ties will help build a clear narrative that will steer policymakers and other stakeholders in the desired direction, towards implementation. The EU and its member states are investing in economic resilience and open strategic autonomy. A key question is therefore: **can India help the EU move closer towards strategic autonomy – more specifically, reduce EU dependence on China?**

India is seeking to promote its own manufacturing and production capabilities through its ‘Make in India’ campaign, which seeks to diversify existing value and supply chains that currently often rely on China. A key question for India is: **can the EU help India to move closer towards strategic autonomy – more specifically, reducing Indian reliance on Russia?**

India is making it clear that it wishes to address overreliance on Russia for military and defence equipment. European countries have an interest in helping

Delhi do just that, as a strong India can be a counterbalance to Chinese influence in the Indo-Pacific region and beyond. Delhi's response to the war in Ukraine – which it portrays as a neutral course, as it abstained on UN votes condemning Russia's invasion and refused to publicly blame Moscow for the crisis – has opened European eyes to the need to reconsider its approach to India, which had been in the making for several years already.

Set against this context, this Clingendael Report investigates the role that technology can play in deepening and broadening the relationship between India and the EU – and the Netherlands in particular. Particular attention is paid to (1) **military technologies**; and (2) **critical technologies and supply-chain restructuring** (semiconductors, batteries, data, etc). The insights of Indian and European experts in the field are given in six stand-alone chapters, preceded by an introduction and followed by concluding analysis by the Clingendael editors.

Opportunities to enhance EU–India ties are analysed along three courses of action: 1) **'protect'**: keeping out unwanted influence; 2) **'promote'**: using innovation and commercialisation; and 3) **'regulate and shape'**: using regulatory frameworks (and standards, for example). In each of these three areas, joint action with India is possible. The EU–India Trade and Technology Council (TTC) will be the natural venue to pursue these opportunities.

The expert analysis highlights that technology and foreign policy have been closely intertwined in India since its independence in 1947. Technology came to be regarded as a key instrument to steer India's developing economy and enhance its strategic autonomy. This explains India's quest to expand research and development in nuclear technology, which – after the nuclear weapons tests in 1974 and 1998 – led several European countries, including the Netherlands, to adopt restrictive countermeasures, some of which are still in place.

Key findings

To India, technology is also a tool to create synergies of interdependence in its foreign relations, with developed as well as developing countries. Delhi has significant foreign policy relationships in military and defence technologies as well as other critical technologies (such as artificial intelligence, quantum computing and robotics). This is most prevalent with the United States, Israel, Japan, France and the United Kingdom. In addition, India has offered technical

courses since 1964 to 160 developing countries, in the hope of improving Indian soft power through technological engagement and positioning.

This report's analysis highlights ample opportunities to enhance cooperation on strategic technologies, with a view to enhancing strategic autonomy and decreasing one-sided dependencies. Looking at defence technology cooperation, great potential exists in the areas of quantum research, drone systems, space research and aerospace materials. Rather than focusing on large systems, the EU (member states and companies) and India have the greatest prospects if they focus on critical subsystems, such as critical alloys, engines and sonars.

Reducing barriers to R&D cooperation for semiconductor companies is another viable path forward for the EU and India. Investment in a joint foundry (semiconductor fabrication plant, or fab) and collaboration on open hardware projects within the semiconductor sector hold great potential to deepen EU–Indian ties. In many high-tech industries, critical minerals are an essential resource. Creating a centre of excellence to explore, recycle and stockpile these minerals jointly will benefit both sides.

Investment should also go into best practice exchanges, particularly on privacy by design and digital IDs. Jointly developing human-centred technologies and exchanging views is another route for the EU and India to work on decreasing dependencies while maintaining democratic principles. Moreover, the two sides could work on capacity-building in India on EU export controls, in order to facilitate cooperation in many tech areas.

Learning from other partnerships

In deepening their strategic tech cooperation, the EU and India can benefit from India's engagement with other trusted partners, such as with Australia, Japan and the United States in the Quad, and Australia and Japan in the Supply Chain Resilience Initiative (SCRI). The lessons to draw from these initiatives are fourfold, and relate to mapping, principles, matchmaking and India as a hub. For example, the EU–India Trade and Technology Council could invest in mapping collective capacity and vulnerabilities in specific technology-sector supply chains, and adopting a common set of principles for the supply chains of critical tech. Key to all these efforts on supply-chain restructuring is the role of 'trust', so investing in

building such trust is required. In addition to mapping and principles, there is an opportunity for India and the EU to engage in matchmaking, such as buyer/seller events.

Moreover, closer engagement by the EU and/or specific EU member states with the Quad and SCRI's pursuits in supply-chain restructuring seems opportune. After all, European tech companies play a key role in specific supply chains, such as ASML in the semiconductor industry, and Nokia and Ericsson in 5G/6G telecommunications technologies. In this sense, India has the opportunity to become a hub for investment. The EU can draw from Japan's approach of setting up supply-chain resilience projects at a company level in several countries, including in India. Moreover, building on EU–Japan agreed cooperation on the resilience of critical global supply chains, the EU could establish similar cooperation with India, or broaden the existing cooperation with Japan to also include India.

Overcoming challenges to unleash opportunities

Specific challenges to deepening the EU–India relationship on strategic tech sectors are yet to be overcome. On the Indian side, this includes India still being considered a difficult market by European companies, in part because of the role of individual Indian states and differences in regulation among them. What stands out on the European side are disparities in European companies' willingness to engage in technology transfer. Another challenge concerns differences among EU member states in export controls on military, defence and dual-use technologies.

Addressing these issues will unlock vast opportunities, as the EU and India can play an important role in each other's ambitions to reduce unwanted dependencies, for example through joint development of human-centred technologies that focus on the people – promoting transparency, openness, inclusivity and digital rights. Military technologies, critical technologies and supply-chain restructuring stand out as areas where these dependencies play a major role and where many opportunities to enhance EU–India ties are yet to be seized.

The evolving role of technology: from business to strategic interests?

Maaike Okano-Heijmans and Vera Kranenburg (editors) | Clingendael Institute, The Hague

Introduction

In the current geopolitical context, the European Union (EU) and its member states, including the Netherlands, are looking to decrease their exposure to critical dependencies, improve their strategic autonomy and become more involved in the geopolitics of the Indo-Pacific region. In doing so, technology will play a key role. The European Commission's Joint Communication on the 'EU strategy for cooperation in the Indo-Pacific' calls India a 'core Indo-Pacific partner' and highlights as its first proposed action: 'Engaging with Indo-Pacific partners to build more resilient and sustainable global value chains by diversifying trade and economic relations, and by developing technological standards and regulations that are in line with our values and principles'.¹

The Netherlands Indo-Pacific Guidelines highlight the need to 'work more closely with [...] countries in the region, such as India, to promote effective multilateralism and to strengthen the international legal order'.² This Clingendael Report seeks to contribute to these objectives, specifically by looking into the role that technology can play in deepening and broadening the relationship between the EU and India, thereby contributing to both sides' strategic autonomy and better equipping both to navigate new geopolitical realities.

India is looking to develop its own high-tech sector, and is opening up to more outside investment and cooperation. For India, partnering with European actors

1 European Commission, '[The EU strategy for cooperation in the Indo-Pacific](#)', September 2021.

2 Government of the Netherlands, '[Indo-Pacific: guidelines for strengthening Dutch and EU cooperation with partners in Asia](#)', November 2020.

can be beneficial for developing key technology sectors of interest (from military to financial technologies), which are vital for Indian diplomatic, economic and security interests. For the EU, a key question is: can India help the EU to move closer to strategic autonomy, through decreasing some of its dependence on China?³ India is also looking to decrease dependence on China in some areas, but its military tech sector is still closely tied to Russia as a legacy of New Delhi's cordial relationship with the former Soviet Union. This brings us to the question: can technology act as a catalyst for the enhanced strategic autonomy of both sides, and, in parallel, for stronger and deeper ties between India and European partners?

To achieve these objectives, the EU needs to broaden from its focus on commercial ties and shed any naivety about the realities of working closely with India. Now, even more than several years ago, this requires 'a practical long-term vision, a reconsideration of political priorities and official language, as well as a willingness to make political trade-offs'.⁴ As illustrated by the war in Ukraine, which the Indian government has been unwilling to renounce unequivocally, European players will have to relate to India more on Indian terms (or at least in a way that India considers appropriate) in order to make meaningful strides. To some EU member states, including the Netherlands, this involves greater flexibility in interpreting sometimes decades-old ideas and limitations to cooperation.

Differences between EU member states are seen, for example, in their responses to India's nuclear tests in 1998. Some governments, including those of the Netherlands, Sweden and Denmark, suspended bilateral aid to India, while France and the UK favoured a more moderate approach and strongly resisted an EU-wide aid freeze.⁵ As detailed in Box 1 below, export control criteria are also interpreted and administrated differently by EU member states, in ways that Indian officials find hard to understand.

3 This set of two questions was first explicated by Dr Mohan Kumar, Chairman, Research and Information System for Developing Countries, Delhi, and former Ambassador with the Indian Foreign Service, at a closed expert meeting in October 2022.

4 Maaïke Okano-Heijmans, '[Reimagining Europe's partnerships with India and Japan](#)', Clingendael Policy Brief, February 2018.

5 See, for example, Mark Turner, '[Union divided over India's nuclear tests](#)', *Politico*, May 1998; and Rakesh Sood, '[India and non-proliferation export control regimes](#)', Observer Research Foundation, April 2018.

Until recently, most European capitals have been unwilling to fundamentally reconsider their mindset and their policies regarding China and the Indo-Pacific more broadly. France stands out as an exception, mainly because of its sizeable defence industry and overseas territories in the Indo-Pacific. As the hardening Sino–US competition and war in Ukraine raise the pressure on governments to coordinate with countries that share concerns about an authoritarian, assertive China and a militaristic Russia, are they willing to make the adjustments today, including in their relationship with India?

As the geopolitics of technology and digitalisation rise to the top of national agendas worldwide, intensification and broadening of the relationship in the tech and digital domains can play an important role in reshaping Europe's relations with India. The Netherlands and the EU stand to benefit from a greater Indian role in their diversification of strategic supply chains for critical products, including semiconductors, batteries and pharmaceutical products. Opportunities abound for cooperation with India on sustainable energy technology and natural resources, particularly as a counterweight to Chinese dominance in supply chains.⁶ A deeper relationship between the EU and India also provides a toehold in the Indo-Pacific for the EU to promote other key issues, such as the climate agenda. With a young population that will soon outnumber China's, India is set to rise in importance to the EU as one of the world's largest business and consumer markets, which can help European companies as they seek market diversification and a boost amid faltering global demand.

Technology in EU–India ties: a focus on business and sustainable development

With almost 18 per cent of the world's population in 2022, India has a very attractive market. Yet India is still relatively poorly integrated in the global value chain, and Europe–India trade and investment ties are underperforming. A prerequisite for successful cooperation between India and European partners, including in the technology field, is an incentivised private sector. International companies are generally interested in doing business in India, but they often opt for easier markets to enter and operate in. This also goes for European

6 Louise van Schaik, Akash Ramnath and Harman Singh, '[Better together: EU–India cooperation in addressing climate risks](#)', Clingendael Policy Brief, August 2021.

companies that produce military equipment. India is considered a difficult market to operate in because of high tariffs, the lack of an overarching government procurement policy and a number of regulatory standards issued by multiple bodies, some of which can operate in contradiction to one another.

As a result, with trade in goods in 2021 at €88 billion or 10.8 per cent of total Indian trade, the EU is India's third largest trading partner – almost on a par with the United States and China. However, also in 2021, India accounted for just over 2 per cent of the EU's total trade volume, compared to 16 per cent for China, almost 15 per cent for the US and 10 per cent for the UK.⁷ As India's seventh largest trade partner, the Netherlands tops the EU member states. In recent years, particularly the import and export value of medicinal and pharmaceutical products has grown substantially.⁸

Several years ago, the Indian government set out to promote its own manufacturing and production capabilities through its 'Make in India' campaign, furthering self-reliance across sectors.⁹ This initiative is based on four pillars: new processes (to improve the 'ease of doing business' in India); new infrastructure (developing industrial corridors and smart cities); new sectors (opening up to foreign direct investment); and a new mindset (the government as a facilitator and not a regulator). Since 2022, 'Make in India' is more regularly followed by 'Make for the World', indicating an ambition to increase manufacturing exports. Although many challenges remain, India has moved up in the 'Doing Business' rankings, from 142nd in 2014 to 63rd in 2022, as per the latest World Bank Report.

The hope in Brussels is that the relaunch in 2022 of negotiations on an EU–India free-trade agreement (FTA) will be used as an opportunity for India to promote domestic reform and unlock its full potential, just as China accepted transformative concessions during its World Trade Organisation (WTO) accession. An FTA would certainly draw more European companies to India, to operate on the domestic market and to expand India's role as a supply-chain hub. Indian officials highlight that India has come a very long way, pointing out that the newfound willingness to negotiate on extremely sensitive issues like sustainable development, government procurement and human rights constitutes no less than a paradigm shift by India. A key reason to embark on this path is that

7 DG Trade, '[Trade picture: India](#)', European Commission, November 2020.

8 For details, see RVO, '[Handel India–Nederland](#)', April 2013; and Government of India, 'Major initiatives: [Make in India](#)', last accessed November 2022.

9 For details, see Government of India, 'Major initiatives: [Make in India](#)', last accessed November 2022.

without access to European technology and lacking a major trade boost, India is unlikely to achieve its 2047 target of becoming a developed economy.

In December 2021, the EU launched the Global Gateway, its connectivity initiative with digitalisation as a key focus area, alongside climate and energy, transport, health, and education and research. This complements the EU–India Connectivity partnership established six months earlier, which seeks more specifically to strengthen connections within India, between the EU and India, and with India in third countries. Under these flags, several projects have been proposed or are underway, including green housing in Maharashtra, Uttar Pradesh and Karnataka; improvement of water supplies in the municipality of Chandigarh; and greenhouse gas reduction support for urban transport policy in the cities of Kochi, Ahmedabad and Nagpur.¹⁰

As evidenced by these initiatives, the EU–India relationship focuses on furthering the Sustainable Development Goals (SDGs) – alongside business. Cooperation in other strategic tech areas based on shared economic, political and security interests is, however, not yet evident in the relationship. The EU and India voiced ambition in this regard with the launch of the EU–India Trade and Technology Council (TTC) in April 2022. The TTC is to become a place of ‘strategic engagement’, responding to geopolitical change and ‘challenges at the nexus of trade, trusted technology and security’.¹¹

The case of the Netherlands

The Netherlands’ main focus in its technological relationship with India has been the earning potential of Dutch companies in India and contributions to the SDGs. As visualised in Figure 1 below, the focus of the Netherlands is very much on three sectors: water; agriculture; and health. Fruitful cooperation has been developed in these three core sectors. Next to these sectors, the Netherlands Innovation Network in India focuses on so-called ‘key enabling technologies’ such as artificial intelligence (AI), Big Data, cybersecurity and space.¹² In 2019, King Willem-Alexander and Queen Máxima, together with (then) Minister of Foreign Affairs Stef Blok made a state visit to India, at which the King also gave a speech at the Netherlands–India Tech Summit in Delhi, co-organised by the

10 EU Delegation to India and Bhutan, [Global Gateway and the EU–India Connectivity Partnership](#), July 2022.

11 See https://ec.europa.eu/commission/presscorner/detail/en/IP_22_2643.

12 Dutch Embassy in New Delhi, [‘The Netherlands Innovation Network’](#), last Accessed November 2022.

two countries.¹³ During the visit, various technology project partnerships were announced, including several related to water and health, as well as in the automotive and internet sectors.¹⁴

While Indian officials reportedly sometimes struggle to cite tech sectors beyond water and agriculture where they see Dutch proficiency, engagement with strategic tech sectors other than military and defence has been on the rise in recent years. For example, the Dutch government has received requests and delegations from the Indian Ministry of Electronics and Information Technology and the Indian Ministry of External Affairs, the Embassy of India and the state level on cybersecurity, quantum technology and semiconductors. Technology collaboration between the Netherlands and India also exists in the Joint Working Group on Science, Technology and Innovation between the Indian Department of Science and Technology and the Dutch Ministry of Economy and Climate Policy. This working group focuses on key enabling technologies such as AI, data analytics and space technology in the fields of water, agriculture and health/life sciences.

Figure 1 Technology in Netherlands–India relations today: sectoral focus on science, tech and innovation



Source: authors' compilation

13 Het Koninklijk Huis, [‘Toespraak van Koning Willem-Alexander bij de India Tech Summit, New Delhi’, October 2019.](#)

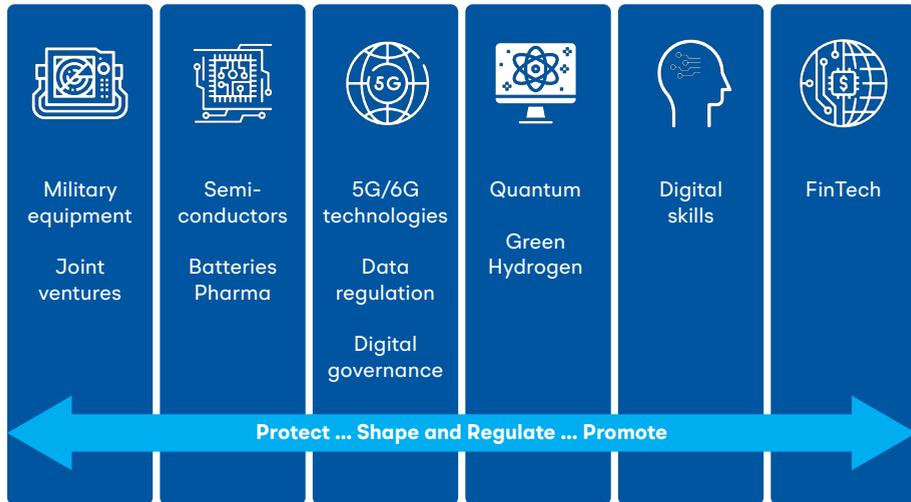
14 [‘Netherlands, India announce partnerships on eight tech projects’, Hindustan Times, October 2019.](#)

Hence, while India is a priority country for the Netherlands' Ministry of Economic Affairs and Climate Policy for science, technology and innovation cooperation, geopolitical considerations do not yet play a major role in the Dutch foreign (economic) policy approach to India. However, the Dutch approach appears to be shifting. India is on the verge of significant technological innovations – including privacy by design, and decentralised approaches including digital public infrastructure – and the Netherlands and other EU member states stand to benefit from closer engagement with these initiatives, while simultaneously strengthening Europe's strategic autonomy. In addition, there is a growing interest from businesses in India – as well as Japan – as the challenges of doing business in China are becoming more evident. Moreover, attempts to attract Indian investments are becoming more strategic, shifting 'from volume to value' – that is, considering which Indian companies can contribute to a specific niche or strengthening of the Dutch ecosystem, rather than supporting a plethora of Indian companies that wish to invest in the Netherlands. Shifting to a more strategic approach to promoting and facilitating high-end and military technology trade, investment and cooperation seems desirable for economic as well as political reasons, including decreasing critical dependencies in supply chains, for example on China and Russia.

Towards more strategic cooperation in tech?

With the challenge to cooperate more strategically between Europe and India in mind, this report focuses on strategic tech sectors. As visualised in Figure 2 below, the tech sectors in which India wishes to cooperate with the EU span from more strategic sectors such as military technologies and critical technologies in supply-chain restructuring, including semiconductors, batteries and data, to more economic challenges, including the spread of financial technologies.

Figure 2 Technology and digitalisation in Netherlands/EU–India relations: what India wants



Source: authors' compilation

Reducing dependence on China is a unifying goal of any technology strategy. There is unlikely to be a scenario where the EU or India can fully substitute dependency on a technology away from China; learning to manage dependencies will be an inevitability.

Amid this geopolitical setting, Europe's and India's search to reduce their dependencies and strengthen their strategic autonomy can broadly be categorised as three courses of action: promote; protect; and regulate and shape. Put differently, this is the 'keep out' strategy (protect) and the 'run faster' strategy (promote), coupled with the EU's Brussels effect through regulatory frameworks (regulate and shape). These are illustrated in Figure 3 below. Action on all three fronts, both at home and with strategic partners such as India, is necessary if the EU wishes to remain a relevant player in this sector.

Figure 3 Three courses of action to strengthen strategic tech cooperation



Source: Maaïke Okano-Heijmans, *Open Strategic Autonomy: the Digital Dimension*, Clingendael Report, January 2022 (forthcoming).

This report’s focus is largely on further cooperation within the ‘protect’ agenda, which is about establishing and deepening trusted connections with third countries – including for supply chains – while avoiding protectionism. Updating the framework conditions of the internal market – with a view to strengthening one’s strategic autonomy – is also part of this agenda. Opportunities for closer EU–India alignment exist on both fronts.

Action on the ‘protect’ side must be tied, however, to the ‘promote’ agenda, which at home is about investments in innovation and valorisation, as well as deeper economic ties more broadly. Abroad, the ‘promote’ agenda is about action taken under the Global Gateway brand. Within EU–India ties, this includes joint investments in science and technology innovation (STI) in more strategic tech sectors – such as defence technology collaboration – as well as joint action under the Connectivity Partnership of May 2021. Finally, the EU’s ‘regulate’ agenda revolves around broad issues including data, digital market and services, standards, the internet and security. Discussions will likely feature in the EU–India Trade and Technology Council (TTC).

In India, a government-to-government agreement is often needed to help launch business relations. Herein lies an opportunity for European governments to actively shape the opportunities for cooperation in particular technological sectors, including in defence technologies, if they wish to act on the premise that deeper, broader relations are a strategic interest of the EU.

With regard to critical technologies and the building of ‘trusted’ supply chains, European governments can assist a shift towards production in India, which is now apparent from the bottom–up. In some tech areas, market forces have

brought about a slow shift in production from China to India. For example, in October 2022, Apple asked its suppliers to produce AirPods and Beats in India.¹⁵ Older iPhone models were already being manufactured in India, but now for the first time new models are also produced in India.¹⁶ Part of Apple's rationale was to begin to diversify production amid concerns about its global value chain's reliance on China; a fear shared by many international companies, especially amid deteriorating relationships between the West and China. The fact that private enterprises in India can rely more on market-based regulation and judicial protection can add an additional layer of trust to supply chains based in India. Strategic cooperation on technology between the EU and India involves both 'promote' and 'protect' elements, as it aims to contribute to the diversification of supply chains in strategic products such as semiconductors and batteries, as well as military technologies (on the part of India). This is in addition to more cooperation on research and innovation in these fields. Traditionally, strategic and defence partnerships have served a similar purpose and India is developing these with the EU and member states as well.

As of 2022, India has four strategic partnerships in Europe: with the EU; France; Germany; and the United Kingdom. As subsequent chapters will elaborate, cooperation on defence and technology is most advanced with France and the UK. With Germany, arms control issues have declined, while Berlin has become much more vocal on security-related issues, as exemplified by the inclusion of a security policy pillar in its Guidelines for the Indo-Pacific.¹⁷ This was a watershed moment for a country whose Asia policy has almost exclusively focused on China. Much the same can be said for the EU, whose Indo-Pacific Strategy has helped focus efforts on security and defence, as well as on relations with India specifically. India has moved up on the agenda of other EU institutions outside of the European External Action Service. Ongoing talks between the EU and member states within the Political and Security Committee on how to deepen defence cooperation with India are an important example of this.

15 Ting-Fang Cheng, '[Apple asks suppliers to shift AirPods, Beats production to India](#)', *Nikkei Asia*, October 2022.

16 Alex Hern, '[TechScope: what's really behind Apple's shift from China](#)', *The Guardian*, September 2022.

17 German Federal Foreign Office, '[One year of the German Government policy guidelines on the Indo-Pacific region](#)', September 2021.

Over time, the shifting strategic context and the EU's outlook are likely to see a change in Indian relations with other EU member states, including the Netherlands. While a defence attaché is appointed to the Netherlands Embassy in Delhi, this official is currently mostly engaged with geopolitical developments and security issues rather than military cooperation. A port call at Mumbai in 2021 by the Dutch frigate HNMLS Evertsen, which accompanied a British fleet to the Indo-Pacific, created an exceptional chance for the Dutch and Indian naval forces to meet. Deepening the ties between the Dutch and Indian defence industries is relatively absent from the Netherlands' agenda, and is perceived to be politically and practically difficult, while ties with Bangladesh and Sri Lanka, in comparison, run much deeper.¹⁸

Ambitions are high and cooperation is ongoing in the field of cybersecurity and counterterrorism. Yet Indian officials highlight that it remains difficult to convince the Indian defence establishment of the benefit of working with the EU, because of competence issues and diverging policies among EU member states. As elaborated in Box 1 below, the implementation of export controls is an important example of this: EU member states occasionally interpret EU criteria for export controls differently (that is, more or less strictly) and the level of transparency about decisions reached differs. These differences, and the opaqueness of procedures, create a lack of trust between India and particular EU member states that needs to be overcome. That said, there is a degree of growing convergence between Indian and European positions on arms control, yet gaps and issues still persist, which could cause complications for any deepening of ties around military technology.

Box 1 European export controls on India: military and dual use goods

EU arms exports are assessed against the eight criteria of the EU Common Position on Arms Exports, while the EU Dual-use Regulation defines the criteria upon which EU member states check their sales of dual-use goods (respectively, Council Common Position 2008/944/CFSP and Council Regulation (EC) No 428/2009). While the criteria are agreed at the EU level, interpretation and implementation of these criteria lie with the EU member states.

18 Authors' communication with Dutch defence officials, August–September 2022.

Differences among EU member states in the interpretation of these EU criteria, as well as in the way domestic export control decisions are reached, occasionally result in more and less strict export controls by EU member states. Differences also exist in the levels of transparency about export control decisions. For example, since 2011, the Dutch government must inform its national parliament when exporting arms worth more than 2 million euros to states that are not in NATO, the EU, Switzerland, Australia, Japan or New Zealand. Other EU member states, notably France, do not have such a rule.

India's non-participation in non-proliferation fora plays a large role in how European countries deal with export controls and India. India is not a full participant in the key export control forum, the Nuclear Suppliers Group (NSG). Due to India's non-participation in the Treaty on Non-Proliferation of Nuclear Weapons (NPT) and its nuclear tests conducted in 1974 and 1998, some EU member states are particularly cautious around the export of certain dual-use items to India.

That said, India's engagement with key non-proliferation and control regimes has increased in recent years. India is a candidate participant of the Nuclear Suppliers Group (NSG), a group of nuclear supplier countries that seeks to contribute to the non-proliferation of nuclear weapons. While many European countries (as well as Russia and the United States) support India's participation, China does not – citing Pakistan's non-inclusion in the NSG as a reason. Members of the NSG cannot engage in civilian nuclear trade of certain sensitive items with countries that have not signed the NPT. However, India was granted a waiver from this rule in 2008.

Separately, India in 2016 joined the Missile Technology Control Regime (MTCR), which aims to prevent proliferation of unmanned delivery systems capable of delivering weapons of mass destruction.¹⁹ In 2017, India went on to join the Wassenaar Arrangement, which promotes transparency in the export of arms and dual-use technologies.

19 Missile Technology Control Regime, '[Objectives of the MTCR](#)', last accessed November 2022.

Towards cooperation in strategic tech sectors?

This report focuses on strategic tech sectors in order to answer the question: can technology play a role in reshaping the relationship between India and the EU, and the Netherlands in particular? Reshaping the relationship builds on the deep and comprehensive cooperation that already exists between the EU and India in the fields of sustainable development and trade, and on water–agriculture–health for the Netherlands and India. In addition, this report aims to identify opportunities in strategically important technology sectors – particularly military technologies, critical technologies and supply-chain restructuring. As a prelude to this report’s expert opinions, the following paragraphs detail key developments and trends in these sectors in recent years.

Military technologies

While India’s focus on ‘Make in India’ suggests that India is unlikely to buy large defence systems from abroad, opportunities exist for collaboration with European defence manufacturers to help reduce costs. When it comes to military technologies, India is looking for different types of technologies to import, or to co-develop, with the ultimate goal of increasing its own production capacity. Today, French companies are most active when it comes to exporting military goods to India, but France’s exports are much smaller in size than what Russia, the US and Israel export to India. European companies have faced difficulties in doing business with India: Pilatus (from Switzerland) and Dassault (from France) have faced allegations of corruption in India.²⁰ Certain French companies have shifted their manufacturing to India, also partially because of problems in the US–China relationship. German companies are also interested in producing locally (even to circumvent arms export issues), but India is seen by these companies as a difficult market.

In recent years, the Indian government has taken steps to enhance its position and role in the defence sector, both by inviting foreign companies into India and by strengthening its position as a defence exporter. From 2016, Delhi eased defence sector foreign direct investment (FDI) norms, thus making India’s military–industrial complex more attractive to foreign companies. This has

20 Keystone SDA, ‘[Pilatus allowed to resume activity in India despite corruption probe](#)’, *Swissinfo*, October 2019; and Dassault Aviation, ‘[About Dassault Aviation and India](#)’, April 2021. More on the issue of corruption scandals can be found in the chapter of this report by Yogesh Joshi.

resulted in stronger ties between India and European countries. For example, also in 2016, Airbus Helicopters signed a contract to make parts for Panther helicopters and Indian company Reliance and French company Dassault started a military aerospace joint venture.²¹ In 2017, Larsen and Toubro (from India) and MBDA (from France) started a joint venture to produce missiles and missile systems.²² Then, in 2021, India lifted its ban on Italian company Leonardo, while in 2022, India pitched to France to become a maintenance hub for Rafale fighter jets.²³ Also in 2022, European Commission President Ursula von der Leyen stated that Brussels would try to increase European arms sales to India.²⁴

The Indian government is not only looking to import defence systems and military technology, but is also aiming to become a defence exporter. Delhi steadily moved up the ranks, and in 2019 became a top-25 defence exporter globally.²⁵ To a large extent, further export potential relies on knowledge transfer and cooperation with and investment from Western countries. Hence, in order to expand defence exports and improve the ease of doing business, the Indian Ministry of Defence in 2022 announced two Open General Export Licences (OGELs) that enable the export of specific parts or components, as well as technology transfer between companies.²⁶ The countries covered by the OGELs are Belgium, Canada, France, Germany, Italy, Japan, Mexico, Poland, South Africa, Spain, Sweden, the UK and the US. The Netherlands is not included in the list.

21 Nicholas M. Florio, Prashant Parikh and Aijaz Hussain, '[Aerospace and defense global cross-border joint ventures](#)', Deloitte Center for Industry Insights, 2017; Anirban Chowdhury, '[Airbus Helicopters signs contract with Mahindra to make parts of Panther helicopters](#)', *The Economic Times*, July 2016; and Nils Zimmerman, '[France, India team up in aerospace joint venture](#)', *DW*, March 2016.

22 Germar Schroeder et al., '[Joint ventures to build national defence industries: beyond offsets](#)', Strategy&, PWC, 2020.

23 '[India decides to lift ban on Italian firm Leonardo, but conditions apply](#)', *The Print*, November 2021; and Sidhant Sibal, '[India pitches with France to become Rafale maintenance hub](#)', *WION*, March 2022.

24 Robin Emmot and Frances Kerry, '[EU chief to seek closer military, trade and tech ties on India visit](#)', *Reuters*, April 2022.

25 Pieter D. Wezeman et al., '[Trends in international arms transfers 2019](#)', SIPRI, March 2020.

26 Government of India, '[Open general export licence for export of parts and components](#)', June 2022; Government of India, '[Open general export licence for intra-company transfer of technology](#)', June 2022.

Critical technologies and supply-chain restructuring

Beyond military and defence technology, the Indian government has in recent years put forward an initiative to develop a domestic semiconductor sector: the India Semiconductor Mission. There are growing challenges to the stability of semiconductor supply because of lack of diversification of the industry, manufacturing overdependence on Taiwan, restrictions because of the COVID-19 pandemic, US export controls on Chinese semiconductor companies and tensions between Taipei and Beijing over Taiwan's independence.

The Digital India Corporation, a non-profit established by the Indian Ministry of Electronics and Information Technology, includes a division titled the India Semiconductor Mission. The India Semiconductor Mission's goal is to encourage intellectual property (IP) creation, technology transfer, the development of semiconductors and a semiconductor supply chain.²⁷ In September 2022, the Indian company Vedanta announced that it had signed memorandums of understanding (MoUs) with the Indian state of Gujarat to set up semiconductor and display fabrication units in a joint venture with Taiwanese tech company Foxconn. Vedanta will own 60 per cent of the joint venture, with Foxconn owning 40 per cent. The joint venture plans to set up a semiconductor manufacturing plant within two years and will be using the 28 nanometre process technology,²⁸ which was first commercially used in 2011.

The top ten companies working on semiconductors in India include the Dutch company NXP, which has operations in Noida, Bengaluru, Pune and Hyderabad.²⁹ NXP Noida is one of NXP's largest (hardware and software) design centres. Another large semiconductor company, Intel (from the US), also has operations in India, but like NXP they do not manufacture semiconductors there. Intel has a design and engineering centre in Bengaluru.³⁰

27 Digital India Corporation, <https://dic.gov.in/>, last accessed November 2022; Indian Ministry of Electronics and Information Technology, '[Vision and objectives](#)', last accessed November 2022.

28 Vedanta Limited, '[Vedanta signs MoUs with Government of Gujarat to set up semiconductors and display fab units](#)', September 2022.

29 Santosh Das, '[Top 10 semiconductor manufacturing companies in India](#)', *Electronics and You* blog, November 2022; NXP, '[Know more about NXP in India](#)', November 2022.

30 Teena Jose, '[Intel India opens new design and engineering center in Bengaluru](#)', *Entrepreneur India*, June 2022.

Other strategic technologies

Another technology sector that the Indian government is interested in developing is the manufacturing of lithium-ion batteries. India currently has no lithium-ion battery manufacturing capabilities and the government has thus introduced incentives to promote Indian battery production, such as the Production Linked Incentive scheme. Companies in South Korea, Japan and China are leaders in lithium-ion battery manufacturing, but Europe has been successful in creating demand for batteries, which has resulted in battery-making companies opening up manufacturing plants in Europe as well.³¹ India has an abundance of light rare-earth elements that have the potential to act as a balance in relations with countries that possess other critical raw materials. India does not have an official list of critical raw materials, but the EU does.³²

Since the COVID-19 pandemic, the pharmaceutical sector has come to be regarded as a strategic sector that requires 'trusted supply chains'. As a key manufacturer of generic medicine, India plays a large role herein. Europe is dependent on both India and China to produce generic medicine, and India is dependent on others, including China, for active pharmaceutical ingredients in order to produce said medicine. The Netherlands and other EU countries are looking to India in their search for strategic partnerships, as illustrated by the exploratory missions of their health ministries' officials to India. The question of what the opportunities are for the EU and the Netherlands to have serious (long-term R&D) cooperation with India on original (rather than generic) medicine is an important one, yet is beyond the scope of this study.

In an aim to improve Europe's understanding of rapidly evolving developments in these strategic tech fields, this report continues with analysis by key Indian and some European experts on these issues.

31 Srinath Rengarajan, '[Battery manufacturing in India: time for a Bharatvolt?](#)', *EV Tech News*, April 2021.

32 V. Balam, '[Rare earth elements: a review of applications, occurrence, exploration, analysis, recycling and environmental impact](#)', *Geoscience Frontiers*, 10:4 (July 2019); DG for Internal Market, Industry, Entrepreneurship and SMEs, '[Critical raw materials](#)', European Commission, last accessed November 2022.

An ‘outside-in’ approach: views from Indian and European experts

In discussing the role of technology in Europe’s relationship with India, this report adopts an ‘outside-in’ approach – that is, presenting views and forward-looking suggestions by experts from India, as well as from Europe. Four chapters are by Indian experts, two of which focus on the field of military technologies, and another two chapters look mainly at strategic supply-chain technologies (in particular, semiconductors). Finally, two chapters by Indian and European experts based in Europe reflect on the diplomatic context of cooperation, as well as on opportunities and challenges in the relationship, specifically in the trade and technology fields.

All of the experts were asked to reflect on the same leading questions:

Can the EU and European capitals develop their relationship with India through enhanced engagement in the field of technology?
Moreover, can technology play a role in aligning (drivers of) Indian foreign policy to that of the EU and its member states?

Taking these questions as a starting point, all of the experts were asked to reflect on the role of technology in foreign relations and the domestic context in which policies are developed; the strengths and dependencies of India in the tech field; as well as objectives and instruments in the field of military technologies and critical technologies in supply-chain restructuring.

The six contributions can be read as individual chapters, but are most valuable when read together. Divided into three different sections, they offer insights into the role of strategic technologies in the relationship between India and the EU, and the Netherlands specifically.

The first section includes two contributions that focus on the military tech dimension. The opening chapter by *Yogesh Joshi* lays out the historical development of India’s defence partnerships. Joshi then argues that the current geopolitical moment presents a prime opportunity for greater European involvement in India’s defence industry. The following contribution by *Sameer Patil* highlights India’s current defence technology collaborations, and identifies four key areas where engagement between EU member states and India can be taken forward.

Next we have a set of two contributions that mainly focus on critical technologies and supply-chain restructuring. In the third chapter, *Pramit Pal Chaudhuri* zooms in on tech partnerships and the relationship with Europe from New Delhi's point of view. He concludes that there is considerable potential for cooperation between India and EU member states, also within the defence technology space. The fourth piece by *Pranay Kotasthane* focuses on the role of semiconductors as a particularly critical tech sector, and makes the case that the EU (and EU member states) and India should invest in building a joint semiconductor ecosystem.

Finally, a third section delves specifically into the question of EU–India cooperation in the field of tech. *Jagannath Panda* examines tech cooperation between European countries and India and the development thereof, including a specific focus on cooperation between India and the Netherlands. Next comes a view from Europe on the role of technology in EU–India relations. *Stefania Benaglia* and *Rosanna Fanni* analyse the role of tech in the relationship between the EU and India, discussing the Trade and Technology Council as well as best practices that the EU and India can learn from each other.

To conclude, the report's editors highlight several findings that emerge from the preceding contributions. Their closing chapter reflects on the main opportunities and obstacles to strategic tech cooperation between the EU and India proposed in the preceding chapters, offering suggestions for further dialogue and joint action.

India and the EU: opportunities to deepen military partnership

Yogesh Joshi | Institute for South Asian Studies, National University of Singapore

Technology plays four vital roles in Indian foreign policy. First, all foreign policy is local for a rising power such as India, unlike the global powers during the Cold War. Technology provides a medium through which New Delhi aims to steer its developing economy into a developed one and transform the living conditions of its vast but highly aspiring population.

Second, technology is also critical for India to create synergies of inter-dependence in its international relations. New Delhi believes technological partnerships often transcend the otherwise transactional nature of international politics. India's preference for technological partnerships was evident in how it pursued its nuclear and space programme during the Cold War, building on multiple technology-sharing agreements with Canada, the United States, United Kingdom and France.³³ However, the rise of the Indian economy has increased India's purchasing power. It has also significantly augmented the capability of India's domestic industry, which has genuinely allowed India to pursue technological partnerships with advanced countries.

Third, given the Indian government's emphasis on strategic autonomy and foreign policy independence, New Delhi seeks multi-vectoral engagement in its technological partnerships and works intensely to avoid overdependence on a single source.

Finally, New Delhi has also used the purchase of technology from advanced economies as a leverage to pursue its economic and political goals. The significant increase in India's financial capability has allowed New Delhi

33 George Perkovich, *India's nuclear bomb: the impact on global nuclear nonproliferation* (Los Angeles, CA: University of California Press, 2002); and Rajeswari Pillai Rajagopalan, '[India's emerging space assets and nuclear-weapons capabilities](#)', *The Nonproliferation Review*, 26:5–6 (2019), pp. 465–479.

more significant bargaining power vis-à-vis global vendors. This has also increased the global competition to seek a foothold in India's economy.

India's policy on military technology addresses all these concerns. Until a decade ago, India disproportionately depended on imports to fulfill its military requirements. Reliance on foreign vendors – such as Russia, Israel and France – not only created considerable pressure on the Indian exchequer, but also impeded domestic production of military equipment. Indian Prime Minister Modi's emphasis on domestic production of military hardware is driven by the quest to reduce import pressure, to build local industrial capabilities and potentially make India a hub for military exports to the developing world. Significant policy initiatives have supported the process.³⁴ To support domestic manufacturing, Modi's government liberalised the investment structure, privatised India's state-owned ordnance factories, blacklisted imports of a series of military equipment and technologies, and, most importantly, encouraged India's private sector to team up with foreign vendors. Consequently, as per figures from research institute SIPRI,³⁵ India's defence imports reduced by 33 per cent between 2015 and 2020. Its defence exports also increased significantly.

Partnerships and cooperation: key countries

The buyer–seller relationship also rendered India highly susceptible to policy changes regarding arms transfers among exporting countries, particularly the US and its allies.³⁶ For example, after India's 1965 war with Pakistan, the US and UK imposed an arms embargo that significantly curtailed India's defence modernisation. Beginning in the 1970s, export control laws – undergirded by regimes such as the Wassenaar Arrangement and the Nuclear Suppliers Group – targeting India's space, nuclear and missile programmes also created enough caution on India's part to avoid importing defence equipment and anything remotely related to dual-use equipment from the West. Similarly, the United States, the European Union (EU) and its member states imposed stringent

34 Manohar Parrikar and Richa Tokas, '[India: self-reliance in defense sector – analysis](#)', *Eurasia Review*, 6 August 2021.

35 Stockholm International Peace Research Institute, '[SIPRI Arms Transfers Database](#)'.

36 Angathevar Baskaran, '[Export control regimes and India's space and missile programmes](#)', *India Quarterly*, 58:3–4 (2002), pp. 205–242.

sanctions after India conducted its nuclear tests in 1998.³⁷ This threat of sanctions and embargoes from the West was principally responsible for India's defence dependence upon Russia, which grew significantly during the Cold War and continued after. However, even when the West's political preferences forced the overdependence on Russia regarding arms transfers, India desperately tried to diversify its arms procurement. The emergence of France as a significant source of fighter aircraft and Germany for submarines in the 1980s resulted from India's preferred policy of maintaining technological autonomy.

After the Cold War, the quest for diversification also forced India to look for alternative arms vendors, namely Israel. However, India's turn to the United States for military supplies was informed by the need to seek American political support for India's rise in the global order. Such diversified military technological partnerships have elevated India's bilateral relations with all these key international players and helped it to garner political support for India's foreign policy goals, whether regarding Kashmir or a permanent seat in the UN Security Council.

Given India's low defence base and the historical neglect of its domestic manufacturing, New Delhi faces a Herculean task combining the third and fourth industrial revolutions in military technology.³⁸ India's defence needs are still highly dominated by conventional weapons systems. Yet the current transformation of military technology underpinned by AI, Big Data and Quantum computation must be incorporated simultaneously. India's immediate defence requirements will primarily be dominated by the necessity to fight limited conventional wars against China and Pakistan, but also to prepare for gray-zone tactics employed by China's People's Liberation Army in the Himalayan frontier and Islamabad-sponsored terrorism in Jammu and Kashmir.

Russia, Israel, France and the United States have been India's preferred partners for its conventional military needs. Although much of Russian involvement is restricted to supporting defence equipment procured during the Cold War, Russia has continuously positioned itself as a supplier of high-end military technologies such as nuclear submarines and S-400 ballistic missile defence

37 Daniel Morrow and Michael Carriere, '[The economic impacts of the 1998 sanctions on India and Pakistan](#)', *The Nonproliferation Review*, 6:4 (1999), pp. 1–6.

38 Morrow and Carriere, 'The economic impacts of the 1998 sanctions on India and Pakistan', pp. 1–6.

systems. It has also been highly forthcoming in transferring technologies. India's indigenous nuclear submarine programme was greatly aided by Russian technology. The joint venture on the Brahmos cruise missile is often considered a model for joint technological development of military hardware. The French have also followed the Russian model closely.³⁹ Paris is more than willing to offer high-end military equipment, such as the Rafale fighter jets, with India-specific technological upgrades. Still, the French have acknowledged the need to partner rather than merely sell military equipment to India. The French Naval Group is already building six Scorpène submarines for the Indian Navy with full technology transfers. Paris has also reportedly offered to make the Barracuda-class nuclear attack submarines for the Indian Navy. After the Cold War and normalisation of Indo-Israel relations, Tel Aviv has emerged as one of the most critical defence suppliers and partners.⁴⁰ Israel's prompt military assistance during the 1999 Kargil War established it as a reliable defence partner for India. Israel's contribution to India's defence profile is enormous: from drones to laser-guided ammunition for India's fighter aircraft to anti-ballistic missile systems for its naval ships.

Meanwhile, Indo-US defence cooperation has expanded significantly in the last two decades.⁴¹ Today, India's defence forces carry many US-made systems: M-114 ultra-light Howitzers; Apache attack helicopters; Chinook heavy-lift transport helicopters; the P8-I maritime reconnaissance and anti-submarine warfare aircraft; and heavy-lift aircraft such as Super Hercules and C-130J. New Delhi is highly interested in American drone technology and is reportedly seeking the domestic manufacturing and technology transfer of Predator drones from Washington, DC. Aircraft carrier technology is another avenue that may come to fruit in the coming years.

Beyond the big players: cooperation with European countries

Except for France, Europe has been a marginal player in India's defence industry. There have been only pockets of cooperation. Germany's shipbuilding company

39 ['India, France to expand defence, security partnership'](#), *The New Indian Express*, 6 November 2021.

40 Alvirte Singh Ningthoujam, ['India-Israel defense cooperation'](#), *The Begin-Sadat Center for Strategic Studies*, Perspectives Paper no. 236, 27 January 2014.

41 Joshua T. White, ['After the foundational agreements: an agenda for US-India defense and security cooperation'](#), *Brookings Institution*, 01:12 January 2021.

HDW provided India with its first non-Soviet submarines in the early 1980s; Swedish Bofors artillery guns were brought in the late 1980s and still serve the Indian Army; Italy has been a source of helicopters, naval vessels and torpedoes; Czech Tatra long-range hauling systems are used for missile transportation; and Ukraine provides upgrades for AN-32 transport aircraft and Zorya-Mashproekt gas turbine engines for Indian frigates that are under construction although the war in Ukraine has slowed down Ukraine's response to both of these upgrades. Yet at one point or another, many of these European firms – including Tatra, Bofors, AugustaWestland and BVT Poland – were implicated in corruption scandals, which were, until recently, a significant feature of India's defence procurements.⁴² Moreover, the European defence industry is also very inward-looking, and defence imports require negotiations with multiple stakeholders as many EU member states are involved in producing defence hardware. For example, one of the considerations in deciding against the Eurofighter Typhoon for India's Medium Multirole Combat Aircraft (MMRCA) procurement was the multiple vendors involved in its production.⁴³

However, shifts in the landscape of India's defence industry and the consequences of unfolding geopolitics underlined by an assertive China and a revanchist Russia provide significant opportunities for the EU and its member states in India's defence landscape.

India's evolving approach: military tech incubation and development

Four major trends are visible in India's military technology incubation and development approach.⁴⁴ First, even though state-of-the-art systems will continue to be procured for some considerable time to come to provide a battle edge for the Indian military, such procurement will be hedged against technological cooperation and domestic manufacturing by foreign arms vendors. States and firms aiming to break into the highly competitive Indian arms market must shed their inhibitions about technology transfers.

42 John Elliott, '[Why Indian politicians love defense corruption scandal](#)', *Newsweek*, 5 October 2016.

43 Kanwal Sibal, '[India's defence ties with Europe](#)', *Indian Defence Review*, 9 August 2012.

44 '[India defence acquisition trends 2022](#)', *Security Risks*, 18 December 2021.

Second, with the liberalisation of India's domestic defence industry and active encouragement from the government to private players – both established and start-ups – foreign arms vendors are increasingly collaborating with Indian firms to produce weapon systems and subsystems for India's requirements and exports.

Third, as India becomes more self-sufficient in system design and integration, military subsystems would become a significant avenue for cooperation. New Delhi has made great strides in designing and assembling tanks, artillery guns, fighter aircraft and naval vessels in the last two decades. However, India's capability for producing critical subsystems such as critical alloys, engines, sonar, radar, over-the-horizon missiles and network-centric warfare suites is still underdeveloped.

Finally, the ruinous consequences of the Russian war in Ukraine and Russian President Vladimir Putin's growing strategic alliance with China have forced the Indian state to recalibrate its dependence on Moscow. New Delhi may want to hold on to its strategic partnership with Moscow, but it also now understands that it desperately needs to scale down its defence dependence on Putin's Russia.

European responses

Many European firms have started appreciating these shifts by India and have adjusted accordingly. The French have taken the lead by pitching themselves as ready collaborators in shoring India's nascent but promising defence industry. France has offered to shift 100 per cent of its Panther medium utility helicopters and 70 per cent of the Rafale fighter aircraft assembly line to India, with the promise of technology transfers and assistance in India's indigenous next-generation fighter aircraft programme.⁴⁵ Airbus Defence has signed a partnership agreement with India's Tata corporation to jointly produce C-295 tactical airlift aircraft for both Indian consumption and exports.⁴⁶ Aircraft and helicopter design, armaments and engines will be significant avenues for defence

45 Mansij Asthana, '[France offers to shift Rafale fighter and Panther chopper assembly lines to India – report](#)', *The Eurasian Times*, 9 January 2021.

46 '[India formalises acquisition of 56 Airbus C295 aircraft](#)', *Airbus*, 24 September 2021.

cooperation. Many European firms such as SAAB, Avio, Paggio Aerospace and Airbus can become leading technology partners for India.

The Indian Navy, too, is looking forward to greater European involvement in its warship construction projects. The French nuclear Barracudas will firmly entrench Paris in India's naval build-up.⁴⁷ Similarly, the Italian firm Fincantieri has teamed up with India's Chennai Shipyards Limited to jointly produce naval ships such as fleet tankers and research vessels. The firm was also involved in construction of India's latest aircraft carrier, INS Vikrant. The Indian Navy is looking forward to technology collaborations for new minesweepers and landing crafts. France's Mistral class, Spain's Juan Carlos I class and German Shipbuilder TKMS are in consideration for these projects.⁴⁸

Many European firms also look forward to establishing themselves in the land-warfare domain. Sweden's SAAB has decided to shift its production line for the Carl-Gustaf M4 anti-tank weapons system to India.⁴⁹ Germany's Rheinmetall and India's Bharat Heavy Electronics Limited have agreed to cooperate on the joint production of Sky Shield anti-defence guns. As the conflict on the Himalayan border with China continues, India's requirement for light combat tanks has picked up significant momentum. Russia has offered its Sprut-class tanks, but the competition is quite open. Germany's Leopard, France's Le Clerc, and Ukraine's T-84 Oplot may be in contention. This will also be a significant opportunity for the European Union to reduce India's traditional dependence on Russian tanks in the Indian Army.

Conclusion: challenges and opportunities for India and Europe

For several reasons, the EU and its member states faced significant disadvantages in the Indian defence market. First, New Delhi saw the EU as too isolated from the security challenges that India faced. Second, negotiating with the EU sat uncomfortably with India's inclination to deal

47 Vishal Thapar, '[France set to offer Barracuda nuclear submarines to India](#)', *Businessworld*, 15 December 2021.

48 Mark Episkopos, '[India is preparing to buy new light tanks for its troops](#)', *The National Interest*, 18 May 2021.

49 Huma Siddiqui, '[Swedish anti-tank weapon Carl Gustaf M4 to be made in India, to be exported as well](#)', *Financial Express*, 27 September 2022.

directly with weapons manufacturers on a bilateral basis. Third, India and the EU focused much more on trade, the future of multilateralism and global institutions, and non-traditional security challenges such as climate change and health. Finally, the EU's 'dual-use regime', which is not only defined by EU regulations but also imposes restrictions on individual countries, made arms procurement a potential minefield.⁵⁰

The military threat from Eurasia's continental revisionist authoritarian powers, such as Russia and China, has forced the EU and India to focus much more on traditional security challenges. If the rise of China has forced the EU to look towards the Indo-Pacific, Russia's resort to unrestrained violence and its blatant disregard for the sovereignty and security of small states in Europe has forced India to recalibrate its defence dependence on Russia. The EU–India Joint Declarations from the 2020 and 2021 summit meetings have increasingly focused on traditional security issues.⁵¹ India and the EU have begun a maritime security dialogue, and the frequency and intensity of naval exercises have gained momentum. However, even though the 'EU–India Strategic Partnership: A Roadmap for 2025' has underlined the need for dialogue and cohesiveness on foreign policy and security,⁵² a clear-cut strategy for defence technology cooperation is yet to be designed and implemented.

Greater participation in India's defence industry will help the EU achieve some of its major foreign policy and security goals: to create a balance of power in Asia against China's bid for hegemony; and influence India's policy calculus vis-à-vis Russia. India, too, will benefit immensely by encouraging defence technology partnerships with the EU and its member states. Russia's war in Ukraine and China's assertiveness in Asia offer an opportune moment for the EU and India to build a strategic relationship in defence technology cooperation.

50 Sameer Patil, Purvaja Modak, Vice Admiral Anil Chopra, Kunal Kulkarni and Aditya Phatak, '[India–EU defence cooperation: the role of industry](#)', *Gateway House: Indian Council on Global Relations*, Research Paper no. 12, December 2016.

51 '[Joint Statement – 15th EU–India Summit, 15 July 2020](#)', *European Council*, Council of the European Union, 15 July 2020.

52 See '[EU–India Strategic Partnership: a roadmap to 2025](#)', *EEAS website (europa.eu)*.

Charting a path forward for India–European Union defence technology collaboration

Sameer Patil | Observer Research Foundation, Mumbai

Technology has emerged as the defining factor of contemporary international relations as several nations are investing heavily in ‘emerging’ or ‘disruptive’ technologies such as artificial intelligence (AI), robotics and quantum computing to gain technological proficiency and acquire a competitive advantage over their adversaries. Many of these are dual-use technologies and hold potential military benefits for those nations pursuing them.

For India, the pursuit of technology has remained a focus since Indian independence in 1947. In the assessment of first Prime Minister Jawaharlal Nehru, India had remained backward because it lagged in the development of science and technology.⁵³ This belief explains India’s quest for research and development in nuclear technology. But besides nuclear, Indian policymakers also pursued the development of several other technologies. They established requisite infrastructure like the Indian Institutes of Technology, Defence Research and Development Organisation (DRDO), specialised laboratories and facilities for experimental research,⁵⁴ and they explored the option of technology transfer by partnering with other countries. However, sanctions and other restrictive measures after India’s nuclear test in 1974 impeded India’s access to many critical technologies.

In recent years, India has accelerated its pace of technological development with a strong emphasis on self-reliance as well as international partnerships. If one reviews India’s recent bilateral engagements with democratic partners (see Table 1 below), the focus on technology policy collaboration becomes clear. India has also demonstrated a willingness to share its technology expertise, such

53 Priya Chacko, ‘[The search for a scientific temper: nuclear technology and the ambivalence of India’s postcolonial modernity](#)’, *Review of International Studies*, 37:1 (2011), p. 192.

54 William A.T. Logan, [A technological history of Cold War India, 1947–1969: autarky and foreign aid](#), Cham (Switzerland): Palgrave Macmillan, 2022.

as creating digital public platforms like India Stack⁵⁵ and the CoWIN vaccination platform with other democracies. Furthermore, the emerging focus of the Quadrilateral Security Initiative (or the Quad) through the Critical and Emerging Technology Working Group underlines India's keenness to leverage deep security partnerships for better technology policy cooperation through plurilateral groupings or a 'coalition of the willing' approach, rather than multilateral frameworks. Most recently, India and the European Union (EU) launched a new mechanism, the India–EU Trade and Technology Council (TTC), to shape bilateral cooperation in technological development and set standards for emerging technologies.⁵⁶

Besides the government-to-government cooperation, India is tapping into the commercial sector to drive its technology development efforts. This is particularly true for hardware, where India is critically dependent on foreign (mostly Chinese) gear and components. One such component, for instance, is semiconductor chips. In recent months, India has revealed its plans to become a key manufacturer in this segment. It has announced US\$10 billion in production-linked incentive (PLI) schemes for developing a semiconductor and display manufacturing electronics ecosystem.⁵⁷

India has developed a similar focus on defence technology, emphasising self-reliance in critical technologies, partnerships with like-minded countries and leveraging its vibrant start-up innovation ecosystem. India aims to harness these tech collaborations to achieve proficiency in emerging technologies, which will help advance the cause of 'Atmanirbhar Bharat' (self-reliant India) and 'Make in India' – two key goals of Prime Minister Narendra Modi's government. Modi has repeatedly emphasised the criticality of technology transfer for India's development, particularly in defence.⁵⁸

55 India Stack is a set of open application programming interfaces, which has been used to build several applications, including Unified Payments Interface real-time payment system.

56 Rezaul H Laskar, '[India, EU launch new body to tackle challenges in trade, tech](#)', *Hindustan Times*, 25 April 2022.

57 ENS Economic Bureau, '[Cabinet decisions: chip, display units. Nod to Rs 76K-cr scheme](#)', *The Indian Express*, 16 December 2021.

58 '[Technology for us is a medium to empower the people of the country: PM Modi](#)', 2 March 2022.

India's current foreign defence technology collaborations

As one of the world's top arms importers,⁵⁹ Indian policymakers comprehend the significance of achieving self-reliance in defence. Moreover, the conflict in Ukraine, Western technology sanctions on the Russian aerospace industry and the consequent Russian defence production and supply-chain difficulties have also underscored the imperative of this objective.

Since 2014, under the flagship 'Make in India' programme, India's government has sought to expand its national defence-industrial base. Government efforts have focused on defence technology research and development (R&D), increasing the budget for R&D to US\$1.4 billion⁶⁰ and engaging private sector industry, academia and start-ups.⁶¹ Another dimension is India's defence technology collaborations with like-minded countries for the joint development and production of technologies and weapons systems (see Table 1). For instance, with Russia and Israel, India has co-developed and co-produced the Brahmos missile system and Barak 8 missile defence system, respectively.

Table 1 India's current significant foreign technology collaborations (including defence)

Partner country	Focus of collaboration	Mechanisms
Australia	AI, quantum computing and robotics	<ul style="list-style-type: none"> Joint Working Group on Defence Research and Materiel Cooperation, set up in 2022 Cyber and Critical Technology Partnership, launched in 2020
France	AI, quantum computing, 5G	<ul style="list-style-type: none"> Indo-French Roadmap on Cybersecurity and Digital Technology, announced in 2019
Israel	Missile defence systems, AI, unmanned aerial systems	<ul style="list-style-type: none"> Vision on Defence Cooperation, unveiled in 2022 Cooperation agreement between DRDO (India) and Directorate for Defence R&D (Israel), signed in 2022 Sub Working Group on Defence Industrial Cooperation, set up in 2020

59 Express Web Desk, '[At \\$76.6 billion, India is third highest military spender in world, says report](#)', *The Indian Express*, 26 April 2022.

60 Kartik Bommakanti, '[Weak investment in defence R&D: key factor behind India's poor defence indigenisation](#)', *Observer Research Foundation*, 19 February 2022.

61 Sameer Patil and Neeraj Singh Manhas, '[Accelerating the pace of India's defence research](#)', *Observer Research Foundation*, 23 July 2022.

Partner country	Focus of collaboration	Mechanisms
Japan	Unmanned ground vehicles and robotics	<ul style="list-style-type: none"> Joint Working Group on Defence Equipment and Technology Cooperation, set up in 2015
Russia	Brahmos supersonic cruise missile	<ul style="list-style-type: none"> Inter-Governmental Commission on Military and Military-Technical Cooperation, established in 2000
United Kingdom	Fighter aircraft and jet engine technology	<ul style="list-style-type: none"> Bilateral defence technology exchange agreement is in the works
United States	Unmanned aerial systems, light weight small arms technology, artillery and mortar systems	<ul style="list-style-type: none"> Defence Technology and Trade Initiative, established in 2012

Source: author's research

As seen from the above overview, three technologies have assumed prominence in Indian foreign policy: unmanned aerial systems and robotics or autonomous systems; artificial intelligence (AI); and quantum computing.

Obstacles and opportunities

While the potential of the above tech collaborations is immense, barring Russia and Israel, partnerships with other countries, including the United States, have not produced a functional prototype, a test model or an application. There are multiple reasons, the primary being the difference in their respective defence-industrial and research capabilities. While India's defence and aerospace manufacturing has advanced in recent years, it is not yet a match for the technological sophistication and manufacturing scale of the US or Israel.⁶² This aspect impacts the degree of defence technology collaboration between India and its foreign partners. Moreover, many foreign business have expressed concerns over India's Intellectual Property Rights laws, which offer inadequate safeguards when it comes to transfer of technology. Additionally, foreign businesses cite challenges such as India's restrictive regulatory framework, complex business environment and the protracted governmental decision-making process, which hamper their participation in the Indian market. This is despite India having improved its position in the 'Ease of Doing Business'

⁶² Richard A. Bitzinger, 'The Indian defence industry: struggling with change', in Rajesh Basur, Ajaya Kumar Das and Manjeet Singh Pardesi (eds), *India's military modernisation: challenges and prospects*, New Delhi: Oxford University Press, 2014, pp. 117-139.

rankings.⁶³ In particular, the long-drawn-out defence procurement process is a deterrent for many companies, which winnows the participation of smaller, niche foreign companies in the Indian market. From the Indian side, the strict export regulations of the US and EU present an impediment to deepening technology cooperation. For instance, the EU's dual-use control regime is extremely detailed, exhaustive and restrictive. It has EU-level and individual member-level controls. This complexity poses a high-risk potential for disruption in any defence cooperation, especially in hardware supplies.⁶⁴

Another concern that many experts have repeatedly flagged is India's inadequate financial allocations for R&D. This directly impacts which research is prioritised and what technologies are pursued, with implications for innovation, as reflected in India's low share in patent filings. For instance, one study shows that India submitted only 46,582 patent applications in 2019, compared to 1.38 million by China and 606,956 by the United States.⁶⁵

A specific concern vis-à-vis Indian defence acquisitions has been its lowest bidder (L1) policy, which prioritises cost over other considerations. In recent months, India has initiated a reform of this process by also including life cycle sustainment costs and technical criteria.⁶⁶ However, L1 is going to endure for the foreseeable future.

Shaping India–EU defence technology collaboration

The establishment of the EU–India TTC is recognition of the reality that despite convergences, India and the EU have not been able to forge a path of partnership and mutually benefit from each other's competencies. In India's case, these competencies include the country's robust information technology sector,

63 Chandrajit Banerjee, '[Transformation in ease of doing business environment](#)', *The New Indian Express*, 7 September 2022.

64 Sameer Patil et al., '[India–EU defence cooperation: the role of industry](#)', in Nicola Casarini et al. (eds), *Moving forward EU–India relations: the significance of the security dialogues*, Rome: Edizioni Nuova Cultura, 2017, p. 137.

65 Itty Abraham, '[The two faces of India's new science and tech policy](#)', *The Wire Science*, 17 May 2021.

66 '[India-US defence engagement: from buyer-seller to co-production and co-development](#)', *Observer Research Foundation*, 2 September 2022.

which is deeply entrenched in the European market,⁶⁷ a start-up ecosystem that is home to 100 so-called unicorns (privately held startup companies valued at over US\$1 billion), and its emerging position in the global supply chain in electronics manufacturing (as countries diversify from manufacturing in China), besides the size of the Indian market itself. Moreover, while there are bottlenecks, India has a proclivity for greater tech partnerships with like-minded partners. This aspect, combined with New Delhi's defence diversification drive, presents opportunities for the EU to strengthen its collaboration with India.

While individual EU member states like France, Germany and the Czech Republic at present have a good presence in the Indian defence market, this trade relationship is not reflected in the defence technology space. Therefore, the TTC's establishment is a step in the right direction. This engagement can be taken forward by focusing on the following domains:

1. *Quantum research*: The European Commission's research initiative, the Quantum Flagship, currently focuses on the US, Canada and Japan through the InCoQFlag project.⁶⁸ This initiative can explore partnering with India and its domestic quantum research, which is focused on both theoretical and practical dimensions, including in the military field. Perhaps a scholarship programme for Indian scientists working in this field to undertake research in European facilities can be established.
2. *Drone systems*: India's national security requirements, the prospering drone industry and the PLI scheme for drones and drone components offer a conducive environment for advancing the bilateral collaboration on drone technology. Existing commercial drone development programmes like those at Airbus can be leveraged to join hands with India's private drone companies.⁶⁹
3. *Space research*: The Netherlands' space research programme offers opportunities for collaboration with India's robust space programme.⁷⁰ In recent years, India has witnessed a proliferation of start-ups as the country implements space reforms.⁷¹ This presents an opportune moment for

67 Surabhi Agarwal, '[How Europe trumped US for Indian IT companies](#)', *The Economic Times*, 14 November 2017.

68 '[InCoQFlag – International Cooperation on Quantum Technologies](#)', *Quantum Flagship*.

69 '[Unmanned Aerial Systems](#)', Airbus.

70 Government of the Netherlands, '[Space research generates new technologies](#)'.

71 PTI, '[About 60 startups registered with ISRO since unlocking of Indian space sector, says Jitendra Singh](#)', *Mint*, 12 July 2022.

Dutch and Indian space companies to pursue prospects for collaboration, including in space-based maritime surveillance.

4. *Aerospace materials*: India gets aerospace raw materials and composites primarily from Russia, Ukraine and other Eastern European countries. This external dependence is a critical vulnerability for India. The EU and its member states can hence work with Indian partners such as Hindustan Aeronautics Limited and Mishra Dhatu Nigam Limited to develop and augment domestic manufacturing capabilities for composites and special alloys.

Concluding thoughts

India and the EU have converging views on a stable international order, democracy and the rule of law, but there are divergences in their approaches, such as on the issue of the importance of human rights in international relations, digital sovereignty, nuclear non-proliferation and data storage. In addition, India's stance on the Ukraine conflict has caused irritation in the EU.⁷²

However, these differences are not irreconcilable, and both sides can develop a better appreciation of each other's position only through more dialogue and engagement. Moreover, the changing geopolitical milieu provides the urgency for both sides to strengthen their strategic collaboration. Defence technology development promises to deepen this. It will also foster a sense of camaraderie between the two sides, which could spawn additional areas of engagement. The EU therefore needs to nurture a relationship with India based on trust and technology-sharing.

As has been seen in India's partnerships with the United States, France and Israel, partnerships formed in the defence and security sector also translate into strengthening cooperation in other sectors. Partnerships cultivate sustained engagement and common understanding of pressing regional and international security issues. They maintain an upward trajectory of the overall relationship, while also permitting scope for disagreement, in line with national interests. The EU therefore needs to cultivate stronger defence ties with India, focused on technology co-development.

72 Mandira Nayar, '[India cannot stay neutral on Ukraine crisis, EU disappointed with New Delhi's position](#)', *The Week*, 23 March 2022.

Delhi's new view of Europe: opportunity for tech partnership?

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India has struggled to create a domestic innovation cycle, one where academic research eventually feeds into economic production. It has created parts of the cycle but they remain disconnected. The interface most lacking is between laboratory and factory. One consequence is that 70 per cent of all R&D spending is made by the Indian government, with very little by domestic private firms, and an overwhelming part of the total is for defence.

The government of Indian Prime Minister Narendra Modi laid out a new science and technology policy in 2013. While it largely repeated what earlier policies had said, it stressed the need to create a technology ecosystem that contributed directly to economic growth.⁷³ The policy intersected with other elements of Modi's policy agenda, including making the private sector the primary driver of economic growth, reviving a stunted manufacturing sector, promoting a new digital economy and green energy transition, and reducing supply-chain dependency on China. India has risen from the 81st to 46th place on the World Intellectual Property Organisation's global innovation index over the past seven years, a crude indicator of some success.

The Indian government has also promoted policies designed specifically to improve R&D in India, such as a new education policy⁷⁴ that encourages new private and foreign universities, and a series of initiatives designed to encourage technology start-ups.

73 Ministry of Science and Technology, Government of India, '[Science, technology and innovation policy 2013](#)'.

74 Ministry of Science and Technology, Government of India, '[India–European Union agreement on scientific and technological cooperation renewed for next five years \(2020–2025\)](#)', 25 July 2020.

Geopolitical opportunity

New Delhi has always recognised that foreign partnerships, whether as idea exchange or institutional partnerships, are essential to its technology efforts. There is now a sharper geopolitical edge to this engagement. Over the past decade, India and China have experienced increasingly poor relations, culminating in 2020 with New Delhi placing severe restrictions on Chinese investment and limited but bloody military clashes. Indian officials privately say they have instructions to purge critical economic sectors – that is, those involving high-end technology, data flows and infrastructure – of China’s presence. India now seeks partners to offset the gaps that are expected to be created by China’s removal, most notably in pharmaceutical ingredients, green energy and electronic components.

India also sees an opportunity in a similar rivalry between China and the United States. The US is seeking alternative sites for supply chains in electronic and green energy equipment. Some of the affected firms are looking to India as a possible site. Apple is a bellwether, but Abbott in medical devices, Lockheed and Boeing in aerospace, and ExxonMobil in petrochemicals are among the firms that have announced investment plans in India.

The US is also creating a coalition of countries who want to exit China digital standards and data infrastructure. India has begun aligning itself with this coalition, while simultaneously seeking to maintain a degree of agency when it comes to standard-setting and domestic production. This has led to an array of government-to-government initiatives to help create a plurilateral architecture that revolves around future technologies. It has also given rise to Indian programmes designed to promote technological autonomy and domestic manufacturing, under the *Atmanirbhar Bharat* (‘self-reliant India’) slogan.

India’s tech partnerships: the Quad and more

The best-known of such initiatives is the Quad, comprising the United States, Japan, India and Australia. The Quad has over 20 working groups, almost all in strategic technologies such as quantum computing, semiconductor chips, green hydrogen, pharmaceuticals and artificial intelligence. The Quad’s initial focus has been to lay down first principles on internet governance, aligning technology

standards and investing in future technology talent.⁷⁵ It is deliberately designed to have an open architecture so that other countries, minus China, can join a specific Quad working group. Theoretically, the semiconductor working group could have Taiwan, South Korea and even the Netherlands as affiliates. Seoul has begun exploring the possibility of signing up for some of these groups.

India has also sought to develop bilateral technology understandings with individual countries on the basis of their perceived strengths. Unlike previous technology understandings, which were largely academic exchanges, these are designed to promote high-end manufacturing or economic activity in India. Three examples of such partnerships are provided. One is a roadmap between the United Kingdom and India, largely in the area of pharmaceuticals. This reflects New Delhi's positive view of its COVID vaccine experience with UK-based AstraZeneca, the non-profit culture of many UK major pharmaceutical companies and an existing business-to-business relationship. All of these contribute to an Indian belief that the UK is an ideal partner.⁷⁶ Second, India has a more comprehensive set of agreements with Japan in a host of areas including robotics, quantum computing and space, but which include Japanese commitments to develop industrial corridors and skills' institutions so that the Indian economy can materially benefit from the knowledge created.⁷⁷ Third, while there is no document in the public domain, officials from both countries say that India and Taiwan have worked out an understanding to dovetail Taiwanese chip investments with a new Indian production-linked incentive (PLI) scheme to promote specific types of critical manufacturing.

Moreover, the US government has publicly urged its firms, especially in the digital and electronics sectors, to consider India as an alternative to China. India has sought to create an ecosystem of component manufacturers through its PLI scheme and improve its infrastructure to make such a move attractive to these firms. The bellwether of these firms is Apple which, some analyses suggest, may be making as many as 25 per cent of its iPhones in India by 2025.⁷⁸

75 White House Briefing Room, United States Government, '[Fact sheet: Quad leaders' summit](#)', 24 September 2021.

76 Foreign, Commonwealth and Development Office, United Kingdom Government, '[Policy paper: 2030 roadmap for India-UK future relations](#)', May 2021.

77 Embassy of India in Tokyo, Ministry of External Affairs, Government of India, '[S&T cooperation](#)', last viewed 2 October 2022.

78 Manish Singh, '[Apple to move 25% iPhone production to India by 2025, 20% iPad and Apple Watch to Vietnam](#)', TechCrunch.com, 21 September 2022.

Delhi's new view of Europe

India has long seen its European relationship as a cluster of bilateral linkages. The UK has been *primus inter pares* because of its legacy of commercial and cultural links. France has been number two, largely because of its defence relationship. The rest of Europe has been seen through a solely commercial prism. Until recently, the Indian envoy to the European Union (EU) was always a trade specialist. Indian diplomats traditionally derided Europe as blinkered about China, but ready to lecture India about human rights as long as it did not interfere with profits. The combination of Brexit, renewed interest in foreign investment and Europe's recent problems with China has led India to try and adopt a more holistic policy towards the continent.

Modi's government has launched a number of initiatives designed to create a post-Brexit European policy, including regular Nordic summits, the creation of a Trade and Technology Council (TTC) with the EU, reviving free-trade agreement negotiations, and state visits to countries that Indian leaders have almost never gone to before, like Spain or Denmark. Other plans, including a regular Visegrad Plus summit, were interrupted by COVID and Russia's war in Ukraine.

Fragmented landscape

There is a sense of patchiness when New Delhi is asked what it does with the EU and its member states in the field of technology. Each EU member state is working with India on a limited set of technologies, largely as government-to-government understandings, and the bulk of it in the climate space. Many of these agreements or projects overlap and are being undertaken with minimal coordination with other EU member states. Indian officials say they have clean energy agreements, especially in green hydrogen and solar/wind power, with almost every European country. But each EU member state sees India's activities with other member states in terms of commercial rivalry rather than broader cooperation. There is hope that the new TTC will bring about better coordination and, equally important, institutionalise technology cooperation between India and Europe.

The Netherlands is seen as having unique technological strengths: water management and agricultural production and processing. Rising sea levels and erratic rainfall are among the five major climate threats facing India and

adaptation to inclement water conditions is almost the leitmotif of Dutch history. Indian officials, however, struggle to cite any other tech sectors where they see the Netherlands as proficient. While a green hydrogen initiative has been launched between India and the Netherlands, it will struggle to stand out given the sheer number of similar discussions that India is already holding with other countries about the fuel. Much of what the Netherlands offers is compared to what India is doing with Israel in water and agriculture, but with the belief that Israel is agro-climatically more in tune with India.

Ultimately, countries like the United States and Japan have embedded their technological relationships in larger geopolitical strategies to promote India. Indian leaders deliberately use the word ‘transformational’ to describe their relations with these two, but never with any European state. Even the United Arab Emirates (UAE) has created a ‘minilateral’, the I2U2 (India, Israel, UAE and the US), that combines trade, connectivity and technology and then made it credible with billions of dollars of investments in Indian infrastructure.⁷⁹

Towards greater collaboration on defence technology?

Military technology is unique because of the controls on its transfer and the strong geopolitical undertone in most defence purchases and understandings. India sources its arms from Russia, Israel, France and the United States. Russia is a legacy of the Cold War, but this is a declining relationship as Russian technology no longer provides India with an edge over its main security concern, China. Israel is a niche weapons provider, mainly of drones and missiles, but provides electronic subsystems to enhance Russian platforms. France has positioned itself as the provider of cutting-edge weapon systems like air-superiority fighters and submarines that give India an advantage over China. The United States has become the main source of helicopters and airlift capabilities.

New Delhi has deliberately avoided weapon systems from other continental arms-makers. It sees no geopolitical advantage, as it sees Europe as a non-player in Asia’s security architecture. The Indian national security system sees

79 Asit Ranjan Mishra, ‘[UAE, US to invest \\$2.3 billion in India under the framework of I2U2](#)’, *Business Standard*, 15 July 2021.

the EU as a difficult player to work with because of its human rights concerns and because its main arms firms are consortia, which means having to deal with multiple governments and their respective agendas. New Delhi still remembers Western arms and technology sanctions following its 1974 and 1998 nuclear tests. There is a severe trust deficit regarding the EU when it comes to military supplies, especially given the ‘weapons without strings’ policies of Russia, France and Israel.

India sees the Netherlands as having an unusually problematic track record. Dutch laxity allowed centrifuge technology to be smuggled to Pakistan. New Delhi suspended Dutch aid programmes to India after criticism of its 1998 nuclear tests. And India has not forgotten that the Netherlands was among the six countries that joined China in trying to block a 2008 US-led effort to end nuclear-related technology sanctions against India. India does not even station a defence attaché in the Netherlands, but instead covers the country by a defence team in Paris that rarely visits The Hague.

Modi’s government has tried to force the reform of India’s entrenched and inefficient state-owned defence manufacturers. It seeks to place India’s private firms at the heart of the new defence sector. This has so far had limited success, but it has meant Indian defence firms are scrambling to find foreign partners to access technology. US firms have struggled because India’s ambiguous status as a non-treaty ally makes technology transfers difficult. Russia has difficulty working with private firms and less and less technology to offer. Israel and France have been able to gain the most from the Indian government’s new policies, but there remains considerable space for more defence technology partnerships to be formed under the new guidelines. Much of this need not be particularly sophisticated: India has poor, if improving, defence manufacturing capabilities and depends on foreign knowhow even for manufacturing assault rifles. There remains considerable potential for collaboration on military technology and weapons development as the present policy unfolds, but built more around revenues from royalties, joint exports and co-development than direct weapons’ sales. One important gap is knowledge among Indian firms about what defence technology is available from their counterparts in Europe.⁸⁰

80 Sumit Ganguly and Chris Mason (eds), [The future of Indo-US security cooperation](#) (Manchester: Manchester University Press, 2021).

Enhancing India–EU engagement on ‘meta-critical’ technologies: a case for collaboration on semiconductors

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India’s approaches to technology and foreign policy

India’s science and technology (S&T) diplomacy is as old as the Indian republic’s foreign policy. One can study the intersection of technology with Indian foreign policy along two axes: ‘foreign policy for technological objectives’; and ‘technology for foreign policy objectives’.

Foreign policy for technological objectives: To access advanced industrial technologies, India interacted with European countries such as France, Switzerland, Belgium and Germany as early as 1949.⁸¹ As a new nation-state facing immense developmental challenges, India’s primary concern in the early post-independence era was to secure access to technologies that could accelerate the pursuit of peace and prosperity for Indians. Unhindered access to state-of-the-art and foundational knowledge was, and still is, perceived as a core national interest.

During the Cold War, India faced stringent denial of technology from international regimes in the nuclear and space sectors. The denial of Indian membership into multilateral export control regimes such as the Nuclear Suppliers Group (NSG) and the Missile Technology Control Regime (MTCR) cast a long shadow on India’s foreign policy outlook. Its default stance was to protect

81 Manoj Saxena, ‘[The role of science and technology diplomacy in Indian foreign policy: an assessment of issues and opportunities](#)’, King’s College London, accessed 21 September 2022.

its turf in global technological fora while simultaneously developing and shielding domestic capabilities.

Technology for foreign policy objectives: India has also used S&T to pursue its foreign policy objectives. Through the Indian Technical and Economic Cooperation (ITEC) programme, started in 1964, India offers technical courses to students in 160 developing countries. By 2013–2014, the programme was awarding over 10,000 scholarships every year and running more than 280 training courses.⁸² Since 1972, India has also posted S&T counsellors in its embassies in select countries.

Recent changes

There have been significant shifts in the two abovementioned dimensions in recent years. Factors contributing to this change in foreign policy outlook on technology include: a growing domestic technological base; an increased presence of Indian talent in the global technology ecosystem; emergent geopolitical realities concerning China; and the rising contribution of cross-cutting technologies in national power. The Indian foreign policy establishment now has a far more positive view of technology and the opportunities it offers for collaboration and competition, apart from contestation. India also realizes that technology is now a global enterprise, where autarchy is not an option. The contemporary concern is to manage interdependence and make technological supply chains trusted, transparent and resilient.⁸³ More recently, India's advances in large-scale digital public infrastructure – payments, identity and data-sharing – have opened up a new avenue for using technology to deepen diplomatic ties. India is currently holding discussions with nearly 30 countries about replicating India's payments solution (including with France, Bhutan and the United Arab Emirates),⁸⁴ and with the World Bank about replicating the digital identity solution.⁸⁵

82 Ministry of External Affairs, Government of India, '50 years of ITEC'.

83 ['Transcript of interview of External Affairs Minister at the Global Technology Summit 2021 \(14 December 2021\)'](#), accessed 26 September 2022.

84 Lok Sabha, unstarred question no. 2085, '[SWIFT payment system](#)'.

85 ['UIDAI working with World Bank, UN to take Aadhaar technology overseas'](#), *Business Standard News*, accessed 1 October 2022.

India's strengths and dependencies

Human capital is India's biggest strength. High-tech industries rely on cross-border movements of intermediate products, intellectual property and, most crucially, human talent. India's large engineering workforce will continue to be essential for the global technology enterprise.

Over the years, India has also developed domestic capabilities in strategic technologies such as space, nuclear energy, shipbuilding, generic drugs and vaccines. These strengths give India the confidence to engage with other geopolitical actors on equal terms.

Third, India's experience of deploying digital public infrastructure for a billion people – for payments, identity, data-sharing and e-commerce – can be a template for other countries seeking to build secure digital backbones for public service delivery.

Turning to India's dependencies, India presents a unique paradox of manufacturing capability in most sectors and yet low integration in global value chains.⁸⁶ High import tariffs, weak intellectual property enforcement, a complex tax regime and logistical barriers are just some public policy reasons for the underdevelopment of high-tech manufacturing.

Second, India's overall research and development (R&D) spending per capita is one of the lowest in the world. As a percentage of GDP, it has been close to 0.7 per cent for over a decade.⁸⁷ Moreover, the private sector accounts for just 37 per cent of this already low R&D spend. Foreign direct investment (FDI) thus remains crucial for India to access advanced manufacturing technologies.

A third dependency concerns strategic minerals. India imports all its lithium, an essential element for making electric-vehicle battery cathodes. India also has low availability of heavy rare earth elements such as europium, dysprosium,

86 Ray Saon and Smita Miglani, *Global value chains and the missing links: cases from Indian industry* (New Delhi: Routledge India, 2018).

87 Amit Kapur and Neeraj Sinha, 'India innovation index 2021', NITI Aayog.

terbium and yttrium.⁸⁸ International cooperation is necessary to secure these elements for a future-ready economy.

A fourth dependency concerns semiconductors. India has no commercial chip-manufacturing facility. While nearly 20 per cent of the world's design engineers are in India, the cumulative revenue of domestic semiconductor design companies is small, at less than US\$20 million.⁸⁹ Previous attempts to establish chip manufacturing or chip assembly and packaging plants have not been successful.

Critical technologies and their supply chains

The Indian government has not yet released a list of critical technologies. Thus, we must classify technologies as 'key' based on a revealed preferences approach. If the government has recently announced a substantial expenditure programme for a product in the technology supply chain, we can classify it as a 'key' technology.

According to this metric, the key technologies for India are semiconductors, electronics and IT hardware, solar photovoltaic modules, pharmaceuticals, advanced chemistry cell batteries, telecommunications equipment, medical devices, artificial intelligence and quantum computing.

Key partners for each of these technologies vary.⁹⁰ For example, International Solar Alliance is a joint project between India and France to increase the deployment of solar energy technologies. Ninety countries have ratified this agreement. On the COVID-19 vaccine supply chain, 5G communications, semiconductor supply chain, technical standards, biotechnology and quantum technologies, the Quad has emerged as a platform for partnership.⁹¹ The European Union (EU) and India have launched a Trade and Technology

88 Anirudh Kanisetti, Aditya Pareek and Narayan Ramachandran, 'A rare earths strategy for India', Takshashila Institution Discussion Document, 2020–16.

89 'Notification on Design Linked Incentive (DLI) scheme', *Gazette of India*, CG-DL-E-21122021-232049.

90 The International Cooperation Division of the Department of Science and Technology maintains a list of ongoing bilateral, multilateral and thematic projects.

91 The Quad grouping comprises Australia, India, Japan and the United States.

Council (TTC), focusing on deepening cooperation at the intersection of trusted technology, trade and security. Moreover, technology will likely feature prominently on the G20 agenda during India's presidency of the G20 in 2023.

Within this expansive agenda on critical technologies, this chapter focuses on one 'meta-critical' technology: semiconductors. There are three reasons for semiconductors' 'meta-criticality'. First, advancements in most other critical technologies rely, in turn, on access to a secure semiconductor supply chain. Second, the hyper-globalised nature of this super-specialised supply chain implies that international cooperation is necessary for ensuring resilience. Finally, the use of semiconductor supply-chain bottlenecks for geopolitical ends in recent years mean that governments have a critical role to play. The imperative of government-to-government cooperation in semiconductors came to the fore during the peak of the COVID-19 pandemic, where chip shortages rippled through automobiles, medical devices and consumer electronics' supply chains.

In September 2021, the Quad partners launched a Semiconductor Supply Chain Initiative to 'map capacity, identify vulnerabilities, and bolster supply-chain security for semiconductors and their vital components'.⁹² Before this Quad announcement, the Indian government's interventions were largely limited to attracting FDI in this sector. As part of this effort, several European companies established their chip design centres in India, such as NXP Semiconductors and STMicroelectronics. Beyond this government-to-business engagement, there is no strategic collaboration between Europe and India on semiconductors.

Opportunities for EU–India collaboration

As two leading powers of the digital world order, a resilient and secure semiconductor supply chain is a priority for India and the EU. From a government-to-government perspective, the two partners need to think beyond national self-sufficiency in semiconductor manufacturing and instead invest in building a robust, joint semiconductor ecosystem.

Collaborations between the EU and India can take different forms depending on the segment of the semiconductor supply chain under consideration.

92 White House, '[Fact sheet: Quad leaders' summit](#)', 25 September 2021.

Collaborate on open hardware projects: Semiconductor design refers to the segment where semiconductor chip blueprints are made using specialised software called electronic design automation (EDA) that combines blocks of licensed intellectual property (IP). The market for EDA and IP is heavily concentrated in the United States. The three EDA makers – Cadence Design Systems, Synopsys and Mentor Graphics – are in the US. Regarding licensed IP for processors, ARM Holdings – a UK-based company – alone powers 90 per cent of mobile-phone application processors. As a balance against this market concentration, the EU and India can encourage open source alternatives. For example, India announced its plans to join the global non-profit organisation RISC-V International as a premier board member in 2022.⁹³ RISC-V is behind a leading open standard for processors. Taking a cue from this policy instrument, India and the EU can come together to identify and support global open source alternatives for EDA software and processor IPs.

Invest in joint R&D foundries: In the manufacturing stage, chip design start-ups need access to prototyping facilities for testing before they can commit to high-volume production. This is a costly and time-consuming process. India, the EU and the Quad can come together to sponsor a prototyping foundry that can be easily accessed by start-ups from these places.⁹⁴

Reduce barriers to R&D cooperation between semiconductor companies: R&D cooperation can take the following forms in this sector: licencing agreements; cross-licencing agreements; technology exchange; visitation and research participation; and joint development. In each of these dimensions, governments play a role. For instance, faster visa processing and lower employment barriers for semiconductor professionals in the EU could facilitate higher technology exchange and joint development levels. Similarly, removing technology transfer

93 RISC stands for Reduced Instruction Set Computer, a kind of computer architecture. RISC-V International is a global non-profit that promotes the use of open standard architectures over proprietary ones.

94 This idea was proposed in the context of the Quad semiconductor supply-chain initiative by Pranay Kotasthane, Glenn Downey and Stephen Ezell in '[3 ideas for 4 countries hunting for chips: what the Quad must do to build a resilient semiconductor chain](#)', *The Times of India*.

restrictions for India could make licencing and cross-licencing agreements easier. Easing capital flows could again foster more joint development projects.⁹⁵

Jointly explore, recycle and stockpile critical minerals: The electronics' supply chain in general and the semiconductor industry in particular need access to rare earth and non-rare earth strategic minerals. India and the EU are both dependent on importing these minerals. Recycling and deep-sea mining are alternative methods to access some of these minerals, but require technological innovation and standardisation. This is where India and the EU can collaborate by establishing a Centre of Excellence for Critical Minerals.

Towards greater India–EU alignment through tech?

Technology holds tremendous promise in deepening partnerships between India and the EU and its member states. Successful international partnerships require: 1) a convergence of interests; 2) a broad alignment of values; and 3) complementarity in strengths. In technology, perhaps more than in any other field, India and the EU are broadly aligned on all three parameters. For instance, both partners are deeply concerned with digital sovereignty and power distribution in the digital world. Both are committed to upholding democratic values. While there are differences in approaches to governing big technology firms, data governance and IP protection mechanisms, there is convergence on core values. Regarding complementarity, while India's strength is human capital, the EU brings deep expertise, infrastructure and capital to the table. The India–EU Trade and Technology Council can become a forum to forge deeper ties and iron out differences, with the aim of widening technology access, not just for each other, but for the world.

⁹⁵ Inspired from an idea for the Quad Semiconductor Supply Chain Initiative, that this author proposed in [‘Siliconpolitik: the case for a Quad semiconductor partnership’](#), NUS Institute of South Asian Studies (ISAS), accessed 8 September 2022.

The prospects of critical and emerging technology cooperation between India and the EU

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Introduction

US–China strategic competition is the predominant challenge of this era and although it has fuelled unprecedented tensions, it has also compelled the other regional and global major and middle powers to take on a larger role in shaping global governance architecture. Democratic actors like India, Japan, Australia, France, Germany, the Netherlands, the European Union (EU) and the Association of South-East Asian Nations (ASEAN) have become central partners in minimising the repercussions of the US–China bipolar contest and spearheading an inclusive order in the Indo-Pacific.

Notably, the fast-evolving political landscape not only mirrors the accelerating changes in new technologies, but is also driven by this profound digital shift. For example, despite its economic and developmental gains, digitalisation has allowed rogue state and non-state actors to exploit digital vulnerabilities inherent in a hyper-connected system.

In the post-COVID era, no country has stood out more than India. As a pharmaceutical hub, it has mass-produced and provided vaccines to less-developed countries despite its own huge demographical needs.⁹⁶ Its resurgent (geared to strategic autonomy) multi-alignment diplomatic policy has been aimed at securing its national interests over appearances, while (finally)

96 Priti Patnaik, 'COVID-19 will recast global health as a security issue: India must gear up for health diplomacy', *The Wire*, 23 April 2020.

espousing a fierce anti-war and pro-dialogue rhetoric.⁹⁷ And as one of the fastest-growing economies and an established technological powerhouse, India has managed to continue its steady strides.⁹⁸

Notably, during 2015–2022, India has moved up from rank 81 to 40 in the Global Innovation Index and it remains the world's leading exporter of information and communication technology (ICT) services.⁹⁹

Consequently, as India completes 75 years of independence and stands at the cusp of a major geopolitical, geoeconomic and technological transformation, strengthening technological ties with like-minded partners is paramount.¹⁰⁰ Of particular significance are the still-emerging dynamics with the EU and its member states. This chapter explores the prospects of critical and emerging technology cooperation between India and the EU and, in particular, the EU member state of the Netherlands, given the current nascent, but potentially dynamic and robust, growth trajectory between them.

Growing centrality of emerging and critical technologies in Indian foreign policy

One of the most important goals of India's foreign policy is to ensure the country's growth trajectory. In contemporary times, this includes a clear focus on regional development diplomacy (which integrates political and economic diplomacy with the provision of public goods) and advanced technologies through programmes such as 'Make in India', 'Skills India', 'Smart Cities' and 'Digital India'.

In this context, critical and military technologies – standing at the juncture of national security and inclusive development – have become key aspects of

97 Jagannath Panda, 'How is India's silent diplomacy navigating the Russia–Ukraine war?', *The Diplomat*, 8 March 2022; and Geeta Mohan, 'This era not of war: PM Modi tells Vladimir Putin at SCO meet', *India Today*, 18 September 2022.

98 Martin Farrer, 'India is quietly laying claim to economic superpower status', *The Guardian*, 12 September 2022.

99 World Intellectual Property Organisation (WIPO), *Global innovation index 2022: what is the future of innovation-driven growth?* (Geneva: WIPO, 2022).

100 'India facing massive digital transformation: Modi at BRICS business forum', *Live Mint*, 22 June 2022.

India's foreign policy, which India is pursuing in pointed engagement with diverse partners in order to maximise today's opportunities. For example, in recent years India has signed key defence pacts with the United States, Russia, Japan, Israel, Vietnam, Oman, France, South Korea and Australia, among others, to facilitate reciprocal access to military information and facilities.¹⁰¹ Such pacts also highlight India's thrust towards middle powers, rather than simply relying on the United States or Russia, to expand cooperation and build a more empowered regional security network.

Furthermore, the creation in 2020 of the New, Emerging and Strategic Technologies (NEST) division by the Indian Ministry of External Affairs underscores the importance of tech diplomacy in India's digitalisation drive.¹⁰² This division provides not only guidance on how India's policy on emerging technologies must take shape (and the international legal aspects of new technologies), but also on working with like-minded partners to navigate competition over critical technology supply chains to manage dependence on China.

In addition, several Indian governmental institutions, such as the Department of Space, the Council of Scientific and Industrial Research, the Ministry of New and Renewable Energy, and the Defence Research and Development Organisation, and the public-private forum Global Innovation Technology Alliance, are all encouraged to pursue international collaboration and cooperation on advanced technologies.

The intensified US-China technological rivalry and the post-pandemic shift of tech-manufacturing firms and supply chains in moving away from China have served to enhance India's appeal as a technology partner for like-minded countries.¹⁰³ Under such an uncertain environment, India's emphasis on inclusive development – such as through 'AI for All' and the 'Trillion Dollar Digital

101 Rajeswari Pillai Rajagopalan, '[India's military outreach: military logistics agreements](#)', *The Diplomat*, 9 September 2021; and Dinakar Peri, '[India and Vietnam sign mutual logistics agreement](#)', *The Hindu*, 8 June 2022.

102 '[Question no. 552: new and emerging strategic technologies division](#)', MEA India, 5 February 2020.

103 Daisuke Wakabayashi and Tripp Mickle, '[Tech companies slowly shift production away from China](#)', *The Economic Times*, 4 September 2022.

Opportunity’ – makes it an attractive alternative partner for these nations.¹⁰⁴ India’s annual Defence Expo, which is a display of India’s land, naval and homeland security systems, showcases the advancements in military technology in India’s indigenous defence industry.¹⁰⁵ It also helps boost investment and discover new avenues for technology absorption. Today, India has shifted to a much more assertive role in its foreign policy and military diplomacy by pursuing multiple defence and trade pacts, as well as enhancing participation in joint military exercises with regional and global partner states (including Japan, Australia, Vietnam and France).¹⁰⁶

India and the EU: a promising green, resilient digital partnership

The recent agreement between Indian Prime Minister Narendra Modi and President of the European Commission Ursula von der Leyen to launch an EU–India Trade and Technology Council (TTC) highlighted the impetus of their outreach to each other – the EU’s only other TTC is with the United States.¹⁰⁷ This new council will act as a ‘strategic coordination mechanism’ to enable both partners to augment new technology capabilities such as in 5G and artificial intelligence (AI) in order to ‘tackle challenges at the nexus of trade, trusted technology and security’, including disruptive Chinese trade and tech practices.¹⁰⁸ This mechanism will also expand access to digitalisation for small and medium sectors and will secure critical supply chains such as semiconductors.¹⁰⁹

Under their Scientific and Technological Cooperation Agreement, India and the EU have increased their joint tech R&D investments, particularly in ICT, resource

104 Shreya Nandi, [‘India becomes founding member of Global Partnership for Artificial Intelligence’](#), *Live Mint*, 16 June 2020.

105 [‘Defence Expo’](#), Government of India; and [‘12th DefExpo to be held in Gandhinagar, Gujarat between October 18–22, 2022’](#), Indian Ministry of Defence, 8 August 2022.

106 Kanwal Sibal, [‘The role of military diplomacy in India’s foreign policy’](#), *World Affairs: The Journal of International Issues*, 23:1 (2019), pp. 24–37; [‘India conducts military drills with multiple nations across the globe, sets up a ton more’](#), *The Economic Times*, 13 September 2021; and Press Information Bureau, Ministry of Defence, India, [‘Joint military exercises’](#), 18 July 2018.

107 [‘EU–India: joint press release on launching the Trade and Technology Council’](#), European Commission, 25 April 2022.

108 [‘India, EU launch new body to tackle challenges in trade, tech’](#), *Hindustan Times*, 25 April 2022.

109 Sunil Prasad, [‘EU–India relations in a changing strategic environment’](#), *Euractiv*, 2 August 2022.

efficiency and electric mobility.¹¹⁰ High-level consultations and the India–EU Connectivity Partnership also feature technology prominently.¹¹¹

Importantly, the establishment of the EU–India TTC after 60 years of diplomatic relationship reiterates their shared values and interests in ensuring a fair and human-centric digital world. The TTC is simply the first step towards deepening their partnership in a bid to tackle contemporary (conventional and hybrid) challenges. For example, during the July 2020 EU–India summit, the two sides agreed to promote human-centric global digitalisation standards and ensure their ‘safe and ethical deployment’.¹¹² Their initiatives – the EU Digital Compass and Digital India – make them natural partners in achieving digital sovereignty and setting global standards for data, technology and infrastructure.

However, their convergence is plagued by questions over India’s protectionist policies driven by its desire to build (or maximise) domestic capabilities (for example, an increased push on manufacturing in India for *atmanirbharta* or self-reliance). Despite Modi’s official rhetoric against ‘forces of protectionism’, India has continued its high tariffs on technology imports and also walked out of the Regional Comprehensive Economic Partnership, and more recently out of the trade pillar of the Indo-Pacific Economic Framework, reiterating the Modi government’s inward-looking stance.¹¹³ The continuing deterioration of digital freedom in India because of excessive government regulations and censorship, which some have called ‘an oppressive architecture’, is also at odds with the Modi government’s people-centric digital narrative and fuels the EU–India divergence.¹¹⁴

Moreover, doubts about India’s *Aadhaar* (national biometric identity) system as an instrument of state surveillance and lack of an EU-compatible data protection

110 [‘India–European Union agreement on scientific and technological cooperation renewed for next five years \(2020–2025\)’](#), Indian Ministry of Science and Technology, 25 July 2020.

111 [‘India–EU Connectivity Partnership’](#), Indian MEA, 8 May 2021.

112 [‘Joint statement – 15th EU–India summit’](#), European Council, 15 July 2020.

113 Keith Bradsher, [‘Modi, in Davos, praises globalisation without noting India’s trade barriers’](#), *New York Times*, 23 January 2018; and Gulshan Sachdeva, [‘What message does India send by opting out of IPEF trade policy pillar?’](#), *Money Control*, 14 September 2022.

114 Hannah Ellis-Petersen, [‘Wolf in watchdog’s clothing: India’s new digital media laws spark fears for freedoms’](#), *The Guardian*, 11 March 2021.

framework may also hinder progress.¹¹⁵ For India, the EU's dogged adherence to norms and its 'mixed' approach towards engagement with China are two main concerns. India is not yet sure of the extent of the EU's commitment to the regional security architecture.¹¹⁶

Nonetheless, for the EU, cooperation with India would have to avoid the tunnel vision of focusing on hot-button issues. Rather, the EU and India must set aside their differences to focus on inherent commonalities (such as democracy, inclusivity and strategic autonomy goals) with a long-term and wide-ranging ambit and regional development perspective. Importantly, Europe must be mindful of India's complex history with the West, and tailor its approach accordingly to enable smoother collaboration on their future-oriented outlook. The EU's complicated dealings with ASEAN would be a useful factor to consider here.

Furthermore, a rather cogent example in this context is the formation, dissolution and ultimately resurgence of the Quadrilateral Security Dialogue (comprising Australia, India, Japan and the United States). The success of the Quad lies in a gradual 'convergence of interests' among the partners, which while keeping China as a central motivating factor does not allow the China issue to overwhelm the developmental agenda in the wider region.¹¹⁷ Moreover, their differences (such as over Russia's war in Ukraine) do not subsume the free and open Indo-Pacific agenda – a testament not just to the longstanding trust factor between them but also to the flexible and open-minded approach towards their respective interests – a nuanced diplomacy cultivated over years.

115 ['EU-India: cooperation on digitalisation'](#), European Parliament, 2020; and Daniel Voelsen and Christian Wagner, ['India as an ambivalent partner in global digital policy'](#), SWP Comment 2022/C 10, 15 February 2022.

116 Stuart Lau and Sarah Anne Aarup, ['India and Europe: match made in heaven or mismatch?'](#), *Politico*, 5 May 2021.

117 Patrick G. Buchan and Benjamin Rimland, ['Defining the diamond: the past, present, and future of the Quadrilateral Security Dialogue'](#), CSIS, 16 March 2020.

India–Netherlands cooperation: chasing tech innovation across sectors?

India shares bilateral arrangements on technology and cybersecurity-related cooperation with several EU member states, and the Netherlands is a key partner. Despite the growing convergence between India and the Netherlands (and the EU), a gap remains because of untapped potential. Increased focus on practical cooperation, such as through the Indo-Dutch Sustainability (INDUS) forum, is one avenue.¹¹⁸ In addition, connectivity partnerships for regional development can also be explored via India-led initiatives like the Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC), or six leader-level Quad working groups, including on new technologies.¹¹⁹

Dutch and Indian ties so far have been focused on trade and sustainable development, but in view of the fragile political situation, India and the Netherlands have been looking into security and defence cooperation, partly because of the common need to strengthen maritime routes for trade and freedom of navigation.¹²⁰ Their convergence in Indo-Pacific visions allows for such cooperation. Already in 2016 at the Indian Defence Expo, Thales and BEL-Thales Systems Limited (BTSL), the joint venture between Bharat Electronics Limited (BEL) and Thales, signed a strategic cooperation contract to co-develop the PHAROS fire control radar for both guns and missile systems.¹²¹ As BTSL is a public-sector undertaking under the Indian Ministry of Defence, the contract aligns with the ‘Make in India’ initiative.¹²²

Furthermore, as the Netherlands looks to bolster its security ties and allow the EU to become a greater maritime actor – as evidenced through the Netherlands’ realpolitik-oriented Indo-Pacific strategy – collaboration with India can provide

118 Karen Maas and Sachin Joshi, [Final evaluation of ‘Omzet met Impact’ programme – case study report: INDUS platform](#), Impact Centre Erasmus, Government of the Netherlands, October 2021.

119 Dipanjan Roy Chaudhury, [‘India–EU Connectivity Plan to take off with BIMSTEC members’](#), *The Economic Times*, 9 May 2021; White House, [‘Fact sheet: Quad leaders’ Tokyo summit 2022’](#), 23 May 2022.

120 Bhaswati Mukherjee, [‘India–Netherlands: a 400-year partnership further strengthened: Dutch PM’s visit and follow-up’](#), Indian MEA, 23 July 2015.

121 [‘Thales and BEL-Thales Systems Limited to develop PHAROS fire control radar’](#), *Indian Defence Review*, 29 March 2016.

122 [‘About us’](#), BTSL.

vital headway.¹²³ For instance, on defensive and critical advanced technologies, India and the Netherlands can work together on developing cutting-edge maritime security platforms or enhanced maritime situational awareness programmes to prevent hybrid interference in the Indian Ocean region (IOR). A few concrete measures include boosting informational technology maturity levels of naval or coastguard authorities; exchanging surveillance data through the Information Fusion Centre (IFC-IOR); and developing toolboxes for strengthening shared systems against cyberattacks.¹²⁴

The Netherlands should also look into supply-chain cooperation (for example, in their digitisation) via the nascent Supply Chain Resilience Initiative (SCRI, comprising Australia, India and Japan) to strengthen digital infrastructure for building cost-effective, resilient supply chains.¹²⁵ To counter China's increasingly hybrid interference-reliant strategies (including disinformation and multidirectional coercion) in the Indo-Pacific, particularly against the democracies of India, Japan and Taiwan, India should consider joining the EU's and the Netherlands' efforts to build resilience and situational awareness capabilities, as well as democratic standards for digital technologies.¹²⁶

Summing up

Since Russia's invasion of Ukraine in February 2022, Europe has been eager to portray itself as a viable alternative for India to diversify its energy and defence dependence on Russia, particularly for the sale of modernised military equipment, as evidenced by President Ursula von Leyen's trip to India in April 2022.¹²⁷ Greater cooperation on critical and emerging technologies in the

123 [Indo-Pacific: guidelines for strengthening Dutch and EU cooperation with partners in Asia](#), Government of the Netherlands, 2020.

124 The Netherlands has shown interest in liaising via the IFC-IOR, which hosts international liaison officers from several partner nations. See Elizabeth Roche, 'We must exchange data to form recognised maritime picture', *Mint*, 24 October 2021; Indian Navy, '[Information fusion centre – Indian Ocean region](#)'; and Dinakar Peri, '[Netherlands keen to have naval liaison officer in India](#)', *The Hindu*, 25 October 2021.

125 Mahesh Veerina, '[Why digital infrastructure is key to achieving supply chain resiliency](#)', *RT Insights*, 21 June 2022.

126 Maaïke Okano-Heijmans, '[Netherlands and Indo-Pacific: inclusive but not value-neutral](#)', *Clingendael Magazine*, 31 August 2021.

127 '[EU chief to seek closer military, trade and tech ties on India](#)', *Reuters*, 25 April 2022.

military and space would therefore certainly be an area of focus. Importantly, technology-centred ventures can help both partners to reduce risk and diversify their supply chains and hybrid challenges.

Furthermore, the Indian military has incorporated defence technology from vendors in Bulgaria, Germany, Poland, Spain, the Czech Republic and France.¹²⁸ Although India is looking to indigenise its military equipment manufacturing to reduce crucial dependencies (*Atmanirbhar Bharat*, literally 'self-reliant India'), the government has recently further liberalised its foreign direct investment (FDI) policy, allowing FDI of up to 74 per cent under automatic routes and up to 100 per cent through the government route, 'wherever it is likely to result in access to modern technology'.¹²⁹ Cooperation through agreements on the transfer of technology and joint ventures between Indian and European companies are hence likely to increase.

As both India and the EU need to balance their growing economic dependence on China with their common divergences on unfair trade and technology practices, as well as disinformation campaigns, they must utilise their convergence on shared values and challenges, as well as coalesce their respective multifarious technological capabilities, to gain an upper hand in the new era of disruption that is characterised by the so-called Fourth Digital Revolution.¹³⁰

128 Sameer Patil et al., [Moving forward the EU–India security dialogue: traditional and emerging issues](#), EU–India Think Tank Twinning Initiative report, Research Paper no. 12 (New Delhi: Gateway House, 2016).

129 Indian Ministry of Defence, '[FDI in defence sector](#)', PIB, 25 July 2022.

130 Klaus Schwab, '[The fourth industrial revolution: what it means, how to respond](#)', World Economic Forum, 14 January 2016.

A view from Europe on the role of technology in EU–India relations: the Trade and Technology Council

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Digital and technology – coupled with the challenges of climate change – are driving relations between the European Union (EU) and India. Ten years ago, the EU and India were not talking,¹³² but the 2017–2020 period was marked by a resumption of relations and the recognition of shared interests.¹³³ The strategic partnership took off in 2020,¹³⁴ announcing the reopening of free-trade agreement (FTA) negotiations and establishing the Connectivity Partnership in 2021. At this time, key enabling technologies driving innovation across industries and sectors started to feature prominently. How the EU and India will cooperate on these key enabling technologies will be primarily defined in the FTA context and especially in the Trade and Technology Council (TTC).

The TTC was established during European Commission President Ursula von der Leyen’s visit to Delhi in April 2022. This geopolitical move came as a surprise to most, including to those at the highest levels of EU decision-making. The EU–India TTC was established less than one year after the one with the United States and while in discussions to establish a TTC with Japan. The EU considers technology development as a driver in its relations with India, just as it acknowledges the centrality of India in developing future and emerging

131 The authors would like to thank EU official Benoit Sauveroche, CEO and founder of Centersource Technologies Amir Rashad and Trade Policy Advisor Nicolas Köhler-Suzuki for sharing their insights.

132 In 2013, FTA negotiations were put on hold. Coupled with a diplomatic incident involving two Italian marines and some corruption scandals, it resulted in the freezing of relations until 2016.

133 At the 2016 summit, the ‘[EU–India Agenda for Action 2020](#)’ was adopted.

134 At the 2020 summit, the ‘Roadmap to 2025’ was adopted, a richer document with a greater level of ambition; see ‘[EU–India strategic partnership: a roadmap to 2025](#)’, EEAS website (europa.eu).

technologies.¹³⁵ Within the next decade, India, and Indonesia as well, face a crucial choice between nurturing relations with democracies such as the United States, the EU or Japan, or rather with autocracies, such as China and Russia. Their preference will impact the global power balance significantly. Establishing a forum with the United States, India (and Japan) facilitates convergence over the future of technology development, which is vital for the stability of democratic societies. Therefore, the potential of the TTC and, above all, expectations for it are high.

From regulating the current market, creating synergies for both public administrations and citizens, and stimulating the development of future technologies, the TTC can be impactful. It is worth remembering that the TTC was established at the height of European disappointment about the lack of Indian condemnation of Russia's invasion of Ukraine. It is hence to be expected that speculations around the TTC's mandate include defence technology (to diversify Indian defence capabilities further, thus lowering India's dependence on Russia). Focusing the TTC on defence technology would also be in line with recent developments in the strategic partnership. For example, during the first EU–India Security and Defence Consultation on 10 June 2022, India and the EU discussed the co-development and co-production of defence equipment, including India's possible participation in the EU's Permanent Structured Cooperation (PESCO).¹³⁶

However, the TTC might hold the most significant potential in technology and data governance. Today, techno-autocracies are employing technology and digital infrastructures to control their societies with increasing sophistication.¹³⁷ The TTC can be instrumental in establishing a constructive platform to discuss complex issues, including digital surveillance, the spread of disinformation on platforms, algorithmic discrimination of minorities and internet shutdowns,

135 At the time of writing, no official statement on the actual scope and objectives of the EU–India TTC have been released. The only public document is the joint press release '[India–EU: joint press release on launching the Trade and Technology Council](#)', EEAS website (europa.eu), which does not provide details on concrete working groups and the scope of work.

136 Idem. For this reason, the authors decided not to focus on defence technology, as negotiations are still ongoing, and the outcome too uncertain to be a research subject.

137 See <https://carnegieendowment.org/2021/10/19/motivations-for-adoption-and-use-of-authoritarian-ai-technology-pub-85510>.

to mention a few.¹³⁸ In addition, during the development of critical enabling technologies, increased attention must be devoted to implementing and enforcing shared democratic principles, as well as equity and inclusivity principles.

Developing or using technologies to implement shared democratic principles would also be instrumental in addressing – and reassuring to a certain degree – European concerns regarding the handling of domestic issues by Modi’s government – notably on freedom of expression and the treatment of minorities. At the same time, as neither the human rights dialogue nor the sustainability clause embedded in the FTA seem to have yielded the result of providing an effective forum to address European concerns constructively,¹³⁹ the TTC could provide this opportunity. By shifting the focus from institutional discussions to a forum to exchange views on the use and development of human-centric technologies, perceptions could change.

Human-centric and sustainable technologies as a pilot for cooperation?

In the realm of data-driven technology (including artificial intelligence (AI), advanced programming and the Internet of Things), the EU’s digital single market and governance mechanisms enable open innovation and research across EU member states. At the same time, the AI Act, the Data Governance Act, the Cybersecurity strategy and other EU digital policies set clear standards to ensure compliance with European and universal human rights, fostering a ‘human-centric’ digitalisation. Regarding data exchange, India’s slow progress on a national data-protection bill makes an EU–India cross-border data exchange agreement in the near future unlikely. However, since the introduction of the EU General Data Protection Regulation (GDPR),¹⁴⁰ the principle of ‘data protection

138 See, for instance, a report published by the European Parliamentary Research Service (2021) on [‘Digital technologies as a means of repression and social control’](#).

139 By design, each FTA concluded by the EU must contain labour and environmental clauses. This has been seen as an opportunity to tackle concerns over the human rights record by Modi’s government.

140 GDPR, article 25: ‘The [data] controller shall implement appropriate technical and organisational measures for ensuring that, by default, only personal data which are necessary for each specific purpose of the processing are processed’.

by design' has made its way into India's proposed national data-protection framework. A game changer in this area is privacy-enhancing technologies (PETs). PETs allow online users to protect the privacy of their personally identifiable information and can be a key enabler in promoting privacy by design. The TTC could facilitate more robust data-protection safeguards in India's data-protection bill, while also launching joint PET projects to ensure compliance with data-protection laws and to leverage advantages for businesses and users.

The use of PETs in India would also contain a political message: choosing privacy-friendly models based on democratic values over techno-autocratic infrastructures and digital services that are prone to government surveillance.¹⁴¹ Again, the TTC will be critical in defining these political objectives.

Interoperable digital identification and agritech

Digital identification (digital ID, or eID) is one of the most promising digital services and an area where the EU and India could collaborate closely to benefit from each other's unique digital ID infrastructure, based on democratic values and human rights.

India's digital ID project, *Aadhaar* (Hindi for base, or foundation), introduced in 2009, is a unique 12-digit number to identify citizens with biometric identifiers (fingerprints and iris scans). To date, almost 99 per cent of the Indian population holds an *Aadhaar* card, meaning that the government of India now hosts the world's largest biometric ID database.¹⁴² However, such unprecedented achievement also comes with challenges. *Aadhaar* provides its users with essential services, including providing legal identity, registering for welfare benefits and opening a bank account. This necessitates strong data privacy, security and human rights to ensure that all Indian citizens can benefit from *Aadhaar* services. However, the Indian government has been criticised for not paying sufficient attention to these safeguards. Ethnic and religious minorities often cannot access essential resources to which they are entitled, and expanding *Aadhaar* by strategically linking databases points to structural

141 See, for example, the [Freedom House report 2018](#) on the rise of digital authoritarianism.

142 In June 2022, the Unique Identification Authority of India (UIDAI) announced that more than 99% of adult residents of India have been issued *Aadhaar* numbers.

exclusion and surveillance. Also, the risk of data security looms with multiple reported data breaches, including when criminals compromised and sold the records of all registered names and Aadhaar ID numbers in 2018, the largest reported data breach, according to the World Economic Forum.¹⁴³

In the EU, the use of digital ID systems is fragmented among EU member states, and uptake is slow. The EU Digital Single Market and the increasing number of citizens working, travelling or living in another country have made it imperative for EU member states to introduce digital ID systems that work across borders. However, in 2022, only about 60 per cent of EU citizens in 14 member states can use all the functions of their national digital ID in another EU country. This is relatively low compared to Aadhaar, because EU member states are not required to introduce a national digital ID system to make it interoperable with those in the other member states. In the 2030 Digital Compass and the update of the eIDAS Regulation on Digital Identity,¹⁴⁴ the European Commission aims to make all critical public services available online by 2030, when 80 per cent of EU citizens should use a digital ID. Here, India's Aadhaar system could serve as a case study for the EU to explore strategies and incentives for EU citizens to increase their uptake of European digital IDs and services.

Moreover, India is expanding its digital ID to four essential digital services – identity, payments, data and open networks – under the principle of interoperability. With its 'IndiaStack',¹⁴⁵ India's goal is to widen access to digital services in a traditional, cash-based economy. The 'IndiaStack' payments layer allows commercial banks to verify customers directly through Aadhaar, and the Indian government can transfer social welfare benefits to the accounts using biometric verification. The fast uptake of a fully interoperable digital money transfer system – from and to the government, banks and non-bank firms – prompted the need for safe information exchange between these entities to introduce safe data flows to the 'IndiaStack'. Despite data protection, accessibility and accountability risks, the initiative successfully leverages the benefits of an interoperable ecosystem and digital public services for its citizens.

143 World Economic Forum, [Global risks report 2019](#), p. 16.

144 The [revised eIDAS](#) (electronic Identification, Authentication and Trust Services) regulation proposal by the European Commission amends and updates the existing [EU regulation 910/2014](#), by introducing an EU digital identity wallet for all citizens and harmonising other EU regulations and directives.

145 See [IndiaStack](#)

The EU has already adopted an interoperability strategy under its ISA² funding programme and its follow-up strategy ‘Interoperable Europe’¹⁴⁶ to support the development of digital solutions for public administrations, businesses and citizens, both cross-border and cross-sector. ‘Interoperable Europe’ expanded on the successes of ISA² by introducing an interoperability policy for EU member states in 2022 to reinforce digital-ready policies and digital public services. The TTC’s view as a standard exchange mechanism could foster cooperation in interoperability policy and project implementation based on safe, privacy-preserving data transfers.

Building on interoperability, the TTC could explore joint actions to foster technological innovation in essential supply chains. For example, the EU already has a portfolio of over 120 research projects and coordination actions for robotics, which enables technology to digitise supply-chain automation. India ranks second after Kenya among the lower- to middle-income countries regarding digital skills and has a policy focus on digital education and training. The TTC could therefore establish joint research projects or launch an innovation challenge to strengthen supply-chain resilience by advancing technical ecosystems and infrastructures.

To conclude, expectations of the TTC are high. Developing or using technologies to implement shared democratic principles can close the trust gap between the partners and constructively address some concerns that Europeans have voiced about India’s human rights track record. The use of PETs, for example, would signal India’s preference for privacy-friendly models based on democratic values. Conversely, the EU could learn much from the implementation of the *Aadhaar* system, also in terms of how interoperability has been implemented. The TTC could also foster cooperation in interoperability policy and project implementation based on safe, privacy-preserving data transfers, or strengthen supply-chain resilience by advancing technical ecosystems and infrastructures.

Finally, from a geopolitical perspective, focusing on future and defence technologies can help to bring India closer to the democratic model of the EU, United States and Japan, and away from an autocratic partnership with Russia or China.

146 See: European Commission, ‘[The Interoperable Europe Policy](#).’

Reflections: Technology in Dutch and EU relations with India

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This concluding chapter offers a summary and reflections by the editors on the preceding contributions by Indian and European experts. It considers lessons learned from India's cooperation with other strategic tech partners, and discusses opportunities for EU–India cooperation along the three courses of action introduced in the introduction: namely, protect; regulate; and promote. That is, the 'keep out' and the 'run faster' approach, coupled with the EU's Brussels effect through regulatory frameworks.

To succeed in their objective of broadening and strengthening ties with India, the EU and its member states need to move on from their focus on commercial ties – in recent years, paralleled with sustainable development goals – and shed any naivety about the realities of working closely with India. This requires political willingness to relate to India more on their terms. For some EU member states, including the Netherlands, this also requires greater flexibility to interpreting sometimes decades-old limitations to cooperation.

To achieve its objectives, what lessons can the EU draw from India's engagement with other trusted partners, including the United States, Japan and Australia?

Tech cooperation beyond EU–India

Since 2020, Australia, India and Japan have cooperated in the Supply Chain Resilience Initiative (SCRI). Within this framework, the three countries initiated the sharing of best practices regarding supply-chain resilience, as well as buyer/seller matching events. India stands to draw investment and become a manufacturing hub for innovative technology.

In March 2021, Australia, India, Japan and the United States established a Critical and Emerging Technologies Working Group within the Quadrilateral Security Dialogue (the Quad). Together, they have 'mapped collective capacity and vulnerabilities in global semiconductor supply chains'.¹⁴⁷ The Quad's Common Statement of Principles on Critical Technology Supply Chains highlights security, transparency, and autonomy and integrity – which are also at the essence of SCRI.

Key lessons to draw from these fora – and, specifically, India's role in it – are fourfold, and relate to mapping, principles, matchmaking and India as a hub. First, mapping out collective capacity and vulnerabilities in particular tech sectors should be a focal area within the EU–India Trade and Technology Council (TTC). A critical or emerging tech working group could be established for this purpose, facilitating cooperation on securing, diversifying and strengthening supply chains.

Second, it is important to define shared principles that underpin, steer and define the objectives of joint EU–India cooperation in strategic tech sectors. A key element of paramount importance is 'trust'. Investment is needed in building trust between the two sides – both between governments (G2G) and with business (G2B) – as well as between their private sectors.

Matchmaking events can play an important role herein. In addition, the Indian side could invest in offering greater clarity about relevant regulations at both the national and state levels. Capacity-building offered by the EU and specific EU member states to the Indian private sector to better understand and deal with export control regulations of specific EU member states will also contribute to this cause.

Fourth, like the SCRI and Quad, the EU–India TTC may present an opportunity for India to draw investment, and to advance its role as a manufacturing hub for innovative technology and critical supply chains. Ideally, ties are thus established between the TTC and the SCRI and Quad supply-chain initiatives. After all, European companies play an important role in supply-chain restructuring for critical technologies – including the Netherlands' ASML in semiconductors and Finland's Nokia and Sweden's Ericsson in 5G/6G telecommunications networks. Japan has expressed interest in connecting global discussions on supply chains to SCRI, meaning that the path is open for cooperation by the EU and India with other trusted partners.

147 White House, '[Fact sheet: Quad leaders' Tokyo summit 2022](#)', 23 May 2022.

Next to engagement with the Quad and SCRI, lessons can be drawn from and cooperation sought with Japan in particular. One lesson for the EU is to be specific – that is, to add more granularity to cooperation with India. Japan has done this as part of its own programme on supply chains in the Indo-Pacific, having established several projects – including six with India. Among other things, these projects seek to visualise supply-chain data at a company level in order to identify risks. Separately, the EU and Japan could consider including India in their efforts on the resilience of critical global supply chains such as semiconductor supply chains. The EU and Japan agreed to act jointly in this field at their summit in May 2022 to cooperate on economic security and resilience.

The path forward: unpacking opportunities in three courses of action

This section considers the recommendations presented in the preceding chapters. These will be presented within the analytical framework introduced in the opening chapter – that is, along the three courses of action of promote, regulate and protect policies. First, we present actions to be pursued jointly by the EU and India, followed by suggestions for India, and then for the EU and EU member states, respectively.

Joint EU–India action

As illustrated in Figure 4 below, on the ‘protect’ side, the EU and India could use the Supply Chain Resilience Initiative and advance technical ecosystems and infrastructures to strengthen supply-chain resilience and coordination. As part of the ‘shape and regulate’ agenda, there are opportunities to exchange best practices, for example when it comes to privacy by design and digital IDs. The EU and India could also reduce barriers to R&D cooperation for semiconductor companies, as well as invest in capacity-building in India on EU export controls in order to ease cooperation in strategic tech sectors. Joint development and use of human-centred technologies that implement democratic principles, and exchanging views on these technologies, can shift the focus from institutional debates that have not yielded the desired outcomes. On the ‘promote’ side, the EU (and its member states) and India could invest in defence technology cooperation, particularly in these areas: quantum research (an area in which the Netherlands is a strong player); drone systems; space research and aerospace materials; and in critical subsystems such as critical alloys, engines, sonars, radars, over-the-horizon missiles and network-centric warfare suites.

When it comes to EU–India cooperation on defence technology, there is still a knowledge gap that Indian firms face with regard to defence technology availability in Europe. As an overall framework, the EU and India would do well to develop a clear-cut strategy for defence technology cooperation. EU–India cooperation is also possible in the semiconductor industry, particularly in investment for a joint R&D foundry and in collaboration on open hardware projects. In the area of critical minerals, the EU (and its member states) and India could establish a Centre of Excellence and jointly explore, recycle and stockpile critical minerals.

Figure 4 Proposed action to strengthen EU–India strategic tech cooperation

		
<p>Protect</p>	<p>Shape and regulate</p>	<p>Promote</p>
<p>Strengthen supply-chain resilience and coordination via the Supply Chain Resilience Initiative, and by advancing technical ecosystems and infrastructures</p>	<p>Reduce barriers to R&D cooperation between semiconductor companies</p> <p>Exchange best practices and jointly promote: privacy protection by design, digital IDs and services</p> <p>Invest in capacity-building and education in India on EU export controls, and contribute together to reshaping multilateral export control regimes</p> <p>Develop and use human-centred technologies to implement shared democratic principles</p>	<p>Invest in defence tech collaboration (e.g. quantum, drone systems, space) and critical subsystems</p> <p>Enhance European participation in India’s defence industry</p> <p>Collaborate on open hardware projects (semiconductor design)</p> <p>Invest in joint R&D for semiconductors</p> <p>Jointly explore, recycle and stockpile critical minerals, and establish a Centre of Excellence for critical minerals</p> <p>Close knowledge gap in Indian firms on defence tech availability in Europe</p>

Source: authors’ compilation

India

In the Indian defence acquisition process, cost is the key variable, leading to implementation of a ‘lowest bidder’ policy. This means that the issue of cost takes precedence over other strategic and technical considerations. This does not necessarily help to enhance cooperation between European and Indian defence companies.

There can be little doubt that India's key foreign technology collaborations with European partners today are with France and the United Kingdom. Next to defence and military tech, these revolve around artificial intelligence (AI), quantum computing and 5G. Less well known, however, is the fact that strategic tech relations are also evolving with other EU member states, including Germany and the Netherlands. Indian–Dutch cooperation has steadily progressed on key enabling technologies, including AI, data analytics and space technology. Building awareness of this among a broader group of Indian officials could add positive momentum to solidify and broaden this trend.

The EU and the Netherlands have been active in building resilience and situational awareness capabilities in order to deal with China's 'interference-reliant strategies' such as disinformation. Combatting disinformation is of interest to many countries also outside Europe, and India could join these EU and Dutch efforts. Another adjacent area where the EU has put efforts is democratic standard-setting for digital technologies. This is also an area where India could combine forces.

The EU

The United States and Japan have embedded their technological relationship with India as part of their larger geopolitical strategy. New Delhi highly values this new approach to bilateral ties, as evidenced by the way that Indian leaders speak of those relations. The Indo-Pacific strategies of the EU and several member states, as well as the EU–India Connectivity partnership, the TTC and Global Gateway initiative, highlight that the EU and India are on the same track. A greater emphasis on the role of technology – including in the military and the critical tech sectors discussed in this report – can further contribute to an alignment of strategic, geopolitical and economic intentions.

India's focus on 'India first' is best answered with a 'Europe first' approach, based on a shared understanding of what the EU and its member states want out of the relationship with India and what they can offer in the current geopolitical context. This requires balancing matters of concern regarding human rights and domestic civil liberties – which are currently under pressure in India – with the desired push for cooperation in economic security and shared political interests, while continuing cooperation in established areas such as development and the promotion of the United Nations' Sustainable Development Goals. In doing so, the EU must develop greater understanding of the burden of history (from India's perspective) and of the interests and goals of Indian foreign policy today. Only

then can the EU, and individual member states like the Netherlands, develop a better relationship with India.

The TTC provides an opportunity for the EU to develop jointly with India human-centred technologies from the bottom-up. This may be considered an alternative, more pragmatic way of addressing specific human rights concerns. After all, technologies play a great role in promoting – or limiting – openness, freedom of expression and inclusivity in societies. A bottom-up approach may yield better results than the top-down manner in which the EU has long tried to address certain domestic issues in India, such as freedom of expression and the treatment of minorities in India, including through the EU-India Human Rights Dialogue. It is also a way to avoid negative responses from Indian officials, who do not appreciate the public and outspoken way in which Europeans address such concerns, and who then accuse Europeans of neo-colonialism.

Related to the point above on the TTC, there are two other ways in which the EU could contribute to strengthening the strategic technology relationship with India. First, the EU could use the European Innovation Council to fund joint research throughout the lifecycle of an innovation. Second, the EU could use its Digital Diplomacy strategy to advance international relationships, like the one with India, with regard to digital diplomacy and strategic technology alliances.

Next, the two sides could coordinate more – with each other, and with other trusted partners – to build the knowledge that is required for improved strategic tech policies, such as supply-chain management. Today, the EU and its member states often lack the in-depth knowledge that enables them to ask specific questions (to companies and to other countries) – as needed, for example, for supply-chain restructuring in critical tech sectors with intricate supply chains. While governments seek to gather more such information, trusted relations need to be built with the private sector in order for them to share this. After all, these data include sensitive information that also impacts security or competition. As India seeks to attract more European investment and takes up a more important role in European strategic supply chains, greater investments are needed also in knowledge-sharing, information-gathering and – with that – in trusted relations between all governments and businesses.

EU member states

One reason that the defence partnership between Russia and India grew in scope and success was the Russians' willingness to engage in technology

transfer. If European states and companies wish to grow their relationship with India on military technologies and play a role in the Indian defence market, including technology transfer as part of any agreement will be a necessity.

In these military partnerships, the focus of the European side should be less on direct weapon or military equipment sales. Instead, a successful focus would be on partnering, including Indian partners in the 'revenues from royalties, joint exports and co-development', as well as loosening the Europeans' grip on intellectual property.

Yet another area for EU member states to investigate is the purpose of their export controls. Treating India as a pariah in the international system is no longer sustainable amid the current geopolitical turbulence. India's unwillingness to relinquish its nuclear weapons seems logical with reference to their strategic rivals, China and Pakistan, that also continue to invest in such systems. In view of their renewed strategic outlook, as defined in their Indo-Pacific strategies, EU member states can consider a more pragmatic approach in certain export control decisions. While France shifted course in this direction earlier, there seems to be greater willingness also among members of the Dutch parliament and policy circles to go in this direction.

Towards a balanced, strategic approach

A balanced approach is needed when it comes to the European relationship with India. Relations with other large powers, such as Russia and China, have provided the EU and its member states with many valuable lessons, including about dependencies, naïve expectations and commercial opportunism. The EU is currently seeking to strengthen its open strategic autonomy, and India is looking to be self-reliant (*Atmanirbhar Bharat*). Neither side has the ability nor the ambition to decouple from the rest of the world – or from China, for that matter. Yet both are looking to decrease dependencies and, in doing so, improving relationships with trusted partners is a necessity. The risk is that India, as a neutral and geographically relatively distant country with a strong strategic mindset of its own, will not be given the priority that is needed to advance EU geopolitical interests in the region – much like Japan a decade ago.

Particularly on the technological areas explored in this report, opportunities exist for the EU (and its member states) and India to have more mutually beneficial

exchanges. EU member states would do well to consider more strategically in which technologies and knowledge areas India seeks to cooperate, and to what level EU member states wish to engage with India on these issue areas.

There are challenges ahead when it comes to improving the relationship between the EU (and its member states) and India on high-tech. One challenge faced by European governments and businesses is the role of Indian states, with differences between their regulations and, hence, differences in opportunities for collaboration. As well as the federal level, individual Indian states can play a significant role, as exemplified by the semiconductor deal between Taiwanese multinational Foxconn and Indian firm Vedanta: two memorandums of understanding were signed with the Indian state of Gujarat (where the plant will be located) to make the joint venture happen. Indian states are important players in foreign policy, and therefore subnational diplomacy matters.¹⁴⁸

EU member states are united in their view that ties with India must be reinterpreted with a more strategic perspective, as it is in the EU's interest to see a counterbalance to China emerge in the Indo-Pacific region. However, EU member states do, of course, have somewhat diverging and even competing national interests.

Considering the geopolitical context, the EU and India have ample reason to elevate their bilateral relations, and the field of technology offers valuable opportunities for this. When it comes to strategic autonomy, India can play a role to help the EU reduce its dependence on China, and the EU can play its part in helping India to reduce dependence on Russia. Military technologies and critical technologies and supply-chain restructuring stand out as areas where these dependencies play a major role and where many opportunities to enhance EU-India ties are yet to be seized.

148 Maaïke Okano-Heijmans and Vishwesh Sundar, '[Bridging the gap: sustainable connectivity in EU-India relations](#)', October 2018.