MEMO

Defence Industry Strategy

Summary

The global security situation has deteriorated. Europe must do more to ensure its own security, and collaboration between the countries of Europe is essential in that regard. For its part, the Netherlands must be in a position to ensure its security in line with the first main task of the armed forces: the defence of national and allied territory. This cannot be achieved without a stable base of knowledge institutes and companies that ensure that the Netherlands has the right military knowledge, technology and capabilities. Such a base is also necessary if the Netherlands is to play a significant role in collaboration with other countries or as a supplier to large foreign companies. Above all, this base is essential to enabling our military personnel to perform their important work as effectively as possible.

This memorandum, the Defence Industry Strategy (DIS), describes the base that is needed in the interest of national security. The knowledge, technology and industrial capabilities required for that base are evaluated on the basis of the national security interest. This DIS differs from the previous DIS in that regard. Furthermore, this DIS has a greater scope. It addresses not only priority technological areas, but also areas of expertise and industrial capabilities, including the capabilities required for the maintenance of equipment and the operational deployment of the armed forces. In addition, it takes into account the knowledge and industrial base available to the Netherlands.

With the DIS, the government is implementing the coalition agreement, whereby the balance must be sought between the importance of international collaboration and a level playing field on the defence market on the one hand and the safeguarding of the vital interests of national security on the other. These are two sides of the same coin.

For each procurement process, the most suitable procurement strategy is carefully considered. The point of departure is our aim to procure the best product for the best price, with the greatest level of involvement of the Dutch business community. We will strengthen the Netherlands defence industry. In future tendering processes we will choose – within the framework of the European regulations – Dutch suppliers if we believe that this is in the interest of our national security. Sometimes it will be important to procure items quickly, and it will be possible to purchase them off-the-shelf elsewhere. In such cases, we will do just that.

By no means all products that we need can necessarily be produced in the Netherlands. In that case, we want to ensure that Dutch companies and knowledge institutes are nonetheless involved in production, to ensure that Dutch industry has access to first-class knowledge and capabilities. We will also give the Dutch defence industry a boost by advocating a more open European defence market with a level playing field for all countries.

Why does the Netherlands need its own stable base of knowledge, technology and industrial capabilities?

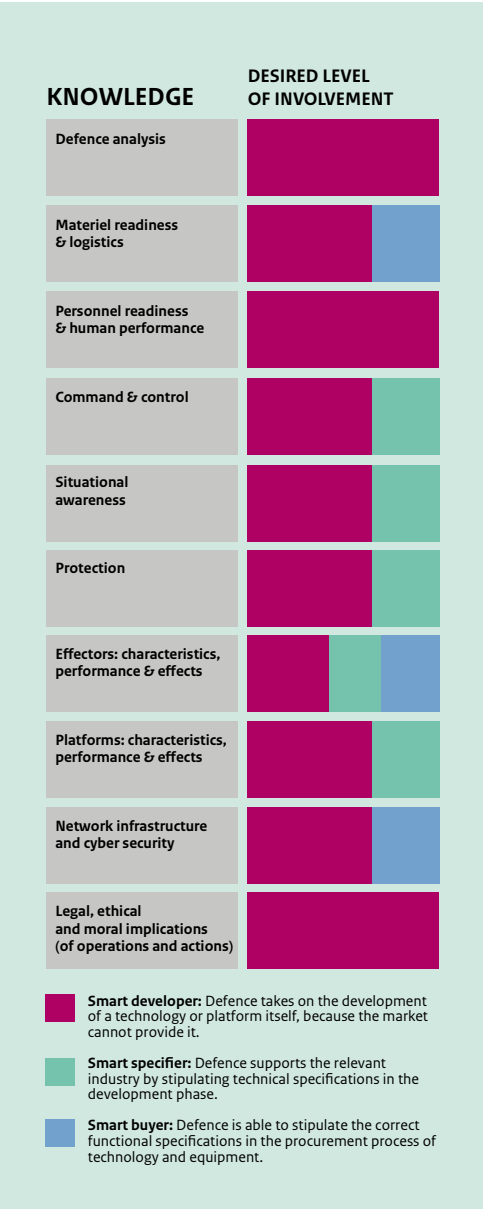
Under the Charter of the Kingdom of the Netherlands, the Constitution and international treaties, the Netherlands Ministry of Defence (hereinafter referred to as Defence) has a number of main tasks. The Netherlands must be able to execute these tasks at all times. These are elementary tasks such as military defence of our external borders and the territorial integrity of the Kingdom and that of our NATO allies, as well as the protection (physical and otherwise) of vital national infrastructure or action in the event of terrorist attacks. The Netherlands must always be in a position to protect our civilians such as embassy personnel, including those in crisis areas, and to protect commercial ships sailing under the Dutch flag. There are a number of cases in which the Netherlands must be able to take direct independent action, or in which it cannot afford to be a free rider. If we are to be able operate independently, we must have sophisticated equipment that can be deployed immediately. In addition, the Netherlands must have something to offer to our international collaboration partners and thus be a credible partner.

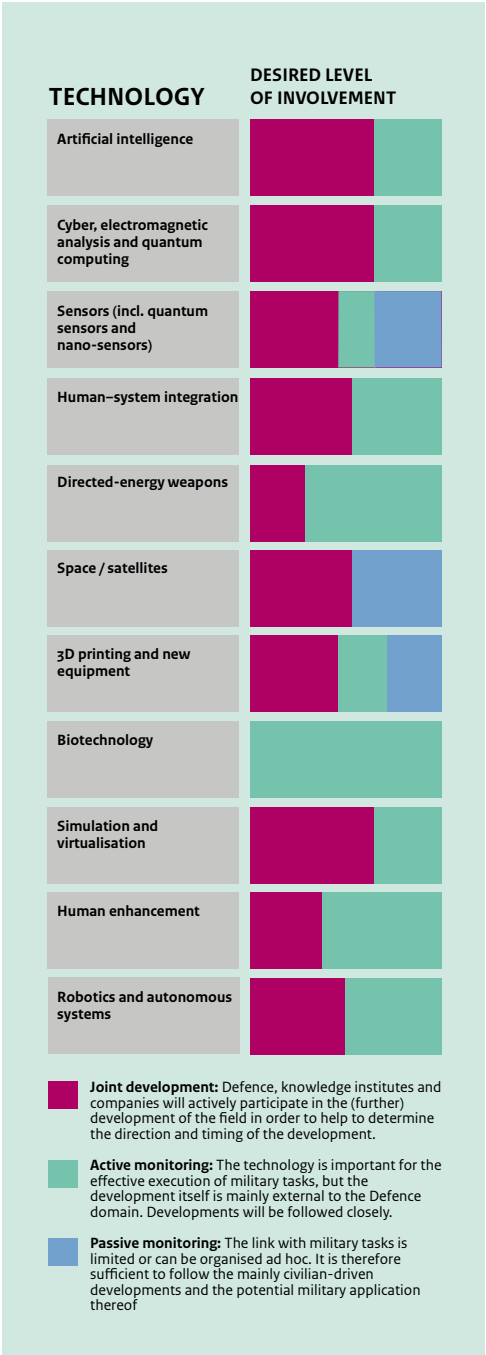
In which areas must the Netherlands excel?

The Netherlands has had a stable base in the maritime domain for centuries, and it has leading knowledge institutes and companies in that field. In the field of radar and sensor technology, the

Netherlands is a front runner worldwide. More generally, the Dutch business community excels in innovative applications and high-tech solutions. From the point of view of national security, we must nurture these areas, in part because they can give the Netherlands armed forces an operational advantage.

The Netherlands wants to continue developing its own military knowledge. We will therefore continue producing our own analyses and developing knowledge that can improve military performance.



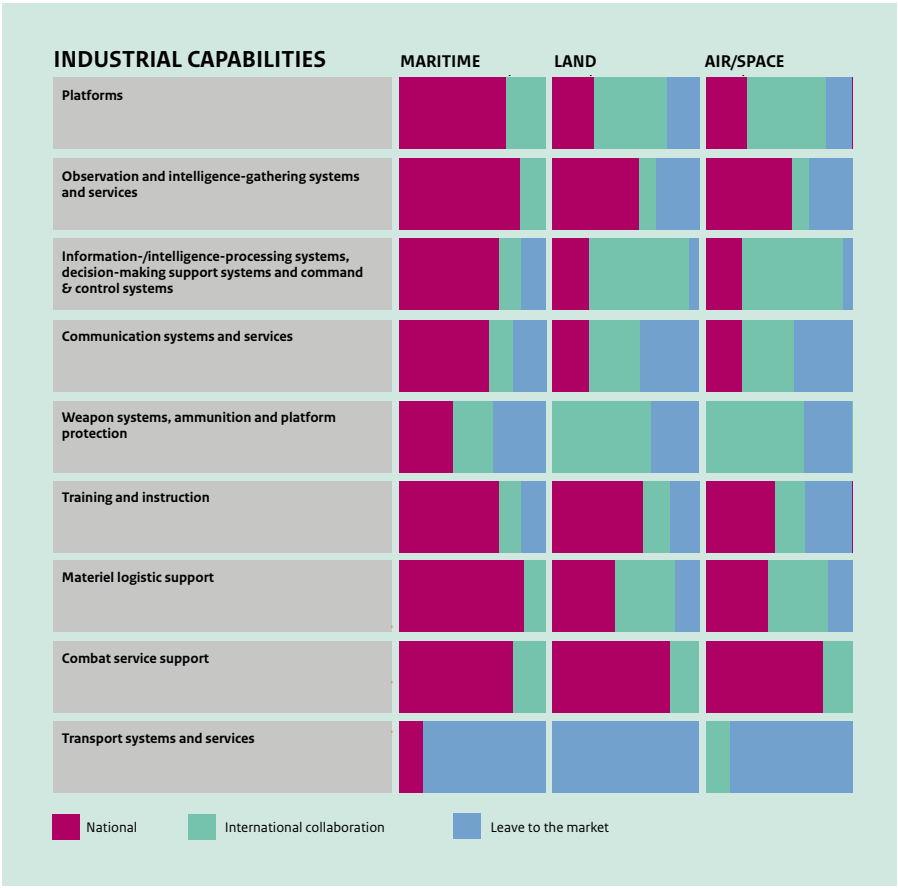


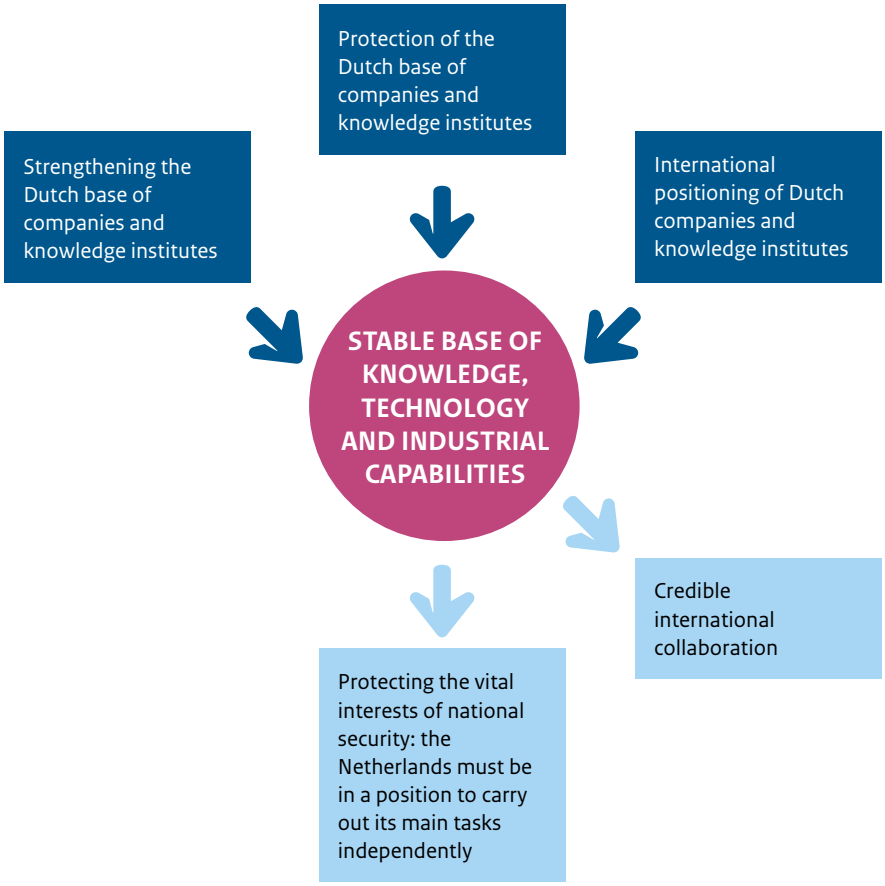
In a number of other areas of expertise, such as command and control, protection, network infrastructure and cyber security, we want to continue to have our own knowledge, but we can also make use of knowledge developed by others. The areas of knowledge and expertise in which we want to remain current are listed below.

In addition, we are seeing a number of (upcoming) technological areas that are currently important for Defence or are expected to be so in the future. Defence wants to be involved in the development of the technology in a number of these technological areas, as they are important for the execution of our military tasks. Examples of these are developments in relation to artificial intelligence, cyber and robotics. The figure below shows the technological areas identified and the role Defence sees for itself in them.

Finally, the Netherlands has the ambition to design and manufacture certain military capabilities itself. In doing so, we will take into account the industries that are already present in the Netherlands as well as the country's capacity and possible limitations. What does this mean in concrete terms? We want to preserve and strengthen our naval shipbuilding industry, for example. We also want to develop and maintain our own sensor systems – namely advanced radar systems and acoustic sensors – ourselves, here in the Netherlands wherever possible. It is our ambition to manufacture our own small UAVs and satellites for intelligence functions, as this is a niche capability that provides operational advantages. In other areas, the Netherlands aims to supply to foreign companies. The landing gear for the F-35 will be manufactured in the Netherlands, for example.

The figure below shows the ambitions the Netherlands has in various areas.





How will we achieve that?

With a view to guaranteeing our defence industrial and technological base, we will take a number of measures. We will strengthen and protect the foundation that we need, and will improve its international positioning. We will, for example, focus more attention on defence and security in government-wide innovation policy and more frequently take on the role of launching customer. If we need new equipment, we will specifically consider the strategy we will apply to procure it. If the application of procurement legislation does not provide sufficient guarantee from the point of view of national security, we can apply Article 345 of the Treaty on the Functioning of the European Union. We will also further develop our industrial participation policy, so that Dutch companies can continue to be structurally involved in the international development, production and maintenance chains of Defence equipment. In addition, we will also critically assess foreign takeovers in the Dutch defence and security industry in order to protect the security interests of the Netherlands. With a view to ensuring a firm positioning of the Netherlands' base on the international stage, we will actively commit to ensuring a level playing field on the European defence market and will strengthen international collaboration in and beyond Europe.

In conclusion

The DIS provides guidelines for procuring the best equipment for the best price with maximum involvement of the Dutch technological and industrial base. The Defence Industry Strategy applies to the government, the business community and the knowledge institutes. Together we must ensure that Dutch security interests continue to be protected. Protecting what is dear to us.

Contents

1. Introduction

1.1 Why a Defence Industry Strategy?

The world is changing and it is important that the Netherlands can continue to protect itself from all existing and new threats. While international collaboration is very important in this regard, the Netherlands must also have independent knowledge and capabilities to protect its national interests and to be a credible partner in international alliances. Dutch industry and knowledge institutes play an important role here. As suppliers of materiel, developers of new materiel, and as partners for the maintenance of that materiel. This government wants to ensure that this knowledge and these capabilities are kept within the Netherlands, and in some cases it also wants to strengthen them. So that we can be sure that – if the need arises and the armed forces are called upon to fulfil their first main task – we can ensure the security of the Netherlands and provide a valuable contribution to international security and that of our allies, to the international legal order and to stability.

The first Defence Industry Strategy (DIS) was published in 2007 [1]. It was updated in 2013 [2]. The market for the defence and security industry is constantly on the move, and the international security context is also subject to change. In October 2017, the coalition agreement 'Confidence in the Future' was presented. It outlines a number of knowledge and innovation developments and the manner in which the government and the business community collaborate, also in terms of the defence and security industry and the application of Article 246 of the Treaty on the Functioning of the European Union (TFEU). Security is a key theme of the coalition agreement. The importance placed on the protection of vital sectors, for example, and the additional funds made available for Defence are testament to this. From the point of view of the international security context, that is a necessity. In this term of office, we therefore want to implement the long-term plans that are necessary to stabilise the financing of the armed forces and to strengthen them. The importance of international collaboration is also evident in the coalition agreement. Europe must take greater responsibility for its own security and the Netherlands must contribute to that. Together, these reasons prompted the revision of the DIS.

The aim of the DIS is to identify what knowledge and capabilities are needed from the business community and knowledge institutes to protect the vital interests of national security at all times, and to identify what is needed to guarantee this base. To a certain extent, this can be done by seeking collaboration with other countries, but in a number of cases the Netherlands must have sovereignty over capabilities, including maintenance services and knowledge, in order to guarantee the capability to act. That is a careful balancing act. We cannot do everything ourselves and that is not necessary either. Furthermore, there would be no international collaboration at all if all countries wanted to be able to do everything themselves. The focus is therefore: in which fields should the Netherlands excel? The DIS provides a number of instruments in this regard. In addition, the aim of the DIS is to position Dutch industry and knowledge institutes in such a way that they can deliver a first-class contribution to Dutch and European security. The DIS is an orientational framework. It provides a guideline for deliberations and indicates the priorities of this government. It is not, however, a rigid set of rules on the basis of which clear-cut decisions can be made.

[1] *Parliamentary document 31 125, no. 1*

[2] *Parliamentary document 31 125, no. 20*

1.2 How does the DIS fit into the bigger picture?

The DIS is not a stand-alone document. The Integrated International Security Strategy [3] (GBVS) provides the strategic framework for what the government does in terms of security for Dutch citizens, the Netherlands and the Dutch Caribbean. It provides an analysis of the Kingdom's security situation. That analysis forms an important cornerstone with regard to the threats the Netherlands must combat to protect the vital interests of national security. In 2019, the government will present the National Security Strategy, which will include an integrated threat analysis.

On 26 March 2018, the Defence paper 'Investing in our people, capabilities and visibility' [4] was issued. It sets out the main features of the Defence policy for this government's term of office. The DIS provides an associated framework for investment in and procurement of materiel. This DIS is not limited to priority technological areas, as determined from the point of view of the national security interest. It also addresses the knowledge, technology and capabilities that the Netherlands needs to be able to perform essential military tasks independently – not only the development of advanced weapon systems to gain operational advantages, but also the capability to operationally deploy these systems, as well as the maintenance of the weapon systems and the services that facilitate the deployment of military fighting power.

[3] *Parliamentary document 33 694, no. 12*

[4] *Parliamentary document 34 919, no. 1*

2. What is going on around us?

The security situation has deteriorated. Europe must do more itself – also in the eyes of the United States – to guarantee security. International collaboration within Europe and the European Union is essential in that regard. At the same time, the Netherlands must be able to guarantee its own security. That requires knowledge, technologies and industrial capabilities, which are also necessary for the Netherlands to be able to play a meaningful role in European collaboration. The DIS provides indicators for the focus on the knowledge, technologies and capabilities that we, the Netherlands, want to have, and the manner in which we want to keep this knowledge and these capabilities in the Netherlands and strengthen and protect them.

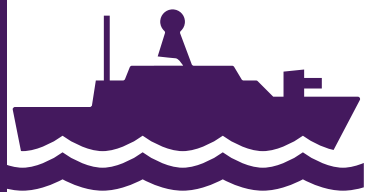
2.1 The global security situation

Much has changed in the world since the DIS was published in 2013. This is described in detail in the GBVS, which refers to aspects such as the rapid advancement of technology, the increase in hybrid conflicts, and the tensions in the Netherlands and in Europe. Such aspects are having an increasing impact on our security, as is evident from the high number of cyber incidents, the likelihood of a terrorist attack (the threat level is 'substantial') and incidents of foreign interference. For the armed forces, this means that the focus is no longer on crisis management operations. Instead, a new balance must be sought between operations and the 'traditional' defence task. This has a direct impact on the allied obligations of the Netherlands under the NATO treaty. For many countries, including the Netherlands, this has been reason to increase the Defence budget, so that investments can be made.

2.2 Developments in European defence collaboration

The Member States of the European Union are faced with the challenge of maintaining capable and effective defence organisations, while simultaneously increasing the capability to act. According to the United States, Europe must take greater responsibility for its security when it comes to defence tasks. A number of countries have recently published or are currently drafting a defence industry strategy. Just as the Dutch DIS does, these bring into focus the precarious balance between the country's responsibility for national security and the need for collaboration. The changing security situation makes both a necessity. Collaboration – both national and international– is necessary for the effective and efficient development, manufacture and maintenance of defence materiel in the future. At the same time, a healthy defence and security industry is needed to be able to support Defence, as a reliable partner, in the performance of its tasks and to ensure a certain level of autonomy. Smaller and medium-sized countries in particular face the same challenges in this regard. The Netherlands cannot maintain its own original-equipment manufacturing industry in all fields. For the Netherlands, it is therefore vitally important that Dutch industry can fully participate at the European and global level, for example as a reliable partner and/or supplier in the development, production and maintenance of defence materiel. This is also a way of keeping the necessary knowledge and capabilities in the Netherlands.

The Netherlands and Belgium have decided to jointly replace the M-frigates and mine countermeasures vessels. The Netherlands will take the lead in the replacement of the M-frigates and Belgium will do so for the replacement of the mine countermeasures vessels. Sharing materiel forms the basis for successful collaboration, as part of which the Netherlands and Belgium have fundamentally integrated their training, maintenance and staffs.



The European Commission has drafted a number of proposals for cooperation between Member States. One of the proposals, the European Defence Action Plan (EDAP), focuses on the European technological and industrial defence base and the strengthening of the European defence market. Part of the EDAP is the creation of a European Defence Fund (EDF), with the aim of stimulating Member States and companies to increase collaboration in research and development, and ultimately in the acquisition of defence capabilities. In this way economies of scale can be gained and the Member States will have interoperable capabilities and systems. The EDF has two strands: one for defence-related research and one for the development of defence capabilities [5]. Criteria are attached to the EDF to promote investment in supply chains, in order to support small and medium-sized enterprises (SMEs). The Commission wants to focus on strengthening security of supply and improving cross-border market access for SMEs. In addition, the Commission wants to promote investments in the defence sector by the active application of European structural funds to investment projects and the modernisation of defence supply chains. Finally, the Commission aims to promote synergy between defence and related civil policy areas, including satellite communication, cyber, aviation and maritime security.

Another important development at the European level is the establishment of the Permanent Structured Cooperation (PESCO). PESCO intensifies the cooperation between groups of Member States in security and defence. The aim is that this will contribute to the joint development of defence capabilities and improve/accelerate the capability of the EU to carry out military missions. Finally, the European Defence Agency (EDA) has developed a capability plan that provides insight into the capabilities needed in Europe, thus creating coherence in capability development.

NATO too is taking action with regard to the development of capabilities. The NATO Industrial Advisory Group (NIAG) brings together the defence industries of NATO partners. NATO is of the opinion that industry needs to be organised in close proximity to its partners, so that it can contribute to the development of military capabilities and solutions. The NIAG also promotes transatlantic cooperation and provides advice on the applicable standards.

For many years, the Netherlands has also been collaborating with other Member States bilaterally in various ways in order to promote interoperability and coherent action, and to realise economies of scale where possible. The position of the United Kingdom is noteworthy in this regard. In December 2017, the United Kingdom drafted its own defence industry strategy, in which it stressed that it would consider the consequences of Brexit for the defence sector specifically and that it is committed to cooperation with its partners. As the Brexit negotiations are currently in full swing, the position of the industry in the United Kingdom and the form in which international cooperation will continue is not clear at this point.

[5] *The figures after 2020 are subject to change. Negotiations on the exact envelope and criteria after 2020 are still ongoing.*

2.3 Developments on the European defence market

As a result of the cutbacks in defence budgets after the 1980s, the defence industry has eroded all over Europe. It is a relatively closed market, with most customers being public authorities. This is in part the reason why there is no level playing field. The large companies that manufacture end products [6] are based in only a small number of countries, and the suppliers are often based in the same countries as the companies they are supplying. An evaluation of the European directive revealed, for example, that in a number of Member States the contracts that are tendered under the directive are predominantly awarded to companies based in that Member State [7].

The European Union (EU) is committed to creating a more level playing field, by means of measures such as tendering directives [8] and the development of the EDF. The European tendering directives ensure transparency on the market at the level of main suppliers, without disrupting supply chains. This is strengthened by the ongoing consolidation of the market, as strict requirements are set regarding the identity of and control over defence companies. Some Member States have state participations in the defence industry. Furthermore, there are differences in Member States' criteria regarding export of defence materiel to other countries. In comparison with other Member States, the Netherlands has a fairly restrictive export control policy. This also has an impact on the competitive position of companies in the defence market. As long as the principle of an open and transparent defence market is not adequately applied, additional measures are needed to keep the industrial and technological base in the Netherlands.

2.4 The Dutch defence technological and industrial base

The Dutch defence and security industry consists of large, medium-sized and small companies, knowledge institutes and start-ups. A company is considered to be a Dutch company if it is registered in the Netherlands. Companies registered in the Netherlands may have a foreign parent company. However, these companies are also considered to be part of Dutch industry if they carry out substantial long-term activities in the Netherlands.

The Dutch defence industry consists of some 350 large and small companies with a joint turnover of €4.5 billion. The sector employs 25,000 people, of whom almost 8,000 in research and development. The sector is responsible for approximately 0.7% of GDP [9].

Dutch industry stands out from the global and broader European industry by virtue of its niche markets. Ballistic missile defence is one example, but in addition to typical defence-related organisations, Dutch companies and knowledge institutes are front runners in fields such as biotechnology and medical technology. Knowledge institutes such as the Netherlands Association for Applied Scientific Research (TNO), the Netherlands Aerospace Centre (NLR), the Maritime Research Institute Netherlands (MARIN) and universities play an important role in several fields.

In the maritime domain, the Netherlands has state-of-the-art companies with authoritative technological and industrial capabilities such as Damen Schelde Naval Shipbuilding and MARIN. In addition, it has an infrastructure in the maritime domain of fundamental and applied research and development, shipbuilding and ship demolition.

In the land domain, there are a small number of companies in the Netherlands that develop complete end product (turnkey) systems. There are many small and medium-sized companies, which makes it

[6] *Original Equipment Manufacturers (Oem's)*

[7] *http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52016SC0407*

[8] *Directive 2009/81/EC for the procurement of defence and security goods and services is a result of this.*

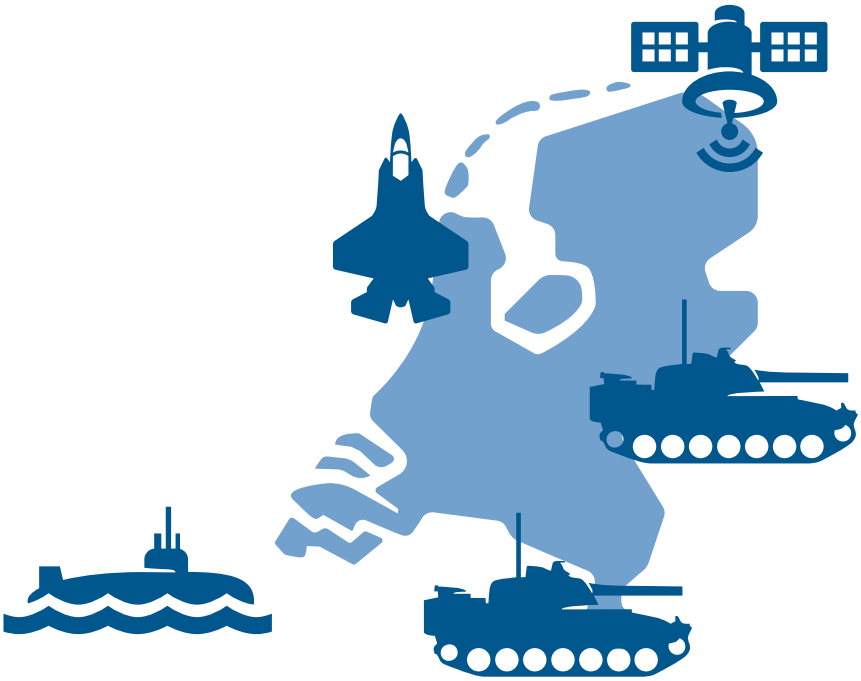
[9] *Triarii 2016*

difficult for these companies to have sufficient impact internationally and to compete with large companies in the land domain. Of course, there are also good examples which do reflect close collaboration, such as the role that Van Halteren Metaal plays in the maintenance of the CV90. Information-driven operations mean that vehicles are increasingly used as information platforms.

High-tech materials, sensors (including quantum sensors and nano sensors) human systems integration and C4I set Dutch industry apart. The Netherlands is a front runner in battlefield management systems for land operations. As we are much more advanced in this field than a number of other countries, parts of German units are now also equipped with these systems and further extension is being investigated. Further strengths on the part of the Netherlands lie in logistic solutions and production processes for the maintenance and repair of systems.

The Netherlands held a prominent position in the field of aircraft design and construction. Following the bankruptcy of Fokker in 1996, this position was lost to a certain extent, but in its place a partnership was set up between Fokker, NLR, Delft University of Technology and SMEs in the aerospace field. In the Netherlands, programmes are being developed in which Dutch companies can participate in development as a reliable partner, such as the F-35 project. The sector has opportunities for fundamental and applied research. There is also technological and industrial capability in this sector, for example with regard to high-tech materials, light-weight structures, maintenance concepts and composite components. Around Delft, an ecosystem has flourished in the space domain, which is working on nano-satellites, space mission design, training programmes, and more.

Finally, the Netherlands is a global front runner in relation to sensors, radar development, combat management systems and C4I capability, which are not necessarily linked to a specific domain. Thales Nederland BV is an important actor in this regard. Examples include harbour radars, container searching, land mine detection and fire control. With a view to the future, the business community is focusing on integrated sensor, weapon and communication systems, electro-optics technology development and developments in the field of ballistic missile defence.



3. What determines the vital interests of national security and what is the desired defence technological and industrial base?

From national security interest to military tasks

Countries determine themselves what they want to protect and what they need to be able to do so. Not only products and technology, but also knowledge about and deployability of materiel.
The Netherlands must at all times be able to protect its vital interests of national security arising from the Charter of the Kingdom of the Netherlands, the Constitution and treaties, because in the first instance the Netherlands stands alone.
The armed forces ensure sovereignty, the security of subjects and ships, and deployment security.
For the independent execution of essential military tasks, we must have sophisticated weapon systems, and materiel and knowledge must be operationally deployable.
Maintenance and services are part of the base that is necessary for the protection of national security.
The ability to safeguard these interests requires knowledge, technology and industrial capabilities in order to preserve a certain level of autonomy and capability to act.
The business community and knowledge institutes help Defence to achieve this.

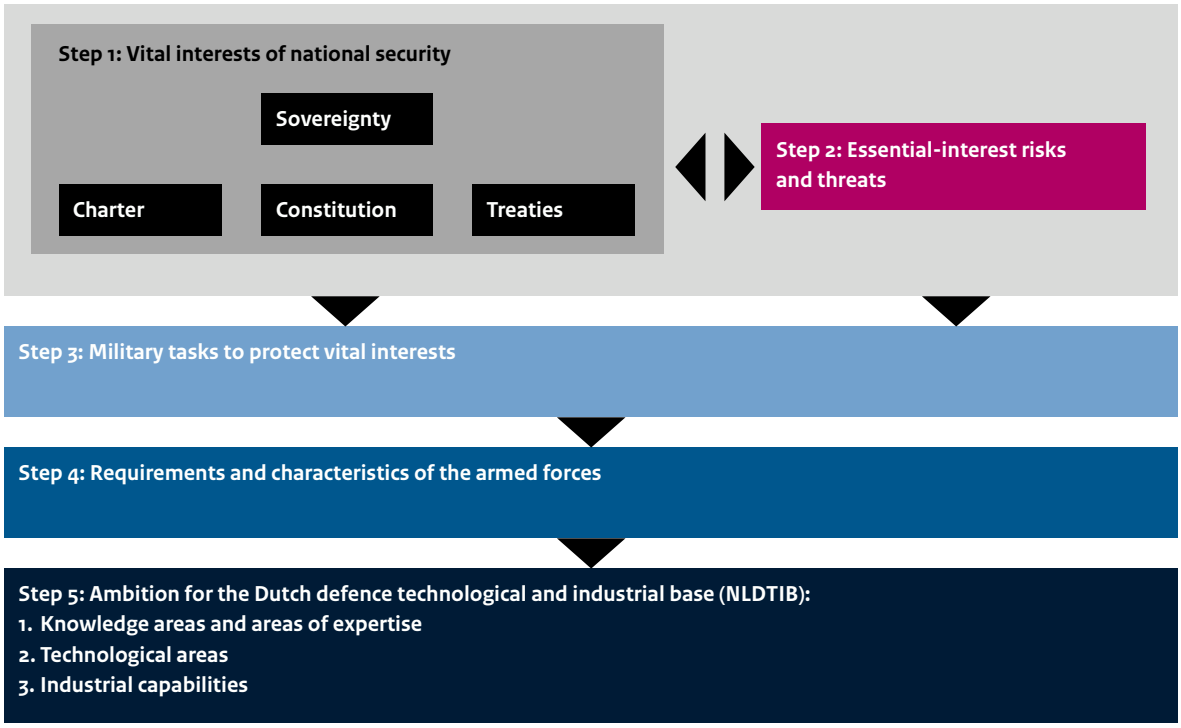
Under the TFEU, it is up to the Member States to define what they consider to be vital interests of national security. A Member State can, under the TFEU, take the measures that it considers necessary for the protection of the 'vital interests of its security which are connected with the production of or trade in arms, munitions and war material'. Sovereignty, the security of subjects and of ships sailing under the flag of the Member State, and the deployment security of military units are decisive in this regard. It is also important that sufficient sustainability can be ensured. The deployment of the armed forces is a response to specific threats. It may be the case that military deployment is obligatory under the Constitution or a treaty. The objectives of foreign, security and defence policy in general terms or a request for military assistance may also be cause for deployment. The deployment of the Royal Netherlands Marechaussee, a police organisation with military status, is governed by the Police Act. A capability is often built up of DCTOMP elements: the applicable doctrine, command and leadership, training, organisation, and materiel and personnel policy. Pooling these elements ensures the ability to perform military tasks and achieve effects. These elements are always determined at the national level, because they constitute the blueprint of the armed forces of a nation.

It is important that we realise that national security is more than technological development and the manufacture of materiel. National security can only be protected if the armed forces are (operationally) deployable now and in the future. That means that the maintenance and services that are necessary for operations are part of the base that is needed to guarantee national security and ensure sustainability. This is in line with the adaptive armed forces policy and is already in place. Many contracts have already been entered into that not only include the procurement of materiel, but in which service, support and maintenance are also provided by industry. If we are to be able to respond more effectively to the rapidly changing security situation, it is important that we be flexible; we want to have knowledge and means available when we need them.

This chapter specifies, from the point of view of the vital interests of national security, the knowledge areas, technological areas and industrial capabilities that need to be embedded in the Dutch defence technological and industrial base. This may be from an independent OEM industry, but where this is not possible, by acquiring a strong position in the chain of suppliers. In addition, this chapter specifies in which cases international collaboration is self-evident and in which cases the market has a role to play. The step-by-step plan presented in Figure 1 is used to determine the defence technological and industrial base that is needed to protect the vital interests of national security. The steps have been detailed in Annex 1.

Knowledge areas, areas of expertise, technological areas and industrial capabilities are closely related. Knowledge areas and areas of expertise are the more fundamental (research) areas. The technological areas then translate this into opportunities and threats for military applications, which must subsequently be embedded in industrial capabilities.

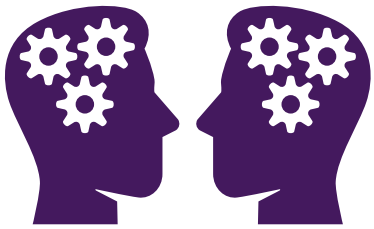
Figure 3.1: From vital interests of national security to the desired Dutch base of defence-related companies



3.1 Knowledge areas and technological areas

Technology is becoming increasingly broad and easy to access. The drawback is that it can no longer be taken for granted that Western units have military and technological superiority over potential opponents. The advance of technology has become more urgent as a result.

Technological advancement also offers a means of providing maximum protection to servicemen and women and of avoiding civilian casualties wherever possible. If we are to respond better to the ever-changing security situation, it is important that investments are made in expertise and technological developments that contribute to the fulfilment of military tasks. They form the foundation for innovation. If it is to continue to counter security challenges and to respond effectively to technological and societal developments, Defence must innovate at an ever-increasing pace. It must have innovative capability in house, but must also make use of the innovative capability of Dutch companies and knowledge institutes.



Definitions

- ***Smart buyer/customer*: the ability to stipulate the right functional specifications in the procurement process of technology and materiel**
- ***Smart specifier*: here, this means that Defence can stipulate the technical specifications in the development phase;**
- ***Smart developer*: here, this means that Defence takes on the development of a technology or platform itself, because the market cannot or can only partially provide it.**

In 2016, Defence determined the knowledge areas and areas of expertise that play a role in the fulfilment of its military tasks. The knowledge areas (KA), and the areas of expertise (AE) they are divided into, were documented in the reassessment of the Defence knowledge portfolio. This military-specific knowledge and expertise has been contracted out by Defence to the external knowledge infrastructure.

The armed forces must be in a position to independently pursue strategy and policy and to be able to operate at least as a smart buyer/customer for the procurement of military capabilities. Furthermore, not all knowledge is available on the market (or only at exceptionally high costs) and it is very specific to Defence. In a number of cases, the desired level of involvement of Defence therefore goes further than just procurement (smart buyer/customer). Defence must be able to understand detailed (technical) specifications, or be able to stipulate them itself, in collaboration with the business community where applicable (smart specifier), or to be able to fully or partially develop products or services itself (smart developer). In the case of the latter, this means that the COTS/MOTS [10] policy for parts will be abandoned. For all these knowledge areas, a degree of independence from foreign parties is desirable, because of the military-critical functionalities associated with knowledge in these areas.

Nonetheless, in practice there will be extensive international knowledge exchange with trusted partners. To a certain extent, distinctions are also made within the various knowledge areas. Broad knowledge in the field of logistics, for example, can be procured on the market, but mission preparation, materiel readiness and logistics support for missions and exercises demand a high level of national involvement in order to ensure, for example, operational deployability and operational advantages.

[10] *Commercial off-the-shelf/Military off-the-shelf*

Table 3.1 shows the extent to which Defence wants to be involved in the various knowledge areas and areas of expertise. Further details are provided in Annex 2.

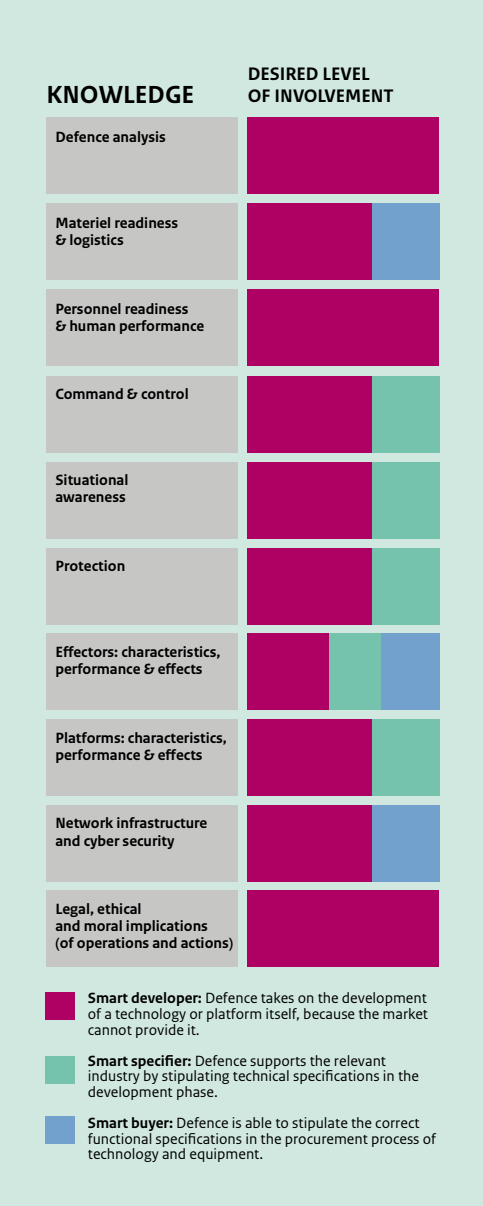


Table 3.1: Desired level of involvement of Defence in knowledge areas and areas of expertise

In light of the current pace of technological (and scientific) developments, the existing and upcoming technologies that will play an important role in the performance of our military tasks need to be prioritised. On the basis of analyses by TNO (2014, 2015 and 2018), ten knowledge areas and technological areas have been identified that will have a significant impact on the performance of our military tasks the coming 5 to 10 years. These analyses explicitly included an assessment of the impact on military operations, with regard to the opportunities that they create as well as the possible disruption to military operations that they could cause, for example if an opponent is able to influence information systems.

For each of the prioritised technologies, an analysis was made of the operational necessity and long-term (5-10 year) impact. On the basis of this analysis, an assessment was made of how actively the technology should be developed (or jointly developed) in the Netherlands. A distinction was made between the following levels of development.

- **Joint development.** The technological area in question is important for military applications, partly due to the high level of influence of the technology on the performance of military tasks as well as the important role of defence applications in the development of the technological area in question. The relevant (existing or upcoming) technology must gain or retain firm embedding in the defence technological and industrial base. Defence, knowledge institutes and companies must actively participate in the ongoing development of this field in order to contribute to the direction and timing of this development.
- **Active monitoring.** The technological area in question is important for the effective performance of military tasks, and development takes place both within and outside the defence domain. The main aim is therefore to closely monitor developments and in particular to develop military applications where necessary.
- **Passive monitoring.** The link with military tasks is limited or can be organised ad hoc. It is therefore sufficient to monitor the mainly civil-driven developments and the potential military applications thereof.

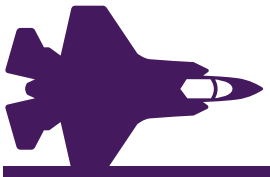
The considerations regarding operational necessity and impact are detailed for each technological area in the table in Annex 3.

The combination of impact and operational necessity means that joint development in the defence technological and industrial base is needed in many priority technological areas. This can be explained by the fact that these are a selection of a broad set of upcoming technologies that are expected to have the greatest impact on the operationality of the armed forces.

Artificial intelligence, cyber, electromagnetic analysis (EMA) and quantum computing, and sensors are so critical for information provision that the capability to develop them is a necessity. The Netherlands must have the technology that enables it to safely communicate and operate, also digitally.

Good combinations can be made with developments on the market in most technological areas. In several technological areas (such as 3D printing, advanced materials, simulation, virtualisation), vigorous development is taking place on the civil market. The involvement of Defence is needed to ensure that opportunities for the military domain are also fully exploited. Here, a combination of monitoring civil developments on the one hand and developing military applications on the other must be found.

Biotechnological developments have become increasingly important in protection from concrete threats (for example in protection from attacks with CBRN means, but also with regard to opportunities: the healing of wounds, for example). The application of the developed knowledge on this market is in many cases sufficient to provide for this, partly due to the large-scale (scientific) research conducted in the pharmaceutical industry. The knowledge institutes also have a role here.



The Netherlands is a global front runner with regard to the integration of systems, such as sensors and wiring in aircraft wings and fuselages. This creates space and a reduction in weight, which is of great importance to the new generation of aircraft.

TECHNOLOGY	DESIRED LEVEL OF INVOLVEMENT
Artificial intelligence	
Cyber, electromagnetic analysis and quantum computing	
Sensors (incl. quantum sensors and nano-sensors)	
Human–system integration	
Directed-energy weapons	
Space / satellites	
3D printing and new equipment	
Biotechnology	
Simulation and virtualisation	
Human enhancement	
Robotics and autonomous systems	

Joint development: Defence, knowledge institutes and companies will actively participate in the (further) development of the field in order to help to determine the direction and timing of the development.

Active monitoring: The technology is important for the effective execution of military tasks, but the development itself is mainly external to the Defence domain. Developments will be followed closely.

Passive monitoring: The link with military tasks is limited or can be organised ad hoc. It is therefore sufficient to follow the mainly civilian-driven developments and the potential military application thereof

Table 3.2: Desired level of involvement of Defence in technological areas [11]

[11] *Defence has added an eleventh technological area: robotics and autonomous systems. In a number of cases, the technological areas overlap the knowledge areas addressed earlier. A knowledge area does not always have a technological component. Furthermore, there are also technological areas – such as biotechnology – that are important but are not directly related to knowledge areas. The choice has therefore been made to address knowledge areas and technological areas separately.*

3.2 Industriële capaciteiten

The areas on which the Netherlands is willing and able to accept dependence, and to what extent, can be determined on the basis of the vital interests and the military tasks. We distinguish between the following levels of independence:

1. **Independent capabilities**. The relevant products and services are, wherever possible, designed, developed, manufactured and maintained by the Dutch technological and industrial base under its own management. This covers the full 'golden triangle' of the government, the business community and knowledge institutes. Dutch suppliers supply the integrated product or service to the armed forces and have sufficient knowledge, skills and capacity to support and maintain the product or service for the extent of its service life. Components of this system may be supplied by foreign businesses, but ultimate control lies with a Dutch partner.

2. **Partial dependence (international collaboration).** The Netherlands and the defence technological and industrial base work closely with trusted European and international partners to design, develop, manufacture and maintain systems. With a view to acquiring and deepening knowledge and keeping it current, international collaboration programmes and direct contact with large defence companies are of great importance to the Netherlands. In this way, the Netherlands can gain experience on the development, manufacture and maintenance of weapon systems. This also ensures that the Netherlands can comply now and in the future with the military standards of state-of-the-art defence systems. The final manufacturer and ultimate supplier of the product or service does not have to be Dutch. Dutch companies are, however, a partner and/or contribute to the supply chains. It is important that we are aware that international collaboration programmes can have a tendency to progress slowly, certainly when the desired specifications of several countries have to be brought into line with each other.

3. **Dependent (leave to the market).** The relevant product or service will be procured from the market as a COTS/MOTS item, as a result of which partial or virtually complete dependence on a foreign supplier may arise.

For the purpose of categorisation, two pragmatic considerations have also been added:

- The first consideration is whether there is a mature international and European market, in which the Netherlands can make a valuable contribution to international collaboration programmes with regard to the development, production and maintenance of defence materiel. It is important that guarantees are given with regard to the availability and security of information, so that deployment security and exclusivity of information can be guaranteed as far as possible.
- The second is the consideration of what the Netherlands is able to take on. This means looking at the industries that are already present in the Netherlands, as well as the country's capacity and possible limitations. As described in Chapter 2.4, the Netherlands has a number of crucial industries. We must not forget this. We want to actively build on strong areas. On the other hand, certain industrial capabilities are beyond the limitations of a country such as the Netherlands. This consideration means that the autonomy of the Netherlands may be desirable from the point of view of vital interests, but it is not practically feasible. A Dutch fighter plane industry is not feasible in practice. This does not alter the fact that it is necessary to have sufficient expertise in the Netherlands about the workings and maintenance of fighter planes. In this specific case, the development of an ecosystem for the maintenance of F-35s in Woensdrecht and the participation of Dutch companies in the F-35 project are good examples. This consideration results in differences between the domains of sea, land and air. Although the interest of national security is, in theory, the same, taking the capacity and possible limitations of the Netherlands into account means that the result may be different.

Industrial capabilities are divided into a number of components. The components are platforms, information-gathering systems, information-processing systems, communication systems, weapon systems, training and instruction, materiel logistics training, combat service support and transport systems.
The Netherlands' ambition for industrial capabilities in the maritime, land, air and space domains are presented per component. This description at the product and service level only offers a guideline. For each specific case, an individual assessment will have to be made on the basis of, for example, economies of scale, international collaboration in the materiel logistics domain, delivery assurance, etc. In addition, niches can be identified within which the autonomy of the Netherlands may be desirable, for example to gain operational advantages or to improve deployment security. It should be noted that a risk analysis is made on the basis of the current security situation. If the security situation changes significantly, different choices may be made, for example when it comes to the guaranteed availability of large-scale transport options or ammunition.

Platforms and system integration

When we refer to a platform, we usually mean the Defence organisation's main weapon systems. A platform comprises various components. Platforms are given added value by the systems in the platform and the manner in which the systems are connected to one another, as well as when it comes to the application of new techniques, such as armour or visibility. In the development of platforms, a distinction must be made between those for the maritime, land, air and space domain.

Ambition

Military capabilities in the maritime domain are above all important for the protection of the vital infrastructure of the Netherlands (such as the Port of Rotterdam and underwater cable networks), for the protection of external borders and the territorial integrity of the Kingdom (including the Dutch Caribbean), NATO and the EU (possibly as a first responder), and for the protection of maritime lines of communication and commercial shipping routes, as well as ships sailing under the Dutch flag. As deployment security can only be guaranteed with sufficient knowledge about system integration, we want to embed platform design and platform integration in the Netherlands. With a view to the specific requirements applicable to platforms, products and services, economies of scale are limited. The integration of SEWACO [12] systems, both with each other and with basic facilities, is something that we particularly want to organise in the Netherlands. Not only because of deployment security, but also on account of the sensitivity of these systems. A certain level of dependence on the market is accepted for propulsion systems. Developments such as zero-emission propulsion, however, could give operational advantages and are therefore of national interest. For hull and platform propulsion for frigates, for example, use can be made of production capabilities elsewhere, on the basis of Dutch design.

Military capabilities in the land domain are primarily important for the protection of Dutch citizens in crisis areas and of the vital infrastructure of the Netherlands, for example from terrorist attacks. They are also important for the protection of external borders and the territorial integrity of the Kingdom, NATO and the EU, as well as the protection of commercial routes over land. The variety of platforms for land operations means that we set great store by economics of scale in development and production. This can be realised by means of European industrial consolidation. We want to develop wheeled and tracked vehicles, ground-based air-defence systems and CBRN systems through international collaboration for the most part with European partners, or purchase them off-the-shelf. This does not, however, mean that we cannot organise the integration of SEWACO systems in the Netherlands where possible. We can also choose to have a platform developed and maintained in the Netherlands, for example to gain specific operational advantages. This also applies to niche capabilities that contribute to the strategic protection of the security interests of the Netherlands.

[12] *Sensor, Weapon and Communication systems*

Military capabilities in the air and space domain are primarily important for the protection of Dutch citizens in crisis areas, for the protection of external borders and for the territorial integrity of the Kingdom, NATO and the EU. In addition, air capabilities are important for the protection of deployed Dutch units, for the protection of commercial routes by air, and for the protection of space infrastructure. Airborne platforms are, however, highly complex due to the multitude of systems and subsystems. In addition, airborne platforms have to be certified. We want to therefore primarily develop airborne platforms in international alliances, so that the Netherlands has access to modern platforms and retains sufficient knowledge in the role of partner or supplier. In relation to smaller UAVs and satellites, which are primarily used to perform intelligence functions, the Netherlands does have the ambition to develop and manufacture platforms independently, because these capabilities are new niche capabilities. They enable the Netherlands to act as a system integrator.

The capacity and possible limitations of the Netherlands
The Royal Netherlands Navy (RNLN) is characterised by the high standard of self-developed platforms. Knowledge institutes such as MARIN and TNO also play an important role in this regard. It is of strategic importance that a Dutch OEM naval shipbuilding cluster is retained and strengthened in the Netherlands, as this enables the armed forces to retain operational advantages and guarantee deployment security. This is necessary in light of the specific geographical characteristics of the Kingdom and the role that the RNLN plays from the allied point of view.

With regard to land systems, the Netherlands has a limited number of large companies that integrate full systems. The Netherlands can – in collaboration with large foreign OEMs – primarily fulfil the role of reliable supplier for land systems and thus provide a valuable contribution to the development, production and maintenance of land platforms.

The development of advanced military airborne platforms is not possible for all companies and countries. The consideration of the capacity and possible limitations of the Netherlands is very relevant in this regard. Fighter planes, armed helicopters, transport aircraft, larger UAVs and satellite networks will therefore primarily be developed through international collaboration or purchased off-the-shelf. Development programmes are usually led by the United States or take place in a European context. In collaboration with large foreign OEMs, the Netherlands makes a valuable contribution to the development, production and maintenance of such platforms and fulfils the role of valued partner or supplier in this regard.

Observation systems and information-gathering systems

Ambition
Sensors are highly influential in determining the offensive and defensive effectiveness of weapon systems, whether they are land, sea or air systems. Authoritative sensor systems can be used to gain operational advantages. Improved sensor systems lead to a better information position, which in turn leads to greater opportunities with regard to both protection and intervention. We consider the development and maintenance of superior sensor systems in the Netherlands to be desirable, certainly where the Netherlands has OEM capability and is in a position to independently develop and build platforms and/or integrate systems.

We particularly want to develop advanced radar systems (ground–ground and ground–air) and acoustic sensors for land systems in the Netherlands. For optical and infrared sensors, purchasing off-the-shelf is a logical approach, as there is a well-established market for these products.

Sensor systems for small unmanned air and space systems are directly related to the development of platforms in this field. As it is our ambition to develop platforms in this field, it is a logical approach to also develop the associated sensor systems in the Netherlands.

The capacity and possible limitations of the Netherlands
The Netherlands has an authoritative role when it comes to sensor and radar systems. These systems can be used at sea, in the air and on land. We must retain and strengthen this position.
Land, air and space systems are usually developed through international collaboration or purchased off-the-shelf. The Dutch defence technological industrial base can, in collaboration with large foreign OEMs, make a valuable contribution as a supplier to the development, production and maintenance of sensor systems, as a result of the knowledge and experience that we have in this field. Maritime systems are usually developed in the Netherlands.

Information/intelligence-gathering systems, decision-support systems and command & control systems

Ambition
The extent to which information from various sensor systems can be collected and processed and the speed at which informed decisions can be taken are essential to the responsiveness of the armed forces. The information is usually secret and must be well protected. At the same time, the interoperability of information systems with those of trusted partners is desirable. Basic systems for combining, processing, managing and storing information are readily available on the market, but they need to be adapted for military purposes and integrated in networks and platforms. In view of the need to protect the information, we want to realise this in the Netherlands, or possibly on the basis of international collaboration.

The capacity and possible limitations of the Netherlands
In the maritime domain in particular, we are able to embed information processing systems in the Netherlands. This is part of the system integration capability. Although the need for land and air systems is no different, in these domains the capacity and possible limitation of the Netherlands and international operational collaboration has a greater impact on decision making.

Communication systems and services

Ambition
Communication systems in basic configuration and communication services for sea, land and air are widely available on the market. With regard to security and robustness, specific military requirements often apply, but use can be made of the military market in this regard. In a number of cases, parts or components of communication systems are specific to the Netherlands and highly classified. As a result, we are of the opinion that industrial capabilities should be organised in the Netherlands, because not all classified information can be shared with partners, and because state secrets and their security must be controlled.

The capacity and possible limitations of the Netherlands
The close connection with system integration for platforms means that, in the maritime domain in particular, we are able to embed parts of communication systems at the national level. The components can nonetheless also be supplied by trusted partners. Although the need for land and air systems is no different, in these domains the capacity and possible limitation of the Netherlands and international operational collaboration play an important role in decision making.

Weapon systems, ammunition and platform protection

Ambition
With regard to weapon systems and ammunition, economies of scale are important, but difficult to achieve at national level. We often have to bring national requirements in line with what is available on the military market. Exceptions are weapon systems for self-defence or smart ammunition with specific national requirements with regard to effectiveness and autonomy and in relation to effective integration with the platform.

We want to keep these under our own control. In addition, it is essential that delivery assurance and security of ammunition and spare parts are guaranteed.

The capacity and possible limitations of the Netherlands
For ammunition, we are largely reliant on foreign suppliers. The close connection with system integration for platforms means that, in the maritime domain in particular, we want to embed platform protection at national level. Although the need for land and air systems is no different, in these domains the capacity and possible limitations of the Netherlands and international operational collaboration have a greater impact on decision making. Furthermore, certification in the air domain means that specific requirements are set, as a result of which the manufacturer does not permit any changes to the system.

Training and instruction

Ambition
Training and instruction are part of the DCTOMP elements, which we want to embed at national level. Training and instruction are linked to the specific national characteristics of the armed forces. They reflect norms, values and history, as well as political and societal decisions. We therefore want to organise much of the training and instruction in-house or as a service procured from service providers that have sufficient affinity and experience with the Dutch military culture and context. This does not alter the fact that military personnel can be trained and instructed both nationally and multinationally, because it is also important that collaboration is possible with other armed forces in operations. This certainly applies to training courses designed to develop skills for capability-building in third countries. Simulators play an important role in training and instruction. The development of simulators is largely realised at national level, unless the simulator is acquired in combination with a specific weapon system.

Materiel logistics support

Ambition
The norm for materiel logistics throughout the service life of platforms and systems has shifted from military-owned-and-operated to public-private models. For materiel logistics services, the reliability, availability and, where applicable, the speed of service must be guaranteed. Defence must be able to trust the service provider. In addition, sustainability can be greatly improved by means of innovative materiel logistics concepts. That is very important for deployment security. We therefore advocate forms of collaboration that can be established at national level or in collaboration with trusted partners. If the platform is developed nationally, we will also organise the materiel logistics support nationally in many cases. Due to the international character of many of the platforms in the air and land domains, a combination of national organisation and international collaboration will be the usual format.

Combat service support

Ambition
The combat service support of deployed units is a national responsibility and must be organised within Defence, potentially in combination with the support of trusted and security-screened Dutch service providers or by forming pools with trusted partners. This is important because combat service support must also be guaranteed in the case of threats to deployed units. Combat service support is also of great importance for the sustainability of the armed forces. Combat service support must be able to get as close as possible (territorially) to the deployed units, as a result of which those units must also be able to work under dangerous circumstances. That is why we want to organise this at national level.

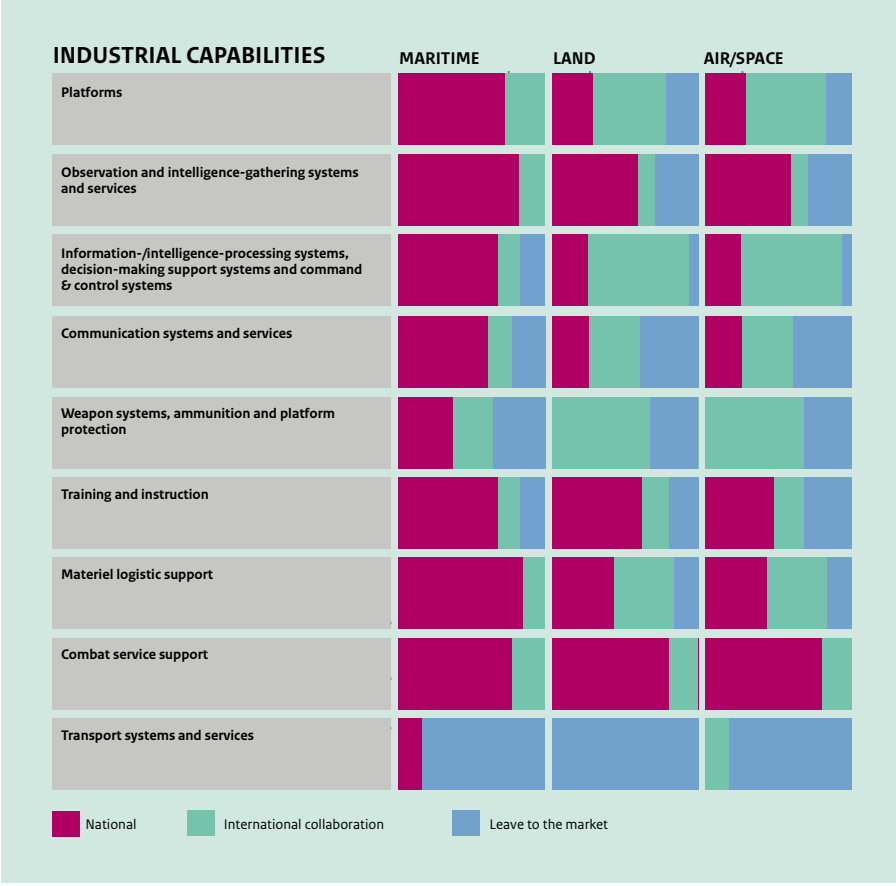
Transport systems and services

Ambition

For transport systems and services, a distinction should be made between national/strategic and operational/tactical capabilities. Defence should always have its own base of transport capability, supplemented with services from the market, whereby it must be able to make agreements about guaranteed delivery. That applies to road, rail, air and water. For the land and air domains, this can in principle be procured from the market, sometimes with specific military applications. We therefore want to procure these systems through international collaboration or on the international (military) market. In the maritime domain, transport capability is often directly linked to the deployment security of units. Here, the points of departure as described for combat service support apply. We therefore want to organise this at national level in a number of cases.

Total overview

The ambition of the Netherlands described above when it comes to industrial capabilities necessary to protect the vital security interests – combined with the pragmatic considerations – is summarised in the figure below.



3.3 The cyber domain

Ambition

The cyber domain is a relatively new domain. There is no question that this domain is of great importance for national security. Although companies are, in principle, responsible for their own cyber security, the responsibility of the Dutch government to protect vital sectors – certainly in the case of state actors – is indisputable. In the cyber domain it is important that Defence:

- is at all times in control of its own IT and weapon systems and has secured its cyber resilience. This will continue to be an important area of focus over the coming years;
- further improves its intelligence regarding who poses a threat to our national security in the cyber domain. Together with that of the General Intelligence and Security Service (AIVD), the role of the Defence Intelligence and Security Service (MIVD) is indispensable in this regard;
- has more capabilities at its disposable for the disruption and deterrence of cyber attacks;
- safeguards, together with civil partners, the security of the Netherlands and of our vital infrastructure and processes in the unfortunate event of a military conflict in which offensive cyber assets are deployed;
- is able to deploy cyber assets effectively in order to gain and retain superiority in military operations. In an allied context, the Netherlands has pledged its willingness to voluntarily provide cyber capabilities for allied defence.

In view of Defence's main tasks, namely to protect our own and NATO territory, promote the international legal order and support the civil authorities, this is a significant, yet necessary, ambition. From this aim it is clear that we primarily want to organise these capabilities at national level – or even within Defence. The operational capabilities of the Defence Cyber Command contribute, for example, to the overall arsenal of deterrence means available to the government.

Cyber resilience is of great importance. If a contribution is to be made to the cyber security of the Netherlands and if the secure and effective deployment of the armed forces is to be safeguarded, it is vital that the cyber resilience of Defence grow at the same pace as the threat. Accordingly, the deployment of Defence is considered to be a vital process within the system of vital infrastructure. Defence's IT systems are fully integrated with organisational management and command and with sensor and weapon systems, and Defence is dependent on these IT systems and the information on them to function. Cyber attacks targeting IT, sensor, weapon and command systems can thus undermine the deployability and effectiveness of the armed forces. A high level of security awareness and effective protection of systems and networks therefore require constant and continued effort. Where possible, we want to use tools that have been developed internationally or by the business community.

The capacity and possible limitations of the Netherlands

The Dutch technological and industrial base has a firm foundation in the technologies that are necessary for cyber resilience, such as chip design, crypto, ICT and networks. The sector has fundamental and applied research in multiple technological areas.

This domain will be extensively explored in the new cyber strategy.

4. How will we realise, protect and position the desired Dutch defence technological and industrial base?

Chapter 3 sets out the knowledge, technology and industrial capabilities that the Netherlands must have to retain a certain capability to act and to guarantee deployment security of the armed forces. This concerns not only the industry that develops and manufactures these systems, but also the service-provision industry, focused for example on information services and training, and on a specific knowledge infrastructure that maintains and applies the knowledge areas. This chapter presents the necessary and available policy and instruments to strengthen, protect and internationally position that base. By strengthen we mean that we want to retain the knowledge, technology and capabilities that we have in the Netherlands and acquire and develop those that are incomplete or non-existent. In this chapter, we will also focus on the protection of the Netherlands defence technological and industrial base. This means that we will consider the possibilities for the protection of Dutch companies against (hostile) takeovers that could form a threat to national security and the ability for the Kingdom to act with sovereignty in the security domain. Finally, instruments are focused on the international positioning of the Netherlands defence technological and industrial base. A strong and competitive Dutch base will provide a valuable contribution to the European base. In addition, it is important that the Dutch base is part of international OEM supply chains based either at home or abroad. In this way, the Netherlands has access to state-of-the-art (production and maintenance) technology and can offer a constant contribution to it. This knowledge is subsequently necessary to guarantee operational deployability, now and in the future.

Main weapon systems, such as ships, aircraft and (armoured) vehicles, are usually kept in use for a long period, while sensors, weapon systems and control and command systems age quickly. This must be fully taken into account in the development and procurement of materiel by making a distinction between long- and short-cycle systems/sub-systems. For example, a long service life by means of replacing electronics goes hand in hand with maintaining operational relevance and with the ease of maintenance of platforms. Modern platforms, such as the NH90 and F-35, are largely made up of composites that need to be maintained over the next few years. Fokker, Airborne, NLR and Delft University of Technology have established the Development Center for Maintenance of Composites, in which they work together to develop technology and repair composites.

4.1 Instruments to strengthen the Netherlands defence technological and industrial base

4.1.1 Greater involvement of SMEs and start-ups and the role of OEMs

The Netherlands defence technological and industrial base consists of small, medium-sized and large business that are active in this market with final products or as suppliers. As Defence wants to successfully exploit opportunities and be able to anticipate future threats, not only is collaboration with traditional, large defence companies important, so too is collaboration with innovative SMEs and start-ups. To this end, Defence and the Ministry of Economic Affairs and Climate Policy will specifically

focus on using their instruments, such as the top-sector policy and the industrial participation policy (see Chapters 4.1.4 and 4.1.5), to involve SMEs and start-ups in technologically sophisticated activities.

Together with the industry, Defence will further the development of the "open innovation" concept. To this end, the innovative capability of our national and international partners will be drawn upon, as will the innovative capability of knowledge institutes, the business community, universities of applied sciences and research universities. Together, the innovation cells and FRONT form the Defence innovation network. Field labs have been included in this network, in which innovative companies from the technological industry, knowledge institutes and Defence collaborate on innovative solutions. Not only do the innovation cells identify innovative SMEs and start-ups, they also serve as a help centre for companies of this kind. They support large and, in particular, smaller companies and start-ups in finding the right pathways within Defence.

Finally, there is an important role for interest groups, such as the Confederation of Netherlands Industry and Employers (VNO-NCW), the Association of Mechanical and Electrical Engineering (FME) and the Netherlands Industry for Defence and Security (NIDV), with regard to effectively connecting SMEs and start-ups with OEMs. In turn, large companies such as Damen, Fokker and Thales, as independent Dutch OEMs or system integrators, also have a responsibility in this regard. This role is important because these OEMs are supported by a (local) network of other companies, who in turn also benefit from the knowledge and skills of the OEMs. The majority of the Dutch technological and industrial base consists of SMEs and is active in the role of supplier in a national/international chain. In general, these companies are highly innovative, but find it difficult to gain access to national/international chains for the development, production and maintenance of Defence materiel.

For start-ups and SMEs in particular, it is important to look not only to the Defence-specific chain, but also to the civil domain. This creates opportunities for Defence, but also for (Defence-specific) OEMs. For the purpose of the acquisition and development of knowledge, it is important that the OEMs are provided with modules that are as complete as possible.

The Dutch defence technological and industrial base can be strengthened by actively creating clusters. Large/medium-sized organisations can act as the core of a cluster, which SMEs and start-ups join as an outer shell of reliable suppliers. These clusters are an important constituent of the golden triangle (see Chapter 4.1.2).

4.1.2 Intensification of collaboration in the golden triangle: from knowledge acquisition and development to the disposal of material

The technological and industrial base can be strengthened by more intensive collaboration between the central government (Defence, the Ministry of Economic Affairs and Climate Policy and the Ministry of Foreign Affairs) and the knowledge institutes and business community of the Netherlands in the 'golden triangle'. Knowledge and skills are divided across various parties.

Defence makes intensive use of simulated environments. They are becoming increasingly important to prepare military personnel for real-life operations. Even if Defence is the owner of a simulator, it leaves the maintenance to industrial partners. This relieves Defence of these activities, and industry is obliged to realise the agreed deployability percentage within the financial parameters. Both Defence and the industry are extremely satisfied with this manner of collaboration. It could serve as an example for the maintenance of other materiel.

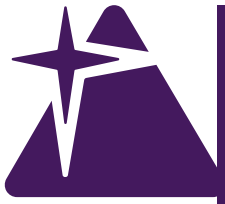
Defence's knowledge and skills will also be incorporated here and linked with the expertise of other parties. By pooling strengths, technologically advanced products can be developed and the greatest possible operational deployability of weapon systems can be realised for the lowest possible price. In addition, it is important for industry to have an outline of the needs of Defence in the medium to long term, so that it can anticipate accordingly.

The strengthening of collaboration in the golden triangle should focus in particular on the knowledge and technological areas and industrial capabilities which – as described in Chapter 3 – are contracted out in the Netherlands, or where Dutch companies and knowledge institutes can provide a valuable contribution to international materiel collaboration programmes. This is possible, for example, when knowledge institutes and the government jointly produce a draft (functional) design. Industry then develops this further and builds the system in question, which Defence then purchases, with due regard for the tendering regulations and possible grounds for exemption from them. In this way, industry has a launching customer, which provides industry with a valuable base for future export. The development of ships for the RNLN is a good example in this regard. They are technologically advanced and are built at a relatively low cost. A precondition in this respect is that Defence has sufficient design capability.

Alternative contract types which emphasise availability rather than ownership could boost the collaboration within the golden triangle. Where traditional supply contracts were once the norm, a different type of contract is being opted for increasingly often. Performance contracts and even more far-reaching collaboration contracts are contracts types with which Defence already has a number of positive experiences. The new contract types will also be used more often in the context of the adaptive armed forces. More so than in the past, we will seek collaboration with other parties, as we cannot succeed alone. The focus will thus shift from the ownership of materiel to the availability of materiel. With regard to the disposal of materiel, timely information exchange is important. In the case of disposal, Dutch industry can provide maintenance of and modifications and other changes to the materiel for the purchasing country. In practice, this is achieved by determining the timeline and strategy in consultation on sales missions.

4.1.3 Targeted procurement strategy

The possibilities for collaboration between the Dutch government, the knowledge infrastructure and Dutch and European industry will be placed within the statutory framework of procurement law, competition law and state aid frameworks. There are various possibilities for collaboration within these frameworks.



Some examples of collaborative ventures in the golden triangle:

- **Command and Control Technologie Platform (C2TP),**
- **Netherlands Industrial Fighter Aircraft Replacement Platform,**
- **Nederlands Marinebouw Cluster (NMC),**
- **Dutch Underwater Knowledge Centre (DUKC),**
- **Platform Vliegende Systemen,**
- **Helikopter-platform (HELI),**
- **Platform Veilig Samenwerken (PVS),**
- **Operationele Energie Platform (OEP),**
- **Thermoplastic Affordable Primary Aircraft Structure innovatieprogramma (TAPAS),**
- **Cyberweerbaarheid Cluster,**
- **Development Composite Maintenance Center (DCMC),**
- **Land Maintenance Initiative (LMI)**
- **TACTIS (Tactische indoor simulator)**

For procurement, the guiding principle is that the Public Procurement Act 2012 (AW2012) or the Public Procurement Act in relation to defence and security (ADV) will be applied. Under both the AW2012 and the ADV, there are various tendering procedures that can be applied depending on the nature and content of the contract and the specific requirements connected to the contract. In addition, both acts include exemption clauses on the basis of which the Procurement Act does not have to be applied. In addition, there is the possibility of tendering, or framework agreements can be entered into. In addition, the ADV includes several specific provisions on the matter of data protection and delivery assurance that can be applied in the tendering process and that impose the necessary requirements on the participating market parties and the manner in which the contract will be executed.

In special cases – in derogation from the abovementioned guiding principle – Article 346 of the TFEU can be invoked if the essential security interests of the Kingdom so require. In that case, the procedures under the AW2012 or the ADV do not have to be followed. Before Article 346 of the TFEU can be invoked, a number of criteria must be met. The following four conditions must apply in this regard: (1) a vital interest of national security precludes the application of the ADV; (2) in the case of the procurement of military materiel, the item in question must appear on a list of military materiel from 1958; (3) the civilian market must not be disrupted; and (4) the measure must be necessary and proportional. The latter means, among other things, that a case must be made as to why the possibilities under the ADV are insufficient to guarantee the vital interests of national security.

Each acquisition must be considered (case-by-case) in terms of whether the procurement has a direct link with a specifically identified essential security interest and which procedure is the most suitable under the AW2012 or the ADV. As part of this, account will be taken of the requirements and conditions that can and must be connected to the award of the contract in view of the essential security interest. In the event that the AW2012 or the ADV provide insufficient possibilities to safeguard the essential security interests, Article 346 of the TFEU can be invoked. For each acquisition consideration will be given – in accordance with the procurement assessment framework – to whether the system should be developed, or whether the decision will be taken to procure existing technology already on the market ("COTS/MOTS"). A COTS/MOTS product can generally be delivered more quickly and has fewer (technological and financial) risks. The disadvantage is that in general a COTS/MOTS product does not offer the Netherlands a unique capability. The question of whether or not to opt for a tendering process is also relevant. A procedure without tendering may seem simpler to implement, but there is then less certainty that the Netherlands will procure the best product for the best price. There are, incidentally, always instruments for validating how realistic the tendered price is, such as an audit of the pricing. In addition, invoking Article 346 of the TFEU does not rule out a form of tendering, but it does require sound motivation, linked to the essential security interest and the question of why the procedures and specific provisions of the ADV do not offer sufficient guarantee for the protection of the vital security interests.

Finally, for each acquisition of over €5 million, an assessment will be made as to whether an effort to realise industrial participation in collaboration with the interested parties is a possibility and could thus contribute to the essential security interests as also identified in this strategy (see Chapter 4.1.5).

4.1.4 Greater focus on and investments in research, development and innovation

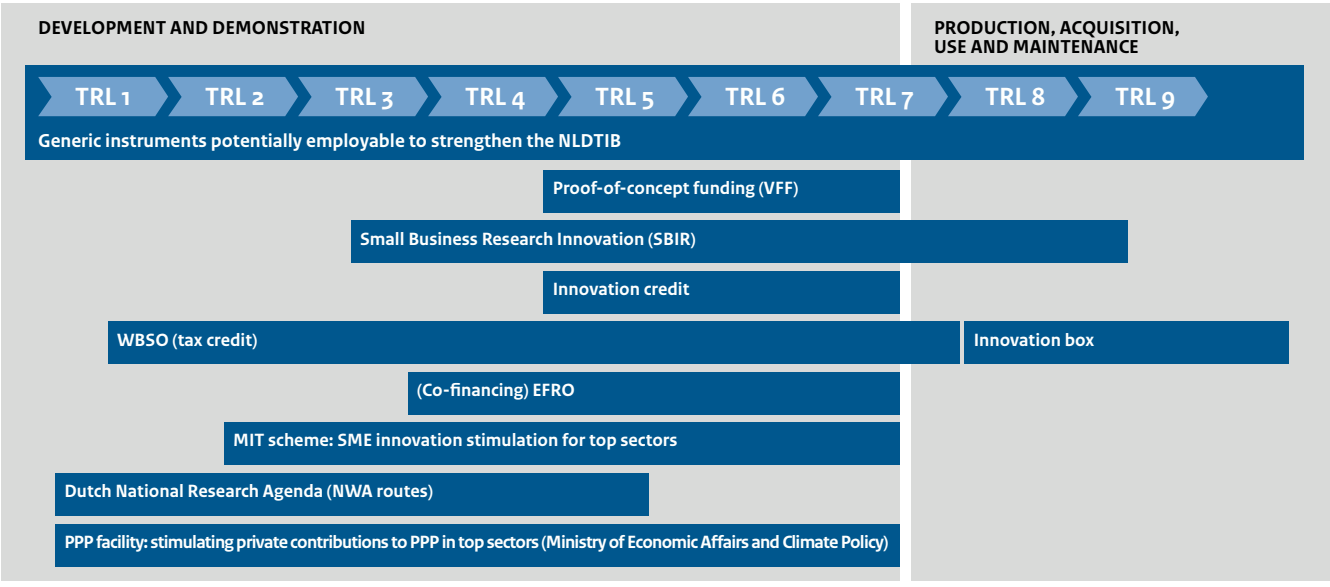
Towards mission-driven innovation policy

The current top-sector policy will be further developed, whereby a number of societal challenges will serve to drive innovation, and collaboration and synergy with the top sectors will be sought. Concrete missions will be set up for these societal challenges. This will be taken on by the most relevant ministries, in consultation with the relevant Top Consortia for Knowledge and Innovation (TKIs), companies, knowledge institutes and civil partners. For key technologies, multi-year development programmes will be set up by the parties involved on the basis of an invitation from the Ministry of Economic Affairs and Climate Policy, on the one hand to be able to use key technologies to provide appropriate solutions to societal challenges and on the other hand to invest in new groundbreaking technologies that are important for the future revenue model of the Netherlands and thus also for a robust defence technological and industrial base. New companies with creative ideas are crucial and new and young entrepreneurs will therefore be more heavily involved in innovation policy. This provides opportunities to SMEs, start-ups and scale-ups, which can then add their creativity to the mix.

The Dutch government provides a broad range of instruments to stimulate the acquisition and development of knowledge, and the development and exploitation of technology. These instruments are generic in nature; that is to say that they are accessible for companies, knowledge institutes and organisations established in the Netherlands, including Defence-related companies. In this further development process, the defence technological and industrial base is given a clear position in the top sectors under the theme 'security'. The broad set of innovative instruments provided by the Dutch government will be more focused on societal themes and will therefore be more accessible for the defence sector, as a result of which the latter can be strengthened. In addition, the possibilities for applying these innovative instruments, such as the Small Business Innovation Research regulation (SBIR), to defence and security will be improved.

For further details regarding the instruments, please refer to the Netherlands Enterprise Agency (www.rvo.nl).

Figure 4.1: List of relevant generic instruments offered by the Dutch government



Innovation instruments, focused on Defence

Defence and the Ministry of Economic Affairs and Climate Policy have specific innovation instruments, such as the Defence Innovation Competition and National and International Technology Projects (ITP/NTP). In the Defence Innovation Competition, Defence presents a military problem and challenges the business community to design innovative solutions. The winner receives – with due regard for the tendering regulations and possible grounds for exemption from them – a contract to develop the idea further. The technology and development projects focus on knowledge areas and technology areas such as those referred to in Chapter 3. The strength of these technology development projects lies in the direct link and close collaboration between developer and user.

Launching customer

The role of launching customer – i.e. that the Dutch government is the first customer of a new product – can contribute to the successful launch of new products. The focus here is on products that contribute to the protection of essential security interests. Foreign governments' confidence in Dutch products can be increased if the Dutch government is seen to be using the product operationally. For export purposes, certainly in the defence and security market, such confidence is very important. As a result, new innovative products can be introduced to a greater target market more quickly.

Practice has shown that there is a disconnect between the development of a product and a successful launch on the market in structural terms. A complaint from the business community is that the product is developed in collaboration with Defence, but when the product is subsequently launched, Defence still has to go through a tendering process if there are no grounds for exemption. As a result, the company in question actually runs the risk of being excluded. That is the case, for example, if the company has a major advantage in terms of knowledge in the development phase. As a result, companies do not have any certainty when it comes to successfully launching the product. This disconnect can be resolved. Under the civil Public Procurement Act 2012, there is the opportunity for innovative partnership. This brings together the development phase and the commercial phase. In addition, the development and commercial phases can also be brought together in other tendering procedures, such as competitive dialogue, as well as in regular tendering processes. This does, however, require the necessary effort by Defence in the preparation phase. By following a tendering procedure, the contract – depending on the value – can gain an international character because the announcement of such a contract is published.

Defence will act primarily as a launching customer in the knowledge areas, technological areas and industrial capabilities in which national investment is needed, as described in Chapter 3. That implies that - in deviation from the COTS/MOTS policy - a standard solution will be chosen less often. Incidentally, the choice also depends on factors such as time (does it take a disproportionate amount of time to meet the requirement as a result?), money (is it disproportionately expensive to meet the requirement?), and military applicability. It is important to make the choice in good time in order to properly satisfy the expectations of all stakeholders.

To implement the role of launching customer, the CODEMO (Defence Materiel Development Committee) scheme must be developed further. Defence's CODEMO scheme has been in existence for a few years now and was set up as a revolving fund. Through the CODEMO scheme, SME companies can submit to Defence proposals for innovative product development. Defence assumes responsibility for a maximum of half the product development costs and can act as a launching customer. If the companies are subsequently able to sell their products to other parties, Defence receives royalties, which are then paid back into the CODEMO fund. Around twenty proposals have been honoured over the last five years, and a small number of them ultimately resulted in procurement.

Due to the current financial scope, the current CODEMO scheme primarily focuses on SMEs. As there is also a need for such an instrument for large projects, the possibility of using the CODEMO scheme will

also be opened up to larger companies and the OEM industry. The CODEMO scheme will be further developed to this end. The Ministry of Economic Affairs and Climate Policy will also play an active role in the further development of this revolving scheme.

New forms of long- and short-cycle innovation

Fast, often civil-driven, technological developments often require short-cycle innovation at the component or module level. Managing this properly requires changes to the manner in which Defence and the industry collaborate.

Small-scale experimentation gives Defence quick insight into the impact of an innovation on operational effectiveness. Defence will set up small-scale and short-cycle projects together with knowledge institutes, the business community, research universities and universities of applied sciences. The rapid developments in technology require Defence to be able to respond more flexibility to these developments. In collaboration with the business community, processes must be shortened and accelerated. This has consequences for the manner in which the Defence Materiel Process is applied in these cases. The question of whether the Defence Materiel Process needs to be amended will be assessed, and removing obstacles to the application of innovations will also be a focal area. In cases where the development of an idea to a prototype is relatively simple, scaling up a successful prototype for producing or introducing a successful prototype within an existing (weapon) system is considerably more difficult. The connection between the development of a prototype and Defence's ultimate requirement will be established in good time. Defence will also cater for this by, in the first instance, working with the implementation of smaller volumes of successful prototypes and gradually expanding in this way. The business community will thus be given the opportunity to grow in a controlled manner. By also seeking win-win opportunities between Defence, the Ministry of Economic Affairs and Climate Policy and the business community, the innovative capability of all parties can be further strengthened. The innovation cells within the Defence elements have in common that they seek out developments from within and outside the organisation, that they connect parties with each other, and that they accelerate developments in those areas in which the operational user has the greatest need. In an open innovative environment, experiments are carried out with various applications with which future capabilities/concepts can be developed. Parallel to the DIS, Defence has drawn up an innovation strategy specifically focused on stimulating short-cycle innovation. It will be published in the near future.

4.1.5 Further development of the industrial participation policy

The industrial participation policy is essential for the realisation of the targets formulated in this DIS. The aim of the industrial participation policy is to make a contribution to the maintenance, strengthening and positioning of the defence technological and industrial base so that the Netherlands can safeguard its national security.

For the Netherlands, a medium-sized country, direct relations with large defence companies in partner countries are necessary for the acquisition, development and maintenance of knowledge and technological capabilities and for gaining sufficient experience in the development, manufacture and maintenance of weapon systems. These relations are also necessary to ensure that the Netherlands can continue to comply with the military standards of state-of-the-art defence systems. While the large Dutch defence companies have a good international position, that does not mean that all Dutch companies are structurally and continuously involved in the international development, production and maintenance chains of defence materiel. Industrial participation can be implemented – with due regard for Article 346 of the TFEU – to nonetheless gain such a position and maintain and further develop technological capabilities. Industrial participation stimulates, firstly, sustainable collaboration between foreign OEMs and companies established in the Netherlands; secondly, access to relevant and new technologies, knowledge and experience; and thirdly, opening up, on the basis of competitive conditions, the largely closed international supply chains. This contributes to the international positioning of the

Dutch business community and the establishment of a level playing field. In addition, it provides a valuable contribution to the desired European industrial base and makes an important contribution to the security of the Netherlands.

The House of Representatives is informed biennially about the results of the industrial participation policy. Over the last few years, an average of €300 million in industrial participation has been achieved, of which 55- 70% went to SMEs. Several hundred contracts are entered into every year.

Only by means of OEMs constantly participating in (international) supply chains can the necessary (technological) knowledge and experience be accessed for the Netherlands to be in a position to guarantee the operational deployability of the armed forces in the future at the level that is necessary to be able to safeguard the Netherlands' own essential security interests.

The tendering procedure on the one hand and the call for industrial participation on the other should be regarded as two separate pathways. The Public Procurement Act in relation to defence and security (ADV) is almost always applicable to the procurement of military materiel, unless the well-founded invocation of Article 346 TFEU is necessary for the relevant contract. The majority of defence contracts are put out to tender on the basis of the ADV.

In the event that Defence plans to start a tendering process for materiel, an assessment will be made on a case-by-case basis by the Ministry of Economic Affairs and Climate Policy in consultation with Defence as to whether and to what extent industrial participation by a proposed party, with the invocation of Article 346 of the TFEU, can contribute to strengthening the knowledge, capabilities and experience of the Netherlands industry that is necessary for guaranteeing national security. For each tendering process to which industrial participation may be able to make a contribution, the level of ambition that can be expected will be determined with regard to strengthening the areas that are necessary for the national security interest, the capabilities of the potential supplier, the capabilities of the Dutch defence and security industry and the term of the contract. These expectations are determined in conjunction with the potential supplier. In the event of mutual agreement, this can result in an IP contract between the State and the supplier, whereby the supplier undertakes to carry out the agreements made.

4.2 Instruments for the protection of the Netherlands defence technological and industrial base

Because of the shifting economic power-relations in the world and the rise of state-driven economies, it must be taken into account that (foreign) takeovers and investments are partly prompted by geopolitical motives. This may pose various risks to national security.

The General Security Requirements for Defence Contracts (ABDO) includes the obligation to report proposed changes in control and company structure to the MIVD. The government will critically assess the risks posed by takeovers of companies that play an important role in the defence and security industry. For example, if the service provision is likely to become unreliable or if there is a risk that facilities will not be available. Although it relates to a different sector, the Telecommunications Sector (Undesirable Control) Bill [13] that the government sent to the Council of State in April 2018 is a recent example.

Since 2014, the government has focused on assessing for each vital sector whether additional measures are needed to sufficiently safeguard national security in the event of a takeover or investment. For each vital process, an ex ante analysis is carried out and an assessment is made as to whether protective measures should be taken against unwanted takeovers and investments.

The deployability of the Netherlands Defence organisation is heavily dependent on reliable suppliers. Defence-related companies therefore play an important role in the protection of the vital interests of national security. The defence sector can therefore also be regarded as a 'vital sector'. In that context, by extension of the ex ante analysis into the vital process 'Defence deployability', an ex ante analysis will also be carried out into the defence sector. On the basis of the results of this analysis, an assessment will be made as to whether, and if so, which protective measures are necessary against undesirable takeovers and investments.

4.3 Instruments to strengthen the international positioning of the Dutch technological and industrial base

4.3.1 Leading role in creating and stimulating a level playing field

The Netherlands is an advocate of a more open and competitive European defence market and, above all, of a level playing field which offers companies (also from small and medium countries) a fair chance as a main contractor or as a supplier.

The Netherlands commits to a more level playing field by stimulating active European joint ventures. On the initiative of the Netherlands, the European Council of December 2013 requested the European Commission to provide additional measures to ensure that suppliers from all over the EU have the chance to enter supply chains for defence systems. In addition, the industrial participation policy contributes not only to strengthening the Defence technological and industrial base (see Chapter 4.1.5), but to the international positioning of the Netherlands Defence technological and industrial base as well as a more level playing field by opening up closed supply chains. The Netherlands is also closely involved in the design of the EDF, for example, so that Dutch (small and medium-sized) businesses can make a contribution to collaboration at European level. The Netherlands plays a leading role in relation to European capability development (see also Chapter 4.3.2). The Netherlands also collaborates with other Member States bilaterally in various ways in order to promote interoperability, complementarity and coherent action, and to realise economies of scale where possible.

[13] *Parliamentary document 32637, no. 311*

The table of industrial capabilities in Chapter 3 shows the areas in which the Netherlands wants to make a valuable contribution to the European defence technological and industrial base. For example, in the event of far-reaching consolidation of the European defence market, the Netherlands could play a prominent role in the maritime domain, because this sector is already extensively developed in the Netherlands. This also came to light in the Triarii report that was recently submitted to the Lower House.[14]

4.3.2 Strengthening the coordination of the Dutch contribution to European initiatives (EDF, EDAP, PESCO)

As mentioned in Chapter 2.2, the European Commission is committed to more intensive collaboration for the joint development of defence capabilities by means of, for example, the development of a strong, competitive and innovative European defence technological and industrial base.

On the basis of the market and knowledge position of the Dutch defence industry on the international market, the Netherlands wants to eventually be one of the top 10 European countries with regard to resources allocated from the EDF. This requires a structured and coordinated national approach and strategy on European development programmes for defence capabilities. The Ministry of Economic Affairs and Climate Policy and Defence therefore intend to set up a high-level interdepartmental coordination group (ICG) in the near future for the abovementioned and related European defence programmes. Strengthening coordination involves a special representative to ensure the interests of the Dutch defence-related industry are properly represented in such programmes.

4.3.3 Intensifying transatlantic and European collaboration

In view of the scope of the Dutch defence market, international collaboration with trusted partners is necessary for the government, as well as for the business community and knowledge institutes. International collaboration has advantages for development, production and maintenance. In many cases, Defence can procure a higher quality product for a good price and increase interoperability with partners. In addition, international collaboration programmes and relations with large defence companies are very important for the acquisition, development and maintenance of knowledge and technological capabilities and for gaining sufficient experience in the development, manufacture and maintenance of weapon systems, as well as for continued compliance with the military standards of state-of-the-art defence systems. International collaboration programmes, such as PESCO and F35, help the Dutch defence industry to position itself in international supply chains for the development, production and maintenance of defence materiel. The table of industrial capabilities included in Chapter 3 indicates the areas in which international collaboration could be intensified.

4.3.4 More active export policy and trade promotion

In light of the relatively small domestic market for defence and security products, export is essential for the stimulation and maintenance of the Dutch base of defence-related companies. There are two sides to the export policy. The possibility for Dutch companies to enter into long-term collaborative relations depends in part on the transparency and consistency of the Dutch weapons-export policy. Export activities are thus considered to be a necessary condition for the continuity of the existing knowledge base. On the other hand, it is undesirable for materiel and knowledge to find its way to countries that could use them to violate human rights or increase (regional) instability. As the knowledge is sensitive, the issue of export licences must be carefully considered and the Ministry of Foreign Affairs consults Defence and the Ministry of Economic Affairs and Climate Policy, as well as other relevant sources of information, in the event of such applications.

[14] *Kamerstuk 31 125, nr. 90*

The decision to grant or reject a licence is a national competence. In each case, applications for licences for the export of military materiel are tested in relation to the criteria for weapons export that have been established in a European context. The Netherlands applies these criteria strictly. Ultimately, security interests always prevail over economic interests. In a European context, the Netherlands also continues to press for strict application. In addition, the Netherlands is committed to transparency in the manner in which countries manage the granting and rejection of licences.

The government supports Dutch companies in contributing to international trade fairs for the Defence and security industry and supports the business community in trade missions. In this way, companies in the Dutch defence and security sector are given the opportunity to present their products to foreign partners. Not only are established companies given this opportunity, SMEs and start-ups are also often part of the delegations. Trade promotion is currently the responsibility of Defence and the Ministry of Economic Affairs and Climate Policy. The diplomatic network will play a more active role in this regard. Needless to say, prior consideration will be given to whether there is a risk that the potential trade partner will use the materiel and knowledge to violate human rights or increase (regional) instability.

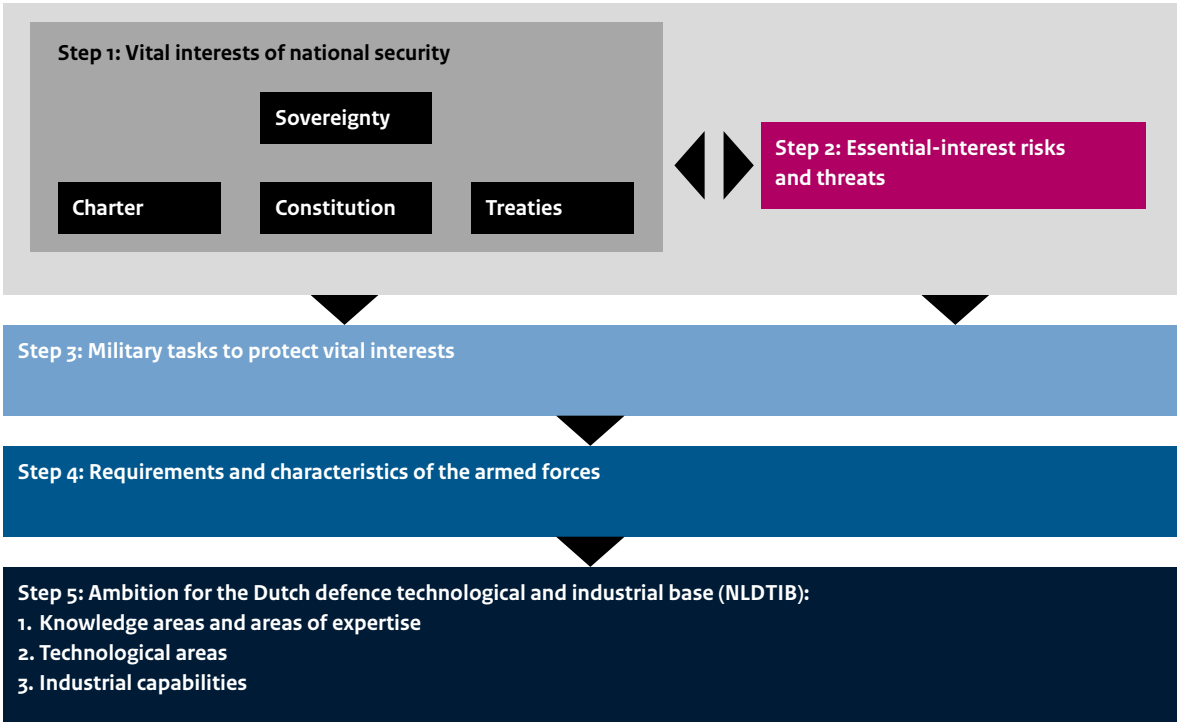
Furthermore, the Dutch government will enter into government-to-government memoranda of understanding (MoUs). Intentions for collaboration will be documented in these MoUs. The provision of military materiel could be included. Good agreements between countries are required to allow sharing of (classified) information and in several countries an MoU is a precondition for simply entering into dialogue. It is the Netherlands' ambition to play a more active role when drawing up MoUs in order to support opportunities for Dutch industry.

In conclusion

This document, the DIS, sets out what the Netherlands considers to be the national security interest and, in light of this, what the Netherlands believes we can do ourselves, where we can collaborate internationally, and where it is up to the market. This is not an exact science. The document provides a guideline, but it is not a blueprint. Deliberations will have to take place on a daily basis and it will come down to the interpretation of the DIS. In the coming period, this will reach consolidation in the implementation of the DIS.

The DIS not only applies to Defence and the Ministry of Economic Affairs and Climate Policy. It also applies to the government and, in equal measure, to the business community and knowledge institutes. Jointly we – the government, the business community, and knowledge institutes – must ensure that the implementation of the DIS is a success. That will require a great deal of consultation. In a number of cases, for large projects the decision may have to be made by the government with regard to the choice of the best materiel for the best price, while ensuring maximum protection of the vital interests of national security. We have every confidence that we are headed in the right direction with this new DIS. So that Defence – together with the Ministry of Economic Affairs and Climate Policy, the business community, and knowledge institutes – can protect what is dear to us.

Annex 1: Steps towards the ambition of a Dutch technological and industrial base



Step 1: What are the vital interests of national security?

Foundations for the Defence contribution

The starting point for determining the vital interests of national security is the Charter for the Kingdom of the Netherlands, to which the Constitution of the Netherlands and the Constitutions of Aruba, Curaçao and Sint Maarten are subordinate. Article 3.1(a) of the Charter for the Kingdom states that the maintenance of the independence and the defence of the Kingdom is an affair of the Kingdom. The Charter thus includes a duty to assist. Then there is the Constitution. The Constitution states that the Dutch government is responsible for the protection of the Kingdom. This is determined in Article 97:

1. There shall be armed forces for the defence and protection of the interests of the Kingdom, and in order to maintain and promote the international legal order.
2. The government has supreme authority over the armed forces.

Of subsequent importance are the collective defence clauses (Article 5) of the Treaty of Washington of NATO and Article 41, paragraph 7 of the TFEU. These articles contain obligations to assist allies in the event of a violation of their territorial integrity.

The government can only fulfil its obligations arising from the Charter, Constitution and treaties if it has freedom of action. This is particularly crucial if there is a direct threat to Dutch sovereignty, the security of Dutch nationals or ships sailing under the Dutch flag, or the deployment security of military units, if there are no international obligations for assistance or, in the case that there are such obligations, if the Netherlands is the first responder in anticipation of international assistance (that may be limited or may not be available for some time).

Strategic aims of the Dutch foreign, security and defence policy

The strategic aims of Dutch foreign, security and defence policy are the expression of national sovereignty and they therefore contribute to a better understanding of the term 'vital interests'. The strategic goals can be inferred from a number of policy documents, each of which covers part of the security spectrum:

- The **Integrated Foreign and Security Strategy** [GBVS] provides the strategic framework for the security of the Netherlands and has three cornerstones: prevention, protection and reinforcement. Each cornerstone has specific goals.
- The **Defence White Paper** identifies three main tasks of the armed forces: protecting national and allied territory; protecting and promoting the international legal order and stability; and supporting civil authorities with respect to law enforcement, disaster relief and humanitarian assistance, both nationally and internationally. In addition, there is a three-pronged strategic task: remain safe, foster security, and secure connections. The Defence White Paper is also based on the Constitution, the Charter for the Kingdom of the Netherlands and the NATO and EU treaties.
- The **National Security Strategy** [SNV] of 2007 is an assessment framework that can be used to determine whether vital interests are at stake and need to be protected to prevent the disruption of the Netherlands. The SNV identifies five vital interests of the Netherlands that must be protected to prevent disruption: physical security, territorial security, economic security, social and political stability. A sixth has since been added: the protection of the international legal order. The SNV outlines the development of a National Security Profile that is submitted to parliament by the Minister of Justice and Security every four years.

Step 2: What are the most significant risks of and threats to the vital interests of national security?

The current volatility of international relations poses all manner of, and in some cases new, threats to the security of the Kingdom. It is important to realise that the security incidents and confrontations that will occur in the future cannot be predicted with certainty. A broader range of threats must be anticipated than will occur in practice.

Types of security risks and threats

Generally speaking, a distinction can be made between four types of security risks and threats:

1. Direct threats to national security, such as military threats at external borders, terrorist attacks using CBRN means, threats to vital infrastructure, and the undermining of national authority by means of targeted disinformation.
2. Geo-economic threats to commercial routes by sea, land and air, including supply lines for raw materials, oil and gas, (underwater) infrastructure of networks and threats to space infrastructure (satellites for communication, navigation and earth observation).
3. Military threats to the territorial integrity of NATO and the EU, (maritime) supply lines for reinforcements and supplies from North America for NATO operations and deployed national units.
4. Threats to social and political stability, such as large-scale migration and refugee flows and the undermining of the solidarity in the EU and NATO by means of targeted hostile disinformation.

Obligations and threat categories in relation to vital interests of national security

On the basis of the security risks identified and the obligations under the Charter of the Kingdom of the Netherlands and the Constitution, three categories of risks/threats can be established on the basis of how and to what extent vital interests will be affected and the extent to which the strategic aims of foreign, security and defence policy can be achieved. This results in the following categories:

- **First category threats** are threats whereby the vital interests of the Kingdom are affected and – with the exception of the provisions of the abovementioned Charter of the Kingdom of the Netherlands – there are no international obligations under treaty law to assist the Kingdom, or there are such obligations but the Netherlands is the first responder.

- **Second category threats** are threats whereby the Kingdom has an obligation under treaty law, or threats that affect the vital interests to such an extent that the government cannot afford to take the position of free rider.

- **Third category threats** are threats whereby the vital interests as defined in the National Security Strategy (SNV) in terms of social and political stability are at stake and/or whereby a contribution from the Netherlands is sought as a matter of urgency. These are insidious processes. If social or political stability is affected, the security (for example of citizens) may be at stake, but the military response to these threats is conducted in support of the deployment of other means in response to threats.

These threats could have a disruptive effect on the economy, the territorial integrity, and the social and political stability of the Kingdom. Preparing for, mitigating or combating these risks and threats is therefore of essential importance. The protection of these vital interests is related to the government's obligations arising from the Constitution, the Charter and treaties.

Step 3: What are the most important military tasks for the protection of vital interests of national security?

The Netherlands' defence efforts explicitly serve the totality of interests and objectives of the Kingdom. In view of the above, deployment of the Kingdom's armed forces must in any case be sufficient for threats where the Kingdom stands alone in principle or at the start [15]. Detailing the three threat categories set out above results in the following military tasks:

- Military defence of the external borders and the territorial integrity of the Kingdom.
- Protection against terrorist attacks on Dutch territory, including attacks using chemical, biological, radiological or nuclear (CBRN) means.
- Protection, physical or otherwise, of vital national infrastructure.
- Prevention of disruption or tapping of data traffic from, to and via the Netherlands (vital) infrastructure both through cables and the ether; and cyber threats against digital (financial) transactions.
- Protection of national authority and social cohesion in the Netherlands by means of targeted disinformation.
- Protection of citizens in crisis areas, and embassy personnel in particular.
- Protection of Dutch commercial shipping, in particular from piracy.
- The (military) protection of deployed national units, including logistics chains and the supporting C41SR systems.

In addition, there are military tasks concerning threats to the vital interests of the Kingdom and/or its NATO and EU partners with regard to which the Netherlands has the obligation under treaty law, and threats that affect the vital interests of the Kingdom and/or its NATO and EU partners in such a way that the government cannot afford to be a free rider:

[15] *'In principle' because there are no compulsory agreements for military assistance from international partners or organisations; 'at the start' when it is likely that international partners will provide (military) assistance, but only in the second instance, because the Netherlands is the first responder.*

- An appropriate contribution to the military protection of the integrity and collective defence of NATO and the EU.
- Protection of (maritime) supply lines for reinforcements and supplies from North America for NATO operations in or on the borders of Europe.
- Protection of commercial sea routes from and to Europe and North America, including supply lines of raw materials, oil and gas.
- Protection of commercial land routes from and to Europe, including the supply of oil and gas through pipelines.
- Protection of commercial air routes from and to Europe and North America.
- Protection of space infrastructure, in particular satellites for communication, navigation and earth observation.

With regard to existential threats, the Netherlands is in principle responsible for the military capabilities that are necessary to combat them, as well as the Defence technological and industrial base needed to this end. In addition, strategic intelligence capability is needed in all cases to identify threats in advance and to be able to respond to them.

Step 4: What requirements have been set for the armed forces?

A number of identifiable demands on and characteristics of the armed forces help to determine how the industrial base should be set up in order to be able to safeguard the vital interests of national security. These demands, characteristics and relevant considerations are detailed below.

- The characteristics of the Netherlands (doctrine, command and control and leadership, training and instruction, organisation and policy, materiel, personnel) The pooling of the DCTOMP elements [16] and the interaction between them ensures the ability to perform certain military tasks and achieve effects. Each country has its own important characteristics and methods.
- Operational advantages Together with allies, the armed forces of the Netherlands strive to maintain technological superiority with regard to opponents and potential opponents. The principle of Defence as smart buyer/smart specifier/smart developer is important in this context.
- Secret contracts Secret contracts are contracts of which the specifications must not be made known, such as SEWACO and information systems.
- Broad knowledge base The analyses of the security situation reveal the necessity of a broad range of military capabilities. To ensure the availability, efficiency and quality of the knowledge necessary for Defence, the organisation structurally invests in a broad knowledge base. While the use of civil products and services is growing, a defence-specific knowledge base is also necessary.
- Innovation on the basis of relevant (key) technologies and throughout service life The defence-related industry is traditionally focused on long innovation cycles that require a methodical and methodical approach.
  A fast innovation cycle is becoming increasingly important because rapid technological advancement is being made in many domains and – in a changing world – requires constant development. Prioritising relevant (key) technologies, as well as innovation throughout the service life, is important for the improvement of operational effectiveness.

[16] *The DCTOMP elements are: doctrine and concepts, command and control and leadership, training and instruction, organisation, and materiel and personnel*

- Integration capability The integration capability at systems/platforms and system-of-systems/capability level is essential to the Netherlands armed forces. It must be possible to quickly find generic solutions that can be tailored to specific applications.
- Managing supply chains The management of supply chains should mean that we have extra capabilities available wherever and whenever necessary. The transparency of supply chains is important for a high-quality integration capability. It makes innovation easier throughout the entire service life of systems.
- Information (systems) as an asset The importance of information as a factor of production is great and continues to grow. A good information position is essential to determining and realising the desired military effects. Insight gained at an early stage with regard to the changing strategic risks and threats is important for the policy and plan cycle of the Defence organisation. The strategic anticipation capability must therefore also be embedded in the national technological and industrial base. A good information position is also important at the operational and tactical level with regard to the actual deployment of the armed forces. The Defence White Paper also states that Defence will invest in strengthening information-driven operations.
- Information (systems) as a target and weapon Information, knowledge, understanding and ideas are increasingly pivotal for success in the financial-economic and social-cultural field. Nowadays, most information is presented digitally. For the armed forces, information in the cyber, intelligence and communication domains is increasingly essential. In addition to information-driven operations, information and knowledge of information systems are also employed offensively in order to undermine the information position of opponents.
- 'Access-to' capabilities Military organisations must shift their thinking to means of guaranteeing 'access-to' capabilities other than by procuring these capabilities to own. In principle, many forms of military/civil owned and military/civil operated are conceivable. Various lease constructions are possible, but Defence can also procure 'the capability to' entirely as a service. Another option is for Defence to procure capabilities, but make agreements with the business community for maintenance and keeping the capabilities up-to-date throughout the service life. The defence technological and industrial base must be willing and able in this regard. There is increasing emphasis on facilitating the exchange of personnel between Defence and the business community and other organisations. Defence is taking steps in this direction through the adaptive armed forces.

Step 5: What is the ambition of the Netherlands?

See Chapter 3 and Appendices 2, 3 and 4.

Annex 2: Desired level of dependence on areas of knowledge and expertise

Areas of knowledge and expertise	Assessment of national investment on the basis of vital interests
KA1: Defence analysis	These activities are largely driven by national political and policy indications, national values, interests and goals, and assessment frameworks based on the national strategic culture. The necessary interaction between analysts and stakeholders is often politically sensitive (sometimes secret) and requires continuity and trust. For the acquisition, development and maintenance of the underlying modelling and toolbox, the role of smart developer is required. See The characteristics of the Netherlands (organisation and policy) and Information (systems) as an asset (strategic level) in Annex 1.
AE1.A Strategic Foresight & Alert	
AE1.B Political Context & Conflict Analysis	
AE1.C Operations Research & Analysis	
AE1.D Defence Planning	
AE1.E Policy Analysis	
KA2: Materiel Readiness & Logistics	Materiel readiness and the logistics support of own deployed units is a national responsibility. In that regard, safety is of increasing importance. Knowledge is needed, for example, with regard to airworthiness, seaworthiness and ammunition safety. Logistics knowledge is widely available on the market. As a result, the role of smart buyer is sufficient in practice. Deployment is in principle as military as necessary and as civil as possible. To this end, collaboration and the sharing of information with the civil logistics market is necessary. Actively monitoring the technological developments in the transport sector is required if it is to remain an effective and efficient part of military supply chain logistics. Mission preparation is so specific that knowledge at the smart developer level is desirable. See Existential threats in Annex 1.
AE2.A Materiel Provision & Care	
AE2.B Force Generation & Deployment	
AE2.C Operational Logistics	
AE2.D Mission Preparation & Rehearsal	
KA3: Personnel readiness & Human performance	Personnel readiness is a national responsibility. Selection, training, deployment and support of military personnel are based on national legislation and standards. The ability to develop (smart developer) training and instruction ourselves is desirable, whether or not in collaboration with partners in the national DTIB. See The characteristics of the Netherlands (training and instruction and personnel) in Annex 1.
AE3.A Personnel Provision	
AE3.B Health & Care	
AE3.C Individual and team performance	
AE3.D Education, Training & Exercises	
KA4: Command & Control	The command and control of deployed units is a national responsibility for the whole DCTOMP chain. The role of smart developer is desirable for integrated C2 systems, and the role of smart specifier/developer for the underlying task-critical subsystems. See The characteristics of the Netherlands (command and control and leadership) in Annex 1.
AE4.A Command & Control and Decision Making	
AE4.B Effects Assessment and feedback	
AE4.C Man-Machine Integration	
KA5: Situational Awareness	The chain of procurement, merging, processing, interpretation and assessment of information/intelligence is a national responsibility for the whole DCTOMP chain. The role of smart developer is desirable for integrated information/intelligence systems and high-end sensors, and the role of smart specifier/developer for the underlying task-critical subsystems. See Information/information systems as an asset (strategic, operational and tactical level) in Annex 1.
AE5.A Environmental & Threat/Target Characteristics	
AE5.B Sensors, Sensor Integration and (Multi) Sensor Data Processing	
AE5.C Classification, Identification and Authentication	
AE5.D Situation Assessment	

KA6: Protection AE6.A Platform and Infrastructure Protection AE6.B Soldier Protection AE6.C CBRN Protection	Protection of deployed national units is of vital importance. The role of smart specifier/developer is desirable for designing and building the integrated, often layered, self-defence of units. Knowledge of specific physical means of protection is usually shared with trusted partners, often with the same or similar systems. See Existential threats: the specific category 1 threat to deployed national units, including the logistics chains and the supporting C4ISR systems in Annex 1. For CBRN protection in the context of national security and deployed units, national autonomy is desirable – practically speaking this may take the form of establishing (or re-establishing) good agreements with trusted partners regarding the mutual exchange of knowledge and the sharing of (expensive) testing facilities. See Existential threats: the specific category 1 threat of terrorist attacks on Dutch territory using CBRN means in Annex 1.
KA7: Effectors: characteristics, performance & effects AE7.A Basic Weapon Technologies AE7.B Weapon Target Interaction AE7.C Weapon System Integration & Effectiveness AE7.D InfoOps & Strategic Campaigning AE7.E Cyber Operations	In general, national knowledge at least the level of smart buyer is desirable. InfoOps, strategic campaigning and (offensive) cyber operations require national autonomy and/or knowledge at the smart specifier/developer level. See Information/information systems as a target and weapon in Annex 1.
KA8: Platforms: characteristics, performance & effects AE8.A Platform technologies/structures AE8.B Platform technologies/performance AE8.C Platform technologies/survivability AE8.D Platform technologies/propulsion & energy AE8.E Control & automation AE8.F System integration & design	For task-critical platforms (in particular the main weapon systems), knowledge is desirable in order to be able to function as system integrator, thus as smart developer at the integrated level. Knowledge of specifications of task-critical systems – the role of smart specifier – is necessary to be able to innovate quickly if so required throughout the service life of platforms/capabilities. This certainly applies to the maritime domain. See Integration capability and Managing supply chains in Annex 1.
KA9: Network infrastructure and Cyber security AE9.A Network Availability & Performance AE9.B Classification, Identification and Authentication AE9.C Cyber Security	Protection of own military networks and information systems, as well as the networks and systems in the vital sectors is a national responsibility and a vital interest. The role of smart developer at the integrated network level is desirable. Subsystems often have their roots in the civil world; the role of smart buyer is sufficient in that case. In this regard see Information (systems) as an asset and Information (systems) as a target and weapon in Annex 1.
KA10: Legal, ethical and moral implications [of operations and actions] AE10.A Legal, ethical and moral implications	This concerns analyses and indications based on (and leading to) national norms and values. The role of smart developer is desirable. See The characteristics of the Netherlands (doctrine and leadership) in Annex 1.

Annex 3: Desired level of dependence on priority technological areas

The monitoring of technological developments and, in particular, knowledge about upcoming technologies are above all related to the considerations of 'operational advantages' and 'innovation throughout the service life'. These considerations apply to all categories in the table.

Technological area	Operational necessity and impact	Desired level of dependence
Artificial intelligence	AI will be an enabler of numerous innovations and capabilities for Defence, such as AI for big data and ISR, as well as for strategic orientation and planning. The deployment of autonomous/semi-autonomous UxVs will also be made possible by AI, and will provide many new operational capabilities, also within complex (e.g. asymmetric) combat situations and for reducing risks for friendly forces. AI also enables UxV swarming, where large numbers of UxVs can form an acute threat for any opponent. In addition, UxVs for logistics will see significant progress; the civilian world is already experimenting to the full in this area. Within the training world, AI will also be a catalyst for even more realistic simulation environments and intelligent interactions and supervision (such as adaptive training, e-coaching or virtual team members).	In terms of threats and friendly-force capabilities, AI could be a game changer. For this reason alone, the developments in the field of AI should be actively monitored and a contribution should be made to development. For the application of AI in the information chain and for decision making (C4ISR), there is a high level of national responsibility. Knowledge and production capability in the national DTIB is desirable at the smart-developer level now and in the future. So we should contribute to development in this field. In this regard, see Information/information systems as an asset and Information/information systems as a target and weapon and The characteristics of the Netherlands (command and control and leadership) in Annex 1.
Cyber, electromagnetic analysis (EMA) and quantum computing	Military operations are increasingly dependent on digital systems and the connectivity of people and systems (see below) is increasing sharply. As a result, there is a great risk (on both sides) of disruption or misconception by means of digital attacks and/or electronic warfare activities, as a result of which operations can be undermined. Deceptive malware for C2 in particular ensures that the situational awareness of commanders becomes clouded at various levels, as a result of which the wrong tactics will be applied and the wrong decisions will be made. An additional concern is that SEWACO systems can be disrupted by a combination of electronic warfare and cyber attacks.	In the field of defensive and offensive information operations and cyber operations, the desired level for the organisation of knowledge and the production capability in the national DTIB is the smart development level. Contribute to development in this field. In this regard see Information/information systems as an asset and Information/information systems as a target and weapon in Annex 1. This does not apply to EMA and quantum computing; these are generic assets that are expected to be available for procurement on the market in due course. These are, however, areas that could have major consequences. Monitor actively.
Sensors (incl. quantum sensors and nano sensors)	The importance of good SA will only increase, certainly in difficult mission areas such as when operating in built-up areas. As a result of physical obstacles and the associated restrictions to line of sight, new sensors and sensor concepts will offer operational advantages. Sensitive (quantum) sensors may make it possible to detect and identify platforms at a greater distance. Small (nano) sensors can be incorporated into the clothing and equipment of military personnel, making it possible to monitor health, physical load and fitness and consequently guarantee the optimal deployment of the military personnel. Sensors can also be applied that register exposure to NBC.	The development of advanced sensor technology applied to high-end ('mil specs')[17] falls under vital interests. Contribute to development in this field. See Information (systems) as an asset in Annex 1. In addition, monitor civil-driven sensor developments in particular passively, and actively where relevant.

[17] *Mil specs = functional and/or technical specifications specific to military applications. Mil specs go further than civilian specifications, for example, in terms of technical performance (superiority over opponents), robustness (operational systems must continue to function in arduous circumstances) and security (protection against hostile violation). Mil specs can also relate to systems or system components that do not really have a civil equivalent, such as in the field of ammunition or armour.*

Human–systems integration	The increase of unmanned systems on the battlefield will also change the role of humans. Teams will be formed of military personnel and unmanned systems, which have to carry out a task together. This requires seamless collaboration in the team, for example with regard to information exchange, task handover and situational awareness. One aspect with major legal and ethical implications is that humans must retain 'meaningful control' over systems, even if these become self-learning, adaptive and more autonomous. It is expected that human-machine teams will need intensive training, for example, by using a simulation. It is currently the case that more – not fewer – personnel are needed as a result of the deployment of unmanned systems. It is therefore important to establish smart interaction between, and integration of, humans and systems to prevent this – in effect unnecessary – additional deployment of humans. Finally, human–system integration should be such that it does not result in an excessive mental or cognitive load on the part of the human.	Human–system integration is an increasingly important success factor in the technological excellence of the armed forces. See Operational advantages in Annex 1. Furthermore, the actual realisation thereof is very specific, so can be easily linked to vital interests. In the context of weapons operation and platform management, keep pace with developments; in addition, monitor developments actively. See Integration capability in Annex 1.
Directed-energy weapons	Laser weapons have clear advantages for self-defence, because incoming projectiles (or small platforms) can be lasered quickly and accurately. An additional advantage is that sustainability is virtually unlimited. In the future, offensive applications will be seen more and more often. HPM can be used for area denial, targeting both people and (small) platforms, as well as for lasering specific persons or objects at long range with a very high degree of accuracy. The precision of laser and HPM weapons ensures the reduction of collateral damage, which is particularly important in complex areas (such as urbanised terrain). This concerns not only human victims, but also unwanted damage to critical infrastructure. In addition to the high level of sustainability, the loss of logistics supply lines for ammunition is also a key advantage. On the defensive side, there are still questions to be answered because it is insufficiently clear what protection measures and methods should be applied.	It is possible that DEW will play a key role in the suite of weapon systems, as an alternative for kinetic weapons. In this field, monitor actively and possibly keep pace with developments with a view to staying at the forefront internationally.
Space/satellites	Satellites are an indispensable link in warfare. They make GPS navigation and broadband data communication possible over long distances and are crucial for observation of areas that cannot be flown over. Offensive actions against these systems are not inconceivable and protection against this will therefore be important. The introduction of space weapons, such as space-based laser systems, can thus also be envisaged in the future. Another problem is that Defence makes increasing use of satellites but does not have its own assets, which means it is dependent on other countries and civil parties in this regard.	The ever-increasing importance of space platforms for C4ISR, in combination with the growing capabilities for launching and deploying national satellites justifies linking space applications in the military domain to vital interests. At the same time, we note that a major share of the space infrastructure is international and increasingly commercial. It is therefore largely a matter of procuring services that do not require any special national development (the European Galileo programme is one example, see www.gsa.europa.eu/galileo/services). This field calls for a combination of co-development with regard to micro satellites and nano satellites to be deployed per mission, and monitoring of developments in the commercial services industry for earth observation, communication services, and navigation services. See Information (systems) as an asset and 'Access to' capabilities in Annex 1.

3D printing and new materials	The application of 3D printing can save time and money for logistics and maintenance. One example is the deployment of many micro UAVs that have to be deployed from land or from a maritime platform. In the future, this will become a commonality, as a result of which the ability to print will provide logistic and operational advantages. With new materials, the same or better protection can be achieved, while the weight is drastically reduced. Meta-materials can reduce the optic, acoustic and radar signatures of platforms, and potentially even enable the (partial) cloaking of platforms.	With regard to 3D printing, the major developments are civil-driven and can be largely procured on the market. Monitor this field passively. For new materials too, the major developments are civil-driven, but there are niche markets in which defence applications can fairly quickly play an important role as a driving force in the development cycle. In these niche areas it is a case of active monitoring and co-development in due course.
Biotechnology	The most urgent danger is that of bioterrorism with new, deadly agents. Protection against this is cumbersome, as a result of which operations are severely hindered. There is also the risk of large numbers of civilian casualties. Vaccinations against such agents require lengthy development and major investment. By means of better detection and diagnosis, the impact can at least be reduced. In addition, biotechnology can improve the chance of survival for military personnel and improve recovery after injury. Various other applications are indirectly relevant to Defence, such as those used for the production of food, energy and special materials.	In connection with B threats only, there is a direct link with vital interests. Active monitoring in that field. See Existential threats: the specific category 1 threats of terrorist attacks on Dutch territory using CBRN means in Annex 1.
Simulation and virtualisation	Operations are becoming increasingly complex, as a result of which it is more difficult to assess the performance and effectiveness of new systems. This requires new forms of (linked) simulations, whereby realism (incl. use of real data), validity and speed (of calculation) are key factors. The ability to model opponent behaviour will also be increasingly important, due to the diversity of opponents and their freedom to act. In addition, military personnel will have a growing need for largely personalised and task-tailored support for training, instruction and deployment.	The application of simulation and virtualisation to training and instruction in the context of readiness can be linked to vital interests. The innovation drive is, however, mainly civil. Actively monitor and co-develop in military-specific niches. See The characteristics of the Netherlands (training and instruction) in Annex 1.
Human enhancement	For the foreseeable future, humans will remain crucial for military operations. While the number of military personnel will decline, due to the introduction of automation and autonomous systems for example, the importance of optimal performance on the part of individual servicemen and women is more likely to rise than fall.	The major technological and medical developments in these areas are civil-driven, but application in the military domain is intertwined with ethical, legal and practical issues that are specific to the Netherlands. These specific elements can be linked to vital interests. A combination of co-development in niches relevant to the military, and monitoring. See The characteristics of the Netherlands (doctrine) in Annex 1.
Robotics and autonomous systems	Robots and autonomous systems can make the armed forces more efficient and safer. They offer capabilities for mapping out new environments quickly and safely, without endangering military personnel. As such, these systems can offer important operational and logistic advantages.	The development of autonomous systems in the civil domain is progressing rapidly. Consider autonomous cars, camera drones, etc. These developments must be actively monitored. Co-development is needed to make developments applicable to the military and to specify them. See Operational advantages in Annex 1.

Annex 4: Desired level of dependence on industrial capabilities

In order to make the step from the assessment framework to industrial capabilities, we need to categorise the products and services that the DTIB can supply to Defence. We cannot fall back on an existing form of categorisation in this regard. We therefore recommend a taxonomy of our own. We make a distinction between products and services that contribute Defence-wide or in the maritime, land, air or space domain. For each category of products and services, we indicate how the underlying industrial capabilities should be organised.

Defence-wide	
Areas of knowledge and expertise	**Assessment of national investment on the basis of vital interests**
Doctrine development	While as much coordination and alignment as possible is sought with partners, doctrines are rooted in the military and strategic culture of a country and are therefore a national matter. Support from service providers, such as in concept development and experimentation programmes, should preferably be organised nationally. See The characteristics of the Netherlands (doctrine) in Annex 1.
Organisation and policy development	Organisation and policy development is rooted in the military and strategic culture of a country and is therefore a national matter. Support from service providers, with strategic policy advice for example, must be organised nationally. See The characteristics of the Netherlands (organisation and policy) in Annex 1.
Staffing and personnel support	Dutch nationality is an essential requirement for the selection, training, deployment and support of military personnel, which can only be waived in very special circumstances. Creating and deploying a pool of reservists and the potential exchange of personnel between collaborating golden-triangle parties is a national matter. Support from service providers must be organised nationally. See The characteristics of the Netherlands (personnel) in Annex 1.
DCTOMP integration	Designing and maintaining comprehensive capabilities in terms of the whole DCTOMP chain is a national responsibility. Support from service providers must be organised nationally. See The characteristics of the Netherlands and Innovation capability (at the capability level) in Annex 1.

Maritime domain

Military capabilities in the maritime domain are primarily of importance for the following category 1 and category 2 threats (See Existential threats):

- The military threat to the external borders and the territorial integrity of the Kingdom.
- The (physical) threat to vital national infrastructure. This concerns, for example, access by water to the Port of Rotterdam, as well as systems and connections (cables and pipelines) on the Dutch continental shelf.
- The threat to citizens in crisis areas, and embassy personnel in particular. This mainly concerns evacuation operations by sea or deployments launched from the sea.
- The threat to Dutch commercial shipping, in particular from piracy.
- The (military) threat to deployed national units, including logistics chains and supporting C41SR systems.
- The military threat to the integrity of NATO and the EU.
- The threat to (maritime) supply lines for reinforcements and supplies from North America for NATO operations in or on the borders of Europe.
- The threat to commercial sea routes from and to Europe and North America, including supply lines of raw materials, oil and gas.

Products and services	Assessment of national investment based on vital interests [18]
Platforms[19]	Maritime platforms are manufactured in small series (classes), and within a series there may also be (limited) differences between successive models. Economies of scale therefore play a smaller role than is the case for most land and air systems. At the same time, the nature of the platforms means there are many opportunities to make a specific cost–benefit analysis. In combination with the importance of the Port of Rotterdam for both the national and European economy and for the operation of NATO in the case of territorial threats (the supply of primarily American units and assets), and the importance of the maritime supply lines to the Caribbean part of the Kingdom, a national shipbuilding cluster is advisable. See Existential threats: the specific category 1 threat of terrorist attacks on Dutch territory using CBRN means in Annex 1. Many supply chains are international and, to a certain extent, civil, but the integration capability on the basis of own design capability should be embedded nationally. The integration of SEWACO systems, in particular, with one another and with the platform's basic provisions , should be organised nationally. See Integration capability and Managing supply chains in Annex 1. Modular design is increasingly important. Modular scaling, reconfiguration, and expansion and updating/upgrading throughout the service life of maritime platforms are only possible with full knowledge of the design. This is of great importance for guaranteeing the future-proofing of the platforms. Long-term close national cooperation between the RNLN, the business community and knowledge institutes (the triple helix) throughout the service life of the platforms is essential. See Innovation throughout the service life in Annex 1. For hull and platform propulsion of surface vessels, excellent use can be made of production capabilities elsewhere on the basis of own design. See the pragmatic consideration Mature market in Annex 1. For the propulsion and energy systems of ships, use can be made of civil developments and the market, on the basis of own design. Zero-emission propulsion is a development that is taking place both on the civil market and in the military domain. See Mature market in Chapter 3.2.

[18] *In the maritime domain, there is intensive Belgian–Dutch collaboration in relation to operations, training, instruction, logistics and maintenance, as well as joint development and procurement. The deep integration established in the Belgian–Dutch collaboration BENESAM means that in the maritime domain, many binational vital interests are shared by the two countries. The operational collaboration with Germany is growing and industrial collaboration is also an option. Traditionally, there have been good relations with the United Kingdom, particularly in relation to amphibious operations and between marine corps. Industrial collaboration with the British is, however, difficult, because they are striving for an independent national naval shipbuilding capability. Where this table refers to international collaboration, this therefore primarily refers to Belgium and then to Germany.*

[19] *The sensor, weapon and command system (SEWACO) borne by the platform is covered in a separate category.*

Observation and information-gathering systems and services	The sensors on a naval platform are highly influential in determining the offensive and defensive effectiveness of the platform and are ideal mil specs. Some specifications must even be kept secret. See Secret contracts. It is desirable to organise the relevant industrial capabilities nationally, but achieving economies of scale by means of international collaboration with retention of own integration capability must not be ruled out. See Information (systems) as an asset in Annex 1.
Information-/intelligence-processing systems, decision-support systems and command & control systems	The information systems on a naval platform are highly influential in determining the offensive and defensive effectiveness of the platform and are ideal mil specs. Some specifications must even be kept secret; See Secret contracts in Annex 1. They are also very specific. Own integration capability is desirable for onboard information systems. See Information (systems) as an asset in Annex 1. It is desirable to organise the relevant industrial capabilities nationally. For onshore systems, basic systems for combining, processing, managing and saving information are widely available on the market. See Mature market in Chapter 3.2. Systems of this kind must be tailored to specific military data models, require specific further development of software in particular regarding, for example, security, real-time links with platforms at sea and information fusion, and must be combined in the specific Defence context of the Netherlands. At the same time, the interoperability of such systems with trusted partners is desirable. With regard to tailoring and further development while retaining own integration capability, international collaboration is the preferred option. See Integration capability and Managing supply chains in Annex 1. For decision-support systems, the interoperability of such systems with trusted partners is desirable. International collaboration while retaining own integration capability is the preferred option. See Integration capability and Managing supply chains in Annex 1.
Communication systems and services	For ships, communication systems, including satcom, are widely available on the market in basic configuration. With regard to security and robustness, specific military requirements apply, but these are generally comparable to those of other defence organisations. Recourse to the market (MOTS) is possible. See Mature market in Annex 1. There must, however, be sufficient knowledge for the integration of these systems and, in the case of highly classified systems, national suppliers must be considered first because of security aspects. For communication services, the reliability, availability and security of communication, and thus confidence in the service provider, must be guaranteed. This calls for Dutch service providers or service providers of trusted partners (with whom binding service level agreements can be established and with whom standardisation and monitoring can be agreed). See 'Access-to' capabilities and Managing supply chains in Annex 1.
Weapon systems, ammunition and platform protection	Economies of scale are important and difficult to achieve nationally, due to the small series of maritime platforms. It is therefore preferable to bring the national requirements in line with what is available on the market. See the pragmatic considerations The Netherlands' capacity and possible limitations in Annex 1 and Mature market in Chapter 3.2. It is essential that the security of supply of expendables (such as ammunition and spare parts) is in fact achieved during actual missions. Weapon systems for self-defence may be an exception, with specific national requirements for effectiveness and autonomy, for example, and with robust integration with the platform. See Secret contracts and Innovation capability in Annex 1. These requirements can be coordinated and aligned with trusted partners to achieve economies of scale. International collaboration while retaining own integration capability is desirable in this area. See The Netherlands' capacity and possible limitations in Chapter 3.2. For the passive protection (such as armour, citadel) of surface vessels, international collaboration with trusted partners with mutual dependencies is a conceivable option. See Mature market and The Netherlands' capacity and possible limitations in Chapter 3.2. For active forms of protection, international collaboration with trusted partners while retaining own integration capability is desirable. See The Netherlands' capacity and possible limitations in Chapter 3.2.

Training and instruction	While military personnel can be trained both nationally and multinationally, the process of training and instruction is part of the readiness process and therefore a national responsibility. A large amount of training and instruction will be organised in-house or will be procured as a service from Dutch service providers. For the development of supporting assets, such as simulation or virtual reality systems, international collaboration while retaining own integration capability is desirable. See The characteristics of the Netherlands (training and instruction) in Annex 1.
Materiel logistics support	The norm for materiel logistics throughout the service life of platforms and systems has shifted from military-owned-and-operated to public-private models, which can be established with trusted partners. For matlog services, the reliability, availability and, where applicable, speed of service provision, and thus confidence in the service provider, must be guaranteed. In the maritime domain, that means that the national naval shipbuilding cluster not only designs platforms and delivers the full product, but also remains intensely involved throughout the service life. See 'Access-to' capabilities in Annex 1 and Mature market in Chapter 3.2.
Combat service support	Combat service support for deployed units is a national responsibility and must be organised within Defence, potentially in combination with support from trusted Dutch service providers or by forming pools with trusted partners. See Existential threats: the specific category 1 threat to deployed national units, including logistics chains and supporting C4ISR systems in Annex 1.
Transport systems and services	For transport systems and services, a distinction must be made between national/strategic and operational/tactical capabilities. Defence must always have its own base of transport capability, supplemented with services from the market. That applies to road, rail, air and water. Supply ships and supply services can be procured from the market, often with some military-specific features (MOTS). In the maritime domain, transport capability is often directly linked to the deployment security of units. The points of departure as described for combat service support apply here.

Land domain

In the land domain, military capabilities are primarily important for the following category 1 and category 2 threats (See Existential threats):

- The military threat to the external borders and the territorial integrity of the Kingdom.
- The threat of terrorist attacks on Dutch territory, including attacks using chemical, biological, radiological or nuclear (CBRN) means.
- The (physical) threat to vital national infrastructure.
- The threat to citizens in crisis areas, and embassy personnel in particular.
- The (military) threat to deployed national units, including logistics chains and supporting C41SR systems.
- The military threat to the integrity of NATO and the EU.
- The threat to commercial land routes from and to Europe, including the supply of oil and gas through pipelines.

Products and services	Assessment of national investment based on vital interests [20]
Platforms	The variety of platforms for land operations means that economies of scale for development and production are important, to be realised by means of European industrial consolidation. In general, the national requirements can be brought in line with what is available on the international market. See The Netherlands' capacity and possible limitations and Mature market in Chapter 3.2. A modular design is important in this regard, so that customisation is possible in order to meet specific national requirements. Modularity is also of great importance to (better) guarantee the future-proofing of platforms. See Innovation throughout the life cycle and Managing supply chains in Annex 1.
Observation and information-gathering systems and services	The quality of civil optical and infrared sensors for observation on land is close to that of high-end military sensors. Recourse to the market is usually possible in this area. See Mature market in Chapter 3.2. For advanced radar systems (ground-ground and ground-air [21]), international collaboration while retaining own integration capability is desirable. See Information (systems) as an asset in Annex 1. For information services, the reliability, availability and security of the information, and thus confidence in the service provider, must be guaranteed. This calls for Dutch service providers or service providers of trusted partners (with whom binding service level agreements can be established and with whom standardisation and monitoring can be agreed). See 'Access-to' capabilities and Managing supply chains in Annex 1.
Information-/intelligence-processing systems, decision-support systems and command & control systems	Basic systems for combining, processing, managing and storing information are widely available on the market. See Mature market. Systems of this kind must be tailored to specific military data models, require specific further (software) development regarding, for example, security, real-time links to information sources and information fusion, and must be combined in the specific Defence context of the Netherlands. At the same time, the interoperability of such systems with trusted partners is a precondition for coalition operations. With regard to tailoring and further development while retaining own integration capability, international collaboration is desirable. See Integration capability and Managing supply chains in Annex 1. Decision-support systems are specific to both the military and the country. See The characteristics of the Netherlands (command and control and leadership) in Annex 1. At the same time, the interoperability of such systems with trusted partners is a precondition for coalition operations. International collaboration while retaining own integration capability is desirable. See Integration capability and Managing supply chains in Annex 1
Communication systems and and services	Communication systems are largely available in basic configuration on the market. In relation to security and robustness, specific military requirements apply, but these are generally comparable to those of other defence organisations. Recourse the market (MOTS) is possible. See Mature market in Chapter 3.2. For communication services, the reliability, availability and security of the communication, and thus confidence in the service provider, must be guaranteed. This calls for Dutch service providers or service providers of trusted partners. See 'Access-to' capabilities and Managing supply chains in Annex 1.

Weapon systems, ammunition and platform protection	Partly due to the variety of weapon systems and ammunition for land operations, economies of scale in development and production are important, to be realised by means of European industrial consolidation. In general, the national requirements can easily be brought in line with what is available on the international market (MOTS). See The Netherlands' capacity and possible limitations and Mature market in Chapter 3.2. It is essential that the security of supply of expendables (such as ammunition and spare parts) is in fact achieved during actual missions. An exception may be smart ammunition, with specific national requirements regarding effects and their accuracy and terminal guidance. These requirements can be coordinated and aligned with trusted partners to achieve economies of scale. International collaboration with mutual dependencies is desirable in this area. The latter is also desirable with regard to the international pooling of scarce ammunition in order to guarantee fast availability. See The Netherlands' capacity and possible limitations in Chapter 3.2.
Training and instruction	While military personnel can be trained both nationally and multinationally, the process of training and instruction is part of the readiness process and therefore a national responsibility. A large amount of training and instruction will be organised in-house or will be procured as a service from Dutch service providers. For the development of supporting assets, such as simulation or virtual reality systems, international collaboration while retaining own integration capability is desirable. See The characteristics of the Netherlands (training and instruction) in Annex 1.
Materiel logistics support	The norm for materiel logistics throughout the service life of platforms and systems has shifted from military-owned-and-operated to public-private models, which can be established with trusted partners. For matlog services, the reliability, availability and, where applicable, speed of service provision, and thus confidence in the service provider, must be guaranteed. This calls for Dutch service providers or pooling with trusted partners. See 'Access-to' capabilities in Annex 1 and the pragmatic consideration The Netherlands' capacity and possible limitations in Chapter 3.2.
Combat service support	Combat service support for deployed units is a national responsibility and must be organised within Defence, potentially in combination with support from trusted Dutch service providers or by forming pools with trusted partners. See Existential threats: the specific category 1 threat to deployed national units, including logistics chains and supporting C4ISR systems in Annex 1.
Transport systems and services	For transport systems and services, a distinction must be made between national/strategic and operational/tactical capabilities. Defence must always have its own base of transport capability, supplemented with services from the market. That applies to road, rail, air and water. Assets for strategic transport can be procured from the market. See Mature market in Chapter 3.2. International pooling or service procurement is increasingly the norm in this area. For transport services, the reliability, flexibility and guaranteed availability (particularly rapid response units), and thus confidence in the service provider, must be guaranteed. This calls for Dutch service providers or pooling with trusted partners. Assets for tactical transport (including transport helicopters) can also be procured from the market. Service procurement is possible, but only in permissive environments.

Air and space domains

Military capabilities in the air and space domains are particularly important for the following category 1 and category 2 threats (See Existential threats in Annex 1):

- The military threat to the external borders and the territorial integrity of the Kingdom.
- The threat of terrorist attacks on Dutch territory.
- The threat to citizens in crisis areas, and embassy personnel in particular. This primarily involves evacuation operations by air.
- The (military) threat to deployed national units, including logistics chains and supporting C41SR systems.
- The military threat to the integrity of NATO and the EU.
- The threat to commercial air routes from and to Europe and North America.
- The threat to space infrastructure, in particular satellites for communication, navigation and earth observation.

Products and services	Assessment of national investment on the basis of vital interests
Platforms	The extent of integration of various functional subsystems in airborne platforms is generally high, both technically and in terms of certification. The development of advanced military airborne systems is therefore reserved for a limited set of manufacturers, primarily associated with larger countries. The level of standardisation is high and there is little scope for (national) customisation. National development of fighter planes, helicopters, transport aircraft and satellite networks is not feasible in practice. The Netherlands can, however, participate in multinational development and production programmes, largely under the leadership of the USA in practice, but also in a European context. See The Netherlands' capacity and possible limitations in Chapter 3.2. With regard to (smaller) UAVs and smaller satellites that primarily serve intelligence functions, national developments can be launched, with or without trusted international partners. Nationally organised industrial capabilities or international collaboration while retaining own integration capability is desirable in this regard. See Information (systems) as an asset in Annex 1.
Observation and information-gathering systems and services	The sensors on fighter planes, armed helicopters and larger UAVs are highly influential in determining their offensive and defensive effectiveness and are therefore ideal mil specs. Some specifications must even be kept secret; See Secret contracts in Annex 1. Although sensors can be configured dynamically (sensor pods) to a certain extent, the extent of integration with the platform is generally high, both technically and in terms of certification. Development, production and maintenance are therefore closely connected to the programmes for the platforms themselves. International collaboration with mutual dependencies is desirable (as part of the development and production of the platform). See Information (systems) as an asset in Annex 1 and The Netherlands' capacity and possible limitations in Chapter 3.2. For smaller unmanned platforms, national sensor configuration is feasible. Recourse to the market is usually possible in this area. See Mature market in Chapter 3.2.
Information-/intelligence-processing systems, decision-support systems and command & control systems	The onboard information systems of air fighters and armed helicopters are ideal mil specs. They are also very specific. International collaboration with mutual dependencies is desirable (as part of the development and production of the platform). See Information (systems) as an asset in Annex 1 and The Netherlands' capacity and possible limitations in Chapter 3.2. For various staff systems, basic systems for combining, processing, managing and storing information are to a great extent available on the market. See Mature market in Chapter 3.2. Systems of this kind must be tailored to specific military data models, require specific further (software) development regarding, for example, security, real-time links with airborne and space platforms and information fusion, and must be combined in the specific Defence context of the Netherlands. At the same time, the interoperability of such systems with trusted partners is a precondition for coalition operations. For tailoring and further development, international collaboration while retaining own integration capability is desirable in order to at least realise the integration (DCTOMP). See Integration capability and Managing supply chains in Annex 1. Decision-support systems and C2 are specific to both the military and the country. See The characteristics of the Netherlands (command and control and leadership) in Annex 1. At the same time, the interoperability of such systems with trusted partners is desirable, as is international collaboration while retaining an integration capability. See Integration capability and Managing supply chains in Annex 1.

Communication systems and services	Communication systems, including satellite communication, are largely available in basic configuration on the market. With regard to security and robustness, specific military requirements apply, but these are generally comparable to those of other defence organisations. Recourse to the market (MOTS) is possible. See Mature market in Chapter 3.2.
Weapon systems, ammunition and platform protection	Just as for sensors, while weapon systems and ammunition of air fighters and armed helicopters can be dynamically configured to a certain extent (e.g. payload), the extent of integration with the platform is generally high, both technically and in terms of certification. Development, production and maintenance are therefore closely connected to the programmes for the platforms themselves. International collaboration with mutual dependencies is desirable (as part of the development and production of the platform). See The Netherlands' capacity and possible limitations in Chapter 3.2. It is essential that the security of supply of expendables (such as ammunition and spare parts) is in fact achieved during actual missions.
Training and instruction	While military personnel can be trained both nationally and multinationally, the process of training and instruction is part of the readiness process and is therefore a national responsibility. In the air domain, much platform-oriented training and instruction, as well as the development of supporting assets, takes place internationally. International collaboration with mutual dependencies is desirable in this area. See The characteristics of the Netherlands (training and instruction) in Annex 1 and The Netherlands' capacity and possible limitations in Chapter 3.2.
Materiel logistics support	The norm for materiel logistics throughout the service life of platforms and systems has shifted from military-owned-and-operated to public-private models which can be established with trusted partners. For matlog services, the reliability, availability and, where applicable, speed of service provision, and as a result trust in the service provider, must be guaranteed. This calls for Dutch service providers or pooling with trusted partners. The (military) logistics hub that is developing around Woensdrecht Air Base, embedded in the broader Maintenance Valley initiative in West-Brabant and Zeeland is a good example. See 'Access to' capabilities in Annex 1 and The Netherlands' capacity and possible limitations in Chapter 3.2.
Combat service support	The combat service support of deployed units is a national responsibility and must be organised within Defence, potentially in combination with support from trusted Dutch service providers or by forming pools with trusted partners. See Existential threats: the specific category 1 threat to deployed national units, including logistics chains and supporting C4ISR systems in Annex 1.
Transport systems and services	For transport systems and services, a distinction must be made between national/strategic and operational/tactical capabilities. Defence must always have its own base of transport capability, supplemented with services from the market. That applies to road, rail, air and water. Transport aircraft and helicopters can be procured from the market, often with some military-specific features. See Mature market in Chapter 3.2. In relation to air transport, multinational pooling will take place in the European Air Transport Command (EATC, 7 countries) and multinational coordination will take place in the Movement Coordination Centre Europe (MCCE, 27 countries). Air-to-air refuelling is also due to be coordinated and pooled at European level. In this way a 'market' of transport service provision will in fact be created, for the time being on the basis of collaborating governments, but this is likely to occur increasingly on a (public-)private basis.

This is a publication by the Netherlands Ministry of Defence and the Netherlands Ministry of Economic Affairs and Climate Policy.

November 2018.