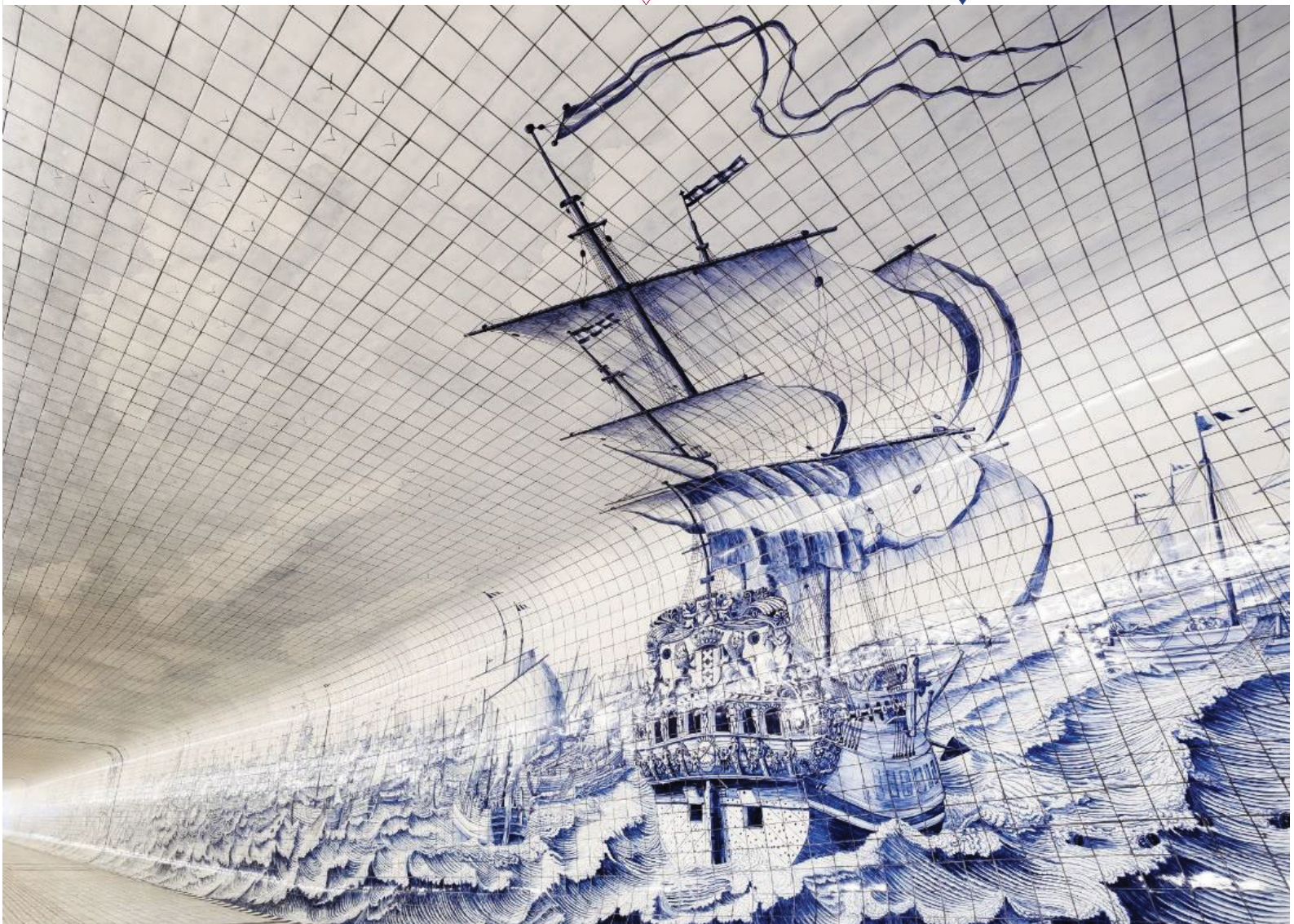


STI DIPLOMACY

ADVANCING THE INTERNATIONALISATION
OF SCIENCE, TECHNOLOGY AND INNOVATION





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STI Diplomacy

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and innovation

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Summary

The Netherlands is in the top five in the global competitiveness ranking, partly thanks to its innovative strength and the solid international position enjoyed by Dutch science. In order to stay in the top five, the Netherlands will need to remain one step ahead of competing countries. Those countries are not standing still: some of them are investing heavily in science, technology and innovation (STI) and are also making major efforts to support the internationalisation of their STI ('STI diplomacy'), including attracting and retaining talent. It is therefore crucial for the Netherlands to ensure that our diplomacy and STI are mutually reinforcing in order to be able to grasp opportunities worldwide and not lose ground to competing countries.

The Netherlands has a number of diplomatic and other networks which actively support various aspects of science, technology and innovation. However, there is no overarching strategy or direction, and there is often no national policy with clear objectives for areas such as attracting and retaining talent and strengthening international innovative capacity. In practice, stakeholders such as research institutes, regions or top sectors regularly operate independently of each other. This limits the effectiveness of the Netherlands' international and diplomatic efforts. Other countries, such as Germany, the United Kingdom or Switzerland, have a strategy with clear priorities which is translated into specific plans for STI diplomacy. Those countries achieve good results with this approach, and this demands a response from the Netherlands.

In addition, the Netherlands is less well equipped for STI diplomacy than some of its competing countries. Although the network of innovation counsellors (in Dutch: 'innovatie attachés') functions well, it is limited in size. Moreover, there are virtually no student or research scholarships of any significance for attracting talent to the Netherlands. The Netherlands Organisation for Scientific Research (NWO) has only a limited budget for bilateral scientific collaboration, and there is no longer a budget at all for bilateral innovation partnerships. Other countries are better equipped and have bigger budgets, which means the Netherlands is not only missing opportunities, but is in danger of falling out of the game altogether in the future.

In response to these issues, AWTI makes the following recommendations to the government:

Recommendation 1

Formulate a vision for the internationalisation of STI and promote the development of a plan for (the role of) STI diplomacy based on that vision

This vision is based on the interests of the Netherlands in the context of economic development, social challenges and essential key technologies. The government should decide on the countries with which the Netherlands should prioritise cooperation.

Recommendation 2

Set up a steering group to oversee the development of a Dutch strategy for STI diplomacy with clear objectives

The government vision must be elaborated into a strategy for the internationalisation of STI and its supporting mechanism ('STI diplomacy'). This strategy should be formulated by a steering group which includes the three Directors-General from the Ministry of Education, Culture and Science, the Ministry of Economic Affairs and the Ministry of Foreign Affairs, who receive a clear mandate for this from their ministers. The steering group also includes key representatives from business and society. This ensures that the steering group has sufficient authority to act and that it is supported by society as well.

Recommendation 3

Reserve an additional budget of 100 million euros per year

The government should make available an additional 100 million euros per year for the development and implementation of the strategy (see Recommendation 4).

Recommendation 4

Elaborate the strategy into a multi-year plan for STI diplomacy, and implement it

The strategy should be translated into a multi-year plan which is reviewed and improved every two years and which describes the deployment of available policy instruments and resources. The STI diplomacy strategy and plan together give stakeholders greater clarity regarding the national priorities. It will also mobilise them to translate the strategy, on the basis of their respective strengths, into the reality of their organisations. To ensure that the multi-year plan for STI diplomacy is effective, at least the following five elements must be in place; this is where the additional investment of €100 million referred to in

Recommendation 3 comes in:

- ▶ Enlarge the diplomatic networks for STI;
- ▶ Strengthen and expand the policy instruments for international STI cooperation;
- ▶ Strengthen the ability to attract and retain talent;
- ▶ Increase the ability to influence EU research programmes and policy;
- ▶ Branding of the Netherlands as a centre of knowledge and innovation.

Introduction

1.1 Urgency

The Netherlands derives most of its export income from exporting high-grade machinery and from the export by the agro-industry.¹ Its leading position in these fields is thanks in part to its edge in terms of knowledge, which in turn is due to its research institutes (such as universities) and R&D-intensive businesses. This lead is an important part of the foundation underpinning the competitive strength of the Netherlands, helping it achieve fourth place in the most recent World Economic Forum's Global Competitiveness Index rankings.²

The ambition of the Dutch government is to maintain a position as one of the top five most competitive countries.³ The government is also keen to ensure that Dutch science is world-class.⁴ In terms of innovation, the Netherlands occupies sixth place in the EU on the European Innovation Scoreboard, and is also classed among the innovation leaders.⁵ In order to maintain this position, the Netherlands must grasp international opportunities and continue to keep pace with competing countries. This also applies in the increasingly international field of science, technology and innovation. Emerging countries such as China, but also Germany, for example, are investing increasing amounts in research and innovation, whereas Dutch government funding for research and development has actually declined.⁶ The Netherlands cannot afford to rest on its laurels.

Talented individuals are increasingly moving across national borders. The availability of a pool of talent is a crucial factor in the decision by R&D and high-tech companies on where to locate their operations. Where does the Netherlands stand in this 'war for talent'? The country is not in the world top-five in the Global Talent Competitiveness Index, but sits in eleventh place. There is room for improvement particularly as regards the ability to *attract* and *retain* talent.⁷ This is urgent, because the limited availability of engineers and other workers with technical training is an obstacle to the Netherlands'

¹ See: <https://www.cbs.nl/nl-nl/nieuws/2017/06/machines-lucratiefste-product-voor-nederlandse-export>

² Schwab, K. (ed.), *The Global Competitiveness Report 2016–2017*, Geneva: World Economic Forum, 2016. On the indicator 'higher education', the Netherlands takes third place in the world, and seventh place for 'innovation'.

³ Vaststelling van de begrotingsstaten van het Ministerie van Economische Zaken (XIII) en het Diergezondheidsfonds (F) voor het jaar 2017, Kamerstukken II 2016-2017, 34 550 XIII, nr. 2, p. 46.

⁴ Ministerie van Onderwijs, Cultuur en Wetenschap (OCW, 2014), *Wetenschapsvisie 2025. Keuzes voor de toekomst*, Den Haag.

⁵ http://ec.europa.eu/growth/industry/innovation/facts-figures/scoreboards_nl

⁶ While government spending on R&D ('GBAORD') in real terms (adjusted for inflation) was 4% higher in Germany in 2015 than in 2011, in the Netherlands it was 5% lower in 2015 and 2011 (AWTI calculation based on Eurostat data, see: <http://ec.europa.eu/eurostat>).

⁷ INSEAD (2016), *The Global Talent Competitiveness Index 2017*, Fontainebleau, France, p. 197.

innovative strength, as recently made clear by a number of innovative Dutch regions. They have issued a call to action to avert the danger to the Dutch position in the world.⁸

Investments in R&D are also increasingly taking on an international dimension. Domestic R&D investments by Dutch companies in the Netherlands are currently under pressure.⁹ At the same time Dutch businesses are investing more in R&D abroad than foreign companies are spending on R&D in the Netherlands. It is therefore important to make the most of opportunities to bring foreign R&D investment to the Netherlands. In addition to a good general investment climate, flourishing clusters of companies and research institutes are essential in making the Netherlands an attractive place to invest. The key to that is to find the right national and international partners. This requires targeted efforts to seek out and exploit opportunities.

Diplomacy can support efforts to maintain and reinforce the Netherlands' innovative and competitive strengths. This fits in with the trend of a diplomacy that is undergoing change: international diplomacy is no longer focused solely on diplomatic relations between states, but is also more alive to the importance of non-state organisations such as businesses, research institutes and other civil-society organisations. As a result, in current diplomacy more attention is being paid to influencing through information, persuasiveness and participation in networks (the 'soft power' approach).¹⁰ Collaboration in the field of knowledge/research can also be a powerful means of building or maintaining relations between countries.¹¹ There has also been a realignment of Dutch diplomacy.¹² Several years ago the focus was shifted more to economic diplomacy, so as to help Dutch companies to make the most of international opportunities. Responsibility for this lies with the Minister for Foreign Trade and Development Cooperation and the Minister of Economic Affairs.

This change is still in full swing, and the effectiveness of the toolkit for economic diplomacy is currently being evaluated.¹³ In addition, a public-private 'Steering Group for the promotion of international trade, innovation and investment', set up by the Dutch Trade & Investment Board, has been looking at how a more structured approach by economic diplomacy through multi-year programmes might work in practice.¹⁴ According

⁸ Manifesto of the *Talent Coalition* Netherlands, 'Internationaal talent versterkt Nederlands kapitaal', 23 February 2017. See also Schwab (2016), *The Global Competitiveness Report 2016–2017*, p. 277: in terms of availability, the Netherlands is in 21st place.

⁹ Deuten, J. (2015), *R&D goes global: Policy implications for the Netherlands as a knowledge region in a global perspective*. Den Haag: Rathenau Instituut, 2015.

¹⁰ Portland, *The soft power 30*, 2015; Adviescommissie Modernisering Diplomatie, *Modernisering van de diplomatie*, 2013.

¹¹ The European Commission is for example closely involved in setting up SESAME research facilities in the Middle East, in which scientists from Iran, the Palestinian regions, Israel, Pakistan, Bahrein, Egypt's, Jordan and Turkey work together. In the current state of international relations, the scientific collaboration with Russia is for example important for Dutch diplomatic relations.

¹² For a more detailed description see: Adviescommissie Modernisering Diplomatie, *Modernisering van de diplomatie*, 2013, and Minister van Buitenlandse Zaken, *Modernisering Nederlandse diplomatie*, 2013.

¹³ Inspectie Ontwikkelingssamenwerking en Beleidsevaluatie (IOB, 2016), *Terms of reference effectevaluatie Economische Diplomatie*, Den Haag: Ministerie van Buitenlandse Zaken, 10 November 2016.

¹⁴ DTIB Stuurgroep internationale handels-, innovatie- en investeringsbevordering (2017), *Team Nederland: Samen sterker in de wereld – een actieplan voor banen en groei*, Den Haag, 2017.

to the Dutch government, the focus here is “not just on promoting the Dutch product abroad, but also on promoting Dutch knowledge and encouraging international cooperation in the field of knowledge”.¹⁵ Promoting trade needs to go hand in hand with cooperation in innovation, with “public and private partners having complementary roles and working together closely to help realise jointly set goals aimed at priority countries, top sectors and global societal challenges.”¹⁶ The Dutch Advisory Council on International Affairs (AIV) recently issued recommendations on linking the international sustainable development agenda more closely to our economic diplomacy.¹⁷

At the same time, we see that a number of ‘competing’ countries, such as Germany, Switzerland and the United Kingdom, are very active in the internationalisation of science, technology and innovation, and are investing more and more heavily in providing diplomatic support for STI. They have a clear strategy, invest in their networks, make targeted choices and invest major efforts in achieving them (see section 2.2). What response does the Netherlands have?

It is in any event high time to investigate how the Netherlands needs to shape its diplomatic support for the internationalisation of science, technology and innovation to ensure that it makes the most of its opportunities in this area and does not lose touch with the leaders in the field.¹⁸ The Netherlands has a good starting position with regard to science, technology and innovation. It also has a tradition of strong diplomacy,¹⁹ though its diplomatic network has been shrinking in recent years.²⁰ Continuing success now depends heavily on linking these two aspects as fruitfully as possible.

1.2 Request for advice

This interaction between (international activities and collaboration in) science, technology and innovation (STI) and diplomacy is referred to as ‘STI diplomacy’. How does STI diplomacy function in the Netherlands, and how can it be improved? This is the question underlying the request for advice from the Minister of Economic Affairs, the Minister of

¹⁵ Memorie van Toelichting bij de Begrotingsstaat van Buitenlandse Handel en Ontwikkelingssamenwerking 2016, Kamerstukken II 2015–2016, 34 300 XVII, nr. 2, p. 15.

¹⁶ Vaststelling van de begrotingsstaten van het Ministerie van Economische Zaken (XIII) en het Diergezondheidsfonds (F) voor het jaar 2017, Kamerstukken II 2016-2017, 34 550 XIII, nr. 2 (MvT), p. 23.

¹⁷ Adviesraad Internationale Vraagstukken (AIV, 2016), *Daadkracht door de Dutch Diamond. Ondernemen in het licht van de nieuwe duurzame ontwikkelingsdoelen*, advies nr. 99, Den Haag: AIV, January 2016.

¹⁸ This was also stated recently by AWTI in its letter to the government informateur (mediator charged with forming the new government) of 28 March 2017 concerning priorities for the science and innovation policy of a new government, available on the AWTI website:

www.awti.nl/documenten/publicaties/2017/03/29/prioriteiten-voor-het-wetenschaps--en-innovatiebeleid-van-een-nieuwe-regering Portland (2016), *Soft Power* 30, p. 47: the Netherlands occupies ninth place on ‘Engagement’, the indicator for diplomatic effort. The Netherlands is however slipping: in 2015 it was in seventh place for this indicator.

²⁰ Ministerie van Buitenlandse Zaken (2015), *Rijksjaarverslag van Buitenlandse Zaken*, Den Haag, 2015.

Education, Culture and Science and the Minister for Foreign Trade and Development Cooperation:²¹

How can STI and diplomacy support and reinforce each other more effectively?

1.3 Definition of STI Diplomacy

The literature distinguishes between three types of STI diplomacy:²²

- 1 *STI for diplomacy*: STI as a means of supporting and building diplomatic relations. The relations between the People's Republic of China and the United States in the 1970s are an example of this.
- 2 *STI in diplomacy*: using science in international organisations and relations. An example is the role of climate-related research (IPCC) in climate diplomacy.
- 3 *Diplomacy for STI*: using diplomacy to achieve STI goals:
 - ▶ Increasing the reservoir of knowledge in the Netherlands by attracting talent, R&D, investments and collaboration;
 - ▶ 'Selling' Dutch knowledge abroad, for example through trade and foreign investments;
 - ▶ Jointly developing international knowledge and innovation.

This report devotes wide attention to the third aspect of STI diplomacy ('diplomacy for STI'), partly in view of its importance for the (future) strength of the Netherlands. A key aspect here is the attractiveness of the Netherlands for R&D, R&D-intensive companies and talented individuals in the fields of research, development and innovation. There is a direct link here with the 'export' of knowledge, skills and innovation, given the recurrent crucial question in this context, namely, 'Is the Netherlands of importance for that other country with the available knowledge or skills?'

The first two aspects ('STI for diplomacy' and 'STI in diplomacy') are also relevant in the context of the interaction between STI and diplomacy to which the request for advice refers. The three aspects of STI diplomacy are interconnected. For example, bringing to bear the factor 'knowledge' for a given theme in the global diplomatic process can help enhance the reputation of a country as a leader on that theme, in turn enhancing the attractiveness of that country in relation to that theme, and vice versa. The value of scientific 'hotshots' in opening doors abroad (including diplomatic doors) should also not be underestimated, especially in countries where science is still highly regarded. The first two aspects of STI diplomacy will be discussed in this report where they are relevant.

²¹ See Annex 1 for the request for advice (in Dutch).

²² See e.g. The Royal Society and AAAS (2010), *New frontiers in science diplomacy. Navigating the changing balance of power*, London: 2010.

1.4 Approach and structure of this report

The literature does not offer a generally accepted frame of reference specifically for STI diplomacy.²³ Attempts have however been made in recent years to evaluate diplomatic efforts for and directed at non-state organisations (such as companies or research institutes) and to compare countries in this regard.²⁴ This has included an analysis of both the diplomatic efforts (input) of different countries and a number of result areas, for example higher education/science and entrepreneurship. These attempts are in line with other comparative analyses, such as the Global Competitiveness Index,²⁵ the European Innovation Scoreboard,²⁶ or the Global Talent Competitiveness Index.²⁷ Characteristic of these analyses is their focus on comparing countries as well as their use of compound indicators for constituent aspects, which in most cases incorporate input, output and structural indicators.

Building on these efforts, AWTI analysed Dutch STI diplomacy by benchmarking it against other countries: what international developments are taking place and what good examples are to be found in comparable, competing countries? For the benchmark we selected countries which have a good reputation for their approach to STI diplomacy. That is to say countries which score well in international comparisons in terms of their results and which are also known for their diplomatic efforts for STI. This international benchmark is the subject of Chapter 2.

Chapter 3 describes the position of the Netherlands in relation to the internationalisation of science, technology and innovation and the way in which STI diplomacy currently supports that position. We compare what the Netherlands is currently doing with what the competing countries studied are doing. From this basis we then assess whether the Netherlands is adequately prepared to grasp the international opportunities in relation to science, technology and innovation now and in the future, and how – learning from examples in other countries – the Dutch government can provide optimal support for this through diplomacy.

This forms the basis for the final conclusions and recommendations (Chapter 4).

We drew on the following resources in preparing this report:

- ▶ Two background studies commissioned by AWTI from Technopolis (2016) and TNO (2017);²⁸

²³ The same 'problem' also applies for economic diplomacy; see: IOB (2016), *Terms of Reference*, p. 5.

²⁴ E.g. by Portland (2015) and (2016), *The soft power 30. A global ranking of soft power*, London: Portland, 2015 and 2016.

²⁵ Schwab, K. (ed.) (2016), *The Global Competitiveness Report 2016–2017*, Geneva: World Economic Forum, 2016.

²⁶ http://ec.europa.eu/growth/industry/innovation/facts-figures/scoreboards_nl

²⁷ INSEAD (2016), *The Global Talent Competitiveness Index 2017*, Fontainebleau, France.

²⁸ See www.awti.nl

- ▶ A literature review and interviews with experts;²⁹
- ▶ A roundtable meeting at the Netherlands Enterprise Agency (RVO) and a meeting with the full network of innovation counsellors ('innovatie-attachés').
- ▶ During the preparation of the report, discussions were held with the 'Steering Group for the promotion of international trade, innovation and investment' set up by the Dutch Trade & Investment Board and chaired by a former senior civil servant at the Ministry of Economic Affairs, Chris Buijink.

We would like to express particular thanks to the Dutch Advisory Council on International Affairs (AIV) for their support and involvement in the preparation of this report.

This report was prepared by a project group comprising Council members Martin Schuurmans (chairman), Dave Blank and Sjoukje Heimovaara and staff members Hamilcar Knops (secretary) and Ruud Verschuur.

²⁹ See Appendix 5 for the experts consulted and Appendix 6 for the list of references.

International

2.1 International STI developments

Science, technology and innovation are becoming increasingly international, a trend driven largely by information and communication technology, liberalisation of world trade, innovations in logistics and transport and the emergence of the 'knowledge society'.³⁰ The transformation to a knowledge society has been under way in the Western world for some time, and the rest of the world is rapidly following suit. This is leading to persistent demand for knowledge and for people who are able to apply and develop it, i.e. 'knowledge workers'. These knowledge workers increasingly determine a country's innovative capacity. The global battle for knowledge means these knowledge workers are in high demand. And that battle is steadily expanding to include the knowledge workers of the future, i.e. students. More and more students throughout the world are looking for good training opportunities; by 2020 China, Russia, Brazil, India, Indonesia, Saudi Arabia and South Africa will together have almost 40% more higher education graduates than the 34 OECD countries put together.³¹ This trend is sometimes referred to as the *war for talent*.³²

This internationalisation manifests itself clearly in the world of science. In its report *Boven het maaiveld* ('Standing out from the crowd', 2014), the AWTI observed that more and more countries are engaging in scientific research. Large centres of knowledge such as the United States, Germany and the United Kingdom still have a strong presence, but countries such as China, Singapore, Brazil and Korea are moving up the ladder. This is leading to an increase in the number of scientific publications worldwide, and also in the number of international co-publications.³³

Innovation is also crossing borders. Companies can today develop, produce, market and sell their products and services across the world. This forces companies to make judicious location choices, and often also to forge partnerships for their business activities. This also increasingly applies for knowledge-intensive R&D activities, as illustrated by the increase in the share of foreign R&D in the total R&D spend by Dutch companies from 21.5% in 1999 to 32.5% in 2009.³⁴ There has been a similar increase in international collaboration between the most prominent innovation hubs.³⁵ The proportion

³⁰ Deuten, J. (2015), *R&D goes global*, Den Haag: Rathenau Instituut, 2015.

³¹ AWT (2014), *Boven het maaiveld. Focus op wetenschappelijke zwaartepunten*, Den Haag: AWT, 2014, p. 26.

³² For a detailed analysis of knowledge workers and the *war for talent*: AWT (2013), *Kiezen voor kenniswerkers*, 2013.

³³ OECD (2015), *OECD Science, Technology and Industry Scoreboard 2015: Innovation for growth and society*, Paris: OECD Publishing, 2015, p. 128-130.

³⁴ OECD (2014), *OECD Science, Technology and Industry Outlook 2014*, Paris: OECD Publishing, 2014, figure 1.10 on p. 43.

³⁵ OECD (2014), *OECD Science, Technology and Industry Outlook 2014*, Paris: OECD Publishing, 2014, p. 43-44.

of patent applications involving at least one foreign (co-)inventor also rose between 2000 and 2013.³⁶

Countries will increasingly have to make best efforts to hold onto existing and attract new talent and R&D investment. It is in this environment that science, technology and innovation diplomacy operates.

2.2 How are different countries responding to this situation?

Introduction

Major strides have been made in many countries, including the Netherlands' neighbouring countries, in linking diplomacy to science, technology and innovation (STI). This trend was triggered by the authoritative publication by the Royal Academy of Science and the American Association for the Advancement of Science (AAAS) on STI Diplomacy.³⁷ The general understanding that growth, innovation and internationalisation are mutually reinforcing is also important. The European Commission also devotes a great deal of attention to the theme of 'science – open to the world', which in turn has an impact on the Member States.

In preparing this report, we looked at the approach to STI diplomacy in a number of countries that are comparable to the Netherlands: Germany, France, Austria, the United Kingdom and Switzerland, as well as the European Union.³⁸ These analyses revealed that Switzerland and the United Kingdom achieve extremely good 'STI scores' in the various rankings and that Germany has been systematically working for several years to strengthen its science, technology and innovation, including internationally. Although France and Austria score below the Netherlands on competitiveness, they have developed a good understanding of the importance of effective STI diplomacy and are systematically working to develop it. The principal focus in the EU is on how the EU shapes its 'own' STI diplomacy in relation to the world beyond the EU. The key findings for these countries are set out in Appendix 2. The main elements of the different approaches are described briefly below.

Strategy and steering

The countries studied have all developed a strategy, on which they have based a multi-year plan to shape the internationalisation of STI in a general sense and to use this as a basis for more targeted STI diplomacy. Countries are making clear choices and setting

³⁶ OECD (2015), *OECD Science, Technology and Industry Scoreboard 2015*, Paris: OECD Publishing, 2015, p. 138.

³⁷ The Royal Society and AAAS (2010), *New frontiers in science diplomacy*, 2010.

³⁸ AWTI made good use here of two background studies carried out for AWTI by TNO and Technopolis: Technopolis, *R&D Attraction Networks*, Amsterdam: July 2016 and TNO, *Diplomatie voor Wetenschap, Technologie en Innovatie*, 2017.

clear goals.³⁹ The strategy serves as a starting point and anchor point for the phased development of a broadly supported policy for the internationalisation of STI and the role of diplomacy in this process.

The national government directs this process. Initial control lies with varying bodies, depending on the country: the Ministry of Education/Science or Economic Affairs in Germany, Austria and the United Kingdom, the Ministry of Foreign Affairs in France, or is exerted jointly (Switzerland). However, regardless of the choice, in all cases steering is based on collaboration among ministries and with STI stakeholders (such as research institutes, umbrella organisations and financiers).

Guidelines and objectives

In most countries, international STI policy is aimed at helping to meet societal challenges (Germany, France, Austria and also the EU); the United Kingdom adopts a more economic perspective by using its own Industrial Strategy as a guideline.

The different countries select objectives which cover the entire STI spectrum, underscoring their interconnectedness. The main focus is on 'branding' the country as a leading nation in (areas of) science and innovation, on strengthening scientific excellence, on tapping into innovation potential and on fostering mobility of students and researchers.⁴⁰ All countries also wish to be successful in the EU, both in the various European STI programmes and in influencing EU policy agendas and research programmes.

Finally, STI diplomacy in all countries is linked to development cooperation. Setting up STI partnerships and infrastructure is regarded as a double-edged sword: it helps the partner countries to develop into knowledge societies and at the same time contributes to the development of a lasting relationship which is expected to be mutually beneficial in the longer term.⁴¹

Choice of countries and themes

All the countries studied prioritise certain countries and themes, though there is a discernible difference in approach. The choice of partner countries is often partly

³⁹ See e.g. European Commission, *Report on the implementation of the strategy for international cooperation in research and innovation*, 2014 and European Commission, *Implementation of the strategy for international cooperation in research and innovation*, 2016 or MAE, MEN, MESR, *La coordination de l'action internationale en matière d'enseignement supérieur et de recherche*, 2014 or Österreichisches Institut für Internationale Politik (OiiP), *Zukunftsräume der internationalen FTI-Kooperation*, 2014.

⁴⁰ See e.g.: BMBF, *internationale Kooperation*, 2013, p. 21, or BIS, *Our plan for growth*, 2014, p. 5, of MAE, *Une diplomatie scientifique pour la France*, 2013, p. 3.

⁴¹ The United Kingdom has two funds focusing (mainly) on encouraging this relationship: 1) the Newton Fund (2014-2021; £735 million) which supports science and innovation partnerships in order to foster economic growth and social development in partner countries, promoting the United Kingdom and creating opportunities for business; 2) the Global Challenge Research Fund (2015-2019; £1.5 billion) has the mission of finding British solutions to social challenges in developing countries. In Germany, the BMBF has drawn up an Africa Strategy (2014-2018; €300 million) in which the central focus is on common research and educational cooperation. This has for example led to the formation of the African-German Network of Excellence of Science (AGNES;2011).

historically determined, especially in countries such as France and the United Kingdom. Germany, in addition to an extensive generic internationalisation strategy, also has a specific STI strategy for China and Africa. Austria makes more specific choices based on its belief that, as a relatively small country, it is important to apply focus. For Austria to regard another country as a 'priority', that country must meet at least three objectives in relation to the internationalisation of STI.⁴²

In making their thematic choices, many countries look for a link with their national policy, and often with the European STI priorities (as set out in Horizon 2020). Germany, for example, aligns with the *Exzellenzinitiative* (science) and *Spitzenclusterpolitik* (innovation) initiatives, while France focuses on a number of themes from the *Alliances* (partnerships for scientific excellence in relation to socially relevant themes). The analysis by the European Commission is very specific: the EC identifies specific themes for bilateral cooperation for each country. In the case of New Zealand, for example, the Commission chooses to cooperate in the fields of health and food security, while the cooperation with Ukraine is focused on ICT, new materials, transport and biotechnology.⁴³

Organisation, institutes and instruments

All the countries mentioned have a diplomatic network of between 80 and 100 people focusing on STI. In many cases they are attachés who work together to promote STI and who seek to connect with and seek out opportunities in the STI field. The major countries also appoint attachés who focus exclusively on science or on technology and innovation. The appointment policy is a growing focus area, given the usual practice in diplomacy whereby diplomats rotate periodically between locations and policy themes. This 'generalistic' approach is at odds with STI diplomacy owing to the specialist knowledge and length of time needed to develop lasting relationships. To support the work of these attachés, a number of robust information portals have been or are being set up.⁴⁴ Countries regard the dissemination of information as a crucial element in the success of STI diplomacy.

The specific organisations set up by a number of countries to streamline their international activities in relation to innovation and/or science are also important. An example is Switzerland's 'swissnex', a public-private partnership between government, research institutes and the business community which is active in eight strong STI regions. Swissnex employs a total of 50 staff and works with four-year performance

⁴² Österreichisches Institut für Internationale Politik (OiiP, 2014), *Zukunftsräume der internationalen FTI-Kooperation*, 2014.

⁴³ European Commission (2014), *Report on the implementation of the strategy for international cooperation in research and innovation*, 2014 and European Commission (2016), *Implementation of the strategy for international cooperation in research and innovation*, 2016

⁴⁴ E.g. Germany – land of ideas (innovation/business); www.euraxess.de (researchers); Research in Germany and Kooperation International (science); France – Business in France or Diplomatie Scientifique; Switzerland– SwissCore (science) or SwissNex.

contracts. Technopolis (2016) has observed that swissnex is already proving to be a success in terms of linking science and promoting investment, whereas in other countries the networks surrounding internationalisation of science and internationalisation of investments are generally still separate.⁴⁵ The United Kingdom uses (national) Catapult Centres⁴⁶ as a means of strengthening its PPP activities, including internationally.

Several other countries (Germany, Denmark, Austria) have also opted to establish science and innovation centres in key STI hubs (e.g. Singapore, Boston, Tokyo) to promote their own science and innovation.⁴⁷ The budget allocated to each centre varies between €250,000 and €600,000 per year.⁴⁸

A further point is the streamlining of the international activities of the various national stakeholders. If universities, sector organisations, cities or regions all operate 'for their own interests' abroad, this can reduce their effectiveness. In the area of higher education and research, Germany offers an interesting example of an approach aimed at streamlining, in the form of the *Deutsche Akademische Austauschdienst (DAAD)*, an umbrella organisation of universities which operates independently and also has close (financial) ties with government ministries. DAAD has an annual budget of €500 million. Its remit is to promote 1) stipends for the best talents (incoming and outgoing); 2) strong international structures; and 3) gathering knowledge for better academic cooperation.⁴⁹ The goal is twofold: to put Germany in the top five of most attractive countries for students and researchers and to ensure that at least half of German students gain experience abroad. Switzerland takes a different approach to strengthening academic cooperation. This too is an interesting example, based on 'leading houses', whereby a different university is appointed to coordinate the cooperation with each specific country. This creates a clear point of contact for the government and other research institutes.

Reference was made earlier to countries that attach importance to being successful in EU programmes. Each of the countries studied sets aside budgets to promote participation in these programmes.

In addition, many countries also have a system aimed at strengthening bilateral cooperation with other countries, both for science (scholarship programmes for students and researchers) and innovation (PPP programmes). Good examples are the German programmes for international cooperation operated by DAAD and the Alexander von

⁴⁵ Technopolis (2016), *R&D Attraction Networks*, p. 1. Switzerland also has a national organisation focusing on general promotion of trade and attracting investments in general: *Swiss Global Enterprise* (turnover CHF 40 million) with 21 Swiss Business Hubs worldwide, which cooperates with the cantonal/regional organisations for that purpose.

⁴⁶ *Catapult centres* target specific sectors that have been identified by the Technology Strategy Board (TSB) is critical for the United Kingdom and with a global market. These centres make available high-grade technology and knowledge to SMEs, large corporations (potential investors), spin-off companies from universities and individuals.

⁴⁷ <https://www.germaninnovation.info/deutsch.html>

⁴⁸ The 6 Danish Innovation Centres had a budget of DKK 25 million (€3.3 million), for example.

⁴⁹ DAAD (2015), *Jahresbericht 2015*, 2015 and www.daad.de

Humboldt Stiftung; the latter foundation spends around €100 million on scholarships each year. Some countries, such as the United Kingdom, also have extensive funds for research linked to development cooperation and sustainable development.

Conclusion

In conclusion, we see that (the governments of) all countries studied believe that international trends in STI demand a vision on the part of the government. Accordingly, in recent years these countries have engaged in developing a strategy and a derived multi-year plan for the internationalisation of science, technology and innovation and the role of STI diplomacy in that process. Central to this are the choices of countries, themes and instruments, which must be matched to the national (and regional) strengths and needs of each country. This strategy and its translation into practice not only sets a clear direction for the diplomatic efforts for STI, but also ensures that the different aspects of science, technology and innovation are considered together. This approach moreover creates more clarity regarding the direction, focus and priorities for stakeholders and those charged with implementation.

In implementing their STI diplomacy, we see that countries first seek to strengthen their traditional networks (e.g. 'innovation counsellors'), organisations (e.g. DAAD in Germany) and instruments (e.g. study and research scholarships). In addition, new variants are being employed, for example new networks or organisations (such as swissnex or the Danish Innovation Centres), new instruments such as the funds in the United Kingdom aimed at linking development aid to scientific cooperation, or modified organisational forms, for example the use of 'leading houses' in Switzerland in a 'secretarial' role in bilateral scientific cooperation.

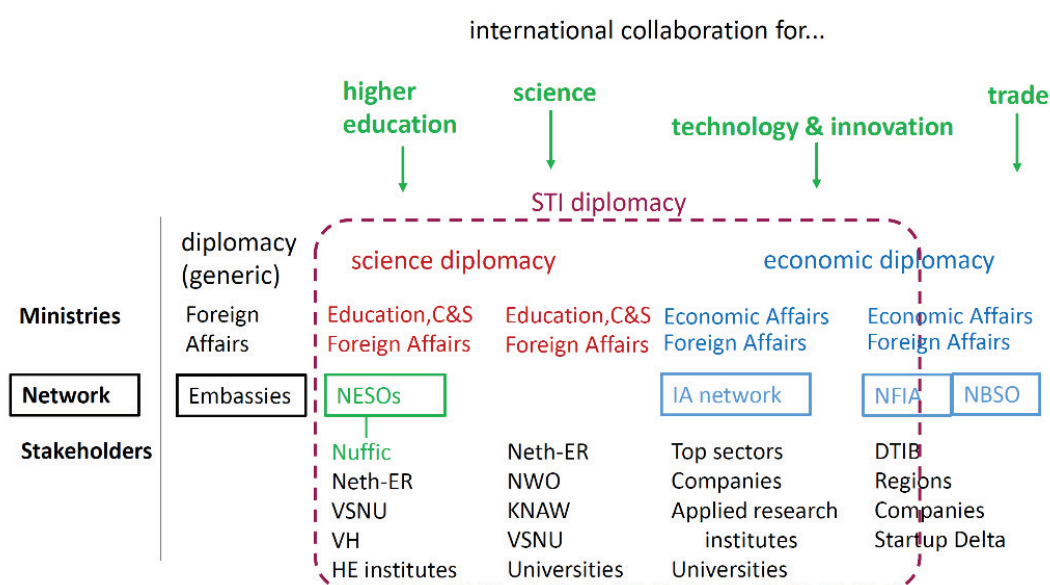
The findings from these countries provide a source of inspiration and best practices for Dutch policy. Against this backdrop, in the next chapter we discuss current Dutch practice and policy in relation to STI diplomacy.

The Netherlands

What do we see if we look at the interaction between STI and diplomacy in the Netherlands through the lens of experiences in other countries? The first point to emerge is that the Netherlands does not have an overarching strategy or central steering covering the whole spectrum of STI diplomacy – though this does not alter the fact that all kinds of activities are carried out in individual areas by public and private stakeholders, supported by diplomatic networks and resources. In this chapter we discuss STI diplomacy from the perspective of the different topic areas. First we explore the theme of talent (§3.1), before turning to international cooperation in science and research (§3.2) and finally focusing on technology, innovation and entrepreneurship (§3.3).

To give an idea of the breadth of the spectrum of STI diplomacy in the Netherlands, the figure below shows the relevant (sub)topics together with the most important stakeholders and diplomatic networks. The network of embassies and consulates forms the underlying basis connecting the more specialist networks cited in the figure. These specialist networks (also) work closely with other parties such as economic attachés or agricultural counsellors at diplomatic missions. In addition, the theme of talent embraces the entire breadth of international cooperation, since it includes students, researchers, knowledge workers and entrepreneurs.

Figure 1. Interaction between STI and diplomacy in the Netherlands



3.1 Talent

It is widely recognised that recruiting, retaining and developing talent in the form of knowledge workers is an increasingly important factor in a country's innovative capacity: as a crucial factor for a knowledge-intensive economy, e.g. helping determine business location policies, but also for the cultural flexibility needed to continue operating internationally as a society. The Netherlands occupies 11th place in the Global Talent Competitiveness Index (GTCI), behind countries such as Switzerland (1), the United Kingdom (3) and Sweden (5), but ahead of countries such as Belgium (16). According to the compilers of the GTCI list, the main improvement opportunities for the Netherlands relate to recruiting and retaining talent, an area where the Netherlands could learn from the approach taken by countries such as Switzerland or the United Kingdom.⁵⁰

At the present time (2016-2017) there are more than 80,000 foreign students studying for Bachelor's or Master's degrees at Dutch universities or universities of applied sciences. In addition, approximately 30,000 foreign students come to the Netherlands each year for a shorter period of study (exchange, internship, etc.).⁵¹ Higher education institutions actively recruit these students, and have their own individual preferences in this regard, as well as historically determined relationships and individual arrangements with other countries or institutes.⁵² They are supported in these efforts by the NESO network (Netherlands Educational Support Office) operated by Nuffic, the Dutch organisation for internationalisation in education. NESO has offices in 11 countries, and its impact is evident from the fact that the number of students coming to the Netherlands from countries where NESO has a presence is rising more strongly than the number from other countries. Traditionally, Dutch higher education institutions have each presented their own individual story. Today, however, there are agreements at the level of the Association of Universities in the Netherlands (VSNU) and the Netherlands Association of Universities of Applied Sciences (VH) to focus on 'shared branding' aimed at encouraging people to study in the Netherlands.⁵³ The Netherlands has a great deal to offer here, given the wide opportunities to study in English and the good quality of its education programmes. One point for attention is that there are virtually no scholarships for foreign students, not even for top talent.⁵⁴

Attracting international higher education students is also on the agenda of the Ministry of Education, Culture and Science, partly with a view to making classes at Dutch higher

⁵⁰ Adecco Group, 'Shaping the Future of Work through Talent and Technology', brief summary of the 2017 edition of the *Global Talent Competitiveness Index (GTCI)* focusing on the Netherlands, p. 3 (*mimeo*).

⁵¹ Huberts, D. (2017), *Update: Incoming student mobility in Dutch higher education 2016-17*, Den Haag: Nuffic, 2017. The most international is Maastricht University, where more than half the students are of foreign origin.

⁵² Maastricht University, for example, has a university-wide approach with teams and actions targeting focus countries.

⁵³ VH & VSNU (2016), *Notitie Internationale positionering/branding*, Den Haag: 2016.

⁵⁴ For an overview see: EP-Nuffic (2016), *Jaarverslag 2015*, Den Haag: EP-Nuffic, 2016.

education institutions more international.⁵⁵ An interdepartmental task force is currently exploring the development of a strategy intended to lead to the formulation of specific ambitions and a focus on particular countries or disciplines for the recruitment of foreign students. The task force will look among other things at ways of increasing the cohesion or streamlining the international profiling of Dutch higher education institutions so that opportunities abroad can be grasped more effectively and more efficiently, including through better synergy between the internationalisation agendas for higher education, foreign trade and development cooperation.⁵⁶ Some Dutch universities are already developing a more integrated approach to internationalisation of education and research in particular focus areas, with a link being emphatically sought with the (diplomatic) relations with the countries concerned.⁵⁷ In a shared view of internationalisation, Dutch universities and universities of applied sciences have already expressed the need for a joint, strategic approach spanning several years.⁵⁸ This not only demands collaboration between institutions and alignment with the agendas of the Ministries of Economic Affairs and Foreign Affairs, but also more specific (existing and new) instruments. Higher education institutions argue that only a combination of a strategy and suitable instruments will enable meaningful steps to be taken.

Some years ago a programme was established aimed at retaining highly educated foreign students (*Make it in the Netherlands*), but this ended when the funding expired.⁵⁹ A recent study shows that there is room for improvement in retaining talent, and that the Netherlands could learn from countries such as Switzerland or Sweden.⁶⁰

University staff are also becoming increasingly international; almost half of all doctoral candidates at Dutch universities now come from other countries, as do 16% of professors.⁶¹ Here again, it is mostly the universities themselves that are active in recruiting and (in some cases) supporting the further careers of those concerned. There is currently a lack of clarity regarding the career progression of these foreign

⁵⁵ Letter of the Minister of OCW to the Second Chamber d.d. 19 september 2016, Kamerstukken II 2016-2017, 22 452, nr. 48.

⁵⁶ See: Verslag van een Algemeen Overleg op 14 december 2016, Kamerstukken II 2016-2017, 22 452, nr. 50.

⁵⁷ An example is Leiden University, which aims to bring cohesion between education and research in strategic international cooperation, linked to diplomatic relations; see Universiteit Leiden (2015), *Excelleren in vrijheid. Instellingsplan 2015-2020*, Leiden: Universiteit Leiden, February 2015, p. 26, and for example the Cleveringa lectures by the LUF at universities and constructs in November each year, but also the Leiden University meeting aimed at Latin America and the Caribbean:

<https://www.universiteitleiden.nl/en/news/2016/05/leiden-strengthens-ties-with-latin-america-and-caribbean>

⁵⁸ VH & VSNU (2014), *Gezamenlijke Visie Internationaal*, Den Haag: VH & VSNU, May 2014.

⁵⁹ For the SER phase, see: <https://www.ser.nl/nl/publicaties/adviezen/2010-2019/2013/make-it-in-the-netherlands.aspx> and for the subsequent programme the Nuffic site: www.nuffic.nl/hoger-onderwijs/internationale-ervaring/make-it-in-the-netherlands

⁶⁰ Adecco Group, 'Shaping the Future of Work through Talent and Technology', brief summary of the 2017 edition of the *Global Talent Competitiveness Index (GTCI)* focusing on the Netherlands, p. 3 (*mimeo*).

⁶¹ C.M. Chiong Meza (2016), Factsheet 'Academische carrière van wetenschappers', Den Haag: Rathenau Instituut, 2016.

researchers.⁶² The Association of Universities in the Netherlands (VSNU) is planning to obtain a clearer picture of this through systematic surveys.⁶³

Although the Netherlands is not unattractive as a location for research (high standards, open culture) and manages to attract a great many researchers from abroad, there are still concerns in the academic world about how attractive the Netherlands is for top researchers. Other countries, such as Germany and China, have specific programmes for attracting or retaining researchers; the Netherlands does not. These concerns prompted the Royal Netherlands Academy of Arts and Sciences (KNAW) to set up a special committee to look at this.⁶⁴ Figures for recent years show a slight brain drain, with marginally more scientists (both Dutch and foreign) leaving the Netherlands than entering.⁶⁵

More generally, the knowledge-intensive regions in particular stress the importance of appealing to knowledge workers. They are working hard on this through the Talent Coalition Netherlands, but in their manifesto they call on the government and other stakeholders to make a contribution, too.⁶⁶ The activities of the different regions include a number of successful and inspiring examples, such as Eindhoven's efforts to leverage the attraction of companies such as ASML to attract talent to other companies as well. The activities of this region appear to be highly successful, because Eindhoven is in ninth place in the recent Global Cities Talent Competitiveness Index, ahead of cities like Berlin (13), New York (14) or London (16).⁶⁷ Another example is the intelligent linking of regional profiles to put them in a better position to offer work to the spouses of knowledge workers. At national level, while there are a few generic facilitating measures (easier procedures for obtaining residence permits, tax breaks, etc.), there is no explicit, focused national policy on international knowledge workers,⁶⁸ and also no systematic talent scouting. Several other countries, such as Germany and Canada, do have a strategy in place for attracting talent (knowledge workers).⁶⁹

⁶² The Rathenau Instituut reaches the same conclusion in a recent publication: E. Koier *et al.* (2017), *Internationale mobiliteit van wetenschappers*, Feiten & Cijfers 20. Den Haag: Rathenau Instituut, p. 13: "There is no source available that provides full and reliable data about the population, flows and quality of internationally mobile researchers." (AWTI translation)

⁶³ Information from discussions with staff of VSNU.

⁶⁴ KNAW committee 'De aantrekkelijkheid van Nederland als onderzoeksland' chaired by Professor Tanja van der Lippe. See: <https://www.knaw.nl/nl/adviezen/lopende-adviezen/onderzoekslaan-nl>

⁶⁵ OECD (2015), *Science, Technology and Industry Scoreboard 2015. Innovation for growth and society*, Paris: OECD Publishing, 2015 p. 68.

⁶⁶ See the manifesto 'Internationaal talent versterkt Nederlands kapitaal' from the Talent Coalition Netherlands (2017).

⁶⁷ Lanvin, B. (2016), 'Benchmarking Cities as Key Players on the Global Talent Scene', in: INSEAD (2016), p. 99-113. The top-5 are: (1) Copenhagen, (2) Zurich, (3) Helsinki, (4) San Francisco and (5) Gothenburg.

⁶⁸ Cf. AWT (2013), *Kiezen voor kenniswerkers*, Den Haag, 2013.

⁶⁹ See e.g.: Government of Canada (2014), *Canada's International Education Strategy: Harnessing our knowledge advantage to drive innovation and prosperity*, Ottawa: 2014.

Conclusion

The Netherlands is just outside the world top 10 for the theme 'talent'. Comparable countries such as Switzerland, the United Kingdom and Sweden perform better. Given the importance of talent and the ambition to be in the world top five for competitiveness, the Netherlands needs to devote more attention to this theme and, drawing on examples from other countries, to make improvements (see Chapter 4).⁷⁰ There appears to be an awareness of this, judging from initiatives such as the establishment of an interdepartmental committee and a Royal Netherlands Academy of Arts and Sciences (KNAW) committee, and the founding of the Talent Coalition Netherlands. The key now is to formulate and implement a cohesive, tangible policy with clear priorities and backed by appropriate resources.

3.2 Science and research

By its nature, science has an international focus. Scientists work across national borders, and a growing share of research funding also comes from international sources. Dutch scientists frequently work and publish in collaboration with foreign colleagues.⁷¹ While the main contacts are at the level of individual researchers and their research groups, research institutes also seek to engage in (strategic) partnerships. Generally, however, institutes operate individually in their international activities, and this fragmentation sometimes stands in the way of effective recognition and grasping of opportunities for Dutch science and research institutes.

Dutch scientists and research institutes also make a major contribution to 'STI for diplomacy' and 'STI in diplomacy'.⁷² Reputed scientists serve as powerful 'ambassadors' for the Netherlands, especially in countries where science is held in high regard, and use can be made of this asset during state visits and other missions. Another example is the current collaboration with Russia on scientific research⁷³ and with Turkey in the field of innovation, despite the tense diplomatic relations with those countries. Dutch science also contributes to global diplomacy on issues such as climate change (IPCC). This is achieved through the involvement of Dutch organisations and researchers, but also through the leading role played by models developed by the Netherlands Environmental Assessment Agency (PBL). More generally, Dutch knowledge and activities in areas such as human rights and agriculture support international efforts to achieve sustainable development goals. Good coordination of the activities of Dutch researchers and

⁷⁰ Cf.: NFIA (2016), *Monitor Vestigingsklimaat May 2016*, p. 4.

⁷¹ Gurney, Th. *et al.* (2015), *International Comparative Performance of Netherlands' Research Base – 2015* (study carried out for AWTI): more than half of all Dutch publications have least one international co-author and these articles have an above-average quality rating (FWCI); the degree of collaboration varies per discipline.

⁷² See section 1.3 for an explanation of these terms.

⁷³ E.g. in the context of the *European Synchrotron Radiation facility (ESRF)*, an international research facility Grenoble, see: Protocol van toetreding van [...] de Russische Federatie tot de [ESRF], *Tractatenblad* 2016, no. 216.

institutes on the one hand and diplomatic efforts on the other can enhance the combined effectiveness.⁷⁴ One thing that did emerge from some of the interviews conducted for this report was that the Netherlands (as a Member State) makes little or no contribution to various EU efforts in relation to 'science for diplomacy'. Finally, the Netherlands is also home to a number of higher education institutions which focus specifically on international development (e.g. IHE Delft and ISS).⁷⁵

Diplomatic support for international scientific collaboration has to come from the network of innovation attachés (IAs), which covers the broad field of innovation, technology and science. These attachés are funded by the Ministry of Economic Affairs. The Netherlands does not have a network of attachés focusing exclusively on science.

The budget for international research collaboration is limited. The central organisation at the Netherlands Organisation for Scientific Research (NWO) has an annual budget of 6 million euros for this purpose, while the various research domains have traditionally each had their own international programmes. NWO is currently an organisation in transition, and as part of this process consideration is being given to a more concentrated and targeted use of resources for international research collaboration. The Royal Netherlands Academy of Arts and Sciences (KNAW) is currently involved in two international research programmes, one for China and one for Indonesia.⁷⁶ The Ministry of Education, Culture and Science no longer has a separate budget for bilateral research programmes with other countries, and this poses an obstacle particularly for potential collaboration with countries where government and direct government funding are important, such as China.⁷⁷ It is also conceivable that they (Dutch) government would like to use bilateral scientific or innovation as a means of maintaining diplomatic relations or linking them to development cooperation, but without a budget (see also §3.3) this is difficult to achieve in practice.

On the question of how Dutch science exploits the international opportunities, it is also relevant to consider how the Netherlands performs in international research programmes and how we prepare for and participate in major research infrastructure. As regards research funding from the EU (such as Horizon 2020, which also covers innovation projects), the Netherlands receives more in grants (7%) than it contributes (5%).

⁷⁴ A good example was the coordination around the theme of 'open science' during the Dutch EU presidency in 2016, which allowed the actions of the civil-society organisations, such as research institutes and their umbrella organisations, and of the Dutch government to reinforce each other nationally and internationally. See e.g.: <https://www.eu2016.nl/kalender/2016/04/04/conferentie-open-science> and also: AWTI (2016), *Durven delen. Op weg naar een toegankelijke wetenschap*, Den Haag: AWTI, 2016. There was in fact also a KNAW committee in the past containing Dutch scientists who were active in various bodies connected with diplomacy, enabling efforts to be coordinated. KNAW is currently active at European level in relation to 'science for policy', see: www.knaw.nl/nl/internationaal

⁷⁵ For the IHE Delft Institute for Water Education, see: <https://www.un-ihe.org/about-ihe-delft> en voor het International Institute of Social Studies: <https://www.iss.nl/>

⁷⁶ See: <http://www.knaw.nl/nl/internationaal>

⁷⁷ See also: AWT (2012), *De Chinese handschoen - Hoe Chinese en Nederlandse kennis elkaar kunnen versterken*, Den Haag: AWT, February 2012.

Nonetheless, there is room for improvement: it emerged from our interviews that the Netherlands makes use of the official opportunities surrounding these research programmes, especially at political and lower civil service level, but that the presence at senior civil service level is weaker, especially compared with other countries. The Netherlands has also been less successful in the past in influencing the design of such programmes and calls via informal channels or through other organisations, although there appears to have been some improvement in recent years.⁷⁸ The budget for Dutch participation in major international research infrastructure is 40 million euros per year (not including CERN and ESA). The Ministry of Education, Culture and Science has delegated the choice of infrastructures in which the Netherlands participates to the special NWO committee, which produces a new roadmap every two years.

Conclusion

Broadly speaking, Dutch science performs well internationally, but this does demand continual maintenance and effort. That is essential to ensure that Dutch research institutes are able to (continue to) grasp opportunities even more effectively and not lose ground to countries that are currently making strong progress. The government, and especially the Ministry of Education, Culture and Science, can play a supporting role here by instilling greater focus in its international science policy (in terms of countries and themes), preferably in conjunction with talent and innovation, and translating this into targeted diplomatic support. Research institutes are recommended to act more in concert in their international activities. A useful tool here is the ‘branding’ of the Netherlands as a strong ‘knowledge country’. The Netherlands could also grasp more opportunities by exerting more targeted influence on EU research programmes and EU policy and through effective deployment of resources for major research infrastructure.

3.3 Technology, innovation and entrepreneurship

Collaboration in the fields of technology, innovation and entrepreneurship covers a wide area. On the one hand there is the ‘traditional’ R&D and development of technology as a source of innovation and export opportunities. Today, however, innovation in the form of developing new business models, creating and developing new markets and establishing new relationships is becoming increasingly important.

There is a clear link to general economic diplomacy, which focuses on promoting trade and attracting investment, aided by trade missions and networks such as the NBSOs (Netherlands Business Support Offices) and the NFIA (Netherlands Foreign Investment

⁷⁸ The founding and development of Neth-ER (see: www.neth-er.eu) has undoubtedly contributed to improving the effectiveness of the (combined) input of Dutch stakeholders in Brussels.

Agency).⁷⁹ Those concerned acknowledge that a more systematic approach of trade missions and economic diplomacy could improve their effectiveness.⁸⁰ With this in mind, a Steering Group for the promotion of international trade, innovation and investment has been established, chaired by a former senior civil servant at the Ministry of Economic Affairs, Chris Buijink.⁸¹ One point for attention here is that the role of science, technology and innovation is not currently properly aligned with economic diplomacy.

In addition to its general network for (economic) diplomacy, the Netherlands has a specific diplomatic network for international cooperation on technology and innovation, namely the innovation attachés (IAs). This network now has a presence in 14 countries, from which it is able to cover a total of 17 countries. Two of those countries are EU Member States (Germany and France),⁸² while the others are outside the EU. The IA network is part of the Netherlands Enterprise Agency (RVO), is managed remotely by the Ministry of Economic Affairs and employs 40 FTE. The IAs at the international missions are highly successful in establishing links between relevant Dutch and international parties. They adopt a local, demand-driven approach, in collaboration with the economic networks at the missions. As the support from the Dutch government in The Hague is limited to just a few FTE, it is not possible to provide a more structured, overarching guidance for the IA activities, which would also enable the role of 'STI for diplomacy' to be incorporated more fully. Although the IA network is paid for largely by the Ministry of Economic Affairs (and to a small extent by the Ministry of Foreign Affairs), the IAs also support science. More generally, the IAs regard it as a problem that, although internationalisation and innovation also affect other spending departments, they receive little or no support from those ministries.⁸³ In addition, the coordination between these departments is often less than optimal.

A further concern is that there is no longer a budget for *bilateral* cooperation on innovation.⁸⁴ More generally, the IAs have virtually no budget, forcing them to be creative. Yet it emerged from several interviews conducted in preparing this report that the lack of a budget (for bilateral projects or programmes) has in a number of cases damaged the position of the Netherlands in the competition with other countries.⁸⁵

⁷⁹ NBSO: www.nbso.nl; NFIA: <https://investinholland.com/>

⁸⁰ The criticism from bodies such as the employers' federation VNO-NCW is that the choice of countries is not always strategic and that (economic) missions are not properly embedded in a long-term plan.

⁸¹ See e.g.: Vaststelling van de begrotingsstaat van Buitenlandse Handel en Ontwikkelingssamenwerking (XVII) voor het jaar 2017, Kamerstukken II 2016–2017, 34 550 XVII, nr. 2 (MvT), p. 16.

⁸² In 2017 IAs will also be temporarily stationed in the United Kingdom and Sweden, and there will be an extra IA in Germany (Munich).

⁸³ This emerged among other things during the meeting with the IA network on 10 April 2017.

⁸⁴ Within the EU, the Netherlands makes use of the 'multilateral' EU funds for innovation cooperation, but beyond this there is no longer a (national) budget for bilateral innovation cooperation.

⁸⁵ See also: DTIB Stuurgroep internationale handels-, innovatie- en investeringsbevordering (2017), *Team Nederland: Samen sterker in de wereld – een actieplan voor banen en groei*, Den Haag, 2017.

In principle, the international cooperation on innovation aligns with the national Dutch policy based on a 'top sectors' approach. The top sectors have an international agenda, with the agenda of the top sector HTSM (High Tech Systems and Materials) being cited as an inspiring example.⁸⁶ This top sector has systematically drawn up priorities in terms of countries and themes for each country and targets its efforts accordingly. This clear agenda offers a good match for the IA and NFIA networks. In some top sectors, however, the international agenda is much less well developed, and there is also a lack of coordination between top sectors. Institutes for applied research also recognise the importance of internationalisation, and have formulated joint principles for this. In practice, however, each of them largely pursues its own course.⁸⁷

Another important topic is the need to attract (direct) foreign investment in R&D and innovation. According to the study carried out by Technopolis for this report, key factors for the establishment of R&D talent are the presence of relevant clusters, protection of intellectual property and the size of the market.⁸⁸ The NFIA provides worldwide support for efforts to bring direct foreign investments to the Netherlands. It has its own offices in 16 countries and operates in nine other countries through embassies or consulates-general. Investments in R&D account for a small share of the total (around 10% of all incoming projects). Moreover, attracting R&D investments takes relatively more effort, since a specific proposition is normally needed. To achieve greater success in attracting foreign R&D investment, it is therefore necessary to devote a portion of the NFIA activities specifically to R&D and to ensure that the necessary expertise for this is in place, in close collaboration with the IAs.⁸⁹

As well as the NFIA, several (innovative) regions and provincial development agencies are also active in attracting R&D investment, often for specific themes. These organisations have joined forces in the National Acquisition Platform, but ultimately the different regions and cities regularly compete with each other. Good coordination could improve their overall effectiveness. In addition, Technopolis notes the less than optimum match between these organisations focusing on acquisition and the top sectors and other STI organisations.

Finally, cooperation in relation to market creation, entrepreneurship and developing new business models is becoming increasingly important. Moreover, emerging countries such as China and India are producing what for the West are totally new business models,

⁸⁶ See: <http://www.hollandhightech.nl/nationaal/internationalisering/strategie>

⁸⁷ TO2-federatie (2014), *Strategisch Kader 2015-2018. Toegepast Onderzoek Organisaties leveren oplossingen*, Delft: May 2014, p. 33-34.

⁸⁸ Technopolis Group (2016), *R&D attraction networks - A report on stakeholder co-operation and STI diplomacy to attract investments in R&D*, Den Haag, 2016.

⁸⁹ Cf.: Brainport Eindhoven (2017), *Samen maken we de toekomst van Nederland. Brainport Nationale Actieagenda*, Eindhoven, 2013, p. 13.

whereas the diplomacy supporting STI collaboration is currently organised predominantly along the lines of technology and therefore does not always take full account of these new approaches and models. Here again, several regions are actively promoting themselves (e.g. Eindhoven as a city of design and engineering, Twente as a region for High Tech Systems and Materials). An attempt is being made to create an overarching national system through 'Startup Delta', which focuses on six points (and related performance indicators).⁹⁰ Startup Delta is a public-private partnership between the Ministry of Economic Affairs and other stakeholders. At national (policy) level, however, there is currently still no strategy for attracting such innovative entrepreneurs or businesses. There is also no vision or clear choice of precisely what the Netherlands can or should offer, for example which technologies or which challenges. The Netherlands could for example be promoted as an attractive testing ground or springboard for certain new forms of business activity, products or services, but this currently happens too little. The Netherlands is also not yet a magnet for venture capital in the way that some other innovative regions (e.g. Israel) are. This venture capital is very important for the continued growth of businesses and innovations. The stronger the Netherlands or its regions are in terms of talent and the development of innovative ideas and business, the more readily the Netherlands will be able to attract venture capital.

Conclusion

The Dutch government makes considerable diplomatic efforts in relation to technology and innovation. It has set up networks such as the innovation attachés and the NFIA. However, there is no structured approach. As with economic diplomacy, such an approach is useful for STI diplomacy, as the example of the top sector HTSM shows. Examples from other countries, based on maximum coordination between (top) sectors, also underline this. This means developing clear plans for each country (which sectors or themes, which goals, etc.) and linking these to the plans for economic diplomacy. The Dutch IA network is also smaller than that of some other relevant countries (see Chapter 2) and there is no budget for bilateral innovation cooperation. When it comes to attracting R&D investment, there is a need for a more integrated approach involving policymakers, research organisations and other stakeholders to allow more specific propositions to be developed for R&D investments, as well as to improve coordination or control across regions. A 'new' network of innovation centres in some innovative regions, comparable with swissnex in Switzerland, could also be useful, but entrepreneurship must also not be forgotten. Startup Delta is a good initiative, which needs to be given a place within STI diplomacy, for example by embedding it in a new strategy aimed at attracting such

⁹⁰ See: <https://www.startupdelta.org/>. The six points on which Startup Delta focuses are: 1) access to capital, 2) access to networks, 3) one hub, 4) access to markets, 5) access to talent and skills, access to knowledge and technology.

entrepreneurship. However, it is still important to view the Netherlands from the perspective of new, external business models; the IAs can play a key scouting role here. Finally, greater effort to brand the Netherlands as a centre of knowledge and innovation could help in all these areas, supported by better accessibility and visibility of Dutch results in the field of STI, for example by creating a central portal to access those results.⁹¹ At present, the Netherlands is still a country known mainly for its windmills, football, cheese and tulips.⁹²

⁹¹ As recommended earlier by AWTI in AWTI (2016), *Durven delen - Op weg naar een toegankelijke wetenschap*, Den Haag.
⁹² See e.g. AWI (2012), *De Chinese handschoen*, en AWTI (2015), *Collaborate to innovate*.

Conclusion and recommendations

4.1 Conclusion

Science, technology and innovation (STI) are becoming increasingly international. The Netherlands has traditionally held a strong position in science and innovation, and this provides an important foundation underpinning Dutch competitiveness. The national ambition of the Netherlands is to be in the world top five for competitiveness and its science to be world-class. This means maintaining a sharp focus in order to grasp as many international opportunities as possible in the fields of science, technology and innovation. It also means that the Netherlands cannot afford to lose any more ground to competing countries that are making major efforts in this regard. This importance is underlined by the societal challenges we face, such as climate change, energy supply,⁹³ health (care) and food. The government can support this by optimising the interaction between STI and diplomacy. There are two key aspects to this: 1) targeted STI collaboration with other countries to foster diplomatic relations, and 2) using diplomacy to support international STI collaboration.

A global battle is under way for talented people in research, innovation and entrepreneurship. International collaboration in science is also growing, and innovation is increasingly taking on a cross-border character. The same applies for entrepreneurship (start-ups, scale-ups etc.) and investments, including in R&D. Other countries that are comparable to the Netherlands have recognised this and are addressing the internationalisation of STI in a structured way. In recent years they have developed a strategy for this, which among other things involves creating focus and making choices in their international STI policy. They have translated this into specific plans for each focus country. They have also increased the capability and resources of their STI diplomacy. Examples include generous funds (United Kingdom), a concentrated presence in STI hotspots (Switzerland), or scholarships to attract top talent (Germany). These initiatives are producing results for these countries.⁹⁴ The Netherlands cannot afford to fall behind.

While the Netherlands has a good STI system and diplomatic network, the connectedness around STI is not optimal. There is no national steering or strategy. And although the coordination between the diplomatic networks is steadily improving, the different stakeholders such as research institutes, businesses and regions still frequently go their own way. As a result, the Dutch presence abroad is fragmented, which does little to boost its effectiveness. There is a great deal to be gained in this area. Partly in the light

⁹³ See e.g. the recent AWTI report (2016), *Oppakken en doorpakken. Durven kiezen voor energie-innovatie*, Den Haag: AWTI, 2016.

⁹⁴ These results are incorporated in Chapter 2 and Appendix 2; sources: the background studies and comparative *rankings*.

of the examples from other countries, we conclude that the Netherlands would benefit from developing a vision of internationalisation of STI and, derived from this, a plan for STI diplomacy. The government and several stakeholders appear to recognise this: a task force has for example been set up to explore a strategy for the internationalisation of higher education,⁹⁵ and a steering group has been installed to advise on a more structured approach for economic diplomacy.⁹⁶ In addition, the Royal Netherlands Academy of Arts and Sciences (KNAW) has set up a committee to look at the attractiveness of the Netherlands for top researchers.⁹⁷ This must not become stranded in mere plans, but must be translated into concrete actions. This should preferably be done with attention for the potential role of science, technology and innovation in supporting diplomatic relations. That would make Dutch STI diplomacy (even) more effective,

Finally, Dutch STI diplomacy is more limited than in the comparable countries studied, in terms of both budget and instruments (taking into account differences in the size of countries). If the Netherlands does not want to lose the competitive battle with these countries, it will be essential to deploy more resources and try out new instruments.

4.2 Recommendations

The Advisory Council for Science, Technology and Innovation (AWTI) stresses the importance of STI diplomacy and the need to develop and implement a vision for it. With this in mind AWTI presents the following recommendations to the Dutch government, and in particular the Ministers of Education, Culture and Science, of Economic Affairs and of Foreign Affairs, together with the Prime Minister:

Recommendation 1

Formulate a vision for the internationalisation of STI and promote the development of a plan for (the role of) STI diplomacy based on that vision

This vision is based on the interests of the Netherlands in the context of economic development, social challenges and essential key technologies. The government should decide on the countries with which the Netherlands should prioritise cooperation,

⁹⁵ Ministerie van Onderwijs, Cultuur en Wetenschap (2016), *Kamerbrief: De waarde(n) van de wereld – voortgangsbrieff over de internationale dimensie ho en mbo*, Den Haag, 2016, Kamerstukken II 2016-2017, 22 452, nr. 48.

⁹⁶ The DTIB Steering group on the promotion of international trade, innovation and investment published its final report in April 2017: *Team Nederland: Samen sterker in de wereld – een actieplan voor banen en groei*, Den Haag, 2017.

⁹⁷ The Talent Coalition Netherlands recently also called on the government and other parties to play their role and create clarity around attracting and retaining talent. The discussions and meetings attended in preparing this report also made clear that stakeholders would like more direction and clarity from the government.

Recommendation 2

Set up a steering group to oversee the development of a Dutch strategy for STI diplomacy with clear objectives

The government vision must be elaborated into a strategy for the internationalisation of STI and its supporting mechanism ('STI diplomacy'). This strategy incorporates clear goals and focuses as a minimum on the following topics:

- ▶ Attracting, developing and retaining talent;
- ▶ The necessary key technologies;
- ▶ The international innovative capacity of the Netherlands;
- ▶ The international role of Dutch science.

This strategy forms the much-needed foundation on which research institutes, regions, umbrella organisations and other stakeholders can build their approach.⁹⁸ The strategy could build on proven approaches in neighbouring countries such as Switzerland and Germany. It could also align with related domains, such as the strategy for economic diplomacy and the development cooperation policy, while the contribution of STI collaboration to bilateral and multilateral diplomatic relations could also be incorporated.

This strategy should be should be formulated by a steering group including the three Directors-General from the Ministry of Education, Culture and Science, the Ministry of Economic Affairs and the Ministry of Foreign Affairs, who receive a clear mandate for this from their ministers. The steering group also includes key representatives from business and society. This ensures that the steering group has sufficient authority to act and that it is supported by society as well.

Recommendation 3

Reserve an additional budget of 100 million euros per year

Looking at the available budgets abroad,⁹⁹ AWTI recommends that the government make available an additional 100 million euros per year for the development and implementation of the strategy (see Recommendation 4).

Recommendation 4

Elaborate the strategy into a multi-year plan for STI diplomacy and implement it

The strategy should be translated into a multi-year plan which is reviewed and improved every two years and which describes the deployment of available policy instruments and resources. The working up and implementation of the strategy will have to align with the

⁹⁸ This was apparent, for example, during a meeting on 1 February 2017 between the Buijink Steering Group and the stakeholders in Eindhoven.

⁹⁹ The current Dutch budget for the IA and NESO networks, bilateral research programmes (NWO and KNAW) and a study grants amounts to €4.47 per head of the population. The Netherlands spends considerably less than Germany (€11.36), the United Kingdom (€12.06) or Switzerland (€10.12) spend on diplomatic STI networks, (bilateral) networks, (bilateral) programmes and scholarships (AWTI calculation). The various amounts spent by the Netherlands and the comparison countries are analysed in Annex 4. Increasing the Dutch budget by 100 million euros would take the Dutch contribution to €10.35 per head of the population. See also Annex 4.

'workplace' to foster public-private partnership in implementing economic diplomacy. Where useful, science, technology, innovation and talent should be incorporated in state visits and other missions. This will give more cohesive direction to the promotion of the Netherlands as a centre of knowledge. In addition, the STI diplomacy strategy and plan will give stakeholders more clarity about the national priorities, mobilise them to translate the strategy for their own organisations and support the cohesion of stakeholder activities and therefore their effectiveness. These stakeholders include research institutes, the Association of Universities in the Netherlands (VSNU), the Netherlands Association of Universities of Applied Sciences (VH), top sectors, the Netherlands Organisation for Scientific Research (NWO), the Dutch Trade and Investment Board (DTIB), the regions, development agencies, Chambers of Commerce, Startup Delta, talent recruitment organisations, large companies, the SME sector and civil-society organisations active in international development, alongside networks such as the Netherlands Foreign Investment Agency (NFIA) and the Netherlands Educational Support Office (NESO).

To ensure that the multi-year plan for STI diplomacy is effective, at least the following five elements must be in place; this is where the additional investment of €100 million referred to in Recommendation 3 comes in:

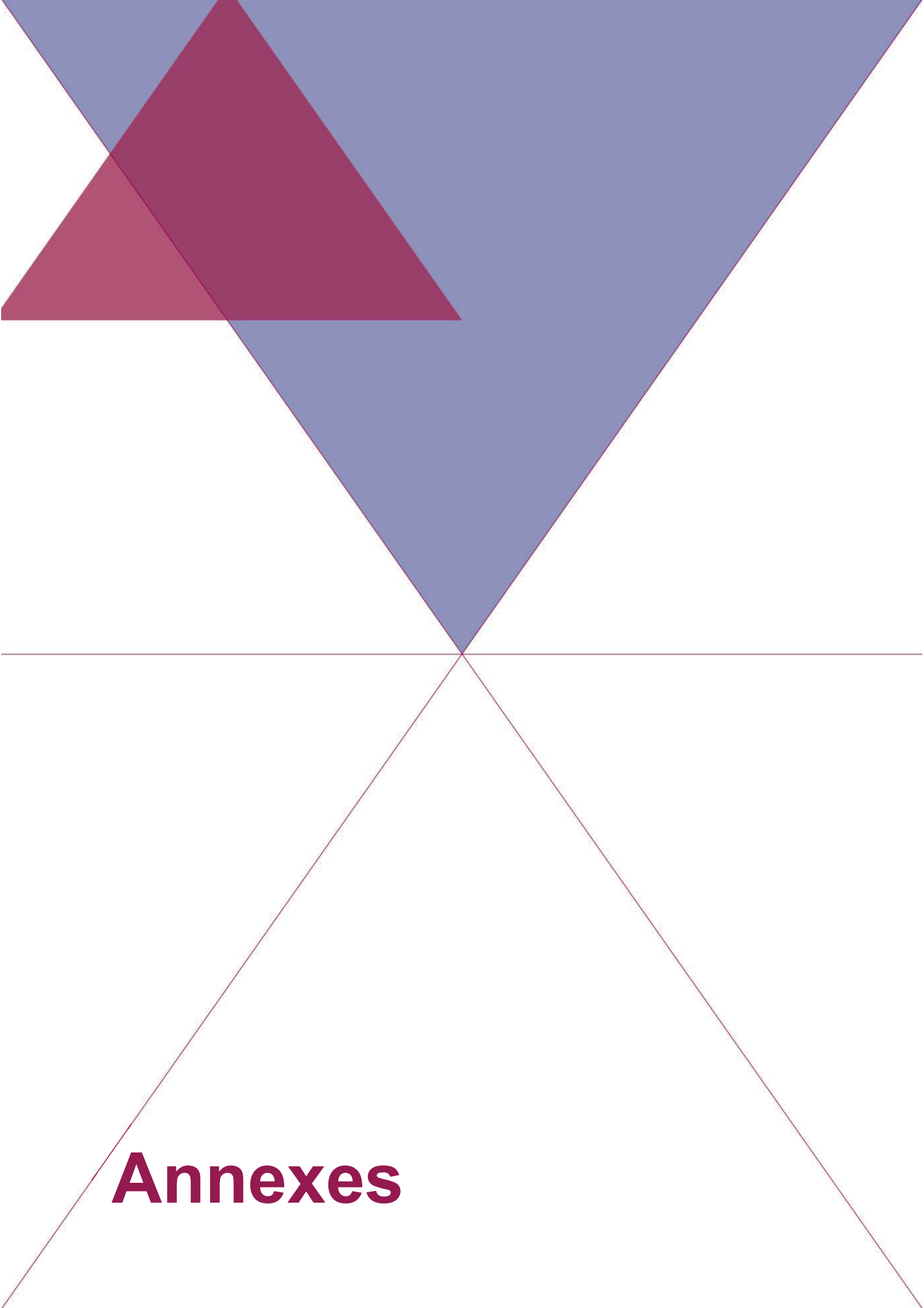
- ▶ Increase the presence abroad by:
 - strengthening the diplomatic network focusing on STI, among other things by doubling the capacity of the network of attachés for innovation, technology and science at existing and/or new locations;
 - developing knowledge and innovation centres in appropriate countries (by analogy with swissnex or the Danish Innovation Centres).
- ▶ Increase the strength of STI diplomacy by providing (partly new) specific instruments for international STI collaboration, such as:
 - budgets for bilateral cooperation on research and innovation;
 - (more) resources for specialist missions (both outgoing and incoming) focused on technology, innovation and science;
 - a more integrated approach involving government agencies, research institutes and other stakeholders to enable more specific propositions for R&D investments, as well as better coordination among regions;
 - more resources for market research, technology scouting, entrepreneurship and venturing abroad and for (help with) setting up and developing consortia of businesses and research institutes.
- ▶ Engage in the war for talent by translating the strategy developed for talent into a national programme for attracting and retaining talent, including:
 - pursuing an active policy to recruit international groups of knowledge workers, especially if they possess skills and competences that are scarce in the

- Netherlands. Ensure that good information is provided about which talent is needed, including information about future job and career opportunities, maintain a good knowledge worker regime, pursue an active alumnus policy and try to establish intelligent links between different regions (for example by offering work to spouses as well);
- making it easier for good students abroad to enter the Netherlands and providing an attractive climate to keep them here;
 - strengthening the public international network (NESO) to support international recruitment effectively;
 - making available substantial ('competitive') scholarships for a hundred top talents from abroad;
 - making available a number of substantial grants to attract top scientists and engineers from abroad (comparable with what Germany is doing, for example).
- Improve the ability to influence the EU's STI programmes by:
- reappointing an STI attaché in Brussels;
 - adequately protecting interests through sufficiently strong representation and standing shoulder to shoulder with Dutch businesses and research institutes.
- Develop a clear branding for the Netherlands as an international centre of knowledge and innovation, among other things by:
- developing a communication strategy and setting up a good communication network (information portals and an access portal for Dutch STI results), for example using the media (e.g. Radio Netherlands Worldwide) and by deploying scientific 'ambassadors';
 - encouraging Dutch universities and knowledge centres to adopt a joint positioning (Netherlands as a Centre of Top Science), profile (e.g. 'Netherlands University of Technology') and a more coordinated presence.

Adopted in The Hague, May 2017,

Professor U. Rosenthal, Chairman

J.J.G. Bovens, Secretary



Annexes

Annex 1 Request for advice



Ministerie van Economische Zaken

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Adviesraad voor Wetenschap, Technologie en Innovatie
T.a.v. de heer prof. dr. U. Rosenthal, voorzitter
Prins Willem-Alexanderhof 20
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Datum **13 MAART 2017**
Betreft Adviesaanvraag WTI-diplomatie

Geachte heer Rosenthal,

In het werkprogramma 2017 van de Adviesraad voor Wetenschap, Technologie en Innovatie (AWTI) is opgenomen dat de AWTI in 2017 een advies uitbrengt over wetenschaps-, technologie en Innovatie-diplomatie.

Een startnotitie voor het onderzoek is inmiddels in goede overeenstemming opgesteld met het bureau van de AWTI en de ministeries van Buitenlandse Zaken, Onderwijs, Cultuur en Wetenschap en Economische Zaken (zie bijlage).

Het Ministerie van Economische Zaken vraagt hierbij, mede namens het Ministerie van Buitenlandse Zaken en het Ministerie van Onderwijs, Cultuur en Wetenschap uw advies over wetenschaps-, technologie- en innovatiediplomatie, conform genoemde startnotitie.

Ik heb inmiddels begrepen dat u het advies nog in april 2017 kunt uitbrengen, in aansluiting op het advies van de Stuurgroep Handels- en Investeringsbevordering van de Dutch Trade and Investment Board, dat in maart wordt verwacht. Mijn collega's en ik waarderen deze inspanning zeer.

Met vriendelijke groet,


H.G.J. Kamp
Minister van Economische Zaken

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Annex 2 STI diplomacy abroad

Many countries, including those neighbouring the Netherlands, have made major strides in recent years in linking diplomacy to science, technology and innovation (STI). For our benchmarking we looked at the approach taken in Germany (§A2.1), France (§A2.2), Austria (§A2.3), the United Kingdom (§A2.4), Switzerland (§A2.5) and the EU (§A2.6). The findings for each country are set out below. We also refer to two background studies commissioned by AWTI for this report. Technopolis (2016) carried out an analysis of efforts to attract foreign R&D investments for Canada, Denmark, Germany, Ireland, Switzerland and the Netherlands,¹⁰⁰ while TNO (2017) provides a detailed description of STI diplomacy in the United Kingdom and Switzerland.¹⁰¹

A2.1 Germany

The German science and innovation system is fairly complex, partly as a result of the country's federal structure. For example, the federal states, or *Bundesländer*, are responsible for universities and universities of applied sciences, whereas the federal government invests directly in R&D by funding research organisations and non-university research institutes. The internationalisation of STI is also a topic where the federal government has taken the lead. In 2012 and 2017 the Federal Ministry of Education and Research (BMBF) developed an international strategy in collaboration with the Federal Foreign Office (*Auswärtiges Amt* – AA) and implementing bodies such as the German Academic Exchange Service (DAAD), the German Aerospace Centre (DLR), and the German Research Foundation (DFG).¹⁰² This strategy is an important guideline for everything connected with German knowledge diplomacy. The BMBF has overall control in consultation with the AA. The federal government regards STI diplomacy as an important topic, and refers to an *Außenwissenschaftspolitik*.

Germany's strategy incorporates five goals:

- ▶ Branding of Germany as a leading nation in science and innovation for improved collaboration with the world's best partners.
- ▶ Tapping into the innovation potential, principally through continued development of an international cluster policy.
- ▶ Strengthening the collaboration with developing and emerging countries.
- ▶ Finding answers to social challenges.
- ▶ Offering better perspectives to people and industry through education and training.

¹⁰⁰ Technopolis (2016), *R&D Attraction Networks*, Amsterdam, 2016.

¹⁰¹ TNO (2017), *Diplomatie voor Wetenschap, Technologie en Innovatie*, 2017.

¹⁰² BMBF (2017), *Internationalisierung von Bildung, Wissenschaft und Forschung. Strategie der Bundesregierung*, Bonn, 2017. Update of the strategy from 2013.

The German government believes that internationalisation of STI is essential to continue competing at international level and to be able to make an effective contribution to solving global social challenges. To achieve the envisaged strategic objectives, German international STI collaboration needs to be more effective (better collaboration procedures), more efficient (better networks) and more focused (excellence). Where possible, synergy is sought here. Monitoring progress is a point for attention in this regard. In collaboration with the OECD, UNESCO and the European Commission, a start has been made on building a system of indicators to enable a comparison of the extent, quality and functioning of the internationalisation of the (German) research and education landscape.

One important general development in Germany itself is that, since the economic crisis, the country has made a deliberate attempt to boost the public budget for R&D. In addition, the 'Excellence Initiative' (*Exzellenzinitiative*) has helped concentrate top scientific groups across a number of institutes throughout Germany, which in turn contributed to develop their quality level in international respect. This has led among other things to an increase in the number of top publications coming from Germany.¹⁰³ A similar focus on excellence can also be seen in the 'Leading Edge Cluster' policy (*Spitzencluster*).¹⁰⁴

There are also several organisations and substantial resources available for international STI collaboration. Firstly, there is the diplomatic network focusing on STI, with 78 STI attachés stationed at 34 embassies, 20 of them focusing specifically on science. An assessment framework is in place for expanding the network, which looks at the presence of aspects such as research infrastructure, research institutes, talent, market access, innovation potential and scope for marketing the German STI system. A long-term view is also taken by linking STI to development cooperation policy. To raise Germany's visibility and attract talent, the federal government also funds six Research and Innovation Centres (*Wissenschafts- und Innovationshäuser*) in Cairo, Sao Paulo, New Delhi, New York, Moscow and Tokyo.¹⁰⁵ A number of information portals have also been set up to support the diplomatic work.¹⁰⁶

Most German universities and universities of applied sciences have their own internationalisation agenda. To ensure a combined and more coordinated approach, there is the German Academic Exchange Service (DAAD), an umbrella organisation of German universities which has an autonomous role whilst at the same time having close

¹⁰³ OECD (2016), *STI Outlook 2016*, 2016, figure 3.18 p. 52.

¹⁰⁴ BMBF (2015), *Deutschlands Spitzencluster*, Bonn 2015.

¹⁰⁵ <https://www.germaninnovation.info/>

¹⁰⁶ Germany – land of ideas (innovation/business); www.euraxess.de (researchers); Research in Germany and Kooperation International (science).

(financial) ties with government ministries. The organisation has a long history; it was founded in 1925 with the aim of using science to lift Germany out of the isolation that followed from losing the First World War – a task which continued after the Second World War. DAAD works to achieve the following goals:

- ▶ Stipends for the best talents (incoming and outgoing);
- ▶ Strong international structures;
- ▶ Gathering knowledge to facilitate better academic cooperation.¹⁰⁷

The aim is to put Germany in the top five most attractive countries for foreign students and researchers and to ensure that at least half of German students gain experience abroad. DAAD maintains a global network of around 15 regional offices and 56 information centres in 60 countries. It has an annual budget of 500 million euros.

Organisations such as DFG and the Alexander von Humboldt Foundation (AvH) also have their own international networks. AvH has 52 liaison scientists and research institutes in 40 countries. As an institute it strives to attract renowned researchers to Germany through a system of scholarships and prizes. Especially well known is the scholarship programme 'AvH-Professur' for attracting international top researchers, for whom an amount of between 3.5 and 5 million euros is available over a five-year period. This enables universities and research institutes to provide constant new input for their research programmes without this adversely affecting the basic infrastructure of universities in particular.¹⁰⁸ In addition, AvH has an extensive alumnus programme through which it maintains permanent contact with the researchers it has funded.

Germany believes that, based on its economic, technological and scientific importance, it plays a special role in the development of an internationally operating European research area aimed at excellence. A solid, well-connected research infrastructure is part of this. The BMBF published its first national roadmap in early 2016.¹⁰⁹ The federal government has set aside €1.1 billion (2014) to finance large-scale infrastructure.¹¹⁰ The substantial role played by Germany is also apparent from its contributions to international and European research organisations (such as CERN, ESO, ESRF, EMBL, etc.), which generally amount to 20-25% of the total.¹¹¹

Finally, the BMBF believes it is important that the good cooperation between businesses and research institutes established in Germany should also continue at international level.

¹⁰⁷ DAAD (2015), *Jahresbericht 2015*, 2015 and www.daad.de

¹⁰⁸ AWTI (2012), *Vasthoudend innoveren*, 2012.

¹⁰⁹ BMBF (2016), *Der Nationale Roadmap-Prozess*, 2016.

¹¹⁰ BMBF (2015), *The German Research Landscape*, 2015.

¹¹¹ https://www.bundeshaushalt-info.de/fileadmin/de.bundeshaushalt/content_de/dokumente/2016/soll/epl30.pdf

A2.2 France

France has the geographically most widespread STI network world, even ahead of the United States and China.¹¹² The French Foreign Ministry (MAE) has around 350 agents active in the STI domain in addition to some 500 local staff members. A hundred diplomats are concerned with universities and scientific cooperation.¹¹³ France thus scores exceptionally well in the ‘Soft Power [top] 30’ on ‘engagement’, a measure of a country’s diplomatic effort.¹¹⁴ The choice of location and the thematic focus (e.g. archaeology) are often historically determined.

In 2013, France made a start on repositioning its international STI policy. France sees itself as a knowledge economy: the country is the world number five in terms of spending and number six in terms of number of publications. Being attractive as a knowledge economy is crucial, but the competition is also strong; diplomacy is vital in helping ensure success here. France has had an international STI strategy since 2013: *Une diplomatie scientifique pour la France*.¹¹⁵ The French Foreign Ministry (MAE) works together on this initiative with the Ministry of Higher Education and Research (MESR) and the Ministry of Education (MEN), with MAE taking the lead.

The focus of the international STI policy is as follows:

- ▶ To ensure good positioning of French scientists, research and businesses abroad;
- ▶ To encourage mobility of French students and researchers (bilateral programmes);
- ▶ To attract major research infrastructure (exposure, strengthening of own science and economy, acting as a magnet to attract top talent);
- ▶ To contribute to resolving major social challenges. France focuses internationally on a number of themes through the ‘Alliances’ promoting scientific excellence at international level based around a social theme: ANCRE (energy), AVIESAN (life sciences), ALLENI (environmental issues);¹¹⁶
- ▶ Strong representation in organisations such as the OECD, UNESCO and especially the EU in order to influence international STI developments;
- ▶ Knowledge diplomacy is also linked to development cooperation. Strengthening the knowledge infrastructure and capacity is important, especially in the life sciences and agriculture.

The fleshing out of the international STI strategy is still in full swing. Thematically, France has opted for a number of social challenges and is targeting the themes that stem from

¹¹² Ruffini, P. (2016), *La diplomatie scientifique, nouvelle dimension des relations internationales?* In *Campus France: Repères*, Paris, 2016.

¹¹³ MAE, MEN, MESR (2014), *La coordination de l'action internationale en matière d'enseignement supérieur et de recherche*, 2014.

¹¹⁴ Portland (2016), *The soft power 30 – a global ranking of soft power*, London, 2016.

¹¹⁵ Ministère des Affaires Étrangères (MAE, 2013), *Une diplomatie scientifique pour la France*, 2013.

¹¹⁶ MAE, MEN, MESR (2014), *La coordination de l'action internationale en matière d'enseignement supérieur et de recherche*, 2014.

the Alliances approach. The recommendation is to improve the definition of priorities, goals, countries and campaigns in an international strategy and to link this to the national strategy and European policy.¹¹⁷

A2.3 Austria

Austria began setting up a revamped international STI policy in 2013, including attention for STI diplomacy. The coordination needed to be improved. A working group (*Arbeitsgruppe*) containing representatives from the relevant ministries of Economic Affairs, Infrastructure, Foreign Affairs and Education & Science, as well as the STI umbrella organisations, set to work on this. They produced the following findings.¹¹⁸

The internationalisation of STI has many goals and actors, making it difficult to identify uniform criteria. Nonetheless, the following goals can be distinguished:

- ▶ Finding new markets;
- ▶ Optimisation of (natural) resources;
- ▶ Scientific excellence;
- ▶ Contributing to the grand challenges;
- ▶ STI diplomacy that is more fit for purpose.

‘Europe’ is not included here, because the Austrian government has a separate European STI strategy: *‘Der Weg zum Innovation Leader’* (‘Pathway to Innovation Leadership’).

In deciding whether or not to engage in international cooperation, reference is made to the criteria put forward by the EU in its 2012 strategy (see §A2.6 below). The cooperation will be restricted to a number of ‘priority countries’. To qualify as a priority country, at least three of the above five goals must be present. Qualitative criteria are also applied, such as political stability and good governance. Finally, cooperation with third countries must not be a ‘one-way street’, but must bring mutual benefits.

Ultimately, the proposal is for three groups of priority countries:

- ▶ United States, China and Russia: science and innovation offices must be set up or developed further in these countries, and IAs must also be present in these countries;
- ▶ South Korea, Brazil, Japan, South Africa, Israel, Canada, Turkey, Singapore and Australia;
- ▶ Mexico, Saudi Arabia, Indonesia, Vietnam, Chile, Argentina.

¹¹⁷ MAE, MEN, MESR (2014), *La coordination de l'action internationale en matière d'enseignement supérieur et de recherche*, 2014.

¹¹⁸ Österreichisches Institut für Internationale Politik (OiiP, 2014), *Koordinations- und Kooperationsstrukturen für die Internationalisierung österreichischer Forschung, Wissenschaft und Technologie (EU-Drittstaaten) – Zukunftsräume der internationalen FTI-Kooperation*, Wien, 2014 en Arbeitsgruppe der FTI-Task-Force der Bundesregierung (2013), *Beyond Europe – die internationalisierung Österreichs in Forschung, Technologie und Innovation über Europa hinaus*, Wien, 2013.

Specific instruments that could be used include setting up Joint Labs and Joint Calls, forging more bilateral cooperation agreements, tackling obstacles in relation to visas and migration, setting up exchange programmes, seeking cooperation with the international activities of the EU, and building up an alumnus network.

Specific attention is also focused on the need to share and gain knowledge. It is key that structural country analyses are performed and that global STI trends and national activities for STI diplomacy are monitored. This can be achieved by organising regular roundtables on STI diplomacy with STI stakeholders and by setting up science and innovation centres in priority countries.

A2.4 United Kingdom

The Dutch research organisation TNO (2017) conducted a detailed study of STI diplomacy in the United Kingdom for AWTI;¹¹⁹ the findings are briefly summarised below.

In 2014 the then ministry with responsibility for economic affairs (Department for Business, Innovation & Skills) published a strategy entitled 'Our plan for growth: science and innovation' as part of an overarching economic strategy ('The plan for growth') from 2011. The ambition is "to establish the UK as a world-leading knowledge economy", based on the following six key elements:

- ▶ Deciding priorities (in terms of sectors/technologies);
- ▶ Nurturing scientific talent;
- ▶ Investing in scientific infrastructure (GBP 5.9 billion extra for science);
- ▶ Supporting research excellence;
- ▶ Catalysing innovation (*Catapult Centres*);
- ▶ Participating in global science and innovation.

A key instrument in this context is the diplomatic UK Science and Innovation Network (SIN), the British equivalent of the Dutch innovation attachés. The SIN has a presence at 90 locations in 30 countries. The overarching UK Industrial Strategy is translated into a focus on sectors and/or technologies for the different countries. That in turn is translated into specific (business) plans per country.

Another key instrument is the Newton Fund, which was set up in 2014. The primary aim of this fund is to promote sustainable economic growth and social development in 16 partner countries by strengthening their STI capacity and, second, to use this to lay a basis for structural STI cooperation between those countries and the United Kingdom.

¹¹⁹ For a detailed discussion of the UK, see: TNO (2017), *Diplomatie voor Wetenschap, Technologie en Innovatie. Een AWTI-achtergrondstudie naar de organisatie en resultaten van WTI-diplomatie in het Verenigd Koninkrijk en Zwitserland*, see: www.awti.nl

The annual budget was originally GBP 75 million, but this has since been increased to GBP 150 million.

Another fund was set up in 2015, the Global Challenges Research Fund, with a budget of GBP 1.5 billion over five years. Its goals are (i) to stimulate cutting-edge research that generates solutions for social challenges faced by developing countries; and (ii) to strengthen research and innovation capacity in the United Kingdom and developing countries.

UK Trade & Investment is the organisation responsible for fostering exports, promoting the UK abroad and attracting inward investment. It has 2,200 staff worldwide and focuses among other things on attracting businesses, investments and students. To accelerate innovation, including attracting foreign partners, the United Kingdom has a network of public-private Catapult Centres. These centres focus on 11 themes with the aim of linking businesses to universities and research institutes. The United Kingdom has proved to be more successful than the Netherlands in attracting foreign investment.¹²⁰

The not-for-profit British Council also plays a role in STI diplomacy. This organisation focuses among other things on international scientific, technological or educational cooperation and is a significant factor in British soft power diplomacy. It is active in 100 countries and has a total annual budget of GBP 980 million.

In addition a number of institutions, such as universities, are active internationally. The United Kingdom is home to some of the world's top universities, which act as a magnet for (top) talent. Accordingly, the United Kingdom takes third place in the INSEAD rankings based on the Global Talent Competitiveness Index. The academic and science system (research and education) therefore constitutes a successful 'export' for the United Kingdom.

A2.5 Switzerland

TNO (2017) carried out a detailed study for AWTI on the STI diplomacy of Switzerland;¹²¹ the findings are briefly summarised below.

For a small country, Switzerland does quite a lot in terms of STI diplomacy. Responsibility for 'knowledge diplomacy' is shared between the ministry of Economic Affairs, Education and Research and the Foreign ministry. There is a federal international strategy for education, research and innovation. Switzerland seeks to promote itself to the outside world as a country of knowledge and innovation and to participate on the basis of its top

¹²⁰ Figure 3.8 from TNO (2017), *Diplomatie voor Wetenschap, Technologie en Innovatie*, 2017.

¹²¹ For a detailed discussion of Switzerland, see: TNO (2017), *Diplomatie voor Wetenschap, Technologie en Innovatie. Een AWTI-achtergrondstudie naar de organisatie en resultaten van WTI-diplomatie in het Verenigd Koninkrijk en Zwitserland*, see: www.awti.nl

ranking position in international networks so as to maintain its position as one of the most innovative countries in the world. This strategy has been translated into three priorities and derived objectives, including creating a top research infrastructure and first-rate research institutes by which they can attract talent and businesses from abroad. But it also includes establishing Swiss higher education and vocational training programmes as an export product.

Science is also highly international in Switzerland: 45% of professors, 30% of students and 50% of Ph.D. students are non-Swiss. Switzerland is a big draw for talent, not just scientists, but also knowledge workers, and tops the rankings in the INSEAD Global Talent Competitiveness Index.¹²² The country is home to several top universities (such as ETH Zürich and EPF Lausanne).

As regards bilateral cooperation in science, technology and innovation, Switzerland has subdivided countries into categories based on an assessment framework. This has produced a number of 'focus countries'. Switzerland has set up 'leading houses' for (scientific) cooperation with these focus countries; this means that there is always one (designated) university which takes the lead in the cooperation with a given country. This creates a clear point of contact for the government and streamlines the international contacts. By 'distributing' countries among universities, each relevant university is able to play a role.

Switzerland has a number of complementary networks for STI diplomacy. Since the 1950s, Switzerland has had its own (diplomatic) network of innovation attachés: there are currently 29 of them in 19 countries. In addition there is the recent creation of 'swissnex', a public-private partnership between the relevant ministry, research institutes and the business community which is active in six strong STI regions (including Boston, San Francisco and Shanghai). Swissnex employs a total of 50 staff. It is internationally regarded as a highly successful instrument and undoubtedly helps strengthen Switzerland's image as a country of innovation and high-grade knowledge. For promoting trade and attracting inward investment, there is a national organisation, Swiss Global Enterprise (turnover CHF 40 million), with 21 Swiss Business Hubs worldwide, which works with the cantonal or regional organisations for that purpose. Coordination between the national Swiss Global Enterprise organisation, which engages in promotion abroad, and the cantons, which have domestic responsibility for attracting investment, is far from ideal. Partly because of this, Switzerland scores below the United Kingdom and the Netherlands on attracting foreign investment in general, but its strong position as a centre

¹²² INSEAD (2016), *The Global Talent Competitiveness Index 2017*, Fontainebleau, France.

of knowledge means this effect is less apparent in R&D investments; for example, Google chose Switzerland as its European base.¹²³

In addition, like Germany, Switzerland sees development cooperation as a key component in its knowledge diplomacy. There is a strong focus on North-South research cooperation for development.¹²⁴

A2.6 European Union (EU)

The decision to treat the EU as a ‘country’ requires some explanation. As a multilateral organisation, the European Union has a strong, independent ‘internal’ STI policy, with the Horizon 2020 framework programme as the chief example. At the same time, Carlos Moedas, the EU Commissioner for research, innovation and science, is a strong advocate of an ‘external’ STI policy, i.e. a policy focused on the world outside the EU. This is part of his agenda for ‘science – open to the world’.¹²⁵ STI diplomacy is an important component of this. This report is concerned with this ‘external policy’. In common with Germany and France, for example, the European Commission has begun a process of developing, fleshing out and implementing a strategy.

The European Commission has in the first place set three goals in its strategy:

- ▶ A strong focus on establishing European research as a global brand for excellence;
- ▶ Contributing to meeting social challenges, to peace and to progress;
- ▶ Engaging in diplomatic relations and contributing to the restoration of trust and understanding where traditional diplomacy is not (yet) an option.¹²⁶

Secondly, the Commission has defined a number of assessment criteria for deciding on whether or not to engage in international cooperation:

- ▶ The research and innovation capacity, including investment, output (publications, patents, citations, licensing), human resources and infrastructure;
- ▶ The risks of and opportunities for access to existing, new or emerging markets, and their impact on the Union's competitiveness;
- ▶ The contribution to the Union's international commitments, as reflected in the Millennium Development Goals, the post-2015 development framework, Rio+20, G20 and the international objectives of sectoral policies; and,

¹²³ See TNO (2017), *Diplomatie voor Wetenschap, Technologie en Innovatie. Een AWTI-achtergrondstudie naar de organisatie en resultaten van WTI-diplomatie in het Verenigd Koninkrijk en Zwitserland*, and Technopolis (2016), *R&D Attraction Networks*.

¹²⁴ Science & Diplomacy, *Swiss Science diplomacy* via <http://www.sciencediplomacy.org/perspective/2014/swiss-science-diplomacy> en <http://www.swissnex.org/>

¹²⁵ European Commission (2016), *Open innovation, open science, open to the world – a vision for Europe*, Brussels, 2016 or European Commission (2017), *Europe's future: open innovation, open science, open to the world – reflections of the RISE Group*, Luxembourg; Publications Office of the European Union, 2017.

¹²⁶ European Commission (2012), *Intensivering en betere concentratie van internationale samenwerking op het gebied van onderzoek en innovatie; een strategische benadering*, 2012, and C. Moedas (2016), *Science Diplomacy in the European Union*, in: *Science & Diplomacy*, 2016 via <http://www.sciencediplomacy.org/perspective/2016/science-diplomacy-in-european-union>

- ▶ The legal and administrative frameworks in place, among the international partners, and where appropriate the Member States, to engage in cooperation, also including lessons learnt from previous cooperation. The Commission adds to this that the choice of target countries also needs to be based on a qualitative assessment and appraisal using extra foresighting analyses.

Finally, the strategy makes a first choice of partner countries and regions. To do this, it distinguishes between the following country groups:

- ▶ The EFTA countries,¹²⁷ candidate Member States of the EU and the Neighbourhood countries. The emphasis for these countries is on promoting cooperation within Horizon 2020.
- ▶ Industrialised countries and emerging economies. The aim for this group is to increase the competitiveness of the Union and to join forces in tackling global issues. The factor ‘innovation’ also needs to be strengthened.
- ▶ Developing countries. The focus here is on supplementing the external policy aimed primarily at sustainable development and key issues such as a green economy and public health.

A number of aspects stand out in the detailed plans for this strategy, which are published every two years:¹²⁸

- ▶ An increasing openness to participation by third countries in the Horizon 2020 programme as well as in the Knowledge Innovation Communities (KICs) and European Institutes of Innovation & Technology (EITs).¹²⁹
- ▶ The role of the EU as a stakeholder or supporter of a number of international and multilateral initiatives such as IPPC (climate), Global Earth Observation System of Systems (GEOSS), or the Group on Earth Observation (GEO).
- ▶ The use of STI policy to strengthen international relations (soft power) and drawing attention to STI in the dialogue with international partners. Within the G8 and G20, the EU and Japan lead the STI agenda. The European Commission is also closely involved in setting up SESAME research facilities in the Middle East, in which scientists from Iran, Palestine regions, Israel, Pakistan, Bahrein, Egypt, Jordan and Turkey collaborate.¹³⁰
- ▶ Linking development cooperation to STI has led to the earmarking of €35 million within the European Development Fund for ‘Knowledge for Development’.

¹²⁷ The European Free Trade Area (EFTA) is a trade partnership between Liechtenstein, Norway, Iceland and Switzerland.

¹²⁸ European Commission, *Report on the implementation of the strategy for international cooperation in research and innovation*, 2014, and European Commission, *Implementation of the strategy for international cooperation in research and innovation*, 2016.

¹²⁹ It is however notable that the involvement of non-Member States appears to be declining. Compared with FP7, international cooperation has fallen from 4.7% to 2.4%. This fall can be partly explained by a change in the funding rules for Brazil, Russia, India, China and Mexico, by recent conflicts and socio-political developments around the EU, and the fact that Ukraine is associated with the Horizon 2020 programme, whereas that was not the case in the seventh Framework Programme.

¹³⁰ <http://www.sesame.org.jo/sesame/about-us/what-is-sesame.html>

- ▶ The follow-up of the country selection consists in a further analysis to decide on the countries with which bilateral cooperation is initiated and on which specific themes. For New Zealand, for example, the themes are health and food security; for Ukraine they are ICT, new materials, transport and biotechnology. An example of collaboration with several countries in a region are the Gulf states, where the focus is on the themes security of energy supply, water, climate and ICT.
- ▶ A key aspect in the detailing of policy is also the monitoring and expansion of 'common principles' in an international context, on issues such as responsible research, research integrity, evaluation indicators, gender issues and intellectual property rights.

Finally, a group of experts appointed by the European Commission advises the deployment of three tools (strategic, operational and supportive) for the adequate design and implementation of STI diplomacy.¹³¹ First, a vision is needed focusing on what the government wishes to achieve (strategic tool). This needs to be followed by good coordination and cooperation between the various stakeholder departments. Setting up an advisory council/steering group to advise the government could be useful here. STI attachés should be posted in embassies and sufficient resources must be invested in initiatives such as scholarship programmes to attract talent and science & innovation houses (operational tools). Finally, organising specific training programmes and conferences could improve the understanding of STI diplomacy (support tools).

¹³¹ European Commission (2017), *Europe's future: open innovation, open science, open to the world – reflections of the RISE Group*, Luxembourg: Publications Office of the European Union, March 2017.

Annex 3 Dutch STI Diplomacy Networks

Table 1 The presence of the various Dutch STI diplomacy networks in the relevant countries

Country	NESO	IA	NFIA
Brazil	√	√	√
Canada		(√)	√
China	√	√	√
European Union		√	
France		√	*
Germany		√	*
India	√	√	√
Indonesia	√		*
Israel		√	√
Japan		√	√
Malaysia		(√)	√
Mexico	√		*
Russia	√	√	*
Singapore		√	√
South Africa	√		√
South Korea	√	√	√
Spain			*
Sweden		2017	*
Switzerland		(√)	*
Taiwan		√	√
Thailand	√		√
Turkey	√	√	√
United Arab Emirates			√
United Kingdom		2017	√
United States		√	√
Vietnam	√		*

Commentary

√ = present in the country concerned

(√) = Switzerland, Canada and Malaysia are being served from the IA office in respectively Germany, United State and Singapore

* = In these countries, NFIA does not have their own office, but the NFIA staff works from the embassy or consulate-general

Annex 4 Comparison of Budgets

How much does each country spend on STI diplomacy? That turned out not to be easy to determine as budget proposals of ministries and other relevant organisations are not always clear in this respect. However, based upon government budgets and annual financial reports we could achieve a rough estimate. For that, we took into account the amounts spent for (bilateral) programmes, grants and scholarships for research and study as well as the budgets for the diplomatic networks that support the internationalisation of STI. In this overview of the national expenditure for STI diplomacy we excluded the investments in European and (other) international research infrastructure as well as the spending on the Erasmus programme. The three countries we compare the Netherlands to are the United Kingdom, Germany and Switzerland. For these countries we found most (reliable) data. Moreover, these countries are considered front runners in the areas of both competitiveness and STI, which makes them a useful benchmark for the Netherlands and examples it may want to emulate. It is important to note that the figures listed below must be seen as an estimate of the order of magnitude of the total budget.

Duitsland

Budget for STI diplomacy (annual amounts in million EUR)	total	excluding	netto	source
BMBF	802		546	1
international cooperation				
int. research infrastructure		256		2
DAAD	471		276	3
contribution of BMBF		110		3
Erasmus programme		85		3
A. von Humboldt	98		98	4
Total			920	
Per capita			€ 11,36	

Sources:

1. BMBF (2017), *Internationalisierung von Bildung, Wissenschaft und Forschung*, Bonn, 2017, p 9.
2. BMBF, *Bundeshaushalt 2016*, 2016, p 48
3. DAAD, *Jahresbericht 2015*, 2015, p 16 en 102
4. Alexander von Humboldt Stiftung, *Jahresbericht 2015*, 2016

United Kingdom

Budget for STI diplomacy (annual amounts in million EUR)	subtotal	total	source
Science and innovation network		15	5
Newton Fund (average 2014-2021)		110	5
Global Challenges Research Fund		297	5
British Council		350	6
Education	262		6
STI cooperation	88		6
Total		772	
Per capita		€ 12,06	

Sources:

5. TNO (2017), *Diplomatie voor Wetenschap, Technologie en Innovatie. Een AWTI-achtergrondstudie naar de organisatie en resultaten van WTI-diplomatie in het Verenigd Koninkrijk en Zwitserland*, Den Haag, 2017.

6. British Council (2016), *Annual report and accounts 2015-2016*, London, 2016, p 55.

Switzerland

Budget for STI diplomacy (annual amounts in million EUR)	total	source
Network of innovation attachés	6	5
Swissnex	9	5
Swisscore	1	5
Bilateral research programmes	37	5
Other (grant/scholarship) programmes SBF	30	7
Total	83	
Per capita	€ 10,12	

Sources:

5. TNO (2017), *Diplomatie voor Wetenschap, Technologie en Innovatie. Een AWTI-achtergrondstudie naar de organisatie en resultaten van WTI-diplomatie in het Verenigd Koninkrijk en Zwitserland*, Den Haag, 2017

7. SBF (2012), *Bundesbeschluss über Kredite für die internationale Zusammenarbeit in Bildung, Forschung, und Innovation für die Jahre 2013-2016*, Bern, 2012.

The Netherlands

Budget for STI diplomacy (annual amounts in million EUR)	total	source
Network of innovation attachés	6	8
NESO/Nuffic	20	9
network	5	9
scholarships	15	9
NWO – internationalisation	46	10
KNAW – international programmes	4	11
Total	76	
Per capita	€ 4,47	

Sources

8. Our communications with the IA-network.
9. EP Nuffic, *Jaarverslag 2015*, 2016.
10. NWO (2016), *NWO-jaarverslag 2015*, p. 56.
11. KNAW (2016), *Jaarverslag 2015*, p. 110.

The NWO budget for internationalisation consists of the following categories:

Category	Budget (2016) in million EUR
Joint Programming Initiatives (EU)	20,0
Contribution for Sustainable Development Goals	16,5
Collaboration with China	3,0
Collaboration with India	1,5
Collaboration with Brazil	1,5
Collaboration with Japan	0,4
Internationalisation Earth and Life Sciences	1,0
Cooperation with A. von Humboldt	0,4
Other (travel grants, visitors' grants, etc.)	1,6
Total	45,9

Source:

12. Own analysis of the NWO instruments to finance research.

Annex 5 List of Interviewees

▶ Sebastiaan den Bak	NWO
▶ Linda van Beek	VNO-NCW
▶ Erik Beerkens	Leiden University
▶ David Bekkers	Embassy of the Netherlands in China
▶ Dirk Jan van den Berg	Sanquin and EIT
▶ Jan van den Biesen	Philips and Business Europe
▶ Peter van der Bloemen	Ministry of Foreign Affairs
▶ Martijn de Boer	Metropoolregio Amsterdam
▶ Berry Bonenkamp	NWO
▶ Cindy van den Boom	Ministry of Foreign Affairs
▶ Michiel Boots	Ministry of General Affairs
▶ Jaap Broersen	Ministry of Economic Affairs
▶ Mariëlle Brouwer	Neth-ER
▶ Piet Brouwer	Freie Universität Berlin
▶ Chris Buijink	NVB and DTIB-steering group
▶ Catherine Chiong Meza	Rathenau Institute
▶ Richard Derksen	Ministry of Education, Culture and Science
▶ Karl Dittrich	VSNU
▶ Wim van den Doel	NWO
▶ Han Dommers	Nuffic
▶ Hanneke van Doorn	KNAW
▶ Erik Drop	TNO
▶ Wouter Feldberg	VSNU
▶ Louise Fresco	Wageningen University & Research
▶ Ferdi Geleijnse	Ministry of Education, Culture and Science
▶ Bernard de Geus	TTI Groene Genetica
▶ Joop Gilliamse	Embassy of the Netherlands in Germany
▶ Thomas Grosfeld	VNO-NCW
▶ Joyeeta Gupta	Advisory Council on International Affairs
▶ Denise Heiligers	Ministry of Education, Culture and Science
▶ Hans de Jonge	Ministry of Economic Affairs
▶ Margrethe Jonkman	Friesland Campina
▶ Anders Karlsson	RELX Group
▶ Michiel Kolman	RELX Group

▶ Fried Kramer	Neth-ER
▶ Jorrit Kuipers	Green Dino
▶ Luk van Langenhove	Free University Brussels and UN University
▶ Erik van de Linde	KNAW
▶ Didier Manjoero	Municipality of Amsterdam
▶ Celso Meiller	The Hague University of Applied Sciences
▶ Jan Mengelers	VSNU
▶ Peter Mulder	Ministry of Education, Culture and Science
▶ Jelle Nijdam	Embassy of the Netherlands in India
▶ Henriette van Notten	Startup Delta
▶ Constantijn van Oranje	Startup Delta
▶ Tiemo Oostenbrink	Advisory Council on International Affairs
▶ Javier Pella	Embassy of Peru in the Netherlands
▶ Christiaan Rebergen	Ministry of Foreign Affairs
▶ Jeannette Ridder	Ministry of Education, Culture and Science
▶ Jurgen Rienks	VSNU
▶ Wouter Roelofs	Consulate of the Netherlands in San Francisco
▶ Juri Roerink	Ministry of Economic Affairs
▶ Lukas Roffel	Thales
▶ Jos Rokx	Ministry of Education, Culture and Science
▶ Huub Ruel	Hotelschool Den Haag
▶ Daan de Ruiter	Ministry of Education, Culture and Science
▶ Wim van Saarloos	KNAW
▶ Bart Sattler	RVO (IA network)
▶ Robert Jan Smits	European Commission
▶ Luc Soete	Maastricht University
▶ Albert van der Steen	TNO
▶ Tim Stok	RELX Group
▶ Carel Stolker	Leiden University
▶ Peter van Terwisga	Damen Shipyards
▶ Robert Thijssen	RVO (IA Network)
▶ Naomie Verstraeten	Brainport Development
▶ Joris Voorhoeve	Advisory Council on International Affairs
▶ Rob de Vos	Ministry of Foreign Affairs
▶ Freddy Weima	Nuffic
▶ Jasper Wesseling	Ministry of Economic Affairs

Round table discussion at RVO on 21 November 2016

- | | |
|--------------------|---|
| ▶ Christien Dohmen | RVO – ‘Internationaal Ondernemen’ |
| ▶ Roy Paulissen | NFIA – HTSM liaison |
| ▶ Bart Sattler | RVO – Coordinator IA network |
| ▶ Jan Reint Smit | RVO – Manager EU/H2020 |
| ▶ Gert Stiekema | RVO – Coordinator Agricultural Attachés |

Round table discussion with innovation attachés (IA network) on 10 April 2017

- | | |
|--------------------------|----------------------------------|
| ▶ Susan van Boxtel | IA Network - Singapore |
| ▶ Jan Hein Chrisstoffels | IA Network - Japan |
| ▶ Tutku Colak | IA Network - Turkey |
| ▶ Pauline Döll | IA Network - Russia |
| ▶ Joop Gilijamse | IA Network - Germany |
| ▶ Sigrid Johannisse | IA Network - USA (Washington) |
| ▶ Rens Koele | IA Network - Brazil |
| ▶ Eric van Kooij | IA Network - France |
| ▶ Racheli Kreisberg | IA Network - Israel |
| ▶ Martijn Lammers | IA Network - India (Mumbai) |
| ▶ Taake Manning | IA Network - China |
| ▶ Wouter van Marle | IA Network - Taiwan |
| ▶ Jelle Nijdam | IA Network - India (New Delhi) |
| ▶ Rory Nuijens | IA Network - Turkey |
| ▶ Martijn Nuijten | IA Network - USA (Washington) |
| ▶ Wouter Roelofs | IA Network - USA (San Francisco) |
| ▶ Nico Schiettekatte | IA Network - Brazil |
| ▶ Petra Smits | IA Network - Brazil |
| ▶ Rob Stroeks | IA Network - Japan |
| ▶ Martijn Verwegen | IA Network - United Kingdom |
| ▶ Peter Wijlhuizen | IA Network - Korea |

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