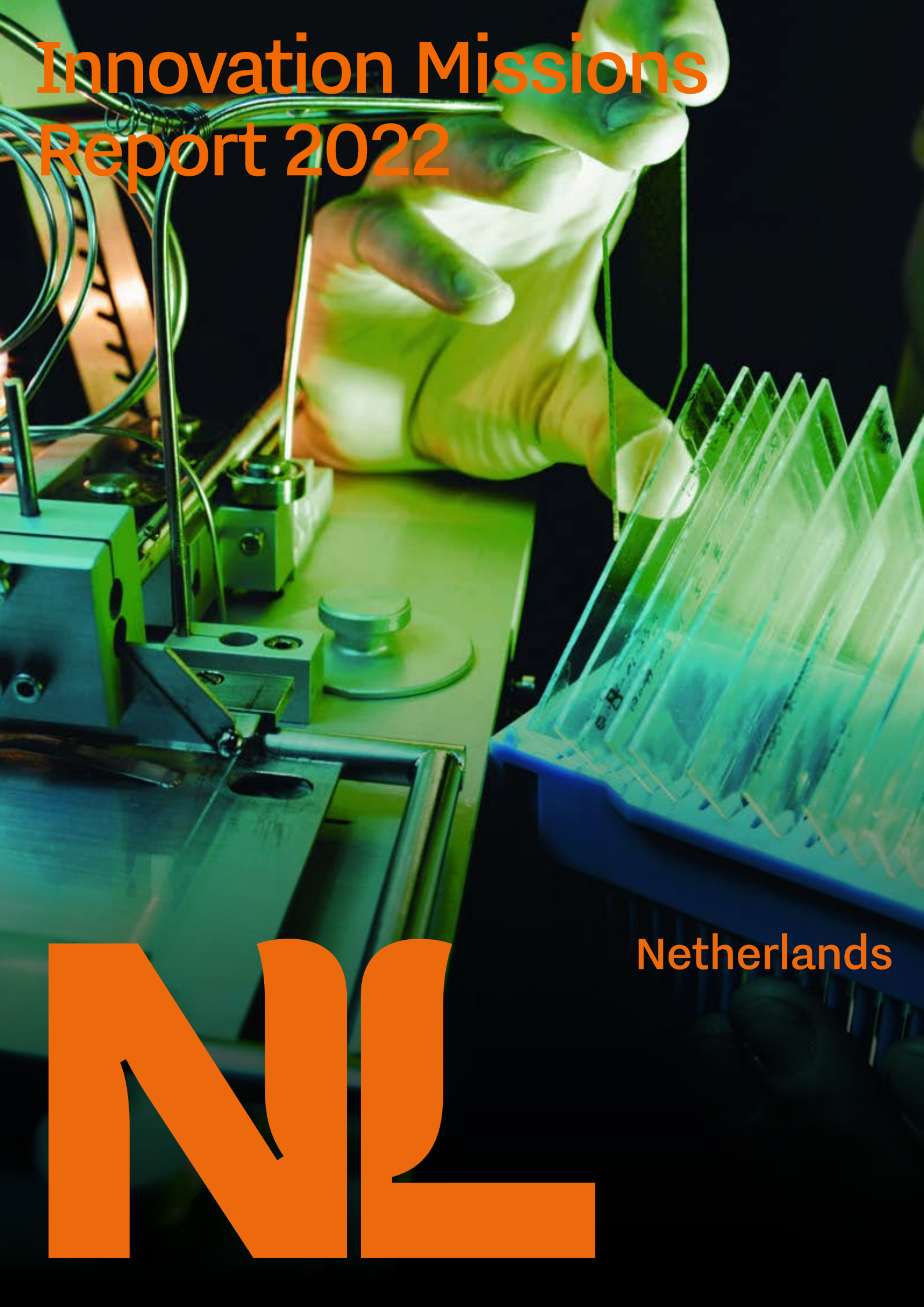
Innovation Missions Report 2022



Netherlands

Content

Welcome

Innovation missions are an important driver for reaching the goals set in the Mission-Driven Topsector and Innovation Policy of the Dutch Government.
For instance, by organizing innovation missions we can illustrate to potential partners abroad that The Netherlands should be one of the first countries of choice for innovation and technology cooperation. This is important because collaboration between business, universities, and governments from across the world is crucial in tackling national and global challenges such in climate, healthcare, agriculture, and security. This is essential because collaboration between businesses, universities, and governments from across the world is needed to tackle national and global challenges such as those in climate, healthcare, agriculture, and security.

Stimulating collaboration and the development of technological solutions will help to create a sustainable, healthy, and secure future for The Netherlands and other countries. Key enabling technologies like quantum, nano, photonics and semicon can play an essential role in ensuring this future. For instance, quantum computing can help to process and use large amounts of data much faster than current equipment thereby creating faster and safer digital communication. Nanotechnology on the other hand, can, for instance, enable physicians to address cancer more effectively, ultimately leading to a healthier society.

With the funding and support by the Ministry of Economic Affairs and Climate Policy and the Ministry of Agriculture, Nature, and Food Quality in 2022,the Innovation Missions team of the Department of International Innovation Cooperation of The Netherlands Enterprise Agency was able to organize 21 innovations missions to 14 different countries. By creating opportunities for Dutch firms, universities,

and governments to collaborate with partners abroad, the innovation missions have played an important part in building the partnerships that can help to address the societal challenges of today and tomorrow, and to further develop the technologies that are essential in doing so.

In the following chapters, we will provide a management summary and more detailed summaries of each of the innovation missions carried out in 2022. We have thematically structured these on the following themes:

- Energy Transition & Sustainability
- Key Enabling Technologies
- Life Sciences & Health
- Cyber, Defence & Water Security
- Agriculture, Nature & Food Quality

Thank you for reading and we are looking forward to another successful innovation mission year in 2023.

Management Summary

Energy Transition & Sustainability

In 2022, we organized six missions in this domain. The mission to Israel and South-Korea were both focused on hydrogen. Hydrogen is a key future energy carrier for both The Netherlands, Israel, and South-Korea. Transition to a system that (partly) works on hydrogen is one a shared goal. Each of the countries are therefore actively investing in hydrogen technologies and organizing bilateral interactions. The innovation missions organized in 2022 further strengthened this. The two missions to Germany in 2022 illustrated two other important enablers for the energy transition: electrochemical conversion (ECCM) and new battery technology. The public and private sector in both The Netherlands and Germany are actively investing in R&D in these domains. For example, past bilateral NL-DE interaction has resulted in an ECCM working group, a common research agenda and bilateral innovation fund. Similarly, The Netherlands and Germany have also strong ties to further develop new battery technologies. Finally, the two missions to France on sustainable aviation and smart and clean automotives illustrate how transitions in the transportation sector are also key to reaching national and global sustainability goals. Both missions are part of larger bilateral NL-FR programs. By participating in each of the six missions in this domain, Dutch organizations have gained several new leads such a new business and new government partnerships. In particular, the mission to France was very successful as it led a signed Memorandum of Understanding between RAI Automotive Industry NL, Automotive Campus Helmond, Trans alley Technopark, ARIA Hauts-de-France and Nord France Invest.

Key Enabling Technologies (KET)

To further stimulate international KET collaboration, we organized five innovation missions in 2022. Two of these missions were focused on photonics and took place in Canada and Taiwan, that both have vibrant photonics ecosystems. In addition to photonics, we also organized missions on quantum to Germany (a top priority country for Quantum Delta) and Japan, both frontrunners in this area. Germany and Japan have proactive government policies and roadmaps that emphasize collaboration. The mission we organized aimed to further stimulate collaboration and explore business and research partnership opportunities. Finally, the mission to South-Korea on semiconductors was also key to Dutch interest as this enabled Dutch companies to further explore the South-Korean semiconductor market (an important geography in this domain for The Netherlands). By participating in the KET missions, Dutch companies and research have gained new leads, and strengthened existing leads. For example, the missions to Japan and Taiwan have enabled Dutch participants to increase understanding of the German, Japanese, Canadian and Taiwanese ecosystems in quantum, photonics (FOS in particular), and semiconductors.

Life Sciences & Health

We organized four Life Sciences & Health missions in 2022. Each of them was essential for furthering international research and innovation cooperation. The mission to India illustrates that KET can have very specific applications in the domain of healthcare and in relation to antimicrobial resistance (AMR), a central theme in the NL and Indian Water-Agriculture-Health (WAH!) agenda that was initiated in 2019 and further improved in 2021. AMR threatens the effective prevention and treatment of an ever-increasing range of infections caused by bacteria, parasites, viruses, and fungi. Pandemic preparedness, AMR and prevention are shared policy priorities between The Netherlands and India. In Brazil, the mission was focused on ‘advanced materials in healthcare’. Important for The Netherlands, because Brazil has a strong knowledge position and policy directed towards key enabling technologies, including advanced healthcare materials, and recently launched several initiatives to encourage R&D and to facilitate the use in different areas of application as well. The mission to Boston (US) focused on emerging technologies in healthcare. Important for The Netherlands as Boston has a strong R&D focus in this domain. For example, the State of Massachusetts furthers R&D through dedicated pools of seed funding and infrastructure investment while the Greater Boston area itself boasts enormous academic research output through its 130 universities and colleges, including Harvard and MIT. Finally, the mission to Singapore was important as Singapore, like The Netherlands, faces the challenge of a rapidly ageing population due to declining birth rates and increasing life expectancy. We can jointly address these challenges through research and innovation cooperation. Together, these missions have resulted in several leads for Dutch participants, including new NL-BR research partnerships for a NWO research call, three EUREKA GlobalStars projects, and renewed collaboration in the domain of dementia between The Netherlands and Singapore.

Cyber, Defence & Water Security

We organized one innovation mission in 2022 to Sweden as part of the European Defense Fund program (EDF). EDF is set up to develop defence, technological and industrial capabilities on a European level with common technical standards and specifications. Sweden is an interesting EDF partner for The Netherlands as they

have a mature defence industry with OEMs and suppliers. By participating in the mission, Dutch organizations have gained several new partners that are currently exploring opportunities to setup new defence-related projects and consortia either within or outside the European Defence Fund.

Agriculture, Nature & Food Quality

For the Ministry of Agriculture, Nature, and Food Quality we have organized five missions in 2022, focusing on either the protein transition (Germany, Singapore), sustainable dairy (United States), or agrotechnology (Japan, South-Africa). Each of the regions are important enablers for strengthening the Dutch sector and helping Dutch researchers and companies with their internationalization strategies. For example, to contribute to the National Protein Strategy, Germany and Singapore are key regions for The Netherlands. Singapore is at the forefront of the protein transition and is the only country in which the consumption of cultivated meat is legally allowed. Alternatively, Japan is important for The Netherlands on digitalization and greenhouse horticulture as both Japan and The Netherlands struggle with labor shortages while demands for safe and healthy food is growing. Collaboration in automation, autonomous growing and robotics solutions can help to jointly solve this challenge. The mission to South-Africa should be seen as part of the multi-year and multi-national Research and Innovation initiative in which the aim is to actively stimulate and enhance international knowledge and technology innovation cooperation with South-Africa. Finally, the mission to the United States should be seen as part of an existing Letter of Intent on Agricultural Cooperation between CA and NL. Dairy is a key sector in the agri-food industry, providing nutritious food and significant economic activity. At the same time, the sector is also facing sustainability and environmental challenges like that of The Netherlands (e.g., greenhouse gas emissions). The missions to Japan, Germany, and United States have each resulted to participants exploring new Public Private Partnership projects while each of the missions in this domain have led to new partnerships between business, and research (e.g., PhD exchanges).

Table 1. Overview of Innovation Missions

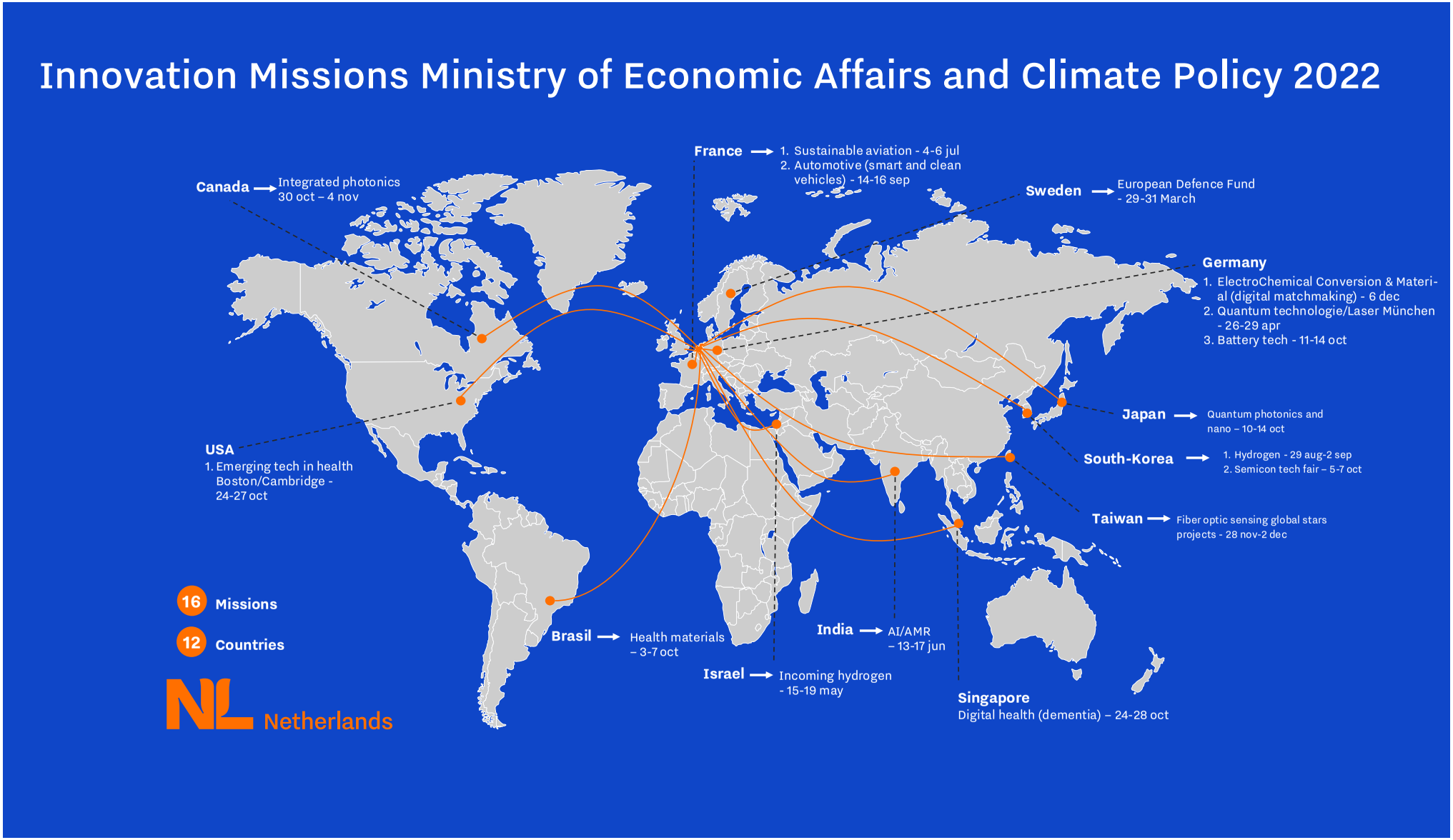
Domain		Missions	Countries	Participants
Ministry of Economic Affairs and Climate Policy	Energy Transition & Sustainability	6*	Israel, France (2), South-Korea, Germany (2)	186
	Key Enabling Technologies	5	Germany, Japan South-Korea, Canada, Taiwan	85
	Life Sciences & Health	4	India, Brazil, United States, Singapore	66
	Cyber, Defence & Water Security	1**	Sweden	27
Ministry of Agriculture, Nature, and Food Quality	Agriculture, Nature & Food Quality	5	Germany, Singapore, Japan, South-Africa, United States	50

* The digital innovation mission on hydrogen to China in December was postponed due to COVID-19 developments in China and the challenges this surfing for organizing a mission.

** The incoming innovation mission from Taiwan to The Netherlands on cybersecurity was postponed due to a lack of interest. This was mostly due to several cybersecurity conferences that were held at the same time. We did accommodate several Taiwanese companies to join the ONE Conference in The Hague from 18-19 October 2022.

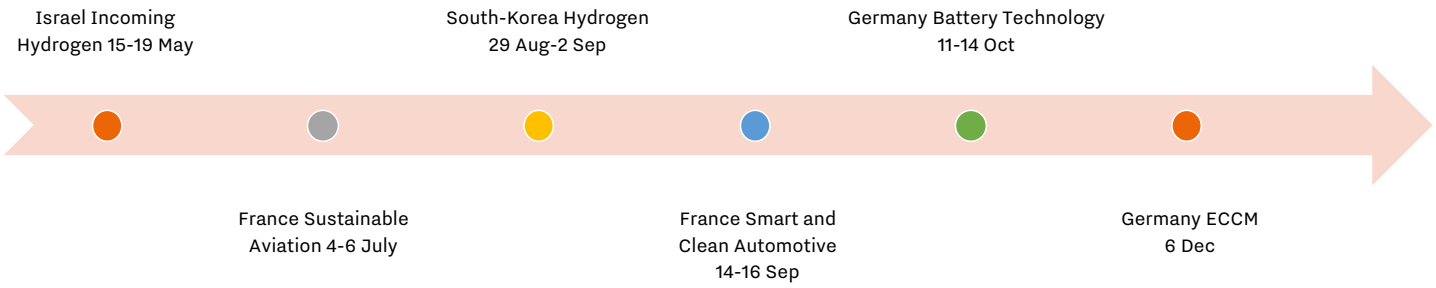
Ministry for Economic Affairs and Climate Policy

Innovation Missions Ministry of Economic Affairs and Climate Policy 2022



Contribution to SDG’s

Energy Transition & Sustainability



Hydrogen (Inbound, Israel)

Background

Organizing an innovation mission was a next step after having worked for the last two years on knowledge transfer in the field of hydrogen from NL to IL. These activities include a basic hydrogen course, a series of NL-IL mini symposia on hydrogen and other energy transition topics, a summer school on the design and planning of hydrogen valleys.

Summary

The mission had as a main goal to introduce Israeli experts from the government, private and academic sector to major developments in the Dutch hydrogen sector (e.g., policy, infrastructure, research and development, international cooperation and more). During the mission, we followed a structured program which included 2-3 site visits a day in 4 locations: Amsterdam (Port of AMS & Shell), Groningen-Eemshaven-Delfzijl (Municipality, Entrance, RWE, GasUnie, Groningen Seaport, Delfzijl Chemical Park), Almelo (VDL), Rotterdam (port). During the visits, the hosts shared presentations and at each site, 1-3 Israeli participants shared their presentations to enhance the visibility of the delegates.

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Sustainable Aviation (Outbound, France)

Background

In January 2021 the HTSM Topsector published a strategic plan for France in collaboration with several HTSM subsectors and the Dutch Embassy in Paris. The goal is to strengthen bilateral NL-FR cooperation in the aviation and automotive industries and around key enabling technologies, focusing on long-term relationships through long-term collaboration programs. Previously, in September 2020, the French government had announced an important economic recovery and investment plan to support the economy. They aimed to support public-private partnerships in fostering breakthrough innovations involving the whole value chain: OEM's, SME's, knowledge institutes. By boosting innovation, the French government aimed for accelerating the transition to an increasingly sustainable, digital, and competitive industry. To make the aviation sector more sustainable, new technologies are required (e.g., alternative fuels, new drive concepts, lightweight materials, and smart sensors). The technologies that are necessary to shape this aim, are core strengths of the Dutch aviation industry: hydrogen tanks and infrastructure, composite materials for construction and fuselage parts, aerodynamic optimization, use of thermoplastic materials and the maintenance of these new types of aircraft. In further support of this, in February 2022, the Netherlands Aerospace Group (NAG) renewed its longtime collaboration agreement with Airbus by signing a new MoU focusing on sustainable aviation, and more specifically: innovative platform concepts, structures and systems, alternative fuels and innovative powerplant solutions for aircraft; innovations for maintenance, repair and overhaul; innovations for aircraft operation; innovative enabling technologies and processes.

Summary

The delegation to Toulouse (France) consisted of several companies and knowledge institutes that are active in the growth fund proposal "Luchtvaart in Transitie". The delegation both had individual objectives and shared objectives with regards to the growth fund program. This improved the quality of the meetings we had. For example, at Airbus, we met the head of the Zero Emission Program (a team of 1.000 people). Other aspects that were included in the program were: visits to Airbus, ONERA, CNES and other companies and knowledge institutes of Aerospace Valley, networking dinners, matchmaking and innovation seminars and workshops on sustainable innovation.

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Hydrogen (Outbound, South-Korea)

Background

This mission is part of the ambitions and multi-year plans to jointly address shared challenges by bringing key players together. For South-Korea, as well as for The Netherlands, the introduction of hydrogen as a future energy carrier is one of the most relevant challenges of the current energy transition. Both countries are therefore actively investing in hydrogen technologies and are also organizing various meetings, conferences, and expos. The hydrogen mission in 2022 to South-Korea is one of a series of SK-NL innovation missions.

Summary

During the mission, we visited several companies in Seoul (e.g., Hyundai Motor Company, TKI, hydrogen charging station), organized matchmaking, presentations, a lunch with the city of Ansan (in which there was a session between the NL ambassador and Ansan's mayor). From 31 August – 2 September, the delegation attended the H2Meet fair. A separate International Country Seminar was organized for all foreign parties, the large majority of which were Dutch (delegation) parties. Each member of the delegation was able to pitch their organization and ideas. Other activities during the fair included networking receptions and matchmaking.

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Smart and Clean Automotive (Outbound, France)

Background

The Hauts-de-France region is known as the automotive manufacturing region of France with 7 production plants. With the recent announcement of three giga-factories, it will become an important region in Europe in the field of battery production. This region is therefore considered as important to our national battery strategy (and growth fund proposals). The region is also interesting due to its close location to The Netherlands. This innovation mission was organized in the context of the March 2022 government consultations between France and the Netherlands in which President Macron and Prime Minister Rutte agreed to establish an "innovation pact" in 2023 where HTSM (including automotive) is one of the core themes.

Summary

During the mission, we focused on improving NL-FR collaboration in the automotive field. One of the highlights of the mission was the visit (and matchmaking session) to the Trans Alley Campus in Valenciennes, an international technology park that brings together companies, start-ups and scale ups, research laboratories and training institutions in the field of Green & Smart Mobility. The delegation also visited the Novares Group (a French (global) plastic solutions provider that designs and manufactures complex components and systems for the automotive industry), CRITT M2A (a 10,000m2 test center to test novel battery technology on air, sounds, vibration), and Renault Group to learn more about Renault's developments regarding "ElectriCity". ElectriCity is an industrial project that brings together three factories: Douai (largest production factory of the Megane model), MCA Maubeuge (Kangoo model) and STA Ruitz (electrical components). This is an entire ecosystem of research, universities, start-ups, and production, and thus of interest for The Netherlands.

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Battery Technology (Outbound, Germany)

Background

Batteries are essential building blocks in the energy transition as they can help to create a new, fully sustainable economy. The storage of electricity is required to stabilize the electricity grid and to help the automotive industry to become sustainable. Material science and technology are at the core of battery development. Over the last year a group of Dutch experts from knowledge institutes, companies, and the Dutch government came together to analyze the Dutch battery ecosystem. A main conclusion was that the Dutch ecosystem has unique strengths and opportunities for the future including: the development of new materials and cells, equipment for cells, modules, and packs, battery systems for heavy duty mobility, systems for integration in the electricity grid; battery testing, and circularity of batteries. Germany and The Netherlands are important players in the battery technology field as many are active in academia, knowledge institutes and companies.

Summary

Our delegation visited several highlights from the impressive German R&D infrastructure: the institutes ZSW (Ulm), KIT (Karlsruhe), RWTH (Aachen) and Meet (Münster). In Münster a Gigawatt-scale Pilot factory is being built, funded by an investment of 600 million euro of the German government. This test facility can be used for the testing of new materials and processes. Furthermore, the delegation visited VARTA and had the possibility to talk to German SMEs and startups during two pitch events.

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Electrochemical Conversion and Materials (Digital, Germany)

Background

Both the Dutch and German public and private sector heavily invest in R&D on Electrochemical Conversion and Materials (ECCM). Several bilateral initiatives in the past have led to a NL-DE public-private ECCM working group under coordination of NWO and TNO. In October 2020, the working group organized a workshop to create a common research agenda and a bilateral innovation fund. The working group consists of public and private parties from The Netherlands (4 TUs, DOW, Nouryon, VNCI) and Germany (Covestro, Siemens). Moreover, EZK and the German BMBF and BMWK are involved and support the ambitions of the working group. In October 2022, a bilateral R&D call on ECCM was opened (and will close on 7 February 2023). This call is coordinated by NWO in the Netherlands and Projektträger Jülich in Germany.

Summary

During the digital event, Maurits Boeije from NWO and Gesine Arends and Jochen Seier from Projektträger Jülich explained the call, followed by a Q&A. A total of 89 participants registered for the event, a maximum of 80 logged in to take part in the webinar. This was followed by a digital matchmaking via B2Match in which 40 digital meetings with 75 participants were booked. Feedback was overall very positive.

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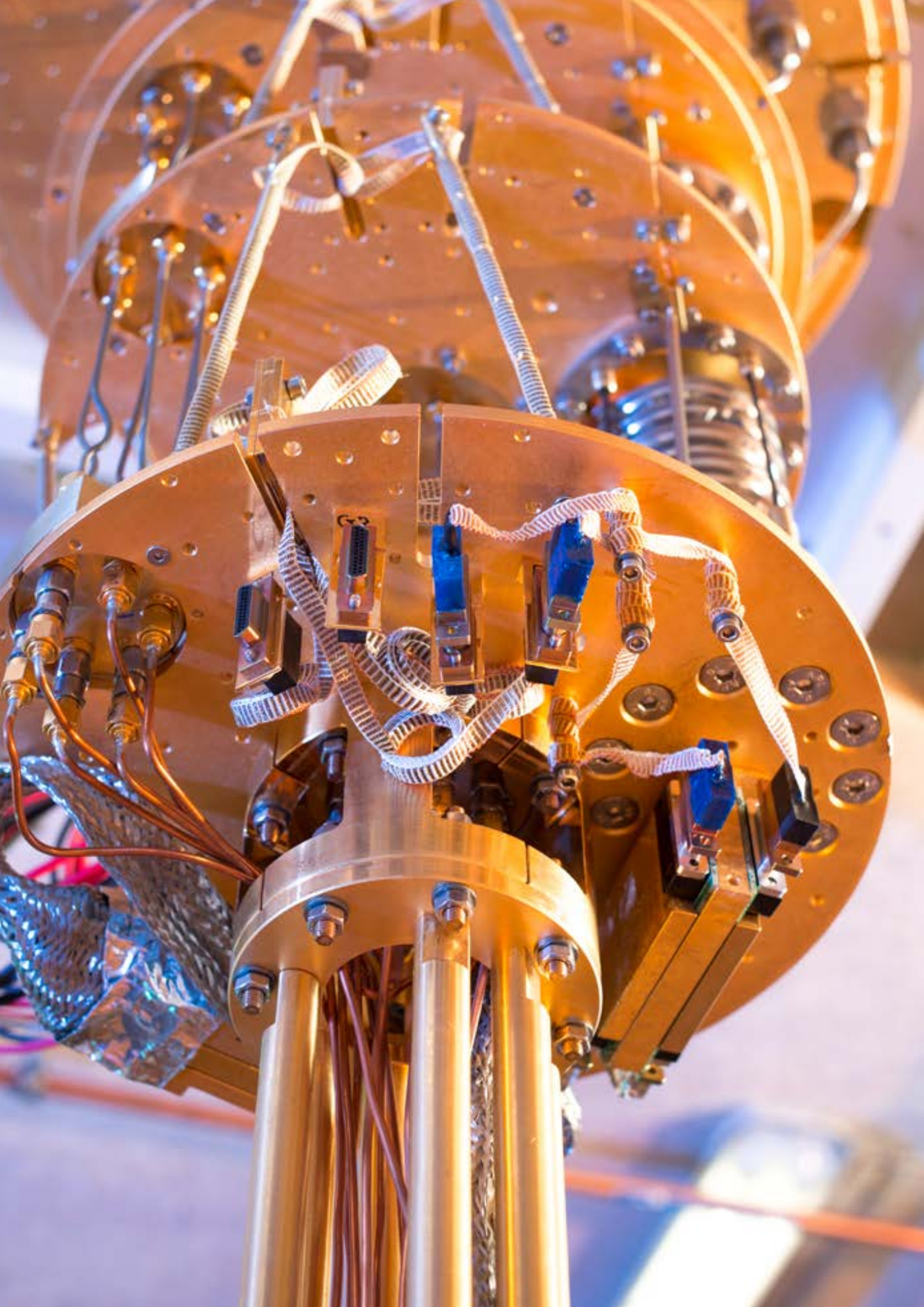
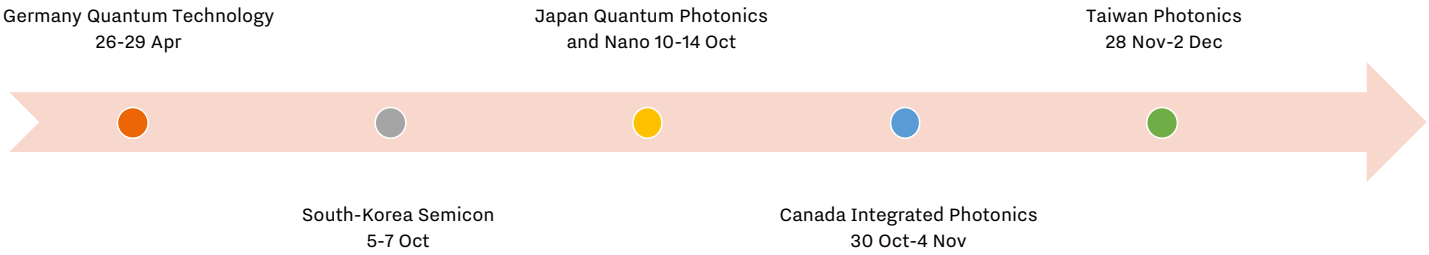
Table 2. Overview of Energy Transition & Sustainability Innovation Missions

Country	Objectives	Topics	Participants
Israel	• Introduce IL organizations to NL companies, hydrogen facilities (e.g., seaports and hydrogen refueling stations), and (local) government organizations (Min EZK, Groningen Municipality, Energy Topsector). • Create business and R&D cooperation opportunities (e.g., via the NL-IL networking event). • Introduce IL startup technology to NL seaports and NL energy companies.	• Hydrogen production, transportation, storage. • Hydrogen applications (e.g., mobility, seaports) • Hydrogen valleys	29
France	• Understand the local network and stakeholders in the Aerospace Valley (Aerospace innovation cluster in Southwest France, mainly located between Toulouse and Bordeaux). • Learn about local developments, challenges. • Identify potential collaboration partners. • Further explore and develop concrete projects and research collaboration.	• Hydrogen, electric, hybrid aviation • New platform concepts and systems • Alternative fuels and powerplant solutions • Maintenance, repair, and overhaul • Aircraft operation innovations • Enabling technologies and processes.	17
South-Korea	• Continue to position NL and its delegates as reliable/strategic H2 partner. • Expand the network of SK companies, knowledge communities and governments. • Identify potential market/collaboration opportunities for business/R&D projects. • Link ZK/NL parties through matchmaking and exhibition presentations.	• Hydrogen projects • Hydrogen charging	9
France	• Explore areas for collaboration in the light of the strategic France plan of the Topsector HTSM and “France Relance investment plan”. • Increase understanding of local developments and challenges in HTSM sector. • Identify partners for collaboration in the North of France. • Explore projects for research collaborations.	• Development, production, and recycling of batteries • Application of lightweight materials • Technologies for connected, and automated mobility	12
Germany	• Discuss sustainability of batteries, including material-efficiency and recycling • Explore digitizing battery production • Identify test and certification methods • Discuss development and production of next-generation batteries and • Explore new battery management systems	• Battery production and materials • Battery sustainability (e.g., recycling) • Battery management systems	30
Germany	• Accelerate the formation of Dutch-German consortia for the bilateral ECCM call. • Presents the specificities of the call to possible applicants in the Netherlands and Germany through the webinar.	• Electrolysis and hydrogen storage • Electrosynthesis and electro conversion • Materials and catalysis • System design • System integration	89



Key Enabling Technologies



Quantum Technology (Outbound, Germany)

Background

Through nationally coordinated (investment) efforts Germany has become a frontrunner in the first-generation quantum technologies and is trying to leap forward into the second-generation quantum technologies. The German Ministry of Education (BMBF) and Ministry of Economic affairs (BMWi) together invested 650 million euros for the period 2018-2022. Both at European and national level, Germany wants to create a workforce and startup ecosystem that can spin out of universities into the private sector. The goal is to ensure that Germany's manufacturing and supplier industry plays an important role in quantum technology. Dutch quantum research, clusters and start-ups could partner up with Germany in these ambitions. At all German government levels and across the regional clusters, internationalization, particularly EU cooperation, is emphasized. Due to the investment made through the Dutch National Growth Fund, The Netherlands is now seen as a strong, and equal, investment partner for Germany, thereby creating high interest in collaboration. Moreover, QuantumDelta put Germany on the list as one of the 3 top priority countries in their internationalization strategy thereby meriting an innovation mission.

Summary

Due to the investments made by Germany and The Netherlands in quantum, the start of national quantum, and the potential for collaboration, a quantum technology factfinding mission will help to stimulate NL-DE quantum collaboration and to develop a multi-annual NL-DE quantum strategy. During the mission, we participated in the Laser World of Photonics trade fair, matchmaking sessions (e.g., between Optonet and BB Photonics) and meetings (e.g., Photonics21 and Global Photonics).

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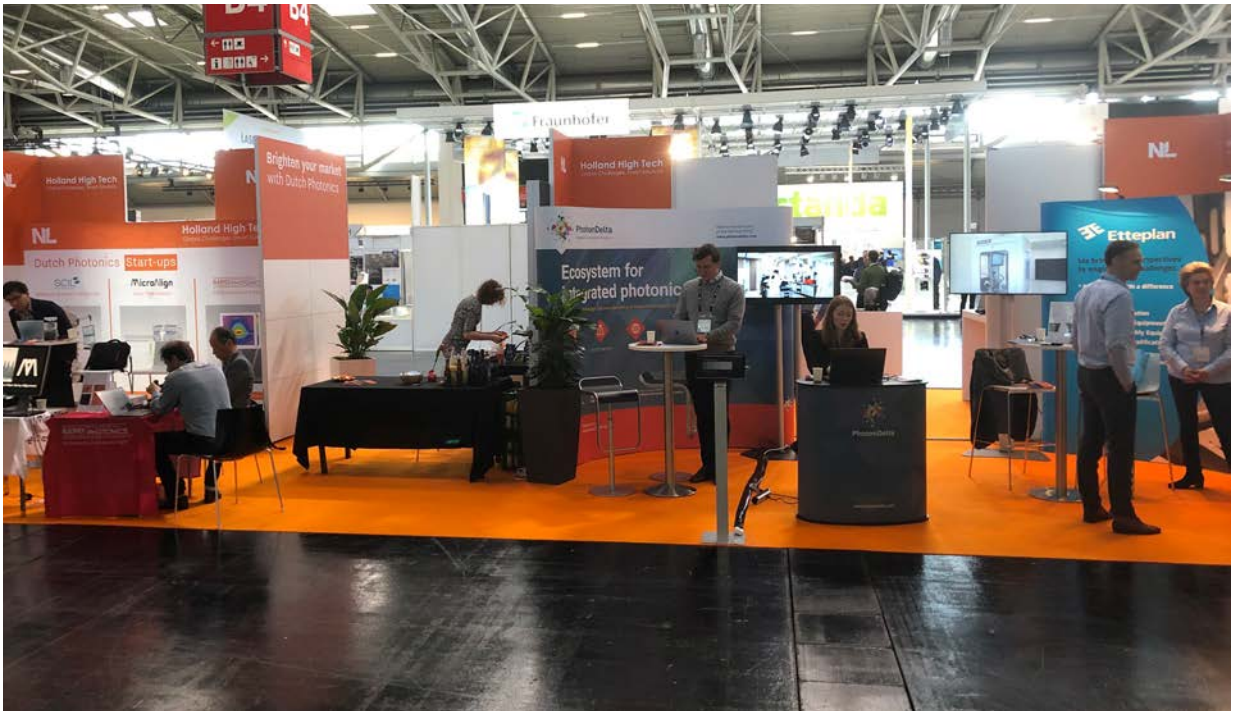

Semiconductor (Outbound, South-Korea)

Background
The semiconductor sector is big in South-Korea. Samsung and SK Hynix are two of the largest semicon producers in the world, and are, together with other companies, continuously looking to further improve production and R&D. For several years, Dutch companies have seen South-Korea as an important market. In 2021, the Dutch embassy set up a booth in the second largest semiconductor expo in South-Korea to promote the Dutch semicon industry. In 2022, we continue promoting Dutch capabilities through an innovation mission to the SEDEX 2022.

Summary
The delegation consisted of seven organizations, including: Boschman, Nearfield Instrument (NFI), TNO, Prodrive, Bronkhorst, Corbion, and ASM. During the SEDEX 2022 (5-7 October), we set up a NL Pavilion for the participants. We were located next to the pavilion of SK Hynix, which always draws a crowd. This crowd naturally flowed into the NL pavilion. On the second day, we held a seminar with Dutch participants.
Each participant had the opportunity to introduce themselves via a 15-minute presentation. Even though preparation time for the seminar was short, our seminar room was full of relevant people from the industry.

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Quantum, Photonics and Nanotechnology (Outbound, Japan)

Background
Both The Netherlands and Japan are frontrunners in the areas of quantum, photonics, and nanotechnology (QPN), both in terms of contents and in terms of industry-academia collaboration. Both countries have proactive policies and roadmaps that strategically position QPN as a KET in a cyber-physical society that thrives economically and addresses societal problems like (cyber) security, climate, and healthcare.
The interest of to collaborate with Japan is to speed up commercialization and societal implementation of QPN-technologies and products. Dutch stakeholders regard Japan as a priority QPN country. It is of interest to further develop NL-JP relations by deepening understanding of their status and future ambitions and exploring possibilities to collaborate on innovation and commercialization.

Summary
A large QPN delegation visited Japan to explore and further strengthen the existing relationship with Japanese counterparts. We are building on digital matchmaking in the past. In just a few days, the delegation visited companies like NTT, Fujitsu, Hamamatsu Photonics and research institutes like Riken, University of Tokyo, and Kyoto. Several networking receptions at the Dutch residency, QPN roadshow in Tokyo and University of Kyoto were organized to bring ecosystem representatives of both countries together. Finally, a matchmaking session was organized for the 10 participating Dutch companies.

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Integrated Photonics (Outbound, Canada)

Background

During 2022, an opportunity surfaced to explore opportunities for innovation collaboration in photonics and quantum technology in Canada. In 2021, Brainport and Photondelta signed a MoU with the University of Waterloo while UTWente (Mesa+) has a long-term collaboration with Waterloo. Quantum Delta considers Waterloo university as a best practice university for valorization of knowledge. Initially, we aimed for a mission to the Boston/Rochester area in the US as well, but after market research, we decided that Canada was more fruitful. Specifically, Quebec and Ontario are hotspots for photonics research and applications.

Summary

Through excellent collaboration with the local Photonique cluster in Quebec and the Photons Canada cluster in Ontario, a program consisting of meetings and lab visits was organized in Quebec City, Bromont and Ottawa. A big part of the program was allocated for matchmaking events with Canadian counterparts. These matchmakings provided many opportunities for the Dutch delegation in finding new leads.

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Photonics (Outbound, Taiwan)

Background

In the last five years, several initiatives to Taiwan were organized: an innovation mission in 2017 on integrated photonics and fiber optic sensing (FOS), and a EUREKA GlobalStars call on Photonics in 2018 and 2021. Several new FOS projects and partnerships have resulted from these initiatives. To strengthen NL-TW collaboration, we organized a 'light' FOS mission to Taiwan in 2022.

Summary

The 4-days program started with the TW-NL innovation cooperation conference on the future of FOS. Around 40 experts from different applications industries joined us to exchange the most recent FOS technologies in semiconductor, structure health monitoring and medical applications. Throughout the program, four different site visits were arranged. First, we visited Taipei 101 to go beneath the tuned mass damper and take a close look of its structure and design for building dynamic monitoring. Second, the National Center for Research on Earthquake Engineering gave the delegates more insight into the seismic and scouring effects on bridge health monitoring. Third, our visit to TienLi helped to learn how wind blades are being made and provided an opportunity to further introduce the Dutch FOS technologies and EUREKA GlobalStars project GBM. Finally, a visit to the GuanDu Bridge enabled us to check the arch design and discuss sensor installation plans.

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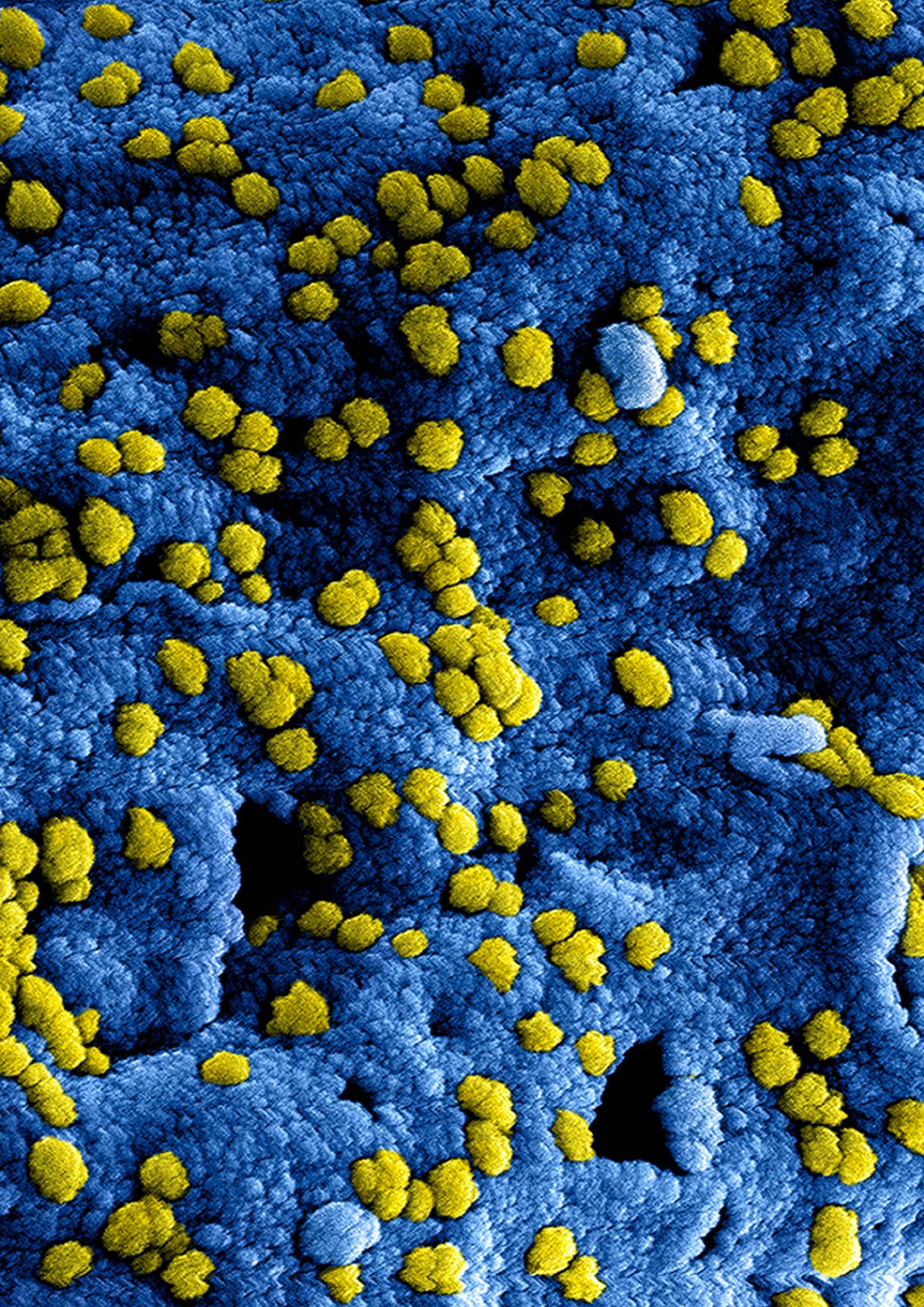
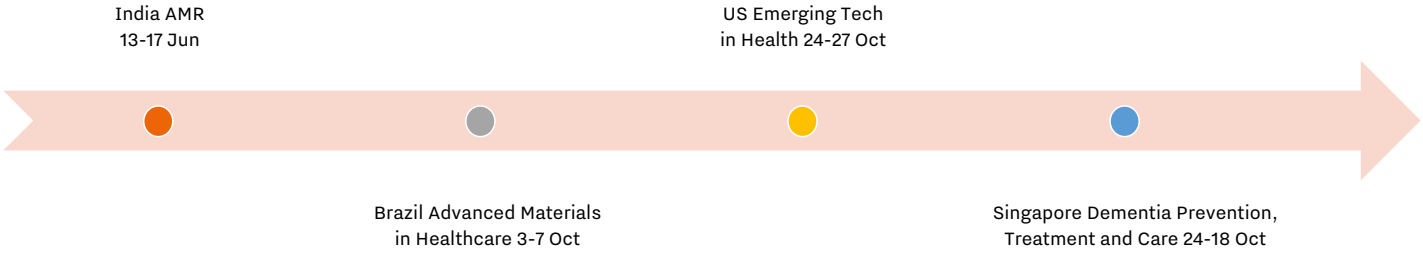
Table 3. Overview of Key Enabling Technologies Missions

Country	Objectives	Topics	Participants
Germany	• Identify potential quantum computing, internet, sensing, communication collaborations between NL and DE. • Increase science-business collaboration. • Accelerate quantum/photonics development.	• Photonics21 and Global Photonics Alliance meeting • Munich Quantum Valley and Network	30
South-Korea	• Continue to position NL as a reliable and strategic semiconductor partner for joint business and joint R&D projects. • Extend networks and explore new business and/or R&D partners.	• Semiconductor technology • Semiconductor applications	7
Japan	• Intensify bilateral relations between governments, companies, and academia. • Commercialize QPN related technology. • Develop bilateral programs in separate or combined areas within the field of QPN. • Benchmark to strengthen NL policies and programs in the high-tech field. • Put NL in a strategic position to link Japan to EU programs (e.g, Photonics21).	• Quantum • Photonics • Nano technology	26
Canada	• Exploration of the opportunities to collaborate in integrated photonics • Explore applications of photonics in • automotive, agrotech, medical.	• Packaging. • Integrated photonics • Manufacturing • New technologies and applications.	17
Taiwan	• Facilitate existing calls, including 2018 EUREKA GlobalStars Photonics and EUREKA GlobalStars High Tech projects. • Support demonstration projects (e.g., at Taipei101 and track-bed monitoring) • Address new opportunities for collaboration in fiber-optic sensing applications in Taiwan	• FOS technologies in semiconductor, health applications • Tuned Mass Damper • Building dynamic earthquake monitoring • Wind blades and sensor installation	5



Life Sciences & Health



Key Enabling Technologies Solutions for Antimicrobial Resistance (Outbound, India)

Background

Central to science and innovation activities between The Netherlands and India is the bilateral Water-Agriculture-Health (WAH!) agenda which both countries initiated in October 2019. During 2021 additional input and focus has been added to the agenda. Antimicrobial resistance (AMR) is an area of strategic importance to the NL-IN WAH! agenda. AMR threatens the effective prevention and treatment of an ever-increasing range of infections caused by bacteria, parasites, viruses, and fungi. Pandemic preparedness, AMR and prevention are shared policy priorities. Tackling AMR through a shared One Health approach illustrates the importance of crossovers with water, environment, and agriculture. Following the digital Key Enabling Technologies and Antimicrobial Resistance (AMR) expert session in 2021 and building on the NL-IN collaboration in the AMR One Health Project, this innovation mission to India is organized as a follow-up.

Summary

The mission was joined by delegates from different backgrounds such as scientists (healthcare and agriculture), entrepreneurs (ICT, healthcare, and agriculture), representatives from public organizations (RIVM, VWS, Top Sector Agri & Food) and the Netherlands counsellors for innovation, agriculture, and health in India. During the mission, the delegation visited New Delhi (Delhi), Hyderabad (Telangana) and Vijayawada (Andhra Pradesh). The program consisted of meetings, visits, and networking receptions. Meetings were organized with UN organizations (UNEP, WHO), federal and state governments (e.g., Ministry of Health and Family Welfare, Government of Telangana, Animal Husbandry and Fisheries Department of Andhra Pradesh) and the National Center for Disease Control. The delegation also visited labs, a shrimp and poultry farm, research institutes and medical colleges. The last day, at YSR health university in Vijayawada, a 'science meets future' event was organized. 50 medical students and 50 veterinary students were invited for lectures and interaction with the delegation to highlight the importance of a One Health-approach for curbing the rise of antibiotic resistance.

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Advanced Materials in Healthcare (Outbound, Brazil)

Background

The HTSM sector is an important enabler to solve healthcare challenges. Brazil and The Netherlands have developed broad knowledge and expertise in both fundamental and applied research in this area. Brazil has a strong knowledge position and policy directed towards key enabling technologies, including advanced materials in healthcare. Brazil has also engaged in collaboration with national partners, such as industry federations and national research institutes, and they are looking for potential partners abroad. An innovation mission will help to strengthen bilateral G2G STI NL-BR relations (in August 2018 State-Secretary Mona Keijzer signed a Letter of Intent with the Brazilian Ministry of Science, Technology, and Innovations to intensify bilateral collaborations). Previously, several visits have been facilitated such as the Joint Committee Meeting in 2019 in which a program of cooperation was signed. Various areas were selected to further investigate and broaden collaboration, of which advanced materials in healthcare was one on the relevant areas.

Summary

The mission took place in the state of Sao Paolo in which the delegation visited the city of Campinas, Sao Carlos, Araraquara and Sao Paolo. We visited several research institutes (e.g., University of Campinas, Centro de la Tecnologia da Informacao Renato Archer, University of Sao Paulo), healthcare organizations (Einstein Hospital, Hospital das Clinicas), and companies active in the advanced materials domain (3D Biotechnology Solutions, Tissuelabs, Baumer). During the visits, there was ample opportunity for the delegation to present themselves and their work and to connect with representatives from the institutes we visited. Exploring opportunities to cooperate was further strengthened by the hybrid matchmaking event, organized by the Dutch Research Council (NWO) and São Paulo Research Foundation (FAPESP) on October 6th, in which researchers and entrepreneurs from Brazil and The Netherlands pitched their research and/or business ideas.

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Emerging Technology in Healthcare (Outbound, United States)

Background

Massachusetts and The Netherlands are both confronted with the challenge of ensuring a sustainable and accessible healthcare system for all its citizens. AI, photonics, robotics, and nanotechnology all represent new technologies that can help to address this challenge. Yet, this requires collaboration. This is at the core of this mission: establishing and developing crossover R&D NL-US collaborations. This mission can help to further strategic NL-US collaboration, and to follow up on the work that has been done over the past years. Several missions and delegations have visited Boston in the past to explore the research, innovation, and technology development in the healthcare sector. The most recent is a visit from Massachusetts to the Netherlands where a program of cooperation was signed to stimulate the exchange of research, investments, business, and talent between the two ecosystems.

Summary

The mission took place in the Greater Boston area with a delegation that consisted of organizations (companies, universities) active in various healthcare domains. During the first four days of the mission, the delegation participated in the AdvaMed Medtech Conference, a leading event in the industry which provides world class plenary speakers (e.g., Johnson & Johnson, Boston Scientific), and valuable networking and business development opportunities (e.g., investor receptions, founder receptions). In addition, the delegation was provided with several opportunities to present themselves to new partners during the receptions organized by the conference, or the NL Innovation Network in Boston. Exploring opportunities for cooperation was strengthened by the design Challenge' event organized at Philips HQ in Cambridge, in which the Dutch delegation was stimulated to collaborate with top US researchers and entrepreneurs from, amongst others, Thermo Fisher Scientific, Bostin Scientific, Philips, and Brigham and Woman's Hospital. Together they worked in mixed NL-US teams on solving healthcare's most pressing challenges (e.g., how to make healthcare personalized, how to shift from treatment to prevention).

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Dementia Prevention, Treatment and Care (Outbound, Singapore)

Background

The stark rise in dementia cases is a shared challenge between The Netherlands and Singapore and requires a collaborative response. Singapore faces the challenge of a rapidly ageing population due to declining birth rates and increasing life expectancy. The disease burden is relatively high for cancers, metabolic and CVDs such as diabetes, and infectious diseases. Currently, 1 in 10 Singaporeans over the age of 60 have dementia (about 86,000). Many of them do not have an established diagnosis. Due to rapid ageing, this number will rise to 130,000 in 2030. We can see a similar trend in The Netherlands. That is why the Ministry of VWS has drawn up the mission to improve the quality of life of people with dementia by 25% by 2030. Prior to this mission, several online sessions were organized. These discussions led to this innovation mission. The mission was linked to the visit of VWS minister Ernst Kuipers to Singapore, who was previously part of the board of the National University Health Systems, one of the health clusters in Singapore. Timing of this mission was excellent as a week before the visit, Minister Ong of the Singaporean Ministry of Health, announced a new strategy, HealthierSG, with more attention to general practitioners and prevention.

Summary

The mission delegation consisted of representatives from the Ministry VWS, Topsector LSH, UMCG, UMCU, Amsterdam UMC, Roche, and the Dutch AI Coalition. The mission gave the delegation the opportunity to meet Singaporean counterparts. During the visit, it was emphasized that our countries have similar challenges, such as an ageing population, shortage of care staff and rising healthcare costs, but also that we can learn from each other through our different approaches to the healthcare system. The Singaporean government has made major investments to not only attract international companies but also to strengthen its own ecosystem and R&D field. For example, research institute A*STAR set up several programs and research centers, while the Lee Kong Chian School of Medicine scores high on citations and impact. Regarding dementia, opportunities for prevention and diagnostics have been identified and will be tackled jointly with VWS and Topsector LSH. The research institutions that the delegation visited focused on setting up cohort studies to better represent 'Asian dementia' in international studies. The delegation members were impressed by the research field in Singapore and, through a better understanding of local context, can take the next steps in existing and new collaborations on data and knowledge exchange.

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Table 4. Overview of Life Sciences & Health Innovation Missions

Country	Objectives	Topics	Participants
India	• Strengthen existing strategic relations with key stakeholders in India • Form new connections through matchmaking and visits/meetings • Explore collaboration opportunities • Evaluate and further extend Indo-Dutch collaboration on AMR One Health Project	• AMR challenges, One Health policies and AMR action plans • Zoonosis, environment, sewage surveillance • AMR awareness (e.g., in human healthcare, and evidence-based innovations to decrease antibiotics use) • Sampling, rapid diagnostics and data sharing between labs, system interoperability	20
Brazil	• Explore research and applications of advanced materials research such as on smart biosensors, intelligent materials, 3D printing. • Explore and stimulate new NL-BR partnerships. Specifically, in support of the NWO-FAPESP call on 'Advanced Healthcare Materials'.	• Research on bioprinting, sensors, -materials, -chemicals, nanotechnology, additive manufacturing, cell therapy, drug delivery. • Business development and scaling inventions	6
United States	• Stimulate crossover relationships between NL-US ecosystems • Help participants to acquire insight into the Greater Boston innovation ecosystem • Identify differences between collaborative frameworks in Massachusetts and NL • Formulate ideas for new applications of technologies • Explore opportunities for structured discussions and strategic exchanges with Boston-based and Dutch-based counterparts.	• Business development and scaling products on the US market • Development and use of digital healthcare technologies • Ideation on how to solve grand challenges • Networking and collaboration opportunities.	20
Singapore	• Share expertise with potential partners. • Explore opportunities for a structured dialogue with Singaporean counterpart. • Exchange knowledge and ideas for new innovations and gain inspiration. • Explore multidisciplinary solutions between public and private partners. • Gain insight into the local context, such as the innovation and care system, clinical care pathway, legislation, and partnerships. • Gain insight into the developments and challenges surrounding treatment and prevention, and the development and use of assistive technology or care concepts.	• Dementia prevention. • Primary care. • Early diagnosis. • Cohorts and dementia research. • Identify other research and innovation cooperation opportunities.	20

Cyber, Defence & Water Security

European Defence Fund (Outbound, Sweden, 29-31 March)

Background

The EDF is an EU programme funded under the Multiannual Financial Framework (MFF) for the period 2021-2027. EDF supports R&D actions in the field of defence and is equipped with a budget of EUR 8 billion. EDF is set up to develop defence technological and industrial capabilities on a European level with common technical standards and specifications. This should enhance interoperability and make Europe more autonomous and less dependent on other countries. Sweden is an interesting EDF partner for The Netherlands as they have a mature defence industry with OEMs and suppliers.

Summary

The mission was organized together with the IA network in Sweden, EZK, CMP, NIDV, SOFF and with cooperation of MID. The mission was opened by Tom Middendorp, NL Special Envoy for European defence collaboration. Multiple presentations followed on, amongst others, EDF and SE-NL EDF coordination by the Swedish EDF coordination office, and the Science and Technology Department of the Dutch Ministry of Defence. Further on, 22 of the participating companies were divided into 5 break-out sessions to discuss topics such as space, digital transformation, underwater warfare, and materials and components. Finally, there was an individual matchmaking session. On the last day, the Dutch delegation also visited SAAB Experience Center and Teledyne FLIR to become familiar with recent developments in Swedish Defence technology.

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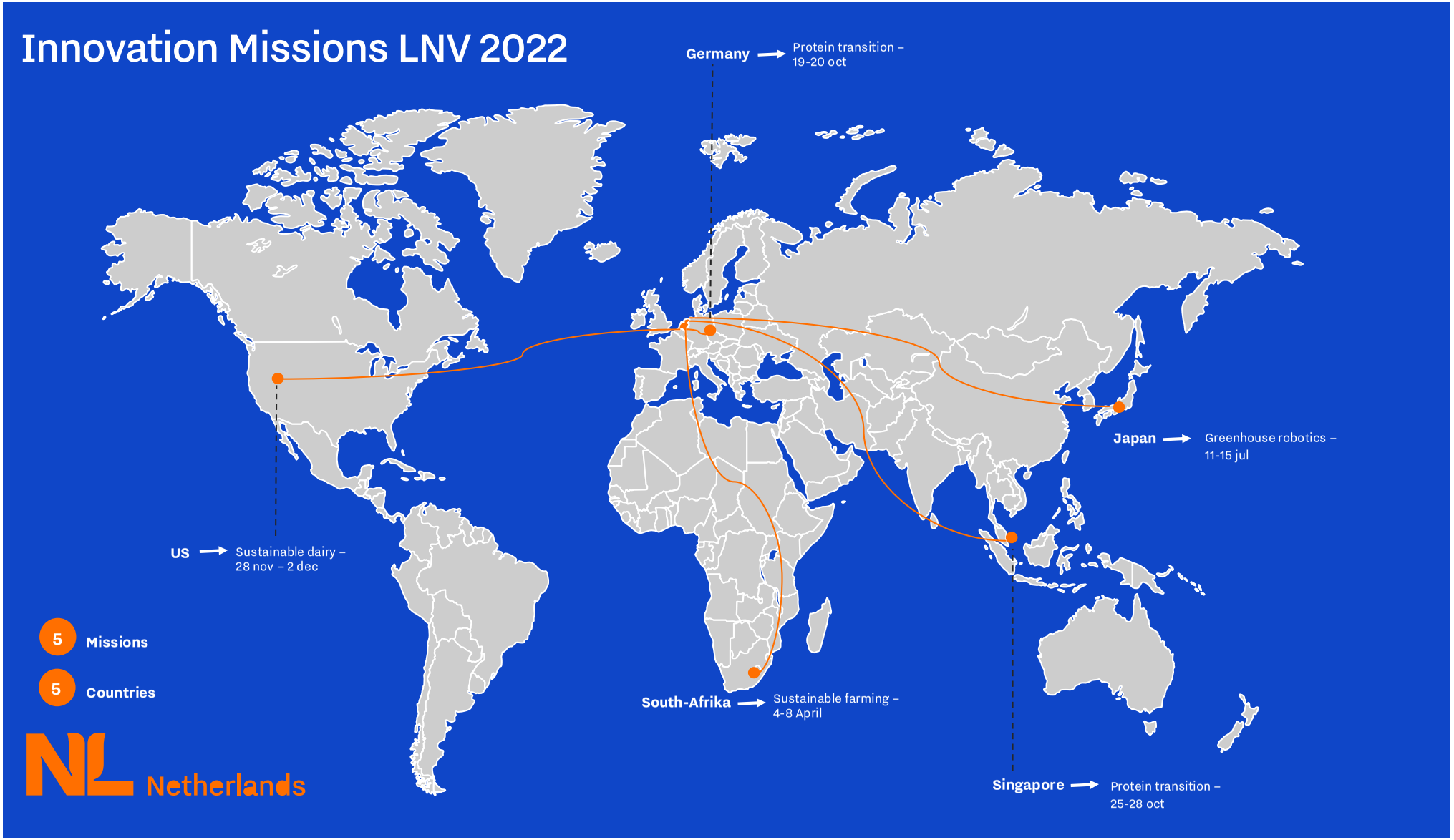
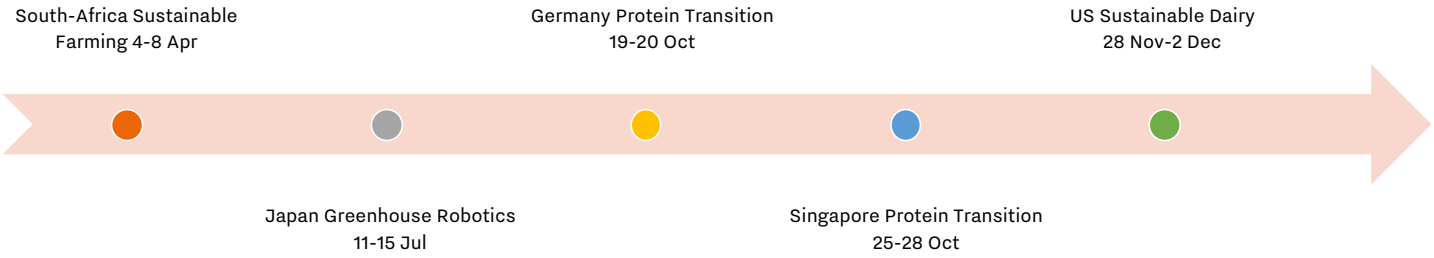
Table 5. Overview of Cyber, Defence & Water Security Innovation Missions

Country	Objectives	Topics	Participants
Sweden	• Create common understanding between governments to develop capabilities • Form NL-SE business and/or research EDF partnerships.	• Digital transformation, underwater warfare, space, materials, and components.	27

Ministry of Agriculture, Nature, and Food Quality


Innovation Missions LNV 2022
Germany
Protein transition – 19-20 oct
Japan
Greenhouse robotics – 11-15 jul
US
Sustainable dairy – 28 nov – 2 dec
South-Afrika
Sustainable farming – 4-8 April
Singapore
Protein transition – 25-28 oct
5
Missions
5
Countries
Netherlands



Sustainable Farming (Outbound, South-Africa)

Background

In 2019, the Dutch Ministry of Agriculture, Nature & Food Quality, Topsector Horticulture, Topsector Agri & Food and The Netherlands Enterprise Agency (RVO) established a multi-year and multi-national Research and Innovation initiative with the aim to actively stimulate and enhance international knowledge and technology innovation cooperation. RVO and LAN network representatives in South Africa are the main coordinators of this initiative. Part of this initiative is to facilitate activities to identify opportunities and stakeholders for B2B/K2K Research and Innovation consortia. This mission was organized as a follow up on a digital mission in 2020 and to further strengthen existing contacts and to explore new NL-SA collaboration possibilities.

Summary

During the mission we attended several meetings and workshops. One of the workshops was focused on the redevelopment of the Grootvlei power station area into agricultural land. In line with the Just Energy Transition in South Africa, coal-fired power plants will be closed in the coming years – creating new jobs for local communities. Our delegation was encouraged to come up with suggestions how to contribute to this project. During the week we also visited several types of farms to get a better understanding of the agricultural practices in South Africa (e.g., avocado, and citrus farms in the Tzaneen region). Additional visits were made to Insectech (a local company for integrated pest management), Flying Swans (a consolidation center) and three vineyards in Western Cape (Imbuko, Schoone Oord, Elnie Nursey). Climate change (specifically water scarcity) and the strict EU export regulations are of growing concern to the SA farmers. This creates a need for more sustainable and organic solutions that reduce residues and environmental impact. On the final days of the mission, we visited Stellenbosch University in which 30+ SA stakeholders joined for a workshop to identity collaboration opportunities on, amongst others, plant health, soil & water, and biodiversity, the Overberg District to learn more about the cultivation of apples and pears, and the University of Western Cape to discuss cooperation and PhD exchanges. Finally, several network receptions and dinners were organized (including one with the Cape Town provincial Minister of Agriculture, a senior representative of Cape Town Municipality and the Mayor of Overberg District).

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Greenhouse Robotics (Outbound, Japan)

Background

In the past two years several online events (digital mission and series of webinars) were organized to explore interest in NL-JP collaboration in the field of agricultural robotics. Results showed that there is an interest from both sides. Particularly, on digitalization and greenhouse horticulture as both countries struggle with labor shortages while demands for safe and healthy food is growing. Increased automation, autonomous growing and robotics solutions can help to solve this challenge. Moreover, Japan's ageing society (including farmers and agricultural workers) is getting strong attention from the Japanese government in which they aim to further digitalization of society. The Netherlands, specifically in agriculture, is considered a strong partner.

Summary

A strong part of the mission was the Topsector's seed money project JaNeth Onshitsu Robotto. During the innovation mission, our delegates (including leading horti-tech companies, research institutes and representatives from OostNL and LNV) met with representatives of Japan's leading high-tech companies (NTT Agri Technology, Panasonic, Kubota, Yaskawa), several startups (AGRIST, GINZAFARM, i-eat, Inaho), greenhouse facilities (Asai Nursery, AgriD, Aeon Agri Create, Yume Farm JA Zen-Noh) and research organizations (NARO, Ehime University, R&D Center for the Plant Factory of Osaka Metropolitan University). In addition, a subcommittee meeting of the bilateral Agricultural Policy Dialogue was held at MAFF in which open innovation and international research collaboration was discussed. The mission concluded with a visit to one of Japan's largest retailers, Aeon, to get an impression how fresh produce is offered to the consumer. Each of these visits, helped to improve understanding of Japan's greenhouse horticulture, digitization within the field (e.g., use of data, robotics), explore possibilities for joint R&D. The overall impression of the delegation was that Japan's robotics expertise was like The Netherlands, which provided interesting leads for technology collaboration. This will, however, require serious efforts and long-term investments. A first step can be to invite experts of Yaskawa, Panasonic and NTT to The Netherlands and show them what we are doing in the field of greenhouse robotics. In the short term, investing in smaller projects (e.g., under a larger PPP program), with various use cases could be a strong next step for the seed money project.

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Protein Transition (Outbound, Germany)

Background

The Ministry of Agriculture, Nature & Food Quality stimulates public-private partnerships and bilateral innovation cooperation in support of the protein transition. These efforts contribute to the National Protein Strategy in which goals are set to transition to a new food balance in which plant-based protein sources are used. Consequently, this requires the increased production of protein-rich crops in The Netherlands and the development of alternative protein food. As part of stimulating the protein transition, a growth fund proposal on cellular agriculture has been granted. This will support development of cultivated meat and animal-free dairy. In support of this, several innovation missions will be organized. Germany has been selected as one of the countries for such a mission. This short, small-scale mission was organized to have exploratory discussions with relevant stakeholders in the NRW border region Niedersachsen.

Summary

As part of this exploratory mission visits were made to Münster and Lemgo to meet with a group of regional stakeholders to explore collaboration opportunities. FH Münster hosted a workshop involving a group of 6 German stakeholders from the region, including industry, research, and local government. Several topics were discussed: primary production of protein rich crops, process development and processing equipment, and consumer insights and market development. At the Technische Hochschule Ost-Westfalen another meeting was organized to learn more about their ongoing research programs on plant-based proteins as well as food processing technology. Each of the meetings we held during the week, illustrated that there is mutual interest to explore collaboration. While a focus topic is still being discussed, both sides showed ambition to take a complete value chain approach. Proposed was to focus food processing while connecting it to the local farmers and the end-consumers. We will continue to determine the key processing subjects that are of mutual interest and that helps to ensure great taste (texture, flavors, look) and nutritional values.

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Protein Transition (Outbound, Singapore)

Background

Next to Germany, Singapore is also a potentially important partner to reach the goals set in the National Protein Strategy. Singapore is currently the only country in the world allowing the consumption of cultivated meat and is pioneering regulations in this field. It has an ambitious 30-by-30 strategy (aiming to increase local food production from less than 10% currently to 30% in 2030). Moreover, the focus on novel foods and alternative proteins as well as its hub-function in Asia make it an interesting country to partner with, and to organize an innovation mission to.

Summary

The mission took place during the Singapore International Agri-Food Week (SIAW), a week full of events, including the Regulators Roundtable on Novel Foods, the Agri-Food Technology Expo Asia (AFTEA), Asia-Pacific Agri-Food Innovation Summit and the Global Agri-Food Scientific Symposium. Apart from the official SIAW events, additional visits and events were organized. First, a visit to the Nanyang Technological University (NTU) in which the delegation visited the Food Science and Technology program in which the group's research activities were presented. Second, a visit to the Protein Innovation Center of Bühler and Givaudan. These two world-leading companies in food processing equipment and food flavoring have established this center to enable (start-up) companies to test and develop their plant-based products.
In addition, a NL-seminar was organized to present the Dutch innovations in cellular agriculture and plant-based alternatives, and a networking reception (hosted by the Ambassador) in which 2 collaboration agreements were signed by Meatable and Mosa Meat with Singapore-based manufacturer Esco Aster to start production of cultivated meat in Singapore.

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Sustainable Dairy (Outbound, United States)

Background

In 2019, dairy has been added to the existing LoI on Agricultural Cooperation between California and The Netherlands. This LoI includes important topics such as agri-tech (e.g., CEA, precision agriculture, robotics, and automation), food innovation (e.g., alternative proteins), and AMR (anti-microbial resistance). Dairy is a key-sector in the agri-food industry of both California and The Netherlands, providing nutritious food and significant economic activity. At the same time, the sector is also facing sustainability and environmental impact challenges. An innovation mission will help to further explore these challenges and the opportunities for addressing them.

Summary

During the mission we had several visits, network receptions and meetings. A first visit was to a dairy farmer with +/- 300 cows. Such a size is in California too small (!) to be competitive as a generic milk producer due to small margins. Consequently, identifying a niche is essential for these companies to survive. The farm employs robotic milking technology and produces renewable energy from methane. Other farms were visited in the Central Valley (1100, 5500, and 700 cows). Sustainability is a concern for these farms (specifically related to water scarcity), and several measures are taken (mostly to address methane). While climate regulations are still less strict in California, the sector is closely monitoring developments in Europe and The Netherlands. There was keen interest to learn from innovative Dutch approaches to increase sustainability. In addition to the visits, a technology session was hosted at UC Merced in which companies could pitch their products (e.g., animal health, manure treatment, feed additives, feeding technology, robotics). Finally, we attended a research and policy session, in which representatives from the CA Department of Food and Agriculture (CDFA), University of California and Dairy Cares were present. State Secretary Karen Ross (CDFA) opened the session together with Guido Landheer and both shared their vision on a sustainable dairy sector and CA-NL cooperation. This session provided insights in current policy and expected developments, and research on various sustainability aspects (including feed, methane emissions, water).

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Table 6. Overview of Agriculture, Nature, and Food Quality Mission

Country	Objectives	Topics	Participants
Japan	• Gaining insights into the greenhouse horticulture sector in Japan • Understanding market trends and technology developments • Gaining insights in the status and ambitions of companies entering the robotics domain • Establishing new contacts with growers, technology companies and researchers • Exploring PPP collaborations together with Japanese partners under the program of the Topsector Horticulture and Starting Materials.	• Digitalization in agriculture (data, robotization) • Greenhouse horticulture • Innovative growing • Open innovation and research collaboration	9
South-Africa	• Gaining insights in the South African fruit and vegetables sector • Follow up on existing contacts from a digital mission in 2020 • Establishing new contacts with potential local partners and customers • Stimulate cooperation on Innovation and Public-Private partnerships	• Climate smart agriculture • Remote sensing • Organic fertilizers • Water management	10
Germany	• Gaining insights in trends and developments in research and industry • Gaining insight into the relevant alternative protein ecosystem • Preparing steps towards a full innovation mission in 2023	• Plant-based proteins • Food processing • Fermentation	5
Singapore	• Strategic Dialogue with Singapore authorities on 30-by-30 strategy (Proteins, Vertical Farming and Aquaculture) • Gaining insights into the Singapore innovation ecosystem • Exchange on regulatory policy of novel foods • Insights in market trends in Singapore/Asia in alternative proteins • Establishing contacts with potential partners • Stimulate Innovation cooperation and PPPs	• Cellular agriculture • Plant-based meat alternatives • Precision fermentation • Food processing	15
United States	• Gaining insights into the current state of the dairy sector in California • Gaining insight into the policy developments regarding sustainable dairy • Understanding market trends and technology development • Establishing new contacts with dairy farmers, technology companies and researchers	• Livestock farming • Manure solutions and emission reductions • Smart dairy (data & automation)	11

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For an overview of the Agriculture Attaché network go to: https://www.rvo.nl/onderwerpen/buitenlandnetwerk/landbouw-attache-netwerk-lan