




Health & Care

Knowledge and Innovation Agenda 2020-2023

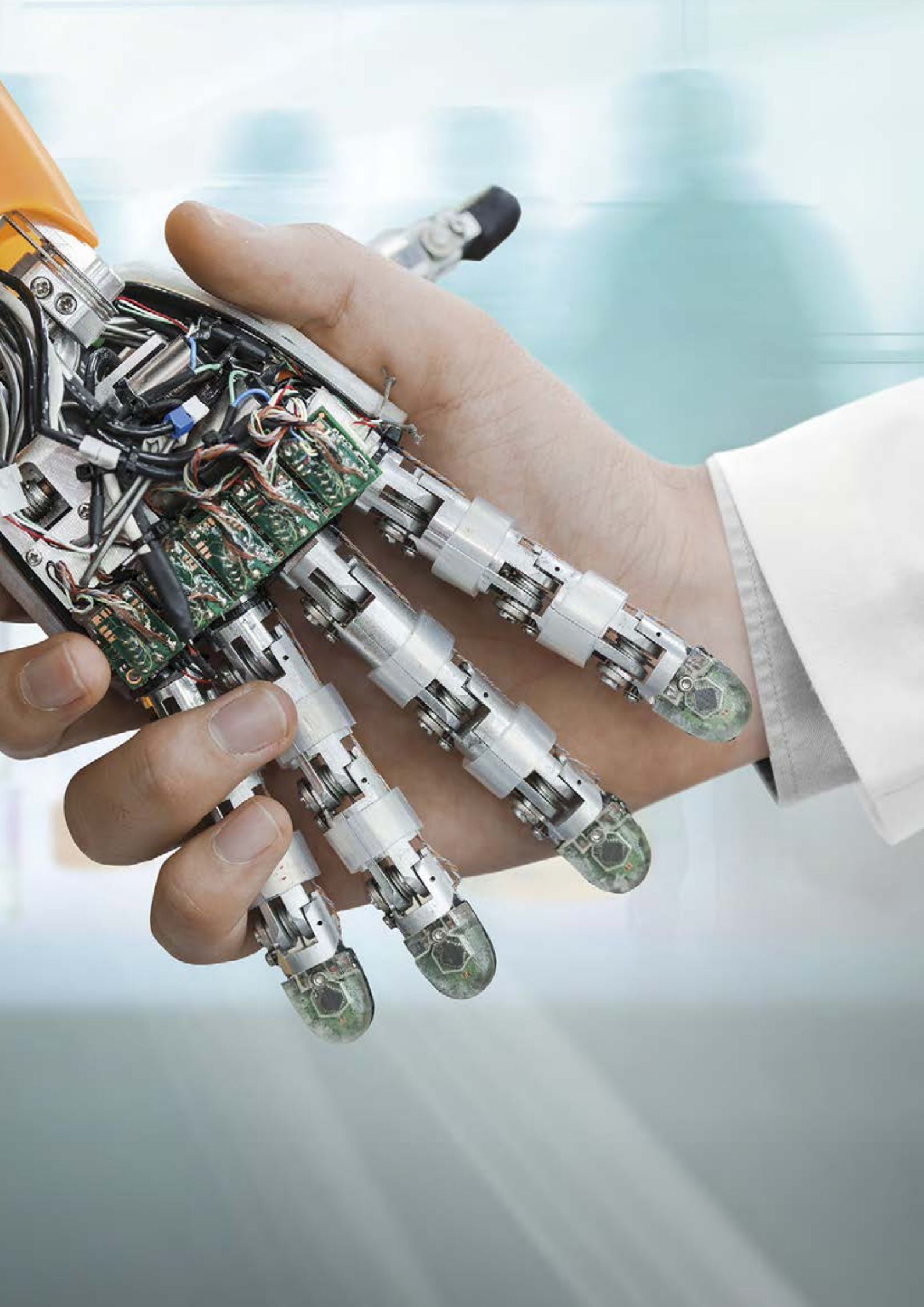
Vital functioning citizens in
a healthy economy

Health~Holland



'We cannot keep healthcare the way it is now. We need to look for new forms. We need to strengthen three areas. The first is prevention: we need to invest much more in prevention and avoiding spiralling care costs. A business model for prevention is still lacking. The second is moving the place where care is provided: from waiting room to living room. And the third is replacing care with innovative solutions. All three areas require intensive cooperation. Across departments, in the community, within the regions.'

DUTCH MINISTER FOR HEALTH, WELFARE AND SPORT, HUGO DE JONGE
(MEDISCH CONTACT, 20 JUNE 2019)



Foreword

The world faces enormous societal challenges, challenges that we can only meet by joining forces and innovating. As an innovative country and as a health and care coalition, the Netherlands is known for its many public-private collaborations, something to which the top sectors have contributed substantially in recent years. The new Mission-driven Top Sectors and Innovation Policy builds on this strong infrastructure of knowledge and innovation. It does so by focusing on four societal themes: Energy Transition & Sustainability; Agriculture, Water & Food; Health & Care; and Security.¹ In April 2019, the relevant ministries and the Top Sector partners drew up 25 specific missions for these themes. These missions were then approved by the Cabinet.

In these missions, economic opportunities for the Netherlands and its sectors go hand-in-hand with the desired and necessary societal changes. Success will depend on the proper societal embedding of technological innovations. The health and care coalition therefore includes not only knowledge institutions, industry and government (the “triple helix”), but also citizens as end users (the “quadruple helix”). Citizens are an essential coalition partner in the current era of innovation. Technological innovation and social innovation go hand-in-hand.

It is now increasingly common for the end user to be a coalition partner in health and care innovation policy. Health and care solutions therefore have much to offer to each citizen, society as a whole and the economy. These solutions are not only relevant and profitable in the Netherlands, but also across national borders. All of this motivates me, as a new chair of Top Team LSH, in chairing our strong and focused coalition for this societal theme. With these new missions, we can continue our journey together towards vital functioning citizens in a healthy economy.

I am proud to take over the baton from my predecessors Hans Schikan (acting chair 2017–2019), Jan Raaijmakers (2015–2017†) and Rob van Leen (2012–2015). To date, the emphasis has been on structure, synergy and alignment in the sector. Now we can build on this solid foundation, with which we will really need to face the enormous challenges in health and care together. I invite all of you to contribute.

On behalf of the entire coalition for the societal theme Health & Care:



ir. Carmen van Vilsteren
Chair Top Sector LSH
Chair Top Team LSH



dr. Erik Gerritsen
Secretary General, Ministry of
Health, Welfare and Sport
Member Top Team LSH on behalf
of the government



prof. dr. Huibert Pols
Emeritus Rector Magnificus
Erasmus University Rotterdam
Member Top Team LSH on behalf
of science



Len de Jong
CEO Enraf-Nonius
Member Top Team LSH on behalf
of industry



prof. dr. Pancras Hogendoorn
Dean, Vice Chair Executive Board,
LUMC
Member Top Team LSH on behalf
of science



Hans Schikan, PharmD
Former CEO Prosensa
Member Top Team LSH on behalf
of industry



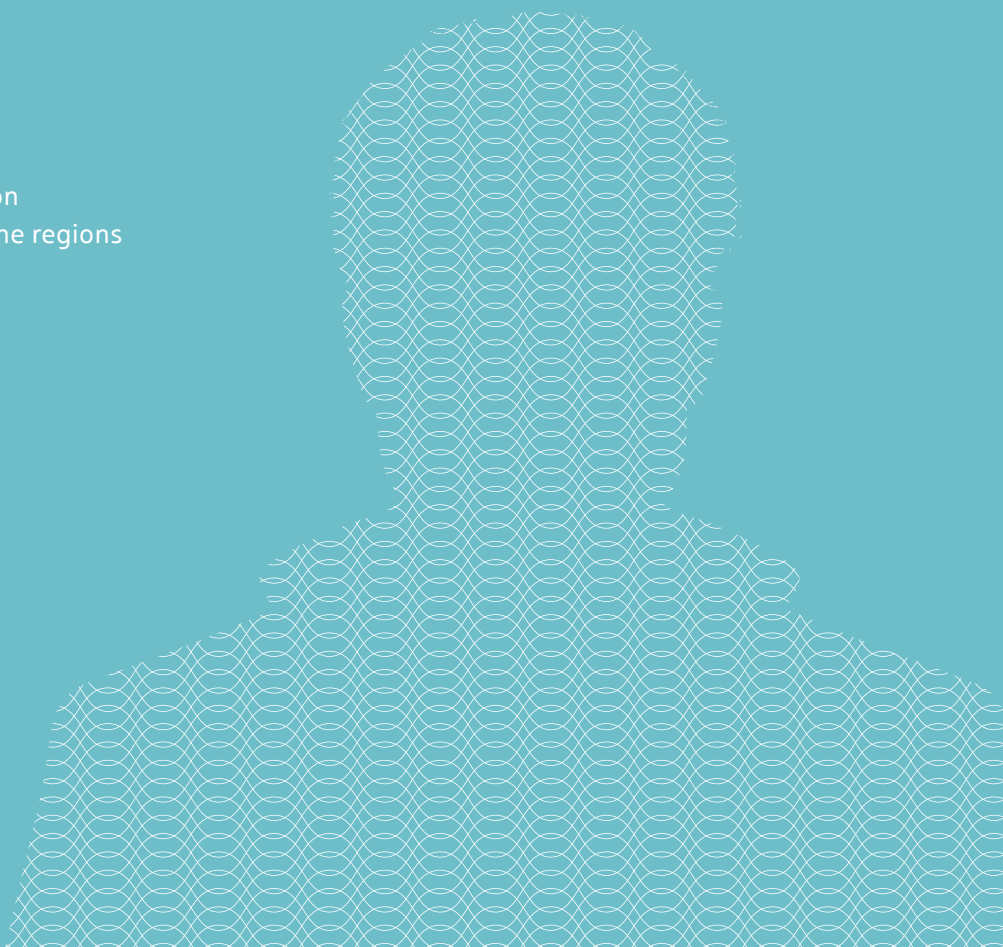
prof. dr. Nico van Meeteren
Executive Director, Top Sector
LSH office

Contents

2	Foreword
4	Acknowledgements
6	Management summary
8	Reader's guide
9	Introduction
17	MULTI-ANNUAL MISSION-DRIVEN INNOVATION PROGRAMMES (MMIPs)
18	MMIP Central mission: Longer in good health
21	MMIP Mission I: Lifestyle and living environment
25	MMIP Mission II: Care in the living environment
29	MMIP Mission III: Increased participation for people with chronic diseases
34	MMIP Mission IV: Quality of life of people with dementia
37	STRATEGY
39	A. Instruments
39	Public-private partnerships and projects
39	Key Enabling Technologies and Methodologies
41	Field labs (<i>GROZZerdammen</i>)
43	Illustration projects
46	B. Prerequisites
46	Communication
47	Funders and investors
48	Valorisation and market creation
51	Programmatic cooperation in the regions
53	Internationalisation
54	Human capital
56	Monitoring and evaluation
58	Organisation and governance
59	APPENDIX
60	Abbreviations and glossary
62	References

Preamble

This Knowledge and Innovation Agenda (KIA) 2020-2023 was drawn up in the second quarter of 2019 by a broad coalition of partners with Top Sector Life Sciences & Health (LSH) as its coordinator and coalition builder. The KIA was commissioned by the State Secretary Mona Keijzer for Economic Affairs and Climate Policy, Mona Keijzer, in line with the Mission-driven Top Sectors and Innovation Policy adopted by the Rutte III Cabinet. The LSH is a public-private cooperation focusing on the societal theme Health & Care. Its missions were formulated in the first quarter of 2019 by the Ministry of Health, Welfare and Sport, and approved by the Cabinet on 26 April 2019. These missions formed the guideline for this strategy paper. On 1 November 2019, the coalition delivered the associated Knowledge and Innovation Covenant 2020-2023. The Covenant describes the implementation, execution and resources (in mind, in kind and cash) of the strategy laid down in this KIA.



Acknowledgements

This Knowledge and Innovation Agenda has been drawn up for, by and on behalf of many participants. Colleagues representing public authorities, umbrella and sectoral organisations, top sectors, societal challenges, Key Enabling Technologies and Methodologies, businesses, funders and investors have all contributed, as have colleagues working in prevention, healthcare and knowledge institutions, education and training. The Top Team members would therefore like to start by thanking everyone, in no particular order, who has already worked with us in recent months to draw up this agenda and to build the coalition. As leaders of the public-private partnership for the societal theme Health & Care, we also hope that this inspiring prelude has set the tone for our future cooperation as a theme coalition. And, on behalf of the coalition, we would urge anyone who feels included in this invitation to come and get involved in executing the activities in order to accomplish the missions. Please join us, so we can work together on the future of health and care with all.

Thanks to...

Knowledge institutions

Citizens

Industry

Government

Nienke Zwennes (VWS), Herm van der Beek (EZK), Ronald Dekker (SZW), Jan-Maarten van Sonsbeek (SZW), Lonneke Baas (IQ), Mark Monsma (SGF), Tonnie Rijkers (RVO), Alexander Schippers (Oost NL), Anthony Stigter (VNO-NCW), Wijnie van Eck (Wageningen University and Research, Top Sector Agri & Food), Sjerp de Vries (Wageningen University and Research, Top Sector Agri & Food), Fred van Roosmalen (Top Sector HTSM), Bart Ashmann (CLICKNL), Joop Spijker (Top Sector Horticulture & Starting Materials), Timen van Haaster (HollandBIO), Albert Veenstra (Top Sector Logistics), Henk-Jan Vink (TNO), Merit Cloquet (ZonMw), Maroeska Rovers (Radboudumc, HI-NL), Carl Moons (UMC Utrecht, HI-NL), Karen van Ruiten (Alles is gezondheid), Karin van Gorp (ZonMw), Henk Soorsma (VWS), Koen Berkenbosch (VWS), Symone Detmar (TNO), Jolanda Keijsers (TNO), Joris van der Hurk (Care-IQ), Frits van Krieken (Care-IQ), Peter van Dijken (TNO), Hanneke Molema (TNO), Paulien Bongers (TNO), Seth van den Bossche (TNO), Marjan van Erk (TNO), Alice Kroeze (SGF), Floor van Bakkum (Jellinek), Tamara de Bruijn (Jellinek), Annelies Dijk (Wageningen University and Research), Milou Segeren (BuZa), Anja Pels (VWS), Chris Flim (VWS), Claire Hostmann (VWS), Robert van Haaften (RVO), Sandra Eikhout (TNO), Dik Hermans (VitaValley), Micha van Lin (TFHC), Cule Cucic

(ZonMw), Frank Pierik (ZonMw), Annemarie Penders (ZonMw), Edwin Dekker (FME), Hanneke Torij (HR), Andrea Evers (Leiden University, NeuroLabNL), Dominique Meijders (Provincie Overijssel), Eveline de Graaff (IPO), Sander Vorselman (Royal HaskoningDHV), Eva Klein-Schiphorst (Royal HaskoningDHV), Clementine Mol (Royal HaskoningDHV), Frans van den Boom (HVP), Cathy van Beek (Radboudumc, VWS-Quartermaster sustainable care), Douwe Breimer (Leiden University), Albert Feilzer (ACTA), Willem Fokkema (ACTA), Inge Steinbuch (Actiz), Marco Blom (Alzheimer Nederland), Martijn Boot (Amgen), Ulrike Jacobi (Amgen), Jannie van den Broek (Amgen), Claudi Bocking (Amsterdam UMC), Nathalie Labrouche (Cicero), Jann de Waal (CLICKNL), Esther de Jong (DC4Balance), Rogier van Gent (Dutch Diabetes Research Foundation), Eline Slagboom (LUMC, DuSRa), Jelle van der Weijde (Economic Board Utrecht), Gerald de Haan (Eriba), Gonda Stallinga (UMC Groningen, ICF), Teun Aalbers (Gainplay studio), Henriëtte Treurniet (GGD-GHOR), Barend Mons (Leiden University, GO-FAIR), Miranda Laurant (HAN University of Applied Sciences), Floris Italianer (Dutch Heart Foundation), Janny van den Eijnden (hDMT), Kim Peters (HIP), Chris Doomernik (Health Valley), Jeroen den Hertog (Hubrecht Institute), Nadia Rozendaal (HVP), Kris Bulder (IMDI), Ton van der Steen (Erasmus MC, IMDI), Hans Rietman (University of Twente, IMDI), Marianne Biegstraaten (ZonMw), Manuella Wilts (Janssen Pharmaceutical Companies), Agnes Gebhard (KNCV), Dominiek Veen (License to Heal), Remko van Leeuwen (Madam Therapeutics), Gilles van Wezel (Leiden University, NADP), Wim Timens (NVVP), Tess Maas (Gortemaker Algra Feenstra), Femke Feenstra (Gortemaker Algra Feenstra), Menno Hinkema (TNO), Caroline Emmen (Nefemed), Bastian Mostert (DCVA), Douwe Atsma (NeLL), Richard van Wezel (NeuroTech-NL), Chris Polman (Amsterdam UMC, NFU), Cordula Wagner (Nivel), Gerrit Meijer (NKI, Health-RI), Dirk Pekelharing (NLC), Gerrit van Meer (NWO), Ton Rijnders (Oncode), Mario de Zeeuw (Panton), Murk de Roos (DGMI), Patricia Heijdenrijk (Pharos), Leon Noorlander (Pharos), Marleen Kaatee (PSC Patients Europe), Michel van Schaik (Rabobank), Richard Slotman (Taskforce for Applied Research SIA), Marieke van Ham (Sanquin), Bernadette Lohuis (Saxion), Rob Baardse (SGF), Eleanne Plaizier (SGF), Bernique Tool (SGF), Theo Mulder (Radboud University, ICMS), Bram Buiting (Welzijn Lochem), Janneke Samson (TIMID), Han van de Sandt (TNO), Nico Verdonschot (University of Twente, TopFit), Oscar van den Brink (Top Sector Chemistry), Loek Hermans (Top Sector Horticulture & Starting Materials), Hans Kroon (Trimbos), Annemarie van Elburg (Trimbos), Roel Vermeulen (Utrecht University), Alke Nijboer (V&VN), Henk Bakker (V&VN), Wim Smit (MRDM, Value2Health), Carla Vos (VIG), Miriam Vollenbroek-Hutten (University of Twente, Vitaal Twente), Martina Cornel (VSOP), Mai Chin A Paw (VUmc), Gerard Dekker (VWS), Jeroen Crasborn (Zilverenkruis Achmea), Guy Schulpen (ZIO), Benien Vingerhoed (ZonMw), Arthur ten Have (OHC), Hayde Zarkeshan (Maatschappelijke Alliantie), Mark van

Houdenhoven (St. Maartenskliniek), Tim Vos (NWO BBoL), Jolande Sap (NPHF Federatie voor Gezondheid, Com. Vraagfinanciering mbo), Michiel Blind (Deltares), Joke Cuperus (PWN), Paul Hekkert (TU Delft), Linda Rindertma (CLICKNL), Peter Zandbergen (Philips), Casper Garos (Philips, Top Sector HTSM), Bart Verkerke (UMC Groningen, SPRINT), Anke-Hilse Maitland-van der Zee (University of Amsterdam, P4O2), Tom Mastenbroek (RegMed XB), Hanneke de Kort (LUMC), Harm Jan Bogaard (Amsterdam UMC, P4O2), Marianne van der Steen (Maastricht University, RegMed XB), Maxime Verhagen (Bouwend Nederland), Richard Mulder (BTIC), Huub Keizers (BTIC), Birte van Elk (RIVM), Loek Stokx (RIVM), Helianthe Kort (Utrecht University of Applied Sciences, TU Eindhoven), Peter-Bram 't Hoen (PHT), Pieter Roelfsema (NeuroTech-NL), Cor Oosterwijk (VSOP), Bea van Golen (LNV), Inge Valstar (ZonMw), Miriam Luizink (Roessingh Research and Development), Peter van der Kraan (Radboudumc), Daniel Tijink (ECP), Irene Heikens (ECP), Debby Weijers (Stichting Proefdiervrij), Harmen de Jongh (TU Eindhoven), Anika Snel (KNCVIBC), Beatrijs Stickers (KNCVIBC), Nathalie Veenman (KNCVIBC), Ruben Kok (DTL), Yvonne Heerkens (HAN University of Applied Sciences, NPI), Coen van Gool (RIVM), Louis Overgoor (Bettery), Arianne van Lavieren (Zilverenkruis Achmea), Ivana Bobeldijk-Pastorova (TNO), Nard Clabbers (TNO), Wiek van Gilst (Dutch Heart Foundation, DCVA), Luuk Klomp (EZK), Dirk Jan Duncker (DCVA), Rebecca Abma-Schouten (Dutch Heart Foundation), Kees de Joncheere (NADP), Constance Schultsz (AMR-Global), Mark Bonten (UMC Utrecht), Anne van Grinsven (Woonzorg Nederland), Freek van Muiswinkel (Utrecht University, NCOH), Dick Heederick (Utrecht University), Heine van Wieren (UMC Utrecht), Chantal Laurens (Menzis), Peter Bertens (VIG), Dineke Amsing (VIG), Judith van Schaik (Roche), Jolanda de Vries (NVVI), Robert Schoevers (UMC Groningen, IMPROVE), Irene Mateo Leach (UMC Groningen), Jeroen Postma (OCW), Karin Alfenaar (Utrecht University of Applied Sciences, Ucreate), Walter Amerika (Utrecht University of Applied Sciences, Ucreate), Rick Grobbee (UMC Utrecht, NWA Preventie), Stefan Sleijfer (Erasmus MC, NWA Personalised Medicine), Judi Mesman (Leiden University), Ton Rabelink (LUMC, NWA Regenerative Medicine), Cees Vervoorn (Amsterdam University of Applied Sciences), Koen Lemmink (UMC Groningen), Inald Lagendijk (TU Delft, NWA Big Data), Teun Bokhoven (Consolair), Marco Beijersbergen (Cosine), David Kleijn (Wageningen University and Research), Rob Hamer (Wageningen University and Research), Monique Volman (University of Amsterdam), Julia Henrich (Leiden University), Jeroen Raijmakers (Philips), Esther Gervers (Gloedmakers), Frederieke Vriendts (Friz), Geert Frederix (UMC Utrecht), Ricco Buitink (VWS), Bakir Bulic (Maastricht University), Michel Italiaander (MR Coils), Niek Dubelaar (Invest-NL/KNAW), Janneke Timmerman (EZK), Anne Reitsma (LNV), Nadja Duykers (EZK), Anja Hezemans (EZK), Martijn Janmaat (EZK), Martijn Rooijackers (EZK), Lucien Vijverberg (EZK), Tamara de Bruin (Utrecht University of Applied Sciences), Anton Franken (VH- Utrecht University of Applied Sciences), Els Loeff (Hanze University of Applied Sciences), Frank van der Zwan (VH), Stephan Dekker (VWS), Jasper Boomker (Neokidney), Wouter Eijgelaar (Nierstichting), Mieke Schutte (hDMT), Bas Knuttel (IenW), Robbert Thijssen (IenW), Marlene Reijnen (OCW), Bas Warmenhoven (EZK), Mark Lengton (EZK), Jolijn Zwart-van Kessel (Wageningen University and Research), and anyone else from current or prospective coalition partners that we may have forgotten! **Theme team:** Hans van Oers (VWS), Liliane de Ruiten-Nanninga (VWS), Henri Géron (SZW), Clementine Vooren (SZW), Wilma van Donselaar (ZonMw), Jan Pelle (BOM), Dick

de Jager (BOM), Jan Rietsema (Provincie Overijssel), Alfred Peterson (Provincie Overijssel), Ton Flaman (Top Sector HTSM), Leo Warmerdam (Top Sector HTSM), Bas van Schooten (Top Sector Chemistry), Bas van Bree (Top Sector Logistics), Ferry Koper (CLICKNL), José Vogelesang (Top Sector Horticulture & Starting Materials), Kees de Gooijer (Top Sector Agro & Food), Fred Boekhorst (DDD), Patrick Cramers (Taskforce for Applied Research SIA), Stella Koppel (Top Sector Chemistry, NWO), Lise de Jonge (NWO-AES) and Ashna Raghoebarsing (EZK). **Sounding board group:** Amy Davies (SGF), Wilma van Donselaar (ZonMw), Iris van Bommel (FME), Robert Thijssen (EZK), Ashna Raghoebarsing (EZK), Simone de Graaf (ZonMw), Fabian Pruisen (HollandBIO), Hans Hennekam (TNO), Steven Jonis (TFHC), Joep Welschen (KplusV), Shanna Ferdinandus (VIG), Niels van Leeuwen (RVO), Melanie Schmidt (NFU), Jacqueline Pot (SIA), Anne-Ruthi Knevel (OCW), Sander Hougee (ZonMw), Lise de Jonge (NWO-AES), Emiel Rolink (SGF) and Ferry Koper (CLICKNL). **GROZ transition teams. Citizens' initiatives:** Jurriaan Pröpper (OptiMedis), Jan Smelik (NLZVE), Anja van der Aa (GezondNL), Netty van Triest (Platform31), Saskia Hinssen (Platform31), Nathan Rozema (Labyrinth), Paul van Grevenstein (NLZVE), Dieger ten Berge (JB Lorenz), Cornelis Boersma (Health Encore) en Pieter Jekel (Zelfzorg Ondersteunend). **Patients' organisations:** Dianda Veldman (PF), Klaartje Spijkers (PF), Roland de Wolf (Hersenletsel.nl), Gaston Remmers (MDOG), Rouming Hu (ZonMw), Ina Vijzelman (Ieder[in]), Dwayne Meijncens (MIND), Ben Roelands (MIND), Anne-Miek Vroom (IKONE), Annemiek van Rensen (PGOsupport) and Anne Braakman (PGOsupport). **Human Capital:** Marc Roosenboom (Gezonde Focus), Jacqueline Stuurstraat (deRotterdamseZorg), Chris Wallner (Leiden University of Applied Sciences), Ayla Kok (Fredifly), Barbara van der Linden (ZonMw), Jacqueline Pot (Taskforce for Applied Research), Thomas Plochg (NPHF), Dov Ballak (NFU) and Flora van Eck (ROC Mondriaan). **Industry:** Jan Boers (IDCP), Hans van Oosterbosch (Buddy2you), Merel Koppel (PostNL), Sebastiaan van Sandijk (First Line Software), Patricia Maas (CB), Niels van Leeuwen (RVO), Maarten van der Boon (Techniek Nederland), Marcel van Loosbroek (Zorgkluis), Paul Korte (Janssen), Rik Poulus (TNO), Jasper Rogmans (Maxxcare BV) and Joep Welschen (KplusV). **Investors and Funders:** Matthijs Blokhuis (Noaber Foundation), Maarten Fischer (Noaber Foundation), Emiel Rolink (SGF), Ruben Koekoek (Social Finance NL), Rob Peelen (Social Finance NL) and Jelena Jakulj (Shaerpa Fund). **Agenda member of Top Team LSH:** Radjesh Manna (ZonMw). **Secretariat of Top Team LSH:** Annemiek Verkamman (HollandBIO), Melanie Schmidt (NFU), Frank Flier (VWS), Patrick Kruger (VWS), Petra van Baak (EZK), Nico van Meeteren (LSH) and Ernst Nagel (LSH). **LSH Advisory Board:** Martin Paul, Marcel Joachimsthal, Frank Baaijens, Clemens van Blitterswijk, Annelien Bredenoord, Fred Dom, Leonard Geluk, Inez de Greef, Hans Hofstraat, René Kuijten, Mirjam Mol, Tom Oostrom, Anton Pijpers, Marcel van Raaij, André van de Sande, Hans Severens, Dianda Veldman, Ruben Wenselaar, Jacobien Geel, Bart van Zijll Langhout, Koen Besteman and Benno van Dongen. **Executive office of Top Sector LSH:** Laila El Aziz, Chloe Foaden, Thom Frielink, Hanna Groen, Hanneke Heeres, Darcey Helstone, Chrétien Herben, Anneli Kemper, Rebiha Lamara, Nico van Meeteren, Anneke Mels, Ernst Nagel, Stephanie van Oorschot, Andrea Stavenuiter, Patricia Schimmel, Mariska Sieslieng, Kirsten van Spronsen, Jannica Swieringa, Rachida Ulbrand, Naomi Vorstermans, Annette Wells and Jolande Zijlstra. **Board of LSH-TKI Foundation:** Len de Jong, Huibert Pols, Henk Smid and Kees Tervoort

Management summary

Business policy

In the wake of the financial crisis, Top Sector Life Sciences & Health (LSH) embarked on further developing the knowledge and innovation infrastructure. Between 2011 and 2019, Top Sector LSH initiated a variety of public-private partnerships (PPPs) and strategic partnerships based on the Business Policy of the Ministry of Economic Affairs and Climate Policy (EZK).² Government, knowledge institutions and industry – the “triple helix” – developed and validated a new range of technologies and therapies for future healthcare. The aim was *vital functioning citizens in a healthy economy*.

Mission-driven Top Sectors and Innovation Policy

This public-private investment in the knowledge and innovation infrastructure in the Netherlands will continue to develop in coming years, thereby focusing on full support of the new Mission-driven Top Sectors and Innovation Policy.³ As the coordinator of a coalition of top sectors, Key Enabling Technologies⁴ and Methodologies, government, knowledge institutions, industry and, above all, citizens, Top Sector LSH strives to capitalise on the economic opportunities of the societal theme Health & Care. The coalition does so based on the missions drawn up by the Ministry of Health, Welfare and Sport (VWS) and its partners.⁵ Demand-driven knowledge and innovation are, more than ever, at the service of healthcare and citizens’ daily functioning. Society’s safeguarding of knowledge and innovation will determine the success of the missions and economic objectives.

Knowledge and technology alone are not enough. Healthcare remains a human field.⁶ Hence the strategic decision to move from a triple helix to a quadruple helix and to involve civil society organisations and citizens fully in the strategy. Achieving the missions and economic objectives requires sufficient qualified personnel, as well as funding options for existing businesses and start-ups, valorisation – translating (scientific) knowledge and innovations into

economic and/or societal value – and market creation, cooperation with provinces and regions, internationalisation policy and innovation-friendly laws and regulations. The coalition partners in the quadruple helix are also working together on these prerequisites for the Mission-driven Top Sectors and Innovation Policy.

Missions

The Mission-driven Top Sectors and Innovation Policy encourages technological and social innovations for the societal theme Health & Care, focused on the following missions:

- **Central mission:**
 - CM By 2040, all Dutch citizens will live at least five years longer in good health, while the health inequalities between the lowest and highest socioeconomic groups are decreased by 30%.
- **Missions:**
 - I. By 2040, the burden of disease resulting from an unhealthy lifestyle and living environment is decreased by 30%.
 - II. By 2030, care is organised and provided 50% more (or more often) in people’s own living environment in cooperation with people’s network, instead of in healthcare institutions.
 - III. By 2030, the proportion of people with a chronic disease or lifelong disability who can participate in society according to their wishes and capabilities is increased by 25%.
 - IV. By 2030, the quality of life of people with dementia is improved by 25%.

Knowledge and innovation tasks

The Mission-driven Top Sectors and Innovation Policy builds on the results achieved in recent years and gives a new focus to the alliances that have emerged. In the spirit intended by

Mariana Mazzucato, the founder of mission-driven innovation,⁷ we do not give a step-by-step plan that describes in detail who should do what and when. The missions are intended to inspire the quadruple helix to innovate new technologies⁸ and therapies (a term that is interpreted broadly here⁹). Our starting point is a coherent set of knowledge and innovation questions in the field of health, care, citizens' daily functioning and quality of life.^{10,11}

We will answer these questions with a set of instruments consisting of top sector public-private partnerships (PPPs) and strategic partnerships, Key Enabling Technologies and Methodologies, and routes of the Dutch Research Agenda (NWA).¹² The answers often lead to stand-alone inventions ("point innovations"). These inventions need to be assembled and validated in field labs and illustration projects in the living environment of citizens, informal carers and professionals¹³ (ecological validation), each with their own talents.¹⁴ This set of instruments is used to translate results from scientists and entrepreneurs in their fields of work to citizens in their living environment: "from lab to life".

Key elements on a micro and macro scale of the knowledge and innovations we hope to gain are:

- Benefits: in terms of health and citizens' daily functioning; turnover and exports for businesses;
- Availability;
- Usability;
- Affordability;
- Sustainability¹⁵ and security.

Business opportunities

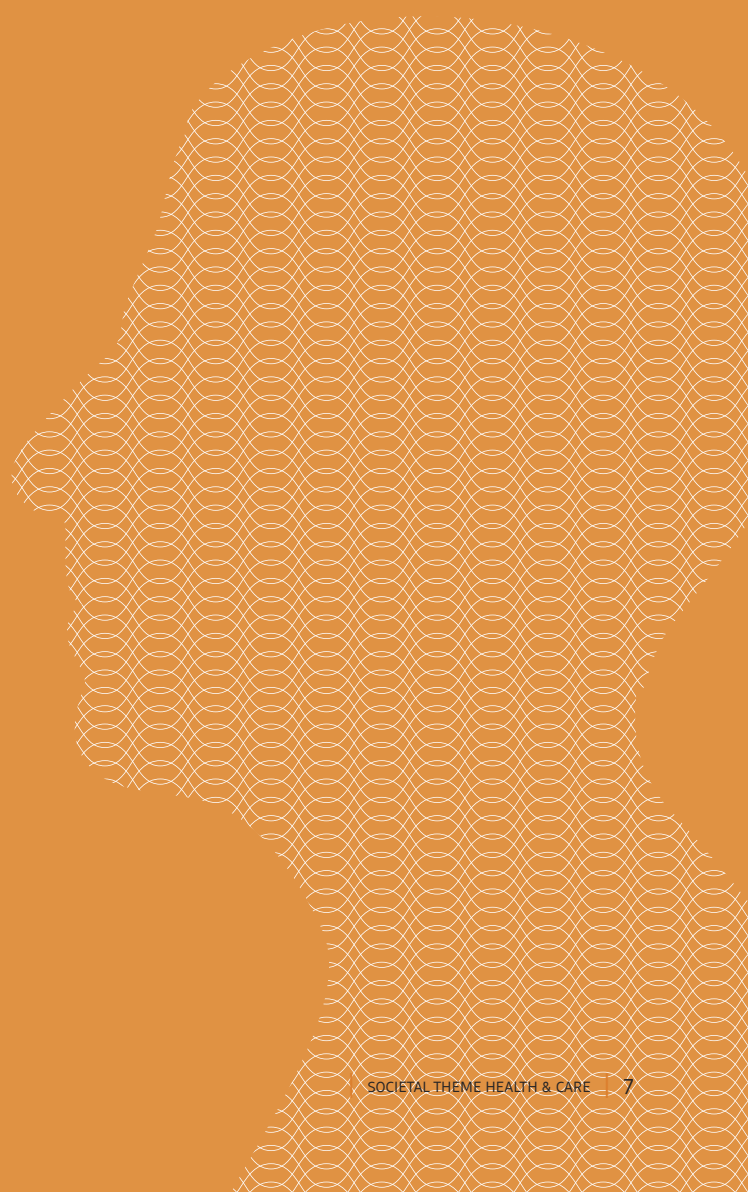
Societal challenges in the field of health and care are global. This presents Dutch industry with export opportunities, in addition to the domestic market. Through valorisation, market creation and an internationalisation agenda for cooperation and trade, we can capitalise on economic opportunities.

Cooperation with other societal themes

By adopting this KIA 2020-2023, the health and care coalition is initiating a sector-wide transition that will unfold over the next two decades. The coalition will work in combination with the other three societal themes: Energy Transition &

Sustainability; Agriculture, Water & Food; and Security.¹⁶ The focus of combining efforts between themes is on aspects such as, respectively, health and citizens' daily functioning, sustainability of healthcare, healthy food and living environment (including green spaces), and security of data and data use.

Coherence is essential for coordinating substantial changes in each of these societal themes. This means coordinating the policies of all parties involved: from the various government authorities through to human capital. In addition, the involvement of citizens in each societal theme is crucial. Broad and continuous communication is needed with society as a whole and with specific groups of citizens and professionals, at the national and regional levels. To achieve this, we will also set up appealing projects ("illustration projects") to be carried out with local parties from the quadruple helix. The coalition and its sponsors will monitor and evaluate the strategy every two years, based on the resulting societal, economic and scientific impact.



Reader's guide

This Knowledge and Innovation Agenda (KIA) 2020-2023 describes public-private collaboration as one of the resources for the societal theme Health & Care of the Mission-driven Top Sectors and Innovation Policy. In the introduction (Chapter 1), we outline how the current policy and missions will build on previous endeavours, but also how the current policy influences the vision for developments in the near and more distant future. For example, we introduce GROZ – an anagram of *zorg* (“care”; see box ‘explanation of “GROZ”’) in which the G for *gezondheid* (“health”) comes first. In the introduction we also stress the importance of field labs.

In the next section (Chapter 2), we give details of the central mission and the four underlying missions. The coherence between them is like the famous Russian Matryoshka dolls that fit inside each other and together form a whole. The central mission therefore encompasses each of the specific underlying missions. Each mission is detailed in a Multi-annual Mission-driven Innovation Programme (MMIP) of knowledge and innovation questions, as are the public-private knowledge and innovation coalitions intended to answer these questions, and the deliverables to be produced by 2023. We also summarise the questions, coalitions and deliverables for the field labs and illustration projects where innovations in citizens’ living environment will be developed and validated.

The section on strategy (Chapter 3) looks at the instruments and prerequisites that will make the KIA a success: (strategic) public-private projects and partnerships, field labs and illustration projects, communication, funders and investors, valorisation and market creation, the regions, internationalisation, human capital, monitoring and evaluation, and organisation and governance.

Throughout the various chapters, specific topics are illustrated and explained in separate text boxes to provide further information and inspiration for the reader.

This KIA 2020-2023 can of course be read as an overall strategy, but readers can also pick out an individual chapter, mission section or strategy section, depending on their own interests and involvement. Certain things may appear more than once in the text. We drew particular inspiration from the work of Marianna Mazzucato, who founded the concept of mission-driven innovation.¹⁷ Her recommendations

proved to be applicable to every part of this KIA. However, they always had to be described in the correct context of each mission or strategic instrument and prerequisite.

Explanation of “GROZ”

In 2018 Top Sector LSH anticipated a firm transition of health and care in the Netherlands for the years to come. With that perspective in mind, the Top Sector team wanted to characterize this transition in a single term that should become a buzzword for all involved. Hereto the anagram of the word “Zorg” (Dutch for “Health”) was chosen. Consequently, “Zorg” was transferred in “GroZ”, to underline the transition at the first place. This anagram also nicely holds the capital “G” which may stand for the “G” for “Gezondheid” and “Gedrag” (respectively “Health” and “Behavior”) up front, and the “Z” that may stand for “Ziekte” and “Zorg” (“Illness” and “Care”) at the end. Thereby paraphrasing at the least two mainstreams within the transition: that of the Institute for Positive Health (www.iph.nl/) and that of the Council for Public Health and Society (www.raadrivs.nl/). Both advocated strongly over the years to invest much more in the positive sides of health and in the collective change of behaviour. Literally “form ZZ to GG” as the RVS proclaimed.¹⁸



Introduction

Business policy 2011–2019

The 2011 letter to Parliament entitled *Naar de top* (“To the top”) launched a new policy for the knowledge economy:^{19, 20} the Business Policy of the Ministry of Economic Affairs and Climate Policy (EZK). This policy emphasised nine top sectors that already had a strong position on the world market and were further strengthened economically and scientifically by encouragement of public-private research and development (R&D). One of these nine sectors recognised internationally as having a strong knowledge position and reputation is Top Sector Life Sciences & Health (LSH).

Cooperation

The ecosystem of Top Sector LSH was strengthened by extensive cooperation between industry, knowledge institutions and government (the “triple helix”) as well as health foundations and other top sectors on ten specific roadmaps.²¹ The numbers of start-ups and science parks around knowledge institutions grew, with knowledge transfer and valorisation as a priority.²² Dutch and international businesses and, increasingly, small and medium-sized enterprises (SMEs) were attracted to these science parks. This led to new forms of public-private projects (PPPs) and partnerships (PPPs) in regional PPPs, and large strategic PPPs nationally. Knowledge questions from healthcare and industry found their way to researchers, with the results of this research benefiting patients and the economy.

For example, PPPs in the fields of cardiovascular disease (Dutch CardioVascular Alliance), oncology (Oncode Institute), medical technology (Innovative Medical Devices Initiative), medicines (European Lead Factory), infectious diseases (Netherlands Centre for One Health) and regenerative medicine (RegMed XB) are set to bear fruit in the coming years for people with chronic and other conditions.

Mission-driven innovation

Under the Health-Holland branding, Top Sector LSH profiles itself both at home and abroad as one of the most knowledge-intensive sectors. Valorisation of the knowledge gained through close cooperation between all stakeholders is a top priority in this context. In mid-2018, citizens’ and patients’ organisations got involved as well. This fourth party in the quadruple helix is now full partner in to determining the agenda.

This cooperation is vitally important for mission-driven innovation in health and care. Under the influenced of societal and financial/economic challenges, our current successful system of healthcare is undergoing a radical

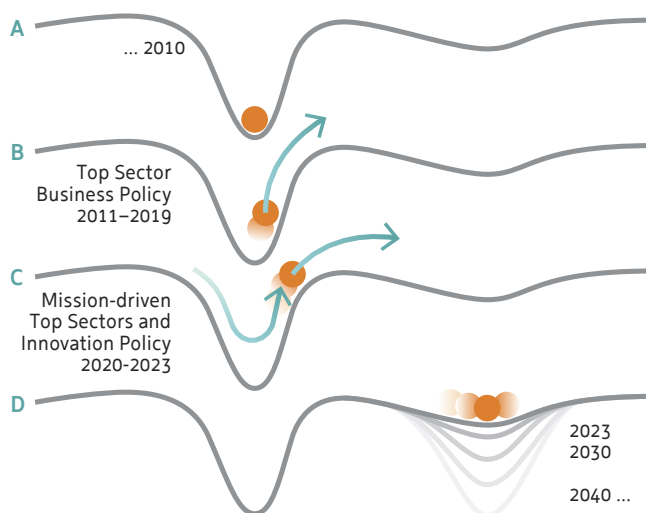


Figure 1: The transition from Business Policy (B) to Mission-driven Top Sectors and Innovation Policy (C). The top line (A) represents the stable situation before the transition; the “marble” standing for the system is firmly established in society. The triple helix – industry, knowledge institutions and government – then joined forces to take the existing healthcare system into transition. From 2018, we will use the energy of the quadruple helix – including citizens – to move forward over the next 20 years and gradually create a new, stable system for health, daily functioning and care (D).

transition. A mission-driven approach is the best way to lend direction to this shift.²³ An approach that strengthens cooperation with other top sectors and Key Enabling Technologies and Methodologies to place health in a broader perspective of daily functioning, lifestyle and living environment, and of maintaining and promoting health in everyday life.

Mission-driven Top Sectors and Innovation Policy

In line with European recommendations,²⁴ the Top Sector Business Policy was followed by the Mission-driven Top Sectors and Innovation Policy (see Figure 1), with a prominent role for the chosen societal themes, Key Enabling Technologies and Methodologies, and cooperation between top sectors, provinces, regions and citizens. Like the Business Policy, the new policy aims to use public-private collaboration to seize the economic opportunities presented by societal themes. The policy focuses on old and new markets, involving products and services for which there is a need and which actually contribute to the quality of society. When John F. Kennedy said his famous phrase ‘We choose to go to the moon!’, he set in motion a mission that led to Neil Armstrong walking on the moon seven years later. But it did not stop there: innovations such as the electronic microchip and Teflon also owe their origins to the original “moonshot”.

The missions within the Mission-driven Top Sectors and Innovation Policy refer to the major global challenges set out in the United Nations’ Sustainable Development Goals,²⁵ grouped into four societal themes:

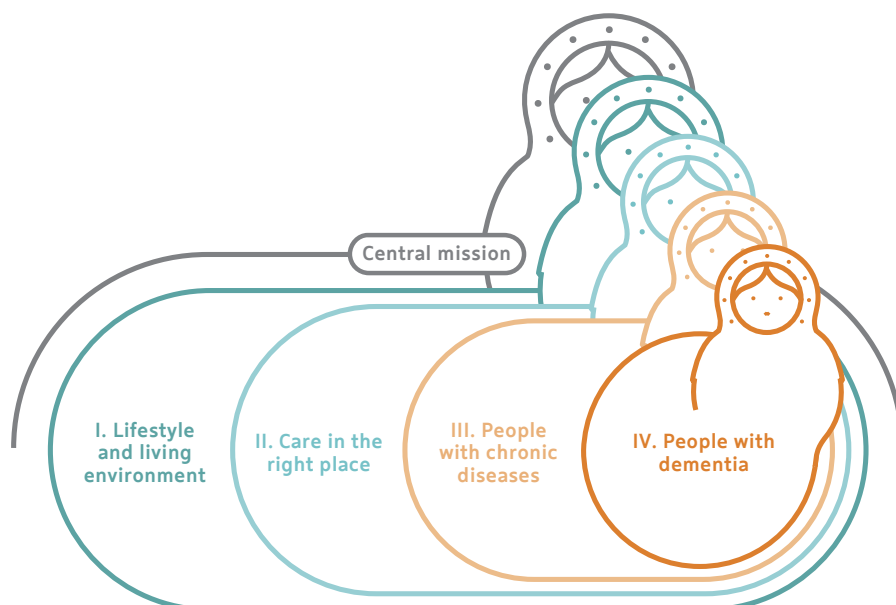
- Energy Transition & Sustainability
- Agriculture, Water & Food
- Health & Care
- Security

Missions are not a blueprint, but a clear long-term target. The route there cannot be planned in detail, but calls for joint steps and regular monitoring and evaluation to change course if necessary. So it remains a “work in progress”. Within the Mission-driven Top Sectors and Innovation Policy, Top Sector LSH undertakes the role of coalition coordinator in the field of health and care. Public-private partnership remains a key pillar of the coalition’s strategy.

1 *‘The economic opportunities presented by societal challenges and the ambition of playing a lead role on a number of Key Enabling Technologies are the central starting points in the new Top Sector approach. (...) By formulating missions jointly, we make the knowledge question explicit and promote cooperation and concertation to tackle societal challenges and better exploit economic opportunities.’*
(Letter to Parliament from Eric Wiebes, Minister of Economic Affairs and Climate Policy, and Mona Keijzer, State Secretary for Economic Affairs and Climate Policy, on Mission-driven Innovation Policy, 13 July 2018)

Figure 2: Coherence between missions.

Like a set of Matryoshka dolls, the central mission comprises each of the others. Mission I also encompasses the subsequent missions II, III and IV, and so on. Mission IV, focused on quality of life for people with dementia, is the most specific mission. To achieve this mission, we need answers to knowledge and innovation questions concerning the health and social participation of people with chronic diseases (mission III), organisation of health and care (mission II), lifestyle and living environment (mission I) and health inequalities (central mission).



Health & Care missions

Ministerial policy agendas²⁶ are increasingly guiding the Mission-driven Top Sectors and Innovation Policy. The Ministry of Health, Welfare and Sport (VWS) and its partners formulated the overarching central mission and four subsequent missions for the societal theme Health & Care (see Figure 2).²⁷ These five missions will serve as a guideline for technological and social innovation by public-private partnerships in the coming years:

- **Central mission:**

CM By 2040, all Dutch citizens live at least five years longer in good health, while the health inequalities between the lowest and highest socioeconomic groups are decreased by 30%.

- **Missions:**

- I. By 2040, the burden of disease resulting from an unhealthy lifestyle and living environment is decreased by 30%.
- II. By 2030, care is organised and provided 50% more (or more often) in people's own living environment in cooperation with people's network, instead of in healthcare institutions.
- III. By 2030, the proportion of people with a chronic disease or lifelong disability who can participate in society according to their wishes and capabilities is increased by 25%.
- VI. By 2030, the quality of life of people with dementia is improved by 25%.

The time horizon for the central mission and mission I runs until 2040. Missions II to IV are to be completed by 2030. This is because interventions in lifestyle and living environment and reductions in the burden of disease are not expected to generate the health benefits mentioned in the central mission until 2040.

2 Cooperation with Ministries

To optimise the contribution of public-private cooperation in the Mission-driven Top Sectors and Innovation Policy, the health and care coalition works closely with the ministries within their policy agendas. The following ministries with their policy agendas and contacts are important for the societal theme Health & Care (this non-exclusive list is given purely for illustration):

- *Ministry of Health, Welfare and Sport (VWS), with for example the National Prevention Agreement and Alles is gezondheid ("Everything is related to health") (Mission I), De Juiste Zorg op de juiste plek ("The right care in the right place") (Mission II) and Werken in de Zorg ("Working in Care");*

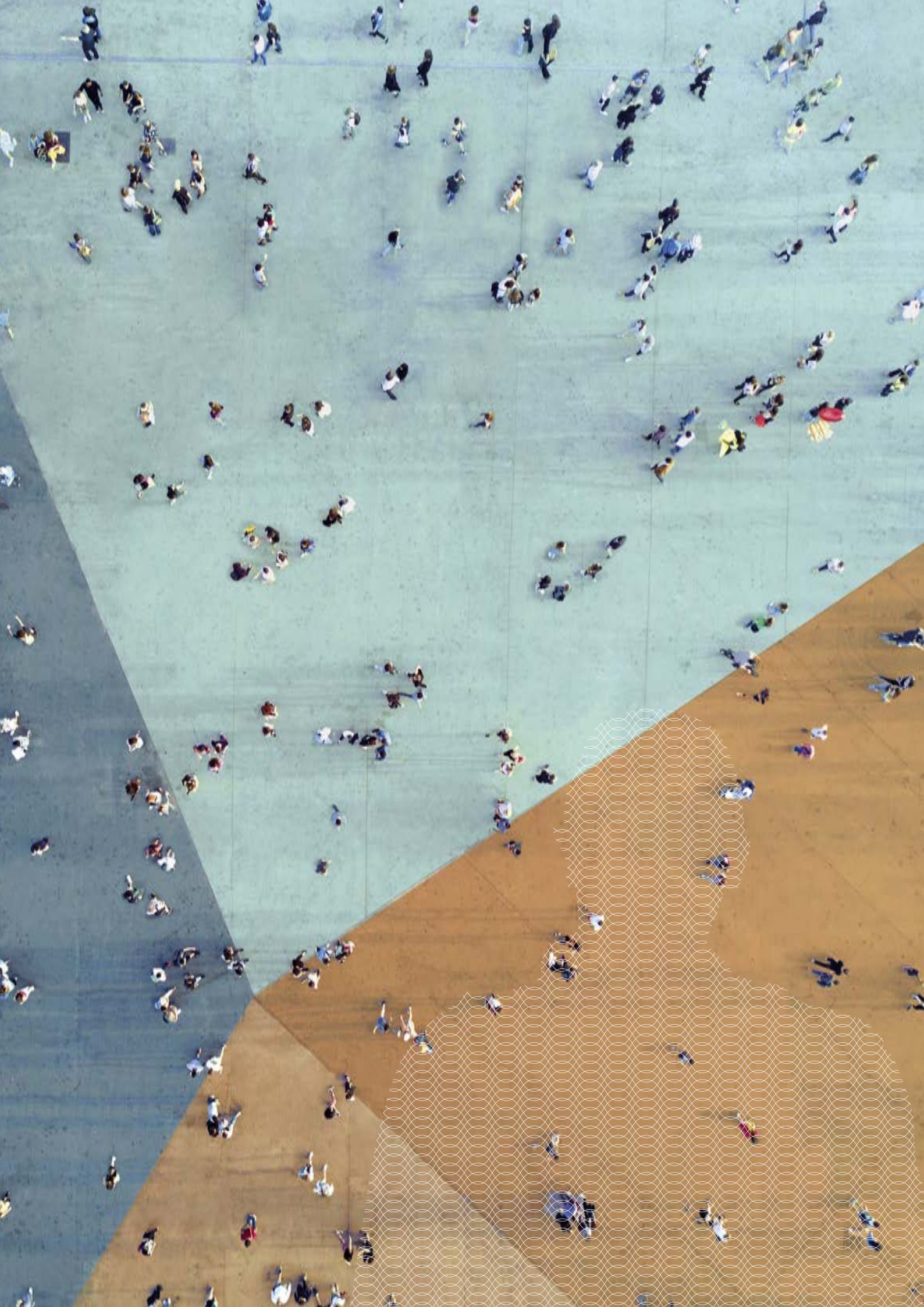
- *Ministry of Education, Culture and Science (OCW), Directorate of Primary and Secondary Education: who helpfully referred us to the coordinating office of Curriculum.nu, which is managing an overall revamp of the primary and secondary curriculum, and with which we had follow-up talks in mid-Q4 2019 concerning an illustration project (see Chapter 3; Mission I and possibly Mission III), and the Directorate of Higher Education and Study Financing, with which the health and care coalition aims to coordinate on the HCA;*
- *Ministry of Agriculture, Nature and Food Quality (LNV): Transition Programme for Innovation without the use of animals (TPI) (Missions III and IV);*
- *Ministry of Social Affairs and Employment (SZW): Knowledge Agenda SZW 2019–2022²⁸ (regarding prevention in employment and the labour market; Mission I and the HCA) and informal care (Werken en Zorgen ["Working and Caring"], Missions III and IV);*
- *Ministry of Economic Affairs and Climate Policy (EZK), specifically the Directorate of Innovation and Knowledge (entire KIA);*

Cooperation with these and other Ministries and/or policy agendas will be implemented where necessary during this strategy period.

All hands on deck

These challenging missions can only be achieved if we all undertake a radical transition in terms of what we think, do and allow in the field of health and care. Many new concepts, products and services are needed, such as innovative preventive approaches, screening and early diagnosis²⁹ as well as prognosis tools, which can be used to cure disease, reduce the burden of disease and maintain and promote health, especially in the living environment. This transition is intended to lead to better health for citizens and, above all, to contribute to their "participation" in society. Health and citizens' daily functioning are an end in themselves, but they can also be seen as an important tool. Social participation has a preventive effect and offers people social and economic prospects. And after all, citizens represent the largest workforce for health and care, now and in the future, in the shape of informal carers.³⁰

The shift in emphasis towards daily functioning and social participation means that new research methods are needed, partly due to advancing digitisation. For an efficient transition, products and services will need to find their way to end users faster. Aside from increased valorisation and market creation, this also calls for new



implementation and de-implementation strategies. We need to remove barriers and create opportunities, for example in the field of laws and regulations, funding arrangements, protocols, guidelines, care standards, and prevention and care training.

Ultimately, the transition will focus on enabling citizens to participate fully and healthily in their own living environment. They will be able to make the necessary changes in a bottom-up and demand-driven way. Citizens will therefore play a key role in a radical cultural and behavioural shift in health and care which is likely to take decades to complete.

Vision

With this transition in mind, we are using a new vision on health that is focused on functioning³¹ in the living environment. This is intended to facilitate physical, mental and social well-being, provide meaning and quality of life and thus, above all, promote citizens' daily functioning.³² Participation is a key health-promoting factor, including for people with chronic diseases. This is why our motto *vital functioning citizens in a healthy economy* is adopted in the Mission-driven Top Sectors and Innovation Policy.

3 Precision thanks to advanced diagnostics

The NWA route Personalised Medicine (also called Precision Medicine) aims to increase the efficiency of treatments and minimise the risk of unwanted side effects. Various initiatives have already reached the market or are almost ready for broader application. A good example is the cooperation around the PATH project: Predictive Analysis for Therapy: PATH to Optimising Access to Personalised Cancer Therapy in the Netherlands, a broad alliance of Dutch pathology departments and oncology practitioners working together to make the most directly applicable molecular diagnostic tools available to everyone with cancer.

Businesses are developing molecular diagnostic tests for specific types of cancer that can be used to predict the optimal treatment for the individual patient. A fascinating new approach that has already been implemented successfully for certain rare hereditary conditions is the growing of miniature organs ("organoids") to test the effect of medicines. Since organoids can be made from the patient's own cells, e.g. stem cells, this approach can help to determine whether a therapy fits the biological profile of the individual patient.

More a person, less a patient

In the not-too-distant future, individuals will be supported preventively in and by their own living environment.³³ The built environment and green spaces, public infrastructure and indoor surroundings – at home, at school and at work – all contribute to vital functioning and social participation. Where prevention falls short, citizens learn to solve health problems themselves, using their own talents (self-management) and with the help of their environment (co-management). If this fails, appropriate technology should offer a solution:³⁴ ranging from rollators and innovative variations on the theme, right through to artificial intelligence (AI). Technology that has been developed and validated *with* the person and their informal carers and *in* their living environment: ecologically validated!³⁵

Using new technology such as eHealth applications, wearables³⁶, domotics, robotics and exoskeletons, citizens can continue to participate in spite of diseases or limitations. Technology can also help the informal and formal support system to work together more effectively and, if necessary, to intervene at the right time. At the same time, social and technological innovations should relieve the burden on informal carers and care professionals, for example by means of respite care and reorganisation of the care professions and training. Devices can be designed for easier use by citizens and professionals, for example by employing new methodologies like data-enabled design.

Anyone in need of acute or complex care will still go to an inpatient facility in the future. But with a higher degree of prevention, self-management and co-management, the need for going inpatient will be greatly reduced. In addition, diagnostics and therapy are focusing increasingly on actual healing (*cure*) rather than symptom control (*care*). Thanks to in-depth fundamental research – ranging from Building Blocks of Life to regenerative and personalised medicine – we will gain more and more deepened insights into disease mechanisms and, based on these, improved starting points for therapy.

Pending time we will also be able to cure conditions such as cancer, cardiovascular disease, depression and anxiety, diabetes, osteoarthritis and infectious diseases. Even the treatment of Alzheimer's disease, the exact causes of which remain rather unclear, is a possibility in the long term. Therapeutic treatments are becoming ever less invasive. A vastly growing part of the treatment and follow-up can even take place in the person's own living environment: at

home, at work, at school, in community centres or at the pharmacy or supermarket.³⁷ In this way, therapy will detract less from citizens' daily functioning and participation in society (see Figure 3).

Transition

A major transition is needed in to achieve the health and care missions by means of this vision. Time is of the essence: a great deal needs to be done to achieve missions II to IV by 2030 and to ensure that the central mission and mission I are successfully completed by 2040. Top Sector LSH, as coalition coordinator, and its many partners will therefore continue to develop the public-private knowledge and innovation ecosystem from 2020 to 2023. We will work on prevention via lifestyle and living environment, and on further innovations in biotechnology and pharma, medical technology and data sciences (including AI).

To speed up the transition, products and services that are demonstrably effective, safe and efficient must find their way to end users. New PPPs will be launched and new areas

will become involved, such as Key Enabling Technologies and Methodologies, and the relevant routes of the Dutch Research Agenda (NWA). New players, such as citizens, educators and employers, have an important role to play in the innovation process. In parallel existing PPPs will also be expanded and supported during the implementation and acceptance phase.

Setting up field labs is essential. These offer a workspace for joint experimentation with integrated social and technological innovations. This is done in various real living environments: in urban and rural areas, with alternative forms of public-private partnerships (see examples in the box "Public-private in the living environment"). Field labs bring together citizens, government, knowledge institutions, businesses from inside and outside the traditional health sector, health insurer(s) and professionals.

End users in their environment take centre stage in this: in asking the right knowledge questions,³⁸ in translating knowledge into innovations and in (ecologically) validating



Figure 3: The future of health and care.

Visualisation of the shift from self-management to co-management, from intramural care to extramural prevention and care in citizens' living environment, by analogy with *De Juiste Zorg op de Juiste Plek* ("The right care in the right place"). Prevention and care that are geared to citizens' different talents and where informal and formal support work closely together, possibly with the aid of low tech, high-impact technology and, if necessary, therapy.

those innovations. We are working on tailor-made solutions. After all, an application suitable for healthy young men in work is not necessarily appropriate for retired women in a disadvantaged neighbourhood.

By 2023, the field labs should already be an inspiring showcase for the health and care transition process. They provide insight into the following core elements:

- Benefits (societal: better health and citizens' daily functioning; and economic: employment, turnover and exports for businesses);
- Availability (of extramural and intramural prevention and care³⁹);
- Usability (for all end users in their various environments); and
- Affordability (essential for the sustainability of our system).

By 2023 it should also be clear how the innovations contribute to national and international economic returns and the 10% export growth envisaged by 2030.

4 Public-private in the living environment

The possibilities are legion: a supermarket giving cooking lessons for single parents, a pharmacy offering blood pressure measurements and an employer making adjustments to how things are lifted in the workplace. But also lessons in primary and secondary education with a focus on sustainability and health⁴⁰, food education⁴¹ and mental health and resilience. Construction companies and architects building homes, communities and green spaces that contribute both to health and to meeting modern safety and climate requirements. Building lifecycle-friendly housings that people can continue to live in as they gradually become less mobile. And building schools and business premises that promote health and healthy behaviour in enjoyable ways.

GROZ

Citizens, social innovation and field labs are three essential, relatively new transition elements for Top Sector LSH and the coalition partners, including the Netherlands Organisation for Health Research and Development (ZonMw) and the Association of Dutch Health Foundations (Samenwerkende Gezondheidsfondsen, SGF). This is why they jointly launched the GROZ initiative in mid-2018.⁴² GROZ is an anagram of ZORG (Dutch for "care"), but putting

the G for *gezondheid* (health) first, rather than the Z for *ziekte* (disease). GROZ ideally connects the public-private parties (of the Mission-driven Top Sectors and Innovation Policy in the strategy period 2020-2023) with 800 to 900 local citizens' initiatives of *Gemeenschapskracht* and *Nederland Zorgt voor Elkaar* (NLZVE).

GROZ does this by means of field labs, called "GROZZer-dammen", and an illustration project preferably for each mission. GROZ includes five active transition teams: citizens, patients and patients' organisations, educational and sectoral organisations for care professionals, industry, and funders and investors.

In the quadruple helix

The quadruple helix is a perfect fit for this complex field of interactions:

- Involved citizens and cooperative local initiatives will make a difference in many areas, generating practical questions for knowledge institutions and innovative businesses.
- Researchers will help more than ever to translate existing knowledge and innovation into tailor-made solutions for local situations.
- Businesses will offer new (ecologically) validated services and products that make the living environment more attractive by contributing to health and daily functioning. In the spirit of social responsibility, they will also voluntarily restrict the sale of products and services that do not benefit health.
- Local authorities will facilitate residents' initiatives within a social district infrastructure, such as local community enterprises. The government will contribute to the missions by putting in place funding and regulations to encourage healthy behaviour and facilitate decompartmentalisation.

Cooperation within the quadruple helix and the resulting benefits should be demonstrated in the final outcome, in a limited number of illustration projects in the field labs. In 2020-2023, one illustration project will be launched on each mission, often with help of existing (strategic) PPPs.

The Netherlands: a leader in care innovation

Big player in key areas

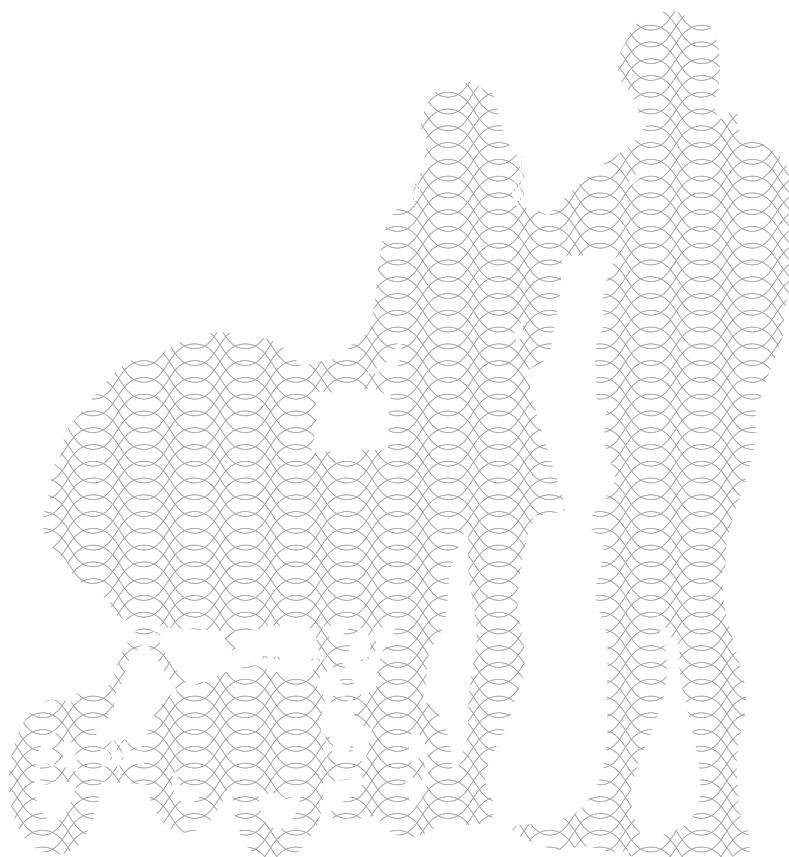
The Netherlands has much to offer in terms of innovation around health, daily functioning, prevention and care. For example:

- A bold but ground-breaking new vision on health and care⁴³ and citizens' daily functioning;⁴⁴
- A consensus-based, non-hierarchical culture that makes it easy to establish links between very different partners;
- Excellent knowledge institutions and networks;
- A strong entrepreneurial climate;
- Lively and active civic participation.

The Netherlands can therefore point the way in key areas as a servant leader in technological and social innovation, involving the associated Key Enabling Technologies and Methodologies. This will not happen automatically. In terms of hard figures (millions or billions available to invest),

we cannot hope to match our major international competitors.⁴⁵ However, we can win on the basis of vision, national image and reputation, cooperation, entrepreneurial spirit and progressive attitudes in the Netherlands. We also need to focus on certain appealing themes, such as the healthcare transition with the GROZ initiative, universal and indicated prevention, regenerative and personalised medicine, lifestyle, regulatory innovations (resulting in part from the arrival of the EMA), technology evaluation and rare diseases and conditions.

The ambition of being an international leader can help us to keep challenging the various partners in the quadruple helix on the path to social innovation and economic benefit. Coordinating national and regional policy, along the lines of the formulated missions, makes the Netherlands stronger. Public authorities can accelerate the spread of innovations by using market creation tools. For example, at EU level, central government can help to distribute innovative Dutch products and services by conducting international trade diplomacy, promoting good organisational, logistical and data infrastructures, and optimising rules and regulations.



Multi-annual Mission-driven Innovation Programmes (MMIPs)



Central mission: Longer in good health



By 2040, all Dutch citizens live at least five years longer in good health, while the health inequalities between the lowest and highest socioeconomic groups are decreased by 30%.

The socioeconomic gap

The biggest gains in the area of healthy life expectancy⁴⁶ can be achieved in people with a low socioeconomic status (SES). But this is precisely where the Netherlands faces its biggest challenge. Socioeconomic health inequalities are worldwide and persistent: a seven-year difference in life expectancy, an 18-year difference in healthy life expectancy.⁴⁷ Citizens, especially vulnerable⁴⁸ citizens, and their interest groups should be actively involved in formulating problems and solutions. This is because reducing health inequalities calls for special attention to be paid to disadvantaged⁴⁹ groups, such as migrants or people with low education, skills or income. In addition, from a health perspective, there is a need for personalisation and a focus on both the young as well as the elderly.^{50,51}

Acquiring health skills⁵² and establishing healthy social relationships can contribute to the utilisation of health potential and thus help to narrow the socioeconomic gap. For example, the recently launched project “Benefit for all”⁵³ is developing a tool to gear reward-based lifestyle interventions as closely as possible to the needs of people in vulnerable groups and/or circumstances. Many other efforts made in recent years within municipalities, knowledge institutions, care and welfare organisations and industry form a basis on which we can build. The challenge remains enormous, because opportunities for sustainable behavioural change are limited in situations where poverty and poor conditions mean that people are mainly concerned with “survival”.

Serving the citizen

To reduce these health inequalities, the existing public-private knowledge and innovation infrastructure should serve citizens and citizens’ initiatives within vulnerable groups. To achieve knowledge and innovation that address current issues in the field of health, structural cooperation is needed between care providers, knowledge institutions,

businesses, municipalities and citizens.⁵⁴ The university medical centres (often with higher and vocational education institutions) are already doing this,⁵⁵ supported by the PPP Health Innovation NL (HI-NL)⁵⁶ and using the data infrastructure of Health-RI⁵⁷ (including mICF). This trend also dovetails with the objectives of Science in Transition⁵⁸ and Citizen Science.⁵⁹

This change of perspective, where the citizen in the region takes demand-driven action and involves the scientist, entrepreneur, care provider or civil servant – rather than the other way around – offers opportunities for improvement where the traditional approach fails. But it will not be easy to change the supply-driven actions of professionals. Anchoring citizens’ initiatives and listening to the stories of hands-on experts can be an important first step.^{60,61} New forms of a circular district and regional economy and cooperation with local SMEs, schools, community centres and public authorities provide the right context for this: supportive, safe and nearby, and offering new combinations for learning and working together.

System approach

Maintaining and promoting health, and participating in society from an early age, make an enormous contribution to healthy life expectancy. Health problems, especially at a young age, can sometimes lead to lifelong vulnerability. An early focus on prevention, especially of psychological problems (e.g. food, smoking or alcohol addiction), can help people to stay socially engaged well into old age and maintain and improve their socioeconomic circumstances.

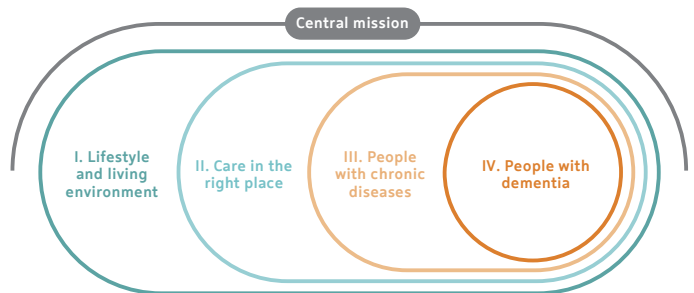
The innovations required for the central mission call for a system approach. This will be developed in the coming years, working with initiatives such as the SGF’s *Gezonde Generatie* (“healthy generation”) 2040, aimed at young people.⁶² The use of field labs, provision of independent information and steps to optimise the living environment for people of all ages will play a key role in this.

Multi-annual Mission-driven Innovation Programme: Central mission

The knowledge and innovation questions outlined below are relevant to the central mission. Then we need to look at the questions from the NWA routes and from the Multi-Annual Programmes (MAPs) for Key Enabling Technologies and Methodologies. With advancing insight and accurate monitoring and evaluation, we can add, elaborate on or delete questions in consultation with experts from public and private partners.

Knowledge and innovation questions

- How can we evaluate the results of the individual missions and the interactions between them?
- How can we facilitate the transition process that are intertwined in the missions as smoothly as possible: locally, regionally and nationally?
 - › Which strategies, methodologies, technologies (concepts, services and products) and innovative human capital competencies are needed, for example in the field of transitions and experiments?
 - › Which coalitions are needed?
 - › What is the ideal governance and implementing and valorisation organisation?
- How can we define, operationalise, examine, monitor and evaluate:
 - › The transition process and progress in the areas of:
 - Societal impact in terms of health, health potential, health inequalities, vulnerable groups and daily functioning?
 - Economic and scientific impact?
 - Micro, meso and macro scales?
 - › The contributions made to the transition and missions by:
 - Different players (citizens, industry, public authorities, knowledge institutions, professionals, Top Sectors, PPPs, Key Enabling Technologies and Methodologies)?
 - Innovative concepts, products and services in the area of prevention, cure and care coming from the PPPs?
 - Field labs and their learning communities in various contexts (urban versus rural, low versus high SES, health versus life sciences, etc.)?
 - Experiments with relaxed conditions and the resulting frameworks for innovative laws, rules and regulations and funding scenarios?
 - › Which innovative technologies (including data infrastructure) can we best use in all of the above, and which standards, norms and values can we apply?⁶³
- How can we define, operationalise, utilise and evaluate:
 - › The talents of citizens (including in their role as



- › patients) and their formal and informal support during their lives and in different circumstances?
- › The core elements: benefits, availability, usability, affordability, sustainability and security of knowledge and innovations?
- How do laws, rules and regulations facilitate or frustrate the development and use of innovations? How can we innovate these laws, rules and regulations?
- Which data facilities and data analysis are needed to monitor the development and use (commercialisation and application) of innovations?

Knowledge and innovation coalition

- Strategic PPPs:
 - › HI-NL (working with RIVM, Pharos, etc.): innovating transition, experimenting and analysing;
 - › Health-RI (incl. GO-FAIR and Personal Health Train): the infrastructure of national health data and data technology;
 - › mICF: social participation and daily functioning;
 - › *Regulatory Innovations (RSNN)⁶⁴: regulatory systems in cooperation with experts from the quadruple helix and IGJ, NZa, CBG, ZIN;
 - › *Artificial Intelligence: data-based decision-making support for citizens, professionals and other parties.
- Top Sectors: CLICKNL, DDD, HTSM (*Smart Industry* field labs) and LSH;
- Taskforce AI⁶⁵;
- NWA routes: Circular economy (R3), sickness prevention (R6), measuring and detecting (R13) and big data (R25);
- Key Enabling Technologies: Digital technologies;



- Key Enabling Methodologies;**
- GROZ transition teams: citizens, patients and patients' organisations, industry, HCA and funders/investors;
- Societal themes: Agriculture, Water & Food; Energy Transition & Sustainability.

Deliverables

- Four to six GROZzerdammen (working with local industry, government, citizens' initiatives and UMCs [regional plans], higher education [Centres of Expertise] and vocational education [Centres for Innovative Crafts]; 2020-2021);
- New and existing PPPs (PPPs Regulatory Innovations [laws and regulations] and AI [data technology and support]) linked to KETs and METs, VWS Knowledge Platforms, NWA routes and GROZzerdammen (2020-2022);
- Public-private knowledge and innovation syntheses "Health Inequalities and Vulnerable Groups", "Transition", "Field Labs", "Talent" and "Core Elements" (2023);
- Transition progress reports (2020 ["baseline measurement"], 2022, 2024).

* In preparation

** The KEM MAPs will be produced in the second half of 2019 under the leadership of CLICKNL, and then added to the coalition for this mission.

5 Data for innovation and monitoring

Health data, data on social participation and daily functioning, and other relevant data of individual citizens are currently distributed between multiple monitors, institutions, businesses, public authorities and citizens themselves. The trick is to learn securely from this anonymised, encrypted data, both as part of the missions and for the monitoring and evaluation of the innovation policy here at hand. Help is available from technology and methods such as AI, the Personal Health Train⁶⁶ and FAIR⁶⁷, in combination with good data stewardship. The topic of data ethics will need to be carefully discussed, especially with the citizens involved. HI-NL and Key Enabling Methodologies can play a role in this.

Mission I: Lifestyle and living environment



By 2040, the burden of disease resulting from an unhealthy lifestyle and living environment is decreased by 30%.

'A healthier Netherlands... that's what we want to achieve. With children who get a good start and benefit from it throughout their lives. With active adults who retire fit and healthy. And with elderly people who have plenty of healthy years ahead of them and participate in society for as long as possible.' (National Prevention Agreement 2018)

Success story

The Netherlands invests a lot in primary prevention, much of it going unnoticed nowadays.⁶⁸ This is the success story that we do not hear nearly enough (see text block "Prevention"). For example, we invest in vaccinations, good maternity care and health clinics, but also in schools, clean drinking water, healthy food, waste processing, safe roads, health and safety legislation and environmental laws. Many of these things are so obvious that we no longer see them as preventive measures. But thanks to these societal and technological innovations, life expectancy in the Netherlands has risen by as much as 35 years over the past century.

To continue this trend in the coming decades, public-private commitment is needed to develop the remaining prevention potential in our lifestyles and living environment. This is in addition to the Prevention Agreement and *Alles is gezondheid* ("Everything is related to health"). Prevention in the area of risks, e.g. workplace risks such as exposure to hazardous substances,⁶⁹ can make a clear difference to health. And radical primary preventive interventions in nutrition, exercise and mental functioning can prevent people from becoming ill and less able to participate in society.⁷⁰

Better

A healthy lifestyle is inseparable from an individual's living environment. Lifestyle has everything to do with "functioning" as defined in the ICF classification⁷¹ and "social participation" as a term within government and society. A healthy lifestyle means building and maintaining the social networks that protect us against psychological and social problems, loneliness⁷² and addictions. It means

getting enough exercise in an environment with clean air and water, with no hazardous substances, with more green spaces⁷³, and in physical and social safety.⁷⁴ This of course means eating healthily⁷⁵: plenty of fruit and vegetables, with moderate sugar, fat and salt intake. But ideally, also eating together and mindfully. And it means having a degree of control over our lives, working hours and conditions, and not suffering from chronic stress and financial troubles.

A healthy lifestyle is largely based on the culture and habits that children learn from those around them. So the younger they start being sensible and practical, the better. A health-promoting living environment is an essential precondition here. On top of that and to an obvious large extent, staying healthy as we get older is also an art that can be learned.⁷⁶

The potential of the region

Regional cooperation between citizens, patients, knowledge institutions, care providers, municipalities and industry will be given a major boost. This will ensure that the potential available, in terms of people and resources, is utilised to best effect. A regional approach like this offers opportunities to take particular account of local differences, as already explained by ZIN and TNO.⁷⁷ The regional partners focus on urgent, specific issues and initiate the most appropriate activities in terms of innovation. One example is the NFU plan "Research and innovation with and for the healthy region". The region offers new profitable forms of public-private alliance.

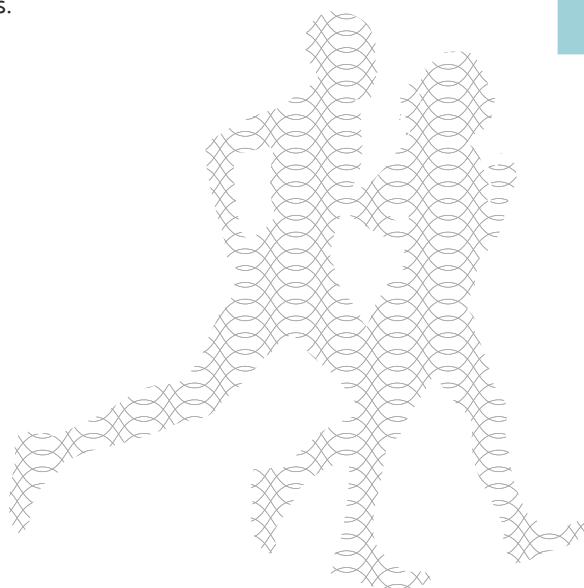
Cross-sectoral challenge

Creating a living environment⁷⁸ that induces healthy behaviour⁷⁹ is also a unique cross-sectoral challenge. Apart from Top Sectors such as LSH, Agri & Food and Chemistry⁸⁰, other players in this are HTSM (including Smart Industry), Logistics, Top Sector Horticulture & Starting Materials, Water, Sport and Exercise Top Teams and Dutch Digital Delta (DDD). In addition, expertise is needed from parties such as PPP HI-NL, KETs and METs as framed by CLICKNL, alongside

newcomers to the health sector such as Bouwend Nederland. This means that, in innovation based on the Safe-by-Design principle for all new fabrics, materials and products, safety and health for humans and the environment will be a design requirement right from the drawing board. In several respects, this KIA overlaps with environmental safety, which needs to be considered in partnership with the Ministry of Infrastructure and Water Management for the full societal impact to be achieved.

Citizens and other partners in the quadruple helix need reliable data and comprehensible information in a wide range of areas to work on health and daily functioning.⁸¹ This should take account of developments in the foreseen large-scale transitions in the other three societal themes.

Knowledge from various NWA routes is essential for this, which is why, in the initial period of this KIA, we are building a strong PPP Prevention around the theme of primary prevention. Our partners in this include participants in the VWS Prevention Agreement and Sports Agreement, the Prevention Coalition and the VWS departments “Nutrition, Health Protection and Prevention” and “Public Health”, the VNO-NCW “Vital business” scheme, MKB Nederland and the Ministries of Health, Welfare and Sport (VWS) and Social Affairs and Employment (SZW) in collaboration with public health groups.



6 Prevention

Prevention – via schools, vaccinations, safer workplaces, sanitation and road safety – is THE success story of the past 150 years. Life expectancy in the Netherlands has risen by around 35 years, with healthcare adding a “mere” 5.5 on top of those. This success story deserves to be more widely known, partly because it would motivate us to make better use of our prevention potential based on cross-sectoral initiatives.

For example, there are major health benefits to be gained by banning airborne particulates and microplastics in drinking water (Top Sector Chemistry), and by ensuring a healthier, more sustainable food supply (Top Sector Agri & Food). We can make the living environment healthier by means of infrastructural interventions involving the construction industry (Building Agenda) and green spaces (Green Agenda of Top Sector Horticulture & Starting Materials). Digital innovations (Dutch Digital Delta) can assist citizens to acquire knowledge and make their behaviour healthier by providing information geared to their talents, lifestyle and daily functioning.

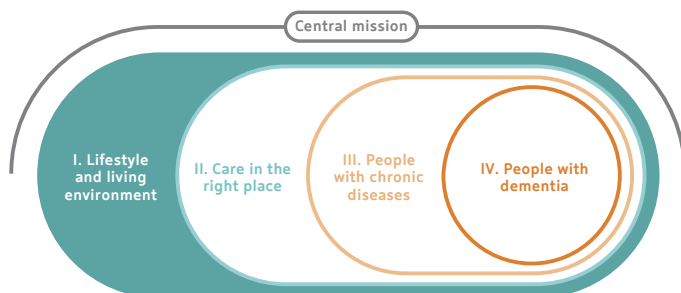
Top sectors Chemistry, Logistics, Energy, HTSM and LSH, the Top Team of DDD and Sport and Exercise and KETs will deliver the technological innovations here⁸². CLICKNL and KEMs together with citizens and creative industry will drive social innovation.

Multi-annual Mission-driven Innovation Programme: Mission I

Besides the knowledge and innovation questions from the central mission, the questions outlined below are also relevant here. Then we need to look at questions from the NWA routes and from the KET and KEM MAPs. With advancing insight and accurate monitoring and evaluation, we can add or delete questions in consultation with experts from public and private partners.

Knowledge and innovation questions

- Which definitions of primary prevention, burden of disease, unhealthy lifestyle and unhealthy living environment can we best use on a macro, meso and micro scale for operationalisation, monitoring and evaluation?
- How can we make society, industry and science more enthusiastic about prevention? And how can we tell the positive and true story of prevention to date?
- Which factors in the course of a life (from pre-conception to death) determine whether a person stays healthy and able to participate in society, or whether they become ill? How do we characterise all of these factors in the areas of biology (genotype, phenotype), lifestyle and behaviour (diet, exercise, sleep and vaccinations), living environment (“exposome”) and the interactions between them? Which alternative prevention strategies are needed and effective to prevent AMR, for example?
- How can investments in the prevention of occupational diseases resulting from physical and psychosocial workloads contribute to a healthy, employable workforce?
- What are the desirable and undesirable effects on healthy behaviour, lifestyle and daily functioning of a major life events and transitions and b) various innovations in the living environment (ranging from data technology to built environment, from diet to microplastics, from green spaces to social media)?
- What data, big data and data technology⁸³, and what conscious and unconscious support, does an individual need to participate as fully as possible and to promote and maintain their own health (taking account of their personal talents and living environment)?
- How, in this context, can different innovations or types of innovation best be integrated into the living environment?
- How do we fund primary prevention?
- What are the costs and benefits of primary prevention?
- How do we handle the costs and benefits of prevention for various stakeholders providing funding and investment? How do we validate these in existing and innovative new economic models (business or value cases)? Which of these models best facilitate prevention?



- How do we maximise the societal and economic benefits of prevention innovations for active lifestyles, behaviour and living environments, both nationally and internationally?
- What is the optimal public-private coalition to successfully develop (primary/universal) prevention and to implement, de-implement and valorise innovations?

Knowledge and innovation coalition

- Strategic PPPs:
 - › Prevention Coalition, IMPROVE, AMR-Global, P4O2, I-JGZ, SPRONG, Personalised Nutrition & Health and TopFit
 - › *BTIC: Living environment (Bouwend Nederland)
- Top Sectors: Agri & Food, Chemistry, CLICKNL, HTSM, Logistics, LSH, T&U, Top Teams DDD and Sport and Exercise (including [National Platform] Sport Data Valley)
- NWA routes: Circular economy (R3), sustainable production (R4), sickness prevention (R6), young people (R7), quality of the environment (R9), logistics (R11), NeuroLabNL (R13), resilient societies (R16), smart industry (R20), smart cities (R22) and big data (R25)
- Key Enabling Technologies : Advanced materials, Chemical technologies, Life sciences technologies and Engineering and Fabrication technologies
- Key Enabling Methodologies**
- GROZ transition teams (citizens, patients and patients' organisations, industry, HCA and funders/investors)
- Societal themes: Agriculture, Water & Food; Energy Transition & Sustainability



Deliverables

- Public-private knowledge and innovation syntheses⁸⁴ of primary prevention (the positive prevention story; 2020), “primary prevention”, “burden of disease”, “unhealthy lifestyle” and “unhealthy living environment” (2021–2022)
- Existing/new PPPs (BTIC [2021–2022] [living environment]) linked to KETs and METs, VWS Knowledge Platforms, NWA routes and GROZzerdammen (2020-2022). This mainly concerns the Prevention Coalition and the PPP Prevention [lifestyle and behaviour]. These are linked to the Prevention Agreement (2020) and related to “Alles is gezondheid”, Health and Sport “Living Labs”, etc.
- Progress on TRL and SRL of technological and therapeutic (including prophylactic) innovations

** In preparation*

*** The KEM MAPs will be produced in the second half of 2019 under the leadership of CLICKNL, and then added to the coalition for this mission.*

Mission II: Care in the living environment



By 2030, care is organised and provided 50% more (or more often) in people's own living environment in cooperation with people's network, instead of in healthcare institutions.

Prevention and care at a tipping point

The year 2019 finds us at a turning point. Healthcare in the Netherlands is well organised and easily accessible, but in its current form not stable enough, let alone *flexible* enough, to cope with the future.⁸⁵ This is already evident in a number of areas, such as mental healthcare, youth care and care for the elderly. It is becoming ever harder to find enough professionals, which is leading to growing waiting lists. These problems will only worsen in coming years if policy remains unchanged. Demand for care is rising, while the labour market becomes ever tighter and the burden on informal carers ever heavier, and budget growth slows or even stops. This mission, which closely matches the vision we outlined here earlier, should contribute to solving these problems.

Developing technology for and with citizens

Smart use of technology⁸⁶ and close attention to our social networks will make secondary and tertiary prevention more effective. Remaining care will be shifted in part to the living and working environment.⁸⁷ This calls for technologies and therapies to be developed and validated with citizens in their living environment (and not, as often still happens nowadays, in a care context without them). Various ZonMw funding programmes (e.g. the "Right care in the right place" voucher scheme), the Association of Dutch Health Foundations (SGF), the Netherlands Enterprise Agency (RVO), the Dutch Research Council (NWO), the Taskforce for Applied Research (NPRO SIA) and other partners can contribute to this. Ideally, this should be done in multi-annual knowledge and innovation programmes, such as the paramedical care programme due to be launched shortly.⁸⁸

To contribute to this, the Top Sectors can use their PPP instruments, and knowledge institutions the efforts of their experts. Knowledge institutions such as the Applied

Research Foundation T02, especially the Netherlands Organisation for Applied Scientific Research (TNO), are working on the development of technological innovations to improve conditions in education and employment. Innovative businesses can join in too, as can citizens and frontline care professionals, hospitals and their sectoral organisations, nursing homes and home care organisations, occupational health care, and coalition parties such as Bouwend Nederland, ACTIZ and Woonzorg Nederland.

Against the background of socioeconomic health inequalities, we need to think about the shifting boundary between healthcare covered by insurance and consumer products. Citizens are increasingly in need of accessible, independent information that is "made to measure". Social innovation that strengthens social cohesion and makes society more inclusive contributes to social participation and daily functioning⁸⁹ and thus to health in the broad sense. The latter prevent absenteeism and drop-outs, including those due to mental health problems (e.g. addiction and psychological conditions).

All of this can generate measurable economic benefits at the national and international levels. Existing rules and regulations designed to protect citizens and the living environment can have a contrary effect. We need to tackle this problem, and one way to do it is via the PPP Regulatory Innovations.

Radical overhaul

Prevention and care professionals face the unusual challenge of participating in the most radical overhaul of healthcare since the emergence of hospitals over a century ago. And this at a time when demand for care is rising. The challenge here for higher and vocational education institutions, universities and UMCs is to prepare professionals for the future. The demands are high: willingness to cooperate and inventiveness on the part of these professionals (physiotherapists, doctors and GPs, nurses and district nurses, occupational health and safety

staff, social workers, dieticians, not forgetting equipment installers and technicians).⁹⁰ Each of these professionals comes into close contact with people with various conditions. They can therefore play a key role in identifying prevention and care needs and in contributing to solutions.

This mission crucially relies on the interaction between citizens, government, industry⁹¹ and knowledge institutions. The innovative pharmaceutical industry is already active in areas such as understandable product information, treatment compliance, refresher training, real world data projects, and so on. We will be able to continue and intensify this line in the coming years.⁹²

Other sectors and industries will also need to contribute substantially for the transition outlined here to be achieved. These include:

- Logistics and installation technology (Techniek Nederland⁹³) for the availability, installation and prompt repair of aids and equipment close to the citizen;
- HTSM and Chemistry for the development of personalised sensors⁹⁴ and biomarkers;
- Agri & Food may be able to strengthen the effects of medication and therapies, or even to replace them with evidence-based dietary advice and products;
- Digitisation sectors for data analysis technology and automated provisioning of information and decision support for citizens and professionals.

7 Kidney dialysis in the future

If the kidneys do not work properly then transplants or dialysis are needed. Patients on the waiting list for a donor kidney or unable to receive a transplant depend on dialysis treatment. In many cases, this means having their blood purified in hospital three to four times a week using a haemodialysis machine. This is an intensive, time-consuming treatment with a major impact on a patient's life. Home haemodialysis allows greater freedom and flexibility, but is also intrusive and demands a high degree of self-reliance.

In the coming years, we will be able to simplify this home treatment considerably and make it suitable for dialysis not only at home, but also elsewhere or while travelling. This means fewer barriers to home treatment and optimum freedom and flexibility. But we will also need to take account of sustainability (e.g. the environmental impact of disposable dialysis materials) and security (i.e. of data traffic). This is because dialysis that used to be restricted to hospitals will be possible more or less anywhere.

Looking further into the future, it will become possible to give someone a new kidney created from stem cells or artificial cells. A solution like this offers health in the broad sense: it facilitates daily functioning, in line with the motto of the Netherlands Patients Federation: More a person, less a patient! Besides technology, the human factor will always be needed. Motivated professionals familiar with both people and technology will help to ensure that the new interventions are applied carefully and to identify both the desirable as well as the less pleasant consequences.

Multi-annual Mission-driven Innovation Programme: Mission II

Besides the knowledge and innovation questions from the central mission and Mission I, the questions outlined below are also relevant here. Then we need to look at questions from the NWA routes and from the KET and KEM MAPs. With advancing insight and accurate monitoring and evaluation, we can remove or add questions in consultation with experts from public and private partners.

Knowledge and innovation questions

- How do we gradually de-implement intramural facilities while maintaining an innovative, high-quality collection of facilities that remain necessary?
 - Can the affordability of care be maintained or even improved through a stronger emphasis on prevention (Mission I) and the shifting of care to the living environment (Mission II)?
 - What are the options in the field of extramural indicated (secondary/ tertiary) prevention and care in both interdisciplinary and cross-sectoral networks in the living environment for citizens with one or more chronic or other conditions? What should stay extramural or intramural?
 - Which factors facilitate or frustrate the shift from indicated prevention and intramural care to extramural care?
 - Which virtual and analogue methods and models exist (or should exist) for personalised diagnostics, prognostics and therapy for people with chronic or other conditions? How do these methods enable people with chronic or other conditions to choose the right technology and therapy and integrate it in their daily participation?
 - Which technologies can we use now (in 2020-2023), which still need to be developed and how long will it be before they can be used?
 - How can people with one or more chronic conditions participate as fully as possible in their own living environment and develop their own health potential? How can they draw on their own talents and their informal and formal support system? Which facilities (technology, eHealth, virtual reality, holograms, gaming, data facilities, etc.) can expand these options safely and effectively?
 - How can we promote self-management of citizens with chronic or other conditions? How can we encourage better cooperation with their social networks or carers? How can citizens use social networks and/or technology in this respect?
 - How can we draw on the experience of people with one or more chronic conditions and their informal and formal support networks when innovating and validating technology?
- 
- How can we simplify all of the red tape and laws and regulations that people with chronic conditions and their carers have to deal with? How do we reduce the administrative burden for care professionals?
 - How can researchers and innovators, embedded in the living environment of citizens with chronic conditions, develop their innovations and validate them (ecologically) there?
 - How can we promote the implementation and de-implementation of care innovations in the living environment of people with chronic conditions, including those in the training and work of professionals and care professionals?
 - What are the best forms of organisation for healthcare close to citizens? How do we organise attention for cooperation, empathy, technology, logistics and data, and ownership if the citizens concerned play an active (or more active) role? And how can training courses and sectoral organisations provide for this?
 - Which (built and infrastructural) living environment facilitates social participation, daily functioning and health for people with chronic and other conditions? What promotes the use of state-of-the-art technology?
 - What should the training and care profession structure ideally look like in 2023, 2030 and 2040? How do we build on the recommendations of the Kaljouw and Kervezee committees and how do we reflect the dynamism in technology development? What sort of professional innovation is needed in the prevention and care professions, and in the professional structure as a whole?



Knowledge and innovation coalition

- Strategic PPPs: Prevention coalition, Extramuralisation, IMPROVE, Oncode Institute, IMDI, ELF, DCVA, Mental Health and TopFit
- Top Sectors: Chemistry, CLICKNL, DDD, HTSM, Logistics, LSH and T&U
- NWA routes: Energy transition (R5), sickness prevention (R6), logistics (R11), materials (R12), measuring and detecting (R13), personalised medicine (R17), quantum/nano revolution (R18), smart industry (R20) and big data (R25)
- Key Enabling Technologies : Advanced materials, Photonics and light technologies, Quantum technologies, Digital technologies, Chemical technologies, Nanotechnologies, Life sciences technologies and Engineering and Fabrication technologies
- Key Enabling Methodologies**
- GROZ transition teams (citizens, patients and patients' organisations, industry, HCA and funders/investors)
- Societal themes: Agriculture, Water & Food; Energy Transition & Sustainability

Deliverables

- Collaboration with PPPs IMDI (including CCTR, Neurocontrol, SPRINT) and Extramuralisation (technology and therapy in the living environment), incl. 3D-printed pills
- Existing/new PPPs linked to KETs and METs, VWS Knowledge Platforms, NWA routes and GROZzerdammen (2020-2022)
- Public-private knowledge and innovation syntheses “(de-)implementation” (2021) and “participation/daily functioning” (2022)
- Progress on TRL and SRL of technological and therapeutic innovations

*** The KEM MAPs will be produced in the second half of 2019 under the leadership of CLICKNL, and then added to the coalition for this mission.*

Mission III: Increased participation for people with chronic diseases



By 2030, the proportion of people with a chronic disease or lifelong disability who can participate in society according to their wishes and capabilities is increased by 25%.

Broad spectrum of challenges

The numbers of people with one or more chronic conditions, possibly combined with physical and/or mental and social disabilities, is set to soar in the coming years.⁹⁵ A chronic disease is not incompatible with a high quality of life and need not prevent an individual from participating in society, education, work and travel, all while receiving support and care and experiencing accessibility and inclusion⁹⁶. *Onbeperkt meedoen* (“Unlimited participation”)⁹⁷, a VWS programme with many partners, works to ensure that people with disabilities have the same opportunities as everyone else. After all, social participation is often much more important in determining someone’s quality of life than the severity of their disease symptoms or their laboratory test results.

But social participation does not happen automatically for people with chronic conditions. The challenges and solutions are diverse. The citizen’s directing role in various circumstances (including in the role of patient) needs to be strengthened. But employers too (for example, facilitating a return to work after serious illness) must see the benefits. Bureaucratic burdens need to be reduced. An effective approach is needed to address the continuing prejudices that still prevent people with disabilities from functioning at school, in paid employment and elsewhere in society. Moreover, a citizens’ daily functioning requires further technological and social innovation with, by and for people with a chronic illness or disability, so they can participate more fully in society. The development of a public-private partnership focused specifically on this type of innovation is therefore envisaged.

We also need to continue developing innovations that improve symptom control and allow actual healing.⁹⁸ Early detection often makes it more likely that harm can be avoided. Frontline care professionals play a role in this, but so do other matters, such as oral health. For example, early signs of various systemic diseases can be detected during regular visits to the dentist or optician. The development

and application of evidence-based lifestyle interventions are especially important, and not just in prevention, as equally the treatment of people with a range of chronic conditions, for example under the Future Medicines Initiative (FMI). Because people stay in work for longer, especially those with chronic conditions, it is important to facilitate their ability to participate into old age.

Mental health and complexity

More than half of all chronic conditions are psychological conditions such as depression, anxiety, addiction, psychosis and so on. With increasing numbers of over-80s in society and the fact that many chronic physical and mental conditions occur precisely in vulnerable people with, for example, limited language and/or health skills, additional challenges are arising in terms of designing the right innovations. A more integrated approach is needed, aimed at improving mental health and daily functioning of people with chronic psychological problems. Lifestyle advice developed and deployed with people with chronic or other psychological conditions is still a relatively new area.

Furthermore, we need knowledge about interactions between different interventions, including diet and medication. Combinations of drugs (and other interventions) have proved successful in people with somatic diseases such as AIDS and cancer. Approaches of this type can also contribute to mental health and daily functioning. Optimal personalised prevention and care means that both private practitioners and government mental health professionals can always answer the question: which intervention works for this person based on these problems and possibilities in this social situation, at this time and with these goals in terms of recovery and participation?

Top Sectors, NWA routes, PPPs

This mission cuts across the terrain of almost all top sectors, which will contribute to the desired social and technical innovations within this mission. Knowledge from

the NWA routes “personalised medicine” and “regenerative medicine”⁹⁹, and the methodology of HI-NL and the FMI-PPP, will contribute to disease reduction and in the long term even holds out prospects of a cure for certain chronic conditions. Work on affordable and sustainable therapies for the future is being done in many other areas too; joining forces here can strengthen our coalition and synergy.¹⁰⁰

New opportunities are also available thanks to Key Enabling Technologies from the life sciences and digital technologies. The applications of biotechnology are growing exponentially. For example, concerted efforts at the national¹⁰¹ and European levels¹⁰² are leading to a paradigm shift: the decoding of the human immune system (“immunome”) and the creation of immune profiles specific to the individual.

In combination with knowledge from (systems) biology and bio-informatics, personalised vaccines and immunotherapies can be developed to prevent and treat various chronic or other conditions. Technological support (e.g. exoskeletons and bio-electronics) can overcome physical disabilities, enabling people to once again participate in society and functioning daily, for instance the workplace. But in all of these technological advances, attention should also be paid to de-implementing obsolete technologies.

Key Enabling Methodologies with regards to ethics, laws and regulations, economics and finance can help to remove the sociocultural obstacles that stand in the way of social participation. Scientific research and education for prevention and care professionals also have an urgent need for new visions, the use of talent, in combination with (innovative) technologies and therapies. The context here is often different from that in the usual intramural cases. Innovative approaches can emerge from initiatives such as citizen science, based on the observational powers and independent research potential of citizens (whether or not in their role as patients).

8 Vaccine development: more than infections

Immunology has undergone a boom in recent decades, a trend that is now translating into specific products. Vaccines to prevent various non-communicable diseases and even forms of addiction are currently in pre-clinical and clinical trials. Dutch researchers and businesses are very active in this field: one example is the Human Vaccines Project. In the future, vaccines for various infectious diseases and other conditions will contribute enormously to the prevention and treatment of chronic diseases and disabilities. And vaccines developed and produced in the Netherlands are of course potential export products.

System approach

The system approach needed to give people with chronic diseases and those around them¹⁰³ the tools to (continue to) functioning in society must involve all partners in the quadruple helix. Identifying the literal and figurative barriers faced by citizens with or without chronic diseases can be an important basis for innovation. Although patients’ organisations represent the needs and issues of those they represent, people with the greatest burden of disease and vulnerability are frequently at risk of being overlooked. Researchers and funding providers should focus more specifically on this.

Knowledge institutions, care providers and businesses are working together to devise system solutions, especially for vulnerable fellow citizens, as well as optimal care and cures. Where barriers and regulations still obstruct social participation or hamper solutions, governments and regulators must make a difference. For example, the administrative burden that people with chronic conditions and their informal carers have to deal with is excessive, on a level comparable to that facing the care professional.

Cure

Not just innovation and R&D focused on citizens' daily functioning, but also innovation and R&D focused on curing physical and mental conditions will play an important role in achieving this mission. The Netherlands is home to unique and distinctive research in the area of new drug R&D (e.g. using state-of-the-art chemical technology in FMI to accelerate drug discovery and development) and other therapies. Research into new avenues and drug molecules is leading to the development of innovative, advanced therapies and diagnostic tests. The Netherlands has internationally renowned scientists working in pre-clinical, translational and clinical research, with biobanks, data structures and sufficient regulatory expertise at their disposal. The country is also characterised by an open dialogue between government, medical insurers, academia, the EMA and the pharmaceutical, biotech and medtech industries.

The pharmaceutical industry faces challenges due to societal pressure on the affordability of healthcare, expiring patents and pressure on the pipeline.^{104,105} But this also offers opportunities for more public-private partnerships, including international ones like the European Lead Factory (ELF).¹⁰⁶ There will be a greater emphasis on early drug development and the first clinical trials in academia and academic start-ups.

The pharmaceutical industry will then pursue the large-scale clinical trials and market approvals. Recently the pharmaceutical market has been shifting away from small drug molecules towards biologicals and advanced therapies, known as Advanced Therapy Medicinal Products (ATMPs). These include knowledge-intensive treatments such as gene therapy, various forms of cell therapy and stem cell therapy and, in the future, possibly the targeted rewriting of genes via CRISPR-Cas9. Some ATMPs could be used in the future to cure patients' chronic conditions for which current therapies merely control the symptoms.

However, these advanced therapies also lead to more complex rules and regulations, logistics and ethics. For example, a new funding and reimbursement system needs to be developed for one-time curative ATMPs to guarantee their long-term availability and affordability. Developing and launching these knowledge-intensive treatments will remain the preserve of UMCs and other specialised centres for a long time to come, working in cooperation with innovative industries when and where possible.

All of these aspects dovetail seamlessly with the NWA routes. Only interdisciplinary and broad-based innovations throughout the chain around ATMPs and regenerative medicine can make a difference. PPPs such as RegMed XB are part of this and will ultimately help to bring these new, fast-developing market innovations effectively to the patient.

9 Regeneration on the right scale

Permanent healing of tissues, organs and organ systems in people with chronic conditions is not yet possible in most cases. But this will develop rapidly worldwide. If the Netherlands wishes to become or remain a leader in certain areas, scale may be a limiting factor. The step from experimental small-scale production to industrial mass production is, after all, an enormous challenge, in which several top sectors will need to be involved. Robotics and control mechanisms will be needed at unprecedented levels to produce regenerative technologies on a large scale.

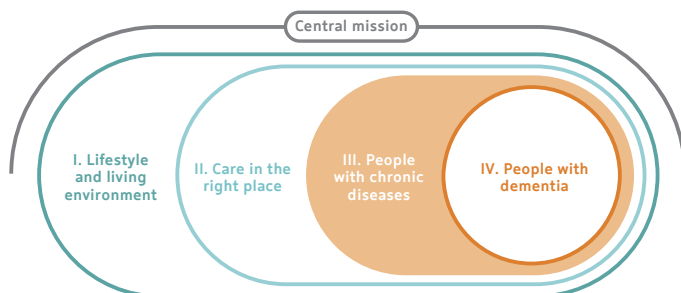
A "chicken-and-egg" situation quickly develops: low production volume limits large-scale clinical validation and the lack of validation prevents scaling up to mass production. This calls for cross-sector efforts on the part of HTSM, Logistics and PPP HI-NL, and for timely research into costs and benefits. PPP Regulatory Innovations should guide this process from the outset, working with the key enabling methodology "ethics".

Multi-annual Mission-driven Innovation Programme: Mission III

Besides the knowledge and innovation questions from the central mission and Missions I and II, the questions outlined below are also relevant here. Then we need to look at questions from the NWA routes and from the KET and KEM MAPs. With advancing insight and accurate monitoring and evaluation, we can add or delete questions in consultation with experts from public and private partners.

Knowledge and innovation questions

- How can people with chronic conditions limit the impact on their daily social, mental and physical functioning and promote their health, with or without their formal and informal support system and technology?
- To what extent do people with chronic conditions currently participate in work, school, leisure activities, etc. (social participation) according to their wishes and abilities? How can they continue to promote this, with or without third parties, technology and therapy, or combinations of these?
- How can we provide loving, respectful secondary or tertiary prevention and care for people with chronic or other conditions, on both an intramural and (increasingly) an extramural basis?
- How can we identify and tackle societal constraints, for example in often fragmented funding systems and laws and regulations?
- How can we ensure that all citizens, including those with chronic conditions, participate in society as a matter of course? What is needed for social acceptance and the breaking of taboos that stand in the way of participation?
- What are the underlying mechanisms of psychological and somatic conditions? How can we, as citizens and professionals, on the basis of biomarkers and functional markers – with or without big data and AI – predict and recognise chronic diseases at an early stage and, if possible, prevent them? How can this be done on the basis of reliable, valid diagnostics and prognostics, and indicated prevention and/or care?
- How can we improve prompt, targeted prevention and care for people with chronic conditions during a major life event or transition¹⁰⁷? How do we measure the effects on their health and daily functioning?
- How can we prevent, delay or (partially) cure a condition affecting a person, organ system, organ, tissue or cell using interventions such as surgery, pharmacology, cell or gene therapy, medical technology, replacement or repair, and combinations of these?
- How do we prevent undesirable side effects of interventions?



- How can we devise diagnostic and therapeutic clinical scientific research that is as close as possible to the unique individual (ecologically most valid)? This also means: with minimal use of animal models. And how do we make researchers, businesses, regulators and the market aware of this?
- Which industrial production methods and logistics are needed to ensure that every researcher, business and professional – including citizens if necessary – has the most affordable technology for their experiments in time?
- Which public-private national coalitions have most prospects of delivering the innovations required for the success of this mission? How do we ensure these coalitions are also strong enough to play a leading role in international knowledge and innovation networks worldwide?

Knowledge and innovation coalition

- Strategic PPPs: IMPROVE, P4O2, NeuroTech-NL, Oncode Institute, IMDI, NeoKidney, hDMT, NCOH, NADP, NILG, Perioperative care, ELF, DCVA, RegMed XB, PATH, FMI-PPP, EBS-CC, Innovation without the use of animals, Mental Health and TopFit
- Top Sectors: Agri & Food, Chemistry, CLICKNL, DDD, HTSM, Logistics, LSH and T&U
- NWA routes: Sickness prevention (R6), logistics (R11), NeuroLabNL (R14), personalised medicine (R17), regenerative medicine (R19), smart industry (R20) and big data (R25)
- Key Enabling Technologies : Digital technologies, Chemical technologies and Life sciences technologies



- Key Enabling Methodologies**
- GROZ transition teams (citizens, patients and patients' organisations, industry, HCA and funders/investors)
- Societal theme: Agriculture, Water & Food

Deliverables

- Strengthening international collaboration through disease-related and/or cure-related PPPs such as Oncode Institute, RegMed XB, DCVA, Health-RI (especially with regard to rare diseases)
- Existing/new PPPs (PPP Immunome/Immunology [2021–2022], PPP Mental Health, etc.) linked to KETs and METs, VWS Knowledge Platforms, NWA routes and GROZzerdammen (2020-2022)
- Progress on TRL and SRL of technological and therapeutic innovations aimed at encouraging daily functioning of citizens with chronic and non-chronic diseases and at curing such diseases

***The KEM MAPs will be produced in the second half of 2019 under the leadership of CLICKNL, and then added to the coalition for this mission.*

Mission IV: Quality of life of people with dementia



By 2030, the quality of life of people with dementia is improved by 25%.

Touchstone of civilisation

Dementia has an enormous impact on the social participation and quality of life of those with the condition, as well as those around them. As a result of demographic trends, the number of people with dementia is on the rise. If trends continue, there will be half a million people with dementia in the Netherlands by 2040, double the current number.¹⁰⁸

Due to this impact of dementia, our relative unfamiliarity with it and its consequences, and the many facets of the challenge, this chronic condition is named in a separate mission. If we can care properly for our fellow citizens with dementia, it says something about the quality of our society and the way in which we jointly provide prevention and care. This mission therefore has clear overlaps with the central mission and Missions I, II and III.

“It takes a village”

Quality of life of people with dementia depends mainly on their social and physical environment, and their participation in society.^{109,110} At the same time, there has been little focus so far on the growing group of people who care every day for a partner, family member, neighbour or friend with dementia. To retain their valuable contribution, we need to look more closely at both prevention and care options, for example by having employers and others take over some tasks of informal carers.

Valuing informal carers is another option. After all, too many of them are forced to give up work or are overwhelmed by taking on long-term care tasks in addition to work. The 24-hour responsibility for a loved one in the home situation cannot be easily transferred or shared. Technology can be part of the solution here, along with certain forms of respite care and other developments. To paraphrase a famous saying: ‘it takes a village to care for those with dementia’.

Early detection

In time, innovations will contribute to the prevention, (early) detection and treatment of dementia, and to slowing its progression. Other innovations will lead to better organisation of that prevention, care and support for people with dementia. Research into underlying, often unknown, aspects of disease mechanisms contributes to the development of new forms of treatment. Sometimes this may even contribute to new drugs and other interventions, whether used singly or combined.

Because interventions have the best chances of success if they are initiated in good time, it is vital to identify risk factors and detect early-stage signs and symptoms of dementia.¹¹¹ This also requires careful counselling of individuals and those around them after a predictive diagnosis. In the absence of effective prevention and treatment for dementia, it is a heavy burden for people to know that they will develop or even have first signs of dementia. Due to its social importance and these ethical aspects, it is essential to engage more often in dialogue with citizens when developing new initiatives around the prevention and treatment of dementia. We also need to develop careful ways to motivate people with early dementia to participate in scientific research.

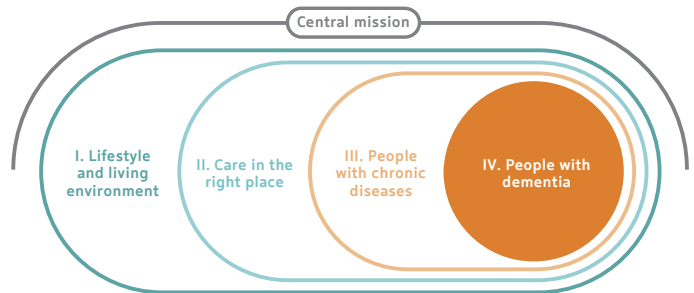
Society needs to be made friendlier for people with chronic conditions, including dementia. One way to achieve this is by working with the Pact for Care of the Elderly.¹¹² Related social and technological innovations need to be (ecologically) validated in their context in the GROZzerdammen, and preferably in an illustration project as well.

Multi-annual Mission-driven Innovation Programme: Mission IV

Besides the knowledge and innovation questions from the central mission and Missions I, II and III, the questions outlined below are also relevant here. Then we need to look at questions from the NWA routes and from the KET and KEM MAPs. With advancing insight and accurate monitoring and evaluation, we can remove or add questions in consultation with experts from public and private partners.

Knowledge and innovation questions

- How can we better understand the mechanisms of dementia?
- How do we measure quality of life of people with dementia?
- How can we prevent (different forms of) dementia and/or delay the impact for the individual and those around them?
- Which technical and therapeutic psychological, social and physical innovations, singly or combined, help to prevent dementia and/or to slow down its progression and impact?
- How can we enable people with dementia to function for as long as possible, through self-management and co-management?
- Which innovations help people with dementia to participate in society for as long as possible, according to their wishes and abilities, helping to guarantee their quality of life?
- What is the best formal or informal personalised care for people with dementia and for their often heavily burdened support systems?
- How can social networks in the living environment treat people with dementia lovingly and respectfully, contributing to their social participation and health? What value does this have for the individual, their formal and informal support system and society?
- How can we simplify all of the red tape and laws, rules and regulations that people with dementia and their support systems have to deal with?
- How can we cure the different forms of dementia? And which clinical or pre-clinical methods and models are most appropriate for this?
- Which coalitions and investments make all of the above possible, preferably in an international context too?



Knowledge and innovation coalition

- Strategic PPPs: Regulatory Innovations, Deltaplan Dementia, Memorable, Innovation without the use of animals, DuSRa-VOILA, NeuroTech-NL, IMDI, hDMT and ELF
- Top Sectors: Agri & Food, Chemistry, CLICKNL, DDD, HTSM, LSH and T&U
- NWA routes: Sickness prevention (R6), logistics (R11), NeuroLabNL (R14), personalised medicine (R17), regenerative medicine (R19), smart industry (R20) and big data (R25)
- Key Enabling Technologies : Digital technologies, Chemical technologies and Life sciences technologies
- Key Enabling Methodologies**
- GROZ transition teams (citizens, patients and patients' organisations, industry, HCA and funders/investors)
- Societal theme: Agriculture, Water & Food

Deliverables

- Public-private knowledge and innovation synthesis "Dementia-friendly society" (2021) and "Quality of life for people with dementia" (2022)
- Existing/new PPPs (PPP Alzheimer [2021–2022], PPP Dementia) linked to KETs and METs, VWS Knowledge Platforms, NWA routes and GROZzerdammen (2020-2022)
- Progress on TRL and SRL of technological and therapeutic innovations

**The KEM MAPs will be produced in the second half of 2019 under the leadership of CLICKNL, and then added to the coalition for this mission.



10 Promising research

Developing drugs for Alzheimer's disease and other forms of dementia has so far proved to be a remarkably difficult area, partly because pre-clinical models, including animal models, are not sufficiently predictive of clinical success. In addition, clinical research is often conducted at a late stage of the disease, when a lot of irreparable damage has already occurred in the brain.

A new approach may offer a solution in the future, conceivably offering a deeper insight into the mechanisms, or improved human models (e.g. "brain-on-a-chip" technology) designed to halt neurodegeneration and its possible causes at an early stage (such as the thorny issue of amyloid plaques: are they or are they not a cause?).

In addition, combinations of new or existing drugs and additional interventions may be effective in specific populations. For some people with dementia (especially early-stage dementia), personalised medicine could be useful. A better understanding of the mechanisms of the various types of dementia is crucial in order to take steps towards prevention and treatment and slowing its progression. International public-private partnerships, especially scientific cooperation, should speed up this understanding.

Strategy

Reader's guide

This chapter on strategy describes the set of instruments and prerequisites needed for the public-private partnerships from the health and care coalition to contribute successfully to the Mission-driven Top Sectors and Innovation Policy within the societal theme Health & Care. We discuss seven instruments first, followed by seven associated prerequisites. We then explain these in more detail and break them down into challenges, opportunities and deliverables. This concerns organisational capacities on the one hand and specific deliverables in the form of products and services on the other.

Challenges

For Top Sector LSH and its coalition partners (see Figure 4), the Mission-driven Top Sectors and Innovation Policy means a refinement of the strategy outlined in the KIA 2018–2021.¹¹³ The missions have raised the level of ambition. And there are now different, more complex, ambitions that lie more in the societal domain. This means that additional instruments need to be developed and synergies strengthened in the quadruple helix, even more so than in the past. We will also need to invest more in public-private technological and social innovation, in such a way that the two reinforce each other.

Successful innovations depend on a wide range of prerequisites. Good communication and funding are essential to create support and momentum. Insights in talents of all involved, innovations in technology and therapy often demand initial investments, a bridging of the early vulnerable period, and ultimately valorisation and market creation at regional, national and international level. Costs also precede the benefits where technological and social innovation is concerned.

Investment in setting up new structures is needed before innovative technologies and therapies can yield additional

benefits and/or savings in combination with the talents at hand. In this respect it is important not only to convince the innovators and early adopters, but also to inspire those who initially prefer to stick with what already exists. To make a success of this Mission-driven Top Sectors and Innovation Policy with its many stakeholders, clear monitoring and evaluation is needed from governance, based on thorough progress analyses.

Opportunities

In some of these challenges, Top Sector LSH has already gained vast experience in recent years in the shape of public-private instruments and organising synergy in the quadruple helix. The PPPs, GROZ transition teams, LSH International Consultation and the H2020 Health Sounding Board Group are clear examples of this. In the coming four years we will work to expand the range of instruments. To combine technological and social innovation successfully, we will add Key Enabling Technologies and Methodologies to the existing (strategic) PPPs for (combining relevant) point innovations, as well as field labs/GROZzterdammen and illustration projects.

The latter set of instruments, in particular, should allow complex system innovations. Besides these instruments, we are also working on similar coalitions on each of the strategy prerequisites listed here. Communication experts from industry, government and knowledge institutions, for example, will come together via Top Sector LSH and work with citizens to build support and momentum. We will also address funding, internationalisation, monitoring and evaluation, and governance, seizing every opportunity for organisational capability, expertise and capacity in national public-private coalitions.

These national coalitions will help to achieve the desired technological and social innovation. Governance too can benefit from this in the coming strategy period, in which the Top Team and Advisory Board will need to broaden their

focus from Top Sector LSH to the full breadth of public-private partnerships in the societal theme Health and Care, in close collaboration with the Theme governance. The same is true, of course, for Top Sector LSH executive office that will expand its support from the Top Sector's governance and inhabitants towards that of the complete societal theme Health & Care.

Deliverables

- Governance of the societal theme Health & Care (explorations in 2019, operational in 2020)
- National public-private coalitions for the societal theme Health & Care (explorations in 2020, operational in 2021):
 - › Communication
 - › Funders and investors
 - › Valorisation and market creation
 - › Regions
 - › Internationalisation (further strengthening of LSH International Consultation)
 - › Human capital (HC) (consider expanding the GROZ Transition Team HC)
 - › Monitoring and evaluation



Figure 4: Overview of stakeholders of the societal theme Health & Care

A. Instruments

Public-private partnerships and projects

Challenges

Forming national strategic PPPs and making them sustainable remains the focus of Top Sector LSH and the knowledge and innovation infrastructure. After all, combining vision, knowledge, resources and innovative and creative capacity in a PPP or strategic PPP always proves to be a strong foundation for technological and social innovation. We have also found that launching, setting up and developing a PPP is sometimes a challenge. When setting up new strategic PPPs, our primary aim is to get industry involved as early as possible.

Opportunities

In addition to the successful existing PPPs, we will make a success of other PPPs, in the areas of structural co-operation, funding and results. New PPPs will also be set up within the missions. Some are already in preparation, such as Regulatory Innovations and the Dutch Innovation Centre for Lifestyle Medicine (also known as Lifestyle4Health).

New strategic PPPs will be set up in the field of prevention (in line with the Prevention Coalition and as a public-private contribution to the Prevention Agreement), built environment, mental health and dementia (especially Alzheimer's disease). Other PPPs will also emerge in the coming years on the basis of advancing insight from governance and the sector(s) or from a PPP. In particular, we will continue to work with a number of disease-specific, cure-focused PPPs on international cooperation in the areas of cancer, cardiovascular disease, pulmonary disease, immunology and mental illness, and especially dementia.

Four times a year, PPP development will be encouraged by "community of practice" meetings, with the involvement of Key Enabling Technologies and Methodologies. That will allow the parties to learn from each other's development stories and successes.

To succeed, the PPPs will also need strategic coaching for their governance. They will be supported by:

- The partner coalition put together by Top Sector LSH and the Technology Transfer Offices (TTOs) and Knowledge Transfer Offices (KTOs) of the knowledge institutions;
- Industry;
- The ministries, RVO, the many cooperation partners such as ZonMw, NWO and SGF, and the provinces and regions.

Deliverables

- Top Sector LSH partnership management office (continuation of 2016–2019):
 - › Community of practice meetings (supply-driven collective guidance) for all PPPs (four per year)
 - › Demand-driven customised guidance for individual PPPs
- Outcomes:
 - › Strategic PPP portfolio expanded
 - › Four to six existing, successful PPPs turned into sustainable national consortia
 - › Four to six existing PPPs progressed to further success
 - › Two to four new PPPs (either already in preparation or coming from a PPP project) launched
 - › Knowledge and innovation infrastructure of PPPs linked to the Key Enabling Technologies and Methodologies (2021–2023)
 - › Business conferences with the PPPs on each of the Missions I to IV (2020–2023)

Key Enabling Technologies and Methodologies

Challenges and opportunities

Key Enabling Technologies and Methodologies hold a special place in the Mission-driven Top Sectors and Innovation Policy. They can be relevant to missions in multiple societal themes and contribute to expanding economic opportunities.

Key Enabling Technologies (KETs), especially in the sciences – such as photonics, ICT, artificial intelligence, new materials, nanotechnology, biotechnology and quantum technology – enable ground-breaking innovations with and for industry. The KIA Key Enabling Technologies¹¹⁴ explains this in more detail and presents the Multi-Annual Programmes (MAPs) in which increasing amounts of (earmarked) public funds, such as PPP Allowance, TO2 programming and NWO grants¹¹⁵, will be invested from 2020 in addition to private funding. The coalition supports MAPs in areas such as MedTech, Building Blocks of Life (BBoL), Life sciences technologies (BRIDGE), built environment and AI.

For social innovation¹¹⁶, Key Enabling Methodologies (KEMs¹¹⁷) from the arts and humanities are crucial. They create new ways of working together, organising large-scale transitions, tackling problems around laws and regulations and dealing with ethical issues. After all, a whole new toolbox of models, strategies, processes and instruments is needed for the Mission-driven Top Sectors and Innovation Policy.¹¹⁸ KEMs are the very tools that citizens can use to articulate their talents, needs and demands, and to create new initiatives. Public and private sector professionals can use them to restructure their work and for their lifelong development. And businesses can use them to reach their markets. In the second half of 2019, MAPs will also be established for the KEMs, under the supervision of CLICKNL.

Missions in the field of health and care require strong interaction between KETs and KEMs, and new and existing instruments. Methodologies can also strengthen the field labs and illustration projects and the GROZ initiative and, for example, contribute to the emancipation of citizens within the missions. The focus here is on opening up and connecting existing innovative technologies in such a way that they provide actual solutions to citizens' problems in the area of health and daily functioning. KEMs also contribute to the de-implementing of outdated technologies and therapies.

Under the Business Policy, Top Sector LSH had already established close cooperation (“crossover PPPs”) with many roadmaps within other top sectors, including Top Sector HTSM. These crossovers, supplemented by KETs, will strengthen existing PPPs and help to develop new ones in the Mission-driven Top Sectors and Innovation Policy. Examples of important PPPs and regional specific innovation ecosystems include: IMDI (Innovative Medical Device Initiative) and DCVA (Dutch CardioVascular Alliance);

FMI, e/MTIC (Eindhoven MedTech Innovation Center); Medical Delta; Health Valley; Holst Center; TopFit and Photon Delta.

The coming years will bring the creation of more of these public-private entities, focused on decision support (AI; MMIP CM), disease prevention and control (prevention and immunology; MMIP I and III), the living environment (BTIC; MMIP I), (self-)medication (3D printed pills within IMDI; MMIP II) and therapy (FAST and Dementia; MMIP III and IV).

11 Capitalising on opportunities together

The arrival of the European Medicines Agency (EMA) in the Netherlands in 2019 brings an additional boost for the knowledge-intensive Dutch life sciences ecosystem. This will facilitate the Future Affordable and Sustainable Therapeutics (FAST) action programme run by the Dutch government, businesses and knowledge institutions.

In the context of the EMA's arrival and Missions II to IV, work is ongoing on the FMI (Top Sector LSH with Top Sector Chemistry, the “Chemistry of Life” roadmap) and Advanced Therapy Medicinal Products (ATMPs) such as cell and gene therapies.

To strengthen these initiatives, the FMI-PPP is working with Building Blocks of Life (for fundamental biological and biotechnological research), HI-NL (evaluating the potential effectiveness and affordability of innovations), Health-RI and DDD (data and AI technology), IMDI (intra- and extramural pharmacology applications), CLICKNL (alternative medication leaflets, especially for citizens with poorer health literacy, in collaboration with the Transition Team for Patients [and Patients' Organisations]), Pharos¹¹⁹ and Regulatory Innovations (PPP in preparation by Lygature and others).

In a nutshell: given promising developments such as the arrival of the EMA, the partner coalition (of the societal theme Health & Care) will establish links with relevant partners across the entire knowledge and innovation infrastructure to fully benefit from the resulting societal, economic and scientific opportunities. The coalition is also working with industry, ministries, provinces and regions on the conditions (regulations, human capital and funding) that need to be in place to capitalise on these opportunities. This approach may also be applicable to other promising contexts.

Field labs (*GROZzerdammen*)

Challenges

What does it look like when the focus is on citizens, with their talents and abilities? What does a transition to integrated population-focused thinking mean in terms of health and daily functioning?¹²⁰ From 2020, this will have to be made visible in a number of GROZzerdammen: field labs in a local neighbourhood, district, municipality or village community, with numbers of residents ranging from around 1,500 to 30,000 or more. GROZzerdammen work on the missions by restructuring the prevention and care pyramid, from healthy living and informal care to third-line care and relationships with the social domain.

All stakeholders in the quadruple helix are involved and the entire “landscape” should become innovative and enterprising as a result. This concerns residents, municipal officials, employers, industry, SMEs, home care, social work, long-term care, the Social Support Act (Wmo), debt restructuring, sports policy, banks, primary care, municipal health services (GGD), youth healthcare (JGZ), hospitals, health insurers, nursing and care homes, provinces, primary, secondary and higher education, universities of applied sciences, universities and university medical centres, the snack bar, the supermarket and the football canteen. Together, they shape GROZ.

Opportunities

The GROZzerdammen field labs should show how better interaction can be achieved between health and daily functioning, space and housing, learning and working, welfare and the local economy. Exchanges of knowledge and experience will be encouraged by governance and institutions such as ZonMw and the SGF, and with the commitment of local and regional knowledge institutions and authorities. The GROZzerdammen can learn a great deal from similar initiatives in other societal themes, such as Goeree-Overflakkee Energieneutraal 2020.¹²¹

These citizens’ initiatives in GROZzerdammen operate from a basis of solidarity and develop a local, circular economy: nearby, social, inclusive and sustainable. The growing group of pensioners with their talents and energy often makes a crucial difference at the local level. Besides the health and care missions, they can also contribute to other missions of the Mission-driven Top Sectors and Innovation Policy. The GROZ transition teams aim to support this group, together with the knowledge and innovation infrastructure. The

teams will encourage umbrella organisations of professionals, industry, knowledge institutions, health insurers and government to send representatives to take part in these field labs.

To maximise opportunities, regulatory and funding bodies will be invited to cooperate in setting up temporary low-regulation zones, in combination with close monitoring and evaluation. This will offer opportunities for experiments, for example in terms of funding structures. In this way, work can be done on merging funding arrangements (Wlz, Zvw, Wmo, etc.) for health and care into, for example, integrated funding for and with the population.

These groups will develop funding scenarios for transition initiatives on both a national scale and a neighbourhood, district or municipal scale. To this end, the governance of the societal theme Health & Care, together with the GROZ transition teams and the GROZzerdammen, will facilitate the many options for (combinations of) public and private funding.

Besides funding scenarios, the governance and transition teams will also use Social Impact Bonds and Health Impact Bonds¹²² for local business cases showing societal and economic benefits. These initiatives, often with the voluntary involvement of citizens, can therefore gradually make the transition from (funded) projects to sustainable, locally based enterprises with social impact.

A GROZzerdam can be launched or supported by, for example:

- 1 Further development based on project funding awarded to a local initiative, for example under the voucher scheme “Right Care in the Right Place”¹²³ or European Regional Development Fund (“EFRO”) funding for one of the Netherlands’ four EFRO regions¹²⁴.
- 2 Participating in or improving ongoing initiatives in the area of field labs (possibly in collaboration with Top Sector HTSM) or living labs (including citizens’ cooperatives, VWS testing grounds, Health and Sport living labs), as set up in collaboration with the G5, regional experiments at a UMC, hospital or university of applied sciences¹²⁵, or otherwise.¹²⁶
- 3 The Health Impact Accelerator (HIA), an intensive coaching path for GROZ and GROZ-related social innovation initiatives. The HIA was created in 2019 with the involvement of investors and funders, and is organised by Top Sector LSH office.



Projects with GROZzerdam potential are further supported and facilitated by the societal theme and Top Sector governance, Top Sector LSH office and coalition partners, providing expertise, knowledge and networks. We also expect support from the UMCs, higher and vocational education establishments and their cooperative partnerships. The regional plans drawn up by the UMCs in the course of 2019 will expand the opportunities for synergy.

New knowledge is not always needed to answer knowledge and innovation questions. Major innovations such as the smartphone were created by assembling¹²⁷ existing technologies and methods. This was of course done after careful validation in the new context. In the coming years, various PPPs will together focus on developing and validating assembled concepts, products and services in the right context, with an emphasis on low tech, high-impact. The fundamental PPPs will focus more on prevention and the mechanisms within prevention, in addition to finding cures for diseases. The applied PPPs will be partly embedded in GROZzerdammen.

Careful data collection is necessary to learn from this and ultimately to ensure that all Dutch citizens become

“GROZzerdammers” benefiting systematically from effective innovations in the living environment. A monitoring strategy will be drawn up in close collaboration with Health-RI, HI-NL, mICF and the NWA routes “Creating value through responsible access to and use of big data”¹²⁸ and “Measuring and detecting: anything, anytime, anywhere”.¹²⁹ Monitoring also provides a good basis for innovative funding alternatives for prevention, care and cure.

Innovation in the GROZzerdammen and beyond will focus on different contexts, from neighbourhoods and districts to the home situation, from leisure, school and work to intramural care.¹³⁰ Expertise in the care sector will develop further here, including in the field of secondary and tertiary prevention. To place data in a context, qualitative input from citizens is always important too. This dialogue with end users can contribute to reflection, support, a demand-driven approach and prioritisation.

The field labs are ideal for externally validating assembled knowledge and innovation, products and services in different living environments. Besides the knowledge and innovation questions for the central mission and missions I to IV, the questions outlined below are also relevant here.

Then we need to look at questions from the NWA routes and from the KET and KEM MAPs. With advancing insight and accurate monitoring and evaluation, we can add or delete questions in consultation with experts from public and private partners.

Knowledge and innovation questions

- Which methods can we use to better understand the dynamics of self-organising networks and to see how direct or indirect intervention or guidance works here?
- How do citizens (individually or in organised groups), professionals, government and industry work together at the local and regional levels to build the health(care) of the future? Together with knowledge institutions, how do they measure and evaluate the transition and effects on health and daily functioning? Which roles do the parts of the quadruple helix have in this process?
- What support does GROZ need from national groups, government, sectoral organisations, regulators and supervisory organisations in the transition and stabilisation phases? What does this demand in terms of the organisation, governance and priorities of these groups?
- How can we facilitate the transition and subsequent stabilisation via the funding system? What are the options, and how do we determine which of them work best in the various regions? How do we then develop a national system that works (and how do we organise the transition and stabilisation)?
- What is the optimal size/scale of field labs and learning communities? What local data infrastructure, connecting to national infrastructure, is required?
- How do we develop the new local/regional health and care infrastructure in such a way that it continues to learn and excel? What mirror and benchmark evaluation do professionals need? Which theories does this call for, what are the prerequisites and how do we develop a reliable set of instruments for self-monitoring and group monitoring?

Knowledge and innovation coalition (as a learning community)

- Strategic PPPs: HI-NL and Health-RI
- Top Sectors: CLICKNL, Logistics, HTSM, Top Teams Sport and Exercise and DDD
- NWA routes: Quality of the living environment (R9), resilient societies (R16), smart cities (R21) and big data (R25)
- Key Enabling Technologies: Digital technologies
- Key Enabling Methodologies**

- GROZ transition teams (citizens, patients and patients' organisations, industry, HCA and funders/investors)
- ZonMw, SGF, JZOJP and, if possible, NFU/UMCs, Centers of Expertise (HBO), Centres for Innovative Crafts (MBO), etc.

Deliverables

- 4 to 6 GROZ-selected field labs (GROZzerdammen) operational (2020-2022)
- Management:
 - › Governance of field labs operational (2020)
 - › Collective guidance structure for all potential field labs (quarterly) operational (2020)
 - › Individual guidance structure for selected GROZzerdammen (customised) operational (2020)
 - › Cooperation between JZOJP and GROZ operational (2020)
- Funding:
 - › Overview of options (including crowdfunding) for funding scenarios ready (2020), updated annually and known and used among existing and potential GROZzerdammen
 - › First HIA operational (2020) and four HIAs "run" (2023)
 - › Two new funding schemes for citizens' initiatives operational (2020-2021)
 - › Four funding schemes accessible to citizens' initiatives (2020-2021)
- Annual evaluation and progress reporting for field labs/GROZzerdammen (2020-2023), in 2020, 2022 and 2024 as an integral part of "Transition progress reports" (see Deliverables, Central Mission)

*** The KEM MAPs will be produced in the second half of 2019 under the leadership of CLICKNL, and then added to the coalition for this instrument*

Illustration projects

Finally, the set of instruments used by the coalition contains something relatively new: the illustration project. This is intended as the coalition's showpiece within the societal theme Health & Care. A project that shows the Netherlands and the rest of the world what we are capable of achieving together, with the Mission-driven Top Sectors and Innovation Policy.

This illustration project is explicitly geared to vulnerable people in society and hence to the largest and most difficult mission: the central mission focused on reducing health inequalities. As we know, these have been on the rise for

decades, both in the Netherlands and worldwide. No-one knows yet how to reduce them. They just keep growing everywhere, and all the time.

We are not just going to try to reduce these differences; we are actually going to do it. Exactly how remains to be seen. But with a wide range of skills in a sound innovative and creative coalition¹³¹ that has plenty of energy and goodwill in the right context, we must be able to take steps to reduce these health inequalities.

We will start with small steps in 2020-2023, but eventually, after 2023, big ones as well. Just as Neil Armstrong's first step was followed by many more, we want to take our own first steps via these illustration projects in 2020-2023. We will start with a total of five projects: one on each mission. Anyone who comes through the selection procedure with a good idea, a sound coalition and the right context, can make a serious attempt.

The following themes have been chosen for the five illustration projects, and there is still some scope within them:

Central Mission (& monitoring and evaluation):

AI for everything and everyone: *Bring it!*

I. Lifestyle and living environment:

Environment for development: *Bring it up!*

II. Care in the right place:

Just done it: *Bring it on!*

III. Participating with chronic illness:

Participate: *Bring it in!*

IV. Dementia:

Burning up dissimilate: *Bring it dill!*

In each mission, the combinations of coalition and context with an illustration project team can choose their own programme and partners. But some national initiatives – e.g. PPPs or Ministerial policy agendas or others – are always involved in each mission. This concerns the following parties:

CM Health-RI, mICF and HI-NL with Top Team DDD;

I. Prevention Coalition with Prevention Agreement, PPP Prevention;

II. GROZ with JZOJP, and with ZonMw and SGF, PPP IMDI (SPRINT, NeuroControl, CCTR) and PPP Extramuralisation;

III. IMDI (namely CCTR, NeuroControl and SPRINT);

IV. Deltaplan Dementia, Memorable, Alzheimer Nederland and PPP DuSRA (including VOILA from ZonMw and Top Sector LSH).

We believe the procedure will be more or less as follows:

- Every coalition (established or in development) wishing to start an illustration project will seek a context (a field lab). This is an energetic and innovative municipality, region or cooperative that wants to adopt and invest in the project in a quadruple helix combination, i.e. with citizens.
- A sound combination of this type wishing to adopt an illustration project can work with the coalition to submit an inspiring proposal to the Top Team LSH.
- Top Sector LSH then submits the most appropriate combinations to the Steering Committee (“Regieoverleg”) of the Mission-driven Top Sectors and Innovation Policy, together with a recommendation.
- This Consultative Body selects the final winning combinations, which will adopt and carry out an illustration project.
- The five winners for the projects listed here on the five missions will be part of the GROZ initiative and be awarded the field lab status of the LSH-HTSM-Smart Industry cooperation.

The governance and national coalition for this theme will encourage facilitation of each illustration project by many new and existing partners from society and industry.

The exact rules and selection procedure for these projects will be worked out in more detail in the second half of 2019. The procedure will be launched by a call or similar arrangement in mid-2020. Our ultimate aim is for all five illustration projects to be up and running by 2021–2022. This is quite a task, but one that we and everyone involved in this knowledge and innovation agenda are keen to take on.

Illustration projects

The knowledge and innovation questions for the central mission, missions I to IV and the field labs are relevant to these projects. Then we need to look at questions from the NWA routes and from the KET and KEM MAPs. With advancing insight and accurate monitoring and evaluation, we can add or delete questions in consultation with experts from public and private partners.



Deliverables

- Five illustration projects in selected field labs operational (2020-2023)
- Management:
 - › Governance of illustration projects operational (2020)
 - › Collective guidance structure operational (2020-2021)
 - › Individual guidance structure for selected projects (customised) operational (2021)
 - › Embedding operational (2021–2023)
- Funding:
 - › Overview of options (including crowdfunding) for funding scenarios ready (2020)
- Annual evaluation and progress reporting for illustration projects (2020-2023), in 2020, 2022 and 2024 as an integral part of “Transition progress reports” (see Deliverables, Central Mission)

B. Prerequisites

Communication

Challenges

How do we get all hands on deck, from citizens to care professionals and researchers, from industry to government? How do we inspire the different parties in this quadruple helix, starting from the status quo, to share ideas about the future they desire and see their own place in relation to the bigger picture? How do we inform them about specific issues, such as digital technology's contribution to health¹³², and the role in this of citizens, care providers and businesses?

“One voice, one message”

A key precondition to publicise and ensure the success of these ambitious missions and our desired position as a leading country is communication. In both national and international settings, Top Sector LSH communicates with a clear Health-Holland branding based on the “one voice, one message” method. This branding is increasingly being adopted by stakeholders and partners from the LSH sector. From now on, this branding will be used to draw attention to the societal theme and the missions, and the innovative concepts, products and services that these will generate in the coming years. More public dissemination and profiling under the Health-Holland flag will be encouraged, also as part of creating domestic and international markets.

Joining forces for the future

The health and care coalition will inform and involve as many stakeholders as possible in carrying out its missions, from local citizens' initiatives to national umbrella associations and international organisations and businesses. Meetings between people from different walks of life are crucial in this respect. The aim is to achieve coherence between various annual events linked to this KIA, to expand and strengthen networks, and to set up major campaigns and public activities via all kinds of media in the context of one or more missions. If the coalition organises

an activity under the Health-Holland flag or supports one as a partner, the relationship with one or more of the missions must be evident.

Informing and inspiring

Clear information provides stakeholders and partners with an understanding of the latest developments and new opportunities emerging from the societal theme. In addition, the shared communication tools will be a source of inspiration, for example by drawing attention to the successes of PPPs, KETs and KEMs, GROZzterdammen and illustration projects. As further inspiration for citizens, professionals and others, and to communicate the missions more widely, a series of artist's impressions will be commissioned to visualise the future experiences of citizens in the area of health, daily functioning, prevention and care at the reference points 2023, 2030 and 2040.

Deliverables

- Organising and implementing capacity
 - › National communication coalition jointly drawing the societal theme Health & Care to public attention under the Health-Holland branding (2022)
 - › Strengthening cooperation with other sectors and connecting societal themes by setting up a consultation structure suited to the Steering Committee
- Network and events
 - › Initial conference on the societal theme Health & Care (2020)
 - › Communication leitmotif – Connecting events in the sector and reinforcing coherence. The leitmotif focuses on the societal theme Health & Care and the underlying missions, and involves all parties from the quadruple helix
- Positioning and communication tools
 - › Communication toolkit – Making Health-Holland branding accessible to stakeholders from the LSH sector in order to use the “one voice, one message” method

- › Website, newsletter and social media – Providing clear information
- › Showcasing the results of public-private cooperation projects and partnerships
- › Artist’s impressions – Illustrating future perspectives on health and care at the reference points 2023, 2030 and 2040 (2021)
- › Campaigns and public activities – Inspiring the general public to join in and contribute to the societal theme Health & Care
- › Hackathons – Harvesting new insights and innovative solutions for health and care (2020-2021)
- Monitoring and evaluation
 - › Monitoring communication investments and results (every two years)

Funders and investors

Challenges

Adequate funding is a constant challenge for innovation. This applies to technological innovation and “hard” products, but even more so to social innovation and “soft” services. Dutch and European funding schemes are often fragmented, with each scheme having its own conditions and accountability procedures. This leads to massive bureaucracy and a loss of efficiency.

So ideally, there should be more synergy. Public investment and the founding of Invest-NL¹³³ offer opportunities in this area, provided that, together with the top sectors and ministries, they persevere sufficiently to connect the public and private sector schemes. This will allow a suitable funding scenario for each instrument. It would be even better if the gaps in the funding landscape could be filled more systematically.

The greatest challenge is probably the accessibility of funding for new players (especially citizens’ cooperatives), given the prominent role they will play in the Mission-driven Top Sectors and Innovation Policy. Many existing schemes do not invite all relevant stakeholders to participate on an equal footing. In some cases, citizens can only participate as followers if knowledge institutions, government and/or industry take the lead. Usually, citizens do not even get a mention.

The health and care coalition will therefore develop an approach with the relevant ministries, RVO and provinces

and regions to put financial support for citizens’ initiatives in experiments and field labs on the same footing as knowledge institutions and businesses. “The right care in the right place”¹³⁴ is a ZonMw voucher scheme that can serve as an inspiring example. This care parties’ initiative supported by VWS focusses on the daily functioning of citizens. From this perspective, the initiative seeks ways to move care (closer to people in their living environment), to avoid (more expensive) care and to replace care with measures such as eHealth. An initiative like MAEX also offers potential for new forms of funding for citizens’ initiatives.¹³⁵

Opportunities

By investing in both start-ups and scale-ups, the government¹³⁶ and Invest-NL can encourage business emergence and rapid growth and thus serve as a driving force for innovative SMEs. This includes making active use of the funding landscape in the regions and provinces, but also of start-up funds (Proof of Concept and pre-seed funding and business development/investor readiness programmes).

LSH venture capital parties in the Netherlands are doing well. In 2018, they raised record-breaking amounts to invest in the LSH sector, putting them at the forefront of Europe. For example, the Netherlands has the EU’s largest life science fund. Unfortunately, much of this capital has not (yet) been invested in Dutch businesses. Providing entrepreneurs with training and information on how to create business cases helps them to connect better with both private and public investors. If successful, this leads to more investment in Dutch innovative SMEs.¹³⁷

The Venture Challenge and the HIA help applicants to articulate their business cases and/or value cases clearly. If the current or future societal and economic benefits are clear, there is obviously a greater likelihood of obtaining funding. Financers often lack enough specialist knowledge to gauge the value of an idea and to define the right milestones, while entrepreneurs just starting out are not always able to state their business cases clearly.

An essential precondition for an actual point innovation or system innovation is the development of new revenue models and associated experiments. For example, in the case of innovations in the field of prevention, ways must be found to balance the pros and cons and the profits and losses for different parties. The balancing system used by health insurers can be a source of inspiration here.

Hopefully, sufficient scope for further funding and investment in prevention will be created by experiments of this kind and by involving private parties more in prevention. A wide range of businesses are available in this context, in sectors ranging from food retail to construction, as well as architects for the behavioural and living environment interventions.

The Knowledge and Innovation Covenant (KIC) that accompanies this KIA, and will be completed in autumn 2019 with all public and private coalition partners, offers a first opportunity to assemble parties around the broad mission portfolio. The parties' deployment of people and resources should lead to increased development of PPPs, PPs, KETs and KEMs, field labs and learning communities, and illustration projects.

Here the parties are seeking opportunities for "deduplication", facilitating additional private efforts, synergy between funders via funding scenarios, and synergy across the entire landscape (from the PPP Allowance of EZK Business Policy to the options under EU programmes).¹³⁸ Efforts are also at hand to broaden public matching options, with special attention to "in mind", "in kind" and "cash" inputs for social innovation and for valorisation and market creation. After all, the latter are crucial in determining the returns of investments for funders and investors.

Deliverables

- Public-private funding and investor coalition for the societal theme Health & Care:
 - › Strategy development of joint programmatic funding and investment scenarios by parties including SGF, NWO, ZonMw, Taskforce for Applied Research, ministries, provinces and regions, as well as banks, pension funds, philanthropists, etc. (2021-2022)
 - › Overview of public and private funders and investors for innovation, valorisation and market creation in the field of health and care (2020)
 - › Funder and investor conference on health and care (2021)
 - › Experimental funding scenarios for missions, PPs, (strategic) PPPs, KETs and KEMs, in their connection to PPPs: (2022)
 - › National coalition of funders and investors for the societal theme Health & Care (2023)
- Project-specific innovation roadmap for development in cooperation with HI-NL (continuous)
- Financial targets:

- › Private investment of EUR 212 million in LSH in 2018 rising to EUR 600 million in the societal theme Health & Care in 2023
- › PPP "gronslag" rights from EUR 65 million (2018) to EUR 180 million (2023: this forces a debate on the current limit of EUR 170 million)
- › Experiment with a "PPP baseline "gronslag" – regional" (regions/provinces; 2020) besides the EZK's existing "PPP baseline "gronslag" – national" (by analogy with the MIT scheme)
- › Other targets: see KIC (2019)
- › Use of generated PPP Allowance administered by institutes from four (2019) to ten (2021) and ultimately to 15–20 (2023)

Valorisation and market creation

Challenges

Valorisation – translating (scientific) knowledge and innovations into economic and/or societal value¹³⁹ – is, together with market creation¹⁴⁰, a key concept and a crucial objective in this Cabinet's Mission-driven Top Sectors and Innovation Policy. Valorisation now occupies an additional central position within the research institutions, with knowledge transfer aimed at encouraging societal application and/or economic revenue. Cabinet policy demands that valorisation and market creation be strengthened and broadened with a view to social innovation.

But within the societal theme Health & Care, valorisation and market creation are a delicate topic posing at least two dilemmas: affordability and efficiency.

Affordability

Firstly, valorisation and market creation must be in balance with the affordability of prevention, care and cure, which is already under pressure due to demographic and other factors. Besides market creation, at least as much attention should be paid to targeted de-implementation. However, vulnerable citizens should always be kept in mind in this context.

The mission-driven approach offers an opportunity here, since research and innovation are more demand-driven. This concerns the necessity and desirability for vulnerable people, in particular, and weighing up the costs and benefits. Managing this demand better can lead to market creation and, at the same time, cost control.

In many cases, innovation and market creation can certainly lead to cost reductions, especially if this achieves the first two missions. But at the macro level, technological innovation often results in rising care costs. One reason for this is that technological innovation can lead to a broadening of indications and hence to an increase in volume. So it is not the innovation itself, but its use, that drives up costs.

Appropriate use is therefore essential. Case studies are crucial to further fuel the debate around innovation and cost reduction, with accompanying research by PPP HI-NL in PPPs, illustration projects and field labs. Such research should enhance the debate by supplying the necessary facts on technological and social innovation. For example, we can use methods such as early health technology assessment (eHTA)¹⁴¹ in the FAST initiative or whole-system analyses (WSAs) within the GROZzerdammen.

Besides HI-NL's involvement in R&D, it is crucial that the Ministries of VWS, OCW and EZK and their institutes, including ZIN, RIVM, RVS and NZa, and possibly the Health Council of the Netherlands, are also actively involved in such dialogues. They can broaden the facts by supplying a policy interpretation in a societal, scientific and economic context. Such an interpretation can help to keep prevention, care and cure affordable and of high quality. It will also help to ensure that funding, laws rules and regulations do not pose unnecessary barriers to market introduction and creation.

The Mission-driven Top Sectors and Innovation Policy can only succeed if discussions also lead to policies that support desired innovations. In this time of transition, this decisiveness is important. Using case studies and innovative measuring methods, we must develop solutions together. All key players must then take decisions in joint, wide-ranging "whole system in the room" meetings. In the case of high-impact innovations, this process should lead to agreements in the form of Health Deals¹⁴² and Health Impact Bonds.¹⁴³

Efficiency

The second dilemma concerns inefficiency and system failures, which result in high-quality inventions not being used. This innovation paradox is proving to be a persistent problem that we need to tackle with new energy. Where regulations obstruct the valorisation process, we need to look at what is possible within the existing regulations, and which rules we may need to amend.¹⁴⁴ The knowledge of

end users (professionals and citizens) is another potential limiting factor. We need to draw on best practice from other areas.

In addition, innovative SMEs could play a stronger role. It is important that knowledge institutions should have enough internal capacity and expertise to implement the various forms of valorisation.¹⁴⁵ They must take account of the societal and economic responsibilities of all participants.¹⁴⁶ Knowledge transfer calls for an active approach. Knowledge Transfer Office (KTO) and Technology Transfer Office (TTO) staff stay close to the demands of the market and society, and actively seek out researchers and businesses.

Opportunities

Joint valorisation efforts based on a properly functioning ecosystem have had demonstrable effects in recent years. This has been possible thanks to sufficient knowledge, entrepreneurship, financial resources and a willingness to cooperate. PPPs such as RegMed XB, Oncode Institute,¹⁴⁷ IMDI and DCVA are inspiring examples and will continue to bear fruit in the coming years. After all, thanks to the link between thematic research and thematic technology transfer, these PPPs have growing expertise and capacities at their disposal. These in turn help to bring knowledge and innovations to the market quickly and effectively, responding to the needs of end users.

These PPPs are distinguished by their fully-fledged valorisation approach, which nowadays stands in a much broader context of knowledge transfer and technology transfer. Central to this are R&D cooperation, Open Science, entrepreneurship and highly qualified specialists. Initiatives such as the Venture Challenge, Paul Janssen Futurelab, TAP BioBusiness, LifeSciences@Work Accelerator and Global Scale-up Program contribute to raising awareness and to solid training for future entrepreneurs in the biotech and medtech sectors. The role of a properly functioning venture capital system is also essential for successful valorisation.



A woman with diabetes, who through an extended study, uses Inreda Diabetic's portable artificial pancreas in her daily life, the National Icon of 2019.

Market creation

In the context of market creation, societal theme partners are working together with EZK and VWS on innovations that offer economic prospects and at the same time reduce care costs in the long term. Besides prevention, examples include regenerative medicine, which promises future cures for a number of diseases, such as diabetes and kidney failure. This requires substantial start-up costs, including private sector funding, to remove the current “solutions” from the system so as to limit the costs. VWS, EZK and Invest-NL are therefore discussing the establishment of a fund to help finance precisely this type of high-risk investment in unproven innovations. Other innovative solutions such as eHealth also require high start-up costs, in the hope that health and care will become more efficient and cheaper further down the line.

This market creation through innovation-focused procurement and purchasing strengthens the innovation and valorisation processes. The individual and joint purchasing power of prevention, care and cure institutions and (semi-)governmental bodies also offers opportunities for contributing to market creation and thus to the missions and the strengthening of the economy.

12 Pillars of modern valorisation

A valorisation approach by a PPP such as the Oncode Institute is currently characterised by various activities based on R&D cooperation and entrepreneurship, preferably taking an Open Science approach, and with highly qualified experts in the field of:

- 1. Knowledge and/or technology transfer;*
- 2. Promoting start-ups/spin-offs: scouting, screening, developing, coaching, readying for investment and funding promising new businesses;*
- 3. Valorisation via existing businesses. This can be done individually, but also via business alliances, business clusters and broader ecosystems (mission-driven and/or theme-driven);*
- 4. Providing facilities to innovate, validate and valorise new products and services, or to commercialise them through market creation.*

Deliverables

- Public-private valorisation and market creation coalition of health and care:
 - › Strategy development on joint valorisation and market creation by parties such as EZK, VWS, provinces, regions, business umbrella associations, regulatory bodies (ZIN, NZa) and representatives of relevant prevention and procurement organisations (including citizens' initiatives), etc. (2020, no later than early 2021)
 - › Inventory of participants in valorisation and market creation (2020)
 - › Starting conference on the societal theme Health & Care (2021)
 - › National coalition for valorisation and market creation within the societal theme Health & Care (2021, no later than early 2022)
- Business case studies, "whole systems in the room" meetings until necessary agreements are made in the form of Health Deals and/or Health Impact Bonds in collaboration with EZK, VWS and RVO and (case-by-case) relevant members of the coalition and PPPs and/or PPPs for the valorisation and market creation of mission-related concepts, products and services (2020-2023)
- A learning community network of TTOs (from universities (including VSNU) and 4TU, HBO (VH) and UMCs (NFU), but also institutes such as TNO and KNAW) for knowledge valorisation, licences and enterprises (2023)¹⁴⁸
 - › Mirror and benchmark (compared to EU and US) of Technology Transfer in the Netherlands (in 2020-2021 baseline measurement to set health and care ambitions)
 - › The aim is to make the Netherlands a Technology Transfer leader in Europe
- Assembling many existing, relatively small, training initiatives into a joint programme training scientists to become successful entrepreneurs: LifeSciences@Work accelerator
- Measuring and evaluating the results of thematic TTOs (Oncode Institute, RegMed XB, DCVA and IMDI) (2021-2022) and, if successful, setting up new thematic TTOs (2020-2023)

Programmatic cooperation in the regions

A key role for the regions

The region is a crucial starting point for innovation. The regional level is an easy place for citizens, health professionals, industry, government and researchers to meet. This creates opportunities for valorisation based on demands in the market and society. And any restructuring of prevention, care and cure often starts locally.

Regional investment funds have already helped many start-ups to pass through the "valley of death". Investments and development efforts by the provinces and regional development agencies (ROMs) yield some EUR 250 million annually.¹⁴⁹ The regional scale lends itself well to effective clustering and (project-based) cooperation between knowledge institutions and SMEs, such as in the Healthy Ageing Network Northern Netherlands, Health Valley, Economic Board Utrecht, Amsterdam Economic Board, Slimmer Leven 2020 and Medical Delta.

Moreover, social innovation often requires attention to local customs, culture and etiquette. Against this background, the UMCs will focus on health issues in their regions in the coming years. For example, according to the NFU plan, each UMC will have a regional plan in place by 2020.¹⁵⁰ In addition, regional agreements can be made with top clinical (Stichting Topklinische Ziekenhuizen; STZ) hospitals and other intramural care institutions.

Challenges and opportunities

Regional involvement is a cornerstone of the Mission-driven Top Sectors and Innovation Policy. Programmatic cooperation in the regions strengthens access to SMEs (and their networks) and promotes SME creativity and entrepreneurship. It also enables potential start-ups to be mobilised as effectively as possible for the missions and for the further development and application of KETs and KEMs.

The provinces and ROMs have general and region-specific knowledge and instruments for funding, business development, cluster and ecosystem development, and market validation at both the national and international levels. These instruments often complement those of the ministries. Finally, cooperation with the regions offers an opportunity to optimise use of regional facilities, initiatives and instruments in cooperation with events occurring

nationally. By working on regional and national synergies, we can achieve greater effectiveness and efficiency.

We can implement programmatic cooperation practically in five areas:

- 1. Providing insight:** the provinces and ROMs are currently mapping out the landscape of relevant instruments and conditions per theme and per region. This will produce “photos” that we, via the governance and coalition, can use in implementing the actions for each mission.
- 2. Brokering and bridging:** based on these photos, we can establish targeted links between theme and mission initiatives, and the instruments and conditions in the regions. We will need to make additional agreements for this. The objective is that, by 2020-2021, half of all regional organisations will use the innovation brokering or networking scheme offered by Top Sector LSH coalition.
- 3. Developing new products, services and projects:** based on the photos and the brokering and bridging activities, any blind spots will become clear. It will also become clear which products, services and mission-related instruments and elements are needed nationally, regionally and locally. An example of a specific product is the ROMs’ Investor Readiness Programme,¹⁵¹ which meets the need for a systematic approach to prepare promising businesses for funding.
- 4. Aligning instruments and resources:** investments from ministries, national consortia and the regions are all necessary for a successful valorisation approach. But their coordination and combining could be improved. The MIT scheme is a good example of harmonisation of national and regional resources and efforts. A joint approach can lead in the future to further optimising and combining of business-focused instruments. For example, the area of early funding offers opportunities for optimisation: by aligning and/or combining (assembling) national, regional and thematic instruments. Where possible, this applies to schemes such as the (national) TTT and IPC schemes.
- 5. Building joint propositions:** based on promising themes, we can build joint propositions for an integrated approach to technology development, innovation capacity and talent development, always on the right scale. These propositions combine all aspects of the broad approach to innovation and valorisation. An existing inspiring example might be the photonics proposition.¹⁵²

The group of new and existing ERDF programmes¹⁵³ is an important aspect of this approach. In the future, this is expected to include a strong emphasis on innovation and sustainability. The field labs/GROZZerdammen and illustration projects should place the emphasis on field labs. Cooperation and substantive linkage between the missions, Key Enabling Technologies and Regional Innovation Strategies (RIS) will allow better alignment of joint substantive and financial efforts.

Towards results: field labs and consortia

Ideally, the ecosystem in the region should involve practice-based research with interaction between fundamental, translational and applied research, and the further development of (ecologically) validated products and services. This validation (testing feasibility and applicability in practice and with end users) often takes place in regional field labs, such as Brainport Smart District and Citizenlab Oost.

In learning communities (or “skills labs”)¹⁵⁴, people acquire the knowledge and skills needed to ensure that society has enough manpower. In the best scenario, these field labs and learning communities coincide in the GROZZerdammen.

Various regions support campus forming, often in the vicinity of a university, technical university, UMC, university of applied sciences (offering courses in physiotherapy, nursing, lab technology, etc.) or senior vocational education (MBO) institution. This open innovation structure encourages knowledge exchange and valorisation. Examples include Leiden Bio Science Park, Pivot Park, Health Hub Roden, Kennispark Twente, Novio Tech Campus and Maastricht Health Campus. In regions with no academic or other campus, universities of applied sciences and regional training centres (ROCs) can pool resources to address regional issues, together with citizens’ initiatives and innovative local SMEs.

Deliverables

The regions encourage the forming of ecosystems for open innovation, where existing consortia and new players work together to develop results and put them into practice. Cluster organisations offer organisational capacity and take initiatives. They bring public and private sector organisations together to achieve specific goals. Here are some examples:

- › The Interdisciplinary Consortium for Clinical Movement Sciences and Technology (ICMS) was established within the broad TopFit programme¹⁵⁵ in the eastern

Netherlands (the provinces of Gelderland and Overijssel). The ICMS focuses on the functioning and conditions of the musculoskeletal system of people.

- › In 2018, the Eindhoven Medtech Innovation Center (e/MTIC) was set up in Brainport Eindhoven in the province of North Brabant, as a hub for innovation in medical technology¹⁵⁶.
- › Another inspiring example is the Province of Gelderland's partnership with the universities of Wageningen and Nijmegen and the Flemish IMEC in OnePlanet¹⁵⁷, which other parties such as TNO are also set to join. This group works together with SMEs on new solutions for agriculture, nutrition and health.
- › Lastly, there is the Health Hub Utrecht, based on a City Deal with the Ministries of OCW, EZK, VWS and I&M, for the health economy, self-management, healthy neighbourhoods and education for healthy living.¹⁵⁸ Provincial authorities and intermediaries, such as the ROMs, can play a key role in involving innovative SMEs and vocational educational establishments (ROCs).

Deliverables

- Specific agreements on deliverables will be made in the second half of 2019 in the interaction between provinces/ROMs and the health and care coalition led by Top Sector LSH. The minimum objective, on the one hand, is to involve substantially more relevant businesses, facilities, funds and programmes in the regions (including in the setting up of field labs/GROZZerdammen). On the other hand, the focus will be on joint programming, proposition development and coalition forming on selected topics within this KIA. Finally, the agreements made in this context will be incorporated into the KIC 2020-2023.

Internationalisation

International cooperation is an essential and highly successful pillar of the strategy in the societal theme Health & Care. It is of economic importance because it stimulates imports and exports, and attracts foreign investment. In addition, science and innovation benefit from a strong internationalisation strategy that promotes cooperation and attracts talent. Thanks to an active approach and a programmatic strategy, the Dutch LSH sector is now well established on the world map. Special attention is paid to cooperation with the focus and priority countries as defined in the 2015 International Strategy.¹⁵⁹

Challenges

The health and care activities in the Netherlands' Mission-driven Top Sectors and Innovation Policy are not separate from challenges in the rest of the world. As implied by the Health-Holland vision "shared challenges, smart solutions", the Netherlands has much to offer, but can also learn a great deal from other countries. International cooperation can thus directly contribute to achieving the missions in the Netherlands. In the context of internationalisation, the LSH coalition will focus on the following challenges, which it will incorporate into its new International strategy in the course of 2019:

- Developing new knowledge, technology, products and services designed to improve health and care both in the Netherlands and beyond;
- Expanding the economic scope and impact of international activities related to the societal theme Health & Care;
- Better branding and promotion of the unique solutions that characterise the success of the Dutch health and healthcare system;
- The Netherlands as a leading country within the EU, making optimum use of the funding available for innovation and for marketing the country's knowledge;
- More detailed market research to increase the depth and impact of activities in certain countries;
- Strengthening the integrated approach to investment, innovation, trade and knowledge;
- Supporting and promoting international contacts with all players within the quadruple helix.

Opportunities

International cooperation within the different levels will have considerable scientific impact in the coming years. For example, promising international developments may contribute to cures for common serious diseases such as cancer, osteoarthritis, depression and anxiety, coronary heart disease, asthma and COPD, diabetes and Alzheimer's disease.

International cooperation is also of clear economic importance. The Netherlands Foreign Investment Agency (NFIA) and the ROMs together form a strong national network focused on objectives such as the strategic acquisition of knowledge-intensive foreign institutions and companies. Trade & Innovate NL¹⁶⁰ (RVO, development agencies and other public intermediaries) ensures national coordination on trade promotion and international cooperation in matters of innovation. It is logical to seek cooperation with these networks in line, for example, with

the valorisation approach described above. Programmatic cooperation with other countries (e.g. focus countries) will develop through long-term agreements and closer coordination with embassies and innovation attachés. Countries that are important to the Dutch healthcare sector based on investments, exports, knowledge development, et cetera can continue to expect a warm welcome in the Netherlands. We will also look at whether countries can contribute to achieving the health missions because, for example, they possibly share similar problems or offer special opportunities in science, innovation or economics. Linking national networks of citizens, care providers and local SMEs to parties with relevant contacts in other countries means that they will also benefit more from internationalisation.

Deliverables

- Public-private internationalisation coalition for the societal theme Health & Care:
 - › Strategy development on the joint agenda with all relevant parties – from RVO to the regions and provinces, from TFHC to the Ministry of Foreign Affairs – by the existing “LSH international working group” (2019)
 - Updating of the International Strategy 2020-2023 (2020)
 - International funding agenda (2020)
 - › Extension of the strategic grants programme (2020)
 - › National coalition for internationalisation (2021)
 - › Internationalisation conference (2021–2022)
 - › Development (2019), start (2020) and implementation (2020–2024) of the Flanders-Netherlands Memorandum of Understanding (Nov. 2018)
 - › Even stronger positioning of Health-Holland branding in collaboration with Invest in Holland

Human capital

Challenges

While we are working hard on the future envisaged in this KIA, almost one-and-a-half million people are working hard on prevention, care and cure. This is no easy task: we are carrying out renovations while the “shop” stays open. The various prevention and care professionals play a key role in meeting the challenges posed by both a growing demand for care and a shrinking labour market, with wide regional differences in urgency and volume.

Practitioners and research professionals are also essential in achieving the missions and in the radical transitions that should ultimately offer solutions. Boundaries between disciplines are becoming blurred, and technology, especially digitisation, still has to find its way. Cooperation is becoming more important than ever, resulting in local/regional networking, reallocation of tasks, “T-shaped” professionals/multi-professionals, and perhaps new occupations. There is also a shift underway in research and innovation.

High demands will be placed on these professionals in the coming years in terms of flexibility, learning ability and development capacity. They will have to deal with new technologies and therapies, and with different ways of working in a changing culture and context. How do professionals who are mainly people-focused learn adequate skills in working with technology? And how do technically oriented professionals develop more competencies in dealing with people with chronic or other conditions?

The professionals of Techniek Nederland, for example, will work more in citizens’ living environments. Managers will have to facilitate the transition to different ways of working and, where necessary, provide support with investments in human capital and learning communities in field labs. Besides professionals in prevention, care and cure, many more talented people are needed in the laboratories of companies and knowledge institutions. There is also a need for professionals capable of carrying out innovative research in the field labs. A further need exists for expertise in the field of regulations, partly due to the arrival of the EMA.

Opportunities

This KIA consciously involves all human capital in the strategy for the societal theme Health & Care. This means working primarily with the VWS “Care Pact” successor *Werken in de zorg* (“Working in Care”), and its committee and Action Learning Network.¹⁶¹ “Working in Care” encourages



people to opt for work in healthcare, and encompasses those normally excluded from the labour market, due to chronic conditions for example. “Working in Care” also promotes adequate training, learning to innovate, permanent sufficient connection between education and the labour market, and sustainable employability (especially by combating burn-out as an occupational risk).

The focus is on preserving the working population and making optimal use of labour potential. New alliances of employers, employees, training and development funds, educational institutions, private training providers, municipalities and entrepreneurial innovators are emerging at local, regional and national level. Sustainable employability is customised to the individual and requires employer investments in labour market and training policy.

We aim to facilitate the involvement of private parties in training, education and sectoral associations of professional groups.¹⁶² The aim is to encourage professionals – including those in training – to strengthen their innovative talents so that they can develop relevant innovations in cooperation with the quadruple helix.

Through education and training, private parties interact with professional groups, ensuring that new technologies and therapies find their way into practice more quickly.

Professionals themselves need to be prepared for lifelong learning and/or development, where the ability to find information will quickly become more important than ready knowledge. We also expect an inquiring attitude on the part of directors and management. We need to identify professionals currently excluded from the labour market due to illness or disability, and involve them again as much as possible in prevention, care and cure.

To help these current and future professionals gain a clear picture of the future and a better feel for their potential contribution, we are working to produce images that are as concrete as possible. The artist’s impressions mentioned above will show how the missions will change citizens’ lives and healthcare by 2023, 2030 and 2040. With these professionals in mind, we will supplement these images with impressions of how work will change from the professional perspective. This will offer the best possible insight into the new ways of working in the future.

Deliverables

Learning communities will start in the four to six GROZzerdammen during this strategy period. This is where citizens, professionals, entrepreneurs, scientists, educational institutions and policy-makers will work on the missions together in local/regional networks. The insights from the GROZzerdammen will be translated to broader (educational) practice via “Working in Care” and other routes, in line with local and regional needs elsewhere. This can also be done by offering training to citizens’ initiatives and cooperatives and patients’ organisations, and by involving citizens with hands-on expertise in the training of professionals. Professionals can learn a lot from citizens, for example by visiting and helping with the initiatives of Gemeenschapskracht and NLZVE.

We will encourage these meetings nationally and locally. We will urge training providers to work together in an interdisciplinary manner to develop a framework planning system for prevention and care training, which is inspired and instructed by the findings of the Kaljouw¹⁶³ and Kervezee committees.¹⁶⁴

In an Educational Health Deal, for which the initial preparations have already begun, agreements will be made between relevant public and private parties, under the supervision of the Ministries of VWS, EZK and OCW. The aim is to get social, technological and system innovations in prevention and care into education and training through private entrepreneurs. This will ensure that the professionals of the future adopt knowledge and innovation more quickly.

We will also work together with sectoral organisations, professional associations and private course providers to reach existing professionals. This approach will enable professionals, together with citizens and other players, to shape social and technological innovations. They are often the first users, advising citizens and their carers, and colleagues from a wide range of disciplines. These are specialists who work partly in care institutions and frontline practice, but also for example in citizens’ cooperatives, schools, businesses, sports clubs, health insurance companies and municipalities. This demands a solid foundation of knowledge and experience. Experiments in field labs such as the GROZzerdammen are needed in order to see what works and what is relevant.

Deliverables

- Public-private human capital coalition for the societal theme Health & Care:
 - › Strategy development on a joint agenda with all relevant parties – from NFU/UMCs, VH/HBO (HGZO and DAS), MBO up to and including the regions and provinces; from VvAA, NPHF Federation for health professions up to and including the Ministries of OCW, VWS (“Working in Care”) and SZW – in cooperation with Transition team HCA (2019):
 - HCA 2020-2023 (2020)
 - HC funding agenda (2020)
 - › National public-private HC coalition (2021)
 - › HC conference (2021–2022)
- Four to six learning communities embedded in an equal number of field labs (2021–2022)
- Human capital agenda (2020)
- Coherent system of framework plans (2020-2022)
- Educational Health Deal (2021–2022)

Monitoring and evaluation

Challenges and opportunities

The Mission-driven Top Sectors and Innovation Policy needs to be well planned and monitored in terms of process and impact, investments (people and resources) and returns (societal, economic and scientific). This will enable careful adjustments by governance (see Figure 5).¹⁶⁵ Together with our coalition partners, we will develop impact pathways¹⁶⁶ for the five missions in early 2020, based on impact logic, the so called theories of change, and with the aid of participatory impact pathway analysis¹⁶⁷. Impact pathways describe the ecosystem involved, its activities and investments, and the deliverables, outcomes and impacts in logic-based, coherent time-phase patterns. In view of the many changes during the transition, we will need to gradually adjust the Key Performance Indicators (KPIs; as set out on page 14 of the KIA 2018–2021¹⁶⁸). By using modern data techniques to measure the correct KPIs regularly, we can draw reasonable conclusions as to which interventions have helped (contribution) and which impact we can attribute to a given intervention (attribution). This will show where the process is on track and where more attention is required.

With the right parameters, more interaction occurs between the different parties working together on the missions. They can learn from each other’s successes and setbacks, inspire

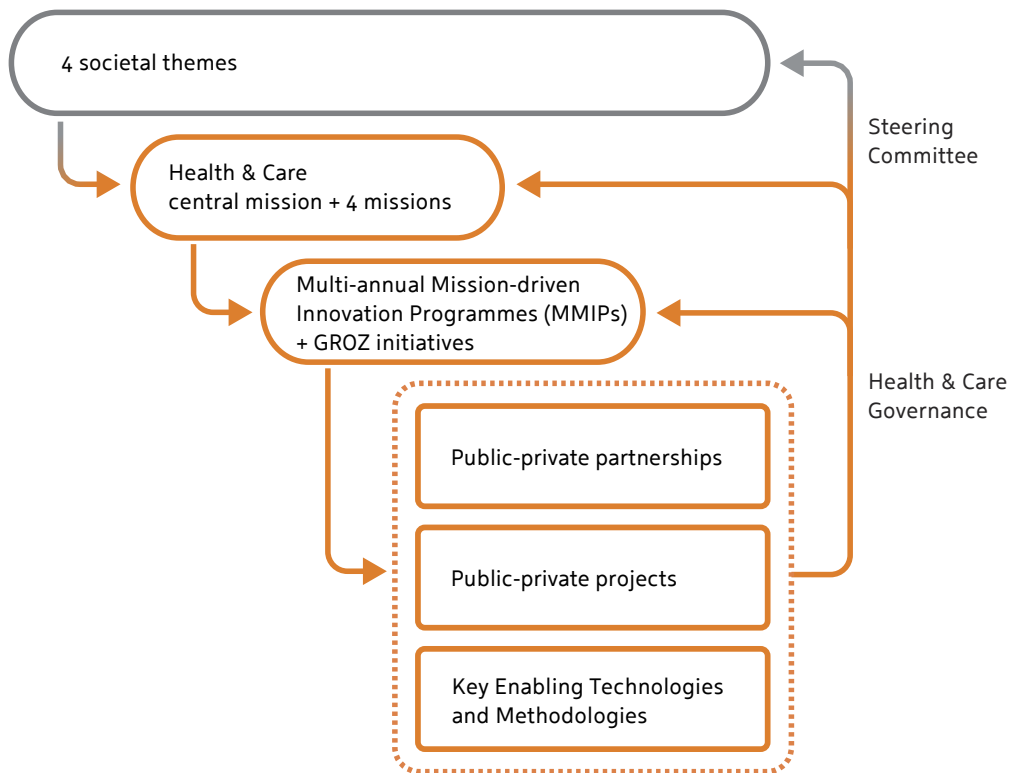


Figure 5: Compressed overview of the related monitoring and evaluation levels for the societal theme Health & Care. The field labs/GROZzterdammen and illustration projects are part of the GROZ initiative.

each other and make connections, thus creating further synergy. The coalition will take a baseline measurement in 2020 and then measure progress at least once every two years. Data from research and innovation projects can also contribute to this monitoring. Finally, we will compare this progress with other countries by using our own monitoring or with the aid of international monitoring initiatives from the business community¹⁶⁹, or in other ways.

Deliverables

Monitoring will take place at various levels (see Figure 5):

- National, for the four societal themes for the entire Mission-driven Top Sectors and Innovation Policy¹⁷⁰;
- By societal theme, at the level of the missions, PPPs and associated Key Enabling Technologies and Methodologies;
- Regional and local, for example at the level of the field labs.

For the societal theme Health and Care, we will initiate a process of monitoring and evaluation. The necessary methodology will be developed by the PPPs HI-NL, Health-RI¹⁷¹ and mICF, a new PPP AI and several Key Enabling Technologies. Health-Holland is pleased to work with various expert partners in this area: RIVM, CBS, CPB, CWTS, GGD-GHOR, NFU, SCP, RVS, Vektis, health insurance and quality registers.¹⁷² These are all organisations with expertise and data from society, industry and science. Gains can probably also be achieved by integrating different forms of monitoring, for example, by using new insights¹⁷³ and consumer and environmental data at district level from businesses¹⁷⁴ a up until municipalities.

Together with our coalition partners, we will develop impact pathways, a new set of KPIs and a corresponding theoretical structure. The working group on health and care will coordinate the KPIs and this structure with the sponsors, Cabinet and EZK, in the quadruple helix and with the governance that will also take the final decisions.

Deliverables

- Public-private monitoring and evaluation coalition of the societal theme Health & Care
 - › Strategy development on the joint agenda with all relevant parties
 - PPPs: HI-NL, Health-RI (and MedMij¹⁷⁵), mICF and AI
 - Key Enabling Technologies
 - RIVM, CBS, CPB, CWTS, GGD-GHOR, NFU, SCP, RVS, Vektis, Pharos, health insurance and quality registers, etc.
 - Monitoring and evaluation agenda 2020-2023 (2020)
 - M&E funding agenda (2020)
 - › National public-private coalition (2021)
- Theoretical monitoring and evaluation structure under the KPIs Health and Care (2020)
- Complete set of impact pathways for the missions and KPIs (2020)
- Infrastructure to measure KPIs linked to Health-RI (2020-2022)
- Periodic reporting of KPIs in the quadruple helix (2020, 2022 and 2023–2024)

Organisation and governance

Challenges

The growing responsibilities in terms of the missions (Chapters 1 and 2) and strategy (Chapter 3) obviously require a sound governance structure. This should strongly represent the quadruple helix and apply to the whole of the societal theme and central missions, as well as to the four MMIPs, the PPPs. The governance must also be linked to regional, national and international efforts, and is aware of current developments.

Opportunities

Since 2013, Top Sector LSH has been led by a Top Team and an Advisory Board. These are supported by the legal entity Stichting LSH-TKI, a foundation which is also the executive organisation of Top Sector LSH (Health-Holland) and has its own board. As the responsibilities of Top Sector LSH in the societal theme Health & Care are now changing, it makes sense to evaluate the governance and implementing organisation and, where necessary, to strengthen them further in consultation with the government, other top sectors and partners.

Deliverables

In the coming years, Health-Holland will work with the other top sectors and the entire ecosystem to achieve the missions in the field of Health & Care. In 2019, the governance, via the Top Team, will bear administrative responsibility for producing and executing this KIA and the KIC. It will be advised in these matters by the Advisory Board.

The board and office make up the organising authority and, under governance supervision, are responsible for producing the KIA and KIC in cooperation with the numerous coalition partners. Together with the GROZ transition teams, they are already accelerating the transition. These teams work as interfaces with the different domains of society.

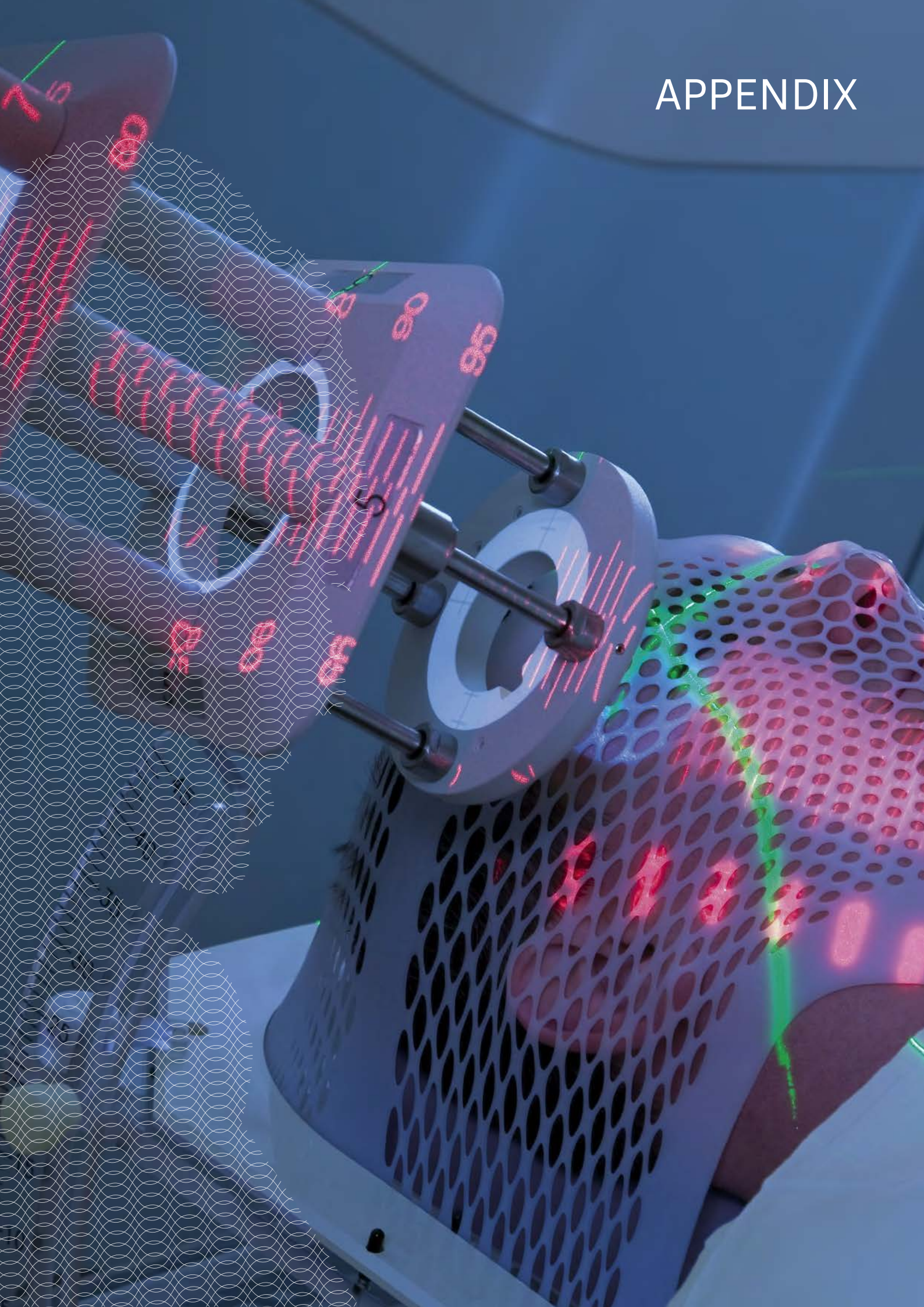
With the shift from Business Policy to the Mission-driven Top Sectors and Innovation Policy, and with the responsibilities for the societal theme Health & Care, we aim to have the new governance and executive organisation operational by the first quarter of 2020. In due course we will also merge the transition teams into a single team that will support the transition in the coming strategy period.

Responsibilities from 2020

With the formal implementation of the Mission-driven Top Sectors and Innovation Policy starting in 2020, the top sectors will be asked, besides meeting economic objectives, to assist more in solving societal issues, but without taking responsibility for those issues. The missions are the responsibility of the relevant ministries: in the case of the societal theme Health & Care that is the Ministry of Health, Welfare and Sports (VWS). The Rutte III Cabinet signed all six of the knowledge and innovation covenants on 11 November 2019, including the health and care covenant-part signed by VWS.

The top sectors contribute to the success of the missions, with the focus lying on economic opportunities in the societal perspective and the creation of prosperity. Top Sector LSH has been asked to coordinate these top sector contributions for the societal theme Health & Care. The growing coalition around this theme is a movement in its own right, with its own joint responsibility. Top Sector LSH's main contribution to this is bringing together relevant public and private parties to invest in and cooperate on the missions.

APPENDIX



Abbreviations and glossary

AI	Artificial Intelligence	GGZ	Geestelijke Gezondheidszorg (Mental Healthcare Authority)	KIC	Knowledge and Innovation Covenant
AMR	Antimicrobial resistance	GO-FAIR	Global Organisation for Findable, Accessible, Interoperable, Reusable data	KNAW	Koninklijke Nederlandse Akademie van Wetenschappen (Royal Netherlands Academy of Arts and Sciences)
ATMPs	Advanced Therapy Medicinal Products	GROZ	Anagram of "ZORG" (Dutch for "care")	KTO	Knowledge Transfer Office
BBoL	Building Blocks of Life	GROZzerdam	Field lab within GROZ (plural: GROZzerdammen)	LS@W	LifeSciences@Work Accelerator (LSH start-up programme)
CBG	College ter Beoordeling van Geneesmiddelen (Medicines Evaluation Board)	HBO	Hoger beroepsonderwijs (Higher Professional Education)	LSH	Life Sciences & Health
CBS	Centraal Bureau Statistiek (Statistics Netherlands)	HC	Human Capital	MAP	Multi-Annual Programme
CLICKNL	Top Sector Creative Industry	HCA	Human Capital Agenda	MBO	Middelbaar beroepsonderwijs (Senior Vocational Education)
CM	Central Mission	HDHL	Healthy Diet, Healthy Living	mICF	mobile International Classification of Functioning
CPB	Centraal Planbureau (Bureau for Economic Policy Analysis)	hDMT	Institute for Human Organ and Disease Model Technologies	MIT	MKB-innovatiestimulerend Regio en Topsectoren (inter-regional scheme encouraging SME innovation in line with top sector agendas)
CWTS	Centre for Science and Technology Studies	Health-RI	Health Research Infrastructure	MMIP	Multi-annual Mission-driven Innovation Programme
DCVA	Dutch CardioVascular Alliance	HIA	Health Impact Accelerator	MYBL	More Years, Better Lives
DDD	Dutch Digital Delta	HI-NL	Health Innovation NL	NADP	National Antimicrobial Development Platform
DuSRA	Dutch Society for Research on Ageing	HTA	Health Technology Assessment	NCOH	Netherlands Centre for One Health
e/MTIC	Eindhoven MedTech Innovation Center	HTSM	High Tech Systems & Materials	NFIA	Netherlands Foreign Investment Agency
EBS-CC	Evidence Based Sensing of Chemical Compounds	lenW	Ministerie van Infrastructuur en Waterstaat (Ministry of Infrastructure and Water Management)	NFU	Nederlandse Federatie van Universitair Medische Centra (Netherlands Federation of University Medical Centres)
ELF	European Lead Factory	IGJ	Inspectie Gezondheidszorg en Jeugd (Health and Youth Care Inspectorate)	NILG	Nederlands Innovatiecentrum voor Leefstijlgeneseeskunde (Dutch Innovation Centre for Lifestyle Medicine)
EMA	European Medicines Agency	IMDI	Innovative Medical Devices Initiative	NLZVE	Nederland Zorgt voor Elkaar ("Netherlands Cares for Each Other")
ERDF	European Regional Development Fund	IMPROVE	Improving Mental healthcare using Personalised treatment based on analyses of Routine data for Optimal Value and Effectiveness	NRPO SIA	Nationaal Regieorgaan Praktijkgericht Onderzoek SIA (Taskforce for Applied Research SIA)
EU	European Union	IPC	Innovatieprestatiecontracten	NWA	Nationale Wetenschapsagenda (Dutch Research Agenda)
EZK	Ministerie van Economische Zaken en Klimaat (Ministry of Economic Affairs and Climate Policy)	JGZ	Jeugdgezondheidszorg (Youth healthcare)	NWO	Nederlandse Organisatie voor Wetenschappelijk Onderzoek (Dutch Research Council)
FAIR	Findable, Accessible, Interoperable, Reusable	JZOJP	Juiste Zorg op de Juiste Plek ("Right Care in the Right Place")		
FAST	Future Affordable and Sustainable Therapeutics	KEMs	Key Enabling Methodologies		
FME	Federatie voor de Metaal- en Electrotechnische Industrie (Federation for the Metal and Electrical Engineering Industry)	KETs	Key Enabling Technologies		
FMI	Future Medicines Initiative	KIA	Knowledge and Innovation Agenda		
GGD	Gemeentelijke Gezondheidsdienst (Municipal Health Service)				

NZa	Nederlandse Zorgautoriteit (Dutch Healthcare Authority)	SME	Small and Medium-sized Enterprises	ZIN	Zorginstituut Nederland (National Health Care Institute)
OCW	Ministerie van Onderwijs, Cultuur en Wetenschap (Ministry of Education, Culture and Science)	SPRONG	Stimulering van Praktijkgerichte Onderzoeksgroepen (Encouraging Practice-Oriented Research Groups)	ZonMw	Nederlandse Organisatie voor Gezondheidsonderzoek en Zorginnovatie (The Netherlands Organisation for Health Research and Development)
P4O2	Predictive, Preventive, Personalised and Participatory Medicine for More Oxygen	SRL	Social Readiness Level	Zvw	Zorgverzekeringswet (Health Insurance Act)
PATH	Predictive Analysis for Therapy: PATH to Optimising Access to Personalised Cancer Therapy in the Netherlands	Tertiary prevention	Preventing diseases or abnormalities from worsening		
PPP Allowance	Public-private partnership allowance	TFHC	Task Force Health Care		
PPP	Public-private partnership	TKI	Topconsortia voor Kennis en Innovatie (Top Consortia for Knowledge and Innovation)		
PPp	Public-private project	TPI	Transitie Proefdiervrije Innovaties (Transition Programme for Innovation without the use of animals)		
Primary prevention	Preventing health problems, illness or accidents in healthy people	TO2	Federation of Applied Scientific Research Organisations		
Quadruple helix	Government, knowledge institutions, industry and citizens	Top Sector LSH	Top Sector Life Sciences & Health		
R&D	Research & Development	Triple helix	Government, knowledge institutions and industry		
RegMed XB	Regenerative Medicine Crossing Borders	TRL	Technology Readiness Level		
RIVM	Rijksinstituut voor Volksgezondheid en Milieu (Netherlands National Institute for Public Health and the Environment)	TTO	Technology Transfer Office		
ROM	Regionale Ontwikkelingsmaatschappij (Regional Development Agency)	TTT	Thematisch Technology Transferplan		
RVO	Rijksdienst voor Ondernemend Nederland (Netherlands Enterprise Agency)	T&U	Tuinbouw & Uitgangsmaterialen (Horticulture & Starting Materials)		
RVS	Raad voor Volksgezondheid en Samenleving (Council for Health and Society)	VH	Vereniging Hogescholen (The Netherlands Association of Universities of Applied Sciences)		
SCP	Sociaal en Cultureel Planbureau (The Netherlands Institute for Social Research)	VIG	Vereniging Innovatieve Geneesmiddelen (Association Innovative Medicines)		
Secondary prevention	Early detection of disease or abnormality in people who are ill, at increased risk or have a genetic predisposition	VSNU	Vereniging van Samenwerkende Nederlandse Universiteiten (Association of Universities in the Netherlands)		
SES	Socioeconomic status	VWS	Ministerie van Volksgezondheid, Welzijn en Sport (Ministry of Health, Welfare and Sport)		
SGF	Samenwerkende Gezondheidsfondsen (Association of Dutch Health Foundations)	Wlz	Wet langdurige zorg (Long-term Care Act)		
		Wmo	Wet maatschappelijke ondersteuning (Social Support Act)		

References

- 1 www.topsectoren.nl/missiesvoordetoekomst
- 2 See: www.bedrijvenbeleidinbeeld.nl/bedrijvenbeleid/bedrijvenbeleid/ <https://www.health-holland.com/partnerships> and www.health-holland.com/project
- 3 Letter to Parliament on the mission-driven approach, 13 July 2018
- 4 Key enabling technologies and methodologies form the connecting link between missions in different societal themes. Examples are digitisation, various biotechnologies, nanotechnology and material development.
- 5 www.health-holland.com/sites/default/files/downloads/missiedocument-gezondheid-en-zorg_0.pdf
- 6 Missiegericht innovatiebeleid in uitvoering, Rathenau Institute, 5 March 2019 ([www.rathenau.nl/sites/default/files/inline-files/20190402_BAP Innovatie \(aangepast\).pdf](http://www.rathenau.nl/sites/default/files/inline-files/20190402_BAP_Innovatie(aangepast).pdf))
- 7 ec.europa.eu/info/sites/info/files/mazzucato_report_2018.pdf
- 8 The word “technologies” is used in a very broad sense in this KIA; besides medical technology and digital developments, it also includes biological, pharmacological and other techniques. In several contexts, construction techniques or logistics, for example, could also be classed as “technologies”.
- 9 The word “therapies” is also used in a very broad sense in this KIA; besides therapy, it also includes “interventions” ranging from preventive (primary, secondary and tertiary, or if preferred, “universal” and “indicated”), to prophylactic, prognostic and diagnostic, through to palliative. For example, infrastructural, building or environmental design innovations that contribute to prevention by encouraging exercise or reducing air and/or water pollution are also classed as “therapy”, including for example “respite care”, which relieves the burden on informal carers (and acts preventively in terms of their own care needs).
- 10 Kwaliteit van leven als criterium voor de gezondheidszorg, NWO and ZonMw 2019
- 11 Policy letter: Kwaliteit van leven als criterium voor de gezondheidszorg, NWO and ZonMw, June 2019
- 12 Recent reports stress the importance of public-private partnerships for the Dutch knowledge institutions and for Dutch and international industry, including: “Industry seeking university” (Rathenau Institute, October 2018) and “Wederzijdse versterking – hoe publieke en private investeringen in onderzoek en ontwikkeling samenhangen” (KNAW, December 2018). In a letter to Parliament dated 19 March, Minister Van Engelshoven of the Ministry of Education, Culture and Science wrote that she sees both reports as ‘supporting government policy aimed at attracting more private investment through public investments’.
- 13 The Council for Health and Society (Raad voor Volksgezondheid en Samenleving, RVS) published a very appropriate and interesting opinion in this context, entitled “No evidence without context” (www.raadrvs.nl/binaries/raadrvs/documenten/publicaties/2017/06/19/zonder-context-geen-bewijs/Zonder_context_geen_bewijs.pdf).
- 14 See ‘Gemeenschapskracht’ and ‘Nederland Zorgt voor Elkaar’.
- 15 Sustainability as intended and included in the United Nations’ Sustainable Development Goals. See: www.sdgnerland.nl/sdgs/
- 16 See for example: [www.thelancet.com/pdfs/journals/lancet/PIIS0140-6736\(18\)32594-7.pdf](http://www.thelancet.com/pdfs/journals/lancet/PIIS0140-6736(18)32594-7.pdf), www.nejm.org/doi/full/10.1056/NEJMra1807873 and www.zonmw.nl/nl/over-zonmw/internationaal/klimaat-duurzaamheid-en-milieu/ and www.topsectoren.nl/actueel/nieuws/2019/april/03-04-19/kabinet25missies
- 17 Missions will require a ‘revolution’ in European governments – Prof. Mariana Mazzucato
- 18 www.raadrvs.nl/binaries/raadrvs/documenten/publicaties/2010/09/15/achtergrondstudie—van-zz-naar-gg/Achtergrondstudie_-_van_ZZ_naar_GG.pdf
- 19 zoek.officielebekendmakingen.nl/kst-32637-1.html
- 20 The Business Policy built on earlier impulses. The Innovation Platform (deployed since 2003 to tackle the innovation paradox) initiated the key areas approach and the Innovation Programmes, which preceded the top sector policy. The policy on genomics and the Biopartner programme have also contributed to the success of Dutch biotech.
- 21 www.health-holland.com/public/downloads/tki-lsh/appendix-a-f-online-application-procedure.pdf
- 22 www.lifesciencesatwork.nl/
- 23 publications.tno.nl/publication/34627285/45Et7M/goetheer-2018-staat.pdf and www.tno.nl/nl/over-tno/nieuws/2018/11/missies-als-oplossing-voor-maatschappelijke-uitdagingen/
- 24 Mission-Oriented Research & Innovation in the European Union: A problem-solving approach to fuel innovation-led growth, European Union 2018
- 25 sustainabledevelopment.un.org/?menu=1300
- 26 www.rijksoverheid.nl/documenten/convenanten/2018/11/23/nationaal-preventieakkoord, www.allesoversport.nl/artikel/sportakkoord-ambities-voor-de-sport-tot-en-met-2021/ and milieuplatformzorg.nl/green-deal/
- 27 VWS mission document to be published in autumn 2019.
- 28 www.rijksoverheid.nl/binaries/rijksoverheid/documenten/jaarplannen/2018/10/01/kennisagenda-szw/WEB_115817_Kennisagenda.pdf
- 29 www.who.int/social_determinants/
- 30 Around 3 to 5 million people in the Netherlands are already acting as informal carers. In the coming years, this workforce is expected to swell to 6–7 million.
- 31 Functioning as defined in the International Classification of Functioning (ICF; www.who.int/classifications/icf/en/) and the adjustments proposed by Heerkens et al. (2018) (www.ncbi.nlm.nih.gov/pubmed/28129712).
- 32 Positive Health philosophy: iph.nl/
- 33 www.patientfederatie.nl/images/stories/dossier/Organisatie/Visie-Meer-mens-minder-patient.pdf
- 34 Technology that does not match the user’s needs and abilities (knowledge, literacy) is not a solution, but part of the problem of growing health inequalities.
- 35 See for example: www.nictiz.nl/rapporten/clientparticipatie-bij-innovatie-in-de-ggz/
- 36 The “Evidence Based Sensing of Chemical Compounds” programme focuses on the development of equipment to adjust drug dosages in real time.
- 37 Already a focus for prevention, see for example www.gezondeschool.nl/
- 38 gemeenschapskracht.nl/en/nlzoergvoorelkaar.nl/default.aspx
- 39 The term “accessibility” was often used in the past, but it refers too much to an intramural context.
- 40 curriculum.nu/
- 41 www.wur.nl/upload_mm/2/a/d/4f1e62f8-a1c0-4fad-a95f1ecc28ff8e18_A5_Drieluik_Alle-kinderen-voedselvaardig.pdf
- 42 vimeo.com/302441972
- 43 www.ncbi.nlm.nih.gov/pubmed/21791490
- 44 www.ncbi.nlm.nih.gov/pubmed/28129712
- 45 This also applies to Europe in comparison with the USA and China: of the nine tech giants, six are from the USA and three from China. www.forbes.com/sites/joemckendrick/2019/04/10/nine-companies-are-shaping-the-future-of-artificial-intelligence/#23a97fa52cf1

- 46 'Healthy life expectancy means not so much the complete absence of disease, but people being able to participate in society according to their wishes and abilities.' VWS mission text.
- 47 Knowledge Agenda Prevention, ZonMw and NfU, March 2018 (drawn up within the framework of the NWA route Prevention)
- 48 This refers to people with a "low socio-economic status (SES)", terminology that is replaced here by people "who are vulnerable" and/or "in vulnerable circumstances".
- 49 See also the report "Van verschil naar potentieel" WRR, 2018
- 50 NWA route Prevention
- 51 See also: www.trouw.nl/samenleving/henk-kamp-de-ouderenzorg-moet-fundamenteel-anders-a13a456f/
- 52 Gezondheidsvaardigheden – Niet voor iedereen vanzelfsprekend, J. Rademakers, NIVEL, Utrecht 2014
- 53 See: www.medicaldelta.nl/projects/ehealth-self-management
- 54 www.gezondheidsraad.nl/documenten/adviezen/2016/10/12/onderzoek-waarvan-je-beter-wordt
- 55 www.nfu.nl/img/pdf/19.2122-NFU_Onderzoek_innovatie_met_en_voor_de_gezonde_regio.pdf
- 56 www.healthinnovation.nl/
- 57 www.health-ri.org/
- 58 scienceintransition.nl/
- 59 www.citizenscience.org/
- 60 www.fnozorgvoorkansen.nl/gezonde-toekomst-dichterbij/je-ziet-het-niet-sanne/
- 61 www.fnozorgvoorkansen.nl/wp-content/uploads/2019/04/Jeziethetniet_FNO-002.pdf
- 62 www.gezondheidsfondsen.nl/activiteit/preventieprogramma-gezonde-generatie/
- 63 ucreate-weconnect.nl/van-innovatie-naar-huiskamer-ii-ethiek-geluk-in-digitale-diensten/
- 64 www.lygature.org/regulatory-science-network-netherlands-rsnn
- 65 www.vno-ncw.nl/meer-informatie/position-paper-ai-algoritmen-die-werken-voor-iedereen
- 66 www.dtls.nl/fair-data/personal-health-train
- 67 FAIR data are Findable, Accessible, Interoperable and Reusable, see also www.go-fair.org
- 68 Primary prevention is the prevention of illness or disability and the promotion of health. Secondary prevention is the prevention of serious problems by early detection or tackling problems as they develop. Tertiary prevention is the prevention of relapse or recurrence (e.g. depression or heart attack).
- 69 The "Evidence Based Sensing of Chemical Compounds" programme focuses on the development of measuring equipment and sensors to monitor air quality in the open air, private homes, offices and other workplaces.
- 70 Where various KETS and technologies can be of crucial importance; see also the initiative note by Dutch MP Hayke Veldman "on modern prevention policy: supporting people in healthy lifestyles", www.tweedekamer.nl/kamerstukken/amendementen/detail?id=2019D14521
- 71 www.whofic.nl/familie-van-internationale-classificaties/referentie-classificaties/icf
- 72 <https://research.tue.nl/en/publications/loneliness-of-older-adults-social-network-and-the-living-environm>
- 73 www.nivel.nl/nl/nieuws/groen-gezond
- 74 A clear example of how the different societal themes of innovation policy overlap. Health overlaps with security, with agriculture and food, and with sustainability. There is therefore ample scope for synergy between the different themes and missions.
- 75 Much more knowledge is still needed, certainly for specific target groups, regarding the effects of nutrition and specific lifestyle interventions in terms of promoting health and preventing disease. It is also essential that evidence-based nutritional and lifestyle advice should be included in guidelines for health professionals and be accessible to the target groups.
- 76 issuu.com/elisagiaccardi/docs/resourceful_ageing_book_full see also www.avans.nl/onderzoek/projecten/detail/get-lab/introductie
- 77 www.zorgin2030.nl/
- 78 Including the indoor climate (installation technology), which influences the quality of life and sleep.
- 79 Another example of an existing project in this area is GOAL: Gamification for Overweight prevention and Active Lifestyle www.zonmw.nl/nl/over-zonmw/ehealth-en-ict-in-de-zorg/programmas/project-detail/create-health/gamification-for-overweight-prevention-and-active-lifestyle-goal/
- 80 From personal risk sensors in the working and living environment to improvements in nutrition and the production and administration of medicines (reducing environmental impact).
- 81 The National eHealth Living Lab (NeLL) focuses on what the user wants to know and can understand. nell.eu
- 82 The "Evidence Based Sensing of Chemical Compounds" programme focuses on the development of measuring equipment and sensors to monitor air quality in the open air, private homes, offices and other workplaces.
- 83 The "Evidence Based Sensing of Chemical Compounds" programme focuses on the development of measuring equipment and sensors to provide individuals with data about their own environment, actions and bodies as a framework for action in future.
- 84 Public-private knowledge and innovation syntheses build on the concept of "knowledge syntheses" as generally produced for and by triple helix partners, but now produced for and by the quadruple helix partners.
- 85 See wordplay table.
- 86 See Minister Bruins' letter to Parliament dated 26 April 2019 on a vision for medical technology.
- 87 This movement is already beginning to take off. An initiative aimed at transmurial care for the large population group with cardiovascular disease was created at the instigation of the Dutch Association for Cardiology: nvconnect.nl.
- 88 www.rijksoverheid.nl/actueel/nieuws/2019/05/16/minister-bruno-bruins-bereikt-onderhandelaarsakkoord-paramedische-zorg and www.zonmw.nl/fileadmin/zonmw/documenten/Kwaliteit_van_zorg/Paramedisch_e_zorg/0009_MOPZ_boekje_met_hyperlinks.pdf
- 89 A specific example is the scaling up of measures arising from the UN Convention on the Rights of Persons with Disabilities, see https://wetten.overheid.nl/BWBV0004045/2016-07-14#Verdrag_2 and https://vng.nl/files/vng/pagina_attachments/2016/vn-verdrag-handicap_20180227.pdf
- 90 Techniek Nederland (www.technieknederland.nl), an employers' association of technical service providers, has already shown willingness to contribute to the desired transitions around health and care.
- 91 Dutch industry has already embarked on this line: see, for example, the vision document by VNO-NCW and MKB-Nederland entitled "Vooruit met de zorg; beter, smarter, menselijker" (2017)
- 92 VIG annual report
- 93 www.technieknederland.nl/home
- 94 Evidence-based sensing
- 95 www.vektis.nl/intelligence/publicaties/factsheet-chronische-aandoeningen-bij-40-plussers
- 96 www.rijksoverheid.nl/documenten/rapporten/2018/06/01/programma-vn-verdrag-onbeperkt-meedoen
- 97 www.rijksoverheid.nl/documenten/rapporten/2019/06/06/voortgangsrapportage-2019-onbeperkt-meedoen
- 98 www.licensetoheal.nl/files/Rapport_License_to_Heal_20190523.pdf
- 99 A common thread running through many of today's scientific endeavours is the development of research methods and interventions that are as close as possible to the individual. This trend has areas of overlap with the Transition Programme for Innovation without the use of animals (TPI). After all, animals are by definition further removed from the human individual than a model system (preferably based on that individual's cells) such as an organoid.
- 100 The FAST (Future Affordable and Sustainable Therapies) initiative of the Ministries of VWS, EZK and OCW
- 101 www.gezondheidsfondsen.nl/wordpress/wp-content/uploads/2018/10/Samenvattingen-imm-projecten-1.pdf
- 102 www.humanvaccinesproject.org
- 103 The people surrounding someone with a chronic illness (partner, children, other relatives) bear some of the problems. An effective system approach facilitates support from those around the person and reduces the negative impact.

- 104 axonhealthcare.nl/farma-pijlijn-groeit-in-rap-tempo/ and www.fda.gov/files/about_fda/published/2017-New-Drug-Therapy-Approvals-Report.pdf
- 105 The FMI-PPP aims to shorten drug development times and bring drugs to market sooner (return on investment) through early collaboration between academic and industrial parties. This creates a synergy that can significantly shorten the time-to-market of new medicines.
- 106 www.europeanleadfactory.eu/
- 107 www.beteroud.nl/beteroud/media/documents/Advies-RvO-Voorbereiden-op-Ouderworden_1.pdf
- 108 www.rijksoverheid.nl/documenten/kamerstukken/2019/04/26/kamerbrief-over-missiegedreven-topsectoren-en-innovatiebeleid
- 109 To achieve this mission, it is first of all important to reach consensus on a measuring method and to carry out a baseline measurement of quality of life for people with dementia and their families as promptly as possible. This can then be used to monitor the desired progress.
- 110 The Social Trials, which were launched with broad support, focus on this aspect of the lives of people with dementia and those around them. See tao-of-care.nl/social-trials/ and zorgenz.nl/?s=social+trials
- 111 www.ncbi.nlm.nih.gov/pubmed/31106731
- 112 www.rijksoverheid.nl/documenten/publicaties/2018/03/08/pact-voor-de-ouderenzorg
- 113 www.health-holland.com/public/downloads/kia-kic/knowledge-and-innovation-agenda-2018-2021.pdf
- 114 5th KIA (Key Enabling Technologies) www.hollandhightech.nl/kia-sleuteltechnologieen
- 115 www.tweedekamer.nl/kamerstukken/brieven_regering/detail?id=2019Z11691&did=2019D24091
- 116 From a technological and economic perspective, the development of technology is measured by the yardstick of TRLs (Technology Readiness Levels); from a societal perspective, the same technology can be measured by the yardstick of SRLs (Societal Readiness Levels). KEMs are the link that connects TRLs and SRLs.
- 117 Knowledge and Innovation Agenda 2018–2021 Top Sector Creative Industry page 37 & 38
- 118 A false dichotomy is often created between technology and people, although healthcare requires both to work together. The information technology platform ECP (www.ecp.nl) is therefore developing programmes and methods to design ethics into behaviour, environment and technology.
- 119 www.pharos.nl/
- 120 Linked (anonymised) FAIR data on income/ethnicity/education/care use, preferably at local/regional level, are essential here.
- 121 www.goeree-overflakkee.nl/inwoners
- 122 See e.g. www.zonmw.nl/actueel/nieuws/detail/item/veelbelovende-financiele-innovatie-health-impact-bond/
- 123 Top Sector LSH and the Ministry of Health, Welfare and Sport (VWS) see overlaps between GROZ and the VWS programme “Right Care in the Right Place” (JZOJP) and envisage cooperation.
- 124 europadecentraal.nl/onderwerp/regionaal-beleid-en-structuurfondsen/structuur-en-investeringsfondsen/efro-gelden/
- 125 Universities of applied sciences work for example with Centres of Expertise, where practical research is carried out in collaboration with businesses, societal partners and other knowledge institutions. New applied knowledge is co-created and technologies are progressed (e.g. from TRL level 3 or 4) into promising prototypes. In universities of applied sciences, valorisation is supported by Regieorgaan SIA, with existing instruments such as lecturer platforms and GoChem, the latter aimed at SMEs. Work will also focus on innovation internships and field labs/public labs.
- 126 “Or otherwise”: the many initiatives already in progress in local neighbourhoods, districts and municipalities, such as those of Gemeenschapskracht, NLZVE, Samen Beter (“Better Together”) (www.samenbeter.org/team/), etc.
- 127 Zorginnovatie (“Care Innovation”) supports innovators seeking connection, co-creation or support for “acceleration”: www.zorginnovatie.nl.
- 128 wetenschapsagenda.nl/route/waardecreeatie-door-verantwoorde-toegang-tot-en-gebruik-van-big-data/
- 129 wetenschapsagenda.nl/meten-en-detecteren-alles-altijd-en-overal/
- 130 And with expertise from various other NWA routes, such as “Health care research, sickness prevention and treatment”, “Logistics and transport”, “Smart Industry”, “Smart, liveable cities”, “Quality of the living environment”, “Child and adolescent development, upbringing and education” and “Sport and exercise”.
- 131 Such as: ucreate-weconnect.nl/creatievecoalitie/
- 132 For example, the Health & Well-being programme line of the VSNU Digital Society works interdisciplinarily with eight Dutch universities to use digital solutions to improve care and reduce costs (see: www.thedigitalsociety.info/themes/health-well-being/). The annual e-health week of the ECP information technology platform is a powerful communication tool in this area, with tens of thousands of visitors.
- 133 www.nederlandsinvesteringsagentschap.nl/organisatie/nia-en-invest-nl
- 134 www.dejuistezorgopdejuisteplek.nl, see also www.zonmw.nl/onderzoek-resultaten/geestelijke-gezondheid-ggz/programmas/programma-detail/juiste-zorg-op-de-juiste-plek/
- 135 www.maex.nl
- 136 www.rijksoverheid.nl/actueel/nieuws/2019/06/03/kabinet-investeert-65-miljoen-euro-in-beleid-startups-en-scale-ups
- 137 www.lspvc.com/news/lsp-raises-record-750-million-in-10-months-for-life-sciences-innovations.html, forbion.com/en/news/forbion_closes_oversubscribed_fourth_life_sciences_vc_fund_at_eur_360_million, <https://gildehealthcare.com/news/2016/gilde-healthcare-closes-oversubscribed-%E2%82%AC250-million-later-stage-and-growth-capital-fund>, <https://gildehealthcare.com/news/2019/gilde-healthcare-raises-eur200-million-for-new-private-equity-fund> and www.growthbusiness.co.uk/europe-raises-record-breaking-e10-6bn-of-venture-capital-in-first-half-2019-2556848/
- 138 ec.europa.eu/programmes/horizon2020/sites/horizon2020/files/health_h2020_draft_sc1_wp_18-20_0.pdf
- 139 www.lifesciencesatwork.nl/wp-content/uploads/Valorisation_ecosystem_book.pdf
- 140 Market creation is the “pull” here, against the “push” of valorisation. In the context of reimbursed care, market creation has the potential to push up costs, which is undesirable, unless other expensive interventions are de-implemented. Market creation in other contexts, such as prevention and health promotion, can promote both societal and economic value.
- 141 See for example IJzerman MJ et al., Emerging Use of Early Health Technology Assessment in Medical Product Development: A Scoping Review of the Literature, *Pharmacoeconomics* 2017; 35(7): 727–740. doi: 10.1007/s40273-017-0509-1
- 142 www.rvo.nl/onderwerpen/innovatief-ondernemen/research-development/health-deals
- 143 www.zonmw.nl/actueel/nieuws/detail/item/veelbelovende-financiele-innovatie-health-impact-bond/
- 144 www.ruimteinregels.nl
- 145 VSNU, NFU, “Principles for Public-Private Cooperation”, May 2010
- 146 www.nfu.nl/img/pdf/19_3973_Tien_principes_voor_Maatschappelijk_Verantwoord_Licentieren.pdf and www.nfu.nl/img/pdf/19_5176_VWS_kamerbrief_NFU-rapport_Maatschappelijk_Verantwoord_Licentieren.pdf
- 147 Strongly modelled on www.oncode.nl/valorization
- 148 Strongly modelled on www.oncode.nl/valorization
- 149 Rathenau Institute/TWIN figures
- 150 “Research and innovation with and for the healthy region”, NFU, April 2019
- 151 www.bom.nl/brabant-ventures/product/investor-readiness-program
- 152 www.brainport.nl/verhalen/fotonica-is-het-nieuwe-goud-voor-de-regio-eindhoven
- 153 ERDF is the European Regional Development Fund, see: www.europa-nu.nl/id/vga3f1usj7zg/europees_fonds_voor_regionale
- 154 www.zonmw.nl/onderzoek-resultaten/geestelijke-gezondheid-ggz/programmas/programma-detail/juiste-zorg-op-de-juiste-plek/
- 155 www.utwente.nl/en/techmed/research/programmes/topfit/
- 156 www.tue.nl/en/research/research-groups/eindhoven-medtech-innovation-center/
- 157 www.healthvalley.nl/actueel/netwerk/groen-licht-voor-oneplanet-provincie-steekt-65-mi
- 158 www.healthhubrecht.nl/, and zoek.officielebekendmakingen.nl/stcrt-2016-45222.html
- 159 Top Sector LSH International Strategy, Health-Holland, 21 October 2015
- 160 tradeandinnovate.nl/

- 161 www.rijksoverheid.nl/ministeries/ministerie-van-volksgezondheid-welzijn-en-sport/organisatie/organogram/diensten-en-instellingen/commissie-werken-in-de-zorg
- 162 Via VvAA, FMS, NPHF Federatie voor gezondheid, etc.
- 163 "Naar nieuwe zorg en zorgberoepen: de contouren", Zorginstituut Nederland, 2015
- 164 "Anders kijken, anders leren, anders doen: grensoverstijgend leren en opleiden in zorg en welzijn in het digitale tijdperk", Zorginstituut Nederland, 2016
- 165 www.ncbi.nlm.nih.gov/pubmed/15774996
- 166 cgspace.cgiar.org/bitstream/handle/10568/33649/11.5%20Participatory%20impact%20pathway%20analysis.pdf?sequence=1 and eit.europa.eu/sites/default/files/11983-eit-2017_our_impact_from_2010_to_2016.pdf
- 167 www.betterevaluation.org/sites/default/files/ILAC_Brief17_PIPA_0.pdf
- 168 www.health-holland.com/public/downloads/kia-kic/knowledge-and-innovation-agenda-2018-2021.pdf
- 169 www.philips.com/a-w/about/news/future-health-index, www.bing.com/search?q=european+health+consumer+index&form=EDGTCT&qs=AS&cvid=ecb6addef9a64203b5a1eb5504f22cd4&refig=3263b12c718e4c74cf1b937bd699c522&cc=NL&setlang=nl-NL&plvar=0, www.weforum.org/system-initiatives/shaping-the-future-of-health-and-healthcare, www.zorgwijzer.nl/zorgverzekering-2017/zorg-europa-nederland-behoort-tot-duurste-en-beste, etc.
- 170 For example: www.cbs.nl/-/media/_pdf/2019/20/monitor-brede-welvaart-web.pdf
- 171 www.health-ri.org
- 172 www.vektis.nl/ and dica.nl/, <https://www.lroi.nl/>, nederlandsehartregistratie.nl/over-nhr/,
- 173 How Do We Measure Value in Health?The Value of Everything
- 174 For example: www.mcr-retailminds.nl/over-ons
- 175 www.medmij.nl/

Credits

Strategic programme manager: Hanna Groen

Operational project manager: Health-Holland

Editing co-author: Pieter van Megchelen

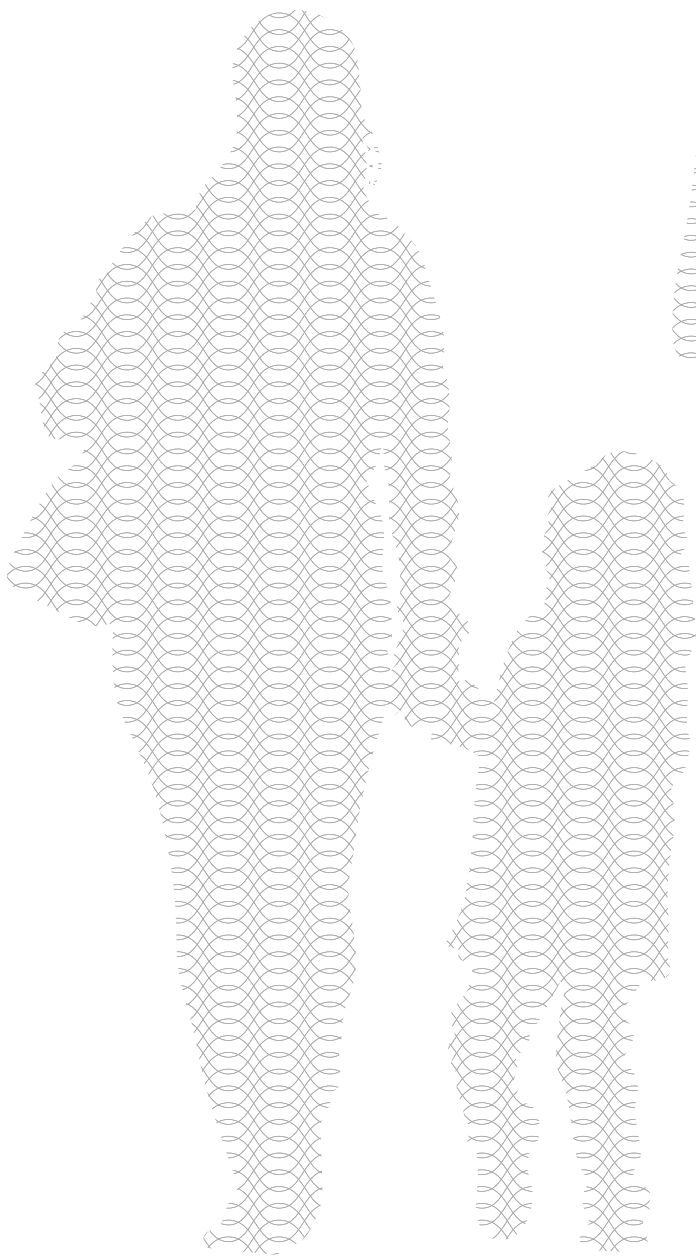
Text editors: Biollandica, Naomi Vorstermans, Jannica Swieringa

Translator: NST Science

Designers: WAT ontwerpers

Cover image and photographer: Jeroen Dietz, Inreda Diabetic

Principal editor: Nico van Meeteren



Health~Holland

Health-Holland | +31 (0)70 205 1400 | info@health-holland.com | www.health-holland.com