ANALYSIS OF NATIONAL INITIATIVES on DIGITISING EUROPEAN INDUSTRY[1]

THE NETHERLANDS:

SMART INDUSTRY

CONTENT

[1] This report has been produced for DG CNECT by Jan Larosse, independent adviser (Vanguard Initiatives Consult&Creation).
The analysis is limited to the information available till September 2017 and the proposed analytical framework can be a basis for a more comprehensive policy documentation.

1. Context

1.1. General

- The Netherlands ranks 4th out of the 28 EU Member States (within 0.01 of the 2nd rank). It ranks 1st in Connectivity with an excellent digital infrastructure which boosts the growth of the Dutch digital economy and society. The Integration of Digital Technology (rank 6) constitutes the Netherlands' relatively weakest performance among the five DESI dimensions.

  https://ec.europa.eu/digital-single-market/en/news/europes-digital-progress-report-2017

1.2. Political changes; new policies

- Enterprise policy and its instrument mix went through a **radical change since 2010**, under the impact of the economic crisis. The government wanted to cut back intervention and play a more facilitating role, with mainly **generic** policies and instruments and leave initiative to the knowledge institutes and companies. It reduced substantially (by two thirds) direct subsidies to enterprises and shifted support towards fiscal deductions for innovation and to revolving financial instruments (loans and guarantees). On the other hand a **specific** new industrial policy was launched: the 'top sector policy', to leverage the impact of public R&D.
- '**Top sectors**' are clusters of companies and knowledge institutes that concentrate the bulk of Dutch R&D, are export intensive and contributing to solutions of societal challenges. They are headed by 'Top Teams' (leading persons from business, research and education, and government. These Top Teams have the mission to prepare 'Knowledge and Innovation Top Consortia' (TKI) and develop joint Knowledge and Innovation Agendas (KIA) to foster innovation driven competitiveness. The government will support these research programmes with a 'top-up' (to make public research funding more effective through connection with joint roadmaps). One of the first nine Top Sectors was High-Tech Systems and Materials.
- The **three core objectives** of enterprise policy for 2020 are:
  - The Netherlands in the Top 5 of most entrepreneurial and competitive countries in the world;
  - R&D-intensity at a level of 2,5 % of GDP;
  - Knowledge and Innovation Top Consortia (PPPs) invest more than €800 million (of which at least 40% private funding).

    https://www.rijksoverheid.nl/documenten/rapporten/2015/03/01/innoveren-en-ondernemen-met-beleid

https://www.rijksoverheid.nl/documenten/kamerstukken/2016/10/06/kamerbrief-over-rapportage-bedrijvenbeleid-2016

- The policy for Top Sectors for research and innovation was evaluated positively in 2015 by Advisory Council for Science, Technology and Innovation (AWTI) in its report 'Flexibility, differentiation, sharper choices'. It should be **continued** because of the more than expected success of these cooperation dynamics in aligning agendas and actions, but the approach to PPPs should become more **open to new themes and cross-overs** between top-sectors, become more clear about objectives and more tailored to specific needs. https://english.awti.nl/publications
- In this context of a more active **role of government** in promoting strategic PPPs to support transformations that hold solutions to societal challenges as well as competitive opportunities, the 'Smart Industry' initiative emerged in 2015. In Summer 2017 the Smart Industry Team prepared an **new action agenda 2018-2020** to be proposed to the new government, still under negotiation after the elections of May 2017.

1.3. Status of general Digital Agenda

- End of 2011 the government formulated the ambitions for a **Digital Agenda** (2011-2015), to use ICT for growth and prosperity by creating the needed **framework conditions**. Therefore the Agenda enumerated government actions in **four action lines**: to create space for smart entrepreneurs (through less regulation, better government services and chances for innovation such as open data); promoting ICT knowledge and skills (Roadmap ICT, Programme for Digital Skills of the Labour Force); facilitating a fast and open infrastructure (free access to internet); digital security and trust (ePrivacy).
  file:///C:/Users/janla/Documents/Projecten%20VIC&C/Project%20CNECT/NL/ibestuurcongres_presentatie_digitale_implementatie_agend.pdf
  https://www.vno-ncw.nl/sites/default/files/downloadables_vno/kamerbrief-over-doorbraken-met-ict-het-benutten-van-de-economische-kansen-van-ict_0.pdf

- In 2012 a first '**ICT roadmap**' was elaborated in a Knowledge and Innovation Agenda, addressing horizontal R&I themes **common** to the Top Sectors (such as monitoring and control, interoperability, data) and **new** themes from the Digital agenda (such as new business models and knowledge commercialisation): projects under these themes were executed in the nine recognised Top Sectors.

- In 2013 the government also launched '**ICT breakthrough projects**' for 10 themes, such as 'Open Geo Data'. This became part of the action line 'creating space for smart entrepreneurs', to tackle the market and system failures regarding the set-up of large-scale projects to accelerate digitalisation. This sector-specific approach and the use of external drivers via PPP was evaluated positively because some of the projects continued afterwards. The 'Big Data' project has evolved later in an new PPP 'Commit2Data'.

  https://www.vno-ncw.nl/sites/default/files/downloadables_vno/kamerbrief-over-doorbraken-met-ict-het-benutten-van-de-economische-kansen-van-ict_0.pdf

- In July 2016 the Ministry of Economic affairs published a **new Digital Agenda 2016-2017** (to bridge the period to the new harmonised planning period starting 2018), outlining actions for further digitisation of the Dutch economy. In the previous Digital Agenda the focus was on reinforcing the framework conditions and on digitising the public administration. This Agenda contains an **integrated approach** and a widening of scope to **four sector-specific priorities**: smart industry, e-health, ICT in the energy sector and smart mobility. The cooperation in PPPs for implementation became more important.

https://www.dutchdigitaldelta.nl/uploads/pdf/PDF-Kennis-en-Innovatieagenda-ICT-2016-2019_2015-10-06_254.pdf

https://www.rijksoverheid.nl/onderwerpen/ict/documenten/rapporten/2016/07/05/digitale-agenda-vernieuwen-vertrouwen-versnellen

- The Agenda for these **short term actions** is divided over **five action lines**: Education, Knowledge and Innovation; Fast and Open Infrastructure; Safety and Trust; Space for Entrepreneurs; Digitalisation in domains.
    - In the first action line the ICT Breakthrough Project for '**Education and ICT**' will focus on personalised digital learning (more than 140 learning labs in schools). The '**Human Capital Agenda ICT**' is focussed on increasing the supply of IT-professionals , in particular for cybersecurity and data analysis (with multi-actor projects mainly on regional level). Research and Innovation will be stimulated by the creation of **PPPs for research and innovation** and development and installation of high-quality **R&I infrastructure** (e.g. for quantum technology – QuTech) that is also open to business. The government appointed an '**ICT Team**' (such as for Top Sectors) to coordinate and initiate PPPs, in cooperation with the Top Sectors and the Smart Industry team.
    - Under the second and third action lines for **ICT infrastructure** there are: a **Knowledge Platform Fast Internet** to accelerate the roll-out of broadband in fixed lines; the **5GFieldlab** (open to all companies and institutions that want to explore this new standard); the **National Cybersecurity Strategy2** (dealing among other things with cyber espionage).
    - The fourth action line on **space for smart entrepreneurs** is dealing with actions for start-ups and scale-ups (Start-Up Delta); digital government services (the Enterprise portal and MyGoverment links will be offered through the regular communication channels of Chambers of Commerce and other public services); the national open data agenda; future proof regulation and legislation (caring for a case-by-case approach of digital platforms); the digital internal market (as a framework for national actions).
    - The fifth action line is new and covers **digitalisation in four domains** (industry, health, energy and mobility). Through the **Smart Industry programme** the Dutch government puts specific emphasis on the need to foster the digitisation of manufacturing with a targeted impulse. Smart Industry was launched in 2015 to prepare an action agenda. This is now implemented successfully. But in order to further improve the digitisation of Dutch companies, it will be important to continuously raise the awareness of enterprises about the importance of digital strategies. The main priority for 2016 and 2017 is in this regard the rolling-out and funding of **field labs** networks of companies and knowledge institutes to develop and test ICT applications. Specific policy agendas in the area of drones as well as standardisation for smart industry are being developed in parallel.
- ICT is a horizontal, key-enabling technology that was **not part of the initial Top Sectors**. In order to integrate ICT related actions the Ministry of Economy installed in 2016 a '**Team ICT**' to stimulate ICT innovation with and across Top Sectors and promote new PPPs in strategic areas. The Team ICT is composed of heavy-weights from business (the presidents of the general employer federation and of the ICT sector federation) and research and government. The first task of the Team was to develop a joint **Knowledge and Innovation Agenda 2016-**

2020. This domain is endowed with 40 million euro by the government for PPPs. The second action was the preparation of a **PPP for Big Data** (**Commit2Data**) to do research on data analytics that provides solutions in the domains of energy (smart grids), care (prevention, diagnostics, personalised care and nutrition), cybersecurity and **smart industry** (production and maintenance). Commit2Data also offers opportunities to SMEs to gain experience with data analytics.

- The Team established the community platform **Dutch Digital Delta.** The Knowledge and Innovation Agenda has been renewed for the period **2018-2021** and translated in an **ICT Action Plan** containing **five subjects with cross-sectoral impact**: big data, cybersecurity, artificial intelligence, blockchain and 5G communication.
  https://www.dutchdigitaldelta.nl
  The **Blockchain Coalition**, another PPP initiative of the Team ICT, will promote large-scale roll-out of blockchain technology in the Netherlands (in particular in the logistics sector).
  https://www.dutchdigitaldelta.nl/blockchain/introduction-to-the-dutch-blockchain-coalition

1.4. Role of ICT and of digitalisation of industry in R&I policy and in industrial policy of the country

- The Dutch **Entreprise policy** stimulates ICT in generic and in specific ways. All companies can use the **Law on Research and Development Work** (WBSO) for digital innovation. And specific support to ICT is channelled through the **Digital Agenda**, including the **ICT plan**, and by investments in **ICT research infrastructure**.

  https://www.bedrijvenbeleidinbeeld.nl/bedrijvenbeleid/bedrijvenbeleid/bedrijvenbeleid-wat-is-het/bedrijvenbeleid-vijf-belangrijke-feiten-uitgelicht

- The Dutch government manages the different layers of the research and innovation system through **multi-annual strategic agendas** agreed with the actors themselves

  - The new **National Science Agenda** (NWA) is developed on demand of the government by the 'Knowledge Coalition' (with all stakeholders, such as the National Science Organisation, universities and business federations). In an open process (including consultation of the population) 140 major research questions for the future were clustered into 16 'routes' (extended in a second step to 25). This Research and Innovation Portfolio has been presented to the government in September 2016 with the advise to invest an additional 1 billion a year to implement the ambitions of this programme. '**Smart Industry**' is one of these 25 routes (with links to related routes on 'Measurement and detection', 'Quantum and nano revolution', 'Resilient society')

  http://www.wetenschapsagenda.nl/publicatie/portfolio/

  https://vragen.wetenschapsagenda.nl/route/smart-industry

  - The **Top-Sectors** develop **thematic roadmaps** on the basis of societal challenges and translate these in joint strategic plans for the next period (2018-2020): the Knowledge and Innovation Agenda, the Human Capital Agenda (linked to the Techniekpact), internationalisation strategies. **Smart Industry** is one of the roadmaps of the Top Cluster on High Tech Systems and Materials (see box on Top Sector HTMS).
  In the Top Sector policy the government exercise their **combined roles** as facilitator (framework), matchmaker (between stakeholders) and driver of initiatives (when market and system failures occur).

- Another strategic framework (concluded in April 2017) is the **Strategic Framework for the Applied Research Organisations 2018-2021** (7000 people with a turnover of 1 billion in research for business innovation and societal challenges). This is promoted by the government additional to the strategic plans of these organisations. **TNO**, which is the biggest RTO for industrial research, is an important strategic actor for linking the different innovation agendas across the different layers (e.g. the one on Smart Industry) and advising the government concerning research, innovation and industrial renewal (see box).

https://www.to2-federatie.nl/nl/to2federatie/show-7/Strategisch-kader-voor-Toegepast-Onderzoek-OrganisatiesToegepast-onderzoek-als-motor-van-Nederlandse-innovatiekracht-.htm

- A very important layer in the governance is the **regional level**, because many provinces have own resources for enterprise policy and innovation. A good example is **Brainport Development** in Eindhoven (cooperating closely with RTOs such as TNO) which has an national and international outreach as high-tech region (see box). The provinces developed smart specialisation strategies in the 4 macro-regions of the Netherlands (with links to smart industry) and manage the structural funds.

The large municipalities and the provinces are very engaged in stimulating innovation and industrial renewal with regional development companies. E.g the **Randstad** region (23 municipalities with 3,2 million inhabitants, develop an ambitious 10 year investment plan for the region, including a '**roadmap new economy**' (https://mrdh.nl/RNE) that targets systemic transitions such as 'Smart Digital Delta'. This roadmap is supported by a first Regional Investment Platform of the EFSI-EIB. This will be a pioneer approach for faster access to the instruments of EIB and EU and those of private investors in order to provide instrument mixes for good business cases.

In the national SME cooperation agenda provinces, the Ministry of Economic Affairs and the top-sectors work together to improve coordination of instruments. Provinces joined the SME **Innovation Promotion of the Top-Sectors (MIT)** in 2016.

- The challenge (in relation to the 2,5 % GDP R&D objective of entreprise policy) is to **increase efficiency and impact of public R&D spending through better alignment with the private sector R&D**. Therefore the government encourages the actors to seek convergence via PPPs. The model of the Top-Sector Consortia for Knowledge and Innovation (TKI), in which the companies, knowledge institutes and public administration are programming, financing and organising joint research and innovation, is now expanded. In particular the connections between these sectors have become more important as spaces where PPPs can organise cross-overs and also radical new innovation. Such as the case of ICT.

- To promote cooperation in PPS the government has established since 2013 the '**TKI Top-up**', which allows an additional budget of **25% on top** of the investments in the KIA (through specific calls). This Top-Up has been expanded in 2017 to other PPPs beyond the original 9 Top Sectors and is now called '**PPP Top-up**' (PPS Toeslag). This has become a new (on-line)support mechanism under support agency of the Ministry of Economic Affairs, RVO. https://www.rvo.nl/subsidies-regelingen/pps-toeslag-onderzoek-en-innovatie

Top Sectors

- The Top Sector policy evolved over different stages of institutionalisation and policy learning to a broader PPP policy (with top sectors as core). They benefit from specific support mechanism (top-up for joint research and SME innovation support instrument - MIT). These financial means are not very large (less than 150 million euro/year for all sectors), but its main merit has been a better alignment of research programming between research organisations and a clear demand-led approach (Top-ups only for public research that has private funding as a basis).
- The Top-sector approach received recently a positive evaluation. The specific governance: by 'Top Teams' has brought a new dynamics of aligning public research agendas with industry. There is a need although for thematic renewal and more cross-overs. The new Knowledge and Innovation Agendas 2018-2020 will be along lines of societal challenges and key-technologies instead of sectoral lines. The ICT agenda has been instrumental in developing the more cross-sectoral approach.

https://www.rijksoverheid.nl/documenten/kamerstukken/2017/07/27/kamerbrief-over-evaluatie-topsectorenaanpak

High-Tech Systems and Materials (HTSM)

- The high-tech sector in the Netherlands stands for € 2,2 billon (2014) or about of 50% of total Business R&D. About 500 million is invested in PPPs, matched by about the same amount by the public sector. The companies in the HTSM sector are also
- The HTSM Team mobilises the sector around eco-systems for 17 specific roadmaps (covering semi-conductor equipment, photonics, embedded systems, components and circuits, .. but also cross-sectoral roadmaps for nanotechnology and ICT, and the roadmap for Smart Industry). The Team also acts as the TKI-bureau for a joint Knowledge and Innovation Agenda.
- The work programme 2016-19 has a budget of € 803 million. This programme is implemented mainly through project calls from the national science and technology funding organisations (NW, STW). But also 50% is linked to European initiatives in H2020 (receiving national co-financing). The TKI only has a limited financial leverage (32,4 million in 2014).
- 'Holland High-Tech' is the label and platform for this top-sector to manage the Knowledge and Innovation Agenda, Human Capital Agenda, internationalisation etc.
- The national HC Agenda is executed mostly through regional partnerships, such as Centres of Expertise for cooperation with and between higher-education institutions.
- Previously HTMS was in charge of the ICT roadmap, but a separate Top Team is in charge as from October 2014. The public budget for KIA ICT is about 19 million a year in 2016 and 17 (part of KIA HTSM).
- Smart Industry was started (as bottom-up initiative, led by the employers federation) with its own Top Team in 2014, but their Roadmap is part of the KIA of HTSM. The Field Labs are included in this Roadmap (but several field labs are linked to other Top Sectors).

https://www.hollandhightech.nl/nationaal/innovatie/roadmaps/smart-industry

TNO

- TNO is the biggest **Research and Technology Organisation** of the Dutch government, employing more than 2600 professionals. Its develops applied research in **5 societal focus areas**: industry; urbanisation; healthy living; energy; defence, safety and security.
  The TNO **Strategic Plan 2018-2020** (released in April 2017), explains how these five areas correspond with a strategy to combine societal and technological challenges. TNO positions itself as the 'flywheel' for innovation, boosting the amount and speed of knowledge creation, maximising impact, focus and cooperation via its early research programmes, research facilities and joint innovation centres.
- Research for '**industry'** is targeted at **five application domains**: **flexible & free form products**; space; sustainable chemistry; semi-conductors; **networked informatics**.
- **Spearheads** for the application domain 'flexible and free form products' in the coming years are: industrial renewal by means of breakthrough technology – bigger computer power through nanotechnology and quantum-computing – developing 5G with a broad spectrum of user applications – Photonics and optics for observation and communication in space – new functional (nano)materials – **smart industry concepts** on the basis of IoT, AI, big data and robotics. (p 34)
- With these **smart industry** concepts TNO works on **digitising of production processes, products and systems**. TNO combines data integration(big data, artificial intelligence), adding smart function (sensors, user interfaces, Internet of Things), and new applications of 5G wireless networks and new transaction methods between systems (Blockchain).
- The research in 'networked informatics' for industry is at the heart of transforming data in information (Big Data Value Center) and other issues for enabling the transformative power of ICT such as interoperability and open standards or optimising vital ICT infrastructure.
- To achieve these goals (in the different domains) TNO will mainly engage in **structural and programmatic cooperation** with (partners) in PPPs, such as field labs, joint innovation centres, innovation hubs, European consortia for H2020 (e.g. Holst Centre, Solliance, QuTech, Biorizon, Brightlands Materials Center en AM SYSTEMS Center). This approach will be expanded strongly because this the most important way to tackle grand innovation challenges. This will also be materialised in regional cooperations, such as in the **field labs** of Smart Industry
- **Technological renewal** is focussed on following technologies: Nanotechnology (for additive manufacturing, macro-molecular self-assembly); quantum technology (for e-security); photonics (sensors); media synchronisation (incl VR for remote maintenance, incl 5G for automated driving); valorisation meta-data (with blockchain technology, new business models for services); smart and green materials (incl additive manufacturing); hybrid energy systems; robotics (key for Smart Industry together with sensors and measuring methods); artificial intelligence (deep learning); inside the human mind (for cooperation with robots) (page xxx)
- One of the instruments of assistance of TNO to SMEs is 'Smart Industry Cluster'. This is a **project** of advice and knowledge diffusion between TNO and groups of at least 5 SMEs (maximum 6 months and maximum 40 000 euro of TNO support) around the questions 'is a technology suited to be applied', 'what are next steps to implement this in my company'.

https://www.tno.nl/media/9442/tno_strategisch_plan_2018_2021.pdf

https://www.smartindustry.nl/nieuws/aan-de-slag-met-een-smart-industry-cluster-bij-tno/

BRAINPORT

- Brainport Eindhoven is well-known as a high-tech hot-spot in North Brabant Province in the South-East of the Netherlands. But the Brainport denomination spans over different layers:
- The Brainport Eindhoven **Region** is an area of 750.000 people in which the development model of Brainport is applied. The Brainport **Campus** is the location of the business park that emerged out of the former Philips laboratories and became a diversified eco-system for new innovation ventures. But the core of Brainport is **Brainport Development**, the organisation that manages the process that has been successful for many years in the reconversion of a depressed industrial region into a leading innovation region. Brainport is a strong-holder of the Top Cluster High-Tech Systems and Materials (HTSM).
- Brainport Development is a development agency of the municipalities around Eidnhoven with multiple roles: from strategic advice to critical soundboard, but also as instigator of new initiatives and orchestrator of the eco-system. Because of this dynamic role in a time of profound transformation Brainport Development presented a new strategy in it **multi-annual development plan 2017-2020**: '**Brainport Next Generation**'. This strategy announced a new course of **adaptivity** in disruptive times. Meaning that the hardware focussed innovation activities in high-tech systems are shifting towards a more software dominated and user oriented innovation strategy. This causes a period of **fluidity** in which it is vital to adapt to new developments with speed and capability. This means also moving away from the traditional triple helix model (where research and education works together with industry and government) towards a **multiple helix** that is far more inclusive for all stakeholders (involving citizens, customers, investors, designers and social innovation) and build bridges for international cooperation to compensate weaknesses.
- The vision is that societal challenges create new business opportunities, firmly based on the strengths that are anchored in the local eco-system. New connections between technology, design and social innovation should reinforce the regional strengths. The new adaptivity strategy relies on consortia of innovative companies, knowledge institutions and social partners to collaborate, tackle rapidly changing conditions and capitalize on economic opportunities.
- HTSM and Design are the pillars of the regional economy. The integrated strategy supports actions in **five domains** - people, technology, business, basics and international - to confront societal challenges to reinforce these technology pillars.

  - People: experiments are set-up to better match education and labour market, in non-sector talent pools and life-long learning. Social Innovation to involve people

  - Technology: public research capability is core in building innovation chains. The existing network of knowledge centers Solliance, Horst, DIFFER will be reinforced with new international innovation centres: in advanced manufacturing (Additive Manufacturing Centre), Big Data (Data Science Centre), and photonics (Photonics Delta). Brainport Development will manage a Technology Portfolio Brainport, to advertise the competences of the regions, and map the knowledge infrastructure in order to ensure access and identify gaps

  - Business: These excellence centres can be linked to strong business clusters, such as High-Tech Software Cluster, where private companies co-invest in smart industry trajectories to develop more efficient, flexible and customised production processes. But in addition the new approach requires also test environments. Therefore strong living-labs (with consumers)

and field labs (with technology providers) will be build. Brainport Development manages a cluster programme and the start-up eco-system

- Basics: the infrastructure as a metropolitan region and international connectivity

- International: Brainport International Programme is an innovative PPP that is becoming the central hub for all internationalisation actions (branding, attraction of talent and investment, cooperation, …) in the region

- Brainport Development is a professional strategic actor for Smart Industry in the Netherlands and Europe, driven by the growth strategy of the Eindhoven region.

https://www.brainport.nl/en/about-brainport/brainport-next-generation-strategy

http://www.brainportdevelopment.nl/meerjarenplan/

https://www.brainport.nl/en/

2. Status of the National Initiative: Smart Industry

2.1. Political commitment

- Smart Industry is **PPP action program** run by the employers federation for the technology industry (FME) , the Ministry of Economic Affairs, the Chamber of Commerce, Netherlands-ICT (sector federation for ICT) and TNO. It is a three year programme (2015-2017) that was launched after a year preparation.
- The catalyser was a joint report of TNO, the Ministry of Economic Affairs, the Chambers of Commerce and the main employers organisations on the significance of the coming of 'smart industry' for companies, knowledge institutions and government in the Netherlands and the potential to play a leading role in this transition.
- This **Smart Industry report** defined and explained Smart Industry in the Dutch context. Smart Industry should be a cross-cutting theme within the top sector policy in which a broad coalition of companies, knowledge institutions and government should be involved. For Minister Kamp of Economic Affairs, the report was an opportunity to ask a Smart Industry Team (lead by the president of FME) to draft a concrete Action Agenda. This agenda should promote to a Dutch industry that reaps the benefits of digital opportunities, thereby increase productivity and remain competitive on the global market.
- The approach was in November 2014 formalised in an **Action Agenda** that supports this ambition. The Action Agenda is an enhancement of the current top sector policy (for research and innovation) and the Technology Pact (for human capital development). The aim is to make the industry more competitive through faster and better utilisation of the opportunities ICT has to offer, and thus foster growth and jobs.
- This Action Agenda contains 15 actions under three action lines:
    - Action line 1: capitalising on existing knowledge (mainly through awareness creation). This action line is run by the CoC.
    - Action line 2: accelerating in Field Labs (the main and most innovative action). This action line is run by TNO and the Ministry.
    - Action line 3: Strengthening the foundation (knowledge, skills, ICT parameters). These actions are run respectively by TNO, FME and Netherlands-ICT.

- The governance of Smart Industry consist of a **steering board** which controls a **program office** in which each founding organization has one person 4 days/week each. These 5 organization fund the office staff in kind and jointly there is € 100.000 yearly budget for operational cost. In addition there is a wider Smart Industry **forum** representing all relevant stakeholders to create support, discuss bottlenecks and act as sparring partner for steering board and the Ministry. This governance anticipates a prolonged effort to support the transition of the industry.
- The SI program itself is not a funding organization. The program can be characterized as a bottom-up program, adapting to regional developments whereas SI accelerated, supports and coordinates those developments at national level and interfaces to EU programs/organisations. It is an important initiative to align different, fragmented efforts and instruments under a common business-led Agenda, in order to generate impact.
- The Team Smart Industry has prepared in Summer 2017 a new **implementation agenda 2018-2021**, to be presented to the new government (still in negotiation early September). This Agenda proposes to continue the Action Lines as an integrated approach to accelerate the digitisation of industry. In this new agenda the emphasis will be on implementation of I4.0 technology and the further professionalizing of the Smart Industry program.

2.2. Strategic roadmap / action plan

- The Action Agenda identified **14 actions under three action lines**:

ACTION LINE 1 CAPITALISING ON EXISTING KNOWLEDGE

1. 'The Netherlands Smart Industry land'.
Informing a wide target group, including the business community, about Smart Industry developments, aimed at insight and support.
2. Entrepreneurs get to work. Entrepreneurs get to work more quickly with new business propositions, supported with information, coaching and advice aimed at cooperation and knowledge valorisation.

ACTION LINE 2: ACCELERATING IN FIELD LABS

3. Sample Field Labs at the start. The aim is to have 10 Field Labs ready to go as soon as possible. Business plans must be detailed, consortia built up and financing arranged.
4. Second instalment Field Labs. There is a need for additional Field Labs. These Field Labs will be made ready for operation in 2015.
5. Monitoring and knowledge exchange.
Investments will be made in getting to know Field Labs and spreading knowledge to education and the broad business community.

ACTION LINE 3: STRENGTHENING THE FOUNDATION

3A KNOWLEDGE
6. Strengthening R&D incentive in Field Labs.
One component of the Field Labs is investing in research themes that are directly linked to the Field Labs. This takes place via the leading sectors, among others.
7. Smart Industry research agenda.
For the somewhat more distant future, a long-term research agenda will be set up with the top sectors in cooperation with universities, TO2, STW and NOW, among others.

3B SKILLS

8. Human capital development within companies.
Together with companies and employees, actions will be performed in the area of employee pools and task rotation. Courses will also be offered to promote sustainable employability.
9. Regional approach in connecting the business community with schools.
To coordinate the needs of companies and the offer from schools, Smart Industry research groups will be set up and modular educational blocks will be offered.
10. Learning without interruption.
The relevant educational programmes from primary education to scientific education and dual education will be adapted to the needs of Smart Industry in future.
11. Social innovation. There will be a social innovation action programme aimed at Smart Industry to equip the organisation as well as the employee of the future for Smart Industry in future.

3C PARAMETERS (ICT)

12. Big data, big trust. The development of technical solutions, business models and forms of cooperation that simplify the exchange and use of data.
13. Software action plan. Carrying out a research programme aimed at the development of software tools, with a view to chain cooperation, standardisation and interoperability.
14. Cyber security. Building on a robust and secure ICT infrastructure for Smart Industry.

- The main ambition in the Action Agenda is the creation of ecosystems - interrelated networks of companies and knowledge institutions - around the core principles of Smart Industry such as automation, zero defect manufacturing, flexible production, chain collaboration, customer intimacy, value creation based on big data and on a number of core technologies such as 3D printing and robotics. A lot of knowledge and expertise is already present but fragmented. Therefore, the Team Smart Industry has opted for an approach with **Field Labs** as interdisciplinary test and demonstration environments (see box).

What are Fieldlabs?

- Field Labs are practical environments in which companies and knowledge institutions develop, test and implement effective Smart Industry solutions, as well an environment in which people learn to apply these solutions.
- In addition, Field Labs strengthen connections with research, education and policy on a specific Smart Industry theme, some with a regional but other with national and European focus. They ensure an interdisciplinary approach (e.g. manufacturing in combination with ICT) and link that to domains where the Netherlands can really make a difference (often identified as 'smart specialisation in regional innovation strategies).
- Field Labs meet the need for experimentation space and accompanying facilities at the TRL levels (5 to 7 – preparing industrial production).
- The Team Smart Industry has prepared the conditions for bringing together 31 Smart Industry Fieldlabs under a common framework with seven criteria. The Team is responsible for labelling new fieldlabs to be eligible for funding.
- "A Smart Industry fieldlab is (1) an **operational industrial environment** where Smart Industry innovation and technologies are developed, tested and/or implemented and where also people learn how to apply the new technologies. Smart Industry innovation are defined as solutions which (1a) **accelerate the digitalization of industry**. Smart Industry fieldlabs all focus on their

own (2) **radical innovation** (radical at (regional) national or European level) and have defined a (3) **program** of three year or more which consists of **multiple innovation and education/training projects**. It has in general (4) one **physical location** and it has a (5) fieldlab program **coordinator**. Next to these requirement the Smart Industry Fieldlabs are, with the help of the program office, in (6) **connection with the other fieldlabs** to avoid doubling of activities, to learn from each other and to coordinate all kind of outreach activities. Important is that Smart Industry fieldlabs can have any (legal) organization construct, have their (7) own **finance and control boards** and are independent from the Smart Industry program office." (p. 6)

- The starting point for financing these fieldlabs are private investments. In addition existing fieldlabs used all kinds of public support (TKI top-up, ERDF, H2020 …). The 'Future Fund' also provided loans. Different national and regional ad hoc sources are combined in a specific support arrangement as from 2017.

https://www.smartindustry.nl/site/assets/files/1951/the_dutch_smart_industry_action_program_with_fieldlabs.pdf

1.3. Implementation

- The Programme Office of Smart Industry, supported by five partner organisations, is responsible for the execution of the Action Agenda, starting from 1-1-2015. The programme has no funding of its own but connects to existing mechanisms and influences the design of new instruments.
- There is an active cooperation with regions (in particular for fieldlabs) that have in many cases also developed regional action agendas. There is also a close cooperation with the German Industry 4.0.

Action line 1: Capitalising on existing knowledge

- Continuous **information actions** in cooperation with employer federations, to spread awareness about the digital transformation opportunities have reached in total 15.000 employers.
- Different **information products** have been developed -scans, master classes – to help employers to collect knowledge and identify opportunities for their companies.
- An **information and advice line** has been created at the Chambers of Commerce.
- A network of **300 Smart Industry Ambassadors**. These are companies and knowledge institutes that are actively contributing toe the agenda and are ready to cooperate and share knowledge in the SI network.
- The yearly event attracts more than 750 participants
- Website and newsletter with 2500 registrations

Action line 2: Accelerating fieldlabs

- The number of field labs increased from 9 at the start to 30 (Summer 2017) and is expected to mount to **more than 35**.
- The fieldlabs **meet four times a year** with the programme office, to share knowledge and better align actions to avoid unnecessary duplications.

Action Line 3: Strengthening the foundation

- A knowledge and innovation agenda has been developed and translated in a 'Roadmap Smart Industry' for Top Sector HTSM and a 'Route Smart Industry' in the national science agenda.
- Different calls for R&D projects, such as big data for smart industry in cooperation with top sectors.
- A **Fieldlab Social Innovation** has been started together with other partners
- Different fieldlabs started with **connecting their activities with training and dual learning**.
- A network of 25 **Smart Industry lectors** is diffusing the state-of-the-art
- Smart Industry courses are offered in different higher education institutes
- A **standardisation agenda Smart Industry** has been developed to identify the important topics at international level.
- A **Data Hub Smart Industry** is going the provide a safe environment for sharing and using data in the value chain.
- Already a toolbox for legal arrangements helps companies to share data (with a **standard cooperation agreement**).

Overview Smart Industry Fieldlabs (medio 2017)

Fieldlabs are practical environments where companies and knowledge institutions develop, test and implement Smart Industry solutions in a targeted manner. In addition, people also learn to apply these solutions in the Fieldlabs. They also reinforce connections with research, education and policy regarding a specific Smart Industry topic and they transfer knowledge to other entrepreneurs. 31 Fieldlabs with a regional, national or international focus started in the period 2015 - 2017. For more information, go to www.smartindustry.nl/fieldlabs.

1. ULTRA PERSONALIZED PRODUCTS AND SERVICES

UPPS develops new methods to design and produce personalized products and services. Aimed at the entire process; from concept development and scanning, to engineering and data processing for production. Partners: CLICKNL, 4TU, universities of applied sciences, TNO, Philips, small and medium-sized businesses. Locations: Delft, Eindhoven, Enschede, Amsterdam.

2. REGION OF SMART FACTORIES

Is the factory of the future with a focus on faultless production and 'first-time-right' product development. The programme comprises 10 pilot projects, Centre of Expertise and scientific research. Partners: CIG Centraalstaal Groningen, Fokker Hoogeveen, Philips Drachten Groningen University, NOM and 40 companies, educational and knowledge institutions.Location: Northern Netherlands.

3. SMART DAIRY FARMING 3.0

Increasing sustainability (health and production), efficiency and profitability of dairy farming by collecting real-time data of dairy cows and sharing this in the supply chain. Partners: Friesland Campina, CRV and Agrifirm. Location: Amersfoort.

4. SMART BENDING FACTORYS

State-of-the-art factory for laser-cutting and bending of steel, fully driven and controlled via internet. Goal: lowering 'total-cost-of-ownership' by 20% and accelerating the 'time-to-market' by a factor of 5. Partners: 247TailorSteel, Gunnebo, Innclose, Staja, Viscon, Jansen Metal Products, ROC Graafschap College, Anton Tijdink Educational Institution. Location: Varsseveld.

5. THE GARDEN

Working together safely in the supply chain. Security in Smart Industry. The first project was EPLM (Extended Product Life Cycle Management). Partners: Thales, Demcon, Figo, Norma, Parthian, PM Group, USG, VIRO, VMI, Benchmark, True Information Solutions, Coblue, Vidinexus, NDIX, FME, Saxion, UT, TNO. Location: Hengelo (Dutch province of Overijssel).

6. FRESHTEQ.NL

Technological innovations for greenhouse horticulture. Smart solutions for fully computerized production, cultivation and distribution of fresh fruit and vegetables. Creating Fresh Food chains for cities and densely populated regions all over the world. Partners: Demokwekerij Westland (Westland demo nursery), TU Delft, WUR, TNO, GHC. Location: Westland.

7. MULTI-MATERIAL 3D PRINTING

Aims to develop entirely new value chains, based on next-generation multi-material 3D print technologies and the accompanying data ma-nagement systems. Partners: TNO, High Tech Systems Centre (TU Eindhoven), ECN, Admatec, Vertex-NextDent, Océ, Philips Lighting, DoMicro, PwC, ASML, XYCarb, BOM and LIOF. Location: Eindhoven

8. SMART CONNECTED SUPPLIER NETWORK

Fieldlab's goal is to achieve more efficient information exchange in the supply chain by means of standardization and interoperability. Starts with ERP software. Partners: Brainport Industries, KMWE, NTS Group, Eurotechniek, MKG, Isah, TNO. Location: Eindhoven.

9. FIELDLAB CAMPIONE

The goal of this first Fieldlab in the process industry is to make maintenance 100% predictable. Condition Based Maintenance: sensors monitor the status of installations in order to accurately predict when maintenance will be needed. The availability of factory installations is increased, whereas costs decrease. Partners: Consortium of about 20 companies, 10 knowledge institutions and 3 supporting organizations. Location: Gilze Rijen.

10. FLEXIBLE MANUFACTURING

The goal of this Fieldlab is to make production processes more flexible by using robotics etc. Simplifying the production of small series by shorter change-over times. Partners: Bronkhorst High

Tech, Omron, Neways, De Cromvoirtse, Van Lierop, Fokker Landing Gear, Brainport Industries and TNO. Location: Eindhoven.

11. DIGITAL FACTORY COMPOSITES

Facility for open cross-sector innovation. Computerized production of composites & demo centre for the computerized production of composites. Partners: Airborne Composites B.V., Siemens Nederland N.V., Kuka, TU Delft and Fontys University of Applied Sciences. Location: Ypenburg.

12. CENTRE FOR LIGHTWEIGHT STRUCTURES

The project concerns the computerized production of composite products and utilizes a pilot plant. Partners: NLR (Netherlands Aerospace Centre), Ampyx Power, Correlian, Fokker Landing Gear, Fontys University of Applied Sciences Engineering, Label/Breed, Kaptein Roodnat, Omron Europe. PAL-V, TNO, TU Delft, VABO Composites, Windesheim. Location: Marknesse.

13. RAMLAB

Develops knowledge of metal 3D printing and certifying large parts for the port/harbour- related sector. Partners: InnovationQuarter, Port of Rotterdam, RDM Maker-space, Valk Welding, Air Liquide, Autodesk, IBM, Lincoln Electric, Lemtech, M2i, Huisman, Heerema, Fokker, Koninklijke Marine (the Royal Netherlands Navy), Damen, Volkerrail, Allseas, MX3D, Bolier, Royal Roos, Promarin. Location: Rotterdam.

14. 3D MAKERS ZONE

Revolutionizing how things are made. Provides infrastructure, knowledge, experience, networks, ongoing projects and application knowledge in production processes for Internet of Things, 3D printing, robotization, wearables and Big Data. Partners: PWN, KLM, InHolland, Nova College, HvA, AkzoNobel, Deloitte, Rabobank, Hoogheemraadschap Hollands Noorderkwartier, Berenschot, the province of Noord-Holland. Location: Haarlem/Amsterdam.

15. SMART WELDING FACTORY

Flexible and fully automated production using welding robots and without any programming time: 'first-time-right' and 'one-piece-flow'. Partners: LAC, NIL, Aebi Schmidt, Pan Oston, Stork Thermeq, Hoekman RVS, Exerion, Contour, Wive.Location: Enschede.

16. CENTRE FOR PRECISION FARMING

Making data and measurement results available for (collective) use by agricultural companies, suppliers, processing industries and knowledge institutions. Offering demonstration and test facilities at the centre for precision farming and at external locations. Partners: ZLTO, Vd Borne, HAS Den Bosch, WUR, TU Eindhoven, BOM. Location: Reusel.

17. THE SUSTAINABILITY FACTORY

Smart Solutions maritime computerization/automation (robotics) and Smart Metrology. Stimulates the development and valorization of inno-vations in the maritime sector and facilitates 'Lifelong learning'. Partners: Valk Welding, Slob Shipyard, De Waal, Krohne Altometers, PRIVA, Verkerk, VIV, Opleidingsbedrijf Installatiewerk, VAF, Da Vinci College. Location: Dordrecht.

18. 3D MEDICAL

To achieve drastic improvements in personalized healthcare by means of SMART technology such as 3D Imaging and 3D printing. Collaboration with UMC Utrecht, Stichting ProtoSpace foundation and Utrecht University of Applied Sciences. Partners: MRIguidance, Zimmer Biomet, 3Devo, Ultimaker, Xilloc, Landre, Livit. Location: Utrecht.

19. COMPOSITES MAINTENANCE AND REPAIR

The goal is to fully computerize the maintenance and repair of composite parts, primarily airplanes. Partners: Stichting Develop-ment Center for Maintenance of Composites foundation (DCMC), Fokker, NLR, TU Delft, Airborne, the Dutch Air Force, REWIN, BOM, TIAT and Damen Shipyards. Location: Hoogerheide/Woensdrecht.

20. THERMOPLASTIC COMPOSITES NEDERLAND (TPC NL)

Centre for both fundamental and applied research for production using thermoplastic composites. Focus areas are tape laying, compression moulding, insert moulding, recycling and automation (robotics). Partners: TPRC and TPAC. Location: Enschede.

21. FIELDLAB CAMINO

The ambition is to achieve 100% predictable maintenance of infrastructure. Think of rail, electricity, water, gas, roads etc. The Camino steering committee consists of representatives of: Kennispark Twente, Oost NV, Strukton Rail / Sanderink Technology Center, Waterschap Vechtstromen water board and World Class Maintenance. Location: Enschede.

22. FIELDLAB SMASH

The ambition is to achieve 100% predictable maintenance. Condition Based Maintenance in shipbuilding. Collecting and analysing real-time information about the ship's condition in order to enable timely maintenance and prevent downtime. Partners: MCN/KIM, NMT, WCM, IQ, several asset owners and suppliers. Location: Rotter-dam/Drechtsteden and rest of the Netherlands.

23. SMART BASEA

Testing ground for the development of a ‘Smart Base’ for the Dutch Ministry of Defence. In cooperation with innovative businesses, the Dutch Ministry of Defence is going to experiment in order to achieve protection, energy, water and ‘support & services’ solutions. Partners: Dutch Min. of Defence, LIOF, BOM, Oost NV, InnovationQuarter, NOM. Location: Amersfoort.

24. FIELDLAB 5G5G

will turn the north Groningen area into the number one test ground for 5G mobile internet. Entrepreneurs and non-profit organizations work together with experts to test applications of 5G. Partners: EBG, KPN, Vodafone, Huawei, Ericsson, TNO, RUG, Hanzehogeschool University of Applied Science, SURF, Agentschap Telecom. Location: Groningen

25. INDUSTRIAL ROBOTICS

Develops certified robot programming and robot operation study programmes at intermediate and higher vocational education levels. Offers the pos-sibility of developing, and experimenting with, new technology and applications. Partners: Altrex, Auping, AWL-Techniek, Deltion, Goma, IJssel Technologie, Kaak, Kinkelder, Landstede mbo, Moba, Nefit, Polynorm, VMI, Windesheim University of Applied Sciences, Wivé. Location Harderwijk

26. TECHNOLOGIES ADDED

The first Shared Smart Factory with a shared production location for Smart Manufacturing, incubators and service providers for this specific field. Added also offers 'in-house' facilities to Stenden University of Applied Sciences and other knowledge and educational institutions. Partners: Technologies Added, Sustainder, NOM, Stenden, RUG, Drente-college. Location: Emmen.

27. DUTCH OPTICS CENTRE

The objective of the DOC is to turn the Dutch opto-mechatronic industry into the global market leader by developing new value chains based on optical and opto- mechatronic technology platforms. Founders: TU Delft, TNO and 25 small and medium-sized businesses and knowledge institutions. Location: Delft and Enschede.

28. ROBOHOUSE

Facility and innovation programme to further develop robotics in the Netherlands. The focus is on accelerating the adoption of 'state-of-the-art' robotics solutions in organizations. Partners: RoboValley, TU Delft, Festo, Exact, The Hague University of Applied Sciences, TNO, Innovation Quarter. Location: Delft.

29. HIGH TECH SOFTWARE COMPETENCE CENTER

Consortium of 20+ high-tech software companies concerning virtual prototyping & design, model-based software and data analytics & services. Demonstrates how ground-breaking innovative software contributes to more efficient, more flexible and more high-quality development and production of hardware. #3x_faster_development #customizable #zero errors. Location: Eindhoven.

30. BLOCKLAB

Het Fieldlab Blockchain Logistiek en Energie wordt opgericht met de volgende radicale doelstelling:nieuwe verdienmodellen en een nieuwe internationale voorsprong in (haven)logistiek en energietransitie dankzij toepassing van blockchain technologie. De belangrijkste toegevoegde waarde van het fieldlab op de lange termijn moet zijn: het gat te dichten tussen huidige blockchain

capabilities en enterprise-wide oplossingen binnen de logistiek en energietransitie (en later ook voor andere sectoren). Location: Rotterdam

31. HIGH TECH SOFTWARE COMPETENCE CENTER

The Dutch Growth Factory heeft als doel het ontwikkelen van een fysieke omgeving waarin bedrijven zowel productontwikkeling als pilotproductie kunnen uitvoeren. Location: Rotterdam

- Financing instruments used for implementing the SI agenda
    - Actions under the Agenda can be supported with generic instruments such as the WBSO tax credit and the Innovation Credit (risk-baring loans)
    - In addition there is the MIT support for SMEs (advise, feasibility studies, SME cooperation projects) that is only open for actions in the Top Sectors, including Smart Industry.
    - On top, the Ministry developed a new mechanism to support fieldlabs, labelled by the Smart Industry team. In March 2017 the Ministry launched a call for application for funding a third tranch of fieldlabs (with a budget of € 14,5 million) for two kind of activities: the organisation of the PPP as 'innovation cluster', and the conduct of 'experimental development' (prototyping, demonstration, pilot development, testing and validation in real-life conditions)

1.4. Evaluations/studies

Evaluation Enterprise Policy:
https://www.rijksoverheid.nl/documenten/rapporten/2015/03/01/innoveren-en-ondernemen-met-beleid

https://www.awti.nl/documenten/adviezen/2016/09/06/vertaling-flexibility-differentiation-sharper-choices

Evaluation Top Sector Policy:
https://www.rijksoverheid.nl/documenten/rapporten/2017/04/07/evaluatie-topsectorenaanpak-deel-1-hoofdrapport

3. Other policy support to digitising industry

3.1. Boosting innovation

- To boost innovation Enterprise policy has a mix of instruments. The most important part are tax incentives to promote R&D investments. The inclusion of activities for process innovation is still an issue.
- The instruments to promote PPPs for innovation and to participate in European R&I programmes are becoming more important.
- The number of Top Consortia for Knowledge (TKI) is restricted to the original 9, but the number of strategic PPPs has grown till about 18 (the number that submitted their KIAs for the new period in June 2017), including the TKI for ICT. At the same the access to the 'TKI Top-up' has been enlarged to other strategic PPPs. Therefore this instrument became in 2017 the 'PPP Top-

Up' (PPS-Toeslag). This Top-Up of 25% for PPP research is granted on top of each euro of private R&D funding for either programmes or projects of the consortia.

- Other instruments that are important in innovation policy and that are relevant for digitising industry is start-up support, because start-ups can accelerate the transformation of whole industries. **StartupDelta** is is a succesful instrument (see Startupbox)

  https://www.startupdelta.org/

- The programme 'National Icons' puts in the picture innovations that illustrate how innovation power can contribute to technological solutions for societal challenges.
  https://www.nationaleiconen.nl/

3.2. Skill development

- The development of talent and supply of professionals with the right skills for digital transformation is supported with related policy actions. These are incorporated mainly by the Technology Pact and the Human Capital Agenda (HCA) in the Top Sectors.
- In 2015 the Dutch government launched in 2015 a specific **Human Capital Agenda for ICT**, an action plan aiming at fulfilling the need for sufficient adequately trained personnel within the next few years. The Dutch Digital Agenda 2016-2018 also indicated the talent development and supply of professionals with the right skills to be a major. To implement it, several projects have been launched, including the integration of digital literacy and computing in the core curricula of primary and secondary schools, and the development of personalised digital learning resources to develop students' individual capacities.
- The **Technology Pact 2020** (Techniekpact) was started in 2013 and was updated in 2016 for the period 2016-2020. The aim is to improve the connections between education and labour market and reduce the shortage of technical profiles. This has been expressed in 12 objectives (which are actively monitored), in which ICT skills also have an important stake. This has been signed by more than 60 organisations from business, education and public sector. Public-private cooperation is a key element to implement the ambition.
- The implementation has been specified for 5 regional parts of the country, to take account of the different conditions of the labour market to align with education and dual learning schemes. Cooperation between regional and sectoral networks is one of the 12 objectives, in particular through 'Service Points Technology', in cooperation with Top Sectors.
- The connection with the human capital agenda of the Topsectors is very explicit in many projects, e.g. with pilots for cross-over learning (cross-sectoral learning). In the 'Topsector Scholarships 'programme 120 companies in the Topsectors are participating, offering to more than 500 students experience with modern industrial environments.
- Also the labour unions are engaged in the Technology Pact, in particular for the Smart Industry Fieldlab on Social Innovation. A new development is the connection within fieldlabs of the same space for technology experimentation and their use for training in using new production technologies (first subsidies from Regional Investment Fund xxxx)
- The **Human Capital roadmap 2016-2020** of the Top Sectors has been designed as a lever to move all private and public in the same direction. The common objectives of the Top sectors for 2020 are: 1. Doubling of the capacity of expertise centres for training; 2. An integrated vision on knowledge circulation by training; 3. Attracting foreign students and making them stay (40%); 4.Four out of ten graduates have a technical education.

Recent studies on behalf of the Topsectors have collected best practices for practice oriented learning. To implement these better coordination between the TKIs and the Centres for professional Education will be organised.
In a recent report the Top Sectors propose the further development of their PPPs into '**learning communities**' in which learning, work and innovation go together.

https://www.pbt-netwerk.nl/publicaties/human-capital-voor-de-topsectoren-van-nederland-roadmap-2016-2020
http://www.socialinnovationlab.nl/

3.3. Standardisation

Standardiseringsagenda

https://www.smartindustry.nl/site/assets/files/2364/smart_industry_action_agenda_standardisation_2016.pdf
(to be completed)

3.4. Regulation Framework

The General Data Protection Regulation will be effective from 25 May 2018.
(to be completed)

4. Investments

- Most public investments supporting digital transformation of industry in the Netherlands are distributed over the generic and specific instruments for enterprise policy (Ministry of Economic Affairs).

  The budget for **generic** innovation policy (mainly WBSO) in 2016 was €1,2 billion (of which two third goes to SMEs). About 23.000 innovative companies received support. While support was always limited to R&D personnel, the investments in research equipment and prototypes also became eligible in 2016.

  The share of the ICT sector in the WBSO is about 25% and increasing (covering innovative ICT-applications in big data, e-health, cybersecurity and IoT).

  For **specific** innovation policy (TKI Top-up, MIT, contributions to JTI etc) there was €134 million for subsidies available in 2015. In addition there are contributions to knowledge institutes such as TNO and execution agencies for more than 650 million.

  In total the budget for innovation promotion is about **€1,75 billion in 2017**.

  In addition the government also offered loan guarantees for 1,7 billion to strengthen the financial position of healthy companies, and increased access to risk capital with the establishment of a Netherland Investment Agency and the Dutch Venture Initiative (DVI – together with the EIF).

  The government has also the Future Fund (that is capitalising on benefits from the gas exploitation), that can provide extra impulses, such as investments in research facilities and infrastructures with interest free loans.

  https://www.rijksoverheid.nl/actueel/nieuws/2016/03/31/fors-meer-steun-voor-innovatieve-snelle-groeiers

- Besides enterprise policy the funding of public research is a direct source of investment for digital transformation. These budgets are managed by the Ministry of Education, Culture and Science. In 2016 there was 3,3 billion euro for fundamental research. The amount for applied research was quite lower, with 390 million. Part of it was going to Top Sector policy.

  These budgets have been rather stable after the crisis, in times of severe budget restrictions. As a consequence the Dutch public R&D-intensity as percentage of GDP (even including the tax reductions, statically not part of GBOARD) is under pressure with the good take-up of growth in the last period. Therefore the 'Knowledge Coalition' (grouping all stakeholders) has pleaded for an additional 1 billion for research.

- For the future the government anticipates an increase of private R&D in the TKI budgets. The original target for 2020 of in total 500 million of TKI investment (and 40% of private funding) has been raised to 800 million. But in 2015 the budget was already more than 1 billion with 48% private funding. The new PPP Top-up will continue granting an extra 25% budget for research to be conducted by public research institutes in the framework of the TKI programmes and projects.

  The new mechanism for funding Fieldlabs might be contained because the number of Fieldlabs will be limited.

5. Good practices

- **Public-Private Partnership** are co-operations where large/SME industries, local schools/academia and research & technological institutes as well as representatives from local/regional/national government work together to achieve jointly defined ambitions. They exist in all kind of different forms. The Smart Industry action program at national level, and fieldlabs at regional/local/city level are examples. Many are bottom-up established when multiple parties encounter a joint challenge. By organizing a triple helix structure one expects to accelerate the development of (regional) eco-systems.

- **Fieldlabs** were established when the EU in the KET discussion (Key Enabling Technologies) identified the lack of means to cross the valley of death in bringing research to innovations into markets. As a result pilot-lines were defined as environments where activities were conducted at TRL (technology readiness level) 4-7/8. Previous co-operation with subsidy funding was limited to pre-competitive research (TRL 1-3/4). In the Netherlands too pilot lines were renamed fieldlab as innovation activities in industrial, but not yet commercial producing environments. The fieldlabs were initially focused on innovation research projects, they now also tend to include (vocational and technology) training for students and employees using the newest technologies too.

- **Digital Innovation Hubs**: In general a fieldlab has a focus on a single technologies, but currently we see regional clustering such that companies and their employees, but also schools and students have access to them close by. As a result of this evolution the creation of a limited number of Digital Innovation Hubs in the Netherlands is foreseeable, as a set of fieldlabs in a certain region where together they form a digital innovation hub around several technology topics (3D/AM, robotics, supply chain coupling, composite production, preventive maintenance, ..)

6. Contribution to European priorities

6.1. Investments in key-technologies:

- The Smart Industry fieldlabs are focused on different manufacturing industries and their digital challenges. But next to a focus on factories, there are also PPPs in the field of solar PV, flexible electronics, quantum computing technologies, nano-electronics, biochemicals, autonomous driving and agro/food which have a focus on other things then the acceleration of digitalization.

6.2. Development and networking of Digital Innovation Hubs

- Exploring the possibilities for regional and thematic clustering of the existing fieldlabs. This also in relation to the development of the European DIH's. Close cooperation between CoC's and LN4.0 in Germany. In June 2017 the Coc organization and a large number of German Coc's visited the Netherland and had a tour around a couple of fieldlabs. A return visit is planned for early next year.

6.3. Participation in industrial platforms

- Exploration of the potential between Industrial Data Space and Smart Industry - a technical exchange on security and identity management.
  First meeting took place in NL with over 50 other interested participants on behalf of the Industrial Data Space Association, TNO, Thales and the Program Bureau Smart Industry. Meeting was successful and Thales and TNO will visit the Industrial Data Space Association for Cross border opportunities.
- The Netherlands intend to play an important role in the European strategic roadmap to deliver 5G services. To speed-up innovations around 5G, public authorities and industry have launched the initiative Fieldlab 5G, by means of which various companies can gain experience with innovative application in the areas of agriculture, care, energy, living environment, and traffic and logistics. Moreover, preparations have started for a (5G) multi-band auction expected to take place in 2019.