

The Smart Industry action program of the Netherlands

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.

INTRODUCTION

The Netherlands has a world-class industrial base. Numerous large and small companies are among the leaders in their respective markets. That is something to be proud of, but we cannot be complacent. Indeed, the world is changing at a rapid pace.

Globalisation continues unabated, economic reality is forcing companies to remain competitive. Consumers and customers increasingly expect tailor-made solutions. At the same time, unparalleled technological development is taking place: the fourth industrial revolution. In other countries this is called: Industrie 4.0 in Germany, Usine du Future in France, Fabriek van de Toekomst in Belgium, Catapults High Value Manufacturing centres in the UK, MADE in Denmark, Made in USA. This revolution is characterised by far-reaching digitisation of industry. High demands are being placed on companies to adapt to this economic reality. This requires action by the Netherlands.

BACKGROUND AND MANDATE OF THE TEAM SMART INDUSTRY

The report, Smart Industry, Dutch Industry fit for the future, was presented at the Hannover Messe. It describes the transition of industry to a digital world in which ICT is deeply penetrating into all facets of the production process. Smart Industry is driven by smart use of ICT to interconnect machines for smart operation. And not only within factories but also between companies and between companies and customers. It involves a combination of the use of production technology, digitisation and a network approach (see figure). And it is about smart products, processes and services.

Smart Industry is not a development of the future; it is happening right now and will experience an even greater boost. We see that others are not sitting idly by. Germany, Belgium, Denmark, the US and China are a few examples of countries that are firmly committed to this development.

For Minister Kamp of Economic Affairs, the report was an opportunity to ask the Team Smart Industry to draft a concrete Action Agenda. This agenda should contribute to a Dutch industry that reaps the benefits of digital opportunities, thereby becoming competitive on the global market, now and in future.

WHAT IS THE CURRENT SITUATION IN THE NETHERLANDS?

The Dutch economy is strong. We are among the world's top 10, with leading sectors that can compete on a global basis. The Dutch manufacturing industry is particularly strong in providing tailor-made work based on an intensive customer relationship, but it certainly has excellent companies in mass production as well. In the area of digitisation, the Netherlands has numerous companies at the forefront. But behind this leading group there is still a world to be captured. A Smart Industry survey has shown that a significant number of entrepreneurs are still relatively uninformed about the upcoming digital revolution and its implications for their business.

This is consistent with the figures from the World Economic Forum. The Global Information Technology Report 2014 shows that while the Netherlands is doing extremely well in ICT, the adoption of new technology can be improved. It can also be noted that ICT is being used



more by companies in their contacts with consumers than for business to business transactions.

The survey and the many workshops that have been organised show that entrepreneurs see a variety of challenges. Two challenges can be singled out:

- (1) how can companies collaborate effectively and are they organised in chains and networks that make optimal use of data? and
- (2) how do companies develop new Smart business propositions with the deployment of new and state-of-the-art technology and knowledge?

AMBITION AND STRATEGY

The ambition of the Team Smart Industry is a strong Dutch industry that grows and creates jobs. The digitisation of industry offers the Dutch business community great opportunities to remain competitive in a new era of global competition. This development is unavoidable; not participating is not an option. All the statistics show that ICT is the most important driver for productivity growth at this time. Therefore, companies will need to have the ambition to be at the forefront. This Action Agenda supports the business community in that ambition. The Action Agenda is an enhancement of the current top sector policy and the Technology Pact. The aim is to make the industry more competitive through faster and better utilisation of the opportunities ICT has to offer. And we do that not only for the business community itself. A strong and innovative industry provides growth and jobs. That is the higher goal. The team proposes the following approach for this.

What will we do:

- 1 Capitalising on existing knowledge
- 2 Accelerating in Field Labs
- 3 Strengthening the foundation

1 Capitalising on existing knowledge

A lot is possible based on existing technology. Two things need to be done to convert knowledge into business. Firstly, a large group of companies is aware of the need and opportunities but lacks the tools to make it work effectively. We will supply these tools. Secondly, an equally large group of entrepreneurs has insufficient insight into the digital revolution which is developing around them. It is important to involve this group. This will only work if we are successful in getting the Smart Industry topic on the social agenda across the board.

2 Accelerating in Field Labs

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. Field Labs are practical environments in which companies and knowledge institutions develop, test and implement effective Smart Industry solutions. Field Labs meet the need for physical and digital space for experimentation and accompanying facilities. In addition, Field Labs strengthen connections with research, education and policy on a specific

Smart Industry theme. Field Labs meet the need for experimentation space and accompanying facilities. 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 such as agro-food. Good proposals already exist for that. The Team Smart Industry intends to give priority to encouraging and accelerating the Field Labs mentioned below.

3 Strengthening the foundation

To support the development toward a sustainable Smart Industry, the foundations need to be reinforced in three areas: knowledge, skills and parameters:

Knowledge

Capitalising on existing knowledge and accelerating in Field Labs provide a lot in the short term. In the longer term, it is essential to invest in new knowledge to face the competition in a sustainable way. There are challenges in different subareas in exploring this knowledge in greater depth, such as in robotics and sensors. Major steps can still be made in the relatively young fields such as big data, which are truly coming to fruition only now. In order to make great strides in future, new knowledge is also needed in the field of complex systems and the interaction between man and machine.

Skills

Now more than ever, company management is being forced to stay close to market developments and translate these developments into their own organisation. They cannot afford to linger in concepts that have proven themselves in the past; rather, they continuously need to think about how to distinguish themselves from the competition with new business propositions. The success of the organisation is largely determined by the skills of the employees. That demands involvement of these employees and therefore another management style and a different organisational design. Many professions will change and investments in digital skills are necessary for staff at all levels. This requires appropriate training at schools and intensive cooperation between education and the business community.

Parameters (ICT)

Parameters in the field of ICT as well as the legal area are necessary for Smart Industry, since the core of Smart Industry is the connection between machines and companies in the chain via ICT, particularly via internet. Organising companies in chains, exchanging data, cybersecurity and the quality of the ICT infrastructure are all critical.

Organisational structure

The Smart Industry action program (SI) is a Dutch public-private partnership run by the industrial employers' organization (FME), the Ministry of Economic Affairs, the Chamber of Commerce, Nederland-ICT and TNO (the Dutch research and technological organization (RTO)). It is a 3-year program that started after a year preparation. In the annex you find a summary in English of the action program as published in October 2014.

The governance of Smart Industry consists of a steering board which controls a program office in which each founding organization has one person 4 days/week each. These



organization fund their persons in kind and jointly there is 100.000 E/y budget for operational cost. The SI program itself is not a funding organization.

The SI is built around 15 actions clusters in 3 action line: awareness (run by the CoC), Fieldlabs (run by TNO & Min of E) and conditions which consists of knowledge (TNO), Skills (FME) and ICT (Nederland-ICT & Min of E). 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.

Operational details

The awareness program consists of weekly multiple presentations and workshops for mainly SME and other interested people. On a yearly basis hundreds of presentations and 10.000 people are reached. Also a website, online training modules and business team trainings are developed. As a result also commercial partners, called Smart Industry ambassadors, are taking over the awareness program. These commercial partners, next to their own commercial interest, share the same ambition as SI: acceleration of digitalization of our industry.

The fieldlab program started with 10 fieldlabs with a radical innovation ambition. After a year a second round of proposals was asked for and the expectation is that the total number of formal Smart Industry fieldlab will extend to 25. In the subsequent paragraph more details of this concept of fieldlab is presented. This is the most international visible aspect of SI.

The strengthening program consists of knowledge, skills and ICT. Knowledge covers the research agenda and roadmap for public/private research in the Netherlands regarding smart industry topics. It ranges from robotics/mechatronics and 3D printing research all the way to ICT topics as cyber security, Internet of Things and Blockchain. The ICT conditions comprise three aspects: cyber security, a topic getting more important, big (trusted) data where in Fieldlabs all kind of legal aspects are popping up and the last aspect standardization of interfaces where international cooperation is sought.

Key condition is skills. Initially focused on education and immediately successfully picked up by poly-technical and some vocational schools, it became more clear that skills can't be separate from Fieldlabs. Starting with a first fieldlab social innovation we experience that all Fieldlabs focus on two aspects: innovation and skills projects. In the social innovation fieldlab the labor unions and ministry of social affairs are partners, in all the other fieldlab vocational school, polytechnics and several universities are involved.

The Fieldlab concept in more detail

Since the EC modified the state-aid ruling at the start of H2020 it is possible to create and subsidize public/private partnership closer to market then before. Where previously such cooperations were restricted to pre-competitive research (TRL 1-4), it is now allowed to support with public subsidies cooperation in non-commercial industrial operational environments (TRL 4-7). In that stage and beyond also innovation credits are available. TRL are technology readiness levels 1 to 9, where 1 is an idea and 9 a commercially produced product. TRL 7 is preparing industrial production.

This EC development around 2014 led in the Smart Industry preparation to the concept of fieldlabs. Not in an academic, but in an operational environment, innovations are implemented and tested before they are suited for use in commercial production. Initially the EC spoke of pilot lines, but practices showed a more broader concept was needed. Hooking up milk cows or distributed process equipment for health/maintenance monitoring is different than a 3D printing pilot line. So the wording Fieldlabs became common.

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 requirements 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.

The seven points in brackets are our criteria for naming a fieldlab initiative a formal aspirant Smart Industry or (full) Smart Industry fieldlab. The attribute aspirant is when a fieldlab has been founded but is still applying and waiting for its full funding.

Regional (public) development organizations are often a crucial partner to start an initiative to establish a fieldlab. They aligned it with their regional smart specialization, but they are always private partners (individual companies, joint foundations, etc.) who are in the lead. As they are bottom-up initiatives all kind of Fieldlabs are being established. Some are organized as a foundation, some are cooperation agreements and some are even established as a not-for-profit company. In all cases the business model is based upon in-kind contributions from the different project partners as well as some cash contribution to fund out-of-pocket costs or non-matched parts of funding of public institutes. In all cases it is an investment by the partners in which they expect to receive results both in better understanding the usefulness, faster successful introduction and reduction of risks of new technologies as well as trained employees. With each partner having its own business case, the fieldlab organization should continuously adapt its position, all depending on project proposals and available private contributions and potential (regional/national/European) subsidies.

It appears the most Fieldlabs evolve around an (regional) eco-systems of private players along a value chain. Putting competitors in the same Fieldlabs is possible in limited cases and conditions. Public knowledge institutes and universities are in most cases involved. And for the education part poly-technics and vocational schools are involved as for them more education can be done in real-life environments on actual topics. Their involvement also enables training of existing employees.

Currently it appears that the around 15-(expected)25 fieldlabs demonstrate a certain coordination in the sense that each region has common interest in topics as 3D printing, robotics, IoT health/maintenance monitoring, digital coupling of factories, etc as well as that regions establish a cluster of several Fieldlabs fitting to its smart specialization. Realize that in the case of Smart Industry, not the national government, but companies are in the lead resulting in this more regional and bottom-up approach. With one particular exception: the smart base where the military wants to cooperate with public and private partners in testing new innovation to be used for military bases with a minimal environment footprint, but as with all Fieldlabs it is about cooperation to jointly manage innovation successfully.

FIELD LABS

CAMPIONE: 100% predictable maintenance in the chemical sector

Making maintenance for chemical companies 100% predictable so that productivity, availability and safety of the means of production are significantly improved and at lower cost.

Smart bending Factory

Becoming a global model of innovation in tailor-made work for the metal industry in bringing small series on the market 25% cheaper and 5 times faster.

Region of Smart Factories

Flawless production and 'First Time Right' product and process development resulting in a successful demand-driven manufacturing industry.

Smart Dairy Farming 2.0

Increasing the sustainability of dairy farming through real-time monitoring of dairy cows and data sharing in the chain.

Designing Ultra Personalised Products and Services: UPPS

Developing radical new product propositions for the manufacturing industry through innovative use of data and by making products fully customised.

Multi-material 3D printing

Developing completely new value chains based on the next generation of 3D print technologies and the associated data management systems.

SMARTfood – now Freshteq.nl

Making the Dutch industry the global leader in smart solutions for fully automated production, cultivation and distribution of fresh fruit and vegetables.

Secure Connected Systems Garden: secure data exchange - now 'the Garden'

Providing Smart Industry with maximum secure data exchange in the entire value chain.

Flexible Manufacturing

In small series, flexible and fully automated production by robots without programming time.

The digital factory: Smart networked high-tech supply chain

Becoming the world's best 'networked' digital factory, where companies collaborate on the development and manufacture of complex high-tech machines.