

INNOVATION PROFILE EAST NETHERLANDS REGION

INTRODUCTION

Within the framework of the development of a 'Europe strategy' for the East Netherlands region and a further sharpening of the Smart Specialisation Strategy (S3), last year's efforts were aimed at creating our 'own' East Netherlands innovation profile.

Background

In the timeframe 2007 - 2015, knowledge institutes and businesses in East Netherlands received an estimated amount of over € 850,000,000 from the central European programmes such as KP7 and Horizon 2020. For the period up to 2020 as well, the European Commission has made funds available to stimulate innovations, particularly in Horizon 2020.

There are concerns that the subsidy income for East Netherlands will go down as a result of competition on a European level. In the first round of Horizon 2020, the average probability of success of projects in the Netherlands has indeed dropped from 26 to 16%. However, total volume of European innovation funds is bigger than ever.

The chances to acquire EU funds for knowledge institutes and businesses in East Netherlands may be increased by drawing up a clearly defined profile and promoting this in a joint effort. Within this framework, the Provinces of Overijssel and Gelderland have asked Mr. Frans van Vught, former advisor of Barroso and former chairman of the Executive Board of the University of Twente, to develop a regional strategy to take better advantage of the potential of the central European programmes, such as Horizon 2020.

Starting principles

In cooperation with the knowledge institutes, the cluster organisations, Development Agency East Netherlands Oost NV and the business community (Confederation of Netherlands Industry and Employers VNO-NCW) a process has been set in motion aimed at establishing an innovation profile. Such a profile will enable us to better exploit the (joint) opportunities of East Netherlands in the European research and innovation programmes. A crucial step is determining the focus of the East Netherlands innovation capacity; what are the substantive areas in which East Netherlands can distinguish itself as European region, both from the perspective of the knowledge institutes and the business community?

This has led to the following starting principles for the innovation profile:

- Cooperation on regional level between the clusters (AgroFood, Life Sciences and Health, High Tech Systems and Materials, Energy and Environmental Technology EMT), universities, universities of applied sciences, businesses and two provinces;
- An integrated approach; improve the level of cohesion in the approach of the European programmes;
- Focus: the current East Netherlands profile is described in the Smart Specialisation Strategy (S3) of East Netherlands. However, the S3 scope is very wide. More focussed choices must be made within that scope;
- Distinctive position in Europe: it is not only a matter of where our strengths lie but especially how these strong points relate to the other European regions and preferably how these strengths can create a unique offer of East Netherlands;
- Evidence-based: the choices need to be based on data from quantitative and/or qualitative research with a substantiation from practice and the presence of businesses and sectors, in particular businesses and sectors with considerable R&D activities.

Based on this strategy with a stronger focus, authorities and organisations from East Netherlands will have to profile themselves towards Brussels in the future. We aim at selecting one or maximally two so-called 'flagships' that are characteristic for the East Netherlands innovation profile.

Process

The process will be supervised by a Steering Group¹, which has convened four times up to date. There has been interim feedback on the results with the Gelderland Strategic Innovation Meeting and the Overijssel Administrative Policy Group Horizon 2020. The meetings were prepared by a workgroup.

To achieve the desired focus, the following steps have been taken:

- Analysis of the economic impact (turnover, employment) of the sectors of the East Netherlands Smart Specialisation Strategy (S3);
- Analysis of the specialisations of the knowledge institutes concerning fundamental and applied research through bibliometric research, performed by the Centre for Science and Technology Studies (CWTS) in Leiden, May 2015;
- Analysis of the projects of the partners in East Netherlands that were awarded by the European Commission in the timeframe 2007 - 2015 (KP7 and Horizon 2020);
- Analysis of the relative presence of technology areas in businesses in East Netherlands on the basis of the Promotion of Research and Development Act WBSO, patents and innovation database, performed by the Netherlands Enterprise Agency RvO, March 2016;
- Inventory and analysis of the European programmes and their relevant calls;
- A workshop with relevant partners on 17 June 2015 in Zutphen.

Empirical evidence shows that the economic top sectors High Tech Systems and Materials, Life Sciences and Health, and Agrofood are of great importance for the provinces of Gelderland and Overijssel both in terms of employment and innovation capacity; the sharpened profile of East Netherlands should target these sectors. Here we also find the demand for knowledge from the relatively large population of small- en medium-sized businesses in the region. It has also been noted that the presence of a wide knowledge infrastructure (incl. centres of expertise and living labs) in the region enables East Netherlands to address various complex industrial and societal challenges that have been formulated in an EU context, in a high-quality and multidisciplinary manner.

Result

The results of this analysis are presented in this paper. The analysis has led to the following two flagships.

- 1) Smart and Sustainable Industries;
- 2) Concepts for a Healthy Life.

These flagships are characterized by a multidisciplinary development and application of knowledge and technology. The cooperation in networks is therefore an essential feature within these two flagships. Three specific spearheads are described for both flagships that enable a further focus and detailed realisation.

The innovation profile is the joint framework in which authorities and organisations in East Netherlands will present their activities towards the European Commission with respect to the general Innovation theme. This does not prevent organisations and authorities from presenting themselves internationally in other ways with respect to themes such as Tourism, Area Development, Business Climate and Mobility.

Through this innovation profile, East Netherlands contributes to the Europe 2020 strategy - the long-term strategy of the European Union. The key objective of this strategy is to develop the European economy into an internationally competitive social and sustainable market economy. Our focus links up with the following objectives of Europe:

- Increased research and development;
- Higher employment levels;
- Sustainable economic growth;
- Raise the level of education.

FLAGSHIP 1: SMART AND SUSTAINABLE INDUSTRIES

This flagship concerns the strength of the East Netherlands manufacturing industry and the industrial activities in the area of sustainability. It is particularly the strong technology component of the manufacturing industry and the chain cooperation in this respect that distinguishes East Netherlands from other regions. This distinctive character of the manufacturing sector positions East Netherlands well for the development into a real 'Smart Industry'. The business community, authorities and knowledge clusters/partners jointly work on the implementation of the Action Agenda Smart Industry East Netherlands (Boost), among others by the development of field labs such as the Smart Bending Factory. The strongly present technological foundations of the Key Enabling Technologies, High Tech Systems and Materials, Chemistry and IT can be elaborated on. The circular economy theme is also highlighted within this framework: this important theme at European level partly profiles East Netherlands and its manufacturing industry in terms of the deployment of new knowledge and applications. These combined strengths will enable East Netherlands to link up perfectly with the Digital Society as emerging theme.

The flagship Smart and Sustainable Industries has three spearheads in the East Netherlands region:

- Smart Manufacturing and Materials
 - In the field of research, this spearhead concerns the development and application of materials on molecular and nanolevel. Areas of research such as functional molecular systems, molecular structures and dynamics, nanoscience, process technology, graphene, material design, etc. are strongly represented in East Netherlands. At the same time the region houses large research facilities unparalleled in the world. In addition, there is a large research capacity and experience with respect to applied research in areas such as nanotechnology, production technology (i.e. Manufacturing), IT applications, smart materials, polymers, (bio)composites and (bio)plastics.
 - This spearhead has numerous opportunities as a result of the technology component of the manufacturing industry and the cooperation in successful networks. These opportunities have already resulted in a strong concentration of research capacity: laboratories, centres of expertise (e.g. TechForFuture and TechYourFuture). Through field labs, testing grounds and open innovation centres, new techniques are made applicable and ready for use in businesses and products. There are interesting opportunities in among others the airline and transport sectors (shift to lightweight), services (implementation of the smart concept in the manufacturing industry), the developments towards personalized manufacturing (3D printing, Design Lab), intelligent systems, the internet of things, value chain/network optimisation, new business models, biobased materials and smart cities/regions. Innovation Campus Kennispark actively contributes to making this knowledge available for SMEs.
 - Knowledge institutes in East Netherlands already show a clear focus on this spearhead at European level. Radboud University (RU) for example participates in the FET Flagship Graphene and the recently started KIC Raw Materials. Wageningen University & Research Centre (WUR) among others participates in the EU SPARC initiative (robotics) and in the KIC EIT Digital. University of Twente (UT) participates e.g. in the ETP Manufacture, the ETP Robotics and the KIC EIT Digital. In the near future, a Fraunhofer Centre will be set up at the UT campus to strengthen the ties with Germany in this area. UoAS Saxion participates among others in the ETP FTC (Future Textile & Clothing) and the ETP Robotics. Via the connection of Overijssel and Gelderland to networks such as the Vanguard initiative and Manunet, SMEs are

offered the opportunity to link up with knowledge and businesses in other European regions.

- Smart Food Production
 - This spearhead aims at contributing to the target of producing healthy food on a global level without any damage to the environment. An essential aspect is the deployment of new knowledge and technology in areas such as agrofood, robotics, geoinformatics, IT and big data. All of these are widely present in East Netherlands.
 - Opportunities for this spearhead particularly lie in the agricultural sector, with food companies and in the manufacturing and packing industry. Examples may include precision agriculture, food safety, food for health, new preservation and conservation techniques, reduced food waste by bringing down harvest losses (but also by measures further down in the food chain), smart packaging, and geo-observation/land management especially outside of Europe. FoodValley NL plays an essential role in linking SMEs to knowledge and economic activity, both on national and international level.
 - With respect to this spearhead as well, we already see a considerable involvement with European programmes. The WUR e.g. participates in the KICs EIT Food (under development) and EIT Climate and the RUMC, UT and WUR are involved in the EIP Healthy Ageing.

- Biobased Production
 - In a general sense, this spearhead concerns the societal wish to offer the materials and energy needs of the world population an increasingly biobased source. The strengths of East Netherlands with respect to this spearhead mainly originate from the knowledge areas such as microbiology, sustainable and green chemistry, life cycle analysis, ecology, biobased materials & products and more specifically from research into pyrolysis and biomass, leading to new chains and techniques for a more sustainable economy (circular economy).
 - Opportunities concerning this spearhead are mainly related to the increasing trend towards more sustainability in both food and energy production and the manufacturing, chemical and transport sectors. Examples may include: novel biomass crops and production (including breeding), biorefinery, biobased chemicals, biobased materials, biobased energy, biobased transition, biomass conversion, cascading, ecosystems services, etc. Energy and Environmental Technology cluster Stichting kiEMT plays a crucial role in linking knowledge to businesses within this spearhead. KiEMT and VNO-NCW Central Netherlands have launched the initiative for CIRCLES, the East Netherlands Top Spot where stakeholders in the region cooperate and share their knowledge concerning a circular economy. In the Biocentre Centre of Expertise of the UoAS HAN, researchers carry out practice-oriented research within the entire Biodiscovery chain, ranging from the discovery and analysis to the production and application of (new) biomolecules. In addition, the UoAS Van Hall Larenstein, the HAN and WUR participate in the Centre of Expertise Biobased Economy (CBBE).
 - On a European level, the East Netherlands knowledge institutes already have a strong presence in this spearhead, among others in the KIC Climate, the ETP Food for Life, the ETP Plants for the Future, the JTI Biobased Industries Consortium (all WUR), the ETP SusChem (WUR and RU) and the EIP Water (RU).

FLAGSHIP 2: CONCEPTS FOR A HEALTHY LIFE

The choice for this flagship shows that East Netherlands goes beyond merely generating expertise with respect to the issue of health and care. In East Netherlands, new knowledge, insights and techniques are used to develop concepts that have a wide range of applications in healthcare. Examples are the East Netherlands initiatives around Healthy Brain including ParkinsonNet (Radboud University Medical Centre RUMC), Technical Medicine (UT) and Food for health (nutrition for the elderly, top athletes, etc.) (WUR, Saxion and HAN). Within this flagship a number of Centres of Expertise are operational: the HAN with the Rapid Recovery Centre and the Social Transition for Rural Areas Centre and the UoAS CHE Ede with Care 2.0 (CHE, UT, Saxion, HAN). In addition, Health Valley links up SMEs to knowledge and the care market within this spearhead both on a national and an international level. The cooperation with the healthcare industry in test labs for example ensures that innovations actually reach the implementation phase.

In the Concepts for a Healthy Life flagship, three spearheads are distinguished within the East Netherlands context.

- Health Technology and Delivery Systems
 - This spearhead concerns both the technological base of medical care (early diagnostics, tissue engineering, medical robotics, e/m Health, nanomedicine) and the social aspects (health technology & services research, health communication, use of social media by patients, use of antibiotics, health management systems). Research in East Netherlands has gained international status in fields such as molecular life-like systems, infection & immunology, oncology, nanomedicine, imaging, medical chip technology ('lab on a chip'), (bio)molecular informatics, language and speech technology, new delivery systems, etc. and offers many opportunities for innovative applications that tie in with the developments towards a Digital Society.
 - Opportunities with respect to this spearhead can be found in the strongly increasing demand for new medical applications and care services. The East Netherlands region offers the unique option of implementing, analysing and assessing a large number of medical and care innovations in a so-called living lab.
 - The involvement in East Netherlands with European programmes and initiatives is high, e.g. the ETP Nanomedicine (RU, RUMC and UT), the EIP Healthy Ageing (RUMC, UT and WUR), the JTI Innovative Medicine Initiative (RU, RUMC), the Active and Assisted Living programme (HAN, Saxion, UT) and the ETP Robotics (UT and Saxion).

- Healthy Brain
 - This spearhead targets the further development of knowledge of the functioning of the human brain and the resulting application options at various levels from molecular details to human behaviour, including didactics in education. In a wide multidisciplinary context, work is being carried out on one of the biggest scientific challenges of the 21st century. The combination of the medical-scientific disciplines present in East Netherlands and the above-stated key-enabling technologies (under medical health and delivery systems) and the cooperation with care delivery systems and the social-scientific basis offer excellent opportunities for increased profiling of this spearhead on an international level.
 - The results of research of the human brain are of great importance; both for the wellbeing of individuals and from a societal perspective. One may think of diagnostics and treatment of brain-related conditions but also of insights into language acquisition, learning and diagnostics, nutrition and cognition, behaviour and technology development inspired by the human brain. Opportunities concerning this spearhead, therefore, relate to a large number of application areas of both

individual medical care (e.g. Alzheimer, Parkinson, ADHD, autism) and the development of new social services (e.g. with respect to education, consumer behaviour, nutrition, care for the elderly, exercise and sports) and products (e.g. with respect to treatment, diagnostics, learning systems, communication). Crossovers between the knowledge institutes will definitely generate opportunities.

- With respect to this spearhead, the East Netherlands knowledge institutes are involved in a large number of European international programmes and projects such as the FET Flagship Human Brain Project (RU), the Human Connectome project (RU), the EIP Healthy Ageing (RUMC, UT and WUR), and the JTI Neurodegenerative Diseases (RU and RUMC).
- Personalized Health and Nutrition
 - This theme concerns the further development of the individual specificity of medical diagnostics, treatment and supervision. Topics are: personalized medicine, personalized diagnostics, personalized nutrition, nanomedicine, as well as personalized healthcare (among others e/m health). In East Netherlands this spearhead is driven by knowledge areas such as genetics, infection & immunology, oncology, cognitive sciences, reproductive medicine, preventive health strategies, food and cognition, microfluidics, nutrition, medical robotics, early diagnostics, etc.
 - Opportunities for this spearhead concern the increasing options for ‘customized’ analysis, advice, prevention, treatment and supervision (with respect to medical care, nutrition, behaviour, lifestyle) on the one hand such as Service Innovation, and the development of new products within that framework on the other (measuring equipment, means of communication, diagnosis instruments). UoAS Van Hall Larenstein participates in the Centre of Expertise FOOD.
 - Also with respect to this spearhead, East Netherlands knowledge institutes are involved in various European initiatives, including the EIP Healthy Ageing (RUMC, UT and WUR), the KICs EIT Food (under development) and the EIT Health (RUMC and WUR), the JPI Healthy Diet for a Healthy Life (WUR and HAN) and the ETP Food for Life (WUR).