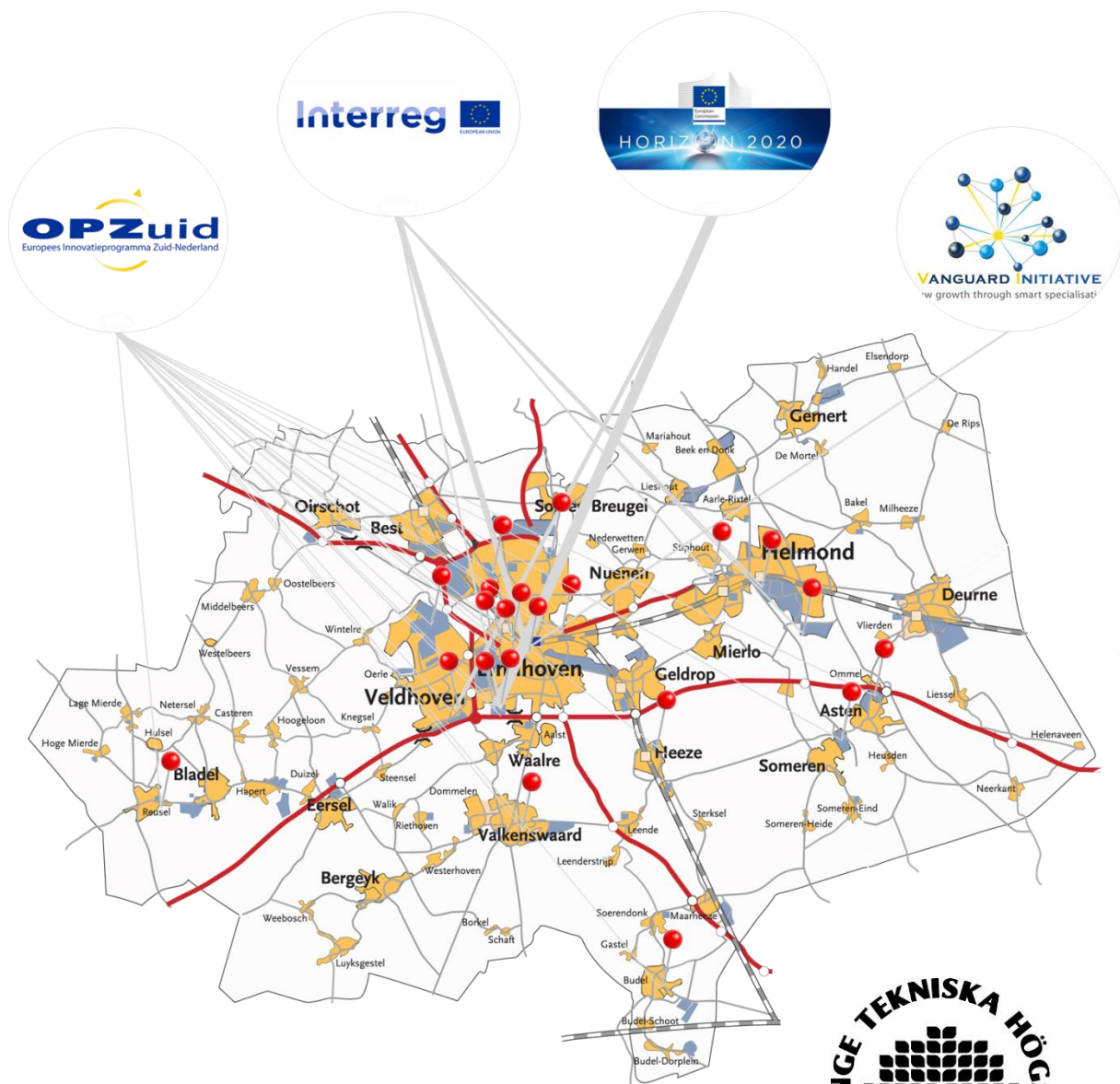


# Contributions from the European Union to the development of Brainport Eindhoven



Johan van de Vijver

Master Thesis Planet Europe,

Faculty of Management Sciences / Department of Spatial Planning,

Radboud University Nijmegen / Blekinge Tekniska Högskola,

June 2017



Radboud Universiteit Nijmegen



# *Contributions from the European Union to the development of Brainport Eindhoven*

---

*A case study on the contribution of the projects from development programmes  
and initiatives to the development of the innovation system of Brainport.*

|                         |  |
|-------------------------|--|
| <b>Name:</b>            | <b>Johan van de Vijver</b>   |
| <b>Student number:</b>  | <b>s4190777 (RU), jova16 (BTH)</b>   |
| <b>Email address:</b>   | <b>jvandevijver12@gmail.com</b>  |
| <b>Courses:</b>         | <b>Master Thesis (MAN-MTHPLANET),<br/>Radboud University;<br/>Master's Thesis in Spatial Planning (FM2564),<br/>Blekinge Tekniska Högskola</b> |
| <b>Date:</b>            | <b>15 June 2017</b>  |
| <b>Status:</b>          | <b>Final Version</b>   |
| <b>Supervisors:</b>     | <b>Pascal Beckers &amp; Jan Evert Nilsson</b>  |
| <b>Number of words:</b> | <b>23.781</b>  |



## Preface

Dear reader,

What you have in front of you is a copy of my master thesis about the contribution of the European Structural and Investment Funds in the development of the innovation system of Brainport Eindhoven, written within the framework of the Erasmus Mundus master programme PLANET Europe. This thesis is written as part of the course Master Thesis PLANET Europe (MAN-MTHPLANET) of Radboud University and the course Master's Thesis in Spatial Planning (FM2564) of Blekinge Tekniska Högskola.

I would like to use this preface to express my gratitude to a few people. Firstly I would like to thank my family and my girlfriend for the support they have given me during the writing process of this thesis. Without their support and motivating pep talks, the writing process of the thesis would be a lot harder for me. Secondly, I would like to thank my friend Arwen van der Linden for giving feedback on my master thesis, especially when it comes to spelling and grammar. Without his help, this thesis would be full of linguistic errors which now have been corrected. Thirdly I would like to thank all the respondents for the time they made free to do an interview with me. Without their input, this thesis would not contain so much new knowledge. Lastly, I would like to thank my thesis supervisors dr. Pascal Beckers and Jan-Evert Nilsson for their feedback and support in the writing process of this thesis. Without their input, this thesis would not have reached this level of quality.

Furthermore, I would like to dedicate some words here to honour my grandfather, who sadly passed away in the last days of the writing process, after suffering from a renal haemorrhage. Although I was shocked by this news, my grandfather's hardworking mentality and his perseverance have inspired me to finish this research in honour of him.

With my deceased grandfather in my mind and in my heart, I would like to wish you an enjoyable and informative read,

Johan van de Vijver

## Table of Contents

|   |      |
|---|------|
| Preface.....  | V    |
| List of abbreviations .....   | VIII |
| Executive Summary .....   | IX   |
| 1. Introduction.....  | 1    |
| 1.1. Development programmes, Initiatives and Funds of the European Union .....                                  | 1    |
| 1.2. Development programmes, Initiatives and Funds of the European Union and the development of Brainport ..... | 2    |
| 1.3. Research Introduction .....  | 3    |
| 1.3.1. Lack of knowledge .....  | 3    |
| 1.3.2. Scientific relevance.....  | 4    |
| 1.3.3. Social relevance .....   | 5    |
| 1.3.4. Main goal and research questions .....   | 6    |
| 1.4. Research model .....   | 7    |
| 2. Theoretical Framework .....  | 8    |
| 2.1. Introduction to theoretical perspectives on innovation systems .....                                       | 9    |
| 2.2. Regional Innovation Systems .....  | 10   |
| 2.3. Regional innovation systems: a structural model .....  | 12   |
| 2.4. Key activities in innovation systems.....  | 14   |
| 3. Conceptual framework and operationalisation .....  | 17   |
| 3.1. Conceptual framework.....  | 17   |
| 3.2. Operationalisation.....  | 18   |
| 3.2.1. Operationalisation for sub-question 1 .....  | 19   |
| 3.2.2. Operationalisation for sub-question 2 .....  | 21   |
| 4. Methodology .....  | 22   |
| 4.1. Research strategy .....  | 22   |
| 4.2. Research approach .....  | 24   |
| 4.3. Research methods: Interviews and desk research.....  | 27   |
| 4.4. Research validity and trustworthiness .....  | 30   |
| 5. Case Description: Brainport.....   | 32   |
| 5.1. Organisations.....   | 32   |
| 5.1.1. Firms .....  | 33   |
| 5.1.2. Knowledge Institutions.....  | 34   |

|  |        |
|--|--------|
| 5.1.3. Governments.....  | 35     |
| 5.2. Relations .....   | 37     |
| 5.3. Institutions.....   | 39     |
| 5.4. Knowledge .....   | 41     |
| 6. Key activities in the innovation system of Brainport in projects of EU development programmes and initiatives. .... | 43     |
| 6.1. OPZuid Projects .....   | 43     |
| 6.2. Interreg projects.....  | 46     |
| 6.3. Horizon2020 projects .....  | 49     |
| 6.4. Vanguard Initiative .....   | 50     |
| 6.5. Reflection on the key activities in the innovation system.....  | 51     |
| 7. Conclusion .....  | 53     |
| 7.1. Conclusions.....  | 53     |
| 7.2. Critical reflection on the writing process of this research .....   | 58     |
| 7.3. Research limitations and recommendations for further research.....  | 60     |
| References.....  | 61     |
| Literature .....   | 61     |
| Interviews .....   | 67     |
| Images .....   | 68     |
| Images used on the front page.....   | 68     |
| Images used in this thesis.....  | 68     |
| Annex 1: Background of the respondents.....  | ii     |
| Annex 2: Interview guides .....  | v      |
| Annex 3: Overview of projects .....  | xxxvii |

## List of abbreviations

|            |  |
|------------|--|
| BOM:       | Brabant Development Agency                                       |
| ERDF:      | European Regional Development Fund                               |
| ESI Funds: | European Structural and Investment Funds                         |
| EU:        | European Union   |
| MRE:       | Metropole Region Eindhoven                                       |
| OPZuid:    | Operational Programme for the South of the Netherlands 2014-2020 |
| PinS:      | Philips Innovation Services                                      |
| RIS3:      | Smart Specialisation Strategy                                    |
| RIS3-Zuid: | Smart Specialisation Strategy for the South of the Netherlands   |
| R&D:       | Research and Development   |
| SME's:     | Small and medium sized enterprises                               |
| TU/e:      | Eindhoven University of Technology                               |



## Executive Summary

In the Brainport region, many different projects take place in the framework of EU co-financed programmes and initiatives. Between the different programmes and initiatives, these projects all have a different way to contribute to this development. Firstly, all projects contribute to the activities of organisations in the region. The subsidy that is linked to the projects gives the organisations in the region extra financial capacity, which allows organisations to do something extra besides their regular activities. The relations within Brainport are also very much developed with contributions of the projects of the EU programmes and initiatives. The projects in all programmes had an emphasis on connecting different organisations with each other and the development of new ecosystems. Therefore, especially the network dimension is developed thanks to the EU co-financed projects. The institutions in the region are almost undeveloped by the projects, because the projects have a duration period that is too small to contribute to this. Although some projects instigate the development of knowledge, this is to a far smaller degree than the instigation of entrepreneurial activities, because knowledge is used in the project as a means to do entrepreneurial activities.



## **1. Introduction**

What started as an industrial city in the South of the Netherlands, now has become an innovation hotspot in North-West Europe. After the growth of multinationals such as Philips or DAF, and the development of companies like ASML and FEI Company, the Dutch city of Eindhoven saw a transformation in its core business from industry to technology. In the 1990s, mass discharges at Philips and DAF instigated the city of Eindhoven and its twenty surrounding municipalities to cooperate with each other. With support from the European Union, the 21 municipalities created a fund for the improvement of the economic structure of the region. Together with companies and knowledge institutions, the municipalities created the base of the innovation ecosystem of Brainport (Brainport, n.d.2). Since its creation, the Brainport ecosystem and network of ancillary industries and service providers has developed ever since. A unique feature of the development of the Brainport ecosystem is the cooperation between governments, knowledge institutions and industries. This triple helix cooperation takes place in the Brainport Foundation, which has been praised by former European Commissioner for Regional Policy Johannes Hahn as a role model for the rest of Europe (Brainport Network, 2012).

### **1.1. Development programmes, Initiatives and Funds of the European Union**

In 2010, the European Commission drafted the Europe 2020 strategy, with the aim to guide the European Union to emerge stronger from the financial and economic crisis. This guidance had to be realised by three key priorities: smart growth, sustainable growth and inclusive growth (European Commission, 2010, p. 5). To realise these three priorities all over Europe, the European Commission proposes EU Cohesion Policy and the European Structural and Investment Funds (ESI Funds) as key delivery mechanisms to achieve these priorities (European Commission, 2010, p. 21).

Cohesion policy is the main instrument of the European Union that aims to achieve economic, social, and territorial cohesion, and a more balanced and sustainable territorial development. Thousands of projects all over the European Union that receive funding from the European Regional Development Fund (ERDF), European Social Fund and Cohesion Fund need to achieve this ambitious goal (European Commission, 2014d). Together with the European Agricultural Fund for Rural Development and the European Maritime and Fisheries Fund, these five funds together make up the ESI Funds. These five funds work together to support economic development across all EU-countries, in line with the objectives of the Europe 2020 strategy (European Commission, 2014c). Apart from these funds, there are more programmes and initiatives under the flag of the European Union that provide funding for innovative activities. Examples are the Horizon2020 programme and the Vanguard Initiative.

## **1.2. Development programmes, Initiatives and Funds of the European Union and the development of Brainport**

In the Brainport region, ESI Funds can be accessed by public and private institutions via multiple European development programmes. The programmes that can provide subsidies for the development of the innovation system are funded by the European Regional Development Fund (ERDF). Within the region, public and private institutions can apply to two different European development programmes to receive co-funding from the ERDF.

The first programme is the Operational Programme for the South of the Netherlands 2014-2020 (OPZuid). OPZuid focused on the provinces of Zeeland, North-Brabant, and Limburg, is a programme that aims to achieve two priorities in the South of the Netherlands based on the Smart Specialisation Strategy for the South of the Netherlands (RIS3-Zuid): the boosting of innovation and the low-carbon economy. To achieve these priorities, the programme regularly opens a call via Stimulus Programme Management for regional development projects, in which governmental organisations and small and medium-sized enterprises (SME's) can apply in a project proposal that, when approved, will receive funding from the ERDF (Stimulus Programmamanagement, 2017c).

The second programme where public and private institutions can apply for co-funding of the ERDF, is the Interreg programme. Interreg, founded in the 1990s is a programme framework from the European Union that stimulates cooperation across borders on three levels of scale: the cross-border level between two or three countries, the macro-regional level between multiple countries, and the inter-regional level across Europe (Dühr, Colomb & Nadin, 2010, p. 233). There are five Interreg programmes to which a public or private institution from the Brainport region can apply for co-financing of the ERDF: Interreg Flanders-Netherlands, Interreg Germany-Netherlands, and Interreg Meuse-Rhine on the cross-border level, Interreg North-West Europe on the macro-regional level, and Interreg Europe on the inter-regional level.

Apart from these programmes, there are other programmes and initiatives, separate from the ESI Funds, that provide funding for innovative activities. The Horizon2020 programme, which is open for all countries in the European Union, is the largest research and innovation investment programme of the European Union. Within the Horizon2020 programme, public and private institutions can apply for ERDF-co-financing in a consortium with other partners, or as a single partner. The programme has a specific focus on research and innovation to deliver breakthroughs, discoveries and the development of products from the lab to the market (European Commission, n.d.). Lastly, the Vanguard Initiative, set up in 2014 with the signing of the Milan Declaration, is a bottom-up initiative from 30 regions all over Europe to cooperate with each other to reach the goals of the regional Smart

Specialisation Strategies (RIS3), which is supported by the ERDF (Political Leaders and representatives of the Vanguard Initiative for New Growth through Smart Specialisation, 2014). The Vanguard Initiative aims to boost new growth through smart specialisation and bottom-up entrepreneurial innovation. In the Vanguard Initiative, there are five different pilots in which the various European regions cooperate with each other to develop new technologies which can be brought to the market in the fields of bio-economy, efficient and sustainable manufacturing, 3D-printing, marine renewables, and off-shore energy applications, and new nano-enabled products (Enterprise Flanders, n.d.).

### 1.3. Research Introduction

The introduction of this study has set the scene for this research. In this section, I will discuss the lack of knowledge, the relevance, and the main goal and main question of this research.

#### 1.3.1. Lack of knowledge

The body of literature on the topic how projects, supported by programmes, initiatives and funds of the EU can contribute to the development of an innovation system is not very extensive. One of the first papers on this topic was written by Musyck & Reid (2007, p. 961), who give a thematic evaluation of innovation-related actions supported by the structural funds to assist declining industrial areas during the period between 1989 and 1999. They concluded that maintaining the structural fund support for innovation governance was vital (Musyck & Reid, 2007, p. 980). Where Musyck & Reid (2007) discussed declining industrial areas in their research, Puigcerver-Peñalver (2007, p. 199) investigated the impact of Structural funds in less developed regions. She concluded that the structural funds have had a significant impact on the economic growth of these regions in the first programming period of the European Structural and Investment Funds. More recently, Kang & Hwang (2016) focus on how innovation networks develop by funding of the European Union, with a focus on systemic innovation in the renewable energy sector. Therefore, the lack of knowledge that this paper will try to overcome is the fact that there is very little scientific literature available on how EU Funds contribute to the development of an innovation system.

Numerous papers have already been written on the development of Brainport. Most of these papers are strategies, like the multi-annual plan by Brainport Development (n.d.1.), the regional Smart Specialisation Strategy RIS3-Zuid (OPZuid, 2013), the national strategy *Pieken in de Delta* (Ministerie van Economische Zaken, 2004, p. 64-67), or the *Top Sector Policy* (Raspe, Weterings, Geurden-Slis & Van Gessel, 2012). In scientific literature, the development of Brainport has often been used as a case study. For example, papers by Legendijk & Boekema (2008), Fernández-Maldonado & Romein (2009), and Smits (2011) focus on the development of Brainport either by describing the role of strategy making, the role of activities and actions of stakeholders, or the role of governance.

However, none of the available scientific papers about the development of Brainport has yet focused on the role and influence of the EU programmes, initiatives and funds. Therefore, this paper also aims to bridge the knowledge gap that exist because there is very little scientific literature available on the role of EU programmes, initiatives and funds in the development of Brainport and its innovation system.

### **1.3.2. Scientific relevance**

In the previous paragraph, I have identified the knowledge gaps that this paper will try to overcome. In this chapter, I will reflect on these knowledge gaps and I will add the contribution of this research to overcome the lack of knowledge.

The first knowledge gap discussed the topic how EU programmes, initiatives and funds can contribute to the development of an innovation system. Musyck & Reid (2007) researched this topic by analysing the development of declining industrial areas in the period 1989-1999 with the help of ESI Funds. Puigcerver-Peñalver (2007) did a similar research in the same period, but her area of research were other less developed regions. Although these researches were conducted only ten years ago, the period which is discussed in both researches took place even longer ago.

Since the 1990s, EU Cohesion Policy underwent a series of reforms due to the enlargements of the European Union in 2004 and 2007 (Dühr, Colomb & Nadin, 2010, p. 272). With the reforms of EU Cohesion Policy, the number of European funds increased from one to three (ERDF, ESF, CF) for the 2007-2013 programming period (Dühr, Colomb & Nadin, 2010, p. 274).

Because of the reforms in EU Cohesion policy, this research will contribute and renew the existing body of literature provided by Musyck & Reid (2007) and Puigcerver-Peñalver (2007) as regards the EU programmes that are a part of EU Cohesion Policy. This is already partly done by Nam, Schönberg & Wamser (2011), who did a research on how the Lisbon Agenda and Cohesion Policy could influence innovation systems. Nam, Schönberg & Wamser (2011, p. 2) argue that since 2007, the promotion of regional innovation systems has become one of the most important EU policy measures for guaranteeing sustainable long-term growth in regions. With Cohesion Policy and the ESI Funds, innovation systems are seen as a kind of self-help and learning tool that is expected to trigger local growth dynamics, which could help less-favoured regions to catch up with core regions (De Bruijn & Legendijk, 2005, in: Nam, Schönberg & Wamser, 2011, p. 5). Then, Nam, Schönberg & Wamser (2011, p. 11-23) apply the regional innovation system perspective in a case study to Spanish Objective I regions to analyse whether EU-funded projects in the 2007-2013 period of Cohesion Policy developed a regional innovation system. The conclusion of Nam, Schönberg & Wamser (2011, p. 21) was that despite the new attention to innovation systems in Cohesion Policy, the innovation system

did not develop in the Spanish Objective I regions because the spending of EU-funds to innovation did not increase. The research of Nam, Schönberg & Wamser (2011) gives a good contribution to the literature on how ESI Funds could contribute to innovation systems, by taking the case study of Spanish regions that were lagging behind. Because Nam, Schönberg & Wamser (2011) only focused on regions that were lagging behind, the knowledge gap that existed due to the outdated of the literature of Musyck & Reid (2007) and Puigcerver-Peñalver (2007) is not entirely bridged, because no research has yet been conducted on richer regions and the contribution of EU funds in the development of these regions. Therefore, this research will bridge the existing knowledge gap by researching the contribution of EU programmes, initiatives and funds in a richer region, namely the Brainport region.

### **1.3.3. Social relevance**

With the establishment of the ERDF in 1975, the first step of the development of EU Cohesion Policy and the ESI Funds was done. Formerly, EU Cohesion Policy mainly served to correct the main regional imbalances within the European Economic Community by supporting regions that were 'lagging behind' and by supporting the conversion of declining industrial areas (Dühr, Colomb & Nadin, 2010, p. 271-272). In the past, Cohesion Policy has been very important for regions, by giving them the opportunity to set up projects to invest in their infrastructures and to become more competitive. With the publication of Europe 2020 in 2010, Cohesion Policy has changed. The economic crisis of 2008 has damaged the economy of the European Union, which has caused the European Commission to strive for three priorities for economic growth: smart, sustainable, and inclusive growth (European Commission, 2010, p. 5). The first priority, smart growth, which is defined as "developing an economy based on knowledge and innovation", is of particular interest for this research, because all the EU programmes, initiatives and funds that are available for the Brainport region have smart growth as a priority, in the form of boosting innovation (European Commission, 2010, p. 10). In this research, I will research whether the current projects of EU Cohesion Policy and the other European development programmes and initiatives like Horizon2020 and the Vanguard Initiative contribute to this objective of smart growth in the Brainport region. This research will be socially relevant, because it will present a case study of how recent projects of EU programmes, initiatives and funds contribute to the development of the Brainport region, and whether these projects are able to realize the goal of smart growth in the Brainport region.

#### 1.3.4. Main goal and research questions

This practice-oriented research aims to discover how European development programmes, initiatives and funds contribute to the development of an innovation system, with the Brainport region as a case study. Therefore the main goal of this research will be:

*“Gaining insights on how development programmes, initiatives and funds of the European Union contribute to the formation and development of an innovation system by analysing the case study of the Brainport region between 2007 and 2017, in order to reflect and give inputs for the theoretical debate on the formation and development and innovation systems”.*

The main goal of this research has indicated a timeframe, between 2007 and 2017. I have chosen for this period for several reasons. Firstly, 2007 marked the starting point of the previous Cohesion policy programming period. Since then, new programmes started which instigated the possibility of new sorts of development. Furthermore, I have chosen 2007 as a starting point for this research, because there is very little data available for EU-funded projects before that period. Therefore, there is a high chance that there is no or very little information available about some projects before 2007. I have chosen 2017 as the end of the timeframe because there are several projects in the 2014-2020 programming period that are running at this moment. Therefore, taking 2017 as the end of the timeframe allows me to give a state-of-the-art update on the contribution of the projects to the innovation system. With this timeframe and the main goal of this research in mind, the main question of this thesis will be:

***“How did the development programmes, initiatives and funds of the European Union contribute to the development of the innovation system of Brainport between 2007 and 2017?”***

This main question will be divided into two sub-questions:

- How can the innovation system in Brainport be described?
- In what way do the projects of development programmes and initiatives contribute to the development of key activities in the innovation system of Brainport, and what is the difference in contribution between the various EU investment programmes and initiatives?



## 1.4. Research model

This paragraph will introduce the main structure of this research. Figure 1 represents the research model:

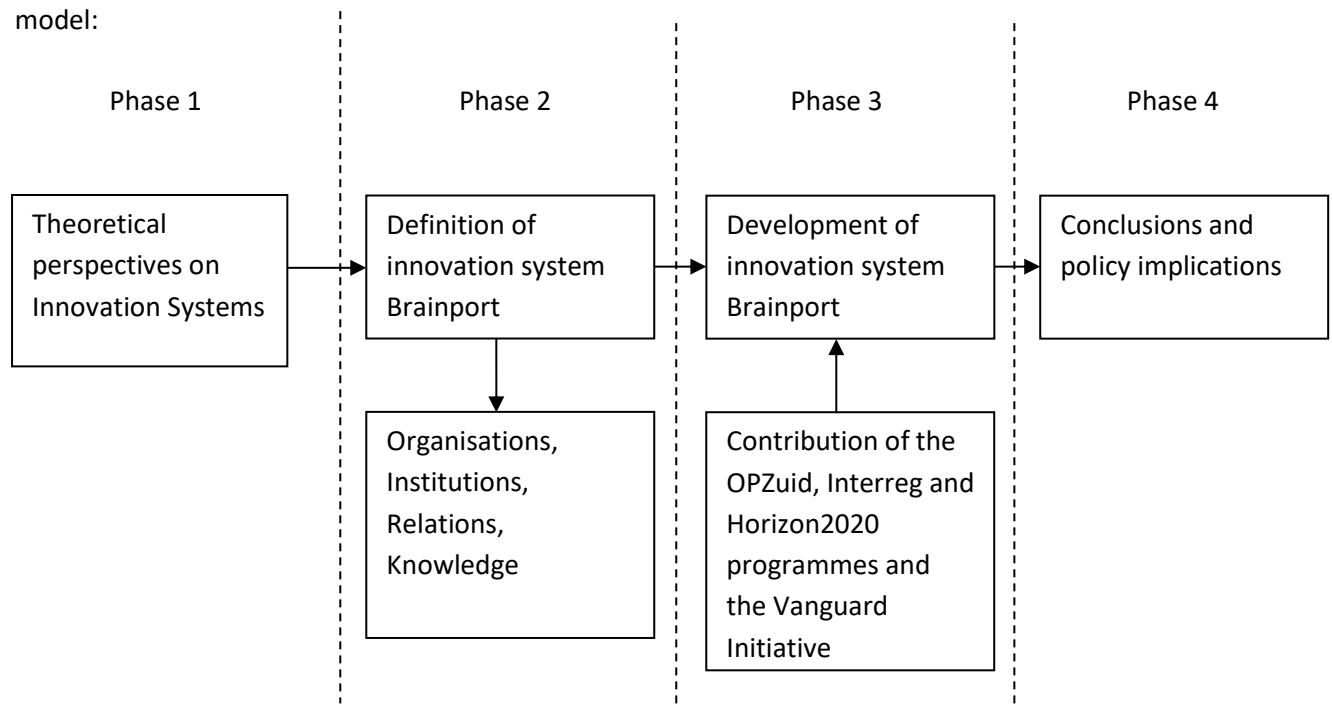


Figure 1: Research model (Source: Author).

This research is divided into four phases. In the first phase, I will explore how different perspectives on innovation systems connect with each other and come together in one theoretical model. In this phase, the perspectives that will form the theoretical foundation of this research will be discussed. In the second phase of this research, these perspectives will be applied to the Brainport region, to answer the first sub-question. In the third phase of this research, the definition of the innovation system of Brainport from phase 2 will be used to analyze the development of the innovation system with the contributions of the EU programmes, initiatives and funds . In this phase, interviews will be conducted with many different experts, in order to obtain solid empirical data. In the final phase of this research, there will be a concluding reflection on the collected data to answer the research question.

## 2. Theoretical Framework

In this chapter, I will embed the research of this study in its theoretical background. Looking at the subject of this thesis, theories like the growth pole theory by Perroux (1955), the actor-network theory by Callon (1986), or the theory of competitive advantage by Porter (1998) could also be suitable for this research, except for the fact that these theories are only able to analyse structural elements of Brainport's innovation system. For example, Perroux' growth pole theory (1955) could describe how a certain industry in Brainport attracts companies to the region and increase the effect of the entire regional economy, but it does not give me the opportunity to analyse how the actors and organisations within the region cooperate or compete with each other, nor to analyse the role of development projects in the development of the innovation system. The actor-network theory by Callon (1986) could contribute in this case, but this theory would only allow me to analyse how actors within Brainport behave in a network. If this theory would be combined with Perroux' theory (1955), it would be therefore very difficult to place the role of this network within the growth pole concept, and still the role of external development projects would not fit in this theoretical framework. Porter's diamond (1998) could be a very useful conceptual framework to describe Brainport and its competitive advantage, but Porter's diamond's (1998) static character also does not provide an approach to analyse the development of the region.

Because it is very difficult to combine theories like the growth pole theory, the actor-network theory and the theory of competitive advantage into one theoretical model, because this research is set in a region that has many characteristics of an innovation system, and because the main question steers me to analyse the development of the innovation system of Brainport, I have chosen to embed this research into the more delineated theoretical area of innovation systems. This theoretical area allows me to analyse structural elements of an innovation system, as well as the development of an innovation system with external projects, like the projects in the framework of the EU programmes, initiatives and funds in this research. Although perspectives of innovation systems never use the same definition for the concept of innovation systems, these perspectives provide a delineated theoretical area in which all the structural aspects of the innovation system can be combined into one theoretical model, together with developmental aspects of the innovation system. Therefore, I will use theoretical perspectives on innovation systems as the theoretical background to answer the main question of this research.

## 2.1. Introduction to theoretical perspectives on innovation systems

The theoretical debate on innovation systems starts in the 1980's when Christopher Freeman discovered elements in Japan's economic system that were different from Europe and the USA. Therefore, Freeman (1987; 1995, p. 20) believed that the development of the Japanese economy in a global economic crisis could be explained due to the presence of a more efficient system of innovation, which he defined as a *"network of institutions in the public and private sectors, whose activities and interactions initiate, import, modify and diffuse new technologies"* (Freeman, 1987, p. 1). To explain the national differences, these networks of institutions in the public and private sectors were present in each country and delineated by the national borders, thus being a National System of Innovation.

Lundvall (1992) looked at these National Systems of Innovation of Freeman (1987) from a broader perspective. He argues that innovation is practically present in all parts of the economy, implying that national innovation systems contain *"all parts and aspects of the economic structure and the institutional set-up affecting learning as well as searching and exploring"*, instead of just the networks of institutions in the public and private sectors (Lundvall, 1992, p. 12). Nelson (1993) builds on Freeman's (1987) and Lundvall's (1992) conceptualisations by doing a comparative research between national innovation systems all over the world. Nelson (1993, p. 4) therefore conceptualized the innovation system as *"a set of institutions whose interactions determine the innovative performance of national firms and the most important institutions are those supporting Research and Development (R&D) efforts"*.

In the 1990s, a shift in the theoretical debate took place. The 1990s marked a decennium with vibrant regional political and economic mobilization, ranging from newly politically empowered regions such as Catalonia, Flanders and the German Bundesländer (Ladrech, 2010, p. 94). Lundvall & Borrás (1997, p. 39) resumed the importance of the new focus on the regional scale, arguing that *"the region is increasingly the level at which innovation is produced through regional networks of innovators, local clusters and the cross-fertilising effects of research institutions"*. This new perspective leads to the fact that place-specific and other non-economic factors like knowledge, relationships and motivations started to appear as new determinants in the new regional perspective on innovation systems.

## 2.2. Regional Innovation Systems

An early definition of the Regional Innovation System was given by Nauwelaers & Reid (1995), who defined regional innovation systems as a *“set of economic, political and institutional relationships occurring in a given geographical area which generates a collective learning process leading to the rapid diffusion of knowledge and best practice”*. Compared to the earliest definitions of the innovation system by Freeman (1987), Lundvall (1992) and Nelson (1993), this definition already shows an increased importance to the topic of collective learning and the diffusion of knowledge.

According to Asheim & Isaksen (1997), there are two types of actors in a regional innovation system: firms that form the industrial cluster and institutional infrastructure that supports the regional innovation, like research and higher education institutes. Braczyk, Cooke & Heidenreich (1998) add to the actors that were identified by Asheim & Isaksen (1997) the governance actors, in which they refer to the level of public institutions and policies that develop the regional innovation system in a hierarchical way. According to Edquist (1997), who proposes a more systemic approach to regional innovation systems, a system of innovation is a system that *“includes all important economic, social, political, organizational, institutional, and other factors that influence the development, diffusion, and use of innovations”*. Edquist’s system of innovation has components of a system, and relations among them. According to Edquist (2005, p. 188), these components can either be organizations or institutions. Before a system of innovation is a system, the components of the system need to have relations with each other. According to Edquist (2005, p. 196), there are three forms of relations: competition, transactions, and networking. Furthermore, Edquist (2005, p. 198) argues that it must be possible to discriminate between what is part of the system and what is not. In other words, the system must have boundaries.

Asheim & Gertler (2004, p. 293) start their perspective on regional innovation systems, by stating the importance of knowledge. They argue that tacit knowledge is a key determinant of the geography of innovative activities because it does not successfully spread over long distances. This implies that if knowledge of innovative activities will mostly stick within the region, the region can become more innovative and competitive by promoting stronger systemic relationships between firms and the region’s knowledge infrastructure (Asheim & Gertler, 2004, p. 299). Because innovation is based on the interactions of knowledge flows between different actors, territorially embedded knowledge is fundamental to analyse how a regional innovation system will develop. Likewise, the interactions between these actors, the networks, and their proximity are key defining figures of the regional innovation system. Asheim & Gertler (2004, p. 299) therefore argue that regional innovation systems can be thought of as the institutional infrastructure supporting innovation within the production structure of a region.

Here, I would like to reflect on two aspects of the discussed perspectives on regional innovation systems. The first aspect that I would like to reflect on, is the fact that the different perspectives describe regional innovation systems as if it were a universally defined concept, whereas this is often not the case. This critique is inspired by the works of Niosi (2000) and Doloreux & Parto (2004), who are very sceptical towards the use of the term regional innovation system. Niosi (2000) argues that any definition of a regional innovation system should start with a description of what a region exactly is because a region can be defined with multiple different geographical scales. Doloreux & Parto (2004, p. 22) clarify this by giving examples of geographical areas that were used in the literature as regions, for example, the entire country of Denmark, the large Canadian province of Quebec, but also small-scale industrial districts. I perceive the critiques of Niosi (2000) and Doloreux & Parto (2004) as very relevant for this research. If this research does not provide a clear description of what is meant with “the region”, this thesis could be interpreted in a wrong way. To clarify what will be defined as the Brainport region and to meet the critiques of Niosi (2000) and Doloreux & Parto (2004), I will, discuss and define the region and its boundaries in the case description in chapter 5.

The second aspect that I would like to reflect on is the fact that the presented perspectives have a very organized and structured character. But according to Cooke (2001, in: Asheim & Gertler, 2004, p. 303-304), there is a distinction in the character of the regional innovation system between the more traditional, organized system of innovation and what he calls an entrepreneurial regional innovation system. According to Cooke, (2003, in: Asheim & Gertler, 2004, p. 304) the organized system of innovation has embedded governance structures, supporting regulatory and institutional frameworks, and systemic relations between the knowledge infrastructure and the production, which result in more path dependent innovations rather than disruptive innovations. But innovation systems like Silicon Valley lack the strong systemic elements of the organized innovation system and gets its dynamism from local venture capital, entrepreneurs, scientists, and incubators (Cooke, 2003, in: Asheim & Gertler, 2004, p. 304). This regional innovation system perspective with an entrepreneurial character is further developed by Carayannis & Campbell (2009) and Chukhray (2012), who refer to innovation systems as ecosystems of innovation. According to Carayannis & Campbell (2009, p. 206), the ecosystem of innovation consists of multiple innovation networks and clusters, which are organised in a chaotic way. Chukhray (2012, p. 14) extends this notion of the organisation of the innovation ecosystem by arguing that the participants of this system and its networks and clusters are usually members of the same supply chain.

This characteristic distinction of Cooke (2001, 2003, in: Asheim & Gertler, 2004, p. 303-304) and the perspectives on innovation systems of Carayannis & Campbell (2009) and Chukhray (2012) shine a different light on the regional innovation system perspective and forces me to reflect critically on the character of the innovation system of Brainport. Because the research goal directs this research to investigate the contribution of the EU programmes, initiatives and funds to the development of Brainport, the research goal focuses me to stick more to the organized character of Brainport's innovation system. This is because the projects from these programmes and initiatives of the EU are mostly executed by public bodies, often in cooperation with knowledge institutions and SME's. In the regional innovation system perspective with entrepreneurial character, the role of public bodies is neglected to a large degree, and therefore their activities and these projects would be neglected as well in this perspective. Nevertheless, I perceive the notion of the chaotic organisation of networks within an innovation system as a very interesting perspective on networks and relations within a regional innovation system, because it forces me to reflect on the way how I will analyse the relations element of the innovation system of Brainport. Therefore, I will pay extra attention to the complexity of networks in an innovation system in the operationalisation in chapter 3.

### **2.3. Regional innovation systems: a structural model**

In this chapter, I will bring the presented perspectives together, to build a model that can describe the structure of the innovation system of Brainport. I will do this by analyzing the perspectives and pick out the elements that build the innovation systems. These elements will be bundled in different dimensions in a tree diagram that will be used in the operationalisation to describe the structure of the innovation system of Brainport.

The first element that I would like to deduct is the element Organisations. Apart from Nauwelaers & Reid (1995), all other perspectives mention organisations as an element of the innovation system. Asheim & Isaksen (1997) mention firms and research institutes as organisations, whereas Braczyk et al. (1998) mention governance actors as additional organisations. Furthermore, I would like to mention start-ups as organisations of the innovation system, based on the characteristic distinction of Cooke (2001, in: Asheim & Gertler, 2004, p. 303-304). The second element that I would like to deduct is the element Institutions. This has been given much attention by Nauwelaers & Reid (1995), Asheim & Gertler (2004) and Edquist (2005). According to Asheim & Gertler (2004), the innovation system could be seen as the institutional infrastructure in the region. The third element that I would like to deduct from the different perspectives is the element Relations. This element has been given special attention by Nauwelaers & Reid (1995), who argue that the innovation system is a set of economic, political, and institutional relationships in the region. Asheim & Gertler (2004) argue that these relations are visible in the form of interactions between actors and networks. Edquist (2005)

adds the elements of competitions and transactions between actors to these relations. The fourth element that I would like to deduct from the different perspectives is the element knowledge. This element has been mentioned by Nauwelaers & Reid (1995) as the result of the relationships within a region. According to Asheim & Gertler (2004), the tacit knowledge that sticks within a region is of key importance to the growth of a region. The deduction of elements from the various perspectives on regional innovation systems, leads to the following structural model of the regional innovation system:

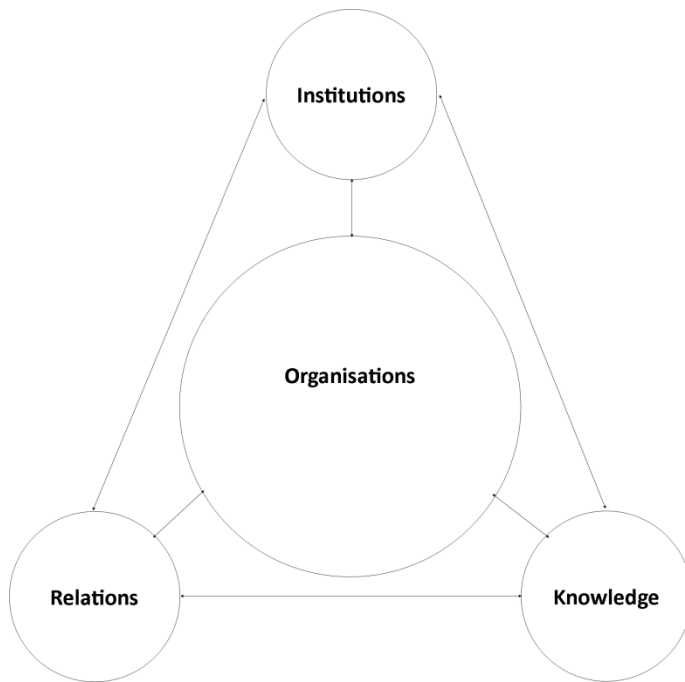


Figure 2: Structural model of the regional innovation system perspectives (Source: Author).

Although this model very well presents the structural elements of the regional innovation system that will be analysed in Brainport in this research, the model still lacks an approach to describe the processes and activities that take place in the innovation system that lead to the development of the innovation system. Therefore, the presented perspectives on regional innovation systems need an additional perspective on innovation systems to make sure that the regional innovation system perspectives can be used to analyse the development of Brainport and answer the second sub-question of this research. This additional perspective will be the functional perspective of Hekkert, Suurs, Negro, Kuhlmann & Smits (2007). I have chosen to add this perspective to the other perspectives of regional innovation systems, because the functional perspective of Hekkert et al. (2007) pays a lot of attention to the processes that instigate the development of an innovation system, by analysing key activities that can spur this development. Because the projects of EU programmes and initiatives can contribute to these key activities, I have chosen to pick this perspective as the additional perspective that will allow me to analyse the contribution of the EU projects to the innovation system of Brainport.

## 2.4. Key activities in innovation systems

To add an aspect of innovation processes that happen within the structure of the regional innovation system, Hekkert et al. (2007, p. 418) propose to focus on key activities in the innovation system that contribute to reaching the goal of the innovation system. This is what Johnson (2001) and Hekkert et al. (2007) call "*Functions of Innovation systems*". I have chosen for this perspective, because this perspective permits the researcher a more systemic method of mapping the determinants of innovation and because it allows the researcher to analyse external dynamics of innovation (Hekkert et al., 2007, p. 420). This aspect is particularly interesting for this research because it allows me to analyse what the contribution is of the external EU programmes, initiatives and funds to the processes of innovation within the innovation system of Brainport. A second reason why I have picked this perspective is that this perspective allows the researcher to deliver a set of policy targets, by discussing how well certain functions are served by the system (Hekkert et al., 2007, p. 420). This aspect is very important for this research because it allows me to answer the fourth sub-question by giving policy implications. Hekkert et al. (2007, p. 421-425) propose seven interrelated functions of innovation systems that can describe and explain processes in innovation systems.

The first function that Hekkert et al. (2007, p. 421-422) describe is entrepreneurial activities. Hekkert et al. (2007, p. 421) state that there cannot be an innovation system without entrepreneurs because they can turn the potential of new knowledge, networks and markets into concrete activities that generate new business opportunities. They can either be new entrants that have a vision of business opportunities or new markets, or companies who diversify in their business strategy and take advantage of new developments.

Secondly, Hekkert et al. (2007, p. 422) propose knowledge development as a function of an innovation system. The development of knowledge is a prerequisite in an innovation system, which encompasses learning by searching and learning by doing. Linked to the development of knowledge is the third function Hekkert et al. (2007, p. 423) propose: Knowledge diffusion through networks. Hekkert et al. (2007, p. 423) see the exchange of information and the new knowledge as an essential function of a network, especially in a context where R&D meets the government, competitors and the market. By exchanging knowledge, policy decisions, standards, and targets can be aligned with the latest technological insights and R&D agendas can be updated.

The fourth function Hekkert et al. (2007, p. 423) propose is the guidance of the search. With the guidance of the search, Hekkert et al. (2007, p. 423) refer to those activities within the innovation system that can positively affect the visibility and clarity of specific demands among technology users. For example, changing preferences within a society can influence the priority setting of R&D



and thus the direction of technological change and innovation. Furthermore, this can be influenced by the interaction between many actors in the innovation system, who can come up with new experiments (function 1), of which the success stories are spread to other actors (function 3). This raises expectations of innovations, which are communicated throughout the system. Under the influence of those success stories, expectations on a certain topic can converge and generate a momentum for change in a specific direction.

The fifth function Hekkert et al. (2007, p. 424) propose is market formation. Often, new technologies have difficulties to compete with embedded technologies. Because of that, Hekkert et al. (2007, p. 424) argue that it is important to create a protected space for new technologies by forming temporary niche markets. These niche markets can be created by governments, who can create favourable tax regimes or minimal consumption quotes within the market. The sixth function Hekkert et al. (2007, p. 425) propose is resource mobilization. Resources, which Hekkert et al. (2007, p. 425) describe as both human and financial capital, are a necessary input for all activities in the innovation system, especially for the development of knowledge (function 2).

Lastly, Hekkert et al. (2007, p. 425) propose the creation of legitimacy as a function of innovation systems. To fully develop, new technologies of existing products have to become part of a regime in which embedded technologies are rooted. Parties with vested interests will oppose to this form of creative destruction. To prevent that, Hekkert et al. (2007, p. 425) encourage advocacy coalitions to function as a catalyst and to put the new technology on the agenda (function 4) and to lobby for resources (function 6) in order to create legitimacy for the new technology.

If I would like to apply this functional perspective in this research, some reflections need to be done. Firstly, the functions of Hekkert et al. (2007) describe the key activities of an innovation system, but they only discuss how these functions can instigate the processes that lead to development very shortly. According to Hekkert et al. (2007, p. 426), these seven functions can have many possible interactions, but less starting points. Hekkert et al. (2007, p. 426) argue that common triggers of development are the guidance of the search, for example by the identification of societal problems, or by a lobby for resources. If I want to apply Hekkert et al.'s perspective (2007), I will need to focus on the latter trigger of development of key activities in this research. Therefore, I will need to assume that the co-financing of the EU programmes and initiatives are the resources that have been lobbied for and instigated key activities in the innovation system. With this assumption, I am very well aware that the EU programmes, initiatives and funds are not the only trigger of development in the innovation system of Brainport, and that there are multiple other resources that can be lobbied for in the region. Also, I am very well aware that there are other key activities taking place in the region,

that can also contribute to the development of the innovation system of Brainport. But in order to reach the main goal of this research and to investigate the contribution of the EU programmes, initiatives and funds in the development of Brainport, I will assume that the funds of these programmes and initiatives are the resources that instigate key activities in the region. A second reflection that I would like to make, is the fact that the functional perspective of Hekkert et al. (2007) is not necessarily geographically tied to the region. Hekkert et al. (2007, p. 418) argue that the key activities take place within the framework of an innovation system. Therefore, I will assume that if the innovation system in which the key activities take place is tied to a region, therefore, this perspective can also be applied to a region.

### 3. Conceptual framework and operationalisation

In the previous chapters, I have presented theoretical perspectives on regional innovation systems, reflections on these perspectives, the functional perspective on innovation systems and how these perspectives can be combined. In this chapter, I will present the conceptual framework and the operationalisation of this research.

#### 3.1. Conceptual framework

In this chapter I will present the conceptual framework of this research. This conceptual framework has been creating by combining the functional perspective of Hekkert et al. (2007) to the structural model of regional innovation systems that was presented in chapter 2.3. Figure 3 represents the conceptual framework of this research:

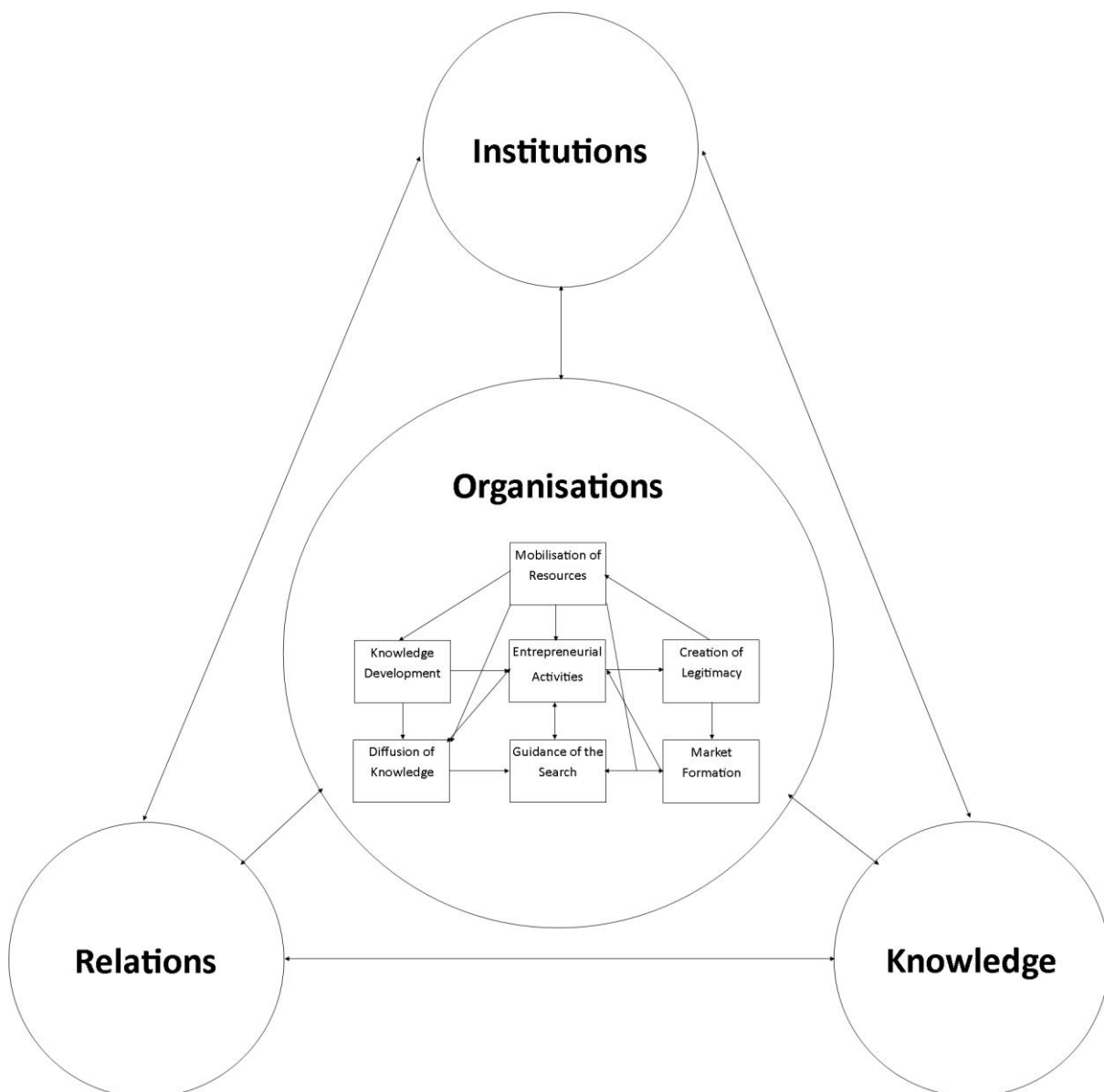


Figure 3: Conceptual model of this research (Source: Author).

This conceptual model attempts to combine the structural elements of the innovation system with the key activities that take place within the innovation system. This is represented by the four structural elements of the innovation system that were defined in the theoretical framework, which are represented by the circles. The seven functions of Hekkert et al. (2007) are placed within the circle of the organisations element, since the organisations are the actors who can execute the key activities of the innovation system. Within the structure of the innovation system, there are multiple relations. For example, organisations can interact with or be influenced by institutions and vice versa. Organisations can cooperate with other actors and therefore form a relation within the innovation system, which can also be influenced by institutions. Organisations can also contribute to the knowledge base of the innovation system, which can also be influenced by institutions. The development of knowledge can be seen as an input for a relation, or a new relation can be seen as a spark that can generate new knowledge.

The key activities that take place within the innovation system follow the reasoning of Hekkert et al. (2007). The mobilisation of resources is put at the top of all the processes, because this will be the starting point of the analysis of this research. Because Hekkert et al. (2007, p. 425) argue that the mobilisation of resources is a necessary input for all activities in the innovation system, this function is connected to all other functions. Hekkert et al. (2007, p. 425) gave special attention to the fact that resources are an important input for knowledge development. According to Hekkert et al. (2007, p. 422), this could lead to entrepreneurial activities or the diffusion of knowledge. When knowledge is diffused, this changes people's attitudes towards knowledge or entrepreneurial activities by raising expectations, which influences the guidance of the search. When entrepreneurial activities are given legitimacy, they can flourish on a newly formed market.

### **3.2. Operationalisation**

In this chapter, I will discuss how I will apply the conceptual framework in this research. Firstly, I will discuss how I will analyse the structure of the innovation system in this research, to be able to answer the first sub-question of this research. Then I will discuss how I will analyse the key activities that lead to the development of the innovation system in this research, to answer the second sub-question of this research. According to Vennix (2011, p. 178-179), the best way to operationalize a theoretical concept like regional innovation systems, is to translate the concept into dimensions and indicators. Using dimensions, that serve as multiple aspects of the theoretical construct, allows the researcher to delineate and explain a theoretical construct in a sharp way (Vennix, 2011, p. 178). These dimensions should then be split up in multiple indicators, that serve as observable variables that refer to the theoretical construct (Vennix, 2011, p. 179). In this research, the regional innovation system and its structures and processes will be operationalised using dimensions and indicators.

### 3.2.1. Operationalisation for sub-question 1

In chapter 2.3. I have discussed the structure of the innovation system and I have identified four key elements from the different perspectives that make up the regional innovation system. These elements were Organisations, Institutions, Relations, and Knowledge. Because these elements are used to describe various aspects of the innovation system, these elements will be used as the dimensions in the operationalisation.

For the element “Organisations”, I will analyse which type of organisations are present in the innovation system of Brainport and what their role in the innovation system is. As types of organisations, Asheim & Isaksen (1997) propose to include firms, and research institutions, and higher education institutions. In Brainport, these firms are multinationals like Philips, DAF or ASML, but also smaller SME’s, start-ups or spin-offs. Braczyk et al. (1998) add the public institutions to these organisations, which can be governments or semi-governments like development organisations. Lastly, I have added the key activities of the organisations as defined by Johnson (2001) and Hekkert et al. (2007), because in this research they are a crucial element of all the activities of these organisations. Because I will focus on the key activities of the innovation system in the answering of sub-question two, the operationalisation of the key activities will be discussed further in chapter 3.2.2.

For the element “Institutions”, I will analyse the formal and informal institutions that influence the innovative activities in Brainport. These informal institutions can be local norms and values or a local culture. The formal institutions are based on rules and laws.

For the element “Relations”, I will analyse the different types of relations and interactions between actors in the innovation system. According to Edquist (2005), these relations can be competition, transactions, or networks. With the indicator networks, I would also like to analyse whether there is a hierarchical or messy structure in the networks of organisations included in the innovation system, to live up to the reflections of Carayannis & Campbell (2009) and Chukhray (2012). To these relations, I will add cooperation between actors as a fourth indicator, for example, the exchange of knowledge or the cooperation in projects.

For the element “Knowledge”, I will analyse the contribution of knowledge to the innovation system in Brainport. I will analyse which types of knowledge are generated in Brainport, and whether it tends to stick in the region or not, as proposed by Asheim & Gertler (2004).

For answering the first sub-question, I will use the following tree diagram in figure 4 as operationalisation:

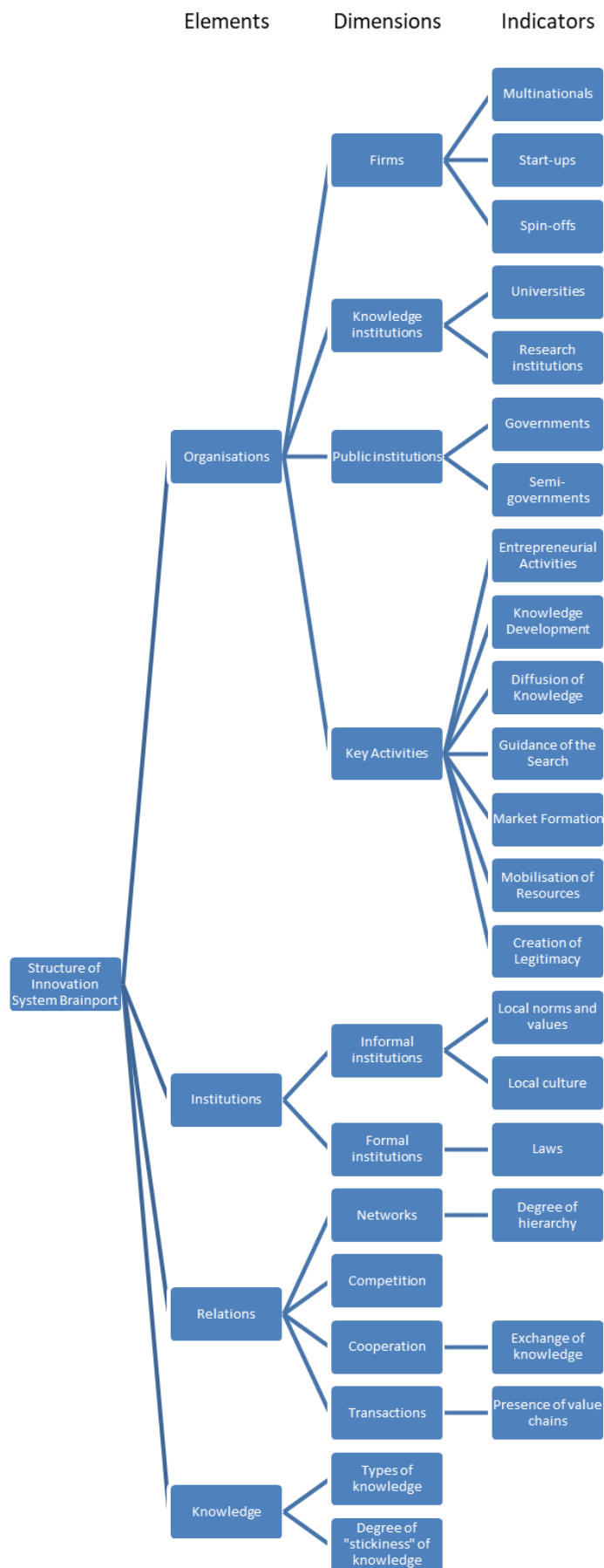


Figure 4: Operationalisation that will be used for answering the first sub-question of this research (Source: Author).

### 3.2.2. Operationalisation for sub-question 2

In this paragraph, I will further operationalise the key activities of organisations. As I discussed in chapter 2.4, I will assume in this research that these key activities are co-financed by programmes and initiatives of the EU. Within these programmes and initiatives, these key activities take place within projects. In the operationalisation for sub-question 2, these projects will be analysed in the framework of the programme or initiative to which they belong. To be able to analyse whether these projects can initiate the development of the regional innovation system, I need to analyse whether these projects contribute to the key activities as defined by Hekkert et al. (2007) in the framework of their respective programme or initiative.

The operationalisation of the key activities in Brainport and the ERDF-programmes can be found in figure 5. In the top row, the OPZuid programme, the Interreg programme, the Horizon2020 programme and the Vanguard Initiative can be found. In the left column, the key activities of the innovation system can be found. By connecting these programmes with the key activities, I will be able to analyse whether projects in these programmes contribute to these key activities in the region, to answer sub-question 2. Then, this analysis allows me to go back to the structure of the innovation system, in order to see whether these key activities have influenced the structure of Brainport's innovation system.

|                               | Projects in the<br>OPZuid<br>programme | Projects in the<br>Interreg<br>programmes | Projects in the<br>Horizon2020<br>programme | Pilot in the<br>Vanguard<br>Initiative |
|-------------------------------|--|---|---|--|
| Entrepreneurial<br>Activities |  |   |   |  |
| Knowledge<br>development      |  |   |   |  |
| Diffusion of<br>knowledge     |  |   |   |  |
| Guidance of<br>the search     |  |   |   |  |
| Market<br>formation           |  |   |   |  |
| Mobilisation of<br>resources  |  |   |   |  |
| Creation of<br>legitimacy     |  |   |   |  |

Figure 5: Operationalisation of sub-question 2, with a connection of the perspective of Hekkert et al. (2007) with the European programmes and the Vanguard Initiative (Source: Author).

## 4. Methodology

*“Scientia potential est”* (knowledge is power) is a well-known phrase of Sir Francis Bacon (1597), with which he tried to explain that having and sharing knowledge seems to be the basis of improving one’s reputation, influence and power. I perceive this phrase as an important way of using knowledge in practice. For example, when a government aims to improve a situation with policies or legislation, like unemployment in a certain region, the government will not randomly spend money. More likely, the government will conduct a research to obtain knowledge of the local situation. This knowledge will give the government the power to intervene in the situation with the right policy measures or laws.

### 4.1. Research strategy

The research strategy that will be used in this research is the case study. Vennix (2011, p. 103) describes a case study as a research about contemporary phenomena, which has borders and that uses multiple forms of empirical evidence to formulate conclusions. According to Yin (1989), a case study is very useful under certain conditions:

- When the main question is focused on getting to know why or how something is the way it is
- When the researcher has little control over the research situation

The main question of this research steers this research to get to know how the EU development programmes, initiatives and funds have influenced the development of the innovation system of Brainport. This resonates the first condition of Yin (1989) because the main question aims to gain knowledge on how the EU development programmes, initiatives and funds contributed to the development of Brainport, thus it is focused on getting to know how something is. The second condition of Yin (1989) is relevant for the decision to take a case study as the main strategy for this research, because the researcher has no control over what happens in the research situation. Thirdly, because this research will focus specifically on the case of Brainport, I have chosen for a case study as the optimal research strategy for this paper. But what will this case study look like? Swanborn (1996, p. 22) describes six characteristics of a case study:



*“A case study is the study of a social phenomenon,*

- With one or multiple owners of the phenomenon: people, groups, interacting people and groups*
- In its natural habitat*
- In a fixed period, in which on several moments measurements are being done, or afterward when information about the developments in that period is being collected*
- In which multiple data sources are being used, like documents, interviews, and observations*
- In which the researcher is focused on a detailed description of stability and the change in numerous variables in order to discover the clarification of processes*
- In which these descriptions and clarifications are being tested”.*

Now I will discuss how Swanborn’s characteristics (1996, p. 22) will be applied in the design of this research. This research will look at only one region, Brainport, which owns the phenomenon of their innovation system and the projects which are co-funded by the EU programmes and initiatives. This research will look at this phenomenon in its natural habitat because interviews will be done in Brainport. The fixed period of this research is the period from 2007 until 2017, as mentioned in chapter 1.3. Furthermore, multiple data sources will be used: project data of development projects that take place within Brainport and interviews with different stakeholders in Brainport, like development organisations, project managers, the university, and SME’s. This is done to give a detailed description of how the EU programmes, initiatives and funds have contributed to the development of the innovation system of Brainport, which will be tested by evaluating, comparing and reflecting on the instigated developments, to give a theoretical input for the debate on innovation systems.

The case that will be studied in this research will be the innovation system of Brainport. But why this specific case and not another case? The first reason to choose the case of Brainport was the scale of this research. In the given amount of time available for this research, it was impossible to do a research on all regional innovation systems in the Netherlands. Brainport is often used as a best-practice case when it comes to innovation systems in Europe and this has invoked a curiosity in me to research Brainport (Brainport Network, 2012). Showcasing Brainport as a best-practice case implies that Brainport has some unique elements, from which regions in Europe could learn lessons. I am very interested to learn what these unique elements are, and how they can be further developed with the help of EU co-financed projects. The second reason to choose Brainport as the case for this research is the fact that Brainport is already a well-established innovation system in the Netherlands. With many developments going on in the region, this means that there is a well-established amount

of literature available about the development of Brainport on which this research can build. Furthermore, there are many EU co-financed projects that have taken place within the region, or are currently running. This gives this research an even stronger research base to build on. The last reason why I have chosen to research Brainport as the case in this research is the fact that living close to Brainport gives me a logistic advantage in executing this research.

Although the case study is the most suitable research strategy for the research of this thesis, there is no research strategy without disadvantages. According to Vennix (2011, p. 105-106), an important problem in the case studies is the problem of bias. Dising (1972) distinguishes two different types of bias: observer bias and participant bias. Observer bias relates to the fact that a researcher always makes a selection in his observations and descriptions from his own perspective. Participant bias relates to the fact that the participation of a researcher in a “natural setting” influences this setting as well (Vennix, 2011, p. 206). In this research, I perceive the participant bias as limited. The reason for this can be found in one of Yin’s (1989) conditions for a case study, that a researcher should not have too much control of the research situation. I will not contribute to the development of the innovation system of Brainport, nor contribute to the key activities in innovation system in a project myself. Only the fact that I will be present in the innovation system, and respondents could, therefore, give socially desired answers, could lead to participant bias. Despite the rather low participant bias in this research, the observer bias could be a very relevant problem in this research. According to Vennix (2011, p. 206), a good way to overcome observer bias is to combine multiple research methods, thus triangulating the data. Therefore, I will use desk research as a research strategy in this research alongside the research methods. I will use already existing reports and other secondary data that contain information about the projects in Brainport, in order to obtain a better understanding of the innovation system of Brainport and the projects that take place or have taken place that were funded by the EU programmes, initiatives and funds

## **4.2. Research approach**

The approach of this research will be of a qualitative character rather than a quantitative character. I have opted for a qualitative approach because a qualitative approach allows me to reach the goal of this research in a better way.

According to Vennix (2011, p. 98), the fundamental difference between quantitative and qualitative research is the fact that qualitative research is characterised by the development of a theoretical framework, which can be further developed by reflection and researched in an interpretative analysis. Because the main goal of this research is to provide inputs on the theoretical debate on the development of innovation systems by looking at the case of how Brainport is developed by ESI

Funds, a qualitative research approach is very well suitable for this research to reach its main goal. Because of the previous two reasons, I will use a qualitative research approach in the case study of this paper. Furthermore, I will use a qualitative approach instead of a quantitative approach because the research goal steers me to research the development of a particular case. Whereas a quantitative approach in the form of experiments or surveys looks at a situation of a certain case at a specific time, a case study, which is often used in a qualitative research approach, allows the researcher to analyse the development of a certain case over a specific amount of time (Vennix, 2011, p. 73). Because the research goal steers me to analyse the contribution of EU programmes, initiatives and funds on Brainport, I will use a qualitative research approach in this paper.

Although qualitative research is the most useful approach for this research, Miller (2012) has identified some important ethical concerns about qualitative methods that need to be reflected on. The first ethical concern of Miller (2012, p. 34) is about what the researcher is allowed to use as data. In her research, Miller (2012, p. 34-35) used interviews as the method of data collection. To arrange these interviews, she made numerous phone calls and she sent multiple emails. The information of the phone calls and emails was very relevant for the research, but because it fell outside of the data collection method, she was not allowed to use this data in her research. The lesson I will take from Miller (2012) is that I will ask my respondents permission of what data I am allowed to use, especially concerning information that is given before and after the interview.

A second ethical concern of Miller (2012) is the relationship between the researcher and the interviewee. Miller (2012, p. 36) refers to the fact that the interview should not harm the interviewee or leave him/her to a risk. This concern has implications for the procedures and the confidentiality of interviews. The lesson I will learn from this concern is that I will clearly ask the respondents if I am allowed to record the interview with my mobile phone for the transcribing and the analysis of the interview. Because everything that is recorded will be used as data, this might lead to the fact that the interviewees might pick their words more carefully in order not to harm their position. Furthermore, I will send the interview guide to the respondents before the interview, so they can prepare themselves. I will inform the respondents that if there are questions that they do not want to discuss, they should inform me. To ensure confidentiality, and to prevent harming the respondents, I will refer to the interviewees not by name but by their position. Furthermore, I will explain to the respondents that I will try to make sure that they are able to recognize themselves in how I analyzed the data. I will, therefore, execute member checks to see whether the respondents agree with the way their information is used in this research, and whether I did not use information which I was not allowed to use.

Before I will further explain which methods are used in this thesis and discuss why I have chosen these methods, I would like to reflect on the philosophical assumptions that will come along with the choice for qualitative research methods in this research. According to Cresswell & Poth (2017, p. 19), a researcher can take different philosophical stances in qualitative research, which direct and influence the study, like the researcher's view of reality (ontology), and how the researcher knows reality (epistemology).

Ontologically, qualitative research requires that assumptions have to be made relating to the nature of reality and its characteristics, because researchers embrace multiple ideas as reality. However, different researchers embrace different realities. In this research, this issue will be met by reporting on a certain topic different perspectives (Cresswell & Poth, 2017, p. 20). By addressing a topic from multiple points of view, a better understanding of a topic can be realised. In this research, there will therefore be more perspectives on each element of the innovation system and each key activity in a European programme or initiative, wherever possible.

Epistemology, qualitative research requires that assumptions have to be made relating to the fact that because researchers try to get as close to the participants as possible, the subjective evidence is based on individual views of the participants. Therefore, the knowledge that is generated, is based on the subjective experiences of people (Cresswell & Poth, 2017, p. 21). This implies that the choice to conduct a qualitative research in this study automatically places this thesis in the interpretative framework of social constructivism. Social constructivism, or interpretivism, is an interpretative framework in which individuals seek to understand the world in which they live and work (Cresswell & Poth, 2017, p. 24). According to Cresswell & Poth (2017, p. 24), these individuals develop varied subjective meanings of their own experiences towards certain objects or phenomena. Therefore, the research will rely on the participant's views of a specific situation. In order to fully understand the subjective experiences of people, Cresswell & Poth (2017, p. 21) argue that it is best to conduct studies in the field where the participants work and try to minimize the distance between himself and the participant. In this research, I will aim to do this by doing face-to-face interviews on location with the participants, rather than telephone interviews or interviews via Skype.

### 4.3. Research methods: Interviews and desk research

In this research, the main method of data collection will be interviewing. I have chosen for interviews as the main research method, because interviews allow the researcher to deeply research a specific topic. Therefore, this will be a very useful method to research how the projects of EU programmes and initiatives have contributed to the development of Brainport. Patton (1980) distinguishes four different types of interviews that can be applied in a research, along to their degree of structuration. The least structured method of interviewing is the informal conversational interview, in which the questions asked are not structured beforehand but are asked in the interview in a spontaneous way. A bit more structured is the semi-structured interview, a method of interviewing that uses an interview guide that serves as a list of topics that will be discussed in the interview. The standardized open-ended interview method has even more structure because the formulation and sequence of the questions are structured before the interview, but the answers are open without structured categories of answers. The most structured type of interviewing is the closed fixed field response interview, in which the interviewee needs to give an answer from pre-selected categories of answers (Patton, 1980; Vennix, 2011, p. 253).

The interviews that I will do at least need to have a certain structure, because in an unstructured interview like the informal conversational interview, it will be very difficult for the interviewer to ask the right questions. This makes reaching the main goal of this research and the ability to answer the main question very difficult. On the other hand, too much structure like in the closed fixed field response interview does not allow the respondent any freedom in his answers, which leads to the fact that the interview starts to look more like a survey. Furthermore, if the respondent is allowed only to choose from fixed answering categories which are drafted by the researcher, it is possible that the researcher forgets or omits a specific answering category, leading to false research conclusions. These reflections limit the choice of interviewing method for this research to the semi-structured interview and the standardized open-ended interview. The method of choice for this research is the semi-structured interview because this method allows the respondent to answer freely. In case the respondent wants to talk about another topic that will come later in the interview, it is possible to discuss that, and to slightly change the structure of the interview. In the standardized open-ended interview, this would be impossible because of the fixed structure. Furthermore, the semi-structured interview allows me to discuss certain topics, i.e. the indicators of the operationalization, with the help of an interview guide and ask new questions around that topic if a new question pops up. In the standardized open-ended interview, the fixed structure would not provide room for additional questions. Therefore, the interview method of choice that will be applied in this research will be the semi-structured interview.

One thing that must always be kept in mind during interviews is that a respondent answers from his own perspective. This imposes some concerns to the validity and trustworthiness of using interviews to obtain data for this research. To obtain the highest level of validity and trustworthiness in interview data, Vennix (2011, p. 257) proposes that the interviewer should repeat the responses of the interviewee in his own words every now and then. By asking: "So, do you actually try to say...", or "Do I understand you correctly when I say that...", or alternative questions, the interviewee can indicate whether he or she agrees with the interpretation of the interviewer. Therefore, this serves as a validity check of the information and it helps the interviewer to remain as neutrally as possible (Vennix, 2011, p. 257). To achieve the maximum level of validity and reliability, these information checks as proposed by Vennix (2011, p. 257) will be executed during the interviews.

Now, I will discuss how I have selected the respondents for the interviews. Because the two sub-questions divide this research in two analytical parts, I need to make sure that I have a representative selection of respondents for both parts of this research. But when the respondents would be categorized in the operationalization, they would all belong to the element organisations, because all respondents are active in organizations. Therefore, I will need to find respondents from these organisations who have experience and substantial knowledge about the institutions, relations and knowledge in the innovation system. Furthermore, I need to make sure that I have enough respondents who participate in EU co-financed projects, in order to answer sub-question 2. In the process of contacting the respondents, I need to be aware that some first-choice respondent could not be able to do an interview with me, because they do not have time for an interview. While conducting the interviews, this could lead to the fact that I will not be able to receive all the information I want because the respondents might not have as much experience with a certain topic as my first-choice respondents. This is something I will need to pay attention to during the interviews, and I will need to make sure to triangulate the information of which respondents are not sure with other data, in order to make valid conclusions. In total, I have interviewed 13 respondents. All of these respondents belonged to an organization, but when selecting the respondents, I ensured that the respondents had at least one extra field of expertise about which I could ask questions. For more information on the respondents, their background, and the reasons for interviewing these respondents, I would like to refer to Annex 1. To give a clear overview of the respondents that I have consulted in this research, I have chosen to categorize them in the category for which I primarily decided to interview them<sup>1</sup>. The list of respondents that I have interviewed in this research is as follows:

---

<sup>1</sup> Respondents with an asterisk (\*) behind their function could be categorized in more than one category:.

- Actor for firms:
  - Business Development Manager at Philips Innovation Services (PIInS) (10 May 2017)
- Actors for knowledge institutions:
  - Head of Innovation Strategy and Partnerships at TU/e Innovation Lab (8 May 2017)
  - Communications Manager at Holst Centre\* (11 May 2017)
- Actors for public institutions:
  - Programme manager at Stimulus\* (17 May 2017)
  - Process manager Economic Strategy at Eindhoven Metropolitan Region (MRE) (18 May 2017)
- Actors for OPZuid-projects:
  - Lead Partner Smart Systems (26 April 2017)
  - Project leader Kennisvragenbanken\* (4 May 2017)
  - Project initiator Printed Electronics\* (8 May 2017)
  - Leader of Photon Delta Office (Project Photon Delta) (11 May 2017)
- Actors for Interreg projects:
  - Programme Director Clusters at Brainport Development\* (Projects ERMIS, EURIS, S34Growth, Inno Infra Share) (4 May 2017)
  - Manager New Business at Twice Eindhoven (Project Link2Innovate) (19 May 2017)
- Actor for Horizon2020 projects:
  - Project leader Fetal Monitoring (19 May 2017)
- Actor for the Vanguard Initiative:
  - Strategic Policy Advisor at Helmond municipality\* (4 May 2017)

During the interviews, I have asked the respondents questions about both the structural elements of the innovation system as well as the key activities of the innovation system. These questions were categorized in the four elements of that can be found in the operationalization. In order to ensure that the information I would receive was as valid as possible, I have decided to ask respondents whose expertise is mostly on the structural side of the Brainport innovation system more questions about the structural side, and to ask respondents who were active in projects more questions on the processes and activities of the project. In Annex 2, more information on who I asked which question can be found in the interview guides.

After the conducting of the interviews, the recorded transcripts will be transcribed and coded, to find patterns in the responses of the interviewees (Vennix, 2011, p. 265). The “codes” that will be used in this phase of data interpretation will be the indicators from the operationalization model and the theoretical framework. Despite the fact that coding is the easiest way to make the rough data

interpretable and suitable for the analysis, Vennix (2011, p. 268) warns for a very dangerous pitfall in the coding process. Vennix (2011, p. 268) and Mero-Jaffe (2011, p. 233) argue that in the process of discovering the interpretations of the interviewees the interpretations of the researcher will implicitly be added to the data. To overcome this problem, Vennix (2011, p. 268) proposes the execution of member checks, in which the interviewees are asked if they agree with the interpretations of the researcher. Mero-Jaffe (2011) proposes to send the transcripts to each respondent and ask for a written approval of these transcripts, to overcome this problem as mentioned earlier. In this research, I will execute these member checks after the writing of this thesis by sending the transcripts and the chapters in which I use data from a respondent to that person and ask for a written approval, so the respondent can check whether he/she agrees with the text.

Apart from interviewing, I will use desk research as a second research method. I have opted to do a desk research next to the interviews, because a desk research allows me to check the information that the respondents have given, especially if respondents are not too sure about certain answers they give. The data of the desk research will primarily consist of specific data of the projects which is provided by the programme websites<sup>2</sup>. The data of the desk research will be used to combine with the information of the respondents. This method of reasoning, in which a conclusion is formed on the basis of general premises is called deduction (Vennix, 2011, p. 45). Deductive reasoning allows the researcher to draw a conclusion on the basis of two premises. This is what will be done in the desk research part of this thesis as well. The first premise will be derived from information that the respondents have given during the interviews. The second premise will be derived from the information about projects obtained during the desk research. On the basis of those two premises, valid conclusions can be drawn. By combining interviews with desk research, and thus performing data triangulation I aim to maximize the research validity and trustworthiness of this research.

#### **4.4. Research validity and trustworthiness**

With the selection of the research approach, I would like to discuss the validity and trustworthiness of qualitative research. Vennix (2011, p. 184-185) distinguishes two different types of validity: content validity and construct validity.

Vennix (2011, p. 184) defines content validity as for whether the research instruments that will be used are capable of measuring what the researcher wants to measure. To make sure that the content validity is as high as possible, it is necessary to make a very detailed operationalization in which

---

<sup>2</sup> Website for the OPZuid programme: [www.stimulus.nl/opzuid/](http://www.stimulus.nl/opzuid/); Website for the Interreg Flanders-Netherlands programme: [www.grensregio.eu](http://www.grensregio.eu/); Website for the Interreg North-West Europe programme: [www.nweurope.eu](http://www.nweurope.eu/); Website for the Interreg Europe programme: [www.interregeurope.eu](http://www.interregeurope.eu/); Website for the Horizon2020 programme projects: [http://cordis.europa.eu/projects/home\\_en.html](http://cordis.europa.eu/projects/home_en.html); Website for the Vanguard Initiative: <http://www.s3vanguardinitiative.eu/>.



theoretical constructs are defined into measuring instruments. I have aimed to maximize the content validity of this research in the previous chapter by translating the theoretical concept of the regional innovation system into four elements of the operationalisation (organisations, institutions, relations and knowledge), dimensions and indicators that can measure these elements.

Construct validity is defined as the way how a certain concept is connected to other concepts (Vennix, 2011, p. 185). According to Vennix (2011, p. 185), the construct validity can only be ensured after the measuring instrument is used. In this research, the construct validity of this research concerns how the theoretical perspectives on regional innovation systems and the way how they are connected to each other. To maximize the construct validity of this research, I have discussed and reflected on how these theoretical perspectives are connected to each other in the operationalisation. Because it is only possible to determine the construct validity after the use of the operationalization, I will make sure to investigate each possible aspect of the different perspectives on innovation systems.

Finally, I would like to discuss the trustworthiness of this research. According to Vennix (2011, p. 186), a trustworthy research is a research in which the measurements are stable. This means that if the measurements were to be repeated, they would have to give the same result as the first time. In qualitative research, ensuring trustworthiness is tricky, especially when abstract concepts are measured, like innovation systems in this research (Vennix, 2011, p. 186-187). One measure Vennix (2011, p. 187) applies to increase the trustworthiness of qualitative research, is to ask multiple questions in order to reconstruct all facets of the abstract concept to be measured. In this research, I will apply this with the help of the operationalization of the concept innovation system. Instead of asking what respondents think the innovation system looks like, I will ask them questions about aspects of the innovation system in which the respondent is specialized. Furthermore, if I would interview an expert on a certain element of the development of Brainport's innovation system, I will also ask other respondents about this development, to ensure that I have multiple perspectives on that element of the development. If I would not do that, I would only have the opinion of the expert as the data, which could make the data a bit skewed, because the data would consist of only one perspective. With asking multiple questions about all themes to each respondent, I aim to maximize the trustworthiness of this research.

## 5. Case Description: Brainport

*“Brainport can mean many different things. We call it a region, as well as a way of cooperating, as well as a brand. We are talking about the region of Eindhoven and 20 surrounding municipalities with 750.000 inhabitants. A region that has a very special economic structure with many high-tech production companies, large multinationals like the famous Philips, ASML, NXP, DAF. And very importantly, there is a large quantity of high-quality suppliers located around these companies in a well-established network”*

This quote from the Programme Director Clusters at Brainport Development (personal communication, 4 May 2017) gives a short introduction to the Brainport region. In this chapter, I will present Brainport as the case which will be discussed in this research, to meet the critiques on regional innovation systems by Doloreux & Parto (2004). References to “the region” from now on, should be interpreted as the Brainport

region, as defined by the Programme Director Clusters at Brainport Development (personal communication, 4 May 2017) above. In this chapter, I will discuss the structure of the innovation system of Brainport, with the roles of the organisations, relations, institutions and knowledge in the development of the innovation system, in order to answer the first sub-question of this research.



Figure 6: Location of Brainport in the Netherlands (Brainport, 2017).

### 5.1. Organisations

In this chapter, I will discuss the roles of firms, knowledge institutions and governments and their activities in the innovation system. Because this chapter focuses more on the presentation of the case study and the answering of the first sub-question, I will focus in this chapter on the roles of firms, knowledge institutions and governments. In chapter 6, I will devote more attention to the key activities of these organisations, in order to discuss the second sub-question of this research.

Firstly, I would like to take some space to present the foundation that has given the name to the Brainport region: the Brainport Foundation. The Brainport Foundation is a cooperation between firms, knowledge institutions, and governments from the region that drafts the strategic agenda for the economic development of the Brainport region (Programme Director Clusters at Brainport Development, personal communication, 4 May 2017). The Brainport Foundation consists of 15 members, with five members from governmental organisations, for example, the mayor of the city of Eindhoven, five members from knowledge institutions, for example, the chairman of the Executive Board of Eindhoven University of Technology (TU/e), and five members from firms, for example the

CEO of Philips Benelux. With the strategic agenda for the region, the Brainport Foundation directs its development company Brainport Development which has to execute projects, programmes, regional branding, and lobbying, in the region together with regional partners to achieve the goals of the strategic agenda. (Programme Director Clusters at Brainport Development, personal communication, 4 May 2017).

#### 5.1.1. Firms

Before the 1990's, the two biggest employers in the region surrounding the city of Eindhoven were automotive company DAF and high-tech company Philips. These two firms formed the backbone of the regional economy, and still are very important players today. In the past, at least a quarter of the population of the city of Eindhoven worked for Philips, being the largest employer in the region for decades. This has had a big impact on the city, as the Business Development Manager at PInS explains (personal communication, 10 May 2017):

*"In the past, there was a Philips Relaxation Centre and the football club PSV Eindhoven was founded by Philips. Philips always presented itself as an employer that cared for its employees. There were Philips doctors, a Philips medical centre, and even in hard times of economic crises, there were Philips soup kitchens where people could get their food at Philips ... We left a significant mark on the region, and that is still noticeable".*

Although Philips used to develop all sorts of technical products and technical applications, starting with light bulbs, Philips has decided to reorganise itself by disposing many company branches like Philips Lighting, and to focus solely on the healthcare sector. According to the Business Development Manager at PInS (personal communication, 10 May 2017), this choice has been made, because innovations in the healthcare sector cost so much effort, money, and personnel, that keeping the other company branches and delivering the same quality and reliability in its products would cost too much for Philips. Despite this shift of focus to the medical sector, Philips has made a huge impact on the development of the high-tech sector in the region of Eindhoven in the past by delivering a lot of spin-offs, some of which have grown to multinationals:

*"If you would write down the companies that are located nearby, a lot of them would come out of the sleeve of Philips, like VDL, FEI, Thermo-Fischer, and ASML. ... Therefore, I believe that Philips definitely was at the source of the development of this region, although developing the region is not our job".* (Business Development Manager at PInS, personal communication, 10 May 2017).

Apart from multinationals, there are many SME's in the region. Many of these SME's develop components or additions for systems and products of the large multinationals in the region like Philips and ASML. Although the city of Eindhoven is the centre of these SME's, with access to primary locations like the High-tech Campus and the TU/e Science Park, the innovative companies and SME's in Brainport are spread out across the entire region, as figure 8 shows:

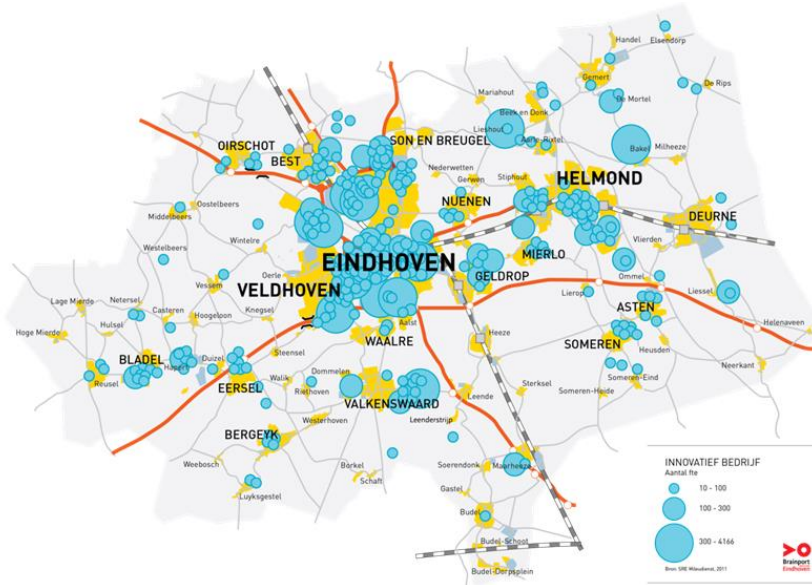


Figure 7: Innovative companies in Brainport (Brainport, n.d.3).

Furthermore, the region is home to many start-ups. These start-ups can use many services of the innovation system to help accelerate their business. For example, HighTechXL, one of the biggest start-up accelerators in the region offers start-ups a personal acceleration manager, workshops, product development support, legal, and financial support and access to funds (HighTechXL, n.d.). Also PlnS offers support to external start-ups by providing expertise, advice and development orders (Business Development Manager at PlnS, personal communication, 10 May 2017). Another company that supports young fast-growing tech companies in the region is Twice, that offers tailor-made and cheap accommodation with special ICT-equipment, laboratories, cleanrooms, etc. (Manager New Business at Twice Eindhoven, personal communication, 19 May 2017).

### 5.1.2. Knowledge Institutions

In the Brainport region, there are various knowledge institutions that are connected to the Brainport ecosystem. The first knowledge institution that I would like to discuss, has a central role in the Brainport ecosystem: the Eindhoven University of Technology (TU/e). Together with Summa college and Fontys University of Applied Sciences, the TU/e fulfills three key roles in the Brainport ecosystem: the provision of education, the execution of research, and the valorization of knowledge. At the TU/e, the different departments like Mechanical Engineering, Biomedical Engineering, and Chemistry cooperate with each other through different Areas, Centres, and Institutes on specific

research fields. Furthermore, the TU/e also offers many services to boost innovations. For example, the TU/e is home to many facilities such as nano laboratories, special ICT-services, cleanrooms, and has its own innovation support office in the form of the TU/e Innovation Lab, an innovation support office that supports in business development, research support, and entrepreneurship (Project leader Kennisvragenbanken, personal communication, 4 May 2017; Head of Innovation Strategy and Partnerships at TU/e Innovation Lab, personal communication, 8 May 2017).

Apart from educational institutions, Brainport is also home to several research institutions, like Holst Centre. Holst Centre, founded by Dutch research institute TNO and Flemish research institute IMEC, is a research institute that focuses on doing research in the fields of flexible electronics and wireless sensors. By bringing together groups of machine builders, end producers, and suppliers on the basis of research results, Holst Centre aims to cooperate on new technologies in order to make prototypes and bring new technologies to the market. Holst Centre aims to work in an open innovation setting to achieve this, but also facilitates dedicated research trajectories with individual companies to further develop a technology for specific applications. Holst Centre offers different facilities like expertise and facilities, such as laboratories and cleanrooms. Furthermore, Holst Centre has a vast network of many big industrial partners, like Panasonic and Samsung, and aims to match local companies with these bigger industrial players. Therefore, the Holst Centre is often used as a best practice showcase of how local and international cooperation can take place within Brainport (Communications Manager at Holst Centre, personal communication, 11 May 2017).

### **5.1.3. Governments**

In the 1990s, an economic crisis struck the Brainport region. DAF went almost bankrupt in 1993, and Philips underwent a massive reorganization by outsourcing most of the production to other countries (Brainport, n.d.2). Because the region used to be very dependent on these two companies, the crisis at Philips and DAF in the 1990s urged the the municipality of Eindhoven and its surrounding municipalities to cooperate more. Therefore, the 21 municipalities founded the Cooperative Union for the Region of Eindhoven, which later developed into the Eindhoven Metropolitan Region (MRE). Within the MRE, the 21 municipalities cooperate on the fields of economy, mobility, and spatial development. The MRE is a network organisation and facilitates the implementation of the Brainport agenda by drafting spatial strategies, creating regional discussion platforms in the form of workplaces, ensuring an attractive business climate, and by putting economic challenges and themes from the municipalities on the regional agenda (Process Manager Economic Strategy at MRE, personal communication, 18 May 2017).

Apart from the MRE, the 21 municipalities also founded the Stimulus programme in the 1990s as their answer to the economic crisis. When European subsidies became available in the Brainport region after the reorganisation at Philips, Stimulus was founded to ensure the management of these funds, which would help to build up the foundations of Brainport. Throughout the years, Stimulus transformed from a regional organisation to an executive organisation of the province of North-Brabant, that is in charge of executing the OPZuid programme for the provinces of Zeeland, North-Brabant, and Limburg, amongst other subsidy programmes (Programme Manager at Stimulus, personal communication, 17 May 2017). Another executive organisation and semi-governmental organisation of the province of North-Brabant is the Brabant Development Agency (Brabantse Ontwikkelings Maatschappij, BOM). Although not specifically focused on Brainport, but on the entire province of North-Brabant in which Brainport is located, the BOM aims to support start-ups and companies from North-Brabant in their development on the fields of capital, knowledge, market, and talent, to stimulate the economy of the province. In this role, the project initiator of Printed Electronics (personal communication, 8 May 2017) sees the BOM as a natural cooperation partner of Brainport Development:

*“On some topics, they work a bit more specific than we do. They just published the Brainport Industry Agenda, in which some parts have been given more focus than indicated by the province. On the other hand, my colleague has been very busy in developing the Brainport Industries Campus. ... So we are present in the region, and I regularly visit my colleagues of Brainport Development, and in projects like these, we join the table together”.*

The final governmental layer that is involved in the development of Brainport is the Dutch State. In the past, former minister of Economic Affairs Van der Hoeven commissioned the region to draft an agenda for regional economic development that focused on the entire south of the Netherlands, rather than solely the Brainport region, which became the Brainport2020 Agenda (Programme Director Clusters at Brainport Development, personal communication, 4 May 2017; Process Manager Economic Strategy at MRE, personal communication, 18 May 2017). In 2017, the Dutch State gave the Brainport Region the status of becoming the country’s third mainport, just like the regions of Amsterdam and Rotterdam. With this recognition, the Brainport Foundation offered the Brainport Action Agenda to the State. With this Action Agenda, Brainport hopes to receive more recognition from the State and means to further develop the regional innovation ecosystem (Strategic Policy Advisor at Helmond Municipality, personal communication, 4 May 2017).

## 5.2. Relations

In the innovation ecosystem of Brainport, there are many different types of relations between organisations. The network of Brainport can be seen from two perspectives: top-down and bottom-up. From a top-down perspective, the most important network of Brainport is the triple helix network of the Brainport Foundation. As mentioned in chapter 5.1, the Brainport Foundation consists of 15 members, five from governmental organisations, five from knowledge institutions, and five from the business world, who jointly draft the strategic economic development agenda for the Brainport region. To keep this triple helix cooperation running, the executive organization of the Brainport Foundation, Brainport Development spends a lot of effort to maintain the triple helix cooperation and to show its added value:

*“Back in the 1990s, the urgency to cooperate was very present and then it also proved itself. But one can notice that in the course of the years, managers swap functions, new persons take place in the Brainport Foundation, ... therefore, it costs a lot of maintenance. We continuously have to show the added value of the cooperation”. (Programme Director Clusters at Brainport Development, personal communication, 4 May 2017).*

From a bottom-up perspective, there are many smaller networks within the region, which are organized into various sectors. There are branch organisations in the field of High-tech, like High-tech NL, Photonics, and many more. Also, clusters organisations are present in the region. An example of such an organization is DSP Valley. DSP Valley, a cluster organization in the domain of smart electronic systems, is a network of technology companies in Belgium and the Netherlands. Companies and research organisations can decide to join this network as a member, which aims to connect the different organisations with each other to cooperate on a specific innovation product. An example of the functioning of this network is given by the lead partner of Smart Systems (personal communication, 26 April 2017):

*“A couple of years ago, Cochlear company was looking for new low power electronics technologies to apply in their new generation of hearing aid products. ... We have spread out the question of Cochlear in our network, ... and eventually, a dozen companies and research institutes applied and are still cooperating very actively with Cochlear European Development Centre in Belgium to develop new products. This has resulted in better energy efficiency of Cochlear hearing implants, a couple of years ago”.*

Within the vast network of Brainport, competition between companies is inevitable, especially between companies in the supplying industry. Also within technology clusters like DSP Valley, members of the same network can be competitors of each other (Lead Partner Smart Systems, personal communication, 26 April 2017). However, the interactions between organisations within the innovation ecosystem are more based on transactions, rather than on competition. As mentioned in chapter 5.1.1., companies like Philips and ASML are hugely dependent on their suppliers. As figure 9 shows, around 70% of the first-tier suppliers of companies like Philips and ASML, are located within a radius of 40 kilometers away from the city of Eindhoven (Process Manager Economic Strategy at MRE, personal communication, 18 May 2017). Because so many suppliers of companies like Philips and ASML are located in the region, the firmness of cooperation in value chains is very strong and there is a huge mutual interdependency between companies (Strategic Policy Advisor at Helmond Municipality, personal communication, 4 May 2017):

*“Actually, ASML and Philips are system integrators. They produce systems and machines, but in order to do so, they need a lot of components and additions from the region. ... We have numerous amounts of companies operating in that supplying industry. Those are companies that consist of 200-300 employees. ... So, around 71% of the first tier suppliers are located in the direct region, and because of that, companies like Philips, DAF and ASML are hugely important for the region ..., because every euro that is earned by ASML partly trickles down into the region”* (Process Manager Economic Strategy at MRE, personal communication, 18 May 2017).

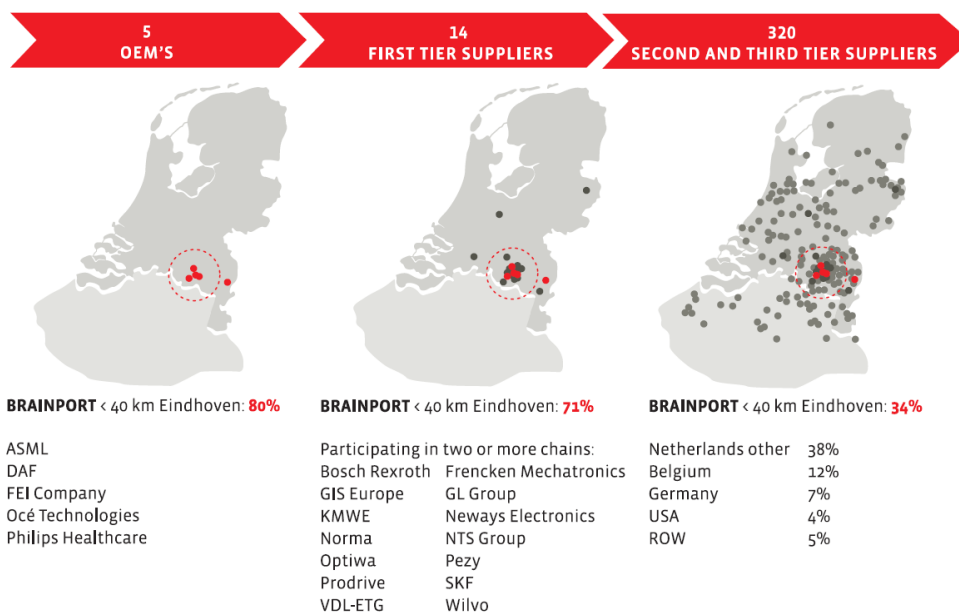


Figure 8: Presence of suppliers in the Brainport region (Brainport, n.d.3).



Apart from transactions, there is also a lot of cooperation in innovative projects going on in Brainport. For example, the TU/e cooperates a lot with SME's in different kinds of projects through its Areas, Centres, and Institutes. The Innovation Lab of the TU/e serves as a supporting organization in this process and advises the Areas, Centres, and Institutes of the TU/e and SME's on what they can offer to each other, who they need to contact, and which university faculties should be approached in the cooperation. Within these projects, much knowledge is exchanged between the project partners:

*"Knowledge spreads through cooperation in projects and then it always comes back to people: people who know each other, people who talk to each other about certain possibilities, certain solutions, or people who talk about problems and what the solutions for that problem might be"* (Head of Innovation Strategy and Partnerships at TU/e Innovation Lab, personal communication, 8 May 2017).

Another example of cooperation is an example from Twice Eindhoven, where small technological companies often complement each other's products:

*"One company develops a sensor, another company develops software, another company develops a product in which that sensor is very well applicable and maybe the software too, so these companies also produce components. We try to match these companies, because there are so many opportunities for cooperation"* (Manager New Business at Twice Eindhoven, personal communication, 19 May 2017).

These quotes show two examples of cooperation within Brainport. Although companies do contact each other directly, it is often the case that the cooperation is organized via an intermediate organisation, like the TU/e Innovation Lab, or Twice Eindhoven in these cases. These intermediate organisations ensure that the company finds the right person or the right company to cooperate with, to be more successful.

### 5.3. Institutions

There are many different institutions that helped with shaping the structure of Brainport's innovation system. Many of these institutions find their origins in the crisis of Philips and DAF in the 1990s. As mentioned earlier, at least a quarter of the population of Eindhoven used to work for Philips in the past. Therefore, in the past, the structure of the region was based on one strategy, the Philips strategy. Philips gave the region a structure of cooperation:

*“There used to be a structure of cooperation with its own vision, its own strategy, its own roadmaps, a common language underneath it and more simple things, like a Philips calendar”. (Head of Innovation Strategy and Partnerships at TU/e Innovation Lab, personal communication, 8 May 2017).*

When the crisis hit the region in the 1990s, the urgency to become less dependent on big companies like Philips and DAF was very high and urged organisations in the region to cooperate. In the 25 years after the crisis, the need for cooperation between different actors has transformed into a regional culture in which cooperation is a central element:

*“I believe that a culture of cooperation has grown here. ... The region used to be very poor in the past, but people have learned that one can become stronger by cooperating, and by not being too dependent on others. And that is rooted very deeply here” (Process Manager Economic Strategy at MRE, personal communication, 18 May 2017).*

The Head of Innovation Strategy and Partnerships at TU/e Innovation Lab (personal communication, 8 May 2017) adds:

*“The faith that talking to other people and sharing your knowledge always leads to added value ..., is felt here as a fact of life”.*

The culture of cooperation and sharing knowledge that emerged within the region was a key to building the Brainport triple helix. But apart from a culture of cooperation, also a shared agenda for the regional economy has developed between the different regional actors:

*“From different perspectives and backgrounds, everybody shares the same economic development agenda, in which everybody aims to achieve the targets of their respective companies. But the layer above is something everybody acknowledges the benefit of, the added value, and the effort of the cooperation” (Strategic Policy Advisor at Helmond Municipality, personal communication, 4 May 2017).*

The crisis in the 1990s did shape the region, regarding informal institutions. Whereas the faith in cooperation from before the crisis was only visible within Philips, the crisis in the 1990s made sure that this institution spread out across the entire region, so the regional economy became less dependent on two large companies. As a result, regional actors still feel the necessity and added value of cooperating with each other in the development of the innovation system. Therefore, cooperation is felt in the region as a natural thing to do, which is also one of the reasons for the success of the Brainport triple helix. Furthermore, the intensive cooperation between actors in the

region has created a huge network of the regional actors, creating an atmosphere in the region in which everybody knows each other.

The informal institutions that have developed in the Brainport region after the crisis have also led to the development of formal institutions within the region that have shaped the structure of Brainport's innovation system. Apart from the laws of the Dutch State, there are local rules of procedure that should keep the innovation ecosystem strong. When DAF and Philips left the region in an economic crisis in the 1990s, this was because these two companies relied on many suppliers from the region. When these two companies were in economic trouble, so were their suppliers, which caused the entire economic system to collapse. A typical example of a formal institution that emerged in Brainport as a result of this crisis can be seen in the rules of procedure of ASML:

*"ASML, who is completely dependent on their supply chain on delivering, says that no supplier is allowed to be dependent for more than 20% of their turnover from ASML. Because ASML works in a highly volatile market, it should not be the case that when ASML suffers from economic downturns, that a supplier ... goes bankrupt due to short-falling turnovers. ... This means that all these suppliers need to look elsewhere for 80% of their turnovers. Well, that is a richness in itself for the ecosystem"* (Strategic Policy Advisor at Helmond Municipality, personal communication, 4 May 2017).

#### 5.4. Knowledge

The universities and knowledge institutions like the TU/e and Holst Centre have a big role in the development and spreading of knowledge in Brainport. For example, Holst Centre starts in a pre-competitive stage with developing scientific knowledge on a certain topic, and turns this knowledge into functional prototypes, combining it with already existing knowledge (Communications Manager at Holst Centre, personal communication, 11 May 2017). Also, the TU/e has seen a shift in the development of knowledge. In the past, the focus was mostly on the development of new scientific knowledge, but in recent years, this focus has shifted towards the application of knowledge and combining fields of knowledge:

*"The TU/e has a lot of knowledge on sensors, and if you look at the problems that the agricultural sector is facing, ... we say that these problems can be solved by using robots and sensors. ... That really is an example of combining existing knowledge, which leads you to a totally new application sector of technologies"* (Head of Innovation Strategy and Partnerships at TU/e Innovation Lab, personal communication, 8 May 2017).

According to the project leader Kennisvragenbanken (personal communication, 4 May 2017), this could be explained by the growing importance of knowledge valorization. She argues that declining incomes force universities to finance their research in another way. This is done through further developing the scientific knowledge and technologies in such a way that they can be applied or sold on the market. Because the knowledge institutions have partnerships that go well beyond the borders of Brainport, the knowledge that is developed in the region does not tend to stick there. The knowledge institutions in the region often participate in international projects, which form a clear-cut subject in which there is international cooperation and knowledge is spread (Communications Manager at Holst Centre, personal communication, 11 May 2017). Also, the knowledge of the TU/e does not tend to stick to the region:

*“Within the projects at the university, the scientists from companies also have their own network. You just have to look at their LinkedIn-profiles, those are networks that go across the globe. Our scientists have international networks, so the knowledge spreads across the world very rapidly”* (Head of Innovation Strategy and Partnerships at TU/e Innovation Lab, personal communication, 8 May 2017).

In Brainport, knowledge is a key element of the triple helix cooperation. Because knowledge institutions and the business world deliberate with each other in the triple helix, the business world can indicate what type of education their workers need. Because of this, educations can be designed in such a way, that the educations match the desires of the business world and alumni can immediately start working, without needing extra education (Project leader Kennisvragenbanken, personal communication, 4 May 2017).

## 6. Key activities in the innovation system of Brainport in projects of EU development programmes and initiatives.

In this chapter, I will discuss the key activities of organisations in the development of the innovation systems, with a focus on the various projects of the OPZuid, Interreg and Horizon2020 programmes and the Vanguard Initiative. Because I will focus on the activities of the projects in this chapter, I will not focus on the general subject of each project. For more general information on each project and the cooperating partners from the region, I would like to refer to Annex 3. Firstly, I will discuss the activities that take place in projects of the OPZuid programme, followed by the Interreg programme and the Horizon2020 programme. Lastly, I will discuss the activities that take place in the Vanguard Initiative.

### 6.1. OPZuid Projects

From 2007 until now, many different projects have taken place in the OPZuid programme. In this paragraph, I will discuss the contributions of these projects to the different functions of the innovation system.

The first key activity of the innovation system was entrepreneurial activities. Projects from the OPZuid programming period 2007-2013 have given a big contribution to the development of this key activity, since many of the projects have focused on the development of new products. These projects were almost not limited to any thematic delineations. Therefore, there were projects like *HiRes Tracking & Capture System IR* that focused on the development of an advanced high resolution recognizing system for traffic control, a project called *TriNano* that focused on developing a demonstrator that could measure 3D objects with a precision of 20 nanometers, and a project called *Ontwikkeling prototype MTT micro WKK*, that focused on the development of a prototype of a micro turbine (Stimulus Programmamanagement, n.d.3; n.d.10; n.d.4). For the programming period 2014-2020, the operational programme was written on the basis of the RIS3-Zuid Strategy. Therefore, the projects need to have a more thematic focus that is in line with the RIS3-Zuid Strategy. Therefore, the entrepreneurial activities within the projects in the 2014-2020 programming period have shifted more towards developing demonstrator projects with prototypes. For example, the project *Smart Systems* is using demonstrator projects, to show how the internet of things can be put on the market as a solution for different types of problems. The lead partner of Smart Systems (personal communication, 26 April 2017) gives an example of such a demonstrator project:

*“A demonstrator project with one of our members is a vest in which all kinds of sensors are placed, and those sensors measure the movements and the acceleration of movements of your joints, but also the force that is applied on those joints. And that information will be processed in an application, in which you can see whether the exercises you have been given by your physiotherapist are executed well enough, frequently enough and whether these exercises need some corrections”.*

Another project, *Printed Electronics*, also delivers demonstrator projects, to show what can be done with a new technology:

*“We are going to make eight or ten demonstrators, to show what Printed Electronics is. ... You can make sensors that are processed in clothing, so you can measure the heartbeat and respiration of a sportsman while he is just wearing a normal t-shirt. ... You can also develop shoe soles, with which you can see how you roll your feet, to see whether you have a right balance or maybe whether you need to adapt your shoe”* (Project initiator Printed Electronics, personal communication, 8 May 2017).

In the 2007-2013 programming period, there were only some projects that focused on knowledge development. For example, the projects *Slimmer werken bij Natuursteenproductie Asten* and *“Going further” vereist een gedegen productieproces* focus on the development of analyses, to gain insights in the potential for improvement of services. Although other projects that focus on the development of products do generate new knowledge about these products, these projects do not have knowledge development as their primary focus. In the 2014-2020 programming period, this trend is continued. Although projects like *Smart Systems* and *Printed Electronics* develop new knowledge in the process with the demonstrator projects through trial and error in the developing process and the organization of events, developing new knowledge is not the primary focus of these projects. The aim of these projects is more on the development of the eco-system and on the stimulation of innovation (Lead Partner Smart Systems, personal communication, 26 April 2017; Project initiator Printed Electronics, personal communication, 8 May 2017). On the other hand, the projects *Photon Delta* and *OpenPics*, have a bigger focus on the development of new knowledge:

*“Our professor started research back in the 1980s, and our technology centre complements to that research by bringing knowledge on the fields of materials, chips and which machines you need to build”* (Leader of the Photon Delta Office, personal communication, 11 May 2017).

With few projects focusing on knowledge development in the OPZuid programme, there are almost no projects that focus on the diffusion of this knowledge, apart from the project *Brainport Industries* of Brainport Development, that focused on tackling the economic crisis in the region by providing information to companies and by providing them with support. The fact that there are so little projects that focus on the diffusion of knowledge in the 2007-2013 programme, is strengthened by the fact that all projects had only one project partner, the beneficiary, which means that there was no network within the project in which knowledge could be shared. In the 2014-2020 period, this has changed, because within the projects many events will be organized in the knowledge can be spread. Within the *Smart Systems* project, the first major event was on the 8<sup>th</sup> of June 2017:

*“In the afternoon, we organized a complete side track with a couple of interesting lectures ... about everything that internet of things can mean as a field of applications. ... We have a workshop there, we show some of our demonstrator projects on an exhibition”* (Lead Partner Smart Systems, personal communication, 26 April 2017).

Also within the *Photon Delta* project, network events are organized in which knowledge is spread, and in the *Printed Electronics* project, there is a demonstrator event once a year, and a newsletter is spread with facts and figures about printed electronics (Leader of the Photon Delta Office, personal communication, 11 May 2017; Project initiator Printed Electronics, personal communication, 8 May 2017).

With few knowledge being diffused in the 2007-2013 OPZuid programming period, there were also few projects that developed the guidance of the search. In the 2014-2020 programming period, this is rather different. Many projects in the 2014-2020 programming period of OPZuid focus on the building of ecosystems, in which barriers for searching the right partner aim to be removed for cooperation to take place in an easier way. In the project *Smart Systems*, the aim is to create an ecosystem of at least 50 companies that can cooperate in the fields of micro-electronics, nano-electronics and the internet of things application field (Lead Partner Smart Systems, personal communication, 26 April 2017). In the *Photon Delta* project, the Photon Delta Office occupies itself in building an ecosystem in the field of photonics, in which members are allowed to use each other's patents and licences, and in which they can benefit from the research on photonics that is conducted by the technology centre (Leader Photon Delta Office, personal communication, 11 May 2017). Furthermore, the guidance of the search is developed with a project from OPZuid, is done by the project *Kennisvragenbanken*. The project *Kennisvragenbanken* has developed a website where SME's who have a question or a problem in their business case, can leave a question which will be answered by students. In this way, SME's can have their problems solved quicker, and a cooperation

between the university and the SME can be set-up very easily (Project leader Kennisvragenbanken, personal communication, 4 May 2017). In the project *Printed Electronics*, the guidance of the search will be developed by the demonstrator projects, because they serve as a showcase to show what can be done with the printed electronics technology (Project initiator Printed Electronics, personal communication, 8 May 2017).

Because the 2007-2013 OPZuid programming period had such a big focus on product development, these products were eventually also taken to the market. For example, the *TriNano* project aimed at developing 3D measuring demonstrator, that has been introduced to the market. In the current programming period, there is less emphasis on market formation. Although there are many demonstrator projects, most of these projects serve as a showcase of what a new technology can do. Only the project *Photon Delta* aims at creating a new market for products which are based on photonics, because that project aims to develop a new cluster around the technology of photonics (Leader of the Photon Delta Office, personal communication, 11 May 2017).

Although the OPZuid projects from the 2007-2013 and 2014-2020 period are very focused on developing new products and technologies, the scope of the project is too small to conclude that legitimacy is created within these projects. Although projects like *Photon Delta* and *Printed Electronics* can contribute to the legitimacy for the photonics and printed electronics technologies. For example, the word of photonics is now well spread within the Brainport region, and it is known for becoming the new top cluster of the region (Leader of the Photon Delta Office, personal communication, 11 May 2017). Therefore, the word of mouth of photonics has definitely contributed to the growth of the legitimacy of photonics, but this is not only because of the *Photon Delta* project. Therefore, the small scale of this project only provides a small contribution to the development of this function.

## 6.2. Interreg projects

From 2007 until now, there have been many changes within the Interreg programmes. For example, the Brainport region has been added to the Interreg Germany-Netherlands region in 2014. Because of this short timeframe, there are no projects from the Interreg Germany-Netherlands programme to present here. In the Interreg Meuse-Rhine programme, the region is represented through a privileged partnership with the programme (Interreg Meuse-Rhine, n.d.). Because this partnership was only set up in 2013, there are almost no projects from this programme with partners from the Brainport region to present here. Therefore, there are three Interreg programmes in which projects with partners from Brainport have taken place: Interreg Flanders-Netherlands, Interreg North-West Europe and Interreg Europe.



In the three Interreg programmes and the three levels, there were few projects that focused on entrepreneurial activities. In the Interreg Flanders-Netherlands programme of the programming period 2007-2013, there was a project *Fablabs in de grensregio*, which focused on the development of small-scale working places with specialised machines in the border region. One of these FabLabs was founded in the Brainport region, where currently many different innovative projects from scholars and students are taking place, like a scan robot and a fusion post processor (FabLab Brainport, 2017).

Whereas the OPZuid projects focused more on entrepreneurial activities, the Interreg projects focus more on knowledge. An example of an Interreg project that focuses on the development of knowledge, is the Interreg Europe project *ERMIS*, in which the municipality of Eindhoven participated as a project partner:

*“ERMIS was about the exchange with regions in Europe how innovation systems can be upgraded. A very important part of this project was to map the innovation systems around Europe, which included a large research. ... We learned that within Europe, innovation systems, the thinking about innovation systems and what the interventions in that innovation ecosystem could be, differ very much”* (Programme Director Clusters at Brainport Development, personal communication, 4 May 2017).

Most of the Interreg projects, however, including *ERMIS*, do not only focus on knowledge development, but more on the diffusion of this knowledge. An example of such a project is the Interreg Europe project *Inno Infra Share*, in which Brainport Development is currently cooperating with European partners like the municipality of Bologna, to share knowledge on mapping the innovation infrastructure and facilities that are available in the region (Programme Director Clusters at Brainport Development, personal communication, 4 May 2017). In Interreg NWE, the municipality of Eindhoven participated in the project *ECCE Innovation*, which focused on turning creative ideas into businesses by the exchange and transfer of expertise, knowledge, and experience related to cultural and creative industries (Keep EU Cooperating, 2016). On the Interreg Flanders-Netherlands level, the project *Incubatorennetwerk(t)* tried to transform successful researchers into successful entrepreneurs by providing the researchers with several masterclasses in which they were provided with knowledge about entrepreneurship and setting up a spin-off (Interreg Vlaanderen-Nederland, n.d.2).

The biggest part of the activities that Interreg projects have conducted, aimed at developing the guidance of the search. For example, in Interreg Europe, the project *EURIS* in which Brainport Development cooperated, aimed to enhance processes on mutual learning and the exchange of good practices in Europe, in order to develop more effective RIS3-Strategies and to embrace open

innovation among the stakeholders in the project (Interreg IVC, n.d.2). Besides *EURIS*, the guidance of the search was also developed in the project *ERMIS*, because the best practices of the development of the innovation system from each region were shared in the consortium. Although this went very successful, Brainport Development did not benefit very much from the sharing of best practices, because the learning effect for Brainport Development was not so high:

*“In ERMIS, I remember very well, we told about our best practices and other partners told about their best practices, and then it became evident that we had the more interesting practices to talk about, especially with the regions from Eastern Europe that we had in our consortium”* (Programme Director Clusters at Brainport Development, personal communication, 4 May 2017).

On the Interreg Flanders-Netherlands level, the guidance of the search is developed on a more local level. For example, the project *Link2Innovate* aims to stimulate cross-border cooperation between companies in the South of the Netherlands and Flanders. The aim of this project is to guide start-ups in searching for a possible partner, so their new product can be sold or implemented quicker by realising new cross-border cooperation between companies.

*“Within the project, we have to scout 20 companies that are interesting to participate in this project. ... Eventually, from these 20 companies, 5 companies need to remain from each region for which a matchmaking process will be set up. ... From those, at least three new cross-border cooperation need to remain for each region”* (Manager New Business at Twice Eindhoven, personal communication, 19 May 2017).

Because the Interreg projects that take place with partners from Brainport focus mostly on learning, networking, and sharing, there were no projects that contribute to the formation of a new market or to legitimize a new technology. Despite these two key activities not being addressed within Interreg projects, the mobilisation of resources is addressed within the Interreg Flanders-Netherlands programme. Within that programme, the project *Crossroads* focuses on resource mobilisation, and is by far the largest project of that programme. The *Crossroads* project is an innovation regulation of around 20 million euros, that tries to stimulate cross-border cooperation between companies (Interreg Vlaanderen-Nederland, n.d.1). This is done by providing SME's with a valorisation regulation and a subsidy, with which SME's are attempted to innovate with a partner from the other side of the border (Programme Manager at Stimulus, personal communication, 17 May 2017).

### 6.3. Horizon2020 projects

In the two recent programming periods, many Horizon2020 projects have taken place with partners from the Brainport region. According to the Community Research and Development Information Service (CORDIS) of the European Commission, more than 2000 Horizon2020 projects have been co-financed within the Horizon2020 programme in the Netherlands (CORDIS, 2017). Because searching for projects via CORDIS proved an impossible task within the given timeframe, I have decided to select the projects for this case with the snowball method, by asking my respondents if they knew about Horizon2020 projects in the region and if they knew possible respondents for an interview. Although I can only present a small part of the case of co-funded Horizon2020 projects in Brainport, it introduces how Horizon2020 projects contribute to the development of Brainport.

Within the projects, in this case, there is a big focus on entrepreneurial activities. An example of such a project is the project *Fetal Monitoring* of Nemo Healthcare B.V. In 2016, Nemo Healthcare B.V. received a Horizon2020 subsidy of 4 million Euros for the development of a new generation of their product. Nemo Healthcare B.V. develops plasters for the protection of pregnant women and the prevention of potential problems during the childbirth. This plaster has several sensors, which can measure the contractions and provide clinics with better information. The new generation of these plasters that Nemo Healthcare B.V. produces with the help of the Horizon2020 subsidy is able to record more information, because they are able to measure the heart activity of the unborn child and because they are wireless. With the subsidy, not only the plaster will be developed, also the technology needed for the plaster to function. This includes the development of new hardware that is able to record the extra information, and the development of a new system that is able to deliver the information of the childbirth to the healthcare professionals (Project leader Fetal Monitoring, personal communication, 19 May 2017). In other fields of technology, other Horizon2020 projects undertake similar entrepreneurial activities. For example, the project *InScope* focuses on the upscaling of the applications of hybrid and printed systems. This is an application technology that enables ink to conduct electricity, which can be used in displays and other sorts of products. In a similar Horizon2020 project, *PiScale*, the Holst Centre is building a pilot line together with its project partners that allow the upscaling of the production of OLED for lighting and displays. The project *CAPID* focuses on the creation of capacitive identification tokens, a new generation of wireless tags that interact with capacitive touchscreens. (Communications Manager at Holst Centre, personal communication, 11 May 2017). The final project of this case is the project *Infor-Med*, in which Philips cooperates in the development of an application that informs patients and healthcare providers of medical treatments using virtual reality and 360° videos (Infor-Med, n.d.).

Because the Horizon2020 projects that were discussed are very much focused on the application and development of technologies, the development of knowledge is not the main goal of these projects. However, this does not mean that there is no knowledge development within these projects. For example, in the project *Infor-Med*, a research group has been founded that investigates the added value of virtual reality in different medical fields (Infor-Med, n.d.). In the project *Fetal Monitoring*, there were different trials and measurements that served for the fine tuning of the algorithms, on which the technology of the plaster is based. Furthermore, at least one hundred measurements will be done on patients, which will be used in the development of the new generation of products (... personal communication, 19 May 2017). As with the project *Infor-Med*, the research that is done in the project *Fetal Monitoring* can be seen as a means to reach the goal of the project, rather than being the goal of the project.

The same conclusion is valid for the diffusion of knowledge, and the guidance of the search. For example, the Holst Centre has worked with OLED displays for a long time, but with the Horizon2020 project *PiScale*, it is able to diffuse its knowledge into the network and to fine tune whether the products that the Holst Centre produces still match the demands of the market. Also, because the Horizon2020 projects that were discussed focus on the development of existing technologies, the projects do not focus on the creation of a new market. However, when the development of these technologies leads to a new product, like in the project *Fetal Monitoring*, Horizon2020 can lead to the introduction of new products to the market.

Regarding the creation of legitimacy, it is difficult to say whether the projects have contributed to the rooting of the technologies in the innovation system. Although the development of new product generations and new technologies may contribute, it is impossible to say whether the legitimacy for one of these technologies only exists due to the projects.

#### **6.4. Vanguard Initiative**

The Vanguard Initiative is a cooperation of 30 regions in Europe that have taken up advanced manufacturing as a focus area in their respective RIS3-strategies, in order to cooperate with each other in developing new projects and value chains in niche markets of the advanced manufacturing sector (Brainport Development, n.d.2). In the Vanguard Initiative, five pilots have been developed, which are split up in different demonstration cases and concrete cooperation projects between organisations. In the Vanguard Initiative, there are four stages in which the regions cooperate: learning, connecting, demonstrating and commercialising. Following these stages, I will analyse the contribution of the Vanguard Initiative to the innovation system of Brainport.

According to the Strategic Policy Advisor at Helmond Municipality (personal communication, 4 May 2017), the first stage of the Vanguard Initiative focuses on learning and aims at getting to know potential partners and their situation. Therefore, the stage learning only marginally touches on the development of knowledge. In the second stage, connecting, the partners try to find a base for cooperation to jointly set up a demonstration case to work out commercially. Another element that contributes to the guidance of the search in Brainport is that facilities of regions are connected to each other. The Strategic Policy Advisor at Helmond Municipality (personal communication, 4 May 2017) gives an example:

*“Within the pilots, we try to connect parties. Some of these companies need a new facility which they don’t have at hand for the development of their own product. Or some parties say that they need a certain facility which is not available at all. So, therefore, we try to develop a kind of “industry commons”, a sort of a common infrastructure that multiple parties can use. We try to show that there is a connection between different innovation ecosystems and their individual assets, where companies from these ecosystems can cooperate and bring products to the market”.*

Currently, the Vanguard Initiative is in the transition from the second stage to the third stage, demonstrating. In this third stage, entrepreneurial activities will take place within the five pilot areas, by the development of demonstration projects. Finally, in the fourth stage, the Vanguard Initiative aims to introduce these newly developed products within the demonstration cases to the market. Because these products are developed in new industrial niche markets, the fourth stage of the Vanguard Initiative contributes to the formation of a new market for these products (Strategic Policy Advisor at Helmond Municipality, personal communication, 4 May 2017).

## **6.5. Reflection on the key activities in the innovation system**

Here, I would like to take some space to reflect on the developments and processes that the projects bring about. During the research, it was very striking that nearly all respondents were in consensus of the benefits of these projects for the innovation system:

*“It has a very positive contribution because the subsidies give companies the opportunity to do research in a field that is not directly in their own focus. You can do something next to your general activities, you can make people free to take up something else”* (Lead Partner Smart Systems, personal communication, 26 April 2017).

The project initiator of the project *Printed Electronics* adds (personal communication, 8 May 2017):

*“I speak with quite a lot of entrepreneurs in new sectors, and if they want to try something new, they often have cold feet. Subsidy can help them to push things through, instead of letting ideas remain unexecuted. ... So, on the one hand, having cold feet, on the other hand, there is the feeling that you’re stronger together, that you can cooperate in a consortium rather than on your own. Especially for small companies, if they can say that they cooperate with the Holst Centre on a specific area, it gives a certain feeling of authority” .*

Although the respondents are in consensus of the benefits of the projects, I would like to put these benefits into a different perspective. Although the projects take place within a programme priority that is themed around the development of the innovation ecosystem, the development of this innovation ecosystem is often not the main goal of these projects. Rather, the development of the innovation ecosystem is often seen as a side effect of the project. Therefore, if the activities of the project have taken place, an extra effort need to be made by all the project partners to make sure that the benefits of these projects are diffused in the innovation ecosystem. This leads to the second reflection I would like to make, because although all projects that have been discussed have actors from the Brainport region, not all projects take place in the Brainport region alone. Therefore, the benefits of the projects will almost always be shared between different innovation systems. This implies that the Brainport innovation system will very often not receive a competitive advantage thanks to these projects. On the other hand, when actors from outside of the region are actively involved in the project to realize developments in the region, the benefits for the region increase.

Another reflection I would like to make, is the fact that this research reflects on the number of activities done in the region. But if this research was to be analysed from a financial perspective, the activities of projects in the Horizon2020 programme would have a far bigger contribution to the development of the region than the activities of projects in the OPZuid and Interreg programmes, because the budgets of projects in the Horizon2020 programme are much higher. Whereas the average budget of an OPZuid project is around 1/1,5 million euro, some Horizon2020 programmes have a budget of more than 10 million euro. Therefore, I emphasise once again that the projects presented here the contribution to the innovation system, rather than the impact on the innovation system.

## 7. Conclusion

This chapter will draw the conclusions from this research and give an answer to the main question and sub questions. Furthermore, this chapter will provide a critical reflection on the writing process and recommendations for further research.

### 7.1. Conclusions

The main question of this research was:

***“How did the development programmes, initiatives and funds of the European Union contribute to the development of the innovation system of Brainport between 2007 and 2017?”***

In order to give a full answer to the main question, the sub-questions of this research will be answered first. The first sub-question of this research was:

*How can the innovation system in Brainport be described?*

The innovation system in Brainport is a system that is marked by a strong cooperation between governments, knowledge institutions and companies in the Brainport Foundation, who drafts the regional economic agenda of the region and facilitates the economic development of the region. The Brainport region is the home of multinational companies in the high-tech field like Philips and ASML, but is also highly dependent on the smaller ancillary companies that supply these companies. With knowledge institutions like the TU/e and Holst Centre in the region, these companies can tap into scientific knowledge whenever necessary. Also, governmental organisations like the MRE or the BOM are actively facilitating the economic development of the region. In the region, there are many different types of relations. There are top-down and bottom-up networks and cluster organisations, there is competition between SME's, but mostly, transactions take place because many SME's are suppliers for multinational companies like Philips and ASML. The region is shaped by many formal and informal institutions over the years, which leads to the fact that cooperation is felt as a natural thing in the region. An example of this can be found in the role of the knowledge institutions in the region, who often cooperate with companies by providing them with knowledge.

The second sub-question was:

*In what way do the projects of development programmes and initiatives contribute to the development of key activities in the innovation system of Brainport, and what is the difference in contribution between the various EU investment programmes and initiatives?*

In chapter 6, many different key activities that were instigated by the various projects with actors from the region have been discussed. Because the presented projects were spread over three different programmes and one initiative, many differences between them can be seen. For example, because the OPZuid and Interreg Flanders-Netherlands programmes act on a local level, the projects within these programmes tend to focus more on the connection of actors, the building of ecosystems, the diffusion of knowledge through events and the development of (demonstration) projects. Therefore, these programmes focus more on the development of the functions entrepreneurial activities and guidance of the search. The Interreg Europe programme on the other hand, tends to focus more on the functions knowledge development and the diffusion of knowledge. The Horizon2020 programme, which is also a pan-European programme, focuses more on the development of technologies, rather than the development of knowledge, therefore contributing more to the function entrepreneurial activities. The Vanguard Initiative will focus on the formation of new markets around new technologies in the future. Figure 9 presents the operationalisation scheme of sub-question 2, filled in with the contributions of projects from the various programmes to the instigation of key activities in the innovation system of Brainport:



|                                   | <b>Projects in the OPZuid programme</b>   | <b>Projects in the Interreg programmes</b>  | <b>Projects in the Horizon2020 programme</b>  | <b>Pilot in the Vanguard Initiative</b>  |
|-----------------------------------|---|---|---|--|
| <b>Entrepreneurial Activities</b> | <ul style="list-style-type: none"> <li>• <i>HiRes Tracking &amp; Capture System IR,</i></li> <li>• <i>TriNano,</i></li> <li>• <i>Ontwikkeling prototype MTT micro WKK,</i></li> <li>• <i>Smart Systems,</i></li> <li>• <i>Printed Electronics,</i></li> </ul> | <ul style="list-style-type: none"> <li>• <i>Fablabs in de grensregio</i></li> </ul>   | <ul style="list-style-type: none"> <li>• <i>Fetal Monitoring</i></li> <li>• <i>InScope</i></li> <li>• <i>PiScale</i></li> <li>• <i>CAPID</i></li> <li>• <i>Infor-Med</i></li> </ul> | <ul style="list-style-type: none"> <li>• <i>Stage 3</i></li> </ul>                           |
| <b>Knowledge development</b>      | <ul style="list-style-type: none"> <li>• <i>Slimmer werken bij Natuursteen-productie Asten</i></li> <li>• <i>“Going further” vereist een gedegen productieproces</i></li> <li>• <i>Photon Delta</i></li> <li>• <i>OpenPics</i></li> </ul>                     | <ul style="list-style-type: none"> <li>• <i>ERMIS</i></li> </ul>  | <ul style="list-style-type: none"> <li>• <i>Infor-Med</i></li> <li>• <i>Fetal Monitoring</i></li> </ul>   |  |
| <b>Diffusion of knowledge</b>     | <ul style="list-style-type: none"> <li>• <i>Brainport Industries</i></li> <li>• <i>Smart Systems</i></li> <li>• <i>Photon Delta</i></li> <li>• <i>Printed Electronics</i></li> </ul>  | <ul style="list-style-type: none"> <li>• <i>ERMIS</i></li> <li>• <i>Inno Infra Share</i></li> <li>• <i>ECCE Innovation</i></li> <li>• <i>Incubatorennetwerk(t)</i></li> </ul> |   |  |
| <b>Guidance of the search</b>     | <ul style="list-style-type: none"> <li>• <i>Smart Systems</i></li> <li>• <i>Photon Delta</i></li> <li>• <i>Kennisvragenbanken</i></li> <li>• <i>Printed Electronics</i></li> </ul>  | <ul style="list-style-type: none"> <li>• <i>EURIS</i></li> <li>• <i>ERMIS</i></li> <li>• <i>Link2Innovate</i></li> </ul>  | <ul style="list-style-type: none"> <li>• <i>PiScale</i></li> <li>• <i>Fetal Monitoring</i></li> </ul>   | <ul style="list-style-type: none"> <li>• <i>Stage 1</i></li> <li>• <i>Stage 2</i></li> </ul> |
| <b>Market formation</b>           | <ul style="list-style-type: none"> <li>• <i>Photon Delta</i></li> </ul>   |   |   | <ul style="list-style-type: none"> <li>• <i>Stage 4</i></li> </ul>                           |
| <b>Mobilisation of resources</b>  |   | <ul style="list-style-type: none"> <li>• <i>Crossroads (2)</i></li> </ul>   |   |  |
| <b>Creation of legitimacy</b>     | <ul style="list-style-type: none"> <li>• <i>Photon Delta</i></li> <li>• <i>Printed Electronics</i></li> </ul>   |   | <ul style="list-style-type: none"> <li>• <i>Fetal Monitoring</i></li> <li>• <i>InScope</i></li> <li>• <i>PiScale</i></li> <li>• <i>CAPID</i></li> <li>• <i>Infor-Med</i></li> </ul> | <ul style="list-style-type: none"> <li>• <i>Stage 3</i></li> </ul>                           |

Figure 9: Operationalisation scheme for sub-question 2, filled in with the contributions of the projects to the key activities in the region (Source: Author).

Now the four sub questions are answered, it is time to give an answer to the main question:

***“How did the development programmes, initiatives and funds of the European Union contribute to the development of the innovation system of Brainport between 2007 and 2017?”***

In the Brainport region, many different projects take place in the framework of EU co-financed programmes and initiatives. Many projects of these programmes and initiatives are based in a programme priority that is related to the development of the innovation system. Between the different programmes and initiatives, these projects all have a different way to contribute to this development. Now, I will reflect on how the projects contribute to the development of the structure of Brainport's innovation system.

First and foremost, the projects all contribute to the activities of organisations in the region. As mentioned by nearly all the respondents in this research, the subsidy that is linked to the projects gives the organisations in the region extra financial capacity, which allows organisations to do something extra besides their regular activities and to undertake an activity that would otherwise not be possible. In this research, this has been confirmed by the fact that many projects in all programmes focused on the development of entrepreneurial activities, through the development of demonstrators or the development of new technologies or products. Therefore, it is possible to conclude that the EU co-financed projects in the framework of the various programmes and initiatives instigate entrepreneurial activities, that lead to the development of the organisations.

The relations within Brainport are very much developed by the projects of the EU programmes and initiatives. The projects in all programmes had a very strong emphasis on the instigation of the guidance of the search. This can be seen in the fact that many projects focused on showcasing best practices and connecting different organisations with each other, with some projects even focusing on the development of a new ecosystem in the region. Therefore, especially the network dimension of the relations element is developed thanks to the EU co-financed projects. The formation of new markets on the other hand, which would influence the transactions dimension, is developed to a lesser extent by the projects. Although the project *Photon Delta* and the Vanguard Initiative contribute to this key activity, the development of the transactions dimension in the region is only very small.

The institutions in the region are almost undeveloped by the projects. Although some projects contribute to the creation of legitimacy of a certain technology, it is impossible to say that the legitimacy for a specific technology or application has only grown thanks to a certain project. Furthermore, the time frame of these projects is often too small to contribute to the creation of legitimacy of a certain technology. Therefore, the institutions did not develop through the projects of EU programmes and initiatives.

As regards knowledge, the co-financing in the framework of the EU programmes and initiatives has led to the fact that some organisations have some extra capacity to develop new knowledge. Although some projects instigate the development of knowledge, this is to a far smaller degree than the instigation of entrepreneurial activities. As regards the diffusion of knowledge, especially the projects in the OPZuid and Interreg programmes contribute to this key activity. With the spreading of knowledge in the projects through various events and networks, more actors in the region gain access to this knowledge. Therefore, the element knowledge is developed more by the instigation of the diffusion of knowledge in EU co-financed projects than the instigation of the development of knowledge.

Now the empirical conclusion is drafted, it is time to reflect this conclusion in the light of the theories of innovation systems. The empirical study concluded that the projects of EU programmes and initiatives have contributed to the development of organisations and the relations of the innovation system, but not so much on the development of institutions and knowledge. Compared with the theory, the fact that organisations and relations are developed thanks to these projects is a logical conclusion, because the projects give organisations extra capacity and offer a framework to network with other partners. The fact that institutions are not so much developed can also be understood with the theoretical perspectives on innovation systems, since these institutions have developed over a much longer period of time than the projects last. But the fact that the projects only have a very small contribution to the development of knowledge is a rather odd empirical conclusion that does not match with theory. After all, Hekkert et al. (2007, p. 425) argued that resources are a necessary input for all activities in the innovation system, but especially for the development of knowledge. Therefore, one would assume that the knowledge element would be developed very much with contributions of the projects from EU programmes and initiatives. But if the activities of the projects are analysed, most of the projects do develop knowledge but with the intention of applying this new knowledge in entrepreneurial activities. Therefore, knowledge development is not seen as a goal or an output in most of the projects, but as a means to achieve a certain goal or to produce an output. Because of this, the empirical conclusion that the projects only have a small contribution to the development of knowledge in the region, can be justified.

## 7.2. Critical reflection on the writing process of this research

This chapter will provide a critical reflection on the writing process. I will discuss in this chapter what went well and what went wrong during this research, and how this research can serve as a learning exercise for further activities in my future career. This chapter will be structured chronologically, starting with the writing process of the research plan, fixing and doing the interviews and eventually writing this thesis.

I started the writing process of this thesis with writing the research plan. Because I was allowed to pick my research topic by myself, I found it very difficult to concretely write down my ideas. I aimed to combine what I have learnt in the three previous semester of this master programme into one thesis, but I could not find the right way to start. With the help of my supervisors who jointly advised to analyse the contribution of the programmes, rather than the influence of just Interreg projects, I finally had my starting point for this research. Then, I was able to write a research plan with the theoretical framework on innovation systems. Again, I needed the help of my supervisors here to find the right structure and formulation. A point of reflection for myself therefore, is the fact that the process of concretely writing down my ideas in a structured way with the right formulation has proved to be very difficult for me. Because I needed to discuss this often with my supervisors, I had to arrange multiple meetings. These meetings could not be done immediately, and therefore, this problem of structure and formulation caused me to have some weeks of delay in the writing process.

Then I went on with arranging the interviews. This has proved to be the most difficult part for me of this research. I have to admit, at first, I did not put enough time in this. Then, I started to contact respondents for interviews, but most of the respondents I initially contacted were not able to do an interview with me. This has caused me two weeks of delay, and after two weeks in April of arranging, I had only fixed one interview. This gave me slight panic, and caused me to think more out of the box in the search for respondents. Slowly but surely I was able to arrange an interview with more respondents, but whereas I initially planned to do all the interviews in April, I did most of the interviews in May. This has led to the fact that I had to do nine interviews in two weeks, in order to have enough time to do the analysis. Therefore, a point of critique for me as regards arranging interviews is the fact that I need to start earlier, and to start with contacting more different types of respondents in the future.

Now the interviews were fixed I actually had to do them. In the beginning I felt that I really had to get used to conducting an interview again. The last time I did an interview was for my bachelor thesis two years ago, so I had some troubles starting off. Luckily, the interview guides helped very well. Sometimes though, I found it very difficult to ask follow-up questions, because certain topics were

discussed in the interview that were not covered in the interview guide, and which I therefore did not prepare. A point of reflection for me in conducting interviews therefore is to better analyse the expertise of each respondent beforehand, to make sure that I am better prepared during the interviews.

With the time miscalculation of how long it would take to transcribe an interview during the bachelor thesis in the back of my mind, I made a very tight planning of when I would transcribe a certain interview. This planning has helped me very much in this part of the research, and it resulted in the fact that I was finished with transcribing only four days after I had conducted the last interview. I am very satisfied with how the transcribing of the interviews went in this research, so therefore, making a planning for transcribing interviews is something I will continue doing in the future.

In my opinion, the writing process went very steadily. After a week of hard work in which I wrote more than 10.000 words, I handed in the concept version of my thesis on the 3<sup>rd</sup> of June 2017. During the writing process, I kept my experiences of the bachelor thesis in the back of my mind, in which I wrote my concept version but neglected the structure I set up in the research, which led to the fact that I could rewrite my entire thesis in three days. I really wanted to prevent that from happening again, so therefore, I paid extra attention to stick to the structure of the thesis. Five days after handing in the concept version, I received very valuable feedback from my respondents and my supervisors, which enabled me to finish this thesis without too much stress.

Although I did not have much stress in the last weeks of writing the thesis, five days before the deadline I have been shocked by the horrible news of my grandfather who was at the point of death after suffering a renal haemorrhage. This news has caused a lot of undesired mental distraction in the last week before the deadline, which made finishing the master thesis a very challenging exercise. Luckily, I was supported by my family who encouraged me to continue with my thesis and to hand it in in time, because that is how my grandfather would have wanted me to act. Therefore, I have also decided not to ask for a postponing of the deadline. My grandfather has passed away on the day before the deadline of this thesis, at the age of 83.

Overall, I am less satisfied of the first three months of the writing process, in which I suffered many delays due to difficulties in structure and formulation and fixing interviews. However, I am very pleased with the proceedings of the last two months of the writing process in which I conducted the interviews and wrote the remainder of the thesis.

### 7.3. Research limitations and recommendations for further research

Every research has its limitations, and therefore, I will discuss these in this chapter. The first limitation of this research I would like to discuss, is the fact that the projects that I have analysed are always co-funded projects. This implies that a part of the spendings in the project are financed by the European funds, and other parts of the spendings are financed by other organisations or funds. Therefore, it has proven to be impossible to analyse which part of the budget spent in the project is spent by financing from EU funds, and which part is not. Therefore, this research is only able to discuss the contribution of these projects, rather than their impact. Connected to this, is the fact that because I have not focused on the exact spendings of the projects, this research might give a skewed perspective of the way how projects contribute to the development. Because an average OPZuid project has a far smaller budget than an average Horizon2020 budget, the contribution to the development of the innovation system is not the same, whereas this research might present the contribution as equal. Another limitation in this research, is the fact that it was very difficult to write about projects from the 2007-2013 programming period. When I asked about projects from this programming period, the respondents found it very difficult to answer my questions, because they could not remember the activities in the project very well. Therefore, this programming period might be a bit underrepresented in comparison to projects from the 2014-2020 programming period. That said, because these projects are currently running, it was impossible to write about what these projects already had achieved, but only about what they aim to achieve. A third limitation in this research, is the fact that there is no convenient list of Horizon2020 projects, in which partners from different regions can be filtered. Therefore, it was very hard to find Horizon2020 projects from the region, and there is a chance that I have missed a couple of projects, because I could not find them.

These limitations lead to several recommendations for further research. Firstly, this research took place in the middle of the 2014-2020 programming period. Therefore, some projects were in the middle of their activities, and I could only write about what they aim to achieve, rather than about what they had achieved. Therefore, it would be interesting to do a research at the end of the 2014-2020 programming period about the contribution of the projects in the 2014-2020 programme period alone. This research should take place between 2020 and 2023, the year in which the programme will formally be closed. A second recommendation for future research, is to do a similar research in other innovation systems in the Netherlands. Currently, many innovation systems are developing in the Netherlands, like Food Valley, Health Valley, Energy Valley and the Delta Region. Because these innovation systems are a lot younger than Brainport, it would be interesting to see how projects from EU programmes and initiatives would contribute to the development of these innovation systems.

## References

### Literature

- Asheim, B.T. & Gertler, M.S. (2004). *The geography of innovation: Regional Innovation Systems*. In: Fagerberg, J. & Mowery, D.C. (eds) (2005). *The Oxford Handbook of Innovation*. Oxford University Press, Oxford, pp. 291 – 317.
- Asheim, B.T. & Isaksen, A. (1997). *Location, Agglomeration and Innovation: Towards Regional Innovation Systems in Norway?*
- Bacon, F. (1597). *Meditationis Sacrae*. London.
- Braczyk, H.J., Cooke, P. & Heindreich, M. (eds.), (1998). *Regional Innovation Systems*. London.
- Brainport, (n.d.1). *Brainport Ecosysteem*. Date of discovery: 16 February 2017, on <http://www.brainport.nl/over-brainport/brainport-ecosysteem>.
- Brainport, (n.d.2). *Brainport in de Tijd*. Date of discovery: 13 February 2017, on <http://www.brainport.nl/over-brainport/het-verhaal-van-brainport/brainport-in-de-tijd>.
- Brainport Development, (n.d.1). *Meerjarenplan Brainport Development 2017-2020*. Date of discovery: 14 February 2017, on <http://www.brainportdevelopment.nl/meerjarenplan/>.
- Brainport Development, (n.d.2). *Vanguard Initiative '3D Printing' Pilot*. Date of discovery: 3 June 2017, on <http://www.brainportdevelopment.nl/project/vanguard-initiative-3d-printing-pilot/>.
- Brainport Network, (2012). *Eurocommissaris Hahn noemt ZO-Nederland als voorbeeldregio*. Date of discovery: 4 April 2017, on <http://www.brainportnetwork.nl/nieuws/nieuws/nieuws-archief/eurocommissaris-hahn-noemt-zo-nederland-als-voorbeeldregio>.
- Brainport Network, (n.d.). *Wat is Brainport Network?* Date of Discovery: 14 February 2017, on <http://www.brainportnetwork.nl/thema-s/brainportnetwork/wat-is-brainport-network>.
- Callon, M. (1986). *Some elements of a sociology of translation*. In: Law, J. (ed.) *Power, action and belief: a new sociology of knowledge?* Routledge, London, pp. 196-223.
- Carayannis, E.G. & Campbell, D.F.J. (2009). *"Mode 3" and "Quadruple Helix": towards a 21<sup>st</sup> century fractal innovation ecosystem*. International Journal of Technology Management 46 (3/4), pp. 201-234.
- Chukhray, N.I., (2012). *Forming an ecosystem of innovation*. Economics of Development 61 (1), pp. 12-18.
- CORDIS, (2017). *Projects & Results*. Date of discovery: 2 June 2017, on [http://cordis.europa.eu/projects/result\\_en?q=\(address/country%3D%27NL%27%20OR%20relatedRegion/region/euCode%3D%27NL%27\)%20AND%20programme/code%3D%27H2020\\*%27%20AND%20contenttype%3D%27project%27](http://cordis.europa.eu/projects/result_en?q=(address/country%3D%27NL%27%20OR%20relatedRegion/region/euCode%3D%27NL%27)%20AND%20programme/code%3D%27H2020*%27%20AND%20contenttype%3D%27project%27).

- Cresswell, J.W. & Poth, C.N. (2017). *Qualitative Inquiry & Research Design: Choosing among five approaches*. Sage, Los Angeles. Fourth Edition.
- Diesing, P. (1972). *Patterns of discovery in the social sciences*. Routledge & Kegan Paul, London.
- Dühr, S., Colomb, C. & Nadin, V., (2010). *European Spatial Planning and Territorial Cooperation*. Routledge, Abingdon.
- Edquist, C. (1997). *Systems of Innovation Approaches: Technologies, Institutions and Organizations*. Printer, London.
- Edquist, C. (2005). *Systems of Innovation: Perspectives and Challenges*. In: Fagerberg, J. & Mowery, D.C. (eds) (2005). *The Oxford Handbook of Innovation*. Oxford University Press, Oxford, pp. 183 – 208.
- Enterprise Flanders, (n.d.1). *High Performance Production through 3D-Printing*. Date of discovery: 8 June 2017, on: <http://www.s3vanguardinitiative.eu/cooperations/high-performance-production-through-3d-printing>.
- Enterprise Flanders (n.d.2). *Vanguard Initiative: New growth through Smart Specialisation*. Date of discovery: 29 May 2017, on <http://www.s3vanguardinitiative.eu/>.
- European Commission, (n.d.) *What is Horizon2020?* Date of discovery: 29 May 2017, on <https://ec.europa.eu/programmes/horizon2020/en/what-horizon-2020>.
- European Commission, (2010). *Europe 2020: A strategy for smart, sustainable and inclusive growth*. Brussels.
- European Commission, (2014a). *European Regional Development Fund*. Date of discovery: 7 March 2017, on [http://ec.europa.eu/regional\\_policy/en/funding/erdf/](http://ec.europa.eu/regional_policy/en/funding/erdf/).
- European Commission, (2014b). *European Social Fund*. Date of discovery: 7 March 2017, on [http://ec.europa.eu/regional\\_policy/en/funding/social-fund/](http://ec.europa.eu/regional_policy/en/funding/social-fund/).
- European Commission, (2014c). *European Structural and Investment Funds*. Date of discovery: 7 March 2017, on [http://ec.europa.eu/regional\\_policy/en/funding/](http://ec.europa.eu/regional_policy/en/funding/).
- European Commission, (2014d). *What is cohesion policy?*. Date of discovery: 7 March 2017, on [http://ec.europa.eu/regional\\_policy/en/faq/](http://ec.europa.eu/regional_policy/en/faq/).
- European Commission, (2015). *Cohesion Fund*. Date of discovery: 7 March 2017, on [http://ec.europa.eu/regional\\_policy/en/funding/cohesion-fund/](http://ec.europa.eu/regional_policy/en/funding/cohesion-fund/).
- European Commission, (2017). *European Maritime and Fisheries Fund (EMFF)*. Date of discovery: 7 March 2017, on <https://ec.europa.eu/fisheries/cfp/emff>.
- European Commission, (2017b). *Financing the Common Agricultural Policy*. Date of discovery: 7 March 2017, on [https://ec.europa.eu/agriculture/cap-funding\\_en](https://ec.europa.eu/agriculture/cap-funding_en).



- FabLab Brainport, (2017). *Projecten*. Date of discovery: 1 June 2017, on <http://fablabbrainport.nl/projects/>.
- Fernández-Maldonado, A.M. & Romein, A. (2009). *The reinvention of Eindhoven: From industrial town in decline to capital city of technology and design region*. Delft University of Technology.
- Freeman, C., (1987). *Technology and Economic Performance: Lessons from Japan*. Pinter, London.
- Freeman, C. (1995). *The 'National System of Innovation' in historical perspective*. Cambridge Journal of Economics, 19, pp. 5 – 24.
- Hekkert, M.P., Suurs, R.A.A., Negro, S.O., Kuhlmann, S. & Smits, R.E.H.M., (2007). *Functions of innovation systems: A new approach for analysing technological change*. In: Technological Forecasting & Societal Change 74 (2007), pp. 413 – 432.
- HighTechXL (n.d.). *Accelerator*. Date of discovery: 30 May 2017, on <http://www.hightechxl.com/accelerator/>.
- Infor-Med, (n.d.). *Home*. Date of discovery: 2 June 2017, on <http://infor-med.nl/>.
- InSCOPE, (n.d.). *About the InSCOPE project*. Date of discovery: 8 June 2017, on <http://inscope-project.eu/project/>.
- Interreg Europe, (n.d.1). *Inno Infra Share*. Date of discovery: 7 June 2017, on: <http://www.interregeurope.eu/innoinfrashare/>.
- Interreg Europe, (n.d.2). *S34Growth*. Date of discovery: 7 June 2017, on: <http://www.interregeurope.eu/s34growth/>.
- Interreg IVC, (n.d.1). *Effective Reproducible Model of Innovation Systems*. Date of discovery: 7 June 2017, on: <http://www.interreg4c.eu/projects/project-details/index-project=114-effective-reproducible-model-of-innovation-systems&.html>.
- Interreg IVC, (n.d.2). *EURIS*. Date of discovery: 1 June 2017, on <http://www.interreg4c.eu/projects/project-details/index-project=99-european-collaborative-and-open-regional-innovation-strategies&.html>.
- Interreg Meuse-Rhine, (n.d.). *Gebiedskaart*. Date of discovery: 13 June 2017, on [file:///C:/Users/Gebruiker/Downloads/A4\\_gebiedskaartje%20Interreg%20VA%20EMR\\_gemeenten.pdf](file:///C:/Users/Gebruiker/Downloads/A4_gebiedskaartje%20Interreg%20VA%20EMR_gemeenten.pdf).
- Interreg Vlaanderen-Nederland, (n.d.1). *Crossroads 2*. Date of discovery: 1 June 2017, on <http://www.grensregio.eu/projecten/crossroads-2>
- Interreg Vlaanderen-Nederland, (n.d.2). *Fablabs in de grensregio*. Date of discovery: 7 June 2017, on <http://www.grensregio.eu/projecten/fablabs-in-de-grensregio>.

- Interreg Vlaanderen-Nederland, (n.d.3). *Incubatorennetwerk(t)*. Date of discovery: 1 June 2017, on <http://www.grensregio.eu/projecten/incubatorennetwerkt>.
- Johnson, A. (2001). *Functions in Innovation System Approaches*. Paper for DRUID's Nelson-Winter Conference, Aalborg.
- Kang, M.J. & Hwang, J. (2016). *Structural dynamics of innovation networks funded by the European Union in the context of systemic innovation of the renewable energy sector*. Energy Policy vol. 96, pp. 471-490.
- Keep EU Cooperating (2016). *Project – Developing Economic Clusters of Cultural and Creative Enterprises in the Innovation Process*. Date of discovery: 1 June 2016, on <https://www.keep.eu/keep/project-ext/21144/ECCE+Innovation?ss=a5dd1edefb53b741249a184cded281ad&espon>
- Ladrech, R. (2010). *Centre –Regional Relations* In: Europeanization and national politics. Palgrave Macmillan, pp. 92-113.
- Lagendijk, A. & Boekema, F. (2008). *Global circulation and territorial development: South-East Brabant from a relational perspective*. European Planning Studies 16 (7).
- Lundvall, B-Å., (1992). *National Innovation Systems: Towards a Theory of Innovation and Interactive Learning*. Pinter, London.
- Lundvall, B-Å. & Borrás, S. (1997). *The globalising learning economy: Implications for innovation policy*. DG XII, Commission of the European Union.
- Mero-Jaffe, I. (2011). *'Is this what I said?' Interview Transcript Approval by Participants: An Aspect of Ethics in Qualitative Research*. International Journal of Qualitative Methods, 10(3).
- Miller, T. (2012). *Reconfiguring Research Relationships: Regulation, New Technologies and Doing Ethical Research*. In: Miller, T., Birch, M., Mauthner, M. & Jessop, J. (2012). *Ethics in Qualitative Research*. Sage, London, pp. 29-42.
- Ministerie van Economische Zaken, (2004). *Pieken in de Delta: Gebiedsgerichte Economische Perspectieven*. The Hague.
- Musyck, B. & Reid, A. (2007). *Innovation and Regional Development, Do European Structural Funds make a Difference?* European Planning Studies 15 (7).
- Nam, C.W., Schönberg, A. & Wamser, G. (2011). *Lisbon Agenda, Regional Innovation System and the New EU Cohesion Policy*. CESifo Working Paper, No. 3564.
- Nauwelaers, C. & Reid, A. (1995). *Innovative regions? A Comparative review of methods of evaluating regional innovation potential*. CIACO.
- Nelson, R. R. (ed.) (1993). *National Systems of Innovation: A Comparative Study*. Oxford University Press, Oxford.

- Nemo Healthcare BV, (2017). *Horizon2020 project Fetal Monitoring*. Date of discovery: 8 June 2017, on: <http://www.nemohealthcare.com/en/h2020>.
- OPZuid, (2013). *Smart Specialisation Strategy RIS3 Zuid, de kunst van het combineren*.
- OPZuid, (2014). *Operationeel programma Zuid-Nederland 2014-2020*.
- Patton, M.Q. (1980). *Qualitative evaluation and research methods*. Sage, Newbury Park/London/New Delhi.
- Perroux, F. (1955). *Note sur la Notion de 'pôle de croissance'*. Economie Appliquée, 1955.
- PI-SCALE, (n.d.). *Ambition*. Date of discovery: 8 June 2017, on: <http://pi-scale.eu/ambition/>.
- Political Leaders and Representatives of the Vanguard Initiative for New Growth through Smart Specilaisation (2014). *Milan Declaration: Joining Forces for Investment in the Future of Europe*. Milan.
- Porter, M.E. (1998). *The competitiveness of nations - with a new introduction*. The free press, New York.
- Puigcerver-Peñalver, M.C. (2007). *The Impact of Structural Funds Policy on European Regions' Growth. A Theoretical and Empirical Approach*. The European Journal of Comparative Economics 4 (2), pp. 179-208.
- Raspe, O., Weterings, A., Geurden-Slis, M. & Van Gessel, G. (2012). *De ratio van ruimtelijk-economisch topsectorenbeleid*. Planbureau voor de Leefomgeving, The Hague.
- Smits, R. (2011). *Triple Helix in Brainport Eindhoven*. Radboud University, Nijmegen.
- Stimulus Programmamanagement, (n.d.1). *Brainport Industries*. Date of discovery: 7 June 2017, on: <https://www.stimulus.nl/op-zuid/project/brainport-industries/>.
- Stimulus Programmamanagement, (n.d.2). *"Going further" vereist gedegen verbeterproces*. Date of discovery: 7 June 2017, on: <https://www.stimulus.nl/op-zuid/project/going-further-vereist-gedegen-verbeterproces/>.
- Stimulus Programmamanagement, (n.d.3). *HiRes tracking capture system IR*. Date of Discovery: 7 June 2017, on: <https://www.stimulus.nl/op-zuid/project/hires-tracking-capture-system-ir/>.
- Stimulus Programmamanagement, (n.d.4). *Ontwikkeling prototype MTT micro WKK*. Date of discovery: 7 June 2017, on: <https://www.stimulus.nl/op-zuid/project/ontwikkeling-prototype-mtt-micro-wkk/>.
- Stimulus Programmamanagement, (n.d.5). *Open Innovatieplatform Fotonische ICs*. Date of discovery: 7 June 2017, on <https://www.stimulus.nl/opzuid/project/open-innovatieplatform-fotonische-ics/>.
- Stimulus Programmamanagement, (n.d.6). *Photon Delta*. Date of discovery: 7 June 2017, on: <https://www.stimulus.nl/opzuid/project/photon-delta/>.

- Stimulus Programmamanagement, (n.d.7). *Printed Electronics*. Date of discovery: 7 June 2017, on <https://www.stimulus.nl/opzuid/project/printed-electronics/>.
- Stimulus Programmamanagement, (n.d.8). *Slimmer werken bij Natuursteen Productie Asten*. Date of discovery: 7 June 2017, on: <https://www.stimulus.nl/op-zuid/project/slimmer-werken-natuursteen-produktie-asten/>.
- Stimulus Programmamanagement, (n.d.9). *Smart Systems*. Date of discovery: 7 June 2017, on <https://www.stimulus.nl/opzuid/project/smart-systems/>.
- Stimulus Programmamanagement, (n.d.10). *TriNano 3D nanometrologie MKB*. Date of discovery: 7 June 2017, on <https://www.stimulus.nl/op-zuid/project/trinano-3d-nanometrologie-mkb/>.
- Stimulus Programmamanagement, (2017c). *Programma OPZuid 2014-2020*. Date of discovery: 4 April 2017, on <https://www.stimulus.nl/opzuid/>.
- Swanborn, P.G. (1996). *Case-study's: Wat, wanneer en hoe?* Boom, Meppel.
- Yin, R.K. (1989). *Case study research: design and methods*. Sage, London.

## Interviews

- Business Development Manager at PlnS, personal communication, 10 May 2017, 13:30-14:30. High-tech Campus 34, Eindhoven, the Netherlands.
- Communications Manager at Holst Centre, personal communication, 11 May 2017, 10:00-11:00. High-tech Campus 31, Eindhoven, the Netherlands.
- Head of Innovation Strategy and Partnerships at TU/e Innovation Lab, personal communication, 8 May 2017, 9:00-10:00. De Rondon 18, Eindhoven, the Netherlands.
- Leader of the Photon Delta Office, personal communication, 11 May 2017, 14:00-15:00. Groene Loper 19, Eindhoven, the Netherlands.
- Manager New Business at Twice Eindhoven, personal communication, 19 May 2017, 9:00-10:00. De Lismortel 31, Eindhoven, the Netherlands.
- Process Manager Economic Strategy at MRE, personal communication, 18 May 2017, 10:00-11:00. Raiffeisenstraat 18, Eindhoven, the Netherlands.
- Programme Director Clusters at Brainport Development, together with Strategic Policy Advisor at Helmond Municipality, personal communication, 4 May 2017, 11:00-12:00. Emmasingel 11, Eindhoven, the Netherlands.
- Programme Manager at Stimulus, personal communication, 17 May 2017, 13:30-14:30. Emmasingel 26, Eindhoven, the Netherlands.
- Project Initiator Printed Electronics, personal communication, 8 May 2017, 14:45-15:30. Goirleseweg 15, Tilburg, the Netherlands.
- Project leader Fetal Monitoring, personal communication, 19 May 2017, 11:00-11:30. De Run 4630, Veldhoven, the Netherlands.
- Project leader Kennisvragenbanken, personal communication, 4 May 2017, 14:00-15:00. De Rondon 18, Eindhoven, the Netherlands.
- Lead Partner Smart Systems, personal communication, 26 April 2017, 10:30-11:30. High-tech Campus 10, Eindhoven, the Netherlands.

## Images

### Images used on the front page

- Brainport, (n.d.3). *Brainport op de kaart*. Date of discovery: 6 June 2017, on: <http://www.brainport.nl/uploads/images/Over-Brainport/kaart-ZOBwit-totaal.png>.
- Free Icons PNG, (n.d.). *Pin PNG*. Date of discovery: 6 June 2017, on: <http://www.freeiconspng.com/img/39473>.
- Ghent University, (n.d.). *Metals consortium*. Date of discovery: 6 June 2017, on: <https://www.ugent.be/metals/img/horizon2020.png>.
- Rubini, A. (2014). *Vanguard Initiative Annual Event Milan 13-11-2014 Part 2*. Date of discovery: 6 June 2017, on <https://i.ytimg.com/vi/pdVjJ3ozhfE/maxresdefault.jpg>.
- Stimulus Programmamanagement, (2017a). *Programma Interreg VA Brabant*. Date of discovery: 6 June 2017, on: [https://www.stimulus.nl/interreg-va/wp-content/uploads/sites/7/2015/11/interreg\\_RGB.jpg](https://www.stimulus.nl/interreg-va/wp-content/uploads/sites/7/2015/11/interreg_RGB.jpg).
- Stimulus Programmamanagement, (2017b). *Programma OPZuid 2014-2020*. Date of discovery: 6 June 2017, on [https://www.stimulus.nl/opzuid/wp-content/uploads/sites/4/2015/02/Logo\\_OPZuid\\_header\\_retina.png](https://www.stimulus.nl/opzuid/wp-content/uploads/sites/4/2015/02/Logo_OPZuid_header_retina.png).

### Images used in this thesis

- Brainport, (n.d.3). *Een uniek ondernemersklimaat*. Date of discovery: 30 May 2017, on: <http://www.brainport.nl/ondernemen/ondernemersklimaat>.
- Brainport, (2017). *Young Brainport Summer School*. Date of discovery: 30 May 2017, on: <http://www.brainport.nl/uploads/images/Leren/YBEP-location.png>.
- Other images are own work from the author.

# Annexes

---

In this part, I will present the annexes of this thesis. This thesis contains three annexes:

- Annex 1: Background of the respondents
- Annex 2: Interview guides
- Annex 3: Overview of projects

## **Annex 1: Background of the respondents**

In this research, I have interviewed 13 respondents. To maximize the trustworthiness of this research, I have indicated in chapter 4 that I aimed to interview multiple respondents about each aspect of the innovation system in this thesis, being either the structural aspects or process aspects. In this annex, I will discuss the expertise of each of the respondents and I will discuss why I have decided to interview the respondent, to check whether this research is as trustworthy as possible. Now I will discuss the expertises of each of the respondents:

1. The Business Development Manager at PInS works almost 30 years in Philips, and therefore, he has a lot of knowledge about Philips, the development of Philips, the companies that were created from Philips and the impact Philips had and has on the Brainport region. Because of these expertises, I have decided to interview him to gain more information on the Organisations and Institution dimensions of the innovation system.
2. The Communications Manager at Holst Centre is involved in all the communications of the knowledge institution Holst Centre. Therefore, she has a lot of insights on the activities that take place within the Holst Centre and the knowledge that is developed there. Therefore, she has great knowledge on the activities of the Holst Centre, making her an ideal respondent to gain more information on the Organisations and Knowledge dimension of the innovation system. Because the Holst Centre is very active in Horizon2020 projects and she frequently writes communications about these projects, I have also interviewed her to gain more information on Horizon2020 projects.
3. The Head of Innovation Strategy and Partnerships at the TU/e Innovation Lab is committed to the development of Brainport via the TU/e Innovation Lab for almost 20 years. Therefore, he has a lot of knowledge about the activities of the TU/e, making him an ideal respondent for the Organisations and Knowledge dimensions of the innovation system.
4. The Leader of the Photon Delta Office is occupied with the reporting of the Open PICs and Photon Delta projects to OPZuid. Therefore, she has a lot of knowledge on the activities of these two OPZuid projects, making her an ideal respondent for an interview on these two projects.
5. The Manager New Business at Twice Eindhoven participates as a project partner in the Interreg Flanders-Netherlands project Link2Innovate. Therefore, he is the ideal respondent to interview about this Interreg project.



6. The Process Manager Economic Strategy at MRE is involved in the drafting and execution of the economic strategy of the 21 municipalities in the Brainport region. Therefore, he has a lot of knowledge on the organisations in the Brainport region, the relations between these organisations and the institutions that influence these relations and organisations, making him an ideal respondent to interview about these dimensions.
7. The Programme Director Clusters at Brainport Development is involved in many activities of Brainport Development. She has a lot of knowledge on the Brainport Foundation and Brainport Development, making her an ideal respondent for the Organisations and Relations dimension of the innovation system. Furthermore, she was involved in the Interreg project ERMIS and has knowledge on other Interreg projects in which Brainport Development cooperates as well, making her an ideal respondent to interview about Interreg projects.
8. The Programme Manager at Stimulus is involved in the managing of the OPZuid 2014-2020 programme and the guiding of the projects in that programme. Therefore, he is an ideal respondent for the OPZuid projects. Furthermore, Stimulus is involved in the Crossroads 2 project, making him a good respondent to interview about this project.
9. The Project Initiator Printed Electronics works for the Brabant Development Agency, and was the person who set up the OPZuid project Printed Electronics. Therefore, he is the ideal respondent to interview about this project.
10. The Project leader Fetal Monitoring is the co-founder of Nemo Healthcare BV, who received a Horizon2020 subsidy of 4 million Euros in 2016 for the project Fetal Monitoring. Because he is very much committed to this project, he is the ideal respondent to interview about this project.
11. The Project Leader Kennisvragenbanken works for SURE Innovation of the TU/e Innovation Lab. Therefore, she has a lot of knowledge of the activities of the TU/e, which makes her an ideal respondent for the Organisations and Knowledge dimensions. Furthermore, she is the project leader of the OPZuid project Kennisvragenbanken, which makes her the ideal respondent to interview about this project.
12. The Lead Partner Smart Systems works for the technology cluster organisation DSP Valley, which makes him an ideal respondent to interview about the Organisations and Relations dimension of the innovation system. Furthermore, because he is the lead partner of smart systems, he is the ideal respondent to interview about this project.
13. The Strategic Policy Advisor at Helmond Municipality cooperates very closely with Brainport Development, and therefore he has a lot of knowledge about the Brainport region and European programmes, initiatives and funds.

Figure 8 presents an overview of each of the expertises of the respondents, which enables me to draw a conclusion on the trustworthiness of this research:

|                      | Structural aspects |              |           |           | Process aspects |          |             |                     |
|----------------------|--------------------|--------------|-----------|-----------|-----------------|----------|-------------|---------------------|
|                      | Organisations      | Institutions | Relations | Knowledge | OPZuid          | Interreg | Horizon2020 | Vanguard Initiative |
| <b>Respondent 1</b>  | X                  | X            |           |           |                 |          |             |                     |
| <b>Respondent 2</b>  | X                  |              |           | X         |                 |          | X           |                     |
| <b>Respondent 3</b>  | X                  |              |           | X         |                 |          |             |                     |
| <b>Respondent 4</b>  |                    |              |           |           | X               |          |             |                     |
| <b>Respondent 5</b>  |                    |              |           |           |                 | X        |             |                     |
| <b>Respondent 6</b>  | X                  | X            | X         |           |                 |          |             |                     |
| <b>Respondent 7</b>  | X                  |              | X         |           |                 | X        |             |                     |
| <b>Respondent 8</b>  |                    |              |           |           | X               | X        |             |                     |
| <b>Respondent 9</b>  |                    |              |           |           | X               |          |             |                     |
| <b>Respondent 10</b> |                    |              |           |           |                 |          | X           |                     |
| <b>Respondent 11</b> | X                  |              |           | X         | X               |          |             |                     |
| <b>Respondent 12</b> | X                  |              | X         |           | X               |          |             |                     |
| <b>Respondent 13</b> | X                  | X            | X         |           |                 |          |             | X                   |

Figure 8: Overview of the expertises of the respondents in this research.

As figure 8 shows, I have interviewed multiple respondents about both of the aspects of the innovation system. As regards the structural aspects, I have interviewed multiple respondents on each of the aspects, which means that this research has the highest possible trustworthiness as regards the structural aspects of the innovation system. As regards the process aspects of the innovation system, I have interviewed multiple respondents about each of the aspects, apart from the Vanguard Initiative. Therefore, the trustworthiness in the process aspects is very high, but not as high as possible.

## Annex 2: Interview guides

In this annex, I will present the 12 interview guides that I have used as instruments during the data collection process. The order of the interview guides is as follows:

1. Business Development Manager at PInS
2. Communications Manager at Holst Centre
3. Head of Innovation Strategy and Partnerships at the TU/e Innovation Lab
4. Leader of the Photon Delta Office
5. Manager New Business at Twice Eindhoven
6. Process Manager Economic Strategy at MRE
7. Programme Director Clusters at Brainport Development and Strategic Policy Advisor at Helmond Municipality<sup>3</sup>
8. Programme Manager at Stimulus
9. Project Initiator Printed Electronics
10. Project leader Fetal Monitoring
11. Project Leader Kennisvragenbanken
12. Lead Partner Smart Systems

---

<sup>3</sup> I have interviewed the Programme Director Clusters at Brainport Development and the Strategic Advisor at Helmond Municipality together in a double interview. Therefore, I have merged the questions for these respondents into one interview guide.

# Interviewgide Business Development Manager at PInS

## Introductie

- Jezelf voorstellen
- Doel van het interview
- Toestemming vragen om het interview op te nemen
- Functie van de geïnterviewde:
  - Business Development Manager bij Philips Innovation Services

## Organisatie

- Wat voor een **type organisatie** is Philips Innovation Services en wat is de **taak** van Philips Innovation Services??
- Wat is de **rol** van Philips Innovation Services binnen Philips?
- Philips Innovation Services ondersteunt en versnelt innovaties, wat zijn de **activiteiten** die Philips Innovation Services onderneemt in het traject van een bepaalde wetenschappelijke ontdekking tot het op de markt brengen van een product, of van het opzetten van een start-up/spin-off om dit proces te versnellen?
- Philips Innovation Services biedt verschillende diensten aan, wie zijn de **“klanten”** van Philips Innovation Services?
  - Wetenschappers van Philips
  - Externe wetenschappers
- Wat zijn de **producten/diensten** die Philips Innovation Services aan haar klanten kan bieden?
  - Kennis (experts)
  - Netwerk (contacten)
  - Instituten (ervaring)
  - Faciliteiten (labs)
- Wat is de **rol** van Philips Innovation Services in het ontwikkelen van:
  - Start-ups
  - Spin-offs
- Philips Innovation Services heeft een locatie midden op de High-tech Campus, waar je niet aan Philips ontkomt. Wat was de rol van Philips in het **ontwikkelen van deze campus**?
- Probeert Philips Innovation Services ook nieuwe **start-ups** naar deze campus te lokken?

## Kennis

- Ontwikkelt Philips Innovation Services zelf ook **nieuwe kennis**?
- Philips Innovation Services heeft verschillende areas of expertise zoals medical devices & equipment, connected digital products & systems, micro-assemblage en vele andere:
  - Wat voor **soort kennis** wordt er in deze area's ontwikkeld: wetenschappelijke kennis, of nieuwe combinaties van reeds bekende kennis?
  - Wat doet Philips Innovation Services om nieuwe kennis om te zetten tot een product  
→ **valorisatie**?
- Hoe wordt de kennis van Philips Innovation Services door het innovatiesysteem **verspreid**?
  - Activiteiten
  - Door spin-offs?
  - Blijft de kennis in de regio hangen, of wordt deze ook daarbuiten verspreid?

## Philips en Eindhoven

- Philips is inmiddels uitgegroeid tot de bekendste multinational uit Eindhoven, en moet dus ook een grote **bijdrage** hebben gehad aan de ontwikkeling van de stad en deze regio. Wat was deze bijdrage?
- Vele respondenten hebben mij verteld dat Philips aan de **basis** staat van het succes van deze regio. Hoe denkt u dat dat komt?
- Hoe denkt ... dat Brainport zo **succesvol** is geworden?
- Een respondent vertelde dat de cultuur van Philips een belangrijke reden voor het succes van de regio was (alles gestandaardiseerd, zoals de Philips kalender), wat denkt u dat de rol was van deze **cultuur** in het succes van Philips?
  - Lokale normen en waarden?
- Wat is de **huidige rol** van Philips in de ontwikkeling van Brainport?
- Wat is de **rol** van Philips Innovation Services in de ontwikkeling van Brainport?

# Interviewguide Communications Manager at Holst Centre

## Introductie

- Jezelf voorstellen
- Doel van het interview
- Toestemming vragen om het interview op te nemen
- Functie van de geïnterviewde:
  - Communications Manager bij Holst Centre

## Organisatie

- Wat voor een **type organisatie** is het Holst Centre en wat is de **taak** van het Holst Centre?
- Het Holst Centre ontwikkelt technologieën voor autonome sensortechnologieën en flexibele elektronica, wat zijn de **activiteiten** die het Holst Centre onderneemt om deze technologieën te ontwikkelen?
- Het Holst Centre is een R&D Centre, wie zijn de “**klanten**” die gebruik maken van de kennis van het Holst Centre?
  - Uit de regio?
  - Internationaal? → Waardoor is het Holst Centre internationaal zo **aantrekkelijk** geworden?
- Wat zijn de **producten/diensten** die het Holst Centre aan haar klanten kan bieden?
  - Kennis
  - Faciliteiten?

## Kennis

- Het Holst Centre heeft verschillende innovation areas zoals the internet of things, displays, health, smart flexible storage en vele andere:
  - Wat voor **soort kennis** wordt er in deze area's ontwikkeld: wetenschappelijke kennis, of nieuwe combinaties van reeds bekende kennis?
  - Wat doet het Holst Centre om nieuwe kennis om te zetten tot een product → **valorisatie**?
- Hoe wordt de kennis van het Holst Centre door het innovatiesysteem **verspreid**?
  - Activiteiten
  - Door spin-offs?
  - Blijft de kennis in de regio hangen, of wordt deze ook daarbuiten verspreid?

## Europese projecten

- Ik heb gelezen dat het Holst Centre actief is in vele door de EU gefinancierde projecten, zoals o.a. Printed Electronics, Smart Systems van OP-Zuid; Nano4Sports en PV OpMaat van Interreg Vlaanderen-Nederland en PING en PiScale binnen het Horizon2020 programma. Wat is de **reden** voor het Holst Centre om aan zo veel door de EU gefinancierde projecten mee te doen?
- Globaal gesproken, wat is de **rol** van het Holst Centre in deze verschillende projecten?
  - Wat zijn de activiteiten die het Holst Centre zoal op zich neemt in deze projecten?
  - Zijn er verschillen tussen projecten?
  - Verschilt de rol van het Holst Centre wanneer we kijken naar projecten uit OP-Zuid, Interreg of Horizon2020?
- In de verschillende projecten werkt het Holst Centre samen met verschillende actoren. Hoe verloopt de samenwerking tussen de verschillende actoren binnen zo'n project?
  - Is er wel een sprake van "conflicten" in de samenwerking binnen een project?
- Deze projecten vallen over het algemeen binnen de Europese programma's in de prioriteit "Versterken van het innovatiesysteem" of iets dergelijks, hoe draagt het Holst Centre daar dankzij de projecten aan bij?
- Hoe denkt u dat de verschillende projecten bijdragen aan de ontwikkeling van het innovatiesysteem van Brainport?
  - Ziet u verschillen in de bijdrage aan de ontwikkeling van het innovatiesysteem tussen de verschillende programma's? → Verschillen OP-Zuid, Interreg en Horizon2020?
- Horizon 2020 projecten:
  - Hoe zou u het project PING beschrijven?
    - Activiteiten
    - Doel van project
  - Hoe zou u het project Pi-Scale beschrijven?
    - Activiteiten
    - Doel van project
  - Wat voor soort activiteiten worden er in gang gezet door deze twee Horizon2020 projecten?
    - Rol van innovatieve activiteiten
    - Rol van Kennisontwikkeling en kennisverspreiding
    - Verbinden, Creëren van markten/Embedden technologieën?
  - Vragen naar andere projecten!

### **Afsluitend**

- Hoe ziet ... de ontwikkeling van Brainport in de nabije toekomst?
- Hoe ziet ... de rol van het Holst Centre in Brainport in de toekomst?

### **Afronden**

- Bedanken
- Vragen naar andere respondenten
- Thesis en teksten opsturen



# Interviewguide Head of Innovation Strategy and Partnerships at the TU/e Innovation Lab

## Introductie

- Jezelf voorstellen
- Doel van het interview
- Toestemming vragen om het interview op te nemen
- Positie van de geïnterviewde:
  - Hoofd Innovation Strategy and Partnerships bij het TU/e Innovation Lab

## TU/e Innovation Lab & SURE Innovation

### Organisatie

- Wat voor een type organisatie is het TU/e Innovation Lab en wat is de taak van het TU/e Innovation Lab?
- Het TU/e Innovation Lab ondersteunt innovatie op de universiteit, wat voor activiteiten onderneemt het TU/e Innovation Lab?
- Wat is de rol van de TU/e in het innovatiesysteem van Brainport?
- Hoe ziet de innovatiestrategie van de TU/e eruit?
  - Op welke onderzoeks- en innovatiegebieden focust deze strategie?
  - Achterliggende gedachtes voor bepaalde keuzes
  - Hoe voert de TU/e deze strategie uit?

### Relaties

- Hoe zijn de partnerships van de TU/e tot stand gekomen?
  - Vraag vanuit TU/e of andersom?
  - Belang van partnerships voor innovaties van de TU/e?
- Wat voor soort Partnerships zijn belangrijk voor de TU/e?
  - Overheid → strategische samenwerking met de gemeente Eindhoven
  - Bedrijfsleven → MKB en multinationals?
  - Brainport Triple Helix
- Waarom zijn deze allianties belangrijk voor de TU/e?
- Wat is de taak van de verschillende strategische allianties?
- Hoe verlopen de samenwerkingen met de overheid, het bedrijfsleven en de Brainport Triple Helix?

## **Kennis**

- De TU/e ontwikkelt op vele gebieden nieuwe kennis. Zijn er onderzoeksgebieden waar het TU/e innovation lab vanuit de innovatiestrategie een bepaalde focus op wil leggen?
  - Alleen onderzoek of ook nieuwe combinaties?
- Wat voor soort kennis wordt er ontwikkeld?
  - Nieuwe wetenschappelijke kennis of nieuwe combinaties van reeds bestaande kennis?
- Kennisvalorisatie: hoe ondersteunt het TU/e Innovation lab de valorisatie van wetenschappelijke kennis van de TU/e?
- Hoe wordt de kennis van het TU/e Innovation Lab door het innovatiesysteem verspreid?
  - Activiteiten
  - Blijft de kennis in de regio hangen, of wordt deze ook daarbuiten verspreid?
- Wat is de toegevoegde waarde van de nieuwe kennis van de TU/e in het innovatiesysteem van Brainport?
  - Bijdrage aan collectief leerproces in de regio?

## **Door de EU gefinancierde projecten**

- TU/e Innovation Lab en de TU/e participeren in een aantal door de EU mede gefinancierde projecten, zoals Kennisvragenbanken, Photon Delta, Drone Safety Cluster en Health Tech Yard. Hoe passen deze projecten in de innovatiestrategie van de TU/e?
  - Wordt daarop geadviseerd?
  - Waarom wel/niet?
- Wat is de toegevoegde waarde van dit soort projecten aan de innovatieve activiteiten van de TU/e?
- Binnen programma's als OP-Zuid zijn deze projecten onderdeel van de prioriteit "versterken van het innovatiesysteem", hoe denkt u dat dit soort projecten het innovatiesysteem van Brainport kunnen versterken?

## **Afsluitend**

- Hoe ziet ... de ontwikkeling van Brainport in de nabije toekomst?
- Hoe ziet ... de rol van het TU/e Innovation Lab in Brainport in de toekomst?
- Verwacht ... dat het TU/e Innovation Lab in meerdere door de EU mede gefinancierde projecten zal participeren?

## Afronden

- Bedanken
- Vragen naar andere respondenten
- Thesis en teksten opsturen

# Interviewguide Leader of the Photon Delta Office

## Introductie

- Jezelf voorstellen
- Doel van het interview
- Toestemming vragen om het interview op te nemen
- Functie van de geïnterviewde:
  - Leider van het Photon Delta Office

## Organisatie

- Vele respondenten hebben mij inmiddels verteld dat fotonica het nieuwe booming cluster is van Brainport, wat verstaat u onder fotonica?
- Wat voor een **type organisatie** is het Photon Delta Office en wat is de **taak** van het Photon Delta Office?
- Hoe **ziet** het geïntegreerde fotonica-ecosysteem van Photon Delta eruit?
  - Wat is het **doel** van het ecosysteem?
  - Competitie, samenwerking?
  - Gestructureerd, hiërarchisch netwerk, waardeketens?
- Wat is de **rol** van het Photon Delta office in het creëren van netwerken in de fotonica?
- Wat zijn de **activiteiten** die het Photon Delta Office onderneemt om deze het fotonica-ecosysteem te ontwikkelen?
- Wie zijn de “**klanten**” die gebruik maken van de diensten van het Photon Delta Office?
  - Uit de regio?
- Wat zijn de **producten/diensten** die het Photon Delta Office aan haar klanten kan bieden?
  - Kennis, Netwerken, Faciliteiten, Verbinden

## Kennis

- Ontwikkelt het Photon Delta Office zelf ook **nieuwe kennis** op het gebied van fotonica?
- Wat voor **soort kennis** wordt er in het gebied van fotonica ontwikkeld: wetenschappelijke kennis, of nieuwe combinaties van reeds bekende kennis?
- Hoe wordt de fonicakennis door het innovatiesysteem **verspreid**?
  - Activiteiten
  - Rol van het Photon Delta office
  - Blijft de kennis in de regio hangen, of wordt deze ook daarbuiten verspreid?

## Project Photon Delta

- Hoe zou u het project Photon Delta beschrijven?
- Wat voor activiteiten worden ondernomen in het project Photon Delta?
- Waarom is het project Photon Delta opgestart?
- Wat is het doel van het project Photon Delta?
- Wat voor soort activiteiten worden in gang gezet door het project Photon Delta?
  - Wat is de rol van het project in deze innovatieve activiteiten?
  - Focus op kennisontwikkeling en kennisverspreiding?
  - Focus op verbinden?
- Op welke actoren is het project Photon Delta gericht? (doelgroep)
- Photon Delta is een project van de TU/e in samenwerking met andere actoren. Wat voor soort actoren zijn dit?
  - Uit Brainport of ook daar buiten?
  - Hoe verloopt de samenwerking tussen de verschillende actoren?
  - Zijn er al “conflicten” geweest in de samenwerking binnen het project?
- Wat is voor soort ontwikkelingen zal het project Photon Delta realiseren?
- Binnen OP-Zuid is het project onderdeel van de prioriteit “versterken van het innovatiesysteem”, hoe draagt het project Photon Delta daar aan bij?
- Hoe denkt u dat de activiteiten van het project Photon Delta bijdragen aan de ontwikkeling van het innovatiesysteem van Brainport?
- Wat zijn de resultaten van het project Photon Delta tot nu toe?
- Zijn er maatregelen getroffen in het project die ervoor te zorgen dat de resultaten van het project ook na afloop van het project langdurig zichtbaar en/of toegankelijk zijn?
  - Wat voor soort maatregelen?

## OP-Zuid

- Waarom hebt u besloten om co-financiering van OP-Zuid aan te vragen om het project te financieren?
- Waarom hebt u voor OP-Zuid gekozen en niet een ander Europees programma, zoals Interreg Vlaanderen-Nederland?
- Hoe wordt de co-financiering van OP-Zuid in het project gebruikt?
- Wat vindt u de bijdrage van de Europese fondsen voor de ontwikkeling van Brainport?
  - Blijvende bijdrage aan de ontwikkeling?

## Afronden

- Bedanken, thesis en teksten opsturen

# Interviewgide Manager New Business at Twice Eindhoven

## Introductie

- Jezelf voorstellen
- Doel van het interview
- Toestemming vragen om het interview op te nemen
- Functie van de geïnterviewde:
  - Senior manager new business bij Twice Eindhoven

## Organisatie

- Wat voor een **type organisatie** is Twice Eindhoven en wat is het **doel** van Twice Eindhoven?
- Ik las dat Twice Eindhoven een bijzonder stimulerende omgeving biedt voor jonge, innovatieve technologiebedrijven, en dat Twice Eindhoven mee bouwt aan een duurzaam succes voor die bedrijven. Wat zijn de **activiteiten** die Twice Eindhoven onderneemt om dat te realiseren?
  - Hoe ziet die stimulerende omgeving eruit?
  - Hoe bouwt Twice Eindhoven aan dit duurzame succes?
  - Wat is de **toegevoegde waarde** van de activiteiten van Twice Eindhoven?
- Wie zijn de “**klanten**” die gebruik maken van de diensten van Twice Eindhoven?
  - Uit de regio?
- Wat zijn de **producten/diensten** die Twice Eindhoven aan haar klanten kan bieden?
  - Verhuren kantoorpanden
  - Netwerk
  - “Reclame” voor bedrijven?
- Op welke manier denkt u dat Twice Eindhoven helpt om het **innovatiesysteem** van Brainport te ontwikkelen?

## Project Link2Innovate

- Hoe zou u het project Link2Innovate **beschrijven**?
- Wat voor **activiteiten** worden ondernomen in het project Link2Innovate?
  - Wat is de rol van het project in deze innovatieve activiteiten?
  - Focus op kennisontwikkeling en kennisverspreiding?
  - Focus op verbinden?
- Wat is de **rol** van Twice Eindhoven in het project Link2Innovate?
- Waarom is het project Link2Innovate **opgestart**?
- Wat is het **doel** van het project Link2Innovate?

- Op **welke actoren** is het project Link2Innovate gericht? (doelgroep)
- Link2Innovate wil jonge bedrijven helpen de “Valley of death” te trotseren:
  - Wat is deze **Valley of Death**?
  - Hoe draagt het project eraan bij om deze Valley of Death te **trotseren**?
- Link2Innovate wil grensoverschrijdende samenwerking realiseren tussen jonge innovatieve technologiebedrijven en gevestigde bedrijven om zo tot nieuwe toepassingen te komen:
  - Aan wat voor **soort bedrijven** moet ik denken, welke sector?
  - Wat voor **nieuwe toepassingen** zouden er gerealiseerd moeten worden?
  - **Hoe** draagt Twice Eindhoven hier aan bij?
- Link2Innovate is een project waarin Twice Eindhoven samenwerkt met andere actoren. Wat voor **soort actoren** zijn dit?
  - Hoe verloopt de samenwerking tussen de verschillende actoren?
  - Zijn er al “conflicten” geweest in de samenwerking binnen het project?
- Wat is voor soort **ontwikkelingen** zal het project Link2Innovate realiseren in de grensregio?
- Wat is de **toegevoegde waarde** van het grensoverschrijdend samenwerken voor de ontwikkelingen die het project Link2Innovate zal realiseren?
- Wat zijn de **voor- en nadelen** van grensoverschrijdend samenwerken?
- Binnen Interreg Vlaanderen-Nederland is het project onderdeel van de thema “Innovatie”, dat zich richt op de **versterking van het innovatiesysteem**. Hoe draagt het project Link2Innovate bij aan de versterking van dat innovatiesysteem?
- Hoe denkt u dat de activiteiten van het project Link2Innovate bijdragen aan de ontwikkeling van het innovatiesysteem van **Brainport**?
- Wat zijn de **resultaten** van het project Link2Innovate tot nu toe?
- Zijn er **maatregelen** getroffen in het project die ervoor te zorgen dat de resultaten van het project ook na afloop van het project langdurig zichtbaar en/of toegankelijk zijn?
  - Wat voor soort maatregelen?
- Wat vindt u de **toegevoegde waarde** van door de EU mede gefinancierde projecten voor de versterking van een innovatiesysteem zoals Brainport?
  - Blijvende bijdrage aan de ontwikkeling?

## Afronden

- Bedanken
- Thesis en teksten opsturen

# Interviewgide Process Manager Economic Strategy at MRE

## Introductie

- Jezelf voorstellen
- Doel van het interview
- Toestemming vragen om het interview op te nemen
- Functie van de geïnterviewde:
  - Procesmanager economische strategie bij Metropoolregio Eindhoven

## Organisatie

- Waarom is de MRE **opgericht**?
- Wat voor een **type organisatie** is de Metropoolregio Eindhoven en wat is de **taak** van de Metropoolregio Eindhoven?
  - Samenwerking van gemeenten
  - Hoe gaat dit in zijn werk?
  - Wanneer en waarom (toegevoegde waarde)?
  - Op welke thema's → strategie
  - Heeft het bestuurlijke macht?
  - Hoe wordt het gefinancierd?
- De Metropoolregio Eindhoven heeft verschillende **thema's** waar het zich mee bezig houdt in de regio zoals Economie, Mobiliteit en Ruimte. Wat zijn de **activiteiten** die de Metropoolregio Eindhoven onderneemt om de regio in deze thema's te ontwikkelen?
- **Waarom** richt de MRE zich op de thema's economie, mobiliteit en ruimte, en niet op andere thema's?
- Welke economische **doelen** heeft de Metropoolregio Eindhoven in de regio?
  - Wat doet MRE precies om ervoor te zorgen dat de economische doelen worden **gehaald**?
  - Worden deze doelen ook **omgezet** in beleidsstukken en strategieën?
- Wat is de **rol** van de MRE in de ontwikkeling van het innovatiesysteem?
  - Hoe **verschilt** de rol van de MRE van de rol van de afzonderlijke gemeenten?

## Relaties

- Ik had gelezen dat de MRE Brainport helpt in het realiseren van zijn ambities. Wat is de **relatie** tussen de Metropoolregio Eindhoven en Brainport?
  - Ondersteunen in uitvoeren agenda Brainport 2020 → **hoe**?



- Wat is de specifieke **bijdrage** van de MRE in het uitvoeren van de Brainport2020 Agenda?
- Verhouding met Brainport Development
- Hoe verloopt de **samenwerking** met Brainport?
- **Waarom** werkt de MRE samen met Brainport?
- Wat is de **rol** voor de MRE in de Brainport Triple Helix?
  - Is de rol van de gemeenten in de Triple Helix door een alliantie via de MRE sterker?
  - Wat brengt de MRE in, in de Brainport Triple Helix?
- Wat is de **toegevoegde waarde** van de samenwerking via Brainport voor de MRE?
- Is er ook nog **samenwerking** met kennisinstellingen en bedrijven door de MRE los van Brainport?
  - Hoe zou deze samenwerking zijn **zonder** Brainport?

### Instituties

- De MRE bestaat uit 21 verschillende gemeenten, die heel erg verschillen, maar toch samen werken in de MRE. Wat is hetgeen dat de 21 gemeenten in **gemeen** hebben?
  - Lokale **normen en waarden**, cultuur in de MRE?
  - Innovatiesysteem
- In de MRE is er een succesvol economisch innovatiesysteem, hoe zou u de economische **cultuur** in de MRE beschrijven?
  - Innovatieve **cultuur**
  - Wat is het beeld van **samenwerking**?
  - Is er sprake van **laagdrempeligheid** in de regio?
  - Wat is de invloed geweest van **Philips** in ontwikkelen van die cultuur?
  - Wat is de **rol** van beleid en wetgeving in het ontwikkelen van deze economische cultuur?

### Door de EU gefinancierde projecten

- De gemeente Eindhoven was en is onder andere bezig met een aantal door de EU mede gefinancierde projecten, zoals EURIS. Hoe passen deze projecten in de ambities van de MRE?
- Wat vindt u de toegevoegde waarde van dit soort projecten voor de versterking van het innovatiesysteem in Brainport?

### Afsluitend

- Hoe ziet ... de ontwikkeling van Brainport in de nabije toekomst?
- Hoe ziet ... de rol van de MRE in Brainport in de toekomst?

# Interviewguide Programme Director Clusters at Brainport Development and Strategic Policy Advisor at Helmond Municipality

## Introductie (allen)

- Jezelf voorstellen
- Doel van het interview
- Toestemming vragen om het interview op te nemen
- Positie van geïnterviewde
  - ...: Programmadirecteur Clusters bij Brainport Development, Contactpersoon Interreg project ERMIS
  - ...: Strategisch beleidsadviseur bij Gemeente Helmond, betrokken bij EU projecten
  - ...: Internationaal projectmanager bij Brainport Development, o.a. Vanguard Initiative 3D printing pilot

## Brainport Development

### Organisatie

- Wat verstaat u onder Brainport?
- Brainport Development is een ontwikkelingsorganisatie, wat voor activiteiten onderneemt Brainport Development om ontwikkeling te realiseren in Brainport?
- Wat is de toegevoegde waarde van de activiteiten van Brainport Development?
- Brainport Development krijgt zowel subsidies van Europa als van het Rijk, welke subsidies zijn belangrijker voor de ontwikkeling van Brainport en waarom?
- Wat is de toegevoegde waarde van Europese subsidies in vergelijking met de Nederlandse subsidies?
- Brainport Development is vaak betrokken bij Europese projecten, zoals ERMIS, EURIS, het Vanguard Initiative en vele andere. Wat is de reden voor Brainport Development om deze projecten te doen?
- Wat is de toegevoegde waarde van deze projecten aan de ontwikkeling van Brainport?

### Relaties

- Brainport Development is onderdeel van de Brainport Triple Helix bestaande uit overheid, kennisinstellingen en bedrijven. Wat is de rol van Brainport Development in deze triple helix?
- Wat is het doel van de Brainport Triple Helix?
  - Competitie, samenwerking, transacties
  - Kennis, goederen & diensten?
  - Netwerk alleen in Brainport of ook daar buiten → Brainport Network

- Hoe is de Brainport Triple Helix gestructureerd?
  - Hiërarchisch en gestructureerd, complex?

### Brainport

- Het accent van Brainport ligt met name op de stad Eindhoven, hoe zorgt Brainport Development ervoor dat ook de gemeenten om Eindhoven heen profiteren van de ontwikkelingen van Brainport?
- Wat voor soort ontwikkelingen (en Europese projecten) zijn er gaande buiten Eindhoven?
- Wat voor door de EU mede gefinancierde projecten zijn er in Helmond?
- Wat maakt Brainport als innovatiehotspot zo aantrekkelijk?
  - Lokale normen en waarden/cultuur
  - Established practices → Philips, ASML
  - Wetten, belastingvoordelen?

### EURIS/Projecten Helmond

- Waarom heeft Brainport Development het project EURIS opgezet?
- Waarom is er gekozen voor Interreg als programma en niet OP-Zuid of Horizon2020?
- Hoe zou u het project EURIS beschrijven?
- Wat voor soort activiteiten werden ondernomen in het project EURIS?
- In het project EURIS is door kennisdeling (F3) en het delen van best practices (F4) bijgedragen aan de ontwikkeling van regionale innovatiestrategieën:
  - Over wat voor een soort kennis praten we hier?
  - Wat zijn een aantal best practices die gedeeld zijn?
  - Hoe heeft dit bijgedragen aan de ontwikkeling van innovatiestrategieën in Brainport?
- Wat voor soort ontwikkelingen heeft het project EURIS gerealiseerd?
  - Actoren, Netwerk, Kennis
- Hoe hebben de activiteiten van het project EURIS bijgedragen aan de ontwikkeling van het innovatiesysteem Brainport?
- Wat waren de resultaten van het project EURIS?

### ERMIS

- Waarom heeft Brainport Development besloten om met het project ERMIS mee te doen?
- Hoe zou u het project ERMIS beschrijven?
- Wat voor activiteiten werden ondernomen in het project ERMIS?

- In het project ERMIS werd getracht om benaderingen te vinden die het lokale innovatiesysteem effectiever maken, o.a. door best practices uit te wisselen (F4), wat de hefboomwerking van het eigen lokale innovatiesysteem zou versterken:
  - Wat zijn best practices die zijn uitgewisseld?
  - Wat wordt bedoeld met die hefboomwerking?
  - Hoe is het lokale innovatiesysteem van Brainport daardoor effectiever geworden?
  - Hoe is de “doeltreffendheid” van de triple helix verbeterd door zich te richten op het MKB?
- Wat voor soort innovatieve activiteiten werden in gang gezet door het project ERMIS?
  - Wat is de rol van het project in deze innovatieve activiteiten?
  - Focus op kennisontwikkeling en innovatie
- Op welke actoren is het project Smart Systems gericht? (doelgroep)
- ERMIS was een Interreg project in samenwerking met andere actoren. Wat voor soort actoren waren dit?
  - Hoe verliep de samenwerking tussen de verschillende actoren?
  - Waren er “conflicten” geweest in de samenwerking binnen het project?
- Wat voor soort ontwikkelingen heeft het project ERMIS gerealiseerd?
  - Actoren, Netwerk, Kennis
- Hoe hebben de activiteiten van het project ERMIS bijdragen aan de ontwikkeling van het innovatiesysteem van Brainport?
- Wat waren de resultaten van het project ERMIS voor Brainport?
- Waren er maatregelen getroffen in het project die ervoor te zorgen dat de resultaten van het project ook nu, na afloop van het project, zichtbaar en/of toegankelijk zijn?
  - Wat voor soort maatregelen?

### **Vanguard Initiative 3D Printing**

- Waarom heeft Brainport Development besloten om met het Vanguard Initiative 3D printing mee te doen?
- Hoe zou u het Vanguard Initiative 3D printing pilot beschrijven?
- Wat voor activiteiten worden ondernomen in het Vanguard Initiative?
- Wat voor soort innovatieve activiteiten worden in gang gezet door het Vanguard Initiative?
  - Wat is de rol van het project in deze innovatieve activiteiten?
  - Focus op kennisontwikkeling en innovatie
- Het Vanguard Initiative richt zich op toekomstgerichte industriële nichemarkten (F5) die rijp zijn voor hun doorbraak (F7) door waardeketens te bouwen:

- Hoe draagt Brainport Development daar aan bij?
- Worden er ook nieuwe nichemarkten gecreëerd → hoe?
- Hoe dragen de Pilots, zoals “High Performance through 3D printing” bij aan het ontwikkelen van nichemarkten en waardeketens?
- Wanneer wordt een nichemarkt geacht dat hij daadwerkelijk rijp is voor de doorbraak → wanneer is de technologie “geaccepteerd”?
- Het VI is een samenwerking met andere actoren. Wat voor soort actoren zijn dit?
  - Hoe verloopt de samenwerking tussen de verschillende actoren?
  - Zijn er al “conflicten” geweest in de samenwerking binnen het project?
- Wat voor soort ontwikkelingen zal het Vanguard Initiative realiseren?
  - Actoren, Netwerk, Kennis
- Hoe zullen de activiteiten van het Vanguard Initiative bijdragen aan de ontwikkeling van het innovatiesysteem van Brainport?
- Wat zijn de resultaten van het Vanguard Initiative voor Brainport tot nu toe?
- Worden er maatregelen getroffen in het project die ervoor te zorgen dat de resultaten van het project ook na afloop van het project zichtbaar en/of toegankelijk zijn?
  - Wat voor soort maatregelen?

#### **Afsluitend (allen)**

- Hoe zien respondenten de ontwikkeling van Brainport in de nabije toekomst?
- Hoe zien respondenten de rol van Brainport Development in Brainport in de toekomst?

#### **Afronden (allen)**

- Bedanken
- Thesis en teksten opsturen

# Interviewgide Programme Manager at Stimulus

## Introductie

- Jezelf voorstellen
- Doel van het interview
- Toestemming vragen om het interview op te nemen
- Functie van de geïnterviewde:
  - Programmamanager bij Stimulus

## Organisatie

- Wat voor een **type organisatie** is Stimulus Programmamanagement en wat is de **taak** van Stimulus Programmamanagement?
- **Waarom** is Stimulus Programmamanagement in het leven geroepen?
- Stimulus Programmamanagement voert verschillende Europese subsidieprogramma's uit, welke **activiteiten** worden ondernomen in de uitvoering van deze subsidieprogramma's?
  - Verschillen tussen de programma's?
- Stimulus Programmamanagement richt zich op Zuid-Nederland, heeft Stimulus Programmamanagement ook een rol in de ontwikkeling van **Brainport**?

## OP-Zuid

- **Hoe** komt het dat Stimulus Programmamanagement het OP-Zuid programma uitvoert?
- De basis van het OP-Zuid programma ligt in de Slimme Specialisatiestrategie Zuid, wat is de **rol** van deze strategie in de activiteiten van Stimulus Programmamanagement?
- Binnen OP-Zuid zijn er twee **hoofdprioriteiten**, de innovatiebevordering en de koolstofarme economie. Wat wordt bij Stimulus **verstaan** onder innovatiebevordering?
- In de prioriteit innovatiebevordering heeft Stimulus Programmamanagement drie **doelstellingen**. Als we kijken naar de doelstellingen, **wat** voor een projecten worden binnen die doelstellingen gezocht?
  - 1B1: Versterken en verbreden van het open innovatiesysteem dmv crossovers
  - 1B2: Versterken van het valorisatievermogen van het MKB
  - 1B3: Versterking van het systeem waarbinnen arbeidsvraag en –aanbod binnen topclusters wordt afgestemd om het innovatiepotentieel te benutten.
- Hoe denkt Stimulus dat de projecten **bijdragen** aan de versterking van het innovatiesysteem in Zuid-Nederland → **Brainport**?
  - Innovatieve activiteiten
  - Kennisontwikkeling en –verspreiding

- Het creëren van netwerken (verlagen van zoekdrempel)
- Er worden bij iedere oproep vele projectvoorstellen ingediend, wat zijn de **redenen** voor Stimulus Programmamanagement om sommige voorstellen **goed te keuren**, en sommige voorstellen af te keuren?
- Zijn er binnen het huidige OP-Zuid programma al **vertraagde projecten**?

### Interreg

- Stimulus Programmamanagement voert niet één van de Interregprogramma's uit, wat is de **rol** van Stimulus dan omtrent Interreg?
- Stimulus Programmamanagement is projectpartner in het project **Crossroads 2**, hoe zou u dat project **beschrijven**?
- Wat is het **doel** van het project Crossroads 2?
- Wat voor **activiteiten** worden ondernomen in het project Crossroads 2?
- Wat is de **rol** van Stimulus Programmamanagement in het project Crossroads 2?
- Wat is de **reden** voor Stimulus Programmamanagement om mee te doen in het project Crossroads 2?
- Wat is voor soort **ontwikkelingen** zal het project Crossroads 2 realiseren?
  - Haalbaarheidsstudies
  - Innovatieprojecten
- Hoe denkt u dat de innovatieve activiteiten van het project Crossroads 2 bijdragen aan de **ontwikkeling van het innovatiesysteem** van Zuid-Nederland?
  - Zijn er **bedrijven uit Brainport** die gebruik gemaakt hebben van de subsidies van Crossroads 2?
  - Kunt u een **voorbeeld** noemen?
- Wat zijn de **resultaten** van het project Crossroads 2 tot nu toe?

### Afronden

- Bedanken
- Vragen naar andere respondenten
- Thesis en teksten opsturen

# Interviewgide Project Initiator Printed Electronics

## Introductie

- Jezelf voorstellen
- Doel van het interview
- Toestemming vragen om het interview op te nemen
- Positie van de geïnterviewde:
  - Programmamanager High-tech bij de Brabantse Ontwikkelingsmaatschappij
  - Projectpartner van het project Printed Electronics

## Organisatie

- De BOM is een ontwikkelingsorganisatie, wat voor activiteiten onderneemt de BOM in het algemeen?
  - Wat voor activiteiten onderneemt de BOM in Brainport?
- Wat is de toegevoegde waarde van de activiteiten van de BOM in de ontwikkeling van Brainport?
- Is de BOM een overheidsinstelling?
- Wat is de rol van de BOM in de ontwikkeling van Brainport?
  - Wat doet de BOM voor de ontwikkeling van de high-tech sector
- Met welke partners werkt de BOM vooral samen op het gebied van high-tech sector?
  - Brainport Triple Helix
  - Wat is de houding van de BOM t.a.v. Brainport Development?
  - Hoe verloopt deze samenwerking?
  - Is er wel een sprake geweest van “conflicten”?
- De BOM is vaak betrokken bij projecten voor regionale ontwikkeling, zo ook in Brainport. Wat is de reden voor de BOM om deze projecten te doen?
- Wat is de toegevoegde waarde van deze projecten aan de ontwikkeling van Brainport?
- De BOM is ook een belangrijke speler in het ontwikkelen van de Brainport Industries Campus. Alhoewel het niet uw dossier is, zou u misschien toch kunnen beschrijven wat de rol van de BOM is in het ontwikkelen van deze campus?
- Waartoe zal de Brainport Industries Campus dienen?



## Printed Electronics

- Printed Electronics is een technologie waarbij je elektronica op een flexibele achtergrond kunt drukken. Hoe moet ik dit zien, en wat voor toepassingen heeft deze technologie?
- Wat is het doel van het project Printed Electronics?
- Hoe zou u het project Printed Electronics beschrijven?
- Wat voor activiteiten worden ondernomen in het project Printed Electronics?
- Wat voor soort innovatieve activiteiten worden in gang gezet door het project Printed Electronics?
  - Wat is de rol van het project in deze innovatieve activiteiten?
  - Wat is de rol van kennisontwikkeling en –verspreiding?
  - Wat is de rol van samenwerking in het project?
- Printed Electronics is een nieuwe sector, hoe wil u deze sector laten groeien?
  - Technologie meer embedden in het systeem?
  - Vorming van waardeketens
- Op welke actoren is het project Printed Electronics gericht? (doelgroep)
- Wat is de reden voor de BOM om mee te doen in het project Printed Electronics?
- Printed Electronics is een project van TNO in samenwerking met andere actoren, waaronder de BOM. Wat voor soort actoren zijn dit?
  - Komen de actoren uit de regio Brainport of ook daar buiten?
  - Hoe verloopt de samenwerking tussen de verschillende actoren?
  - Zijn er al “conflicten” geweest in de samenwerking binnen het project?
- Wat is voor soort ontwikkelingen zal het project Printed Electronics realiseren?
  - Actoren, Netwerk, Kennis
- Hoe denkt u dat de innovatieve activiteiten van het project bijdragen aan de ontwikkeling van het innovatiesysteem van Zuid-Nederland?
  - Brainport?
- Wat zijn de resultaten van het project Printed Electronics tot nu toe?
- Zijn er maatregelen getroffen in het project die ervoor te zorgen dat de resultaten van het project ook na afloop van het project langdurig zichtbaar en/of toegankelijk zijn?
  - Wat voor soort maatregelen?
- Wat is de toegevoegde waarde van dit soort projecten aan de activiteiten van de BOM?

### Afsluitend

- Hoe ziet ... de ontwikkeling van Brainport in de nabije toekomst → BIC?
- Hoe ziet ... de rol van de BOM in het ontwikkelen van Brainport in de toekomst?
- Verwacht ... dat de BOM in meerdere door de EU mede gefinancierde projecten zal participeren?

### Afronden

- Bedanken
- Vragen naar andere respondenten
- Thesis en teksten opsturen

# Interviewguide Project Leader Fetal Monitoring

## Introductie

- Jezelf voorstellen
- Doel van het interview
- Toestemming vragen om het interview op te nemen
- Functie van de geïnterviewde:
  - Vice President Business Development & Sales bij Nemo Healthcare BV

## Organisatie

- Wat voor een **type organisatie** is Nemo Healthcare en wat is het **doel** van Nemo Healthcare?
- Nemo Healthcare is een bedrijf dat zich richt op de ontwikkeling van nieuwe technologie voor zwangerschapsbewaking. Wat zijn de **activiteiten** die Nemo Healthcare onderneemt om dat te realiseren?
- Wie zijn de “**klanten**” die gebruik maken van de diensten van Nemo Healthcare?
  - Patiënten
  - Doktoren
  - Andere bedrijven?
- Wat zijn de **producten/diensten** die Nemo Healthcare aan haar klanten kan bieden?
  - PUREtrace pleister

## Relaties

- Met welke **partners** werkt Nemo Healthcare samen om bepaalde ontwikkelingen te realiseren?
  - Waarom die partners
  - Doel van de samenwerking
- Nemo Healthcare is gevestigd in de MMC Incubator, hoe beschouwt Bas Lemmens de **relatie** tussen Nemo Healthcare en de andere start-ups die zijn aangesloten bij deze incubator?
  - Netwerk
  - Competitie
  - Samenwerking
- Vindt er samenwerking plaats met kennisinstellingen?
- Vindt er samenwerking plaats met overheden?
- Vindt er samenwerking plaats binnen netwerkorganisaties?

## Project Fetal Monitoring

- Hoe zou u het project Fetal Monitoring **beschrijven**?
- Wat voor **activiteiten** worden ondernomen in het project Fetal Monitoring?
  - Wat is de rol van het project in deze innovatieve activiteiten?
  - Focus op kennisontwikkeling en kennisverspreiding?
  - Focus op verbinden?
- Waarom is het project Fetal Monitoring **opgestart**?
- Wat is het **doel** van het project Fetal Monitoring?
- Hoe verloopt het project Fetal Monitoring?
  - Stand van zaken
  - Vertraging?
- Waarom is gekozen voor financiering van **Horizon2020** voor het project Fetal Monitoring?
- Wat is er dankzij de subsidie van Horizon2020 wel **mogelijk** voor Nemo Healthcare, wat zonder deze subsidie niet mogelijk zou zijn geweest?
  - Innovatieve activiteiten, kennisontwikkeling, verbinden, marktformatie, legitimeren van technologieën (maturen)?
- Tijdens de call van Horizon2020 is het project Fetal Monitoring uit meer dan duizend aanvragen verkozen. Wat maakt het project Fetal Monitoring zo **uniek**?
- Vindt er binnen het project **samenwerking** plaats met andere actoren?
  - Hoe verloopt deze samenwerking?
  - Zijn er al “conflicten” geweest?
- Op **welke actoren** is het project Fetal Monitoring gericht? (doelgroep)
- Wat is voor soort **ontwikkelingen** zal het project Fetal Monitoring realiseren?
- Wat zijn de **resultaten** van het project Fetal Monitoring tot nu toe?
- De Horizon2020 subsidie maakt heel veel mogelijk, maar ondervindt Nemo Healthcare ook **nadelen** van deze subsidie?
- Wat vindt u de **toegevoegde waarde** van door de EU mede gefinancierde projecten voor de versterking van een innovatiesysteem zoals Brainport?
  - Blijvende bijdrage aan de ontwikkeling?

## Afronden

- Bedanken
- Thesis en teksten opsturen

## Interviewgide Project leader Kennisvragenbanken

### Introductie

- Jezelf voorstellen
- Doel van het interview
- Toestemming vragen om het interview op te nemen
- Positie van de geïnterviewde:
  - Projectleider bij TU/e Innovation Lab van SURE Innovation en Kennisvragenbanken

### TU/e Innovation Lab & SURE Innovation

#### Organisatie

- Wat voor een type organisatie is het TU/e Innovation Lab en wat is de taak van het TU/e Innovation Lab?
- Wat voor activiteiten onderneemt het TU/e Innovation Lab?
  - Ontwikkelt het TU/e Innovation Lab zelf kennis en/of innovaties?
- Wat is de rol van de TU/e in het innovatiesysteem van Brainport?
- SURE Innovation richt zich op slimme matchmaking tussen bedrijven en excellente masterstudenten, hoe komt deze matchmaking tot stand?
  - Is het een soort stage of traineeship?
  - Martijn!

#### Kennis

- Op welke onderzoeksgebieden wordt er door het TU/e Innovation Lab kennis ontwikkeld?
  - Hoe? → Alleen onderzoek of ook nieuwe combinaties?
- Zijn er bedrijven die vragen om een specifiek soort kennis dat door het TU/e Innovation Lab moet worden ontwikkeld?
  - Hoe vaak gebeurt dit?
  - Veel interactie met bedrijven?
- Hoe wordt de kennis van de TU/e gevaloriseerd?
- Hoe wordt de kennis van het TU/e Innovation Lab in het innovatiesysteem verspreid?
  - Blijft de kennis in de regio hangen, of wordt deze ook daarbuiten verspreid?
- Wat is de toegevoegde waarde van de nieuwe kennis van de TU/e in het innovatiesysteem van Brainport?
  - Bijdrage aan collectief leerproces in de regio?

## Project Kennisvragenbanken

- Hoe zou u het project Kennisvragenbanken beschrijven?
- Wat voor activiteiten worden ondernomen in het project Kennisvragenbanken?
- Wat vult het project Kennisvragenbanken aan t.o.v. SURE Innovation?
- Wat voor soort activiteiten worden in gang gezet door het project Kennisvragenbanken?
  - Wat is de rol van het project in deze innovatieve activiteiten?
  - Focus op kennisontwikkeling en kennisverspreiding?
- Op welke actoren is het project Kennisvragenbanken gericht? (doelgroep)
- Kennisvragenbanken is een project van de TU/e in samenwerking met andere actoren. Wat voor soort actoren zijn dit?
  - Uit Brainport of ook daar buiten?
  - Hoe verloopt de samenwerking tussen de verschillende actoren?
  - Zijn er al “conflicten” geweest in de samenwerking binnen het project?
- Wat is voor soort ontwikkelingen zal het project Kennisvragenbanken realiseren?
  - Actoren, Kennis
- Binnen OP-Zuid is het project onderdeel van de prioriteit “versterken van het innovatiesysteem”, hoe draagt het project daar aan bij?
  - Human capital
- Hoe denkt u dat de activiteiten van het project bijdragen aan de ontwikkeling van het innovatiesysteem van Brainport?
- Wat zijn de resultaten van het project Kennisvragenbanken tot nu toe?
- Zijn er maatregelen getroffen in het project die ervoor te zorgen dat de resultaten van het project ook na afloop van het project langdurig zichtbaar en/of toegankelijk zijn?
  - Wat voor soort maatregelen?

## OP-Zuid

- Waarom hebt u besloten om co-financiering van OP-Zuid aan te vragen om het project te financieren?
- Waarom hebt u voor OP-Zuid gekozen en niet een ander Europees programma, zoals Interreg Vlaanderen-Nederland?
- Hoe wordt de co-financiering van OP-Zuid in het project gebruikt?
- Wat vindt u de voordelen van de financiering via OP-Zuid in vergelijking met andere fondsen?
- Wat vindt u de nadelen van de financiering via OP-Zuid in vergelijking met andere fondsen?
- Wat vindt u de bijdrage van de Europese fondsen voor de ontwikkeling van Brainport?
  - Blijvende bijdrage aan de ontwikkeling?

### **Afsluitend**

- Hoe ziet ... de ontwikkeling van Brainport in de nabije toekomst?
- Hoe ziet ... de rol van het TU/e Innovation Lab in Brainport in de toekomst?
- Verwacht ... dat het TU/e Innovation Lab in meerdere door de EU mede gefinancierde projecten zal participeren?

### **Afronden**

- Bedanken
- Vragen naar andere respondenten
- Thesis en teksten opsturen

# Interviewgide Lead Partner Smart Systems

## Introductie

- Jezelf voorstellen
- Doel van het interview
- Toestemming vragen om het interview op te nemen
- Positie van de geïnterviewde:
  - Director Business Development bij DSP Valley
  - Projectleider OPZuid project Smart Systems

## DSP Valley

### Organisatie

- Wat voor een type organisatie is DSP Valley en wat is de taak van DSP Valley?
  - Bedrijf, kennisinstelling, publiek?
- Wat verstaat u onder Smart Systems?
- Hoe draagt DSP Valley bij aan de ontwikkeling van Smart Systems?
- Wat is de toegevoegde waarde van Smart Systems voor Brainport?
- Wat is de rol van DSP Valley in het innovatiesysteem van Brainport?
- Is DSP Valley eerder betrokken geweest bij een OP Zuid of ander project?
  - Welk project (ELAT?)
  - Ervaringen
  - Hoe ziet ... de rol van door de EU mede gefinancierde projecten in de ontwikkeling van Brainport?

### Relaties

- DSP Valley is een netwerkplatform met meer dan 100 leden. Hoe ziet dit netwerk er uit en hoe werkt het netwerk?
- Wat voor soort actoren zijn onderdeel van het netwerk van DSP Valley?
- Wat is het doel van het netwerk van DSP Valley?
  - Competitie, samenwerking, transacties
  - Kennis, goederen & diensten?
  - Netwerk alleen in Brainport of ook daar buiten?
- Hoe is het netwerk van DSP Valley gestructureerd?
  - Hiërarchisch en gestructureerd, complex, value chains?
- Wat is de rol van DSP Valley in het creëren van netwerken in Brainport?



## Project Smart Systems

- Hoe zou u het project Smart Systems beschrijven?
- Wat voor activiteiten worden ondernomen in het project Smart Systems?
- Wat voor soort innovatieve activiteiten worden in gang gezet door het project Smart Systems?
  - Wat is de rol van het project in deze innovatieve activiteiten?
  - Focus op kennisontwikkeling en innovatie
  - Cross-over HTSM, Life Sciences & Health en Maintenance & Industrie
- Op welke actoren is het project Smart Systems gericht? (doelgroep)
- Smart Systems is een project van DSP Valley in samenwerking met andere actoren. Wat voor soort actoren zijn dit?
  - Uit Brainport of ook daar buiten?
  - Hoe verloopt de samenwerking tussen de verschillende actoren?
  - Zijn er al “conflicten” geweest in de samenwerking binnen het project?
- Wat is voor soort ontwikkelingen zal het project Smart Systems realiseren?
  - Actoren, Netwerk, Kennis
- Hoe denkt u dat de innovatieve activiteiten van het project bijdragen aan de ontwikkeling van het innovatiesysteem van Brainport?
- Wat zijn de resultaten van het project Smart Systems tot nu toe?
- Zijn er maatregelen getroffen in het project die ervoor te zorgen dat de resultaten van het project ook na afloop van het project langdurig zichtbaar en/of toegankelijk zijn?
  - Wat voor soort maatregelen?

## OP-Zuid

- Waarom hebt u besloten om co-financiering van OP-Zuid aan te vragen om het project te financieren?
- Waarom hebt u voor OP-Zuid gekozen en niet een ander Europees programma, zoals Interreg Vlaanderen-Nederland?
- Hoe wordt de co-financiering van OP-Zuid in het project gebruikt?
- OP-Zuid co-financiert 1 miljoen van de 2,75 miljoen dat het totale project moet kosten. Hoe wordt de rest van het project gefinancierd?
- Wat vindt u de voordelen van de financiering via OP-Zuid in vergelijking met andere fondsen?
- Wat vindt u de nadelen van de financiering via OP-Zuid in vergelijking met andere fondsen?
- Wat vindt u de bijdrage van de Europese fondsen voor de ontwikkeling van Brainport?
  - Blijvende bijdrage aan de ontwikkeling?

### **Afsluitend**

- Hoe ziet ... de ontwikkeling van Brainport in de nabije toekomst?
- Hoe ziet ... de rol van DSP Valley in Brainport in de toekomst?
- Verwacht ... dat DSP Valley in meerdere door de EU mede gefinancierde projecten zal participeren?

### **Afronden**

- Bedanken
- Vragen naar andere respondenten
- Thesis en teksten opsturen

## Annex 3: Overview of projects

In this annex, I will present an overview of the projects that have been discussed in this research. This overview will provide general information on the projects activities, and which partners that are located in Brainport cooperate.

### OP-Zuid projects

#### Brainport Industries

This project aims to tackle the economic crisis in the Brainport region by providing information to companies, by taking support measures and by strengthening the industrial ecosystem of the region. This project was part of the OPZuid 2007-2013 programming period, and its beneficiary was Brainport Development NV (Stimulus Programmamanagement, n.d.1.).

#### **“Going further” vereist een gedegen productieproces**

*Translation: “Going further” requires a thorough production process*

By analysing work processes, the beneficiary of the project aims to get an overview of the potential of improvement. Per production unit there will be a research on the organisation of work process and how losses can be reduced. In the end, the beneficiary aims to reach a situation with high flexibility and high productivity, still ensuring high quality products. This project was part of the OPZuid 2007-2013 programming period, and its beneficiary was Ramaer Printed Circuits BV (Stimulus Programmamanagement, n.d.2.).

#### HiRes Tracking & Capture System IR

This project focuses on the development of an advanced high resolution tracking system for speed control and speed safety, based on the newest hard- and software techniques. The system will control the use of safety belts, telephoning hands-free and the use of vignettes. This project was part of the OPZuid 2007-2013 programming period, and its beneficiary was TechNet BV (Stimulus Programmamanagement, n.d.3).

#### Kennisvragenbanken

*Translation: Databases for knowledge questions*

The project *Kennisvragenbanken* aims to bridge the gap between SME's and the young, upcoming technicians of the TU/e. The *Kennisvragenbank* (knowledge database) is a database and a website. This database starts with a question of an SME. This question will be answered by excellent students within a timeslot of 3 hours. The questions often have the form like this: *“Is it possible to develop a connector that can disconnect safely?”*. The students of the TU/e then provide an answer, followed with an advice how SURE Innovation can help. This project is part of the OPZuid 2014-2020 programming period, and has SURE Innovation as its lead partner. Partners from the Brainport region

are SURE Innovation, Stichting Kien and High-tech NL (Project leader Kennisvragenbanken, personal communication, 4 May 2017).

### **Ontwikkeling prototype MTT micro WKK**

*Translation: Development prototype Micro turbine technology for cogeneration (warmte-krachtkoppeling).*

This project is focused on the evolution of the Micro Turbine Technology micro turbine into an integrated prototype of a micro unit that can be applied into a micro system. Micro Turbine Technology will develop a serie of prototypes which will deliver a unit that can be tested outdoor. This project was part of the OPZuid 2007-2013 programming period and had Micro Turbine Technology BV as its beneficiary (Stimulus Programmamanagement, n.d.4).

### **Open PICs**

*Full project name: Open Innovatieplatform Fotonische Integrated Circuits*

*Translation: Open Innovation Platform Photonic Integrated Circuits*

Photonic integrated circuits (PICs) are the electronic chips of the future. These integrated circuits work on the basis of light (photonics) instead of electronics. With this project, the co-operators want to strengthen the position of photonics in the south of the Netherlands, by creating an industrial platform for PIC-production for all parties that are interested. This project is part of the OPZuid 2014-2020 programming period, and has the TU/e as its lead partner. Partners from the Brainport region are the TU/e, Bright Photonics BV and Effect Photonics BV (Stimulus Programmamanagement, n.d.5).

### **Photon Delta**

Photonics is a sector that is booming worldwide, and is acknowledged as a Key Enabling Technology in the European Union. The TU/e, COBRA Research Institute and companies from the Brainport region have realized a frontrunner position in the worldwide photonics market. The aim of the Photon Delta project is to grasp this momentum by developing the photonics sector in the region by facilitating photonics research, creating a photonics ecosystem, connecting financiers to the ecosystem and by bringing photonics to the market (Leader of the Photon Delta Office, personal communication, 11 May 2017). This project is part of the OPZuid 2014-2020 programming period, and has the TU/e as its lead partner. Partners from the Brainport region are the TU/e, Brainport Development BV, HTCE Site Management BV, Smart Photonics BV, Effect Photonics BV, VTEC Lasers & Sensors and Genexis BV (Stimulus Programmamanagement, n.d.6).

### **Printed Electronics**

In recent years, there have been developments that allow you to print electronics with the help of conductive inks, materials and substrates. These materials allow you to increase the functionality of a surface by installing sensors or touchpads. The project Printed Electronics aims to put the companies who are involved in developing these products into one consortium, in order to promote printed electronics and to show what is possible with the technology by developing demonstrators (Project initiator Printed Electronics, personal communication, 8 May 2017). This project is part of the OPZuid 2014-2020 programming period, and has TNO as its lead partner. Partners from Brainport are Ato-Gear BV, De Budelse BV, DoMicro BV, Faes Cases BV, HTCE Site Management BV, LifeSense Group BV, Metafas BV, Meyer Burger BV and Stichting Fontys (Stimulus Programmamanagement, n.d.7).

### **Slimmer werken bij Natuursteen Productie Asten**

*Translation: Working smarter at Natural Stone Production Asten*

By analysing work processes, the beneficiary of the project aims to get an overview of the potential of improvement. In the end, the beneficiary aims to reach a situation with high flexibility and a smooth interaction between the production and sales department, still ensuring high quality products. This project was part of the OPZuid 2007-2013 programming period and had Natuursteen Productie Asten BV as its beneficiary (Stimulus Programmamanagement, n.d.8).

### **Smart Systems**

The Internet of Things is an application field with a lot of knowledge, but in which the offer of knowledge is fragmented. Smart Systems is a project of the regional government that aims to realize cooperation in the local industry, in the sectors internet of things, smart health and smart industries, to have a better proposition to the market. The project aims to build an ecosystem in these sectors to offer internet of things as a total solution on the market. Furthermore, the project aims to build demonstrators, to show how such an ecosystem can work and how internet of things can be used (Lead Partner Smart Systems, personal communication, 26 April 2017). This project is part of the OPZuid 2014-2020 programming period, and has DSP Valley as its lead partner. Partners from the Brainport region are DSP Valley, Genexis BV, VTEC Lasers & Sensors, VinciTech BV, Philips Innovation Services BV and Ideas to the Market BV (Stimulus Programmamanagement, n.d.9).

### **TriNano, 3D Nanometrologie voor het MKB**

*Translation: Trinano, 3D nanometrology for SME's*

The TriNano project focused on the development of a demonstrator that can measure 3D objects with an accuracy of 20 nanometers. The aim is to develop a commercial product which can be put on the market for € 100.000,-. This project was part of the OPZuid 2007-2013 programming period, and had XPress Precision Engineering BV as its beneficiary (Stimulus Programmamanagement, n.d.10).

## Interreg projects

### Crossroads2

In the 2007-2013 programming period, Crossroads was one of the biggest successes of the Interreg Flanders-Netherlands programme. The project realised tens of sub-projects in which concrete innovations were realised by companies that cooperated across the border. Examples are a digital printable glue and the TempMitter, an instrument of mobile validation measuring. The Crossroads 2 project builds on this success, but focuses on innovations in the domains of Agrofood, Chemistry & Materials, High-tech Systems, Life Sciences & Health, CleanTech, Biobased, Logistics and Maintenance. By means of an active and direct approach and open calls for project proposals, guidance and coaching in partner matching and subsidies, Crossroads aims to generate new cooperations in the border region between companies and research institutes. This project is part of the OPZuid 2014-2020 programming period, and has Stimulus Programme Management, Zest BV and Alligator Plastics Industry BV as partners from the Brainport region. Furthermore, companies and research institutes from the Brainport region are welcome to apply for funding within the project (Interreg Vlaanderen-Nederland, n.d.1).

### ECCE Innovation

*Full project name: Developing Economic Clusters of Cultural and Creative Enterprises in the Innovation Process*

The aim of the project ECCE Innovation is “to foster the innovation capacity of Creative Industries in order to access new markets”. The creative sector is the most dynamic sector in the economy. It is a key driver of economic and social development and leads to innovation in various other industries and sectors. Turning creative ideas into businesses is the key aim of the project. The project will focus on the exchange and transfer of knowledge and experience related to the cultural and creative industries at a regional level. This project was part of the Interreg North-West Europe programme in the 2007-2013 programming period and is now closed. The Municipality of Eindhoven participated as a project partner (Keep EU Cooperating, 2016).

### ERMIS

*Full project name: Effective Reproducible Model of Innovation Systems*

The ERMIS project aims to enhance the leverage effect of local innovation policies and systems by developing an effective systemic approach that involves the whole value chain of political and economic actors dedicated to SME's. In other words, the ERMIS partners have the "pieces of the puzzle" and this project will help them to fit the pieces together more efficiently. The objective of the ERMIS project is to jointly develop effective and transferable governance models for Local Innovation Systems dedicated to fostering value innovation in SMEs. This project was part of the Interreg Europe

programme in the 2007-2013 programming period and is now closed. The municipality of Eindhoven participated as a project partner (Interreg IVC, n.d.1).

### **EURIS**

*Full project name: European Collaborative and Open Regional Innovation Strategies*

The embracement of open innovation, in terms of accelerated intraregional and interregional cooperation rates among Innovation Stakeholders is the ultimate goal of EURIS. The project aims to:

- Develop more efficient RIS3 Strategies of partners, through mutual learning, the exchange of best practices and the joint development of new interregional approaches on the field of Collaboration Policies conducive to open innovation
- Disseminate and transfer the best practices to other EU Regions.
- Deliver policy recommendations at the regional, national and EU level, to embrace open innovation.

This project was part of the Interreg Europe programme in the 2007-2013 programming period and is now closed. Brainport Development participated as a project partner (Interreg IVC, n.d.2).

### **Fablabs in de grensregio**

*Translation: Fabrication/Fabulous Laboratories in the border region*

A FabLab (Fabrication or Fabulous Laboratory) is a small scale working place with a supply of machines that can make “almost everything”. The base concept rose at the MIT, where everybody was given the opportunity to use such a working place and the specialised machines. FabLabs enable students or young companies to develop a prototype of a product. During the project, such a FabLab was opened in Eindhoven. This project was part of the Interreg Flanders-Netherlands programme in the 2007-2013 programming period and Brainport Development participated as a project partner (Interreg Vlaanderen-Nederland, n.d.2).

### **Incubatorennetwerk(t)**

*Translation: Incubator network(ing)*

Incubatorennetwerk(t) has offered an important added value for the economic valorisation of research results of Flemish and Dutch universities, by encouraging an interregional and inter-university cooperation. By diverse master classes, the project attempted to turn the researchers into successful entrepreneurs. This project was part of the Interreg Flanders-Netherlands programme in the 2007-2013 programming period, and the Technical University Eindhoven participated as a project partner (Interreg Vlaanderen-Nederland, n.d.3).

### **Inno Infra Share**

*Full project name: Sharing Strategies for European Research and Innovation Infrastructures*

In the project Inno Infra Share, European partners will share strategies for European Research and Innovation Infrastructure. The project aims to improve the efficiency and impact of the policies addressed to the exploitation of Research and Innovation Infrastructures for economic and social growth. These infrastructures have the potential to serve as enablers of competitiveness and growth for local SME's, especially in the fields of Key Enabling Technologies. This project is part of the Interreg Europe programme in the 2014-2020 programming period, and Brainport Development is participating as a project partner (Interreg Europe, n.d.1).

### **Link2Innovate**

Young companies are often confronted with the so-called valley of death in the final stages of the development of their new product. Having an innovative product or service, does not mean that you will succeed to put in on the market quickly and efficiently. The Link2Innovate project encourages cooperation between young technology companies and renowned companies on both sides of the border, by scouting them and involving them into a matchmaking process which should lead to three new cross-border cooperations. This programme is part of the Interreg Flanders-Netherlands programme in the 2014-2020 programming period, and Twice Eindhoven is participating as a project partner (Manager new business at Twice Eindhoven, personal communication, 19 May 2017).

### **S34Growth**

*Full project name: Enhancing policies through interregional cooperation: new industrial value chains for growth.*

In the S34Growth project, ten European regions from eight countries will develop an innovative interregional element to their structural fund policy instruments, supporting the renewal of Europe's industry and competitiveness. The goals of this project are to support the renewal of Europe's industry and competitiveness, to emphasise the importance of industry-led interregional collaboration, and to create new interregional cooperation by linking value chains across Europe. This project is part of the Interreg Europe programme in the 2014-2020 programming period, and Brainport Development is participating as a project partner (Interreg Europe, n.d.2).



## Horizon2020 projects

### Fetal Monitoring

The project Fetal Monitoring of Nemo Healthcare BV focuses on the development of innovative technologies used for pregnancy monitoring. In the project, the second generation of a plaster will be developed, which consist of sensors combined with hardware that process the measurements into clinically relevant information. In the project, Nemo Healthcare BV is further extending its products by developing a solution that can monitor the heart activity of the unborn child. This project is part of the Horizon2020 programme. Nemo Healthcare is the only beneficiary of this project (Nemo Healthcare, 2017).

### Infor-Med

The project *Infor-Med* focuses on the development of an application that informs patients and healthcare providers of medical treatments. The project will use virtual reality and 360° videos, that match the information needs of patients concerning specific medical treatments. The project will offer 360° virtual reality videos to inform patients about these treatments. An example of a 360° video is one from the plaster room in the hospital. The video shows how the plaster is cut off and explains that the saw produces a lot of noise but is not dangerous. This video was especially made for kids, who indicated that they were less afraid of the medical treatment after seeing the video. This project is part of the Horizon2020 programme, and has VisitU, Philips BV, the Brainport Foundation, the TU/e, the Maxima Medical Centre, the Health Innovation Campus BV and Acknowledge BV as beneficiaries from the Brainport region (Infor-Med, n.d.).

### InSCOPE

The project InSCOPE aims to create a pilot line service for Hybrid and Printed systems. The project will allow a faster transition from product concept to product, and it will support the development of manufacturing capacity, which will allow SME's to enter the market of thin, organic and large area electronics enabled products. The project aims to provide a comprehensive complementary toolbox for hybrid printed electronics manufacturing processes, and to set up a service infrastructure that enable the development of 15 demonstrators in the project. This project is part of the Horizon2020 programme, and has the Holst Centre and Philips Lighting BV as its beneficiaries from Brainport (InSCOPE, n.d.).

### PI-SCALE

The PI-SCALE project aims to create a world-leading pilot line for companies interested in the manufacturing and system-level integration of OLEDs in products. The project aims to achieve this by bringing together the European infrastructure and knowledge on flexible OLEDs from different locations into one pilot line. This pilot line will enable companies of all sizes to test and scale up their

flexible OLED lighting concepts or to bring them to a level where they are ready for mass production. By increasing the availability of knowledge about flexible OLED technology, the pilot line aims to accelerate the commercial adoption of flexible OLEDs and help to build a sustainable industry in Europe around this technology. This project is part of the Horizon2020 programme and has the Holst Centre as its beneficiary from the Brainport region (PI-SCALE, n.d.).

## **Vanguard Initiative**

As mentioned in the main text, the Vanguard Initiative consists of five pilot lines. The Brainport region is in the lead of the pilot line *“High Performance Production through 3D-Printing”*. Therefore, I will limit myself in this annex to describing this pilot line.

### **Pilot “High Performance Production through 3D-Printing”**

3D-printing is seen as an important component of the new industrial revolution which will create employment across Europe. Many fields of application for 3D-printing remain only partially exploited because of different bottlenecks in the emerging value chains. This pilot aims to create a network of demonstrators across European regions to improve the uptake of solutions provided by 3D-printing technologies. By exploiting the potential of regions, and by instigating interregional collaboration in demonstration and piloting activities, development of 3D-printing will be accelerated. The pilot follows a five-step methodology:

1. Share a vision on the future of 3D-printing, to give direction to joint efforts.
2. Mapping of potential actors and infrastructures for emerging value chains
3. Matching of partners in the identified value chains
4. Development of the network of pilots and demonstrators for manufacturing
5. Implementation by business actors of new innovation and industrial investment projects

This pilot line is part of the Vanguard Initiative that was set up in the end of 2014. In this pilot line, the South of the Netherlands, Flanders, and the region Norte from Portugal are in the lead (Enterprise Flanders, n.d.1).