NOVIO TECH CAMPUS

Where innovation works!

2019

Cooperation or Competition?

Master's thesis

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Image front page: Novio Tech Campus seen from above—taken by Martien Schouten (Fotowerkt)

Master's Thesis

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Preface

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Dear Reader,

Thank you for reading this document. This thesis is written to fulfil the master's program of Economic Geography at Radboud University in Nijmegen. The thesis is written in strong collaboration with Rikus Wolbers, my current employer at Novio Tech Campus.

I wrote this thesis as a conclusion of my dual track master's program, during which I worked for Novio Tech Campus and did my master's study. This thesis was an interesting journey for me in which I experienced the difficulty of being part of my own research. This gave me some useful insights and helped me significantly but did not necessarily make it easier.

I have experienced that cooperation in the region is possible if people could look outside their own range and for complementary elements between partners. Especially within Nijmegen, the possibilities are huge. To make this work, the cards must be shown so that people can see where they can set up joint programs to help start-ups and ideas become successful.

I want to thank Arnoud Lagendijk for taking the time to support and advise me. I have realised that the dual track is a lesson in balancing work and being a student, which is sometimes a challenge. Most of all, I want to thank Rikus Wolbers; as my boss, he had to put up with me and stimulated me to finish this thesis. We have had many interesting conversations, and I have learned much about being a professional in the challenging field of start-ups and innovation. Of course, I also want to thank my family and girlfriend for their never-ending support, advice, and love. Without them, none of this would be possible.

I hope you enjoy reading this thesis and will see interesting observations, analyses, and insights which you can possibly use in cooperation with others in your professional life.

Kind regards,

Tim Will

Index

1. Introduction: Campuses, Cooperation, and Regions

Economic growth is important for regions to continue developing (Florida, 2001 p.2). There are multiple ways to create beneficial growth, such as campus development (Appendix I, observation 1, Buck 2014). A campus is a location where companies can grow and new companies can be attracted, both of which are important for the future economic development of regions (Lucas, 1998 p.39; Appendix I, observation 31). Campuses regarding this study are innovation hotspots where new products and concepts are developed. Some focus on specific sectors, some are also part of a university campus and some are also industry parks where a lot of production takes place.

Most campus locations have certain attractive qualities (specific facilities, real estate which is suitable, network events) for innovative organisations. However, to develop a campus, both the hardware (the actual campus) and software (the network around it) must be developed in a consistent manner (Van Gils, 2016 p.12). Physical hardware must be adequate, but the software determines the success. After all, a beautiful campus without a sufficient network (software) is only a lovely location. Thus, this thesis elaborates on the software aspect: the networks around campuses. How can they work together? Do they actually work together? What areas can they work together on? Are there possible limitations? This research focusses on how cooperation amongst certain campuses can benefit the region and the locations of and around the cities of Wageningen, Arnhem, Nijmegen, and Oss. The possible sense of competition is limiting possible cooperation. This research will investigate if and on which level there are possibilities for cooperation.

This first chapter briefly introduces the topic of campuses, focussing on Novio Tech Campus, as well as other campuses in the Netherlands.

The first example of future development involves university campuses, of which the Utrecht Science Park (the Uithof) and Heyendaal Campus in Nijmegen are the first examples. These locations were mainly founded because the number of students became too large for buildings in the city centre (Appendix I, observation 42). Current university campuses include Groningen Campus, Kennispark Twente, Amsterdam Science Park, TU Campus Delft, Utrecht Science Park, Wageningen Campus, Mercator Science Park (also called Heyendaal Campus), TU/e Campus Eindhoven, and Brightlands Health Campus Maastricht (Buck 2017). Another category of campuses emerged in Eindhoven at the High-Tech Campus (Appendix I, observation 13); these do not have an educational institute on their grounds but have large “knowledge-driven” multinationals on their campus (Carvalho, 2013). Examples are High-Tech Campus Eindhoven, Novio Tech Campus, Pivot Park, and Brightlands Chemelot Campus (Buck 2014).

Novio Tech Campus (NTC) is devoted to the study of health, life sciences, and high-tech semiconductors in Nijmegen. It is located near one of the most important sites for manufacturing semiconductor wafers in Europe (NXP) (Buck 2017; www.noviotechcampus.com, 2018a; Appendix I, observation 1). It is a fast-growing campus which specialises in health and high tech (both the energy sector and the semiconductor sector) (Buck 2017). Because of this focus, many innovative companies in the region decided to work together with NTC or have opened an affiliate on the grounds of NTC (Buck 2017; www.noviotechcampus.com, 2018a).

The development of the campus started during slow economic times for NXP, the largest—and, formerly, the only—company on the site. During the economic crisis, NXP almost became bankrupt and decided to close two of the three wafer production facilities. This meant an abundance of free space on which the campus could be developed. In addition to this, the accessibility of the site was greatly increased by the construction of the “Nijmegen Goffert” railway station (www.noviotechcampus.com, 2018a; Appendix I, observations I, II, and V). This also contributed to the economic possibilities of the area.

As mentioned, a campus is a complex structure, divided into hardware (the location) and software (the network). The complexity of hardware comes from the multiple partners involved in campus development, the different owners of parts of the campus, and in the sense of governmental aspects. (The case of NTC and an outline are provided later.) The complexity in software comes from the concept of a campus. The strength of a campus does not come from the total number of companies involved; success is generated by cooperation and connectivity, not only with other companies on the campus but also with people, companies, and institutions outside the physical campus (Buck 2017). NTC has many stakeholders and tries to cooperate with organisations to create successful businesses (Appendix, I observation 1).

For NTC, one of its major assets is the fact that networking organisations like Health Valley, BC SEMI NL, and Briskr (a consortium between partners in Nijmegen) are present on the campus (Appendix I, observations 1, 2, 5, 54, and 55). They organize numerous joint events, and there is easy access to other organisations in their network (www.noviotechcampus.com, 2018 b). Because of this, NTC is an interesting case: it generates economic growth in the region and enhances better cooperation between companies located on the campuses.

A fictive example can be used to illustrate the benefits of cooperation between campuses and organisations. If one company at NTC, e.g. EPR partner, provides excellent workshops in finance and accounting on campus, other companies located on the campus and in other locations could benefit. The latter could host the same workshop at their other locations. Thus, both the representing company and hiring company would benefit, stimulating economic development on the campus. However, these opportunities often are not realised yet.

Another example is a joint network reception. By inviting all entrepreneurs from the Rijk van Nijmegen region, one can meet new people and create new possibilities to do business together. This event can lead to further events and integration of networks. In this way, cooperation amongst organisations in the region can result in economic growth. If the city prospers, making it more pleasant to live in and providing better welfare for its citizens.

For NTC, this topic is interesting since the campus itself is undergoing rapid growth. Being part of the regional economy, campus developments are the locations where such growth happens (Appendix I, observation 4). Even though globalisation is becoming more dominant, campuses seem to keep expanding, with many being developed or extended and by this being an important magnet for economic development (Lucas, 1998). Campuses in that extent can be seen as a node between the global and local economies. The development of other campuses can be observed in figure 1 (adapted from earlier research by Buck 2014), which shows a multitude of campuses in the Netherlands, several of which are ‘mature’. (This figure is further discussed in chapter 4.)

Figure 1 is an adjusted illustration made by Buck Consultants International and constructed before the most recent paper on campus development in the Netherlands was released. Buck (2018) showed no real changes for the Arnhem Wageningen Nijmegen region except for the deletion of Arnhem’s Buiten. This can be explained because the campus organisation stopped (Buck 2018, Appendix I, observation 40). The location of Industrie Park Kleefse Waard (IPKW) is missing on the map because it lacks a certain knowledge carrier, according to Buck’s definition of a campus (2014) (Carvalho, 2013).

It has been added for this study because of the rapid growth and the importance of location for the city of Arnhem according the municipality of Arnhem (Appendix I, observation 40).

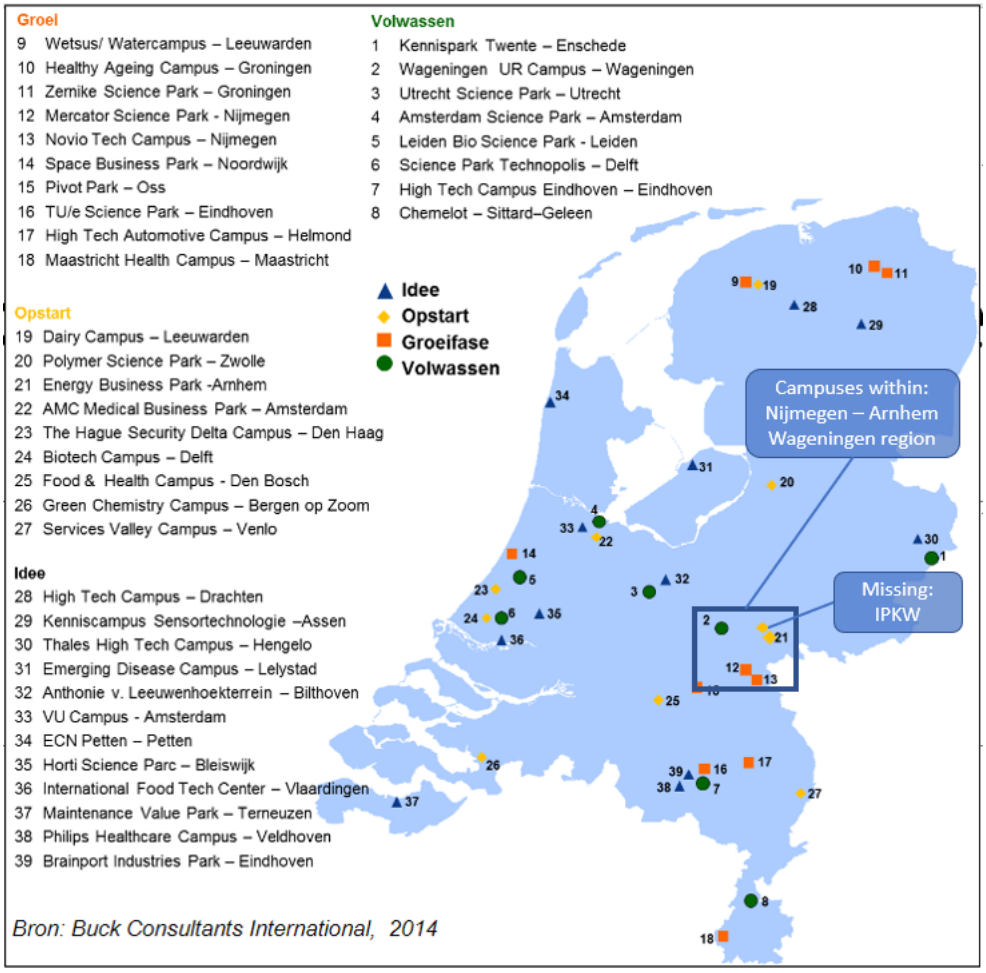


Figure 1: Campuses in the Netherlands (source: Buck Consultants [2014] with own changes)

Introduction: Novio Tech Campus

The complex structure as seen at NTC is also noticeable on other campuses, which is not surprising since the campus organisation is a semi-public entity and works with regional governments.

NTC was launched in 2013 in the old buildings of Philips Semiconductors, now named Next eXPerience (NXP). Some buildings were abandoned by NXP, which, together with the municipality, was looking for a new destination. Inspiration was found in the High-Tech Campus Eindhoven (Appendix I, observations 2 and 4).

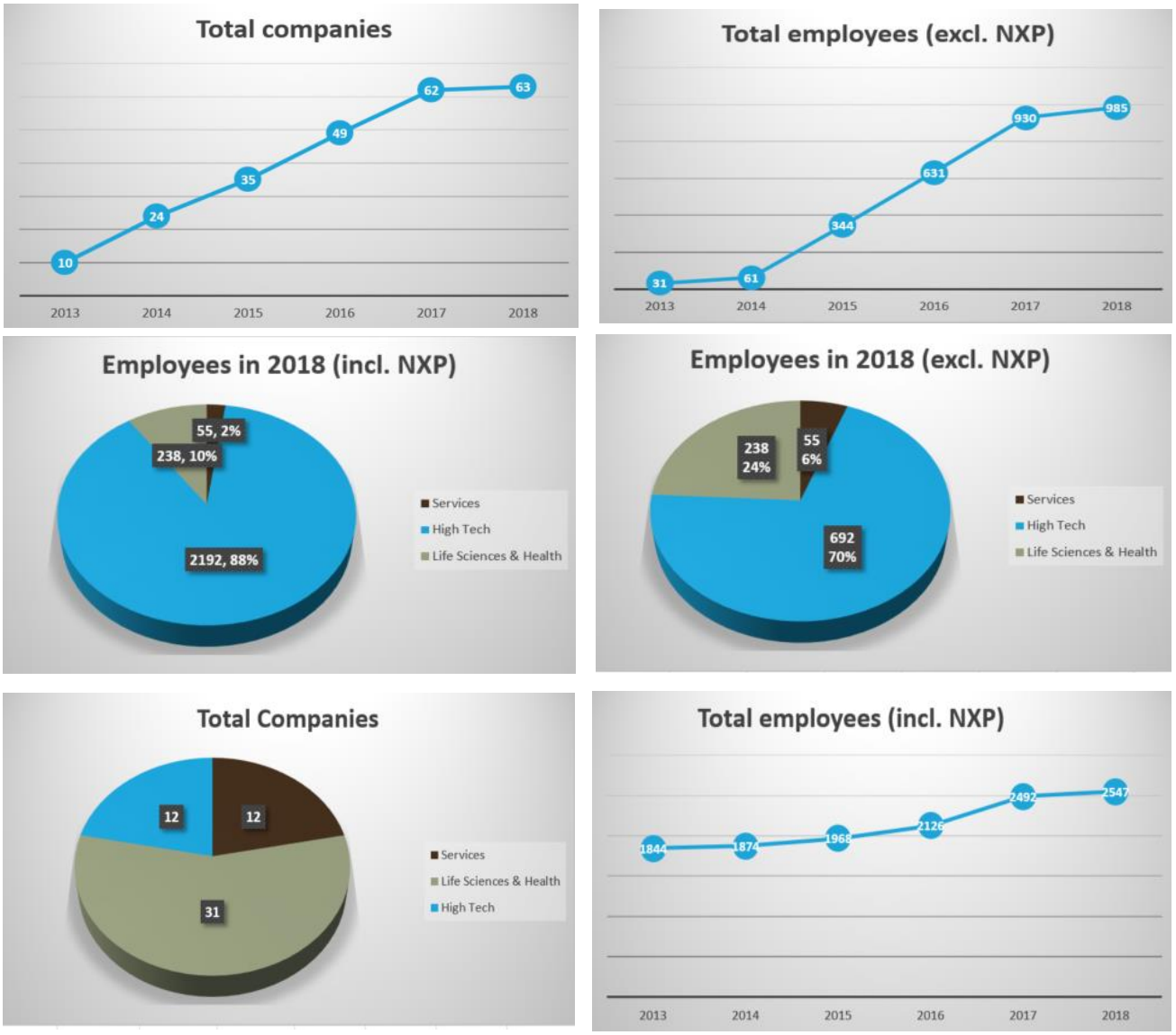
The campus is home to multiple spin-offs from the Radboud University and Radboudumc, branches of NXP, and companies which relocated to the campus. NTC also hosted the Rockstart accelerator programme, a six months period programme to rapidly accelerate a start-up (Rockstart, 2018; www.noviotechcampus.com, 2018a).

The development of the campus has been one of continuous growth of both employees as companies. The settled companies' employment rates continue to develop, and the number of companies attaching themselves to the campus is increasing. Within five years, the campus has grown to over seventy companies with around five more in a stage of negotiation (Appendix I, observation 8). Only a few small companies have left the campus because they found a more logical location to continue

business. Several others decided to stay on campus after completing the Rockstart programme, which generates growth for the campus (Appendix I, observation 1).

Numerous large organisations have come to NTC, for example, EPR in 2017; in 2019, a newly built single-tenant building will follow for NTS (Eindhovens Dagblad, 2018). Next to the campus is '52 degrees', an unofficial part of the campus which hosts companies interested in the campus but not in the official scope of the campus (Appendix I, observation 8). This generates more connections with organisations which are not focussed on health or high tech but are on site for companies to cooperate with (Appendix I, observation 10).

Figures 2a–f shows the actual number of companies and amount of employment on the campus with and without NXP. These graphs are explained further in the case report of the campus.



Figures 2a–f showing the numerical development of NTC (corporate data)

As seen in figures 2a and 2b, NXP supports a large share of employees on the campus. Almost 40 per cent of the employees at the campus work for NXP. However, this number has been decreasing over the years since the campus is generating more employees.

There is an increasing number of life sciences and health companies present on campus. However, they are mostly smaller (each with fewer than five employees) compared to the high-tech companies, which all have more than fifty employees.

NTC does not exploit the buildings and locations itself. The A&M buildings are operated by Kadans Science Partner, which rents the grounds from NTC. The newest building is used by EPR, which also rents from an investor. The buildings BY and BZ and the grounds of NXP are not run by NTC; instead, NXP owns those specific buildings (Appendix I, observation 25).

Broader view on campuses

This thesis is written by a participant observer from NTC. The topic was chosen in accordance with the university. The importance of this research can be found in the report of KplusV (van Gils, 2016), which reveals gaps in the ecosystem and concludes that cooperation on NTC is a solid solution to mend those gaps. Even though NTC is part of the network being researched, it is not the core of the network and not the foundation on which this thesis is written. The ecosystem had been built up from NTC outwards, from which the other locations are chosen, and others could easily be added from some other locations in the network, like Arnhem's Buiten and World Food Centre (in Ede). However, these were not fully reviewed since they are not completely operational and do not have a specific organisation trying to develop the location (which all others do have).

The broader network consists of the cities of Arnhem, Wageningen, Nijmegen, and Oss. In the cases chapter, there is more information on the individual locations, most of which focus on innovation. In that manner, campuses are helpful for economic growth in the region.

Campuses are locations for a business environment to grow for start-ups. At certain points, they require scaling up and growth. Different locations can help at certain stages of development of a company (van Gils 2017 p.137).

Networks around campuses

To be successful, a campus must be part of certain regional network structures which are always developing and changing. This thesis tries to describe the best network possibilities and generates more understanding of the factors that determine the success of a network.

Being involved in networking organisations is important. If a location is focussed on health, the organisations utilising this location will attend networking events on that topic. In this way, they try to play an active role within the network.

A good example of a regional network is Briskr, which consists of nine partners: Radboud University, Radboudumc, NTC, SMB, Health Valley, Kadans Science Partner, the municipality of Nijmegen, OostNL, and the province of Gelderland plus three associate partners: BC SEMI NL, the Economic Board, and Rabobank Rijk van Nijmegen. The main objective for Briskr is to be a business generator in health and high tech. The partners use their individual strengths to help companies grow and become successful (Appendix I, observation 3).

The network of this research

Figure 3 shows the network as it was constructed after the first observations. This is discussed further in chapter 7. For now, it is used to show the actors involved.

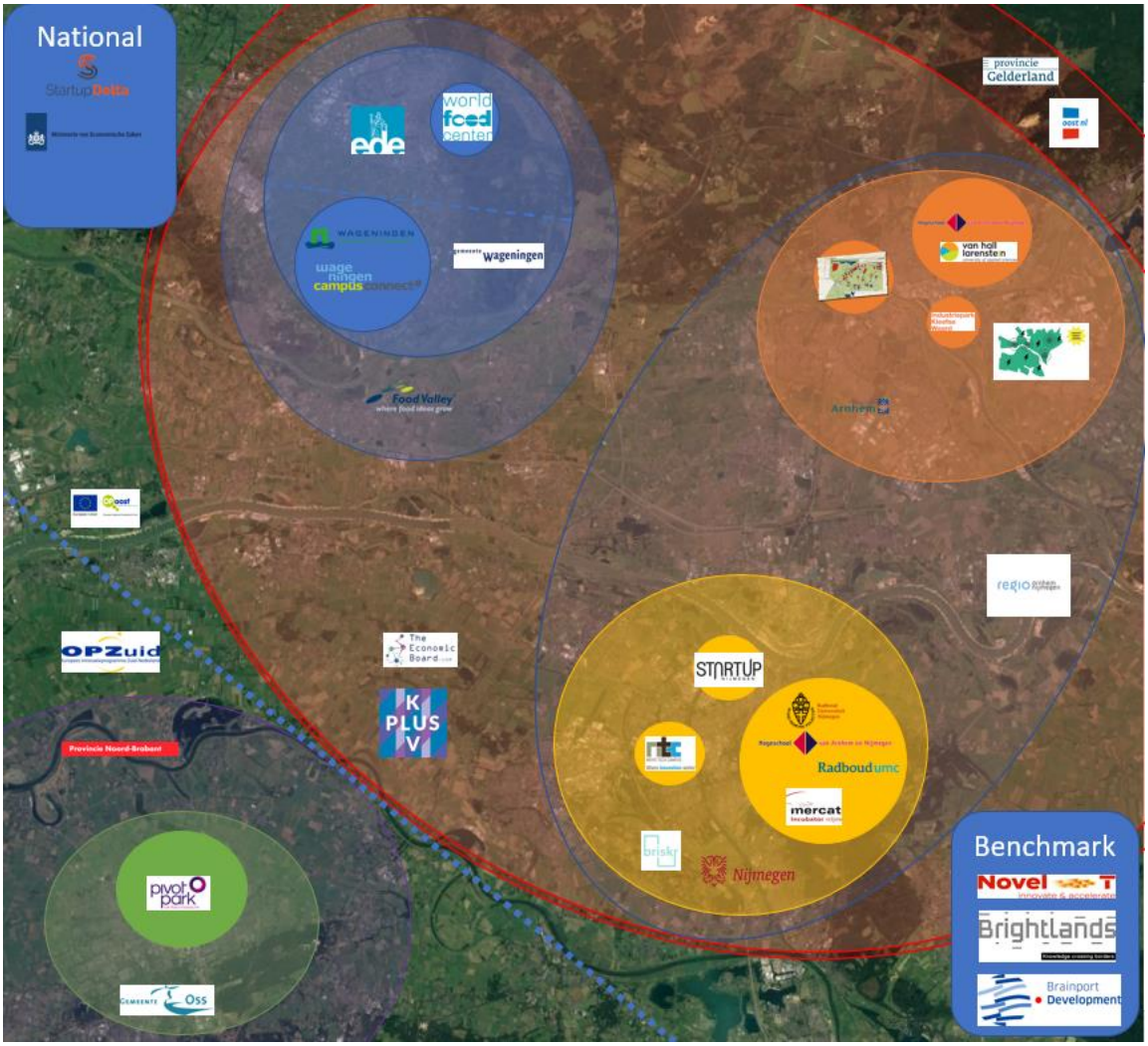


Figure 3: The networks within the research area (own figure).

This network includes the Wageningen, Arnhem, Nijmegen, and Oss regions. Every city has a local network, and all except Oss have a university (of applied science) within its boundaries. The network therefore consists of multiple layers—the general network and the local networks, which are also economic entities in themselves. More on this is discussed in the following chapters.

Some city regions consist of multiple innovation hotspots. This generates a network within the city (Carlino, 2014). A good example of this can be found in the benchmark of Brainport which is discussed in chapter 6.

Setup of this research

This first chapter introduces the importance of campuses, what defines these locations, what the network is, and their impact on the region. The relevance of this topic is discussed and sub questions answered.

To understand the topic and relevant issues, the theoretical chapter provides the conceptual toolbox, including theories on how networks are formed and the role of institutions. In addition to the theorical aspect, benchmarks are added to provide examples in other regions which can be observed to see how cooperation can take shape. These examples are important because cooperation can have different forms or come from other initiatives.

These theories and concepts must be researched and analysed, which is discussed in the following chapter, which also includes benchmarks to help map out the networks and the region.

A qualitative method has been chosen to do this research in combination with desk research to get a better understanding of the topic and find out which actors are important in the network.

The result is shown in two ways, descriptive and in colours. This has been chosen for readability and understandability. More details about this method are found in chapter 5.

The cases chosen for this research are discussed in chapter 6. Although these cases are different, they have similar goals. Each one tries to reach its goal in a different way, with various scales, sizes, and backgrounds. Without an understanding of these cases, an understanding of the results and analysis is difficult.

After the analysis, the last chapters provide the conclusion of the thesis. The final chapter consists of a critical reflection and recommendations for possible follow-up research.

2. Scientific Relevance and Social Relevance

This chapter elaborates on the importance of the research, going in depth about both the scientific and social relevance. One of the major aspects is the fact that most campuses run on subsidies granted by national or regional governments. Thus, responsible use of that money is an important political matter.

Relevance for science

This thesis combines different theoretical debates: the general cluster theory, described by Porter (2000) and Menzel and Fornahl (2007), and the vision of the way organisations cooperate (Kaats & Opheij 2013).

In this context, organisations are responsible for making the clusters and campuses work and avoiding a situation in which a cluster could get into a lock-in. This means that the cluster is losing its connectivity with other sectors and regions. The specialisation of economic geography (specifically on regional economic development) is focussed on economic growth and how this is settled in the scope of an increasingly globalised world, as well as location behaviour of organisations and city marketing (Glaeser, 1995 p.188; Glaeser, 2003 p. 86) . According to literature (Katz & Bradley, 2013; Barber 2013), cities and more important economic clusters and campuses play an important role in global economy. This is also acknowledged by several observations throughout the research period. The campus tries to generate more economic growth on site, which also results in more economic growth for the region. This makes the link with economic geography valid. Globalisation is not a one-sided process since local and global places and institutions are interconnected. In that way, regions and development of regions play a role in globalisation (Dicken, 2015).

According to the province of Gelderland, campuses are the places where the most important economic development is taking place (Appendix I, observation 4). Every different campus tries to achieve this economic growth. Their aim is cooperation in the region, but this also generates competition between the partners on the campus and between the campuses themselves.

In a campus environment, companies come together, and the idea is that because of these interactions, more ideas and innovation will develop than off a campus (Buck 2018; AWTI 2009). However, since a campus like NTC is not an individual project, it must act in the regional economic environment (Peer & Penker, 2014).

This research is of academic interest since the discussion on regional economy and economic growth is a relevant and present one. There are multiple concepts which are widely discussed such as clusters, campuses, cooperation strategies between organisations, and governance. A brief review of relevant literature is found in chapter 3.

Social relevance

All campuses try to attract more employment and economic growth to their region. However, many are currently acting like individual projects without interaction, which is not favourable to themselves and their main objective (economic growth for the region). Combining strengths, rather than competing between locations, could generate an economically stronger region. For this, cooperation is needed. This research gives some directions to improve this.

Another relevant issue is the financial aspect. When campuses and hotspots (locations where innovative start-ups are based) work together, they become more cost efficient, lowering costs for the

province or municipality, which is often the main investor. Lowering costs and increasing efficiency means that there is more money available for other initiatives benefiting society or more money to invest in more programs or projects. An observation has been that repeatedly subsiding initiatives like this is not politically viable. However, fewer financial costs could result in lower subsidies, which could lead to less taxes as a different solution to decrease investment costs.

Stimulating economic development is one of the roles of municipalities. Campuses generate this growth and innovation. These new ideas generate new businesses—thus, new jobs—which makes a city more attractive (Carlino, 2014; Carvalho 2013). Competition between locations, therefore, is logical and does occur, especially in attracting large multinationals. Cooperation between locations though is beneficial for economic development of a region so of great importance.

3. Research Objective and Questions

The objective of this research is to find out if better cooperation and communication between campuses is possible to provide more economic growth and efficiency. As explained in chapter 2, better cooperation between campuses can provide more economic growth for the region. This thesis uses a qualitative approach to support the view that it also generates more benefits for companies on the sites, such as the possibility to enhance more business support together.

This chapter outlines the research type and questions and further elaborates on the objective.

Research objective

The objective of this research is to investigate in which ways cooperation amongst NTC, Heyendaal/Mercator Science Park, Startup Nijmegen, IPKW, Wageningen Campus, and Pivot Park can be improved. This study elaborates on an improved economic environment in the research region to provide companies with ways to increase their local business and networking possibilities for new cooperation between companies, which could generate new innovations.

Research type

This research is based on a practise-oriented approach, as described by Verschuuren and Doorewaard (2009, p. 41–61), to describe suggestions that could be used by real-life companies to further improve cooperation. Therefore, the main goal of this study is to advise different entities, not to create a new theoretical framework.

Verschuuren and Doorewaard (2009) define five types of practise-oriented research: problem analysis, diagnosis, design, change, and education. They state that practise-oriented research is meant to provide knowledge and information that can contribute to a successful intervention to change an existing situation. The intervention-oriented research may encompass a(n) (existing) plan for solving the problem that has not yet been implemented or has just been started. This type of research is known as a change-oriented or monitoring project (Verschuuren & Doorewaard 2009, p. 57). The current study aims to provide a plan for solving a problem; therefore, the chosen type of practise-oriented research is change.

This paper is an example of multiple-case research. Embedded case studies, according to Yin (2003), are those which contain more than one subunit of analysis. This provides a means of integrating both qualitative and quantitative methods into a single research study (Yin 2003; Scholz & Tietje 2002). This type of design is an empirical form for descriptive studies and has a main objective of describing the process, context, and features of a phenomenon (Scholz 2011, p.25). The cases in this study are:

- NTC
- Mercator Science Park/Heyendaal
- Startup Nijmegen
- Pivot Park
- IPKW
- Wageningen Campus

The context of these locations is discussed in chapter 6, including their functional networks.

This study is focussed on the current situation in a specific region. Therefore, the main question is based on this location at this time. Results of this research study are not equal for other regions and are not, without further investigation, applicable to other situations.

Research question

This research elaborates on cooperation amongst innovation hotspots in the regions of Nijmegen, Arnhem, and Wageningen and poses the following research question:
How can campuses or other so-called hotspots like NTC within the Nijmegen, Arnhem, and Wageningen regions improve their cooperation to benefit the companies in in these locations?

The sub-questions are:

How are the campuses/hotspots organised, and what are their main goals? In what ways are they similar?

Before a recommendation can be made on how to improve communication and cooperation amongst campuses/hotspots, the similarities and differences amongst these organisations must be defined. Similarities or complementary aspects could be used to improve cooperation.

- *What can campuses/hotspots do together and in cooperation with the government and research institutes?*

  . After reviewing the possibilities, it is necessary to find out if there is a desire to cooperate and under which terms.

- *To what extent is the Nijmegen, Arnhem, and Wageningen region a fitting geographical scope? Are these borders logical, or is a campus like Pivot Park interesting as well?*

  This question is a follow-up on the main question since it must be defined which types of geographical partnerships are promising.

Some of the meanings of the central concepts used in the formulation of the objective and questions must be clarified in this research. In chapter 4, a more in-depth overview is given.

The main concept is cooperation, meaning that organisations responsible for the location work together. Such cooperation can lead to possibilities for organisations based on the campus to use the network they form together to help them grow in their business.

4. Literature Review and Concepts

This chapter elaborates on the relevant theories for this research, including those on cooperation, networks, and ecosystem-cluster campuses (the last of which is also used in both of Buck's researches, 2014 and 2018).

A campus is a location which attracts great interest, just like the valley approach used to create networks on a larger geographic scale. Campuses are mostly geographically oriented, whereas clusters and ecosystems are looser. To that extent, they have their own "ecosystems" (Simmie, 2004).

Interest in these locations is due to their importance to regions and cities for economic and societal development. Innovation and economic growth mostly develop in a fluid network based on trust and knowledge of each member. This is more present on a smaller scale than on a national level, as shown in multiple studies (Katz & Bradley, 2013; Barber 2013) which state that North American cities are taking a leading role in economic issues that challenge federal governments. It showed that campuses are beneficial for regional development. Glaeser (2001) also states that cities are the healthiest, most sustainable, and most economically beneficial places to live. According to OESO (2009), only 4 per cent of the regions in OESO countries between 1995 and 2005 are responsible for 33 per cent of the GDP.

Clustering is always a success(?)

Clustering and campus development are dynamic cycles, according to Menzel and Fornahl (2007). There are four stages: emergence, growth, sustaining, and decline or transition. A cluster is a cooperation between triple-helix parties' sectors or product chains which can operate without a campus but needs an ecosystem and does not have a fixed geographical scale but more set for a region (Bartheld, Malmberg, & Maskell, 2004). The emergence of a cluster happens because of geographical location, certain circumstances, and coincidence. This is also called path dependency, which plays a key role in the development of clusters. According to Menzel and Fornahl, predicting where and when a cluster occurs is difficult, as well as predicting the development of the cluster, but it mostly develops around innovation. Afterwards, when the cluster exists, there are possibilities to map out its development. It sometimes relates to a large knowledge carrier/institute (Pouder & St. John, 1996) or a large firm or corporation like NXP in Nijmegen. Infrastructure (like important crossroads, rails, airways, or highways) and other hardware can help develop a cluster but are not tools to create one. A cluster is heterogenic with many competing ideas, technologies, processes, and business models.

At the start or emergence of a cluster, there are several small firms which grow fast; this is the growth phase. It attracts many new firms, which leads to a consolidation and the danger of a lock-in, meaning that a cluster becomes too homogenic and loses its connection with the economy outside it. This could lead to the end of cluster unless a transition takes place (Menzel & Fornahl, 2007). A good example is the once-prospering car industry in Detroit, which has disappeared because it did not innovate.

Campuses and possibilities

Campuses are a widely discussed topic in literature regarding economic development. They play an important role in innovation hotspots in the Netherlands. According to Raspe and De Graaff (2017), governmental politics stimulated the development of certain locations; Therefore, it is important to know the role of locations within a network. Organisations like Health Valley, NTC, and Holland BIO all serve a certain network. Such networks can differ in their geographical scope, but there may also be similarities.

Within a region, there are three different settings in which companies could be grouped. The first is the ecosystem, defined as a large set of conditions to stimulate economic activities which are not necessarily technology- or sector-bound. A good example is StartUp Nijmegen, which is location-bound. In a wider perspective, the ecosystem of Nijmegen for innovative start-ups is an example. It includes the total network of innovative companies in and around the city. The entities organising the network, like the municipality or physical locations, are also part of the ecosystem.

The second setting is a cluster, a partially bounded geographically area in which triple-helix parties (education, knowledge-focussed companies, and governments) in certain sectors or product chains intensively cooperate in the sense of innovation, export, education, and start-ups. Examples can be found in organisations like Food Valley, Health Valley, and BC SEMI NL(Porter, 2002).

The last setting for cooperation is a campus, the most geographically bound area in which researchers of knowledge-based companies and knowledge centres cooperate in R&D and innovations. Examples are university campuses like the Mercator Science Park, Utrecht Science Park, and also NTC and High-Tech Campus (Eindhoven) (Buck 2017).

There is a clear difference amongst the three settings, and they have a certain order in which they function. Without the lower rank, the high rank would not be possible. This is explained in figure 4.

Type of environment	Short definition	Condition	Geographic scale	Physical examples
Campus	R&D and innovation takes place between knowledge-intensive companies and education.	A campus needs one or more strong clusters to be successful.	A bounded geographical scale smaller than a cluster.	NTC, USP, HTC
Cluster	Cooperation between triple-helix parties' sectors or product chains.	A cluster can operate without a campus but needs an ecosystem.	Not a fixed geographical scale but more set for a region.	Food Valley, Health Valley, BCS
Ecosystem	A large set of conditions to stimulate economic activities which do not necessarily have to be technology- or sector-bound.	The ecosystem is the starting point for cluster development but also for individual development of companies.	No strict boundaries and much like the geographic scale of a cluster.	StartUp Nijmegen, StartUp Arnhem

Figure 4: Types of business environments (Bartheld, Malmberg, & Maskell, 2004; own table)

Figure 4 is a culmination of different theoretical approaches to ecosystems. Porter (2000) describes how an ecosystem as a cluster operates and also distinguishes differences as defined by Bartheld, Malmberg, and Maskell (2004). This figure is important in understanding the spheres of the research objects.

Campuses, as defined by Buck (2018), are locations within urban economies which make face-to-face contact easier and bind the economy (Storper & Venables 2004). These researchers discuss that current theories of urban economies are incomplete because they do not go into the aspect of face-to-face contact. They also agree on the fact that localised forwards and backwards linkages only account for a small part of contemporary urbanisation (Gordon & McCann 2000). Sorter (2004) states that this does not come from physical transportation possibilities or physical locations but that there are four properties in which face-to-face contact impacts development of urban economies (Sorter, 2004 p. 353).
Buck Consultants (2018) defines a campus according to four principles:

1. Physical location with high value settlement conditions and research facilities
   There must be space available for high-value, knowledge-intensive operations like labs, cleanrooms, and test facilities. These locations could be used jointly.
2. Focus on R&D and/or knowledge-intensive activities

To conduct innovation, cooperative product design, and exchange of knowledge, there must be a focus on R&D and knowledge-intensive activities.

3. Presence of an unmistakable knowledge carrier

   An unmistakable knowledge partner is a physical, substantial presence with research activities and is the anchor tenant on the campus. Examples of these anchor tenants are large international operating companies, a (technical) university, a university medical centre (UMC), and a large research institute.

4. Active, open innovation

   A dedicated open-innovation organisation is present, which makes relations between companies work on and offsite and creates knowledge valorisation, knowledge transfers, the building of a network, business development, and acquisition of companies.

Within in the Nijmegen, Arnhem, and Wageningen region, there are multiple innovation hotspots and campuses, according to Buck Consultants (2018). These are:

- Wageningen Campus (Wageningen): Listed as a 'mature' campus at the site where the university is located. There is a strong symbiosis between the university and the companies, many of which are spin-offs (organisations that spun off a university).
- Mercator Science Park (Nijmegen): Listed as a campus in the category of "Growth". Mercator is located at Heyendaal where the Radboud University is located as well. This location consists of a lot of spin offs of the Radboud University.
- Novio Tech Campus (Nijmegen): Also listed in the category 'growth' according to Buck (2014). NTC is a campus specialising in health, life sciences, and semiconductors. It is located on the former grounds of NXP and next to their plant.
- Arnhem's Buiten (Arnhem): Listed in 2014 in the category of 'starting' (according to Buck (2014), Arnhem's Buiten is an energy campus which focusses on companies in the energy sector. Most of the location consists of office buildings in a green park. Whilst the organisation of Arnhem's Buiten has gone bankrupt, the municipality of Arnhem is trying to revive this location, but no visual progress had been made yet (Appendix I, observation 40).
- Pivot Park: A pharmaceutical campus located in Oss. Pivot Park is settled on the former grounds of Organon, which left Oss in around 2009. Because of this departure, many former employees lost their jobs and started their own businesses.
- World Food Centre: The municipality of Ede is developing the World Food Centre. This is a campus specialised in food, but it also has an experience centre planned. The municipality is the initiator of WFC, which is also working in the food corridor, where business, science, and society are combined to survey how food is part of people's lives.

According to Buck, the following locations are not a campus but are included in this thesis:

- Industrie Park Kleefse Waard (IPKW)(Arnhem): IPKW was not on the list of the Buck report but has been added since it is also a campus. This campus focusses on energy and clean tech and is on the former location of Akzo Nobel.
- StartUp Nijmegen: An incubator location near the railway station of Nijmegen in which companies can start their business in a coworking space environment, including business support (Appendix I, observation 26). This location is not discussed in the Buck Consultants report but is interesting for the fact that it does not aim to have specific sectors of organisation but rather types of organisations (start-ups).

Most locations mentioned above are subsidised by the government, or a higher-education institute is involved in the development (like Wageningen Campus or Mercator Science Park). These institutes play an important role in the development and sustainability of local economies (Peer & Penker, 2014; Glendon, 1998). Den Heijer and Curvelo Magdaniel (2012) argue that this trend in further collaboration

amongst universities, corporations, and governments (the triple helix) is growing, and these locations are starting to play an increasing role in the development of cities (Hamers, 2014).

Simmie (2004) argues that innovation is the key driver for competitiveness. Boschma (2005) states that innovation and proximity are interrelated and cannot be seen apart. Innovation is an internationally distributed system of activities. It is also localised geographically, where firms within a cluster are only a small part of such a system. Simmie discusses Porter's concept of clusters and states that 'localised economic interactions are not therefore likely to contribute much to an understanding of the relationships between innovation and economic growth' (Simmie, 2004).

Figure 5 shows the way campuses are likely to organise in the region. Almost all campuses (with one or two possible exceptions) are focussed on a specific cluster, which creates the unicity of the campus. The campus thus attracts specific companies because of this unicity. There is also another 'pool' of companies, the generic part, wherein those companies could land on multiple campuses since they are less specialised.

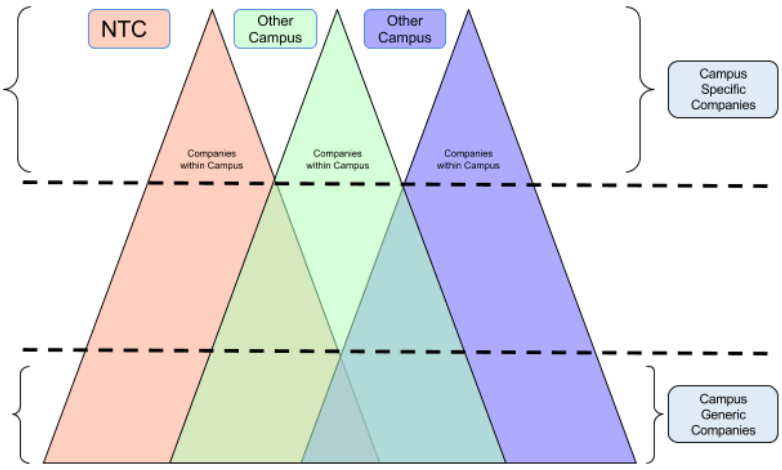


Figure 5: Conceptual framework of campuses and their types of companies (van Gils, 2006)(own table).

A company in the 'specific' pool chooses a specific location for the competencies the location has. A good example is the company Sencio on NTC. It has chosen the location because it is near NXP and Ampleon, which are important clients for them. Locating on another campus would be the same as in any other business park. To that extent, it is a campus-specific company. Other NTC-based examples are Fluke, PinkRF, TropIQ, and QM Diagnostics (because of the cleanroom facilities) and service providers like HIP B.V., DutchNFCConsult, and BC SEMI NL.

A company like Sit&Heat, also located on NTC, has chosen this location because of the 'social environment'. Sit&Heat could well have been located on another campus and would have fit in there as well since it is a generic company. Other examples are companies in the health and life sciences which only have their offices at NTC.

The same is true for many spin-offs of Radboud University which are at Mercator Science Park. These companies are located there because the university offers cheap facilities. Their operations are not especially influenced by the other companies around them. Van Gils (2006) discusses the specific differences between locations: in what way they are unique and what makes them complementary.

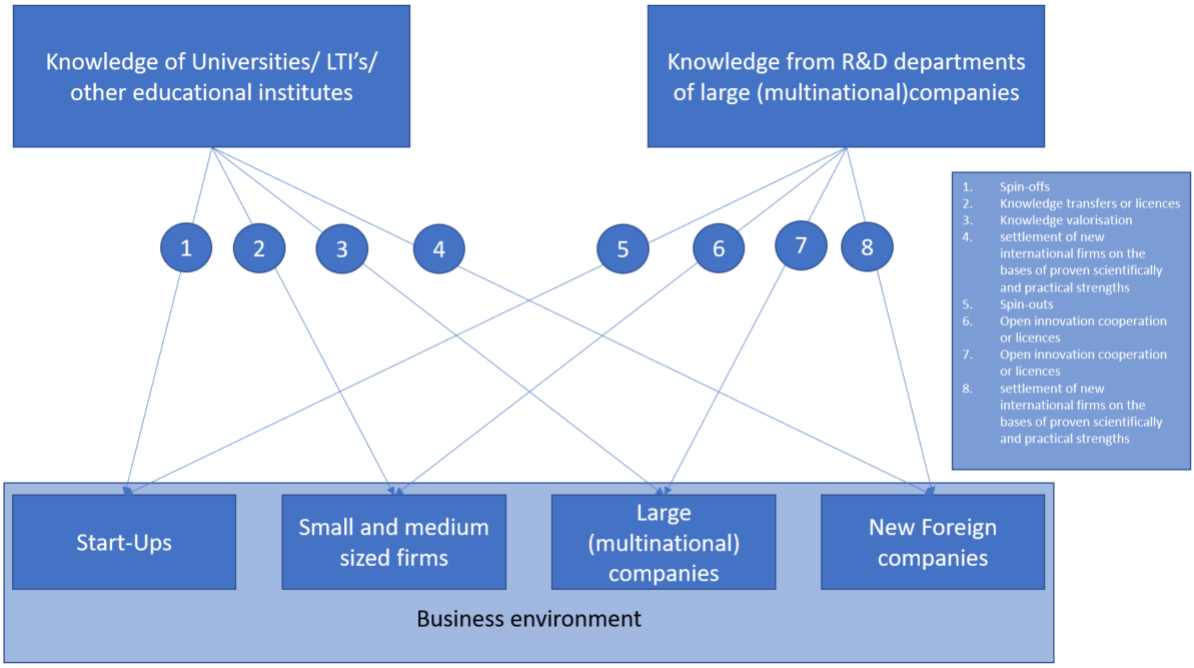


Figure 6: Different types of companies (Buck 2017)

Figure 6 shows the environment which could be present at campuses and how companies are embedded. Not all links must be present, but they are all possible. The more links there are, the stronger a campus can be. Another element for a campus to be successful is a critical mass: the right volume of both companies and employees. Companies on a campus can be linked with other knowledge-intensive companies and educational institutes in several different ways. For a cluster or an ecosystem, however, this is not always the case (Buck 2017).

According to the same study, there are three types of campuses:

- Science park: location related to a university or university medical centre (Wageningen campus and Mercator, according to Buck Consultants, are science parks.)
- Innovation campus: (former) company-based campus where one or multiple corporate anchor tenants are conducting R&D and where other companies can also locate. Cross-fertilization and cooperation between companies onsite are stimulated (for this research, NTC is seen as an innovation campus, according to Buck [2018]).
- Facility campus: innovation location where a manifest knowledge carrier is not present, but facilities are acting as a magnet for innovation and companies. These facilities can be used by all companies on that campus (an example from Buck relevant to this study is Pivot Park).

Cooperation between organisations and the network is shown in the book *Leren samenwerken tussen organisaties* (Kaats & Opheij 2013), a clear piece of literature which explains how cooperation between organisations (in this thesis, campuses) can be conducted and made to work. One of the key aspects for success is the motive to cooperate. Figure 7 gives such motives for cooperation.

Motives for Cooperation			
Development of the markets and position	Cost efficiency	Development of knowledge	External pressure
Development of cooperative marketing	Realisation of scale advantages	**Organisation of cooperative innovation**	Political pressure towards the citizens
Improvement and upscaling of distribution	***To overcome investment barriers***	Gaining access to new technologies	Legal obligations towards cooperation or consultation
Development of new products and markets	**Realising of joint supporting services**	**The use of additional competencies of partners**	Moral pressure from society or politics
Gaining access to new markets	For gaining efficiency and rationalisation of the production	**Learning knowledge and skills from partners**	
Protection against competition	Rationalisation through improved coordination in production network	Learning the culture of partners	
Binding between client and suppliers through better chain integration and better integration within the chain		Gaining new patents and gaining admission to new patents	

Figure 7: Motives for cooperation (Kaats & Opheij 2013)

The motives most integral for this research are highlighted in bold. These are chosen according to De Jong (2017) and Kaats and Opheij (2013), who describe cooperation in different aspects. The bold aspects are chosen to develop specific ways for entities to possibly cooperate.

- *Development of cooperative marketing*—This motive is important for the province, Food Valley, and Health Valley since cooperative marketing will help in promoting the region. This could lead to regional and international publicity and possibly acquisition for research. A lock-in can be prevented (Porter 2000; Menzel & Fornahl 2007).
- *Improvement and upscaling of distribution,* development *of new products and markets, and gaining access to new markets*—This motive could be a result of successful cooperation. For example, if companies could jointly use a cooling truck, they could load it with different goods from different companies, which could be efficiently transported to new markets. It could also create an incentive for upscaling (this leads to business support as a concept for the research), which relates to the heterogeneity of the cluster or ecosystem.
- *Learning knowledge and skills from partners*—Skills within a certain sector can also work in another sector. This also leads to business support as a concept for the research and relates to the importance of higher-education Institutes like RU, Radboudumc, HAN, or Wageningen University which provide knowledge for innovation.
- *Organisation of cooperative innovation*—Because there is coordination on the level of campuses, companies themselves could cooperate better within the sphere (this leads to management as a concept for further research). Examples can be found in Brainport and Novel-T, organisations which operate on this principle which is explained in the benchmark chapter.
- *Realising joint supporting structures*—This is the core objective since business support could be one of the best grounds for cooperation between companies to start with (this leads to networking, housing, and management as concepts for further research of this study).

Brainport and Novel-T can be seen as organisations with a joint supporting structure in the way they are financed but also in how they operate.

The motive 'to overcome investment barriers' is written in italics since this is one of the conclusions of the research. As for Pivot Park, being in another province could limit investments possibilities when working with organisations or entities from Gelderland, which would limit possibilities for Pivot Park-based organisations. This could be a barrier which could be lowered when working together more intensively.

Cooperation is an important aspect in this research and must be developed in several stages to be successful. Figure 8 shows the four progressive, general stages of cooperation. These could work for people, companies, or other structures in which cooperation is needed (e.g., for governments) (Newlands, 2003 p.524) .

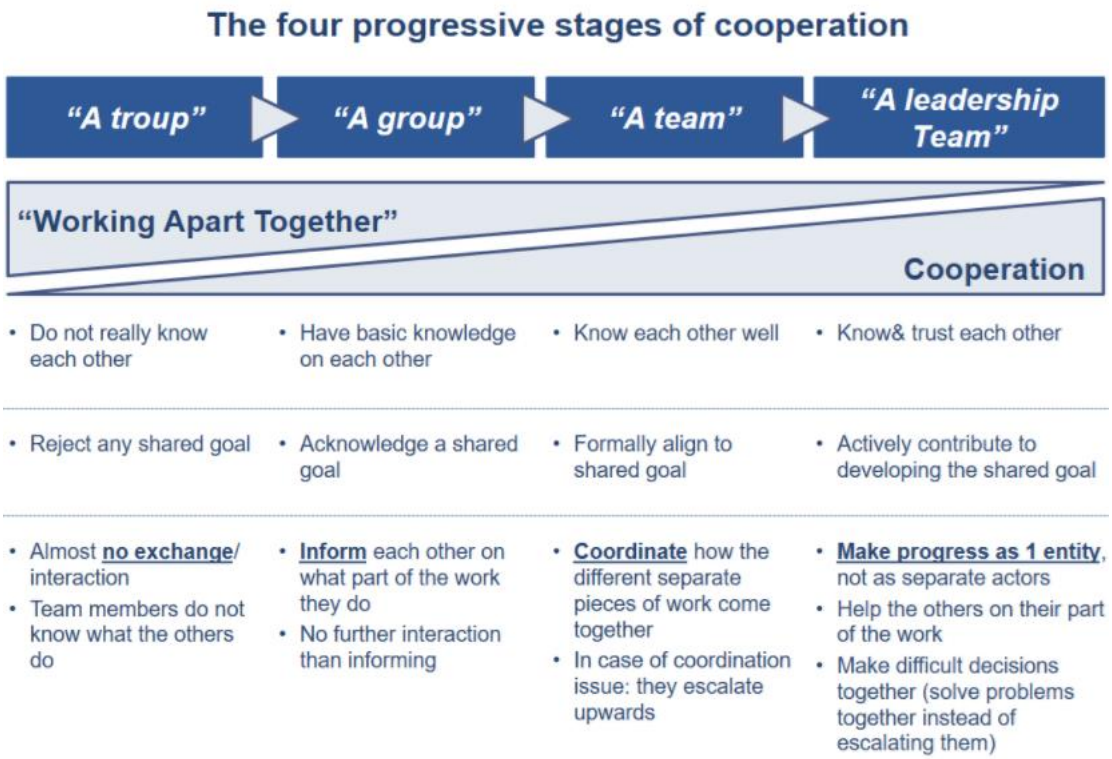
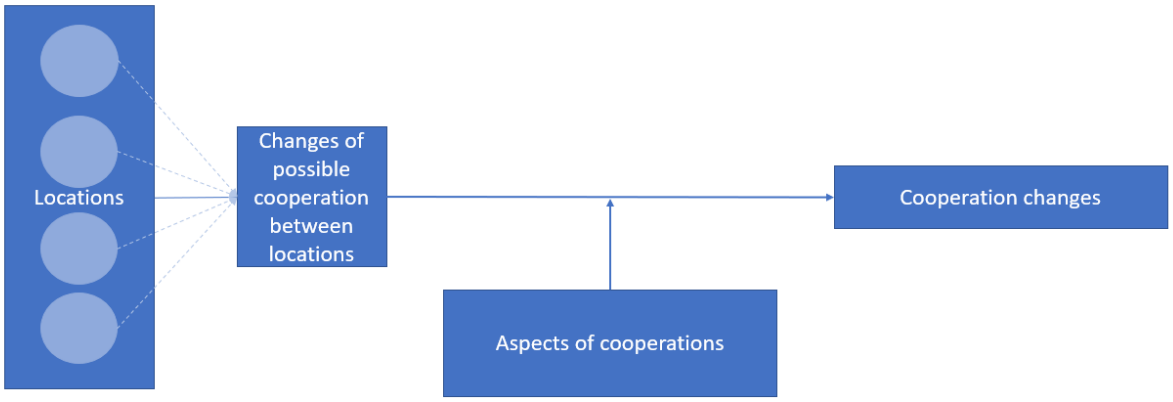


Figure 8: The four progressive stages of cooperation (De Jong, 2017)

Currently, the situation in the region under study is the phase between a 'troop' and a 'group'. This is identified by the representatives of several organisations (Appendix I, observations 1, 2, 4, 16, and 21).

Another important dimension to investigate in cooperation is the social/political dimension since the campuses themselves have individual goals. This is described by Adams (2015) in an analysis of North American campuses which, whilst not entirely comparable to the regional scope of this paper, can help in understanding.

Conceptual model



The figure above represents the conceptual model of this thesis. The locations are the cases investigated. There are different possibilities for cooperation amongst these locations. The dotted lines indicate the chances of possible cooperation between locations. Locations can also form different coalitions in which they work together. These coalitions can differ, depending on the theme of the cooperation. The aspects which make cooperation successful or not are also investigated in this thesis based on research by Kaats and Opheij (2013) and other literature. These aspects have been tested, and results are shown in diagrams per location compared to the other locations. The reciprocity of the estimated success of the cooperation is also described.

Benchmarks

The benchmarks: Brightlands, Novel-T and Brainport Development are made to illustrate networks within regions and how they function. The examples are all Dutch organisations/situations, of which an analysis is made. These benchmarks help to understand how networks can be formed and are also seen by representatives as examples (Appendix I, observations 4, 5 & 6).

Brightlands (Chemelot Campus)

Figure 9: Areal view of Brightlands Chemelot Campus Geleen

General introduction to Brightlands Chemelot Campus

Figure10: Logo of Brightlands

Brightlands Chemelot Campus is located next to the Industrie Park Chemelot in Geleen, in the south of the Netherlands, in the province of Limburg. This location was developed by DSM (De StaatsMijnen, the state mines) around the 1950s. At that time, the state mines were closed, and a chemistry cluster was created around the mine building. This is currently the most important location for chemistry in the Netherlands (after the port of Rotterdam), which focusses mainly on heavy chemicals (Appendix I, observations 6 and 13).

Major players at Chemelot are DSM and Sabic, and DSM has its innovation lab on campus. However, the current situation has a limited future, especially economically, as described later in this chapter (Appendix I, observations 6 and 13).

The development of the Chemelot Campus is very similar to NTC, the High-Tech Campus, and Pivot Park. However, the region has a large problem with population shrinkage as many young people are

leaving and older residents are passing away. This leads to many vacancies, and companies are considering leaving. Thus, LIOF and the province of Limburg have tried to prevent this by launching Brightlands and the Brightlands Chemelot Campus (Appendix I, observations 6 and 13).

Brightlands and other networks around it

Brightlands is a network of four campus locations within the province of Limburg. All these locations have their own specialisations and focus on specific topics or sectors. The campuses are Venlo (logistics), Maastricht (healthcare), Heerlen (data security), and Geleen (chemistry). Collaboration between the locations is limited except that they have the same name. It is a network created by the province of Limburg (Appendix I, observations 6, 13, and 18), not one naturally occurring.

In addition, the campus also hosts Lonza, an organisation that allows start-ups to be developed in-house to become successful companies. Lonza tries to be a breeding ground for young, innovative companies in the hope that they will stay in the region. This is done in close cooperation with the University of Maastricht (Appendix I, observations 6 ,13, and 18).

Development of the campus organisation and Brightlands

Brightlands Chemelot Campus was founded in 2012. The campus is a collaboration amongst DSM, the University of Maastricht, and the province of Limburg. They all own one-third of the Brightlands Chemelot Campus and supply €1.5 million per organisation per year plus a start funding. This structural funding is for ten years and ends in 2022 (Appendix I, observation 18).

The campus organisation itself consists of +/- 70 fte. It is a very large organisation with many more functions compared to other campuses in this research. The organisation is responsible for the management of the buildings and the catering as well as the park management and business development. The campus, therefore, has a much broader role compared to other campus organisations (Appendix I, observation 18). It is located in a safety zone where certain dangers are present because of the chemical factories close to the campus ground. This causes limitations and forces people to register when entering the campus (Appendix I, observations 13 and 18).

In recent years, the campus has tried to focus more on certain sectors to get a stronger profile. This implies the possible danger that companies like DSM or SABIC will disappear (Appendix I, observation 18). To prevent this, the campus gives certain sectors more emphasis by specifying them but does not exclude others (Appendix I, observations 6, 13, and 18).

Comparison of the research area and Brightlands—conclusion

To look at the campus and its development, it is almost like other campuses such as NTC and Pivot Park. A former large Dutch company has (or had) vacant real estate, and an innovation campus has emerged with the ultimate goal of strengthening the region. However, its structural organisation is extremely different and hardly comparable. Because of a ten-year structural funding, the campus has developed very strongly and holds a strong position within the sector where they are operating. The organisation develops many activities which provides several income sources. It makes income from rent, service, catering, and events. This makes the organisation more diversified.

Compared on the level of networks, LIOF is putting much effort into making the region attractive for companies to locate there. The main objective is to avoid population shrinkage as this could cause a snowball effect in which a knowledge drain in the region could take place.

This benchmark shows that money can help to solve (if not eradicate) several problems. The large investments made to set up the present developments are no guarantee for success in the future, as seen in the campus development in Geleen.

Brainport Development

Figure 11: Logo of Brainport Development

Brainport Development is the regional business society of the Eindhoven region. This authority aims to strengthen the regional economy and cooperation. They are also busy setting up the Brainport Industries Campus, an initiative of companies from the region aimed at the efficient organisation of logistics and production through cooperation. This campus will be completed in the course of this or next year (2019/2020) and will become the fifth hotspot/campus in the region (Appendix I, observation 30).

Brainport sees the five campuses in the region of Eindhoven as different steps in production and how far along a company is. For example, the High-Tech Campus is not seen as the first location where a company should start. The TU/e campus is more suitable for this (Appendix I, observation 30). This stepwise development is an example of a pathway for companies to develop and to be present in the best place according to the current development stage of the company.

Brainport is funded on a project basis but also has a member model. The twenty-two municipalities that are members of Brainport all donate one euro per inhabitant of the municipality to Brainport, and some donate more. In this way, the organisation can be paid. Brainport itself is not a financier for companies in the province, such as OostNL, which is in the region of Gelderland and Overrijsel (Appendix I, observation 30).

Where Briskr and Food Valley use a network, Brainport is the hub of the network and is similar but with more objectives and a larger network. Because it has already existed for quite some time, Brainport it is much bigger, and the impact is greater. Commercial organisations are more involved compared to the networks in the other researched regions. Plus, Brainport performs specific projects to stimulate regional development together with other regional organisations (Appendix I, observation 30).

Brainport is an umbrella entity over the pool of municipalities which are members so that there is a partner at the table representing all municipalities within the region.

Kennispark Twente and Novel-T

Figures 12 and 13: Aerial view of Kennispark Twente (figure 12) and logo of Kennispark Twente (figure 13)

Kennispark Twente is located in Enschede. On the Kennispark, there are three different activities centres next to the university: knowledge, business, and leisure. In addition to the university, many companies are located there which are not affiliated with the university. Also, sports facilities can be found there. In addition to the university sports centre, there is also the Grolsch veste of FC Twente. This means that Kennispark is also a location where people come outside of office hours, which was one of the aspects spearheading the establishment and organisation of the Kennispark (Appendix I, observation 29).

Novel-T is the campus organisation that takes care of the university campus of Kennispark Twente. It contains business complexes where new companies and spin-offs can start. When they are large or mature enough, they can move to another location in the vicinity of the university (Appendix I, observation 29).

Next to Novel-T, there is also an entrepreneurs' association for the companies not located on the campus. This association works with Novel-T. They do not compete with each other because they have different interests and attract different types of companies (Appendix I, observation 37).

Companies based on the university are located there because they need to work closely with the university (for example, they need research tools that the university offers). The companies in the

business field often need the university less or are mainly service providers (Appendix I, observations 29 and 37).

Novel-T operates as a regional party whose main goal is business support. They offer this to all the companies in the region. This means there is a strong regional bond and mutual interest (Appendix I, observation 37).

Development of the campus and network

In the 1950s, the Twente region was important for the textile industry. However, due to the emergence of this industry in low-wage countries, the textile sector in Twente has largely disappeared, which created much unemployment. As a result, the city of Enschede established a technical university. This is a bit similar to Chemelot in Geleen (Appendix I, observation 29).
In the 1980s the university focussed very much on entrepreneurship. The Business Centre Twente (or BTC) emerged from this, and a strong cooperation has developed amongst the university, the municipality, and the province of Overrijsel. Kennispark Twente resulted from this. Originally, this location was not exclusively for the university. There were already companies around the university grounds, including many cooperating with the university. This enabled the campus organisation to focus strongly on the area development and strengthening of the 'Enschede ecosystem' (Appendix I, observation 29).

After the area development of the Kennispark, Novel-T expanded its orientation so that it now provides business support for the entire region with no restrictions on the sectors (Appendix I, observation 29).

Main comparison

Novel-T is a regional organisation which has already been cooperating for a long time. The funding is like Brainport, which means the organisation is investing effort in the entire region but also makes entities in the region invest in each other and cooperate with a mutual goal.

5. Methodology, Methods, and Techniques

This section explains how the qualitative research for this paper was conducted, leading to data from several actors. Since the research is done when in the middle of the research area, the methods must be adjusted to ensure objective research. Thus, it is important is to discuss various subjects with different actors and to check and recheck. Being part of the research field could also influence the answers.

Chosen methods

The chosen methodologies are a combination of both desk research and qualitative research. Desk research is done to understand the theory and the network. To understand the complexity of the topic takes time, but it is important before doing the actual research. The desk research includes examining the different campuses and aims to find facts and figures about the locations in the region. The qualitative part includes multiple interviews with different actors.

The desk research also elaborates on the literature review and on the figures in the theoretical part of this research given to get a better understanding of what kind of companies are within each campus, cluster, and pool. The importance of this research is to underline the hypothesis that business support can be generated together with other campuses. This business support can be conducted by specific service companies within the generic pool.

Part of the interviews were held with representatives of the different locations. The aim was to talk about the network in an informal way. Therefore, asking direct (unprepared) questions provided the best answers by preventing standardised answers without the desired depth. Unfortunately, some meetings turned into conversations about the research topic and not the campus organisation.

Representatives of the municipality, the economic board, and the province of Gelderland were also interviewed. These organisations have a more overall approach towards the campuses and their mutual cooperation, and they believe they can have a leading or governing role. There was a group meeting with three representatives of the province of Gelderland where they outlined the vision of the province.

Next to people within the network researched there also have been interviews with people who operate within a different network or have a function which elaborates on the development of networks.

The strength of these methods is to generate insights into the different campuses and the networks around them. This is important to better understand the figure in chapter 1 and to create a clear view of the region and the different campuses with their specialisations in specific clusters. The decision to choose for representatives outside the network is to generate a better reliability of this study.

The conversations with the representatives provide information about the extent to which they think cooperation could be improved and also in what way cooperation is desired. A critical note could be that the answers may not be as in-depth as desired, which is also argued by Creswell (2007) and could be an obstacle when conducting qualitative research. A solution is to do multiple interviews with the same people.

Creswell (2007) also adds a critical note about the way group interviews are conducted since they can lead to some serious issues. Certain representatives could play a more dominant role. To avoid this

problem, the respondents were also interviewed individually. Another strategy is to conduct the interview with a different approach with another group leader. An additional strategy is to not only interview representatives but also other people who are of great help to the campus. They see and can indicate many problems to address. Such people are difficult to find but could be helpful when cooperation is desired by the companies on the campus.

The conversations also give an insight into the internal structure of the campus. This is a vital part of the research as well since, in this case, NTC must know what to do, according to the residents of the campus, to make the campus more successful.

The problem with this qualitative data is that it is all opinions and interpretations of the respondents. To overcome this, several methods of interviewing and different types of interviewees were used, as described above.

The desk research and some of the conversations with Rikus Wolbers (see Appendix I) led to the definition of the topics which are used to generate the results.

Data collection

Data collection was done by taking notes and writing summaries during the meetings. Because of the author's employment at NTC, this allowed full participation in the case study. These meetings gave certain access to data which would not have been given during a regular interview with a researcher who was not part of the field.

Most of the data was gathered during or soon after the meetings as well as during events or short conversations. These data files are interesting but require a certain involvement in the network and knowledge of the field to understand the discussion.

The objective of the thesis is to see whether cooperation is possible and with which subjects, not what the direct implementations or solutions would be. This can be done afterwards or in future research or meetings since implementation often requires negotiations.

For this research, qualitative research methods were mostly used. The triangulation of data is of great value since it is necessary to collect the data needed for the case study to be validated and checked. By using triangulation, the validity of the research is ensured.

Follow-up meetings were organised to discuss most of the interesting data directly with a colleague to check on trustworthiness and the right interpretation. In-depth conversations elaborating on the research generated data during multiple discussions in the last year, during which the research took place. The most important conversations are listed below since these most clearly elaborate the results. Further data can be found in the observance diary which is added as an appendix.
An overview of the most elaborative conversations can also be found in Appendix I.

Name	Function	Organisation	Subject
Rikus Wolbers	Director NTC	NTC	About other locations but also to define the topic of the thesis more specifically
Bart Brorens	Senior advisor Gebieds-ontwikkeling	Royal Haskoning DHV	Brightlands Chemelot Campus (This interview was also done on the development of the ecosystem in Limburg.)
Hilde de Vocht	Marketing & communications	High-Tech Campus Eindhoven	To elaborate on campus development in general and Brainport/High-Tech Campus Eindhoven
Eric Appelman	New business developer	Brightlands Chemelot Campus	Brightlands Chemelot Campus and information about the network in Limburg
Lennard Nellestein	Advisor/Consultant	KplusV	This conversation was held to elaborate on the general network in Gelderland.
Rick Meurders	Business developer	Pivot Park	To elaborate on the results of Pivot Park
Rob de Koning	Director	BTC	The main objective was to generate a benchmark for the research with Novel-T as an example.
Rikus Wolbers	Director	NTC	To elaborate on the results for NTC
Anne van der Velden	Project coordinator	Brainport Development	For the benchmark on Brainport
Mark Hiddink	Acquisitions manager	Industriepark Kleefse Waard	To elaborate on the IPKW part
Petra Caessens	Programm director	WUR Campus	This conversation was on the view of Wageningen Campus in the Food Valley network and the other locations.
Mike Verkouter	Ambassador startups	Novel-T	Phone call as a follow-up on the conversation with BTC about Novel-T
Frits van Dimmendaal	Economic affairs	Municipality of Ede	This conversation was to elaborate on Wageningen Campus and the broader view on Food Valley.
Dick Bos	Director	Startup Nijmegen	To elaborate on Startup Nijmegen
Inez Rensink	Economic affairs	Municipality of Arnhem	This phone call was to elaborate on the network around IPKW and Arnhem.
Roland Nordbeck, Iris Hardkamp, & Kees Pieters	Economic affairs	Province of Gelderland	This group discussion took place to draw out the first results and hypothesis on the Gelderland network as well as to distinguish between the differences of cities in the region.
Rob Groenendaal		Mercator Launch	To elaborate on the network around Mercator Launch
Ed Koster	Radboud Research Facilities	Radboud Innovation	To talk about shared facilities and their importance in the network and for companies located at Mercator and other locations

Figure 14: Table of main people who were interviewed for this research

Confidentiality

Cooperation (working together) is based on trust between organisations and entities. In this study, the research was conducted in a participatory way, a double role (I was both employee of NTC and researcher). This could create conflicts because this research could reveal certain conclusions from specific people and influence future cooperation and relations. Therefore, records were not kept to the letter to ensure this confidentiality. Quotes have also been avoided because of this.

Results an analysis on data

To analyse the data, the first step is to provide the results in a clear way. Thus, in this research, an outline of the data is given per case. Possible interaction between the campus cases can only occur if both feel the need and if there is a good possibility. In that sense, it is a bidirectional relationship.

The topics chosen to analyse mutual cooperation are the following:

- International positioning:
  In a globalised world, an international market is increasingly important to attract new businesses. This could be done individually, but a location competing with a location only a couple of kilometres away at an international event seems counterproductive. There are already national entities to support this, like StartupDelta, Holland Bio, Health Holland, and Holland High Tech.
- Acquisition:
  This subject could be related to the first topic. Acquisition in this research is more specifically about getting new tenants. This could be one of the most difficult topics to cooperate on since it is also part of competitiveness.
- Housing:
  Housing for tenants makes it possible for companies to cooperate more easily at different locations, which could be good for their business.
- Equipment:
  Not every company needs certain machinery or tools at every moment. Therefore, locations have shared facilities which could be rented for a small fee.
- Network:
  A location has a network around it (the software of a campus). This network is set up to make it possible for companies to get access to needs like funding or business support. It is possible that networks can, up to a certain point, be integrated.
- Regional positioning:
  Attracting businesses to the region is also a subject on which locations could work together.
- Business support:
  Locations have business support partners which could help companies to scale up and develop. These programs could be shares or integrated between organisations/locations.
- Management:
  On a management level, integration could be possible because there are many similarities or complementary elements. Difficulties could present themselves if organisation structures are significantly different.

In the result chapter, two types of figures per case can be seen. The first table per case is an explanation of cases' relationships to each other. The second table is in five colours:

Dark green	: Good possibilities to operate jointly on the specific topic
Green	: Fairly good possibilities to operate jointly on the specific topic, though some issues may occur; not as good as the dark green
Yellow	: Possibilities to operate jointly; issues may occur but can be overcome if the desire or need to cooperate is really there; not as good as the green colours or as bad as orange or red
Orange	: Poor possibilities to operate jointly; many problems can occur but can also be overcome if cooperation on that topic is desired
Red	: Almost impossible to work together on that topic, probably due to impossibilities or strong lack of desire

This scale is not set up in relation or comparison to other locations. Instead, every topic has unique reasons or matters that justify why a colour was chosen. A comparison would mean a certain ranking, which is not the aim of this research.

As for the analysis, there are two figures per case to be compared. On the result page, the diagram from the respective case comparing it to the other cases per topic is shown. Thus, it shows case A in relation to B, C, D, etc. This is constructed per case, so also for case B in relation to A, C, D, etc.

As stated, this is a bidirectional relationship, so a table the other way around can also be constructed. Another graph can be constructed by combining elements of the other cases in relation to the respective case. Thus, the second graph would be B, C, D, etc. in relation to A. The results for this case come from using elements of the other graphs.

These graphs show some differences and similarities. If similarities occur (if the colours match), that can be a reason to look for future possibilities if the colour is positive. If they differ, it is interesting to see where the differences come from and if it would be possible to overcome them. This is the analysis part.

In the bottom of the table, there is an overall average which also compares the location to the other locations. This average is built with a combination of calculations and likeliness in general according to the data. The strategy for coming to a strong conclusion is to develop possible answers which would lead to the conclusion. That operation must be done with reliable data. A problem with this tactic, however, is that it could guide the analysis towards a desired answer. This could make the research unreliable. To avoid unreliability, there were efforts to have more data per topic and result.

6. Cases

This chapter discusses the researched cases individually to understand some notions in the result, analysis, and conclusion chapter. It also states differences between the locations discussed in the research. Data comes from desk research and conversations (included in Appendix I).

Novio Tech Campus

Figure 15: Aerial view of NTC (Martien Schouten, own data)

This section describes the current situation of NTC based on discussions with Rikus Wolbers (Appendix I, observations 1–8, 10, 17, and 25). It also explains the development and possible future development of the campus. In addition to numerical development, which is also shown in the introduction, there is a development of the campus which can take place outside NTC because NTC does not manage the entire area and also cooperates with NXP, Kadans Science Partner, the municipality of Nijmegen, the province of Gelderland, and the educational institutions in the region. NTC is sometimes seen as more than just the area that it actually is. Some people think that the 52degrees building is also a part of NTC (Appendix I, observation 8). That is why it has more exposure and is being seen as an important location. This is not only the case for NTC but is also part of the theory on campuses (as described in the literature review).

Development of the campus

NTC has been developed on the former premises of NXP. Located in Nijmegen, it was the first semiconductor site for Philips. In 1957, the first building was opened, the former ICN-4 facility the location in Nijmegen manufactured silicon wafer boards on which semiconductors are produced. The facility grew with several other fabrication lines (ICN-5, ICN-6, and ICN-8). Only the ICN-8 facility, which is called the Blue Cathedral, remains and employs about 1,700 people. In addition, Some 400 people in R&D work on site (Appendix I, observation 56).

After the spin-out of Philips Semiconductors to NXP, the company closed some of the production lines due to low demand of NXP products and a near bankruptcy. That was when much of the real estate on the grounds of NTC became vacant.

In 2013, NTC was launched with the aim of being one of the centres in the Netherlands for semiconductors and to provide a crossover between health and high tech. This was ensured by the presence of the Donders Institute, Radboudumc, and Radboud University (Appendix I, observation 3). That also made Health Valley and BC SEMI NL decide to locate on campus.

Since its establishment, NTC has grown every year in employment (over 10 per cent on average per year), in companies (more than ten per year), and in use of the buildings (almost one new building per year has been opened). There are many companies from the SMB network (most of them spun off from Radboudumc) that have grown into successful companies and also a number of organisations that wanted to settle there for the campus location. Until 2016, one entire floor of the first building of NTC was dedicated to these companies. SMB is an organisation which provides spin-offs from Radboudumc with funding to rent office space and labs on the NTC campus (Appendix I, observation 5).

In addition, there are other spin-offs from the university and also spin-outs (mainly from NXP) on campus. The difference between a spin-off and a spin-out it that a spin-off spins off a university and a spin-out of a company. The three largest companies on campus have their origin in Philips (so they are all spin-outs). Two of the largest parties on campus are spin-outs of NXP (Ampleon and Nexperia). The larger organisations like NXP and Ampleon operate mainly by themselves and therefore have little or no influence on the economic situation of the campus.

The official campus has been described by a special 'post stamp' zoning plan made by the municipality of Nijmegen which overruns the regular zoning plan for all of Winkelsteeg. The zoning plan can thus be seen as a guarantee of the core sectors of NTC but also a restriction because, as is apparent in other locations, this limits the business operations. This is not yet the case at NTC, but it may be possible in the future. The limitation could be seen as an issue for cooperation since the scope of the campus is more restricted than others.

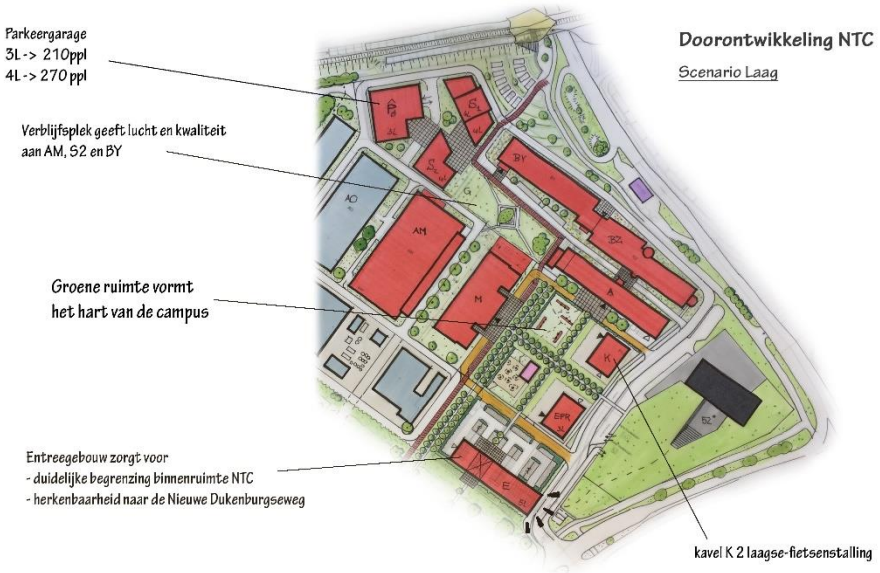
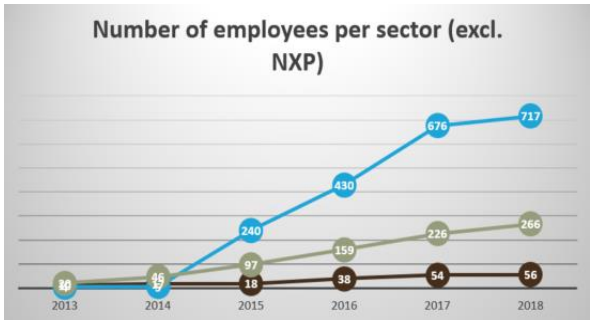
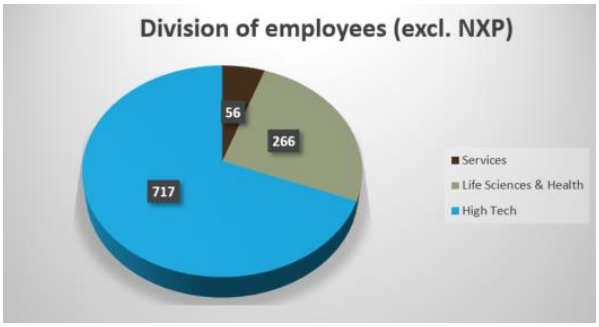
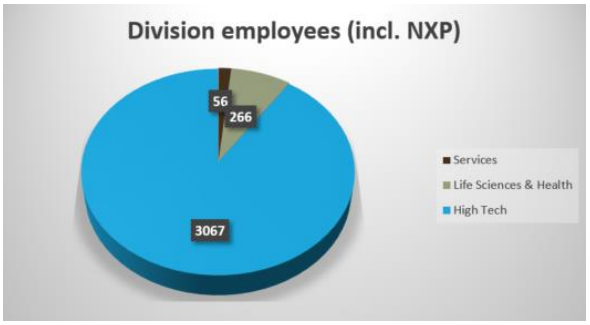


Figure 16: Current and future development of NTC







Figures 17–20: Statistical development of NTC in employees (figure 17), employees per sector (figure 18), and division of employees including NXP (figure 20) and excluding NXP (figure 19) (own data)

Statistical development of the campus

As can be seen, the campus (including NXP) has 3,400 employees. This would be more if the 52-degrees building is considered. However, NXP and Ampleon, which are included in these figures, own the properties themselves and are more standalone. The multitenant buildings and the EPR building (the buildings where lease payments are paid) have about 1,050 employees.

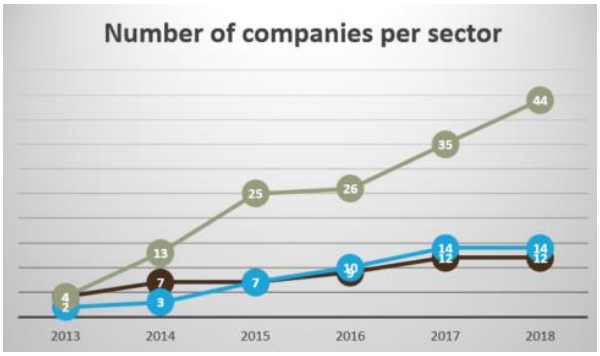


Figure 21: Total companies on NTC (own data)

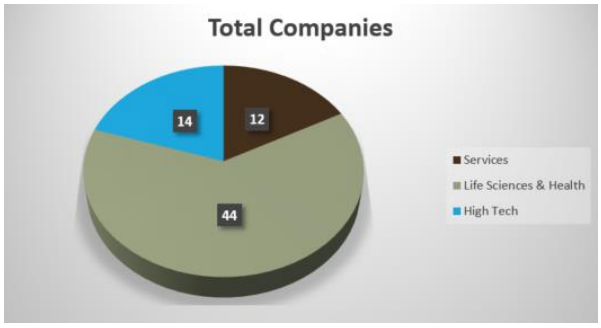


Figure 22: Total companies per sector on NTC (own data)

In total, the campus currently has around seventy companies (in previous years, this included the ten companies which were in the Rockstart digital health program). This can be divided into twelve service companies, forty-four life sciences and health companies, and fourteen companies in the high-tech sector. This shows that the high-tech companies have a much larger average number of employees (even if 'the big three' are not included).

The growth that can be observed for the last few years in the health sector is mainly because many relatively small companies are recovering, as well as the transferring of the companies from the Rockstart Digital Health Accelerator program. From all of those companies, there are only a few that have remained for several years. The constant growth by the Rockstart Digital Health Accelerator companies is therefore because they continue to complement themselves. If this program disappears, this growth will also disappear. The plans for a possible self-regulated

sequel to the Rockstart Digital Health Accelerator program offer opportunities that can sustain this growth.

Pivot Park

Figures 23 and 24: Aerial view of Pivot Park (figure 23) and logo (figure 24)

Pivot Park, located in Oss, is a campus focused on pharmacy and drug development. The development of the campus and the origin of chosen sector looks similar to NTC, Brightlands Chemelot Campus, and the High-Tech Campus (Buck 2018).

Also, the organisation resembles the setup of NTC but also with a real estate department (in a different organisation though). The location is run by a campus organisation with a separate test location run by an independent organisation (Pivot Park Screening Centre). This has to do with the shared facilities that are available, which are very specific and not easy for everyone to use. Therefore, they offer knowledge about and short-term usage of facilities which are too expensive for individual companies to obtain (Appendix I, observation 24).

Pivot Park has the advantage of being located almost next to Oss Station, making it relatively easy to reach despite its location (being on an east-west highway rather a north-south one coming from the Randstad). As a result, Oss has a very specific sector despite not having a knowledge institution (as Nijmegen and Wageningen have). Nevertheless, Radboud University is relatively close by. It has a science faculty and UMC, which can work together with companies from Oss (Appendix I, observation 24).

Development of the campus

Oss is a city with a strong original presence of drug developers. This is because Organon was established there until 2007. Where Philips had been the major company before the High-Tech Campus in Eindhoven was set up, and NXP was there before NTC, Pivot Park had Organon. The only major difference is that the entire company disappeared and was taken over by another company, MSD, which decided that the R&D facility in Oss had to disappear. In the vacant real estate, just like in NTC, a new campus was developed by the regional government. Many highly skilled employees lost their jobs, which led to an opportunity in their moment of need: Pivot Park (Appendix I, observation 24).

After MSD relocated the R&D away from Oss, the company became much smaller. It did not need all the real estate at the location. With the departure of the R&D department, many other companies disappeared, and more people became unemployed. Some lived in places outside Oss and found employment there. This loss of jobs was seen as a major problem by the municipality of Oss, the province of Noord-Brabant, and the BOM. Therefore, Pivot Park was founded, following the example of other successful campuses (Appendix I, observations 24 and 25). The campus owes its success mainly to people from the old Organon time who started their own companies at Pivot Park.

However, a possible risk for the location currently is that it is difficult for the municipality of Oss to attract new talent. Attracting this talent is necessary to avoid a brain drain (Chambers 1998, Morreti, 2012) This is partly due to the location, which is far from ideal (Appendix I, observation 24). The network of Pivot Park lies outside the city. Since almost the entire sector is located at or next to Pivot Park and there are no major other knowledge centres nearby, its first focus is Nijmegen. The reason for this is the university, which generates many potential spin-offs to locate at Pivot Park that could come from Nijmegen because of its vicinity (Appendix I, observation 25).

Industriepark Kleefse Waard (IPKW)

Figure 25: Aerial view of IPKW

Industriepark Kleefse Waard (IPKW) is an exceptional location compared to other campuses in this study. At the moment, it is still being built and developed and is currently an industrial area where many campus activities already take place. The future goal is to offer shared facilities, just like NTC, but it is still very much in its early days. However, the proposition is very strong, as is the structure of the organisation. Because of this, IPKW is included in this report (Buck 2018; Appendix I, observations 21 and 32).

Industriepark Kleefse Waard

Figure 26: Logo of IPKW

IPKW is currently an industrial area where production takes place. It already has an incubator (The Greenhouse). However, this incubator is not yet very successful due to strict selection criteria. Plans are being developed to revitalise the incubator and to develop the location into a strong, clean-tech campus. They also want to focus on coworking spaces and flex rooms, so there is special attention on the development of the IPKW café (Appendix I, observations 21 and 32).

Some companies at IPKW already contribute to an innovative ecosystem (Alucha and Allego) (Appendix I, observation 21), and the HAN has training institutes at IPKW (Appendix I, observation 32). However, IPKW is not an 'open' campus. It has a gate, and people cannot access it freely, keeping unwanted visitors out.

Development of the campus

IPKW originated on an old site of AKZO Nobel. Because of that, there are many empty factory halls. Some of these can be part of the campus zone, where there are already several companies present that are involved in innovation or start-up. This is the foundation for further development of the campus (Appendix I, observations 21 and 32).

According to the definitions, IPKW is not listed as a campus since it does not have a large knowledge institute or company on site. It does, however, provide a bachelor's program offered by HAN (Hogeschool van Arnhem en Nijmegen), the regional university for applied sciences (Buck 2018).

The main difference compared to other locations is that IPKW is privately funded. There is no governmental or university funding. Because of this, it has a more commercial attitude and plays a different role in the networks (Appendix I, observations 21 and 32).

Wageningen Campus

Figure 27: Aerial view of Wageningen Campus

The Wageningen Campus is located on the grounds of the Wageningen University & Research (WUR), which houses external organisations related to the core business of Food Valley. Food Valley is a regional network organisation aimed at food innovation consisting of the municipalities of Wageningen, Ede, Barneveld, and Nijkerk (Appendix I, observation 34).

In Wageningen, there is also a smaller campus run by WUR. This location is called Wageningen Business & Science Park, which resembles an ordinary business park, offering office space for several organisations (Appendix I, observation 34). WUR is not only a university but also a research institute and is the operator of the campus.

Figure 28: Logo of Wageningen Campus

Wageningen is famous for its agriculture university (WUR), which is well known for its focus on agriculture and food. It is also the main knowledge institute in the Food Valley network (Appendix I, observation 34). This network is indicated on the map and contains Nijkerk, Barneveld, Ede, and Wageningen. Each village has its own specialty, though Wageningen is seen as the core of Food Valley (Appendix I, observations 34 and 46).

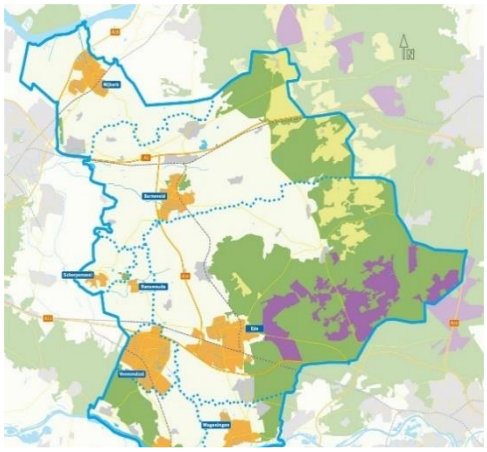


Figure 26: Map of the Food Valley network

Development of the campus

In the past, Wageningen had its university buildings scattered throughout the city. At a certain point, the university decided to centralise this because it was more efficient and the buildings were too small (Appendix I, observation 34).

It was a successful move to bundle the activities. The number of students has grown, and it attracted many large national and international companies that established their research centres on the university grounds (Appendix I, observation 34).

All the buildings at the original campus are occupied, and an additional overflow area 1 km from the campus was founded at the other side of the provincial road. This second campus, the Wageningen Business & Science Park, also offers space to small companies that do not fully fit in the scope of the Wageningen Campus (Appendix I, observation 34), which is to attract companies that intend to conduct fundamental research in collaboration with WUR. This means that they are generally specialised in agro-food developments (Appendix, I observation 34).

Mercator Science Park/Heyendaal Campus

Figure 29: Aerial view of Mercator Science Park/Heyendaal Campus

Mercator Science Park is located on the Heyendaal Campus, which includes the knowledge institutes of Radboud University, Radboudumc, and the Nijmegen location of HAN in Nijmegen (Appendix I, observation 2). The main focus of Heyendaal Campus is science (education and research). The location does not have a specific campus organisation, and the UBV (Universitair Vastgoed Bedrijf) owns all the real estate (Appendix I, observations 14 and 53).

Mercator Science Park was developed to accommodate spin-offs from the universities. It consists of three buildings and offers companies the possibility to locate close to the university. This proximity stimulates cooperation with university researchers. There are special, lower rental rates to attract organisations that are just starting (Appendix I, observation 14).

Recently, Radboud University acknowledged the importance of entrepreneurship and launched the Mercator Launch programme especially for students and PhD candidates interested in entrepreneurship; it is also offered at the campus (Appendix I, observations 14, 54, and 55).

Mercator Science Park is not focussed on a specific sector, in contract to other campuses. It also houses organisations which have no direct link with the universities. This is because there is no organisation to monitor certain characteristics of the campus.

Startup Nijmegen

Figures 30 and 31: Logo of Startup Nijmegen (figure 30) and image of the building in which Startup Nijmegen is located (figure 31)

Startup Nijmegen (SuN) calls itself the generic incubator of Nijmegen. It offers cheap housing to start-ups of all types, in all sectors, and with all focusses. Because of that, it has a wide range of different types of companies and so a broad network within the city. Startup Nijmegen is located in the centre of Nijmegen, close to the main railway station, so it is easily accessible (Appendix I, observation 26).

As an incubator, SuN organises knowledge sessions on how to successfully develop a company. These can be attended free of charge by anyone who is interested, even those who are not a partner in the programme. The training courses are provided by organisations which are part of the network of SuN (Appendix I, observation 26).

The companies housed at SuN mostly stay within the program for only a year. After that time, they have usually grown enough to do business without the support of SuN, or they quit business altogether. The successful companies relocate to other places in the city. The companies in the program are asked to have a certain development during their time at SuN (Appendix I, observation 26).

Because SuN has no specific target group or topic, it is not part of the Briskr network, and it has no close connections to other locations in the Nijmegen area (Appendix I, observation 26).

7. Results and Analysis

First results

This chapter is divided into two parts. The first one gives an overview of the results of the desk research and provides a quick view of the results from conversations with people in the network (first observations).

The second part is the analysis of topics which have a chance of success. Topics were chosen according to theories and input from interviewees. In this chapter, an analysis is made of the relationship of a specific location with the other locations in this thesis and vice versa. Both directions are examined because cooperation is bidirectional. If one of the locations has no intention to cooperate, there will not be any cooperation. A bidirectional analysis is important to see the possibilities of forming a connection with the different networks.

The first part of this chapter consists of schematic maps of the regions with possible connections in which a cooperation network can be formed. This analysis is on a flat scale, and it does not suggest how to implement these possibilities. This is not the objective of the research.

The second part shows multiple tables which outline changes in the manner of cooperating seen from the specific location towards another. This is done in words and colours and can be used as a comparative analysis.

First observations

The first observations are mostly hypothetical and are the starting point for possible networks which could exist. De Jong (2017) identifies different stages of cooperation that groups can be in. Depending on the network, these stages differ. Parameters of these results are shown in figure 8. For example, the Briskr consortium is set up to become more of a team rather than just a group and is organised in a way in which coordination can take place (Appendix I, observation 5).

The diagrams are built in a geographical sphere. The largest, most transparent orange and purple circles indicate the provinces. The logo of the provinces and regional development agencies are added in the circle. The next, smaller level is regions: the Oss region (bordered by the provincial border) and the region of Arnhem, Wageningen, and Nijmegen (the area in which the economic board operates). Then there are smaller regions within Gelderland, Food Valley and the former Stadsregio, two very different types of regions, according to conversations (Appendix I, observations 34 and 46).

The next layer consists of the municipalities of Arnhem, Nijmegen, Oss, and Ede/Wageningen which offer space to the campus locations. For Nijmegen, there is another layer (not mentioned in the figure) which distinguishes health and high tech from the other sectors. The map also shows some national actors which could be enlarged even more (top left). Included in this map are the benchmarks discussed in the theory, which were the inspiration for this map.

This map shows some issues and limitations for certain entities and possibilities for cooperation, which is elaborated on in the second part of this chapter.

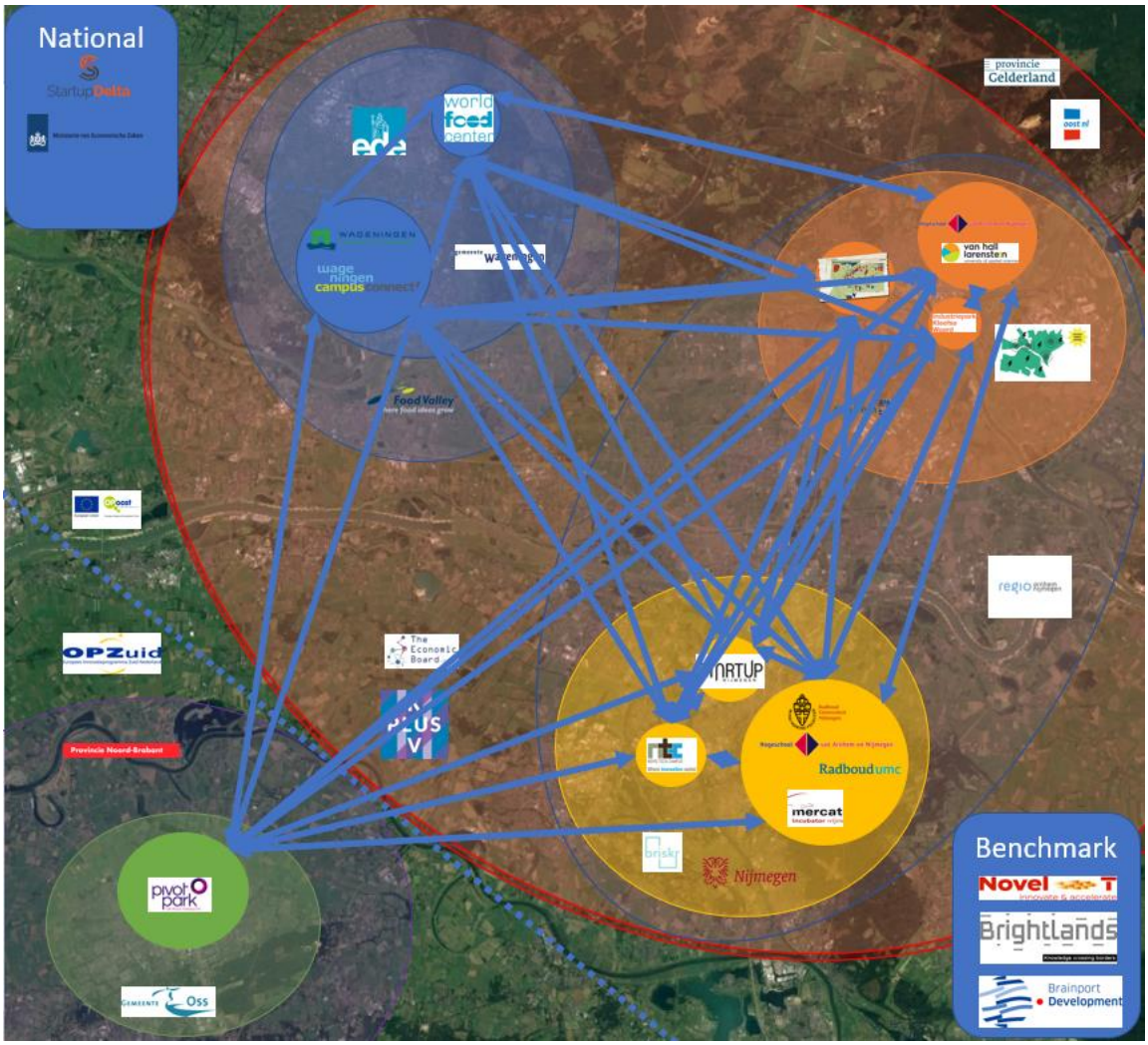


figure 32: Image of network connection between campuses (own data)

Network connection between campuses

On this map, all locations are interconnected. To get this result, much contact must be made amongst the locations, which differ in sector, size, and focus. There are six different locations investigated for this thesis, but the map shows nine to illustrate that much depends on the definitions and criteria or scale being used.

The nine locations on the map were chosen because they were mentioned during conversations or were involved in Buck's study (2014). Initiatives like Rebelspaces (stopped in march '19), Nex'd, StartLife, Dock024, and StartupArnhem (relaunched in April '19) were excluded because they do not fit the definition, were just launched, or are defunct. For instance, they lack a campus organisation or campus structure, but of course that is debatable. The same is true, for example, of Arnhem around Presikhaaf, where much is happening in the automotive business, but there is no intention to start a campus (Appendix I, observation 40).

On the map, connectivity can be seen between direct and joint operations on specific topics (e.g., housing or regional proposition). For each topic, coalitions within this network could be formed, and depending on the subject, other locations could also be involved. This would lead to the following maps.

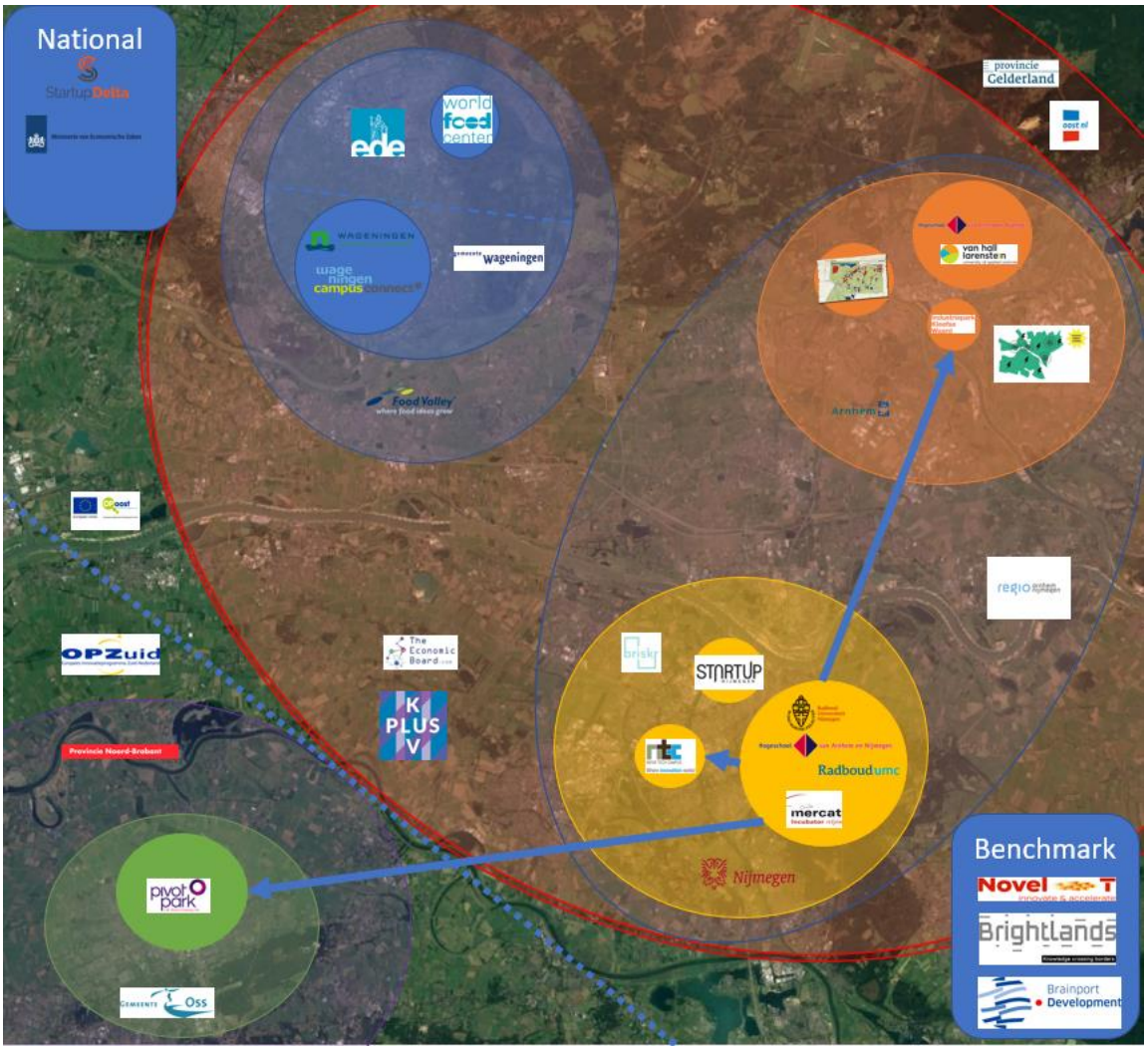


Figure 33: Image of the network from idea to business (own data)

Network from idea to business

This concept is often found in relation to universities and is based on an idea described by KplusV (see picture) (Appendix I, observations 14 and 21). Students who have an innovative idea and have finished their master's or PhD must work together with the university for research purposes (for instance, of a PhD). Meanwhile, they can develop their product. When the idea is 'product ready', they would not need to stay on the university site, and the university usually sees no need to support them anymore (Appendix I, observation 14). At that point, the small company could relocate to another location.

These locations of networks from idea to business can be found at IPKW, NTC, and Pivot Park, depending on the sector in which the company operates. The aim could be to pass specific organisations to dedicated locations where they fit best and have the best environment to scale up in (Appendix I, observation 14). Considering de Jong (2017), the current situation is one in which this occurred without any coordination.

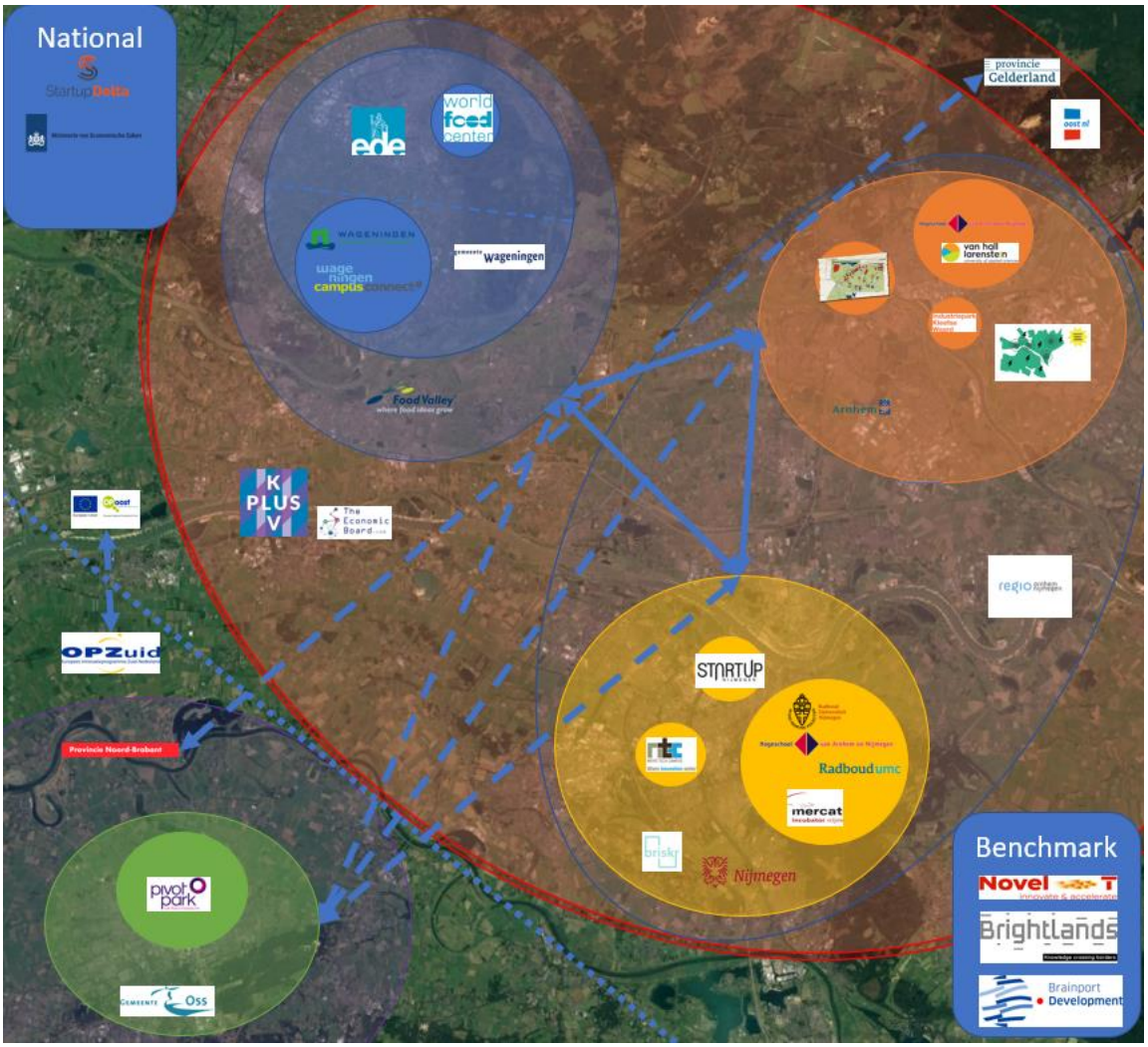


figure 34: Image of the network between regions

Interconnectivity between regions

This hypothetical network is based on regional interconnectivity; here, regional governments play an important role since they could be more focussed on generating a setting in which the organisations and campuses can conduct business. This could mean larger influence for the economic board and more support of campuses and hotspots. This generates possibilities to overcome a potential provincial border problem. This idea and observation are based on the benchmarks of Brightlands, Novel-T, and Brainport.

This interconnectivity has been tried in the past with Stadsregio, Arnhem, and Nijmegen (literally translated “City-region”) but without Oss and Wageningen. This used to be an extra political layer and can still be observed in the public transport network named Breng, which was established during the reign of the Stadsregio. The network shown in figure 34 has an even larger geographic scale and consists of more municipalities, including the province of North Brabant.

This would result in a network with the same setup as the Metropole region Amsterdam, which includes parts of North Holland and Flevoland. This entity has no governmental power but tries to strengthen cooperation within that specific region. Another single province example is one of the benchmarks, Brainport Eindhoven.

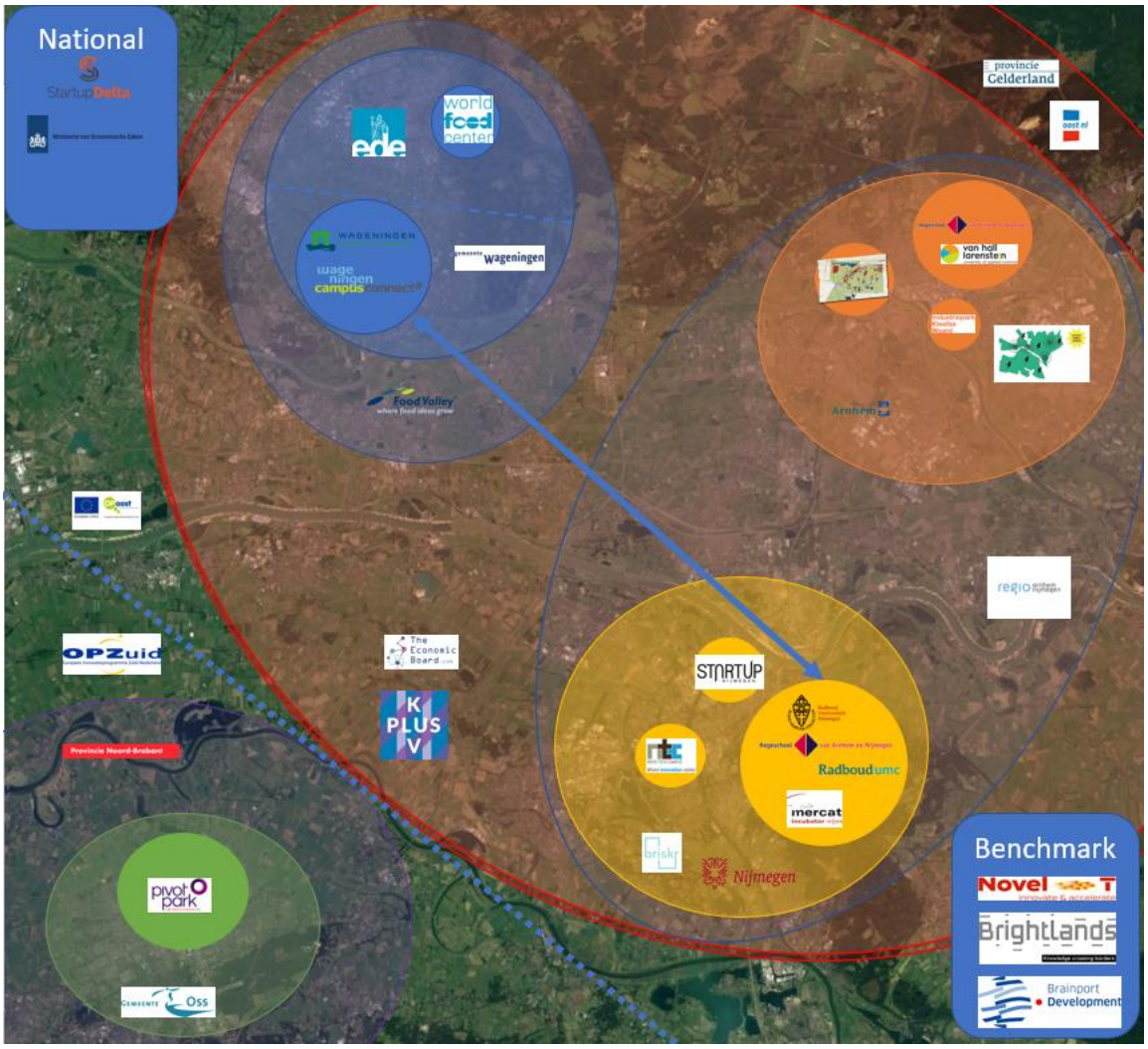


Figure 35: Network on research shared facilities (own data)

Network on shared facilities for research

This is a network which possibly already exists or is being built up between the two universities in the region (Appendix I, observations 27 and 34). Because of their scientific background, cooperation is easier because they have a feeling of mutual understanding. Pivot Park holds certain facilities especially for the sector. This can be seen and used as a shared facility but is based on a commercial level instead of a scientific basis (Appendix I, observation 24).

Cooperation on an academic level seems logic since such institutions use the same academic language and business model, which differs in private or semi-public locations. The main sources of income for universities are generally generated by publications and subsidies granted by the Ministry of Education.

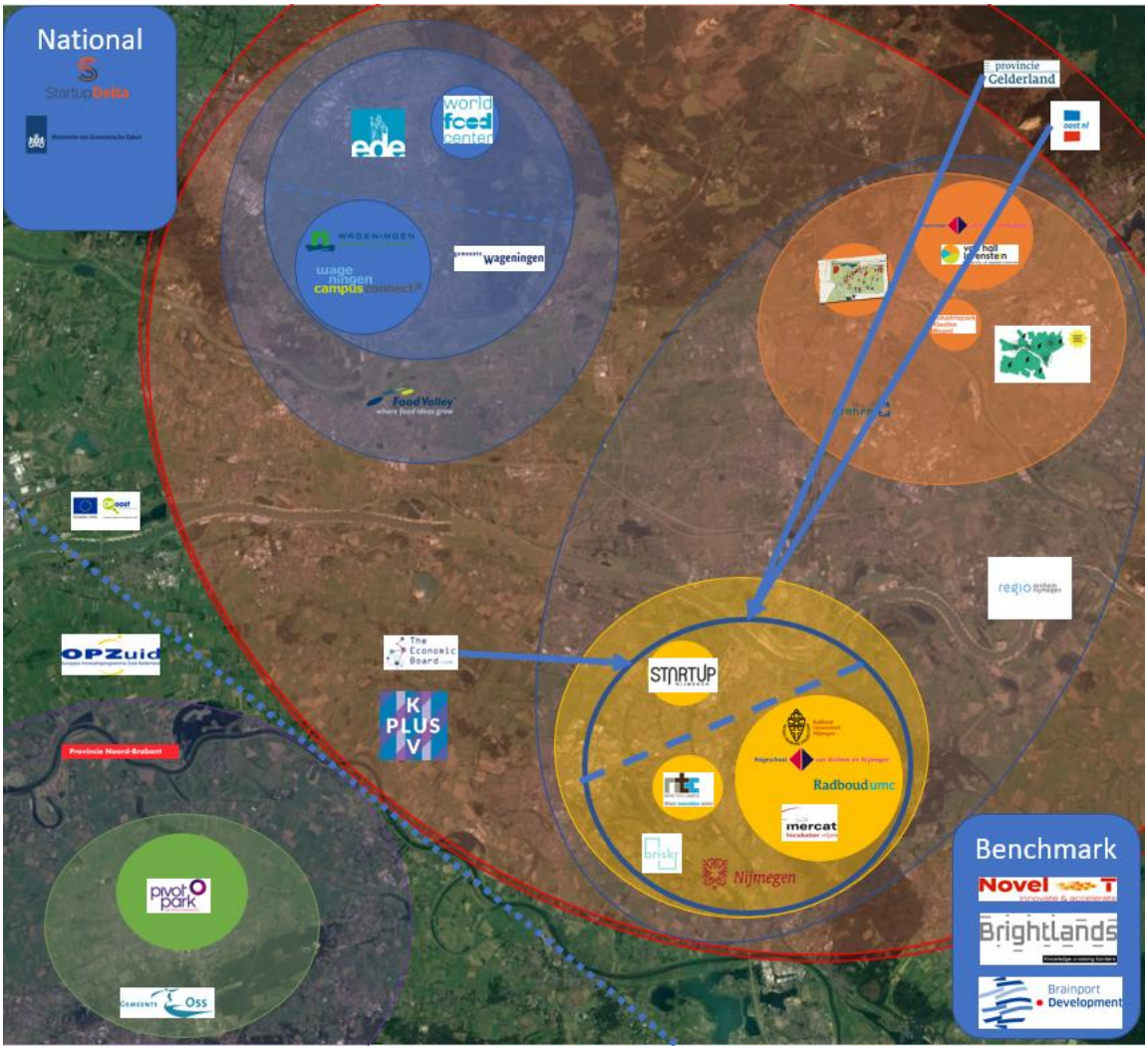


Figure 36: Image of a possible Nijmegen network (own data)

A possible Nijmegen network

This map is seen solely from the Nijmegen point of view but could exist for the other cities or multiple cities as well. The only important factor is that the city (in this case, Nijmegen) generates a feeling of being one group, whereas being together with Arnhem feels like two different locations working together.

To that extent, common projects could be set up by the locations (more than those shown in this picture). One initiative which has been started is setting up Briskr. This organisation only focusses on health and semiconductors. Besides this, there could be a broader, more generic cooperation network for the city. Inspiration for this possible network comes from how Novel-T operates (Appendix I, observation 37).

This possible network looks similar to Food Valley or the Novel-T network, initiatives set up by the regional governments.

Results and analysis

This part of the analysis is a more in-depth view on specific relationships between locations. The hypothetical networks drawn in the previous chapter are tested in two ways: from the inside out and from the outside in (thus, from location A towards the others and from the others to location A). The relationships are bidirectional, but one location could see possibilities with another, yet the other might not feel that need.

The sections have the following structure: The first table shows per location how the relationship is seen from that location towards the others. This is done in a descriptive way to explain the relationship and to provide insight into how the analysis is structured. In the second table, colours indicate the extent to which locations have a strong mutual interest in certain topics. At the bottom, there is an overall average compared to the other locations and based on a combination of calculations and likeliness in general, according to the data. The third part contains the analysis from the outside in and the inside out in two different graphs. These show the links and the differences of both figures. The reason both directions are discussed is to improve the readability since the differences between the relationships are especially important. If the outside-in part of the relationship is different, it can be compared to the chapter on that location. By doing this, some parts may seem to be double (since they are shown in two places in the analysis), but this is done to improve readability and understanding of the analysis. However, only the most relevant differences are mentioned.

The tables show five colours: dark green, light green, yellow, orange, and red. This scale shows the possibilities of cooperation: dark green is the most positive and red the most negative. The scale is built on the likeliness that cooperation between locations will occur or develop on a certain topic or project-specific topics. This scale is not a ranking of which location would be the best because the colours differ too much between locations.

Novio Tech Campus

NTC

Campus→ Way of Cooperating	Mercator Science Park	Startup Nijmegen	IPKW	Wageningen Campus	Pivot Park
International positioning	Good as one city, so this is logical (Observations in tables will be shown as: A-I-O 9, 16, 17 & 38)	Not really since SuN is more locally focussed on start-ups (A-I-O 26 & 27)	Possibly because of proximity (A-I-O 32, 33 & 39)	Same as IPKW as seen from NTC (A-I-O 34 ,35 & 36)	A possibility together with MSP and IPKW (A-I-O 24 & 25)
Acquisition	Important since companies from Mercator can be interesting to locate at this location when scaling up (A-I-O 9, 16, 17 & 38)	SuN is more generic, so not necessarily (A-I-O 26)	A joint acquisition is possible because of complementary elements, being both high-tech clusters (A-I-O 32 & 33)	No, Wageningen is focussed on food and does not attract the same companies (A-I-O 34)	Acquisition could be a joint operation to locate prospects on locations which suits them best(A-I-O 16, 17, 24 & 25)
Housing	As part of a growth track for spin-offs from RU and Radboudumc, this could be an interesting possibility (A-I-O 8, 9 & 10)	To locate start-ups at the best place, this could be possible when being done in the SuN program and in the scope of NTC (A-I-O 26 &8)	No, different scope of sectors, but knowledge could be shared (A-I-O 6, 32 & 33)	Kadans could play a role in this housing aspect (A-I-O 6 & 34)	As part of acquisition and possibility of an overflow location if either location is full, but provincial borders are limiting (A-I-O 24)
Equipment	Strong network already with companies on NTC, so this already exist (A-I-O 8, 9 & 10)	SuN has no specific hardware facilities (A-I-O 26&27)	Shared facilities to be set up, not available at this moment (A-I-O 32, 33 & 36)	Shared facilities; strengthened through cooperation with RU, so chances are present but need to be done within Briskr (A-I-O 34 & 35)	Shared facilities which are unique for pharmacy are interesting for NTC (present at Pivot Park because of former organon equipment) (A-I-O 24 & 27)
Network	Interesting because of an intensive network professor (especially for health), not for high tech—Is already happening (A-I-O 4, 5, 16 & 17)	Has a really strong regional network which could be beneficial for companies at NTC (A-I-O 26, 27, 28, 48 & 49)	For high-tech companies at NTC, this could be interesting since energy and energy use in semiconductors (RF) could be helpful (A-I-O 32, 33)	Strong international network in food which possibly could be interesting but not relevant for NTC at this moment (A-I-O 34 ,36 & 39)	Strong network within pharmacy which is interesting for companies at NTC (A-I-O 24 ,25 & 31)
Regional positioning	Yes, there are ideas called Nijmegen Campus (A-I-O 7, 16 & 17)	Yes, as city of Nijmegen but also as a role for the municipality or a ROM (A-I-O 39)	This could be, but this is a role for the municipalities; Arnhem is not looking for this kind of cooperation yet (A-I-O 32 & 33)	Seems to be too much distance between the two (A-I-O 39)	Possibly, but geographical province border is a problem (A-I-O 24 & 25)
Business support	Part of Briskr and to that extent possible (A-I-O 5)	As associate partner of Briskr (A-I-O 5 & 26)	On a larger, more generic scale between Orion and Briskr (A-I-O 21, 32, 33 , 39 & 40)	It is possible to share facilities for health or food organisations looking for possibilities in the other sector, but this role is more for the universities (WUR and RU) (A-I-O 34 & 39)	Same as regional positioning. (A-I-O 24, 25 & 31)
Management	As Campus Nijmegen, but scopes are different (A-I-O 16, 17 & 49)	Possibly and especially because they are complementary (A-I-O 47)	No, the structure of organizations is different (semi-public NTC versus private IPKW) (A-I-O 32 & 40)	No, the structure of organizations is different (semi-public NTC versus private Wageningen Campus, run by WUR) (A-I-O 34)	Nearly impossible because of funding by other provinces and municipalities (A-I-O 24 & 25)
Other	MSP has a broader scope in innovative companies	SuN mostly focusses on generic start-ups; to that extent, it is complementary	The locations are complementary (A-I-O 40)	Shared facilities and internationalisation are chances, but this role must be fulfilled by either the universities or province and OostNL	Many possibilities for cooperation between NTC and Pivot Park, but the border seems to be an issue

Figure 37: Table of cooperation between locations for NTC (in words)					
NTC Campus→ Way of Cooperating	Mercator Science Park	Startup Nijmegen	IPKW	Wageningen Campus	Pivot Park
International positioning					
Acquisition					
Housing					
Equipment					
Network					*
Regional positioning					
Business support					
Management					
Total					

*This aspect could be promising, but due to a border friction between provinces, the business possibilities seem limited (Appendix I, observations 24 and 25).

Figure 38: Table of cooperation between locations for NTC (in colours)

Inside out

When looking at the possibilities of cooperation seen from the NTC point of view towards others, it is clearly visible that possibilities of cooperation with Wageningen University are most limited, except for housing and international acquisition. The cooperation on housing is executed by Kadans, which is an important partner of NTC. They are involved in the Plus Ultra complex at the Wageningen Campus and on NTC. The rest is due to a geographical issue and different focusses of both locations (Appendix I, observation 35).

For international acquisition, the joined strength of the region is needed, as investigated and acknowledged by the research of KplusV done for the province. For NTC alone, it is difficult to make international acquisitions, but regional and national parties can support this proposition. For example, organisations like Health Holland, Holland High Tech, or the FNWA as international promotion entities are valuable players. On a governmental level, the province could play an important role in international acquisition/proposition, as well as OostNL (Appendix I, observation 21).

For SuN and Mercator Science Park, the regional aspect of being near each other (within the municipality of Nijmegen) is an important factor. The Briskr consortium and the network of campuses are an interesting combination and generate an ecosystem within the city which offers many possibilities for companies. They are complementary (Appendix I, observations 1–4, 17, and 21). The locations have enough individual strength and overlapping to be seen as three strong individual

locations partnered up. For NTC, a change in how the campus is managed could be done through cooperation with other locations (most importantly, Mercator Science Park) (Appendix I, observation 17). For the locations of Mercator and NTC, ideas to improve a joint management have been discussed on an informal level. Theoretically, SuN could join because it has its own entrepreneurial network. This could be valuable for the innovation and educational networks of the other locations. Plus the management is set up in a way to prevent too much conflict.

Both IPKW and Pivot Park are more distant locations from NTC. They have a similar goal, but their focus is on different sectors. For Pivot Park (as seen from NTC), the focus is more complementary since the pharmaceutical sector is an important aspect of the health sector. For the housing aspect, there have been ideas to create an overflow location for when an organisation cannot immediately find a space at one of the two locations. As discussed, the provincial border is an issue (Appendix I, observation 24). As seen from NTC, the network between NTC and Pivot Park is of great strength. The geographical provincial border, however, is a real border for networks (Appendix I, observation 24) because of different ways of funding and different possibilities of cooperation between organisations in both campuses and regions.

Outside in

From the outside in, the results are slightly different because of the focus of NTC on health and high tech, which it makes it less interesting, for instance, to MSP, which has a broader focus (Appendix I, observation 24). As seen from MSP, this location is a follow-up in the growth process of spin-offs, just like IPKW and Pivot Park could be in their specific sectors (Appendix I, observations 24 and 32).

For Wageningen Campus, the location is not interesting, except for internationally promoting the region (Appendix I, observation 34). For Pivot Park, the interest outside in is quite similar to NTC towards Pivot Park (Appendix I, observations 24 and 25). For IPKW, cooperating with the location is very interesting because of a learning process for them and also to conduct business with the semiconductor companies (Appendix I, observations 32 and 33).

Analysis

Inside out

Campus→ Way of Cooperating	Mercator Science Park	Startup Nijmegen	IPKW	Wageningen Campus	Pivot Park
International positioning					
Acquisition					
Housing					
Equipment					
Network					*
Regional positioning					
Business support					
Management					
Total					

Outside

Campus→ Way of Cooperating	Mercator Science Park	Startup Nijmegen	IPKW	Wageningen Campus	Pivot Park
International positioning					
Acquisition					
Housing					
Equipment					
Network					*
Regional positioning					
Business support					
Management					
Total					

Figures 39 and 40: Table of cooperation between locations for NTC from inside out and from outside in (in colours)

There are clear differences between both graphs for NTC. The main ones are visible for Mercator and Pivot Park. For the latter, this is due to the geographical location (as mentioned). For both locations, the province where they are located does not show the same involvement as Overijssel and Gelderland, which have OostNL as the regional development agency.

For Mercator Science Park and NTC, the difference occurs because the scope of Mercator Science Park is more broadly focussed than only on health and high tech. This can be a limitation for some topics but not others (for example, on housing). There are good possibilities for cooperation since companies already shift from Mercator Science Park to NTC when they are large enough. Also, for co-working space, joint programs could be set up.

For management, the possibilities are fairly limited. The way the funding of management of the campuses is currently set up does not offer possibilities to cooperate. A more integrated management could improve this.

Mercator Science Park/Heyendaal Campus

MERCATOR SCIENCE PARK

Campus→ Way of Cooperating	NTC	Startup Nijmegen	IPKW	Wageningen Campus	Pivot Park
International positioning	Good as being one city, but not as good as for NTC since NTC is more focussed on specific sectors (A-I-O 9, 16 & 17)	Not really since SuN is more locally focussed on start-ups (A-I-O 26, 27, 48 & 49)	Strong as a growth network for companies and a future landing place (A-I-O 32, 39, 40 & 53)	Possible because both are a university location within the province (A-I-O 34, 39 & 53)	Strong as a growth network for companies and a future landing place (A-I-O 24, 38, 39 & 53)
Acquisition	Not necessarily since Mercator focusses on spin-offs from RU and Radboudumc (A-I-O 9, 16, 17 & 53)	SuN is also a landing place for spinoffs; both aimed at young entrepreneurs (A-I-O 26 & 48)	Not necessarily since companies could go there, but MSP is for spin-offs (A-I-O 32 & 53)	Not necessarily since companies could go there, but MSP is for spin-offs (A-I-O 34 & 53)	Not necessarily since companies could go there, but MSP is for spin-offs (A-I-O 53)
Housing	As part of a growth track for spin-offs from RU and Radboudumc, cooperation on housing is interesting (A-I-O 6, 16, 17 & 53)	To locate start-ups at the best place, it is interesting to cooperate (A-I-O 26 & 53)	As part of a growth track for spin-offs from RU and Radboudumc, cooperation on housing is interesting (A-I-O 32)	Not necessarily since companies could go there, but MSP is for spin-offs, whereas Wageningen is almost the same for WUR (A-I-O 34)	As part of a growth track for spin-offs from RU and Radboudumc, cooperation on housing is interesting (A-I-O 24)
Equipment	Strong network already with companies on NTC, but NTC is more focussed (A-I-O 9)	No specific hardware facilities present at SuN (A-I-O 27 & 53)	As part of a growth track for spin-offs from RU and Radboudumc, IPKW lacks facilities now (9 ,32 & 53)	Strong linkages with shared facilities; both locations are complementary (A-I-O 9, 34 & 53)	As part of a growth track for spin-offs from RU and Radboudumc, especially the Pivot Park Screening Centre is interesting (A-I-O 24)
Network	Strong entrance into the semiconductor industry (A-I-O 16 & 9)	Has a really strong regional network which could be beneficial (A-I-O 16 & 9)	Strong specific network, complementary (A-I-O 24, 39 & 53)	Strong specific and international network, complementary (A-I-O 34, 39 & 53)	Strong specific network, complementary (A-I-O 24, 39 & 53)
Regional positioning	Yes, as Nijmegen Campus, but no university present, so not as strong (A-I-O 16, 21 & 19)	No university, so same as NTC (A-I-O 16 & 26)	As part of a growth track for spin-offs from RU and Radboudumc (A-I-O 53 & 39)	As two top university locations in one province (A-I-O 39 & 53)	As part of a growth track for spin-offs from RU and Radboudumc (A-I-O 24, 38 & 53)
Business support	Part of Briskr and to that extent possible, but also more narrowed than the focus of MSP (A-I-O 16, 17, 21, 27 & 53)	Generic but interesting for all companies on MSP, so good possibilities (A-I-O 21 & 26)	No, since Arnhem is not planning that at this moment, but IPKW has that desire (A-I-O 32, 53 & 40)	From an MSP perspective, it is interesting since most important sectors are easily mixed (health and food)	Not now and difficult because of border, but possibilities are seen (A-I-O 38 & 53)
Management	As Campus Nijmegen, but scopes are narrower for NTC (A-I-O 53)	Possibly and especially because they are complementary (A-I-O 53)	No, different organisational structure (private versus university) (A-I-O 32 & 53)	No, both are large and different institutes (A-I-O 34 & 53)	No, regional ownerships (by the province) make this impossible (A-I-O 53)
Other	NTC focusses on specific sectors, not one of which is lectured on within the university	SuN mostly focusses on generic start-ups, so to that extent it is complementary		WUR and RU are two different universities with different focusses	Governmental border is a big issue

Figure 41: Table of cooperation between locations for Mercator Science Park (in words)

MERCATOR					
Campus→ Way of Cooperating	NTC	Startup Nijmegen	IPKW	Wageningen Campus	Pivot Park
International positioning					
Acquisition					
Housing					
Equipment					
Network					
Regional positioning					
Business support					
Management					
Total					

Figure 42: Table of cooperation between locations for Mercator Science Park (in colours)

Inside out

Mercator Science Park, in comparison to other locations, could find more ways to cooperate. This is because of the fact that Mercator could function as a provider of spin-offs from Radboud University and Radboudumc. In the first part of the analysis, two maps are drawn in which the university locations have an important role. They operate as a starting point of innovation. With the new Mercator Launch project, they focus on pre-seed ideas (Appendix I, observation 14). In the second part, as seen from the university's point of view, entrepreneurialism does not play a major role and is not the core business of the university. There are multiple, easier ways to cooperate with the university.

The university provides the large organisations in the region with highly skilled employees. Because of the Mercator Launch project, multiple start-ups erupted after students finished their studies. Graduates are looking for jobs at the Mercator Science Park after they have finished their education. This also occurs at HAN, which has stronger ties to IPKW since, at this location, classes are held (Appendix I, observation 14).

For the connection from MSP towards Wageningen Campus, the shared facilities which both universities offer play an important role. They are complementary since the main objective of both universities is to conduct fundamental research, whereas other locations aim for production and innovation (Appendix I, observations 9, 14, and 34).

As seen from the university's perspective, the management aspect is slightly different from NTC, but Mercator Science Park also offers chances for cooperation. For NTC, managing a campus is their main

objective, but this is not the case for Mercator Science Park. This results in less focus on management, which is not a negative and is more in line with the university's perspective (Appendix I, observations 14 and 17). A special entity or department could be set up for management of the campus and more focus and cooperation on campus development. At this moment, this is part of Radboud Innovation and the Universitair Vastgoed Bedrijf (UVB) (Appendix I, observation 17). This resembles NTC, which also has a different organisation responsible for exploitation of the real estate. The difference is that the Mercator buildings and UBC (in which entities like Mercator Launch and Startup Mix Students are located) only represent 3 per cent of the real estate owned by the UVB, which makes their focus on the campus development less important (Appendix I, observation 36).

Outside in

From the outside in, Mercator Science Park could be, in an extreme way, seen as a place where new start-ups could move after they scale up and start to develop products. This must not be seen as cherry picking or competition but as a logical flow for companies to settle where they would fit best. There is an unspoken agreement that companies choose freely and sign a contract only after both locations contact them (Appendix I, observations 17, 26, 27, 28, and 53).

SuN is also interested in MSP. Many students who start their own spinoff business stay at the university campus, but there are also companies founded by graduates which are located at SuN. This might be because after college, students do want to get away from the university or do not need science to conduct business. In that context, the incubation program at SuN is interesting (Appendix I, observation 26).

Analysis

Inside out

Campus→ Way of Cooperating	NTC	Startup Nijmegen	IPKW	Wageningen Campus	Pivot Park
International positioning					
Acquisition					
Housing					
Equipment					
Network					
Regional positioning					
Business support					
Management					
Total					

Outside

Campus→ Way of Cooperating	NTC	Startup Nijmegen	IPKW	Wageningen Campus	Pivot Park
International positioning					
Acquisition					
Housing					
Equipment					
Network					
Regional positioning					
Business support					
Management					
Total					

Figures 43 and 44: Table of cooperation between locations for Mercator Science Park from inside out and from outside in (in colours)

Differences in results can be found in almost all locations. They seem more positive from the outside in than the inside out. NTC (discussed in the previous chapter) is mostly green along with Startup Nijmegen. For IPKW, which is comparable to the situation of NTC and MSP, the geographical distance plays an important role. Spinoffs are as less likely to move from Nijmegen to Arnhem, so it is interesting to cooperate on topics like housing.In comparison to Wageningen Campus and MSP, the focus of Wageningen is on food. Cooperating on crossovers is likely but is not of primary interest, according to conversations with representatives of the local government and university in Food Valley. For Pivot Park, the geographical scope is again an issue since, for the same reason, companies from Mercator are limited to move their operations to Oss. The Pivot Park Screening Centre is a positive asset of the location, making cooperation based on equipment likely. Their scope fits better than that of IPKW.

Startup Nijmegen

STARTUP NIJMEGEN

Campus→ Way of Cooperating	NTC	Mercator Science Park	IPKW	Wageningen Campus	Pivot Park
International positioning	For SuN, it could be interesting to attract new companies which would like to settle, but this topic is not relevant for SuN (A-I-O 26, 27 & 48)	it could be interesting to attract new companies which would like to settle, but this topic is not relevant for SuN (A-I-O 16, 26 & 53)	Not really since start-ups at SuN are mostly locally based (A-I-O 26)	Not really since start-ups at SuN are mostly locally based (A-I-O 26)	Not really since start-ups at SuN are mostly locally based (A-I-O 24 & 26)
Acquisition	SuN is more generic, so it could be because of complementary aspects of the location (A-I-O 26, 27 & 36)	As a generator of spin-offs, it could be interesting (A-I-O 24, 26, & 36)	Same as NTC; geographically, it could be difficult (A-I-O 26 & 32)	No, different regions (A-I-O 26 & 34)	No, different regions (A-I-O 24 & 26)
Housing	To locate start-ups at the best place, it could be good, but needs for companies from NTC are not suitable for SuN (A-I-O 6, 26 & 27)	To locate start-ups at the best place, it could be good (A-I-O 6, 16, 26 & 53)	Same as NTC; geographically, it could be difficult, but needs for companies from the IPKW are not suitable for SuN (A-I-O 26 & 32)	No interest from Wageningen Campus, and needs for companies from the Wageningen campus are not suitable for SuN (A-I-O 26 & 34)	Could be as a landing spot after SuN, but needs for companies from Pivot Park are not suitable for SuN (A-I-O 24 & 26)
Equipment	Not present at SuN; NTC has equipment available but not used or needed by SuN companies (A-I-O 9, 26 & 26)	Not present at SuN; MSP has multiple shared facilities to use by start-ups of SuN (A-I-O 9, 16, 26 & 53)	Not present at SuN; same as NTC (A-I-O 26 & 32)	Not present at SuN; could be used by SuN companies but not different from any other organisation (A-I-O 26 & 34)	Not present at SuN; could be used by SuN companies but not different from any other organisation (A-I-O 24 &26)
Network	Has a strong specific network which is interesting for NTC (A-I-O 26, 27 , 48 & 49)	Has a really strong academic network which could be beneficial (A-I-O 48, 49 & 53)	Same as NTC (A-I-O 26 & 32)	No interest from Wageningen Campus (A-I-O 24 & 34)	Same as NTC (A-I-O 24 & 26)
Regional positioning	As city of Nijmegen, but not as a role for the municipality or a ROM (A-I-O 38)	Yes, as city of Nijmegen, but not as a role for the municipality or a ROM (A-I-O 38)	Geographically, distance makes it difficult (A-I-O 26, 39 & 32)	No interest from Wageningen Campus; geographical distance makes it difficult (A-I-O 24, 39 & 34)	No, different regions (A-I-O 24, 39 & 26)
Business support	As associate partner of Briskr (A-I-O 27, 38 & 54)	Generic but interesting for all companies on MSP (A-I-O 16, 26, 53 & 54)	Possibly, but not in the scope, and geographical distance makes it difficult (A-I-O 5, 26 & 32)	Geographical distance makes it difficult (A-I-O 5, 24 & 34)	Geographical distance makes it difficult (A-I-O 5, 24 & 26)
Management	Possibly, they are complementary (A-I-O 26 & 54)	Possibly, they are complementary (A-I-O 26 & 54)	No, different structures (A-I-O 26 & 32)	No, different structure and distance (A-I-O 24 & 34)	No, different structure and distance A-I-O 24 & 26)
Other	SuN mostly focusses on generic start-ups, so to that extent it is complementary	SuN mostly focusses on generic start-ups, so to that extent it is complementary	Distance could be an issue	Distance could be an issue	Distance could be an issue

Figure 45: Table of cooperation between locations for Startup Nijmegen (in words)

STARTUP NIJMEGEN

Campus→ Way of Cooperating	Novio Tech Campus	Mercator Science Park	IPKW	Wageningen Campus	Pivot Park
International positioning					
Acquisition					
Housing					
Equipment					
Network					
Regional positioning					
Business support					
Management					
Total					

Figure 46: Table of cooperation between locations for Startup Nijmegen (in colours)

Inside out

SuN tries to cooperate with every organisation when synergy is possible. This does not mean every cooperation is favourable, but there is always an opening to investigate possibilities for cooperation. For SuN, the real chances lie within the city area because of their regional network, the size of organisations, and their origin (Appendix I, observations 26, 48, and 49).

Outside in

SuN plays a special role within the ecosystem, especially if looked at from a city level. The location is open to all kinds of start-ups. This generates a generic environment of start-ups. One of the main advantages of SuN is the network which surrounds it; there are many partners with a large and strong regional-focussed network. SuN is more embedded in the economical network of the city compared to the other two locations. This an interesting aspect from which MSP and NTC could benefit (Appendix I, observations 27, 28, and 49).

The other researched locations have no special interest in cooperating with SuN because of its Nijmegen-focussed network (Appendix I, observation 21).

Analysis

Inside out

Campus→ Way of Cooperating	Novio Tech Campus	Mercator Science Park	IPKW	Wageningen Campus	Pivot Park
International positioning					
Acquisition					
Housing					
Equipment					
Network					
Regional positioning					
Business support					
Management					
Total					

Outside in

Campus→ Way of Cooperating	Novio Tech Campus	Mercator Science Park	IPKW	Wageningen Campus	Pivot Park
International positioning					
Acquisition					
Housing					
Equipment					
Network					
Regional positioning					
Business support					
Management					
Total					

Figures 47 and 48: Table of cooperation between locations for Startup Nijmegen from inside out and from outside in (in colours)

The main difference between IPKW, Wageningen Campus, and Pivot Park compared to SuN is easy to see: the network of SuN mostly consist of entrepreneurs and organisation from the Nijmegen region. This is not in the scope of the other locations which have a certain regional network as well in their own city/region.

The main observation when comparing the tables is that equipment is entirely red because of the absence of physical equipment at SuN. Companies based there would have to cooperate with companies on other locations to use their equipment. This generates possibilities for further cooperation, which explains the green colour.

IPKW

IPKW

Campus→ Way of Cooperating	NTC	Startup Nijmegen	Mercator Science Park	Wageningen Campus	Pivot Park
International positioning	Possibly because of proximity (A-I-O 32, 33, 39 & 40)	Not really since start-ups at SuN are mostly locally based (A-I-O 32 & 48)	Strong as a growth network for companies and a future landing place (A-I-O 32, 39, 40 & 53)	Same as NTC (A-I-O 21, 32, 37, 39 & 40)	Same as NTC (A-I-O 24 & 32)
Acquisition	As a health cluster, a joint acquisition is possible (complementary) (A-I-O 32, 33 & 39)	Not interesting because of limited geographical scope (A-I-O 21, 32 & 48)	Important since companies from Mercator can be interesting to locate at this location (A-I-O 32, 39 & 53)	No, Wageningen is focussed on food (A-I-O 21, 32 & 34)	Geographical distance makes it difficult (A-I-O 24 & 32)
Housing	No, different scope of sectors, but companies have equal needs, so possibilities are present (A-I-O 6, 32 & 33)	The size of companies is different (A-I-O 21 & 32)	As part of a growth track for spin-offs from RU and Radboudumc (A-I-O 32 & 53)	Same as acquisition (A-I-O 21 & 34)	Same as acquisition (A-I-O 24 & 32)
Equipment	Different demand of shared facilities (A-I-O 32 & 33)	No equipment presents at SuN (A-I-O 32)	The university's shared facilities are interesting (A-I-O 17 & 32)	Shared facilities present at Wageningen Campus, so possible but not plausible (A-I-O 21, 37 & 34)	Shared facilities; possible but not predictable because of different scopes (A-I-O 24 & 32)
Network	Within energy and battery sector, yes; for companies on NTC, not necessarily (A-I-O 32, 33, 38, 39 & 40)	Same as NTC (A-I-O 21, 32 & 39)	Strong specific network, complementary (A-I-O 21, 32 & 53)	Strong international network in food (A-I-O 32, 34 & 46)	Strong international network in food (A-I-O 32 &24)
Regional positioning	This could be, but this is a role for the municipalities; Arnhem isn't looking for this kind of cooperation yet (A-I-O 32, 33, 38, 39 & 40)	Not in the scope of IPKW (A-I-O 40)	As part of a growth track for spin-offs from RU and Radboudumc (A-I-O 32, 38, 39, 40 & 53)	Could be, but not really desired by Wageningen Campus (A-I-O 34 & 46)	Could be, but not really desired by Wageningen Campus (A-I-O 32 & 34)
Business support	On a larger, more generic scale between Orion and Briskr (A-I-O 32, 33, 38, 39 & 40)	Possibly, but not on the same scope (A-I-O 37, 39 & 47)	No, since Arnhem is not planning on that, but IPKW has that desire (A-I-O 32 & 53)	There is a possibility on shared facilities for health or food organisations looking for possibilities in the other sector, but this role is more for the universities (WUR and RU), so no intention seen so far (A-I-O 34)	There is a possibility on shared facilities for health or food organisations looking for possibilities in the other sector, but this role is more for the universities (WUR and RU), so no intentions seen so far (A-I-O 24 & 25)
Management	No, the structure of organisations is different (semi-public NTC versus private IPKW) (A-I-O 32 & 33)	No, different structures and not enough complementary elements (A-I-O 40)	No, different organisation structure (A-I-O 53)	No, the structure of organisations is different (semi-public NTC versus private Wageningen Campus, run by WUR) (A-I-O 34 & 39)	No, the structure of organisations is different (semi-public Pivot Park versus private Wageningen Campus, run by WUR) (A-I-O 24)
Other	The locations are complementary	Distance could be an issue	Lack of a university in Arnhem could possibly create a lack of interest between both locations	Shared facilities and internationalisation are chances, but this role must be fulfilled by either the universities or province and OostNL	Shared facilities and internationalisation are chances, but this role must be fulfilled by either the universities or province and OostNL

Figure 49: Table of cooperation between locations for IPKW (in words)

IPKW					
Campus→ Way of Cooperating	Novio Tech Campus	Startup Nijmegen	Mercator Science Park	Wageningen Campus	Pivot Park
International positioning					
Acquisition					
Housing					
Equipment					
Network					
Regional positioning					
Business support					
Management					
Total					

Figure 50: Table of cooperation between locations for IPKW (in colours)

Inside out

For IPKW, the campuses in the region, except for MSP, are all interesting. The focus, however, is different, and so are the networks and housing needs (Appendix I, observation 32).

MSP is interesting for IPKW because this could be a follow-up location for spinoffs from RU. However, the other educational entity on that campus (HAN) is perhaps more interesting because of its focus on energy and automotive. Because of that, IPKW attracts HAN students to follow courses at IPKW (Appendix I, observation 32).

IPKW is also trying to develop a campus location. For IPKW, therefore, it is interesting to gain information from MSP, NTC, Pivot Park, and Wageningen about campus development (Appendix I, observation 32).

Outside in

IPKW is quite like NTC and Pivot Park. The differences are only the location and sector (Appendix I, observation 33).

There is a planned development of a campus environment on IPKW. For Pivot Park and NTC, this offers an opportunity to cooperate and help IPKW with that development. Indeed, this strengthens their own regional position and does not compete since the focus of the sectors of all locations is different (Appendix I, observation 21).

Analysis

Inside out

Campus→ Way of Cooperating	Novio Tech Campus	Startup Nijmegen	Mercator Science Park	Wageningen Campus	Pivot Park
International positioning					
Acquisition					
Housing					
Equipment					
Network					
Regional positioning					
Business support					
Management					
Total					

Outside in

Campus→ Way of Cooperating	Novio Tech Campus	Startup Nijmegen	Mercator Science Park	Wageningen Campus	Pivot Park
International positioning					
Acquisition					
Housing					
Equipment					
Network					
Regional positioning					
Business support					
Management					
Total					

Figures 51 and 52: Table of cooperation between locations for IPKW Campus from inside out and from outside in (in colours)

It is important to mention the general differences between Wageningen Campus and IPKW, which are like the differences between NTC and Mercator. NTC and IPKW are Innovation based, but Mercator and Wageningen are science based. In the relationship between Wageningen and IPKW, the geographical distance also plays a part (Appendix I, observations 26 and 34).

The same geographical difference is there between Pivot Park and IPKW. Business support as a way of cooperation is not present at IPKW because it is seen as a provincial issue. Since the province of Gelderland only represents itself, the colour for the Pivot Park -> IPKW relationship on that aspect is yellow but could have been empty as well.

Management is entirely red since IPKW is the only fully privately owned location in this research. Cooperation on management would only be possible if the private owner would buy a location or be bought out.

Wageningen Campus

WAGENINGEN CAMPUS

Campus→ Way of Cooperating	NTC	Startup Nijmegen	IPKW	Mercator Science Park	Pivot Park
International positioning	Possibly, because of the linkage with province (A-I-O 34, 35, 39 & 46)	Not really since start-ups at SuN are mostly locally based (A-I-O 26 & 34)	Same as for NTC (A-I-O 32, 34, 39, 40 & 46)	Could be done jointly, but as individual, strong universities, this does not have to occur (A-I-O 34 ,35, 39, 46 & 53)	Difficult because of province border (24, 34 & 39)
Acquisition	No, Wageningen is focussed on food (A-I-O 34 35, 39 & 46)	No interest from Wageningen Campus (A-I-O 34)	No, Wageningen is focussed on food (A-I-O 32, 34, 39, 40 & 46)	Not necessarily since companies could go there, but MSP is for spin-offs (A-I-O 34, 35, 38, 39, 46 & 53)	No, Wageningen is focussed on food (A-I-O 24, 34 & 39)
Housing	Same as for acquisition (A-I-O 34 & 35)	No interest from Wageningen Campus (A-I-O 34)	Same as for acquisition (A-I-O 32 & 34)	Not necessarily since companies could go there, but MSP is for spin-offs, whereas Wageningen is similar for WUR (A-I-O 34 & 53)	Same as for acquisition (A-I-O 24 & 34)
Equipment	Shared facilities; strengthen through cooperation with RU (A-I-O 34 & 35)	Could be used by SuN companies (A-I-O 26 & 34)	Shared facilities; possible but not predictive (A-I-O 32, 34 & 46)	Strong linkages with shared facilities, complementary (A-I-O 34& 36)	Shared facilities; possible but not plausible (A-I-O 24 & 34)
Network	Strong international network in food (A-I-O 34, 35, 39 & 46)	No interest from Wageningen Campus (A-I-O 34)	Strong international network in food (A-I-O 32, 34, 39, 40 & 46)	Strong specific and international network, complementary (A-I-O 34, 36, 39 & 53)	Strong international network in food (A-I-O 24, 34, & 39)
Regional positioning	No interest from Wageningen Campus (A-I-O 34 & 35)	No interest from Wageningen Campus (A-I-O 34)	Could be, but not really desired by Wageningen Campus (A-I-O 32, 43 & 39)	Both top university locations in one province (A-I-O 34, 36, 39, 46 & 53)	Could be, but not really desired by Wageningen Campus (A-I-O 34)
Business support	There is a possibility on shared facilities for health or food organisations looking for possibilities in the other sector, but this role is more for the universities (WUR and RU) (A-I-O 34, 35 & 39)	No (A-I-O 34)	There is a possibility on shared facilities for health or food organisations looking for possibilities in the other sector, but this role is more for the universities (WUR and RU) (A-I-O 34)	No (A-I-O 34 & 36)	There is a possibility on shared facilities for health or food organisations looking for possibilities in the other sector, but this role is more for the universities (WUR and RU) (A-I-O 34)
Management	No, the structure of organisations is different (semi-public NTC versus private Wageningen Campus, run by WUR) (A-I-O 34 & 39)	No, different structure and distance (A-I-O 34 & 39)	No, the structure of organisations is different (semi-public NTC versus private Wageningen Campus, run by WUR) (A-I-O 34 & 39)	No (A-I-O 34 & 39)	No, the structure of organisations is different (semi-public NTC versus private Wageningen Campus, run by WUR) (A-I-O 34 & 39)
Other	Shared facilities and internationalisation are opportunities, but this role must be fulfilled by either the universities or province and OostNL	Distance could be an issue	Shared facilities and internationalisation are opportunities, but this role must be fulfilled by either the universities or province and OostNL		Shared facilities and internationalisation are opportunities, but this role must be fulfilled by either the universities or province and OostNL

Figure 53: Table of cooperation between locations for Wageningen Campus (in words)

WAGENINGEN CAMPUS					
Campus→ Way of Cooperating	Novio Tech Campus	Startup Nijmegen	IPKW	Mercator Science Park	Pivot Park
International positioning					
Acquisition					
Housing					
Equipment					
Network					
Regional positioning					
Business support					
Management					
Total					

Figure 54: Table of cooperation between locations for Wageningen Campus (in colours)

Inside out

Wageningen Campus is an exceptional, special case in this research, which can be seen by looking at these tables. Wageningen Campus holds a strong focus on food and can attract large multinationals to locate at their campus. Possibly because of this, the interest in cooperation with the other locations is rather low at Wageningen Campus (Appendix I, observation 34).

In international perspective, especially IPKW, NTC, and MSP can be interesting because of the focus of the province on this issue. However, here, Food Valley itself has a strong and independent brand in their field of expertise and does not necessarily need the help of others. Therefore, the need to cooperate with other locations is low (Appendix I, observation 34).

Especially towards Pivot Park (except for some scientific aspects) and SuN, there is very little intention to cooperate because of the local focus of both locations (Appendix I, observation 34).

MSP holds a special position since it is also located on a university site, and both locations offer shared facilities (Appendix I, observations 34 and 36).

Outside in

From the outside in, the view is different. The other locations see Wageningen as a valuable location. Here, the link is more unidirectional than for other locations, except for MSP, where there is a bidirectional link.

Analysis

Inside out					
Campus→ Way of Cooperating	Novio Tech Campus	Startup Nijmegen	IPKW	Mercator Science Park	Pivot Park
International positioning					
Acquisition					
Housing					
Equipment					
Network					
Regional positioning					
Business support					
Management					
Total					

Outside in					
Campus→ Way of Cooperating	Novio Tech Campus	Startup Nijmegen	IPKW	Mercator Science Park	Pivot Park
International positioning					
Acquisition					
Housing					
Equipment					
Network					
Regional positioning					
Business support					
Management					
Total					

Figures 55 and 56: Table of cooperation between locations for Wageningen Campus from inside out and from outside in (in colours)

These two tables differ the most from the others in this research because, as mentioned, Wageningen does not have that much interest in cooperation with the locations in the Arnhem/Nijmegen (and Oss) region (though this is not the case the other way around).

In the relationship Pivot Park <-> Wageningen Campus, minor differences occur. There is an entirely red column for management because of the ownership of the campus. WUR is the only owner and therefore holds the power over the campus development, in the same way that Utrecht University (UU) does over Utrecht Science Park, Amsterdam University (UvA) does over Amsterdam Science Park, and Leiden University does over Leiden Bio Science Park.

Pivot Park

PIVOT PARK

Campus→ Way of Cooperating	NTC	Startup Nijmegen	IPKW	Wageningen Campus	Mercator Science Park
International positioning	A possibility together with MSP and IPKW in growth path of start-up (A-I-O 24, 25 & 38)	Not really since start-ups at SuN are mostly locally based (A-I-O 26, 24 & 38)	Same as NTC (A-I-O 24, 32, 38, 39 & 40)	Difficult because of province border (A-I-O 24)	Strong as a growth network for companies and a future landing place (A-I-O 16 & 24)
Acquisition	To best locate prospects where they are suited, acquisition could be a joint operation in supervising (A-I-O 24, 25 & 38)	No, different regions (A-I-O 26, 24 & 38)	No, IPKW is focussed on energy, and the geographical distance is an issue	No, Wageningen is focussed on food	Important since companies from Mercator can be interested to locate here (A-I-O 16, 24 &53)
Housing	As part of acquisition and possibility of an overflow location if the other location is full (A-I-O 6, 24 & 38)	Could be as a landing spot after SuN (A-I-O 24, 26 & 38)	Same as acquisition (A-I-O 24)	Same as acquisition (A-I-O 24)	As part of a growth track for spinoffs from RU and Radboudumc (A-I-O 16, 24 & 53)
Equipment	Shared facilities which are unique for pharmacy (because of former organon equipment) (A-I-O 24 & 25)	Could be used by SuN companies (A-I-O 24 & 26)	Shared facilities; possible but not plausible (A-I-O 24 & 34)	Shared facilities; possible but not plausible (A-I-O 24 & 34)	As part of a growth track for spinoffs from RU and Radboudumc (A-I-O 24, 16 ,26)
Network	Strong network within pharmacy (A-I-O 24, 25 & 38)	Same as NTC (A-I-O 24)	Strong international network in energy (A-I-O 24)	Strong international network in food (A-I-O 24)	Strong specific network, complementary (A-I-O 16, 24 & 38)
Regional positioning	Possibly, but geographical border is a problem (A-I-O 19, 24, 25 & 38)	No, different regions (A-I-O 24 & 26)	Could be, but not really desired by Wageningen Campus (A-I-O 24, 34 & 46)	Could be, but not really desired by Wageningen Campus (A-I-O 24)	As part of a growth track for spinoffs from RU and Radboudumc (A-I-O 24 & 53)
Business support	Same as positioning (A-I-O 19, 24 & 25)	Same as regional positioning (A-I-O 24)	There is a possibility on shared facilities, but due to a sharp focus, this could be difficult (A-I-O 24, 34 & 46)	There is a possibility on shared facilities, but due to a sharp focus, this could be difficult (A-I-O 24)	Not now and difficult because of border, but desired by Pivot Park (A-I-O 24, 16 & 53)
Management	Near to impossible due to financing from other provinces and municipalities (A-I-O 24 & 25)	No, different structure and distance (A-I-O 24)	No, the structure of organisations is different (semi-public Pivot Park versus private Wageningen Campus, run by WUR) (A-I-O 24 & 34)	No, the structure of organisations is different (semi-public Pivot Park versus private Wageningen Campus, run by WUR) (A-I-O 24)	No A-I-O 24)
Other	Good possibilities and contacts, but provincial border is seen as an actual border	Distance could be an issue	Shared facilities and internationalisation are possible opportunities, but provincial borders are limiting	Shared facilities and internationalisation are possible opportunities, but provincial borders are limiting	Governmental border is a big issue

Figure 57: Table of cooperation between locations for Pivot Park (in words)

PIVOT PARK					
Campus→ Way of Cooperating	Novio Tech Campus	Startup Nijmegen	IPKW	Wageningen Campus	Mercator Science Park
International positioning					
Acquisition					
Housing					
Equipment					
Network	*				
Regional positioning					
Business support					
Management					
Total					

*This aspect could be of great value, but due to a border friction between provinces, it is not possible to make full use of it.

Figure 58: Table of cooperation between locations for Pivot Park (in colours)

Inside out and outside in, a special case

Pivot Park sees itself as both being part of the Brabantian and Gelderland networks—and, more specifically, the Nijmegen network. Being part of the Brabantian network is obvious since Oss is located in Brabant and receives European funding for location because of this, which makes it easier for organisation and campuses to do business with Pivot Park or to relocate there from other locations in Brabant (Appendix I, observation 24).

To become part of a Gelderland network, the limitation lies in the fact that there is a real provincial border. A company located in Brabant and operating on funding provided from Brabant, mostly from the province, BOM, or OPZuid (EFRO), has been given this funding to generate benefits for the region of Brabant. If doing business with Gelderland-based organisations, entities, or companies is more beneficial, the geographical location could still limit these possibilities. This is a problem, and networks (or even companies) could not be easily merged even if this would be more logical for the company (Appendix I, observation 24).

The diagram shows that Pivot Park—although it could be functioning as a follow-up for start-ups in pharmacy from Radboud University—is not a very likely location. Companies still need to hold their main seat in Gelderland, which limits the network possibilities (Appendix I, observation 24).

For Pivot Park, this is a problem since Brabant does not have a university medical centre (UMC). Limburg (within the OPZuid EFRO region) does, but it is more than an hour and a half away. However, Pivot Park is an interesting case. Possibilities to overcome these problems must be found to fully implement this campus in this network, especially the Nijmegen network (Appendix I, observation 24).

Analysis

For Pivot Park, the border potentially limits many possibilities. NTC and Pivot Park have several similarities and are close by, so the possibilities for cooperation would flourish if that limitation were gone.

Figures 59 and 60: Table of cooperation between locations for Pivot Park from inside out and from outside in (in colours)

Inside out

Campus→ Way of Cooperating	Novio Tech Campus	Startup Nijmegen	IPKW	Wageningen Campus	Mercator Science Park
International positioning					
Acquisition					
Housing					
Equipment					
Network	*				
Regional positioning					
Business support					
Management					
Total					

Outside in

Campus→ Way of Cooperating	Novio Tech Campus	Startup Nijmegen	IPKW	Wageningen Campus	Mercator Science Park
International positioning					
Acquisition					
Housing					
Equipment					
Network	*				
Regional positioning					
Business support					
Management					
Total					

8. Conclusion

This thesis posed the following research question:

> *How can campuses or other so-called hotspots like NTC within the Nijmegen, Arnhem, and Wageningen regions improve their cooperation to benefit the companies in in these locations*?

The sub questions for this research were:

> *How are the campuses/hotspots organised, and what are their main goals? In what ways are these similar?*
>
> *What can campuses/hotspots do together and in cooperation with the government and research institutes?*
>
> *To what extent is the Nijmegen, Arnhem, and Wageningen region a fitting geographical scope? Are these borders logical, or is a campus like Pivot Park interesting as well?*

To answer the first sub question above—*How are the campuses/hotspots organised and what are their main goals? In what way are these similar?*—campuses and innovation hotspots are locations where economic development is taking place. Many locations in the Netherlands are created to establish a hub for innovations and start-ups. They have different aims and names, like incubator, campus, or coworking space. However, all these initiatives try to support start-ups and keep innovation within the region. Some of them focus on specific sectors, and others focus on specific operations or organisations (like start-ups or scale-ups).

There is significant variety in the way locations are organised, mainly because of how they are funded or their organisational form, e.g., stitching, BV, NV, part of a larger organisation, etc. Many organisations are funded by either a municipality or province or by a university. These funders have certain power or influence within the organisation, and their own interests sometimes prevail, which makes cooperation with such locations more difficult.

In Gelderland, there are many of these initiatives, all with the intention to help organisations located in a certain place or around a certain facility (in a physical and nonphysical sense). Cooperation between these organisations is sometimes hard because initiatives must make a profit to keep running and are, therefore, sometimes competitors. In general, however, it is potentially beneficial for the companies to cooperate.

The benefits are even bigger when there are complementary subjects in which they could find common grounds. Possibilities are, for instance, joint international or regional positioning, for which they could achieve more in cooperation with the regional/provincial or national government. Most campuses have a specific focus. Pivot Park, NTC, Wageningen Campus, and IPKW focus mostly on specific sectors. SuN focuses on regionally based start-ups. Both Wageningen Campus and Mercator Science Park focus on spinoffs and pre-seed initiatives. Despite this, they all have the same main goal: to make innovations work and blossom.

What can campuses/hotspots do together and in cooperation with the government and research institutes?

There are several things campuses/hotspots can do together to be more successful. First, it is important to build a network. The initial results show how a network can be built up and created. Other important issues on which cooperation is possible are acquisition and housing. However, these are more difficult topics requiring negotiations because they could influence operations of the different organisations. Nevertheless, in the researched locations, there seems to be a certain desire to

cooperate on these topics. Depending on different aspects, cooperation is possible, for example, between Pivot Park and NTC.

Possibilities are also present with, for example, research institutes. These have an important role in innovation since they are mostly in the pre-seed phase and contribute to the validation of a product.

To what extent is the Nijmegen, Arnhem, and Wageningen region a fitting geographical scope? Are these borders logical, or is a campus like Pivot Park interesting as well?

Geographical aspects play an important role in possibilities for cooperation on specific topics and between different locations. This applies not only to the locations analysed in this research but, moreover, to organisations in general. Borders play an important role because they limit locational possibilities for companies when they have specific funding from regional governments or universities.

As seen from the analysis, not only are geographical borders an issue, but the actual distance (e.g., the distance to Wageningen Campus) or geographic scope of the location could also limit possibilities (e.g., for Startup Nijmegen).

As discussed, geographical issues are the reason for most difficulties in possible cooperation (as reflected in the coloured tables). *How can campuses or other so-called hotspots, such as Novio Tech Campus, within the Nijmegen, Arnhem, and Wageningen region improve their cooperation to gain more benefits for the companies involved in these locations*?

There are several aspects which influence the possibilities of cooperation between campuses/hotspots. In the analysis, seven topics (positioning, acquisition, housing, equipment, network, business support, and management) were identified in which cooperation can be improved. These were found in the literature and during the first meetings/interviews. These topics were discussed with representatives of the researched locations and resulted in a model which describes the possibilities of cooperation and synergy.

There are also general issues which play an important role in cooperation. First and most importantly, to achieve cooperation which has impact, the locations involved must feel the need to actually cooperate and share the belief that they both have something to gain in this. Without a sense of urgency, the cooperation would not be sustainable. There are examples in which one of the two locations does not see or feel such a need.

The second important issue is the focus of the location, which can cause the main differences. A sector-focussed location has a different interest than a location with more generic companies, And these differences could limit the possibilities of cooperation. Currently, it seems that campuses and hotspots are mainly focussing on their own regional networks without enhancing cooperation with each other. However, opportunities to do so are present and shown in this research.

The third issue is finding synergy and complementary aspects. This is a big chance for mutual success. Cooperation seems like a challenge because locations are organised as partnerships and have several stakeholders who want certain results. Other locations are, therefore, seen as competitors, and partnering with them seems counterproductive since they all must fill their office spaces or desks to maintain a profit. Whilst it is true that it is difficult to find cooperation on those aspects, the results of this research show that it is easier to join forces on topics in which organisations do not compete or can be complementary to each other. It is easier to do things jointly when it does not conflict with important topics which generate the most income for locations. Thus, it is essential to identify which aspects campuses or hotspots can be complementary on or gain profit from each other. For example, in some locations, the campus organisation does not own the real estate. If so, there are more

possibilities to cooperate on this aspect since this does not conflict with areas that generate the most income.

Also, of importance to cooperation is the geographical location and the role of the government. The role of the government in building the networks is important since when they show the incentive to introduce such networks business and knowledge institutes will follow in certain times. Governments can limit the possibilities of cooperation because they only subsidise regional partnerships. However, a regional government can also play a role as a connector by enhancing cross-border cooperation. Some locations have a specific scope related to their region. To that extent, the role and support of the government are important and are different per location. This regional focus limits the possibilities of cooperation with locations outside the region. Thus, locations with such a strong regional focus have partnerships with organisations in their own region. This can also be observed in the benchmarks which prove that geographical based networks are also strongly backed by businesses and knowledge institutes (with Brainport being the best developed example).

When looking into the Arnhem-Nijmegen region, a strong conclusion can be made about the aspect of regional cooperation. This region has an international profile as one strong region with differences per campus location. Having their own strengths can sometimes mean that they are complementary. For the Arnhem Nijmegen region, the Food Valley area around Wageningen seems a logical partner to add to the region because of complementary sectors (health/high tech and food). The other way around, from a Wageningen perspective towards Arnhem Nijmegen, however, this need is not felt since the region sees itself as strong and independent, located in Gelderland. Its focus is stronger on other, more competing regions than Arnhem Nijmegen (for example, Utrecht).

Another possibility of cooperation for the Arnhem-Nijmegen region it with Oss. The Oss region (Pivot Park) feels a strong connection with Nijmegen because of the mutual focus on health. This cooperation, however, is limited through hard geographical borders, which also limit the movement of companies between the regions. This results from the fact that regional funding limits location movement of companies that are bounded. Especially between Oss and Nijmegen, there are strong intentions to work together on more difficult subjects to overcome this issue. The results of this thesis show that an option could be cooperating more on a management level. Managerial cooperation also seems profitable for NTC and Mercator Science Park and perhaps also with SuN.

General conclusion

Cooperation between campuses and hotspots is not easy to achieve due to multiple partnerships and influences from various stakeholders, resulting in different interests and desires. A shared belief in the mutual benefit of cooperation seems, along with other aspects, the most important factor for successful cooperation between locations. Regionally, good intentions were found in this study to make this cooperation stronger, but there is still a long way to go because of extensive discussions and interests amongst multiple partners.

9. Recommendations

Some recommendations can be made as a result of this research. To enhance successful cooperation between the research locations in the region, it is important to start small. According to the literature, cooperation is stronger when people trust each other. In that context, starting with something small (like organising events together) can be the beginning of building trust. Step by step, larger implementations can then take place.

By looking for complementary aspects, cross-overs can be made that do not conflict with the different types of operations at the locations since these are complementary. A good example is an initiative to link the areas of food to health to collaborate on the possibilities that food offers to cure people or prevent them from getting sick.

When looking for joint projects, it is best to start with a small number of organisations to work together and build from there. This is because with each new actor, more complications or conflicting interests follow. If complications between two organisations are solved, new actors can possibly join.

On positioning in the region, cooperation amongst the three regions is possible, but on other levels the interests are just too different and difficult. Wageningen sees the region and the added value differently than Arnhem and Nijmegen do.

When the regional scope and number of organisations are small, cooperation can occur on more aspects such as housing possibilities and business support (like the Briskr consortium):

- Housing possibilities include beneficial contracts for start-ups when moving from one location to another (it limits possibilities for start-ups but strengthens cooperation).
- Business support like Briskr is based on two sectors because there is specific knowledge of them, and experts know directly what these companies need in addition to the standard setting up of a business (a health or high-tech company needs research facilities and, at certain times, use of a shared facility, so lending or buying has benefits).

Such benefits could be a start for larger networks, but even for the Nijmegen region, it is difficult to set this up without difficulties. As the benchmarks proved, establishing such networks takes time and commitment of the triple helix.

Benchmarks show examples of how these cooperation's can take place. It also shows how networks can be formed and it would take time to develop. Time to develop trust between each other and to introduce successful programs.

As for recommendations about research, it should be noted that this research was done by a full participant/employee. Thus, some results can be conflicting since, as part of NTC, certain conclusions were probably interpreted differently than if the research were done by an observer. This also generates possible conflicts of interest between the researcher and employee.

This study is, to a large extent, only viable for the researched region, but some conclusions overlap with the literature, so generalisation can be possible to a limit.

Certain contacts also resulted in direct implementation of the research to areas for new cooperation. For instance, together with Radboud Innovation and the Mercator Launch programme, joint events were organised. This resulted in a different level of interaction between those actors as compared to others.

These circumstances resulted in research which is difficult to reproduce. To that extent, triangulation is of great importance and involves multiple views to avoid personal matters. Because of this,

conversations were attempted with as many representatives as possible without giving exact details about the research to keep a distance and reflect on the results.

Another issue which could be elaborated on in future research is rechecking the analysis of the locations in individual conversations with representatives from those campuses. Possible results could be adjusted afterwards to improve the analysis and data. This was only done in depth for the case of NTC and lesser so with the other Nijmegen locations during meetings and conversations since representatives of those campuses were easier to meet due to proximity.

Current forms of cooperation which were established after (and thanks to) this research (Appendix I, observations 48, 49, and 52) require further implementation. Other possibilities of cooperation (for example, between NTC and both Pivot Park and Mercator Science Park) can be further investigated since they seem the most promising according to the data.

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Appendix I Observation diary

This appendix consists of the list of observations which are used for this research. The numbers in list correspondent with the numbers used in this document which are used as referral data to do research. The name of the observation doesn't always fully elaborate on the subject of the observation since there are sometimes multiple subjects discussed.

NUMBER	NAME	ORGANISATION	NAME OF OBSERVATION
1	Rikus Wolbers	Novio Tech Campus	Framework thesis
2	Wijnand Kok	Gemeente Nijmegen	Introduction to gemeente Nijmegen
3	Rikus Wolbers	Novio Tech Campus	Defining research objects
4	Roland Nordbeck	Provincie Gelderland	Introduction to Province of Gelderland
5	John Schalken	SMB/Briskr	Introduction to Briskr and SMB
6	Bart Brorens	Royal Haskoning DHV	Brightlands Chemelot Campus
7	Wijnand Kok	Gemeente Nijmegen	Cooperation and networks in Nijmegen
8	Pim van Os	Kadans Science Partner	Role of real estate in campuses
9	Ed Koster	Radboud Innovation	Radboud Research Facilities & Mercator Launch
10	Rikus Wolbers	Novio Tech Campus	Shared Facilities and NC and possibilities with Pivot Park
11	Cathy Oh & Yp Kroon	Kamer van Koophandel & RVO	Cooperation in other regions and nationwide
12	Martijn Lafeber	ESA-BIC	Cooperation in networks around Den Haag
13	Bart Brorens	Royal Haskoning DHV	Brightlands Chemelot Campus
14	Hilde de Vocht	High Tech Campus Eindhoven	High Tech Campus Eindhoven
15	Pim van Os	Kadans Science Partner	Shortly on Wageningen Campus
16	Rob Groenendaal	Radboud Innovation	About Mercator Science Park
17	Rikus Wolbers	Novio Tech Campus	Short response on role of Mercator Science Park
18	Eric Appelman	Brightlands Chemelot Campus	Brightlands Chemelot Campus
19	John Schalken	SMB	Role of Brightlands as a network compared to Briskr
20	Rikus Wolbers	Novio Tech Campus	Role of Brightlands Chemelot Campus for NTC
21	Lennart Nellestijn	KplusV	Networks in Gelderland
22	Egbert Ottevanger	World Startup Factory	World Startup Factory and the role of incubators
23	Carin Derks	Gemeente Nijmegen	NTC as economic engine for the city
24	Rick Meurders	Pivot Park	Pivot Park
25	Rikus Wolbers	Novio Tech Campus	Role of Pivot Park for Novio Tech Campus
26	Dick Bos	Startup Nijmegen	Startup Nijmegen

27	Ed Koster	Radboud Innovation	Role of SuN as seen from the university
28	Rikus Wolbers	Novio Tech Campus	Role of SuN for NTC
29	Rob de Koning	Business Centre Twente	Twente and the development of the ecosystem in the region
30	Anne van der Velden	Brainport	Brainport network
31	Rikus Wolbers & John Schalken	Novio Tech Campus & SMB (Briskr)	Brainport and the differences between Brainport and Briskr
32	Mark Hiddink	Industriepark Kleefse Waard	Industriepark Kleefse Waard
33	Rikus Wolbers	Novio Tech Campus	Role of IPKW for NTC
34	Petra Caessens	Wageningen University & Research	Wageningen Campus
35	Rikus Wolbers	Novio Tech Campus	Role of Wageningen Campus for Nijmegen
36	Ed Koster	Radboud Innovation	Role of shared facilities between Nijmegen and Wageningen
37	Mike Verkouter	Novel-T	Novel-T
38	Wijnand Kok	Gemeente Nijmegen	Cooperation regionwide
39	Roland Nordbeck, Iris Hardkamp & Cees Pieters	Province of Gelderland	Cooperation between hotspots/innovation/campuses in Gelderland
40	Inez Rensink	Gemeente Arnhem	Cooperation in Arnhem and between other cities
41	Rikus Wolbers	Novio Tech Campus	View of municipality of Arnhem compared to Nijmegen
42	Tom Straeter	Utrecht Science Park	Utrecht Science Park and the development of USP
43	Joey van Baarsel	Novio Tech Campus	Differences between Nijmegen and Utrecht ecosystems
44	Rikus Wolbers	Novio Tech Campus	Differences between Utrecht Science Park and Novio Tech Campus
45	Daan Beudeker	Radboud Innovation	Implementation of research to compare Novio Tech Camps and Mercator
46	Frits Dimmendaal	Gemeente Ede	World Food Centre and Food Valley
47	Wijnand Kok	Gemeente Nijmegen	Cooperation between Wageningen and Nijmegen
48	Dick Bos	Startup Nijmegen	Further possibilities to cooperate between Startup Nijmegen and Novio Tech Campus
49	Rikus Wolbers	Novio Tech Campus	Further possibilities to cooperate between Startup Nijmegen and Novio Tech Campus
51	Hilde de Vocht	High Tech Campus Eindhoven	High Tech Campus Eindhoven
52	Folkert Potze	ROC Nijmegen Technovium	Cooperation between Technovium and Novio Tech Campus
53	Rob Groenendaal &	Radboud Innovation (both)	Briskr

	Brechtje Veenegoor		
54	Richard Dobbelman	The Economic Board	The regional network, Briskr & Novio Tech Campus
55	Briskrday (multiple stakeholders)	Multiple organisations	Cooperation within the Briskr Network
56	Henk Verstappen	NXP	NXP

Appendix II List of Abbreviations

This Appendix consist of the full list of abbreviations used in this document. Everyone is written full out in the document and after the first the abbreviation is used.

Abbreviation	**Full name**
ASP	Amsterdam Science Park
BC SEMI NL	Business cluster Semiconductors Netherlands
BCT	Business Centre Twente
BIF	Brightlands Innovation Factory
HAN	Hogeschool van Arnhem en Nijmegen
HTCE	High Tech Campus Eindhoven
IPKW	Industriepark Kleefse Waard
LIOF	Limburgs instituut voor ontwikkeling en financiering
ML	Mercator Launch
MSP	Mercator Science Park
NTC	Novio Tech Campus
RHDHV	Royal Haskoning DHV
ROC	Regionaal Onderwijs Centrum
ROM	Regionale Ontwikkelingsmaatschappij (Regional Development Agency)
RRF	Radboud Research Facilities
SMB	Science Meets Business
SuN	Startup Nijmegen
USP	Utrecht Science Park
WFC	World Food Centre
WSF	World Startup Factory