

# The campus evaluated

Delivered benefits for on-campus located real estate users



TU delft, Msc Architecture  
Management in the Built Environment

Koen Broekhuizen  
4534522

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**Tutors:** Hilde Remoy, Erik Louw  
**Graduation organisation:** CBRE



## Abstract

Campuses have recently drawn attention from governing organisations in the Netherlands and are identified as promising types of office- and university development on national, regional and company levels (Wiebes, 2019). Millions of dollars are invested in campuses by local and regional governments in order to attract businesses and jobs towards the respective regions and to stimulate innovation and Research & Design (Baggerman, 2020; Gruijthuisen, 2020; Knop, 2020; Wiebes, 2019). However, the title 'campus' is not protected nor has an undisputed definition and therefore is subject to inflation (Magdaniel, De Jonge, & Den Heijer, 2018). This leads to the contradiction that public money is invested in initiatives that can differ in various ways and therefore remain unclear in how they should be managed successfully and what they deliver for their users. Researches state that clustering people and businesses leads to more innovation (Belso-Martínez, Mas-Verdu, & Chinchilla-Mira, 2020; Bolter & Robey, 2020; Glaeser, 2010; Guzman, 2019). Campus developments rest on the same principles. However, when approaching a campus from the demand side a campus should deliver the user preferences demanded by real estate users. This in order to attract them to the physical location and play a positive role in incubating and facilitating the respective real estate users (Ng, Junker, Appel-Meulenbroek, Cloudt, & Arentze, 2020; Remøy & van der Voordt, 2014). In order to reduce uncertainty surrounding campuses for policy makers, managers and users, these developments have to be redefined on what they are, what they intend to deliver and if that what is supplied matches the demand. Therefore the following main question will be answered; *What are the perceived benefits campuses deliver for its real estate users?* This will be answered by making use of literature study covering the definition and theoretical benefits. Secondly a case study towards four different campuses will be executed. This case study will consist of semi-structured interviews with both start-up and scale-up companies and the respective campus management teams in order to establish what benefits are delivered by locating on a campus. Followingly these results will be analysed and compared in order to build conclusions.

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## Reading guide

This thesis report is structured in six themed chapters.

1. Research background
2. Theoretical framework
3. Empirical research
4. Analysis
5. Conclusions and implications
6. Recommendations

These will firstly introduce the research background, where the problem statement, research questions and research methods will be introduced and explained. Secondly the results of the three topics on which literature study has been conducted will be presented. These studies are the foundation for the empirical research and have been translated into the interview protocols. They discuss the definition of the campus, theoretical benefits of a campus and the localization preferences of real estate users. Thirdly the empirical research is presented. This chapter presents the data collection and introduces the different cases and findings per case. This is followed by the analysis, in this chapter the collected data is analysed and compared in order to draw and substantiate conclusions on what a campus delivers and whether or not benefits are experienced by users located on campus. Sequentially the conclusions and implications are presented, in this chapter the findings are presented per research question and present the findings of the research. Finally recommendations for further research are suggested. These contain limitations on the current research and suggestions on how this can be improved or extended for future research.

## List of abbreviations

<b>Abbreviation</b>	<b>Definition</b>
STP	Science and Technology Park, collective name used in literature for a wide variety of real estate agglomerations
BIC	Business incubator centre
R&D	Research and Development
CMT	Campus management team
HTCE	High Tech Campus Eindhoven
NTC	Novio Tech Campus Nijmegen
DTC	Dutch Tech Campus Zoetermeer

# 1 Research Background

## 1.1 Problem statement

Campuses have recently drawn attention from governing organisations in the Netherlands and are identified as promising types of office- and university development on national, regional and company levels (Wiebes, 2019). Millions of euro's are invested in campuses by local and regional governments of the Netherlands in order to attract businesses and jobs towards the respective regions and to stimulate innovation and Research & Design (Baggerman, 2020; Buck, 2018; Gruijthuisen, 2020; Haisma, 2022; Wiebes, 2019)

The campus concept rests on basic principles of agglomeration benefits as established by Glaeser, linking clustering of firms and people to easier movement of goods and knowledge across space (Glaeser, 2010). Several studies have been conducted on defining what types of different real estate agglomerations there are and on what benefits they deliver (Buck, 2018; Hobbs, Link, & Scott, 2017; Magdaniel et al., 2018; Mora-Valentín, Ortiz-de-Urbina-Criado, & Nájera-Sánchez, 2018; Ng et al., 2020; Skokan & Zotyková, 2014; Westhead & Batstone, 1999).

However the 'campus' as a real estate development does not have a clear definition. The name is used for a variety of different real estate developments in the Netherlands. For example; university campuses, sports campuses, single tenants housing in multiple buildings (E.g. Nike EHQ Campus Hilversum), real estate agglomerations, high schools, medical sites and more. As has been identified by Albahari et al, and Scandizzo, stating a variety of definitions and naming is used for similar real estate developments across the world (Albahari, Barge-Gil, Pérez-Canto, & Landoni, 2022; Scandizzo, 2005).

Despite wide variety in interpretation of what a campus is or can be, these facilities have been growing in size and numbers, supported by private and government investments, as identified by Buck Consultants International (Buck, 2018). In their report, written for the Ministry of Economic Affairs and Climate Policy, they defined that a campus has the following four key elements in place: 1. A focus on R&D and/or tech driven activities or companies 2. Physical location with research facilities and accommodation possibilities 3. Knowledge institute or anchor tenant 4. Active and open innovation between knowledge source and companies. Based on this definition the research evaluated 82 campus initiatives of which only 35 have been identified as 'real campuses'. This substantiates the case made by Magdaniel et al. in 2018 stating that the definition of 'a campus' is subject to inflation (Magdaniel et al., 2018).

This research aims to re-evaluate the campus as a real estate development. Therefore research will be conducted to establish what benefits are delivered for on-campus located real estate users. This will be done by clarifying the definition of a campus, how it relates to other agglomerations and by analysing both the supply and demand side of four campuses in the Netherlands. By assessing the benefits a campus delivers for on-campus located real estate users part of the added value can be established. In this way this research aims to contribute to better understanding of this specific type of real estate development for its users, management teams and policy makers in the Netherlands.

### 1.1.1 Scientific relevance

As previously stated several studies towards various related real estate agglomerations have been conducted, however, according to Hobbs et al., the literature available can be considered at an embryonic stage in comparison to the attention and growth of these facilities (Albahari et al., 2022; Hobbs et al., 2017; Magdaniel et al., 2018; Ng et al., 2020). Albahari et al, reviewed 221 quantitative researches on the added value of Science and Technology parks (STP's), this definition is used in literature as a collective name for a wide variety of comparable real estate agglomerations, defining these as: "non-spontaneous agglomerations aimed at encouraging the formation and growth of on-site technology and knowledge-based firms.(Albahari et al., 2022, p. 1)" A definition amongst which "the campus" can be shared too. The research concluded that in the case of almost every variable related to STP's studied, that evidence is contrasting.

Firstly availability of empirical evidence of boosted economic performance delivered by science parks was found to be limited. Secondly research that STP's deliver benefits for its users are countered with a similar amount of researches that found no significant performance differences between on- and off-campus located companies. Albahari et al, did conclude that collaboration between on-park located firms is more likely to occur than between off-park located firms, underlining that the principles of agglomeration benefits apply to STP's. Secondly it has been concluded that the main cause for lack of evidence is caused by a limited sample size of on-campus located firms. However in contrast to the review released in 2010, Albahari et al., have linked park-level and firm-level heterogeneity to increased benefits from locating on an STP in the updated research version of 2022, stating that further empirical research on this topic can enhance this conclusion (Albahari et al., 2022; Albahari, Pérez-Canto, & Landoni, 2010).

Magdaniel et al., stated in 2018 that more research towards campuses should be conducted in order to verify the investment decisions in these facilities. The research states it is hard to develop an innovation stimulating environment but that it might be just as hard to maintain this environment over a longer period of time, questioning the quality of campuses over longer periods of time. Next to that the research concluded that the definition campus was subject to inflation. This finding was supported by Hobbs et al., who stated in 2017 that research towards innovation focussed clusters requires more effort in order to keep up with the growth of these parks around the world.

NG et al. have researched firm associations between science park attributes and benefits in the Netherlands in 2020 through a survey. The research concluded that both the proximity and park management are associated with economic, innovation and network related benefits. The research suggest that a follow-up research should be executed in a more open format. This was recommended to measure attribute-benefit association based on recall and not on recognition in order to add more depth to their findings.

Despite the fact that significant amount of research has been devoted to STP's such as science parks, campuses and other real estate agglomerations, the amount of undisputed conclusions about performance benefits of these respective facilities presented remains limited. A knowledge gap has been identified in the definition of campuses, the benefits delivered by a campus and the experienced benefits by its real estate users. The goal of this research is to contribute to filling this knowledge gap. This will be done by clarifying the definition of a campus and by researching the supply side and the demand side of a campus in order to establish what perceived benefits campuses deliver for its users.



### 1.1.2 Social relevance

The social relevance of this research lies in a two-fold of factors; Political relevance and economical relevance.

The political relevance of this research lies with the appearance of campuses on the political agenda. In policy documents significant sums of public money are and have been reserved for stimulating the development of campuses as real estate developments, whilst there are many unknowns surrounding the benefits these developments deliver. This research aims to provide insights in what benefits can be delivered in order to justify these investments in the public debate. Therefore the information presented in this research can be relevant for policy makers on regional and national level but can also provide insights to support the political debate.

Economical relevance can be gained from this research by real estate users and developers, because the research provides insights in a currently rapid growing part of the real estate market. Defining what a campus is and what it can offer can serve as guidelines in policy making of campus management teams. Secondly it can prove helpful in selecting a strategic location as a real estate user. Giving an overview of the theoretical benefits a campus delivers can be relevant information for both the supply and demand chain. Whilst the information on user experience and user preferences will benefit the entire real estate supply chain.

## 1.2 Research questions

### 1.2.1 Research objectives

The aim of this research is to contribute to reducing the knowledge gap surrounding the benefits a campus delivers. As stated in the introduction there is uncertainty with regard to what a campus is and what benefits it delivers. The combination of uncertainty and the desire to stimulate campus developments results in the contradiction of investing in uncertainty. Researching the benefits this type of real estate agglomeration delivers and how these benefits are perceived by its users has the objective of contributing to a better understanding of the concept 'campus'. Subsequently this supports policy makers, real estate managers, -developers and -users in their respective (real estate) strategies.

Secondly clarifying what benefits are perceived by real estate users on a campus opens up for comparison of the quality of campuses. Measuring the quality of campuses in terms of what they deliver for real estate users locating on them contributes to understanding of what benefits users can expect from locating at a campus. The insights gained by analysing what benefits are perceived by companies located at a campus can be valuable to companies, developers and governmental institutions. This contributes to the main goal of re-evaluating the campuses in the Netherlands and has led to the research questions formulated below.

### 1.2.2 Main research question

**What are the perceived benefits campuses deliver for its real estate users?**



### 1.2.3 Sub research questions

What is a campus?

What are the theoretical benefits of locating on a campus as a real estate user?

What are the benefits that real estate users prioritize in their choice of location?

What are the benefits that campus management teams intend to deliver to real estate users located on a campus?

What are the benefits perceived by real estate users located on a campus?

### 1.2.4 Conceptual model

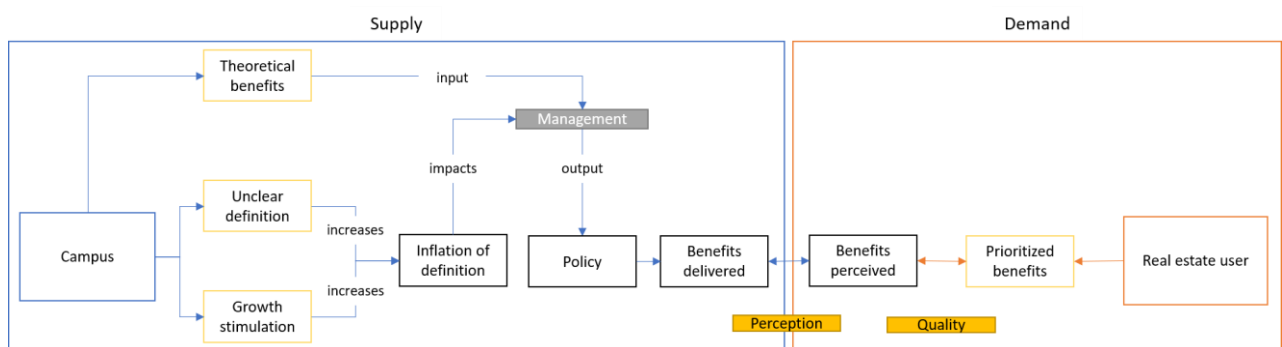


Figure 1

Fig 1; Own figure, 2022

This conceptual model describes the relationship between the campus and the real estate user and shows the topics discussed in this research and how they relate to each other. All topics indicated with a yellow outline will be discussed in the literature study and their impact is based on the assumption that the theoretical findings are true. Amongst these are the theoretical benefits that campuses deliver and the prioritized benefits by real estate users. Secondly the study will highlight the problem statement which includes that unclarity in definition combined with growth stimulation contributes to further inflation of the definition.

As shown in this model, campus management plays a pivotal role in the benefits delivered by a campus. This is because it can be expected that the impact of the management tasks and their performance influences the benefits delivered through their policy. Campus management is expected to use the theoretical benefits a campus is supposed to deliver as basis for their policy, but might be clouded in their policy development by inflation of the definition of what a campus is.

In order to re-evaluate the quality of the campus as a real estate development, the benefits delivered to the real estate users have to be estimated on their value. It is expected that benefits delivered will take shape in campus management services, co-locating with other on-campus located firms and in image factors as identified by Albahari (Albahari et al., 2022). In order to assess the value of the benefits delivered, they should match those demanded by real estate users. It is expected that the match between delivered benefits and prioritized benefits is clouded by perception.

From the demand side the priorities of real estate users with regard to their strategic real estate choices will be established from literature and will be verified in the interviews. This gives insights in why real estate users choose to locate at a campus. Secondly this allows for comparison between the benefits delivered by a campus and those perceived by real estate users located at the campus.

### 1.3 Research method

#### 1.3.1 Type of study

This research uses a qualitative empirical approach towards establishing the benefits delivered by campuses. This method has been used because of recommendations found in the literature study. Various researches suggest follow-up research should take a more empirical approach in order to substantiate findings in small sample size research (Albahari et al., 2022; Albahari et al., 2010; Magdaniel et al., 2018; Ng et al., 2020). Second to that this research aims to established perceived benefits on a campus in order to comprise the benefits that are delivered in addition to the real estate. Since a significant amount of the benefits established in the literature study are soft factors a qualitative approach has been chosen, this allows participants from both the demand and supply side of the research to elaborate on their input. This is expected to collect the most suitable data for answering the research question.

The aim of the study is to verify what campuses deliver for its real estate users in order to assess the added value of this type of real estate development. This will be done by researching both the supply and the demand side of four different campuses in the Netherlands. On these respective sites the intended benefits delivered from the supply side and the benefits perceived by the demand side will be established. Followingly will be analysed what intended benefits are perceived as beneficial and if these match the preferences from the demand side.

#### 1.3.2 Methods & techniques

##### **1. Literature study**

The literature study conducted for this research serves the following purposes: Firstly to define what is a campus. This is necessary to define the scope and research subject. Secondly gaining understanding of the theoretical benefits delivered by a campus has been achieved through literature study. This contributed to building a framework and serves as a basis for the semi-structured interview protocols. The literature study is finalized by explorative research on what aspects are prioritized in real estate choices. This explorative research completes the input for the semi-structured interviews, contributes to the knowledge of the demand side and opens up for comparison between the benefits delivered by a campus, how these are perceived and whether these match demand.

##### **2. Comparative case study**

For this research four campus sites in the Netherlands are selected to conduct a comparative case study. This research method is selected in order to compare different real estate user experiences in response to locating at different campuses. The strength of this method lies within the possibility to compare actors in disparate locations that are being exposed to different policies and surroundings, this allows for comparison and substantiating generalised conclusions (Bartlett & Vavrus, 2016). In this research the four campuses represent the disparate locations whilst the interviewees, as representatives of their real estate user, function as the different actors. The campuses will be selected on the basis of a typical case sampling method (Bryman, 2016). This results in four cases that apply to the definition of a campus derived from the literature study. The four selected cases will be compared on generics, amenities and services to gain a general understanding of the respective real estate facility.

## **2.1 Semi-structured interviews**

The main research method used for the comparative case study are semi-structured interviews. This type of research method suits qualitative research because it allows to ask questions about various topics, but also allows to ask for more elaboration to gain better understanding of the interviewees perspectives (Bryman, 2016). Both the advantages of using semi-structured interviews support the goal of establishing perceived benefits from locating at a campus.

On all four campuses two start-up companies and two mature companies will be interviewed. These two real estate user types are distinguished because they have different prioritized benefits and requirements from an organisational perspective, as has been derived from the literature study.

This results in 8 start-up interviews and 8 mature company interviews representing the demand-side in this research. The interviews will be equally divided over the four different campuses.

On every campus the campus management teams will be interviewed in order to research the supply side. This way insights on their policies and the benefits they intend to deliver can be gained. This would add up to a total of 20 conducted interviews, however start-ups proved to be less willing to participate in the research. Therefore only 1 start-up has been interviewed on two campuses and have two start-up interviews been replaced by a interview with an incubator management team. This results in 16 interviews over 4 different campuses.

## **2.2 Ranking questions**

The semi structured interviews will be supported by asking the interviewees to answer ranking and rating questions. These serve as an numeric substantiations to the verbal data collected with the interviews. By asking the interviewees to rank location choice characteristics from most to least important for their organisations real estate strategy, and by asking them to rate certain aspects of the campuses they are located on, extra data will be collected to confirm, discuss or elaborate on qualitative findings. Ranking is a simple and efficient data collection technique to understand perception an preferences and is therefore applied to gain understanding of the real estate users and campus management teams (Yu, Gu, & Xu, 2019).

These numeric data sets will be presented in the case study of all respective locations and real estate users interviewed. Because of the limited sample size of the data set possibilities with regard to statistical analysis of ranking data is limited to descriptive statistics (Yu et al., 2019). The data presented will be visualised in a colour scheme to enhance readability by making use of excel conditional formatting.

The ranking schemes will be used to derive user preferences in real estate choices and to assess benefits gained from locating at a campus. The rankings given by the respective interviewees will be compared in order to find correlation on more or less important real estate characteristics and to assess the appreciation of their respective campus on aspects derived from the literature study.

The ranking questions consist of 10 real estate aspects which are ranked from 1 (most important) to 10 (least important) in the real estate strategy of the interviewees start-up or scale-up. These rankings are presented in graphs with a degrading colour-scale from green at 1 to red at 10 in order to make them more insightful. The ten aspects that are requested to be ranked have been derived from a recent CBRE consultancy project. In this process the client has been requested to rank the same aspects on their importance, which proved very insightful. This ranking was used to give weight to key performance indicators and has substantiated their decision making between different possible real estate strategy scenarios.

Second to that the interviewees have been asked to rank the campus on a scale of 1 (does not supply) to 5 (totally supplies) on specific campus aspects that have been identified in the literature study. These results are also presented in tables using a similar colour-scheme, with a rating of 5 presented in green and rankings of 1 in red. In addition to that the users are asked to rank the campus on their user satisfaction on a scale of 1-10. The aspects that have been requested to be rated have been translated from the list of theoretical benefits that is presented in the literature study. These nine theoretical benefits have been translated into practical descriptions and presented to the interviewees.

#### 1.4 Data collection

The dataset that will be collected will come from the semi-structured interviews. These interviews will be audio-recorded and transcribed with the live transcription method of Microsoft Teams. The interviews will preferably be conducted in person, however when the interviewee does not want to cooperate on this, the interview can alternatively be conducted by using a Microsoft Teams meeting.

The literature study has been conducted by making use of Google Scholar. All articles mentioned in this research have been accessed through websites that can be found through the Google scholar website/software. Access to these articles might be restricted and has been managed through the TU Delft licence and/or collaborations with the respective publication platforms.

In addition to that corporate data from CBRE on trends for real estate users has been presented in the literature study. This data provided insights on the latest trends and expectations amongst real estate users in a wide variety of sectors. In addition to that the respective websites of all campuses have been utilized for both the case selection, interview selection and to gather generic information about the respective sites and the facilities they offer.

For further details I would like to refer to the data management plan in the link below: <https://dmponline.tudelft.nl/plans/101414> .

##### 1.4.1 Data analysis

The interviews will be both audio recorded and automatically transcribed by using the Microsoft teams transcription software in order not to lose any significant dimensions of the interview. The automatic transcripts will be processed by summarizing them whilst making use of the exact words used in the interviews. The data will be analysed systematically according to the six-phase approach, a thematic analysis approach suited for qualitative research analysis (Terry, Hayfield, Clarke, & Braun, 2017). This approach suggests the analysis should proceed along the following six sequential phases in order to increase the analysis reliability: (a) familiarizing with the data set, (b) generating initial codes, (c) searching for themes, (d) reviewing themes, (e) defining and naming themes, (f) and reporting data.

##### 1.4.2 Data plan

The data collected from campus management teams, interviewees and the interviews will be saved on a private TU Delft one-drive for the duration of writing the research. The data will exist of information on the whereabouts, size and policy of different campuses in the Netherlands and the companies located on them. Next to that the audio recordings, transcriptions and findings will all be stored in the same one-drive. No personal information or information that might be harmful for the respective participants will be shared with the TU Delft nor others that have not been mentioned as participants in this research without permission. The un-anonymised data set will only be used by the researcher and shared with the direct mentors. After the research is completed an anonymised data set will be shared with the TU Delft archives to check the research validity.

### 1.4.3 Ethical considerations

This research does not include any form of human research, whereas a human participant is the research subject. The participation in the interviews is on a voluntary basis. Next to that all participants have received and signed an informed consent letter or have agreed beforehand of the interview they are aware of the data processing and the purposes the collected data will be used for. All collected data will be anonymised before it is being shared with third parties except for the names of the respective campuses being mentioned in either the interviews, interview transcripts and/or the report.

## 2 Theoretical framework

### 2.1 Literature study

#### 2.1.1 Defining the campus

By researching different real estate agglomerations in the Netherlands a variety of characteristics has been established. Varying from the name of a specific area in a city to a real estate development housing a single tenant; a real estate development housing over hundreds of different tenants; University campuses; Educational facilities; Business area's connected to a university, and so on. However this phenomenon has also been established the other way around, with similar real estate agglomerations being named in a different way. This led to the literature study defining various real estate agglomerations on generics in order to distinct them and contribute to the understanding what benefits a campus has to offer.

In a research towards financing of technology, Scandizzo has defined various real estate agglomerations in order to establish how different financial incentives are distributed towards innovation focussed agglomerations (Scandizzo, 2005). Therefore he has developed the following definitions:

- a) *The Science Park is generally located in a University campus and essentially specializes in activities of research, development, product design and development of prototypes. In such a structure only rarely the production and marketing phases appear;*
- b) *The Research Park is also located in a University campus, but is characterized for the absolute commitment to research and the exclusion of any production related activity;*
- c) *The Technology Park is composed of enterprises engaged in the commercial application of advanced technology. It is committed to activities of research, development, and production, marketing and technical assistance. The production activity is thus primarily important, while the presence of the University is not essential;*
- d) *The Innovation Centre, through financial, technical and administrative assistance, promotes the creation of advanced technology SMEs;*
- e) *The Business Park, which does not require the presence of a university, is engaged in producing, assembling, selling and managing activities, with the goal of creating a high quality environment for enterprise creation and growth;*
- f) *The Business Incubation Centre (BIC) is a housing centre, offering a limited space to new enterprises. It offers them material (physical space, common facilities, network resources) and immaterial infrastructure (technical services, marketing support, management advise, financial counselling).*

*(Scandizzo, 2005, P41)*

From the findings of Scandizzo can be derived that there is a variety in types of real estate agglomerations in their focus, activities or connection with universities. Next to that he stated that a Science park is essentially the same as a research- and technology park. Scandizzo identified a BIC as an individual facility however various researches assume an incubating function can be included in Business- and Science parks as well (Magdaniel et al., 2018; Ng et al., 2020; Skokan & Zotyková, 2014; Westhead & Batstone, 1999). The definitions given by Scandizzo do not cover the 'campus' as a real estate development, however they provide a spectrum of different real estate agglomerations and therefore serve as a starting point on defining what a campus is.

Magdaniel et al. have conducted a case study on two campuses from an innovation perspective (Magdaniel et al., 2018). The research contained a case study of two campuses, one located in Eindhoven and one in Boston. The research concluded that campuses should have five points in place in order to stimulate innovation. 1) a concentration of innovative organisations is required, 2) an innovation area, 3) a diversity of functions, 4) an innovation climate and 5) a flow of incentives should be in place in order for a campus to stimulate innovation. They found that a campus can be managed and steered towards generating innovation from both an strategic asset perspective as well as an operational resource perspective. However these strategies will have to be balanced in order for a campus to flourish. From this research can be derived that campuses are innovation and R&D focussed, however a campus does not necessarily have a connection with a university. Placing the campus in the spectrum between the Science park and Technology park in the definitions of Scandizzo (Scandizzo, 2005). Since it has no university ties it does not define as a Science park, however it does not have the focus on production like a Technology park.

Since it has been established a campus lies in between the Science park an Technology park literature on both can be used in order to finetune its definition. In a literature review of over 200 scientific writings Albahari et al. compared the findings on benefits of science and technology parks (STP's), the definition of STP covers a wide variety of different real estate agglomerations and is defined as follows: "non-spontaneous agglomerations aimed at encouraging the formation and growth of on-site technology and knowledge-based firms (Albahari et al., 2022, p. 1)." Therefore it can be concluded that research on both science parks, technology parks can be combined in order to generate conclusions on real estate agglomerations. However how these relate to the campus remains to be established.

Early contributors of research towards science parks and its effects are Link and Scott (Link & Scott, 2003). They researched science parks across the United States and aimed to measure their impact on innovation on the respective universities they were linked to. The research concluded that the Science parks researched had very different structures but also had three basics in common; 1) It is a real estate development. 2) It harbours an organizational program of activities for technology transfer 3) A Science Park is a partnership between academic institutions, government and the private sector.

Another definition for Science Parks in the Netherlands is; "Science parks are managed area developments that provide accommodation for knowledge-based firms and institutions to conduct knowledge-intensive activities (Ng et al., 2020, p. 1)". According to NG et al. the main mission of SP's is to foster collaboration between university and industry whilst stimulating innovation. The difference with a campus is the direct connection with a university, but the core value of stimulating innovation overlap. For example science parks fill the same void in the real estate market as campuses. They aim to cluster R&D and connect innovation focussed real estate users by sharing resources and knowledge. Although quite some research towards Science Parks and campuses has been conducted, NG et al. state that an increase in networking and collaboration has been proven, but findings on economic benefits for real estate users located at a campus or science park have always remained inconclusive.



Hobbs et al., have compared the definition Science Park associations use for the respective facilities and concluded that a Science park is an innovation-related infrastructure through which knowledge is exchanged, and a university is often a catalyst for that symbiosis (Hobbs et al., 2017). Next to that the research mentioned the definition of UNESCO for Science Parks. UNESCO states that all of the following definitions show great similarities with the definition of a Science Park: technopolis, science park, science city, cyber park, hi tech (industrial) park, innovation centre, R&D park, university research park, research and technology park, science and technology park, science city, science town, technology park, technology incubator, technology park, technopark, technopole and technology business incubator. This recommendation will be copied for the largest part, however distinction is drawn for solely a technology- and business incubator since this specific function does not fully align with the definition of a Science Park.

All of the definitions mentioned above have been summed up into Table 1 in order to gain a clear overview of the spectrum of different real estate agglomerations. As can mentioned before naming for similar or closely related agglomerations can differ per country, therefore the definitions most commonly found in the literature have been used in the table. The typologies have been ranked on the basis of amount of requirements a real estate user has to meet to locate on the respective real estate agglomeration. Additionally the theoretical benefits a real estate agglomeration offers have been estimated and categorised in 'basic', 'improved' and 'excellent'.

Basic agglomeration benefits = benefits of co-locating with random real estate users, allows for sharing basic facilities such as access roads for improving accessibility.

Improved agglomeration benefits = benefits of co-locating with related real estate users, allows for overarching organisations and low level cooperation, and basic agglomeration benefits.

Excellent agglomeration benefits = benefits of co-locating with real estate users active in comparable market segments, allowing for collaboration and knowledge sharing, and basic- & improved agglomeration benefits.

Table 1: Spectrum of real estate agglomerations

Typology	Definition	Theoretical benefits	Source
Business park	Area that engages in producing, selling, and managing activities by creating a high quality office environment	Basic economic agglomeration benefits. Provides improved infrastructure and strategic location.	(Lustig, 2012; Scandizzo, 2005)
Innovation district	An innovation district is a place-based urban development strategy that aims to regenerate an under-performing downtown neighbourhood into a desirable location for innovative and creative real estate users and workers.	Improved economic agglomeration benefits. Facilitates in incubation and innovation because of large amount of start-up companies.	(Morisson, 2020)
Business cluster	Undefined group of different real estate users that compete and cooperate in the same cluster and generate economic benefit for their cluster and the surroundings	Improved agglomeration economic benefits. Active awareness of participating in a cluster.	(Skokan & Zotyková, 2014)
Campus	A managed physical real estate development location with an incubator function, utilized by start-ups and other real estate users in related fields of work that share agglomeration benefits, but that is not necessarily linked to an educational facility.	Excellent agglomeration economic benefits. Facilitates in incubation, facilities, attracting talent, network growth and active collaboration.	Derived from: (Hobbs et al., 2017; Link & Scott, 2003; Magdaniel et al., 2018; Ng et al., 2020; Scandizzo, 2005)
Science park	Physical real estate development location that cooperates with a University (campus) aims to attract R&D orientated real estate users and stimulating innovation	Excellent agglomeration economic benefits. Facilitates in incubation, facilities, network growth, active collaboration and direct access to talent.	(Magdaniel et al., 2018; Ng et al., 2020; Scandizzo, 2005)
University campus	A university location including all its five function groups; academic, residential, retail & leisure, related businesses, infrastructure.	Excellent agglomeration economic benefits. Facilitates in incubation, facilities, education, active collaboration and direct access to talent.	(den Heijer, Arkesteijn, de Jong, & de Bruyne, 2016)

Table 1: Spectrum of real estate agglomerations, own figure (2022)

The table presented above implies that the facilities mentioned further down the table deliver more added value than facilities on the top of the table because an increased amount of theoretical benefits is delivered, emphasis is required that this is not the case.

For example Leiden Bio Science park, a science park facility in the Netherlands that has been a top tier science park for decades, is planning on losing the Science Park title (Haisma, 2022). This in order to attract a wider range of companies and functions towards the area with the goal to increase the added value of the park and to continue its growth. Because of participation restrictions regarding the label Leiden Bio Science Park the management aims to become Leiden Innovation District in order to add housing, a greater variety of companies and several other functions to become a more mixed-use city district. This intended change does reduce the parks theoretical benefits according to the table, however it only changes the scope of what the management focuses on. This might add added value in areas that are outside the scope of this research.

The example mentioned above sketches the importance of clear definitions of what a specific business area supplies. A change from Science Park to Innovation District allows for extra functions to be present in the designated area, but is not directly related with a decrease in added value. Restrictions that come with the different types of typologies mentioned in table 1 contribute to the innovation climate of the respective facility (Magdaniel et al., 2018). But when a specific type of real estate agglomeration is developed but this does not match the demand of real estate users, the added value will not be maximised. Therefore localization preferences of real estate users will be elaborated more in the final chapter of the literature study.

### 2.1.2 The theoretical benefits of a campus

To establish the theoretical benefits of a campus literature on campuses, science parks and business parks will be consulted. In the previous paragraph the characteristics of the campus have been discussed, by doing so similarities and dissimilarities with related real estate agglomerations have been established. Whilst researching theoretical benefits the (dis)similarities between the respective real estate agglomerations will be taken into account when comparing their effects. By doing so literature that is dedicated to related real estate agglomerations can be used in order to gain insights in the theoretical benefits a campus can deliver.

A Science Park can be seen as a campus with a higher amount of requirements stated in their admission policy and a direct link to a university, but besides that only similarities are in place. For Science Parks a direct connection with a university is obliged and all real estate users present at the facility are knowledge- and/or tech-focussed. This definition differentiates for a campus, a campus entails a managed real estate cluster with real estate users that benefit from each other without the obligation to be knowledge- and/or tech-based nor being connected to a university. Therefore translating findings about Science Park benefits to campus benefits has to take into account the impact of a university being connected to the real estate agglomeration and the presence of more tech- and knowledge focussed companies.

For benefits regarding business parks the same reasoning is used to apply theoretical benefits to campus developments. A business park is a cluster of real estate users that have no direct economical relation nor have any regulations in place for which users are allowed to rent office space at the facility. Therefore theoretical benefits established on business parks can be applied on campus developments but theoretical benefits might be increasingly beneficial because of the more specified group of real estate users on the campus.

According to bibliometric analysis related to STP's the most used terms related to these developments are: innovation, interorganizational relationship, spill-over and technology (Mora-Valentín et al., 2018). As previously discovered in defining what is a campus innovation and cooperation are important drivers of a campus and play a main role in the theoretical benefits a campus delivers.

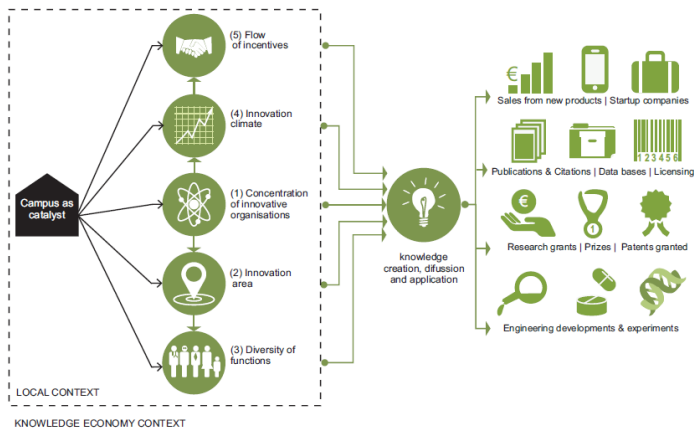
Magdaniel et al., have studied campuses in order to link campus real estate developments to innovation. They found that campuses should facilitate five conditions in order to stimulate innovation, as shown in figure 2:

- 1). Concentration of innovative organisations.
- 2). Innovation area.
- 3). Diversity of functions.
- 4). Innovation climate.
- 5). Flow of incentives.

From this conclusion can be interpreted that the real estate users of a campus play an active role in the benefits the campus generates, because the innovation a campus generates relies on the innovation of the organisations. Secondly a campus should provide a lively environment by supplying different functions and a flow of incentives. These five conditions do overlap in some aspects, for example the innovation area is created by realising a flow of incentives and having a diversity of functions on campus. However the framework serves as a very good basis on comprising what theoretical benefits a campus can deliver.

In the following figure derived from the research of Magdaniel et al. the relation between input, processes and outputs of a campus have been described. Firstly the 5 input factors as described above make a campus function as catalyst for innovation. The processes these input factors should stimulate are knowledge-, sharing, diffusion and application in order to generate output indicators. These output factors are seen as benefits generated by the campus and are shown on the right side of the image. These can be categorised in sales, publications, acknowledgements and innovations.

Figure 2 Campus input, process and output indicators



Campus input, process and output indicators (P. 90) (Magdaniel et al., 2018)

Buck Consultants International (BCI) has carried out an evaluation report of the status of campuses in the Netherlands for the ministry of Economic Business in 2014. Although this is not a scientific report it gives insights in exploring the field of campus developments in the Netherlands and therefore is discussed in this research. BCI has identified four main drivers for a campus 1). Open innovation 2). Shared facilities 3). Start-ups & Spin-offs 4). Magnet effect (Buck, 2018). These four points have been identified as focus areas from a management perspective. The report states that when a campus facilitates in those four points it will deliver sufficient benefits in order to be successful. Translating these four points to actual benefits a campus should 1) stimulate innovation, 2) Offer high quality real estate and research facilities 3) Has an incubator function that helps start-ups grow and guides their growth processes 4) A well-managed campus delivers user-benefits in knowledge, talent, facilities and maintains this position because of a growing network.

Research of Westhead and Batstone has presented empirical evidence on the function of science parks in the UK (Westhead & Batstone, 1998). They found a main function of a Science Park is to generate new formation and urban regeneration, helping technology start-ups to overcome young-company liabilities. In other words, an incubator function. The research states that real estate users are looking to gain advantages over competitors and therefore prefer technological development benefits and commercial reputation by locating at a Science Park, resulting in willingness to pay rental premiums compared to business parks.

These findings have been linked with a connection to a higher educational institute, therefore they do not directly apply to a campus as defined in this research. On the other hand can a managed real estate agglomeration also contribute to delivering similar perceived benefits. A follow-up research from Westhead and Batstone found a relation between experiencing more benefits from a managed business park location, a campus, than a non-managed business park (Westhead & Batstone, 1999). A campus with a network that does not necessarily require a link to an educational institute to increase overall reputation and market image.

Research of Albahari et al., found that the connection with a knowledge institute also has negative effects (Albahari, Catalano, & Landoni, 2013). Science park tenants tend to file for increased amounts of patents with university involvement. However the involvement of a higher educational institute on the other hand is negatively associated with the amount of products moved to the market.

Porter states that the power of a cluster is dependent on the competitive nature in it. Stimulating this competitiveness would bring up the best in all firms involved within the cluster (Porter, 1998). This rivalry would be the basis for a knowledge spill-over effect because firms participating in a cluster learn from one-another in order not to be outperformed by competing firms within the cluster. Because of this competition real estate users participating in a cluster can gain an edge over firms outside a cluster. The positive effect of competing firms is defined as healthy rivalry. Secondly from participating in a cluster branding emerges which can result in gaining competitive advantage over firms outside of the cluster. Resources and customers prefer leading firms in their field of expertise and therefore tend to prefer doing business with firms participating in a cluster regardless of having a factual edge over single-firm competitors. On the other hand Porter states that although flow of information might be prevented by conflicts and rivalry within a cluster, that knowledge spill-over will still pursue because of informal ties between employees of different firms participating in the cluster that meet each other. In relation to campuses these cluster effects can apply as well, with various researches stating similar benefits such as, knowledge spill over, healthy rivalry and increased commercial reputation (Albahari et al., 2022; Ng et al., 2020; Westhead & Batstone, 1999)

NG et al., has conducted a survey amongst science park residents in order to research the relation between Science Park services and perceived benefits by the real estate users located on them (Ng et al., 2020). The research distinguished three different types of firms on the basis of their perception of benefits obtained from a managed science park location. Commercial firms, experiencing they are closer to their targeted customers. Matured science-based firms, who experience image benefits, being near customers and having closer relations to other firms. And finally technology start-ups who experience cost-driven and image benefits from locating at a Science Park.

For the basis of their survey the following seven perceived benefits were conducted from literature: (1) knowledge sharing and collaboration, (2) proximity of University, (3) proximity of firms in similar sectors, (4) proximity of markets and customers, (5) liveability of the site, (6) image and prestige of the site and (7) cost of accommodation and services.

In order to conclude what are benefits of a campus, a physical and managed real estate location without direct connection to an educational institute, all findings presented above have been compared. This has led to the conclusion that a campus offers the following theoretical benefits:

- Focuses on attracting real estate users active in the same sectors
- Stimulates innovation of on-campus located real estate users
- Stimulates knowledge sharing between on-campus located real estate users
- Stimulates healthy rivalry between on-campus located real estate users
- Provides high quality real estate (in terms of image and prestige)
- Provides an incubator environment for start-ups
- Facilitates in attracting talent
- Stimulates network growth
- Provides positive commercial reputation

### 2.1.3 Localization preferences of real estate users

In the field of corporate real estate management this appears to be an ever re-occurring question; What are current real estate user preferences and how do we develop real estate that matches demand? This paragraph is devoted to real estate user preferences in order to gain insights on what are current trends. It is important to know real estate user preferences in order to adapt the real estate facility to their wishes and to attract and make them stay at the respective development (Remøy & van der Voordt, 2014). The same reasoning is used in order to validate investments in campus developments. Campuses should deliver benefits that are preferred by its real estate users in order to be relevant real estate developments.

Remøy et al., have identified a correlation between vacancy of office buildings and misalignment between supply and demand in one of the following preferences: accessibility by car, image of the area, geographical location, accessibility by public transport, proximity to Schiphol airport, quality of real estate, labour market, business cluster, multi-functionality, high-visible location, presence of clients, presence of suppliers, parking, external appearance, entrance visibility, interior finishing quality and lay-out flexibility. The research also states that in real estate management four different factors should be taken into account; push, pull, keep and reject factors (Meester & Pellenbarg, 1986). Which means that there are differences in valuation between preferences for tenants already located at the facility and for tenants considering to move away from their current location. Push and keep factors are valid for tenants currently hiring at the facility whilst pull and reject factors are in place for potentially locating real estate users.

Remøy et al. conclude that financial impact mostly remains the strongest driver in stay or go decisions for real estate users. Secondly the importance of environmental issues has been ranked significantly higher in 2014 compared to the 1990's. Car accessibility, extension space, location and external appearance have been identified as the top priorities in real estate user preferences. Locating at a real estate agglomeration such as a campus, has been mentioned in the research but no significant impact and importance in real strategic location decisions has been established.

Research has been done on an international level comparing the locations of cities all over the world (Dixit, Clouse, & Turken, 2019; Perez-Benitez, Gemar, & Hernández, 2021). Since the scope of this research is set on the Netherlands some of these implications do not apply. Such as regulatory differences or tax benefits between different countries do not apply in the choice between locating on- or off-campus. Dixit et al., have identified several factors heavily influencing real estate user preferences for locating their business. For example; costs, possibilities for expansion, labour availability and competitiveness of the region as economic factors. Non-economic factors identified were; branding, the visual image, reputation, sense of place and identity. Combining these factors has led to the diagram shown below:



Figure 3

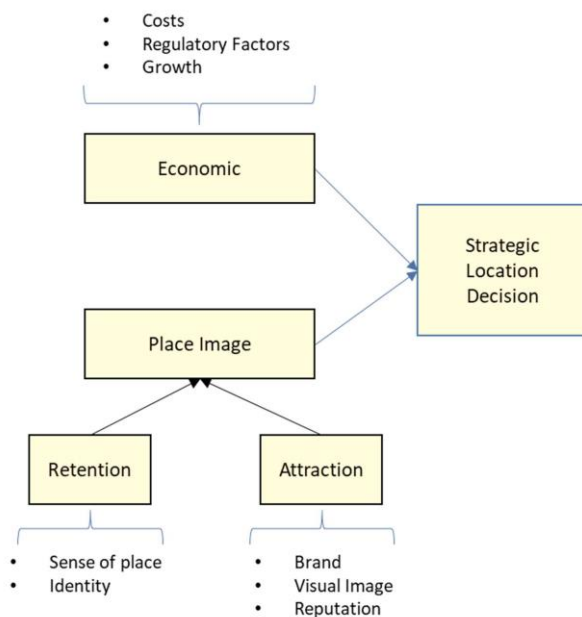


Fig 3: Multi-perspective framework for strategic location decisions (P. 81) (Dixit et al., 2019)

The economic factors are similar to those identified by Remøy et al., however the clear distinction between economic factors and place image factors differentiates. The impact of place image factors is expected to play a significant role in the process of real estate users strategically deciding to locate at a campus. Since campuses distinct themselves from single tenant locations on factors that fall under retention and attraction as described by Dixit et al.

Ng has researched the drivers of demand surrounding science parks (Ng, 2020). Ng has distinct university science parks and corporate science parks, defining the High Tech Campus Eindhoven as corporate science park, a science park that has no direct connection with a university, which matches the definition of ‘campus’ used in this research. According to Ng real estate users that decide to locate at a science park value gaining economic benefits as most important drivers in their real estate strategy. Therefore they choose locating at science parks in order to gain access to talent and to improve sales, these preferences are followed by benefits in networking and innovation.

Next to that Ng has distinct three different types of real estate users locating at science parks; commercially-oriented firms, mature science-based firms and young tech-based firms. These types target different preferences in their real estate strategies however all can be found locating at science parks. Commercially oriented firms target being in close proximity of their clients. Mature science-based firms target image benefits, proximity of educational facilities, customers and similar firms. Whilst younger firms are more cost driven with shared facilities available on science parks lowering their overall operational expenses.

In conclusion the priorities of real estate users can be divided in economic and place image factors, which are split between retention and attraction factors. Priorities are related to amenities, quality and appearance of real estate and having relevant real estate users in the direct periphery. All of these factors ultimately weigh up against the price of the real estate. Which when translating these preferences to a campus, results in real estate users with a higher willingness to pay for place image factors will decide to locate at a campus whilst real estate users unwilling to pay a higher rental price per square meter will choose not to locate at a campus.

## 3 Empirical research

### 3.1 Case study analysis

In the following chapter the findings of the theoretical framework have been used as a basis for the empirical research, providing input to build the interview protocols. In the empirical research interviews have been conducted at four different campuses located in the Netherlands. The aim and goal of the interviews is to establish what benefits campus management teams intend to deliver for the users located on their facilities. In order to establish what benefits are actually perceived by real estate users located on a campus 12 out of 16 interviews have been conducted with real estate users, whilst the other 4 have been conducted with the management teams.

The interview protocol for interviewing real estate users focuses on why the real estate user has chosen to locate at the campus, what their experiences are on the campus and finally the impact of the campus on their business operations is discussed. Whilst the interview protocol for the CMT's focusses on how the CMT's would describe their tasks, what is their policy, how they think their users experience the campus and the financial performance of the campus. The full interview transcripts are presented in the appendix.

Firstly the case selection method and generics of the specific cases are presented, these are followed by a detailed description of the interviews and the opinions of the interviewees. Comparison and conclusions are drawn in the following chapter 'evaluation'.

#### 3.1.1 Case selection

These campuses have been selected on the basis of a typical case selection; therefore the campuses selected for the empirical research all qualify to the definition described in the paragraph 'defining the campus' which is the following: *A managed physical real estate development location with an incubator function, utilized by start-ups and other real estate users in related fields of work that share agglomeration benefits, but that is not necessarily linked to an educational facility.*

In order to make the case selection firstly a long-list of campuses that suit the definition presented in the literature study has been made. The research of Buck consultants has been consulted for this, since their research has assessed the development of campuses in their report (Buck, 2018). Secondly this long-list has been shared with consultants and brokers of CBRE, these have been able to contact the campus management teams of the respective facilities and could confirm if the facilities met the definition developed in the literature study in this preliminary phase. Followingly the websites of the respective campuses have been addressed in order to confirm if the case matched the definition as concluded from the literature study and were suited for executing the research plan.

The High Tech Campus Eindhoven has been selected since it is the first real estate agglomeration in the Netherlands that was developed with the intention to become a campus. The report of Buck consultant has identified this campus as a 'mature campus', stating it delivers all aspects a campus should deliver according to their definition.

Second and thirdly the Novio Tech Campus and Pivot Park have been selected from the list of campuses that Buck has identified as well. Both these campuses have been identified as campuses in the 'growth phase' in 2018. This was defined as a campus where all aspects were in place to become a 'mature campus', but fell short in one of the four key-aspects, identified by Buck, a campus should have. Either on R&D, knowledge bearing real estate users, facilities or knowledge sharing. Since the report was published in 2018 over four years have passed for further development of these campuses.

The Dutch Tech Campus in Zoetermeer was not mentioned in the report of Buck consultants, but was selected after consulting with a CBRE employee. This case was recommended after stating the desire to select a case that was not located in the same economic area as the others. Followingly the Dutch Tech Campus matched the definition set in literature and was selected as a case.

### 3.1.2 Case generics

In order to select the cases and to confirm that the campuses met the definition developed from the literature study, their respective websites have been consulted. This information has also been used as upfront information for the interviews with the real estate users and management teams. It has been presented in the table below to provide a quick overview of the generics of the different campuses. The information consists of the whereabouts, focus sector, size, growth expectations (according to the CMT), and the facilities present at the campuses. The information can be used to get a general impression of the size and focus sector of the campus without having to visit the website or site itself. Further analysis on these case generics is presented in the analysis (chapter 4).

Table 2 Case generics presented per campus

	<b>Dutch Tech Campus</b>	<b>High Tech Campus</b>	<b>Pivot Park</b>	<b>Novio Tech Campus</b>
<b>City</b>	Zoetermeer	Eindhoven	Oss	Nijmegen
<b>Owner</b>	Ping Properties	Oaktree Capital	Municipality Oss, Province Noord-Brabant, Commercial service party	Kadans (real estate), Novio Tech (land only),
<b>Founding year</b>	2015	2003	2011	2013
<b>Origin</b>	Siemens	Philips	Organon	Philips
<b>Focus sector(s)</b>	Smart mobility, ICT, E-health & care	Health & Vitality, Sustainability, Applied Intelligence, Smart Environments & Connectivity and Software & Platforms	Biopharmaceutical and drug discovery	Semiconductors, chip integration, radio frequency, Digital health, medical tech, bio tech
<b>Size</b>				
Sqm	42.000 m2 LFO	700.000 m2 LFO	50.000 m2 LFO	Est. 50.000 m2 LFO
Growth expectation	+25.000 m2 LFO	+160.000 m2 LFO Masterplan over 1 mill. m2 LFO ( <a href="http://www.jhk.nl">www.jhk.nl</a> )	+10.000 m2 LFO currently built +30.000 m2 LFO short term plans	+25.000 m2 LFO short term +100.000 m2 LFO Masterplan 2040
Number of companies	12	260	65	70
<b>Directly connected educational facilities</b>	Dutch Innovation factory, Haagse Hogeschool, MBO Rijnland	No formal connection with university	University of Leiden, Radboud University, HAN University of applied sciences	Radboud University

Sources: [Home | Dutch tech campus - Dutch Tech Campus](#), [High Tech Campus Eindhoven](#), [Home - Pivot Park](#), [Homepage - Novio Tech Campus](#)

## 3.2 Interview preparation

### 3.2.1 Interview matrix

For the case study interviews have been conducted at four different campuses aiming to cover two start-ups, two scale-ups and the management team for each campus. This adds up to a total of twenty interviews. The separation between start-ups and scale-ups has been made in order to gain insights in the requirements for real estate users that are entering the market versus those that have established themselves already. The start- and scale-ups have been contacted through the respective campus management teams, through regional consultants of CBRE and by directly contacting real estate users on own initiative. The real estate users that took part in the research will remain anonymously for both privacy concerns and in order for them to give their honest opinion about their current real estate location, which can potentially be politically sensitive.

Since at two campuses no second start-up has been found willing to take part in the research these have not been interviewed. Secondly at the High Tech Campus Eindhoven the start-up companies were represented by the incubator party of the respective facility. This can be seen as a separate CMT that owns real estate on the HTCE but works in close collaboration with the general CMT.

Table 3 Interview matrix

Campus	Dutch Tech Campus Zoetermeer	High Tech Campus Eindhoven	Pivot Park Oss	Novio Tech Campus Nijmegen
Management				
Start up		Incubator management		
Start up		Incubator management		
Scale up				
Scale up				

### 3.2.1 Interview protocol

For the semi-structured interviews an interview protocol has been prepared. This interview protocol has been developed on the basis of the theoretical research presented in the theoretical framework. Two different protocols have been developed, one for the interviews with the CMT's and one for the interviews with real estate users. Both interview protocols share a similar structure, this has been developed so the results of both the CMT interviews and the real estate users interviews can be compared in order to establish the relation between supply and demand, as described in the theoretical model. The details of the interview protocols can be found in appendix B and C.

Both interviews start with a short introduction in order to comfort the interviewee and gather some basic information on the interviewee. This information has been erased from the interview summaries in the anonymisation process.

In the second section the management team representatives are asked for information on the emergence of the campus and insights on the supply side, such as their policies and vision for future development of the campus. Whilst the real estate users have been asked why they have decided to locate at a campus.

Followingly both the management team and the real estate users have been asked what its like to locate at the campus. Whereas the management team have been asked questions from a supply perspective and how they see the real estate users located on the campus. Whilst the users are asked for their user experiences.

The last topic for the campus management team interviews is aimed at the occupation and financial performance of the campus. Whilst on the other hand the real estate users of the campus are asked about the effects of locating at a campus on their business operations.

3.2.2 Ranking & rating questions

All interviewees have been asked to fill out ranking and rating questions at the end of their respective interviews. The numeric data that has been collected through this method is presented in graphs per campus and per interviewee representing a real estate user.

In table 4 an example of the presentation of the ranking questions has been presented. In the top row the different aspects are shown. In every column below the aspect the rating of that aspect has been presented. These ratings vary from 1 to 10, with the most important aspect being rated a 1 and the least important aspect being rated a 10. In order to make the results more insightful a colour scheme has been applied, degrading from green at 1 (most important) to 10 (least important). At the bottom of the table an average rating has been presented, this way an average ranking of importance of various real estate aspects can be concluded. In the bottom row the deviation is presented, the higher the deviation the bigger the gap between answers given by different real estate users. The higher the deviation the higher the disagreement on the importance of the real estate aspect.

Table 4 Presentation of ranking questions example

Real estate aspects related to importance for real estate strategy		External appearance	Quality	Sustainability	Flexibility of lease contract	Availability of parking	Accessibility	Shared research & production facilities	Amenities in surrounding area	Innovative cooperation	Price/quality level
Location	Interviewee type	1	2	3	4	5	6	7	8	9	10
	Interviewee type 2	10	9	8	7	6	5	4	3	2	1
	AVERAGE	5,5	5,5	5,5	5,5	5,5	5,5	5,5	5,5	5,5	5,5
	DEVIATION	9,0	7,0	5,0	3,0	1,0	1,0	3,0	5,0	7,0	9,0

In table 5 an example of the presentation of the rating questions is presented. The rating questions can be answered on a scale of 1 to 5. When the supply of a campus is rated 1 the real estate users opinion is that this aspect is not supplied at all, with a rating of 5 the aspect is fully supplied by the campus. Again a colour scheme is applied to the ratings to make them more insightful. A 1 has a red colour, 2,5 – an average rating – is presented in yellow, whilst a 5 rating is presented in green. Again the averages are presented, but in contrary to the ranking questions the deviation is presented between the management team and the real estate users. This has been chosen to gain insights in the match between supply and demand. In other words, how the management thinks their campus performs, and how this is perceived by the real estate users. The final column presents the general grade real estate users give their campus, this grade is a user satisfaction grade on a scale of 1 to 10, with a 5,5 as neutral, 1 very dissatisfied and 10 totally satisfied.

Table 5 Presentation of rating questions example

	Value to what extent the campus supplies the following aspects	Focus on attracting real estate users in the same sector	Stimulates innovation	Stimulates knowledge sharing	Stimulates healthy rivalry	Facilitates high quality real estate	Facilitates an incubator environment	facilitates in attracting talent (employees)	Stimulates growth of network	Stimulates in improving commercial reputation	General grade (1-10)
Location	Management	5	4,5	4	3,5	3	2,5	2	1,5	1	
	Real estate user	1	1,5	2	2,5	3	3,5	4	4,5	5	7
	AVERAGE	1	1,5	2	2,5	3	3,5	4	4,5	5	7,0
	DEVIATION MT/USERS	-4,0	-3,0	-2,0	-1,0	0,0	1,0	2,0	3,0	4,0	

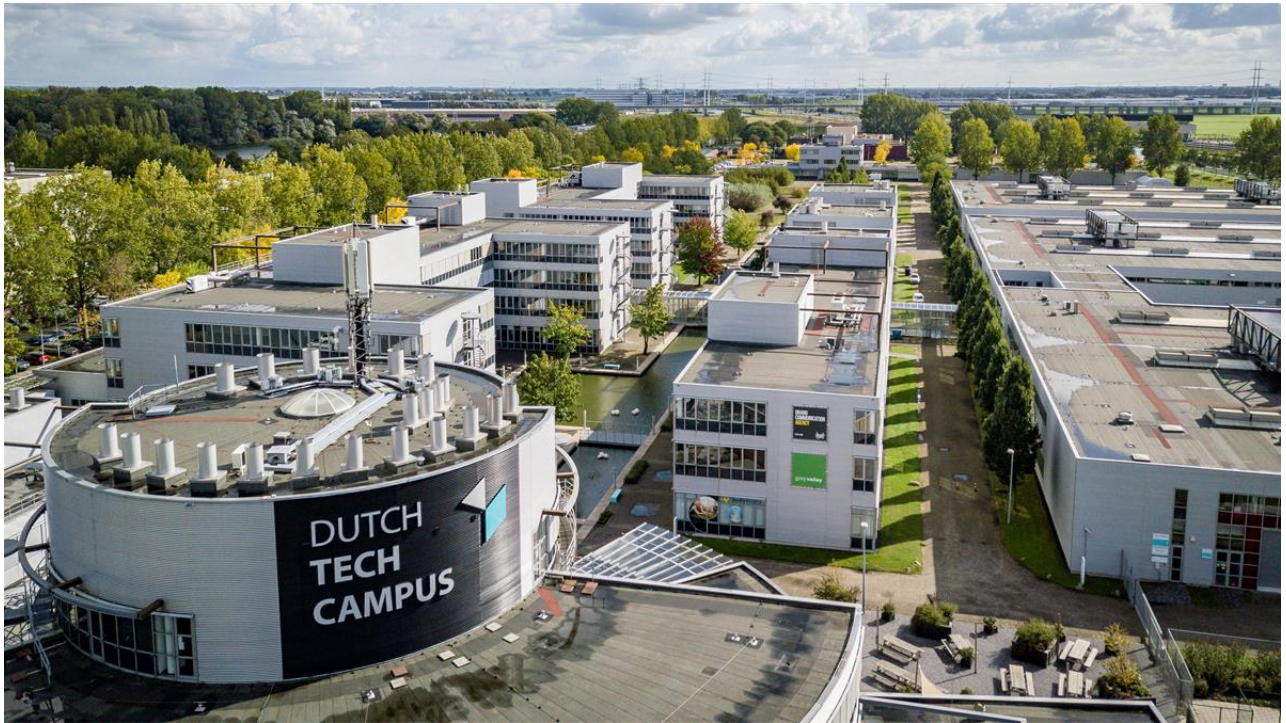
### 3.3 Interview results

In the following section the results of the interviews conducted with the CMT's, start-ups and scale-ups will be presented. All findings presented are translated directly from the interviews and have been presented in the exact same words used by the interviewees as far as possible. The full interview protocol can be found in the appendix. The results of the four campuses have been presented per campus, each containing an interview summary of the statements made by the interviewees. This summary is divided over seven different topics that have been directly translated from the interview protocols of both the campus management team and the real estate users. Chapter 1 and 2 cover the supply side of the campus. Chapter 3 gives insights in why real estate users decide to locate at a campus, corresponding with the literature study towards localization preferences. Chapter 4 and 5 are aimed at establishing the benefits that are delivered by a campus, with the aim an goal to either confirm or deny the findings of the literature study towards theoretical benefits. Whilst chapter 6 has the function to confirm or extend findings of the empirical research. Chapter 3 Interview results is used to present the data that is collected from the interviews whilst in chapter 4 Analysis interpretation and explanation on the findings will be presented.

1. The management policy, providing a summary of the campus emergence, CMT's current activities and future plans.
2. Campus in figures, which presents data on the performance of the campus in terms of financial figures, growth and vacancy rates.
3. Choice for the campus, which contains the findings of why real estate users chose to locate at the respective campus they are currently located on.
4. Locating at the campus, presenting the user experiences since they are located at the campus, ranging from experiences with the CMT's, events or other users located at the same campus.
5. Effects on business operations, for this section interviewees have been asked to state concrete examples of influence that locating at the campus has had on their business operations.
6. Numeric valuation, this section contains various tables presenting the answers given to 'the ranking questions', whereas interviewees have been asked to quantify different aspects in their real estate strategy.
7. Conclusion, in this part the findings of all sub-paragraphs mentioned above are briefly summarised and generalised per campus. In addition to that an analysis of the findings and an interpretation of the performance of the campus is presented.



### 3.2.1 Case 1: Dutch Tech Campus Zoetermeer



#### *Campus management team*

##### *Management policy*

The management of the Dutch Tech Campus, further referred to as DTC, is executed by Ping Properties. The representative interviewee states their main tasks in managing the campus are asset management and real estate development services. These services take shape in marketing, contract & facility management and connecting with the local municipality. Community management, such as maintaining connections with educational facilities and organising network events, is executed by a founding in which the management takes no part.

The campus is located strategically along the Utrecht-The Hague axis next to the A12 and located closely to train station Lansingerland-Zoetermeer. The development aims to distinguish itself from other business parks by offering a restaurant, coffee bar and bookable meeting rooms. Next to the facilities services as catering, security and possibilities to host larger events are aspects that the DTC aims to supply their real estate users.

Initially cooperation between real estate users and stimulating innovation were KPI's of the DTC, however these points no longer have priority since this has proven not to be essential for attracting real estate users. The campus management team (CMT) believes the pull factor for the campus is the possibility to locate with similar companies that do not directly compete in the same market. In the ideal situation this would result in a matrix of different companies that are linked and/or closely related. The CMT is actively searching for real estate users that fit within their existing matrix, stating: "We aim to build a matrix of companies that are active in the same sector, can relate to each other, however do not directly compete." Secondly the CMT experiences that when this matrix is clearly communicated/publicly marketed, possible real estate users will find the campus themselves. The policy does not contain marketing strategy, their policy is built from a business perspective and they focus on delivering "a good product in terms of real estate and extra services and then tenants will follow."

### Campus in figures

The vacancy rate of the campus has decreased from 26% to 9% in the two years since Ping Properties has bought the plot and is actively managing the agglomeration as a campus. Currently 4000 m<sup>2</sup> is vacant and available for rent. In this two year period that Ping Properties have managed the location another 26.000 m<sup>2</sup> development has been added to the real estate stock. The campus still has expansion possibilities and therefore no extra developments are planned unless a real estate user specifically asks for it. Adding up these figures; The CMT has rented out 34.000 m<sup>2</sup> of real estate on the campus in the last two years.

### Real estate users

#### Locating at the campus

At the DTC three different interviewees have been selected and each have answered the questions in the interview proposal representing their companies perspective. Locating at the campus all interviewed parties state there is no cooperation between the different real estate users on a business level. Next to that all parties state they did not intend to cooperate with the other parties when entering the campus, although both scale ups state they would be open for future cooperation's. All interviewees experience the campus as a positive working environment and appreciate the other users located at the DTC.

#### Choice for the campus

The first scale-up company interviewed has chosen for the DTC because of the strategic location of Zoetermeer in the middle of the Randstad. This, and the willingness of the CMT to make investments in a "perfectly fit-out" and modern office building in trade-off for a 10-15 year lease contract were main drivers for the company to locate at the DTC. Secondary elements were network, parking space availability, flexibility in terms of expansion possibilities. The building supports the sustainability ambitions of the company which is also valued.

The second scale up had a similar profile in their answers. The real estate user was looking for a development near their former location which consisted of both office space and warehouse facilities. The scale up had been in touch with the previous campus management team but opted out of a move, the current CMT has succeeded in attracting the scale up by offering a suitable business case and a campus concept. Secondary elements important to this user were appearance of the campus for their employees and clients, quality of the real estate, management service and the campus concept in general, valuing the sense of togetherness with neighbours.

The start-up company was looking for a specific type of real estate and a flexible lease contract with growth possibilities. When reaching out to the campus management they were able to offer this. Secondary pull factors were public facilities and services such as meeting rooms, lunch room and cleaning service.

#### Effects on business operations

When the interviewees are asked about direct effects on business operations they are not able to state a concrete example. However all interviewees are positive about the look and feel of the campus. For the start-up company the appearance of the campus, although unmeasurable, has a positive impact on business operations. One of the scale-up companies stated that the appearance and possibility to use campus facilities have a positive effect on their operations, stating "our clients are impressed with the location, even though we occupy only a part of the real estate." The other scale-up interviewee stated the most beneficial is that they rent a building that fits their needs for office space and storage combination. They appreciate the working environment of the campus for their employees and the possibility to grow, direct effect on business operations are not named.

## Numeric valuation

### Ranking aspects on importance in real estate strategy

The CMT of the Dutch Tech Campus refused to take part in the numeric valuation of the campus since they stated that the value of the qualitative outcomes of this research are more important to them. Therefore no table is available to compare the numeric valuation of real estate aspects from the management teams valuations and the real estate users can be presented.

However the real estate users of the DTC have rated the 10 different real estate aspects on their importance in their real estate strategy. This has led to the following results, presented in the table below. The highest ranking an interviewee can give is a '1' stating it is the most important aspect in their real estate strategy, whilst a '10' is the least important aspect. Therefore a colour grade has been applied to the table, which applies a green colour to the aspects that are important, degrading to orange for the average ranks and further degrading to red for the least important aspects.

This colour grade has been applied to the averages as well, which give insights in the average importance of real estate aspects in the real estate strategy of the real estate users located at the DTC.

Table 6 Ranking questions Dutch Tech Campus Zoetermeer

	Real estate aspects related to importance for real estate strategy	Real estate aspects									
		External appearance	Quality	Sustainability	Flexibility of lease contract	Availability of parking	Accessibility	Shared research & production facilities	Amenities in surrounding area	Innovative cooperation	Price/quality level
ZOETERMEER	MANAGEMENT TEAM	nb	nb	nb	nb	nb	nb	nb	nb	nb	nb
	SCALE UP 1	2	1	3	8	10	4	7	5	6	9
	SCALE UP 2	5	4	3	7	6	2	10	8	9	1
	START UP 1	4	5	8	1	6	3	10	9	7	2
	AVERAGE	3,7	3,3	4,7	5,3	7,3	3,0	9,0	7,3	7,3	4,0

Real estate users of the DTC highly value accessibility, external appearance and quality of the real estate. Both scale-up companies acknowledge the importance of sustainability within their real estate strategy whilst the start-up does not. Two of the users highly value the price/quality level of the location whilst one of them does not.

Shared research & production facilities stands out as most unimportant to real estate users on the DTC. This is followed by availability of parking, amenities in the surrounding area and innovative cooperation which are all given an 7,3 on average. Flexibility of the lease contract is valued as unimportant by both scale-ups whilst the start-up highly values this aspect.

### Rating to what extent the campus supplies campus aspects

In this second table the interviewees have been asked to rank the DTC on a scale of 1-5. They were asked to rank the campus to what extent it supplies on the following aspects, with a 5-rating the campus fully supplies this specific aspect whilst a 1-rating would mean it does not supply this aspect at all. This has been asked to the management team as well, in order to get a numeric confirmation of what their management policy is focussed on. In addition to that the interviewees have been asked to grade the campus on a 1-10 satisfaction scale, with a 1 being totally dissatisfied and a 10 being totally satisfied.

Table 7 Rating questions Dutch Tech Campus Zoetermeer

	Value to what extent the campus supplies the following aspects	Focus on attracting real estate users in the same sector										General grade (1-10)
		Stimulates innovation	Stimulates knowledge sharing	Stimulates healthy rivalry	Facilitates high quality real estate	Facilitates an incubator environment	facilitates in attracting talent (employees)	Stimulates growth of network	Stimulates in improving commercial reputation			
ZOETERMEER	MANAGEMENT TEAM	5	3,5	2	1	4,5	4	5	2	4		
	SCALE UP 1	5	5	3	3	4	4	4	5	4	7,5	
	SCALE UP 2	5	3,5	2	1	4,5	4	5	2	4	7,5	
	START UP 1	nvt	nvt	nvt	nvt	nvt	nvt	nvt	nvt	nvt	8	
	AVERAGE	5	4,25	2,5	2	4,25	4	4,5	3,5	4	7,7	
	DEVIATION MT/USERS	0,0	0,8	0,5	1,0	-0,3	0,0	-0,5	1,5	0,0		

The start-up interviewed stated that it is only recently located on the campus and therefore sees itself as unable to rate the campus on the aspects asked. Therefore the grading has been labelled as 'n.a.' in the table. The interviewee added that it currently does not take part in the campus and sees it more like a classic landlord relationship which offers the right real estate. However, ambitions are in place to participate more in the future.

The main focus points of the CMT are on attracting real estate users in the same sector, facilitating high quality real estate and facilitating in attracting talent/employees, both ranking a 5/5 for the level the campus supplies these factors. These points are acknowledged by real estate users as aspects that the campus supplies, ranking respectively a 4/5, 4.5/5 and 4,5/5.

Next to that the points ranked lower by the management are also ranked lower by the real estate users, this suggests alignment between the benefits supplied by the CMT and the benefits expected by real estate users.

The highest deviations are 1,5 and 1,0 which are caused by deviating answers from a single real estate user, because of the low amount of respondents averages are heavily impacted with a single deviant rating of a real estate aspect. Except for 'the stimulation of network growth' both scale-ups have given comparable rankings for real estate aspects.

The campus has been rated a general grade of 7,5 for user satisfaction, with a 1 being totally dissatisfied, a 5 neutral and 10 totally satisfied, all interviewees are positive about the campus. This implies that knowledge sharing, healthy rivalry and stimulation of network growth are not pivotal points in the real estate strategy of the interviewed companies.

### *Conclusion*

The Dutch Tech Campus in Zoetermeer is a campus that has transformed a vacant former Siemens site into a campus real estate development and the CMT, after taking over, has managed to significantly reduce the vacancy rates within a short time-frame by creating a product in demand. What is mentioned by interviewees as strengths of the campus are; the raster of related companies, the facilities, good contact with the CMT and the CMT's willingness to invest to adapt the real estate to the users wishes. In relation to the campus concept, as found in literature study, it is remarkable that the cooperation between different companies hardly takes place. Secondly the admission of companies not locating their R&D departments on the campus does not relate to the pre-assumed definition.

Accessibility, quality of real estate, external appearance and price/quality level are primary drivers for the real estate users that locate at the campus. Despite the campus not providing all aspects that were preliminary expected of a campus, the user satisfaction of all interviewed parties was positive, scoring a 7,7 on their general grade and scoring high valuations in the other aspects acknowledges the campus supplies relevant benefits to their real estate users. The high quality of real estate, positive working environment and having neighbours you identify yourself with are acknowledged benefits of locating in a campus environment.

The campus deviates from the findings in literature in several aspects. Firstly literature suggests that campuses are developed for knowledge intensive real estate users and therefore do not necessarily house production facilities or significant logistic space, however at the DTC a significant part of the real estate is developed for these activities. Secondly the aspect of collaboration deviates. The campus positions itself with a focus area on smart mobility, ICT, E-health & care, despite users claiming that the matrix of real estate users is aligned with this focus area, no significant collaboration between the real estate users has emerged up till now. Therefore the benefits of the

campus are limited to sharing facilities, improved appearance factors from the collective site and the addition of having a campus management team.

In other words; The DTC does generate benefits from co-locating. However the campus is located between a business cluster and a campus in the real estate agglomerations spectrum as presented in chapter 2.1.2. In conclusion, the campus does not provide all theoretical benefits that are to be expected from a campus and therefore contributes to the inflation of the definition of what is a campus. On the other hand, the real estate development does deliver additional benefits compared to a solitary real estate development and performs equally well as other campuses in terms of vacancy rates and user satisfaction. The strength of this real estate agglomeration lies within the ability to match demand from the real estate users that are located at the campus, however this raises the question whether or not these real estate users align with typical real estate users that would locate on a campus.



### 3.2.2 Case 2: High Tech campus Eindhoven



#### *Campus management team*

#### *Management policy*

On the High Tech Campus in Eindhoven the management is focussed on maintaining and expanding the campus. Next to that they see themselves as a spine in the triple helix within the Brainport region (economic region of Eindhoven), connecting government, business and education and stimulating contact between the three entities. Next to facilitating real estate the CMT states that it is focussed on building an ecosystem; Which is a collective name for the collaboration and sharing of knowledge and innovation between on-campus located users (Buck, 2018), the CMT states that keeping the right mix of companies is essential for that. The HTC focusses on R&D oriented real estate users and house a mix of multi nationals, scale-ups, start-ups and business support services for which they are actively managing the ratios represented on the campus through their company allowance policy.

Since the campus is founded on an old Philips site, no formal connection with educational facilities has been in place when the campus started. This currently is a top priority for the CMT looking to formally collaborate with the TU Eindhoven. The interviewee states that informally these ties already exist through companies and employees at the campus that have a connection with the TU Eindhoven campus.

The management has a policy of which a part has been drafted by Philips and the Eindhoven municipality when the campus development strategy was developed. This policy offers a framework wherein the CMT is allowed to operate. This framework addresses which type of real estate users can locate at the HTC and what the aim and goal of the campus is. The CMT focusses on attracting and keeping parties that anchor knowledge on the site and secondly aims to stimulate human encounters as much as possible. For example; buildings are prohibited from having own lunch areas so all employees are forced to go to the community lunch facility which stimulates encounters outside your company.

Next to the campus management there is an incubator campus management team (ICMT) in place. This ICMT has been interviewed instead of two start-up companies at the HTCE. The start-ups proved unwilling to cooperate in the research, however the ICMT which represents the start-ups at the HTCE did participate. The ICMT owns 5% of the real estate at the campus, just short of 20.000 sqm. and represents 25% of the companies located at the HTCE. The ICM owns real estate at the TU Eindhoven campus and the HTCE and has as primary goal to maintain promising start-ups in the region to stimulate economic growth. The ICMT uses to the same policy as the campus with regard to the strict rules on allowance of type or real estate users. The ICMT delivers network support, organises own and combined events with the HTCE and focuses on facilitating start-up businesses in their requirements.

#### Campus in figures

The vacancy rate of the campus is currently at 3%, this is, according to the CMT, too low because it might prohibit real estate users from expanding their business. There is an expansion plan for the campus in place, new developments have been delayed because of COVID-19 and a change of ownership, but are soon to be finalized. The campus currently exists of over 750.000 sqm and will grow with 160.000 sqm in the near future to over 1 Mio sqm. over the full development of the masterplan. The campus real estate price per sqm. lies within the high segment of the Eindhoven area, but the public facilities incorporated in the fee should lower the required amount of real estate for the users. Therefore CMT believes that below the line the rental price is competitive within the market.

#### Real estate users

##### Choice for the campus

The first scale-up has made a clear and substantiated move towards the campus. As an early adopter the scale-up chose for a campus location to pull together with suppliers, developers and other relevant parties whilst maintaining connection with the TU Eindhoven. The open innovation system that was promoted appealed to the wishes of the scale-up. Next to that factors as appearance, marketing factor and low key access to network have been stated. The second scale-up also values that suppliers know where to find you and that customers and students are both actively engaged on the campus. Next to that the atmosphere of 'everyone working together', efficiency in office size and attracting and retaining talent were named.

##### Locating at the campus

Both scale-ups are positive about locating at the HTCE. The interviewee of scale-up 1 draws comparison to their former location where there was contact with the neighbours hardly once a year and mentions that is impossible on the HTCE. Besides the social encounters the scale-up experiences that recruitment is easier but states that the CMT could offer better services for this. Next to that the campus is experienced as a highly competitive area, both positive and negative. On the positive side the campus pushes you to outperform your neighbours in order to stand out. The negative side is that skilled people can switch between companies. A strength of the campus is the high standard of the real estate developments. However, a downside is that the CMT is described as 'very passive' when adjustments to buildings want to be made, also the shift of ownership has led to an increase in landlord-occupier discussions.

Scale-up 2 acknowledges the effort that is put into facilitating human encounters and highlights the boy-cot of having private lunch facilities as positive factor of the campus. Next to that the events hosted by the CMT actively stimulate collaboration between different real estate users and the higher price per sqm. is returned in the shape of facilities available at the campus and the pleasant working environment. A downside of the campus is inflexibility with regard to research facilities and permits for working with specific products, this is regarded as a limiting factor.

### Effects on business operations

Both companies experience both positive and negative effects of locating on the campus. The added value of the management, location, logistics and regulations all positively influence the ecosystem and positively influence business operations of Scale-up 1. The company has taken part in several longer and short-term collaborations within the campus, although they state these might have emerged if they would not have been located on the HTCE as well. It is experienced as a limiting factor that not all permits for specific research are in place, this forces the organisation to have another location. The basic facilities are taken care of very well, when customization is required the campus could improve its service. Finally recruitment of employees is experienced as positively influenced by the campus, although competitors are also located on the campus.

Scale-up 2 values the increase in contact between them and suppliers, customers and students. Next to that the added value of events organised by the CMT supports knowledge sharing. The scale-up believes the environment of the campus boosts their attractiveness as an employer and thus increases productivity and recruitment. The campus forces the company to lead by example. The possibility to cooperate with start-ups with promising ideas has led to several innovating projects.

### Numeric valuation

#### Ranking aspects on importance in real estate strategy

On the HTCE the users have been asked to rank 10 different real estate aspects on their importance in their real estate strategy. This has led to the following results, presented in the table below. The highest ranking an interviewee can give is a '1' stating it is the most important aspect in their real estate strategy, whilst a '10' is the least important aspect. A colour grade has been applied to the table, which applies a green colour to the aspects that are important, degrading to orange for the average ranks and further degrading to red for the least important aspects. This colour grade has been applied to the averages as well, which give insights in the average importance of real estate aspects in the real estate strategy of the real estate users located at the campus.

Table 8 Ranking questions High Tech Campus Eindhoven

	Real estate aspects related to importance for real estate strategy	External appearance	Quality	Sustainability	Flexibility of lease contract	Availability of parking	Accessibility	Shared research & production facilities	Amenities in surrounding area	Innovative cooperation	Price/quality level
EINDHOVEN	MANAGEMENT TEAM	10	4	7	9	6	5	2	3	1	8
	SCALE UP 1	10	6	5	3	9	8	2	7	1	4
	SCALE UP 2	9	6	2	5	7	8	4	10	1	3
	AVERAGE	9,5	6,0	3,5	4,0	8,0	8,0	3,0	8,5	1,0	3,5
	DEVIATION MT/USERS	-0,5	2,0	-3,5	-5,0	2,0	3,0	1,0	5,5	0,0	-4,5

Innovative operation is valued most by both scale ups and the management team. Shared research and production facilities is ranked second by the real estate users followed by price/quality and sustainability.

External appearances on average is least important in the real estate strategy of the real estate users with the amenities in the surrounding area ranking second least important. Accessibility and availability of parking space are equally ranked in third lowest place.

When comparing this to the CMT ranking of the aspects they show substantial similarity. Firstly all interviewed parties value innovative cooperation as most relevant aspects in their real estate strategy. Secondly the shared research and production facilities are highly valued by both the CMT and its real estate users. The external appearance of the real estate stands out on the other end of the ranking, this aspect is valued as least important in the strategy and is acknowledged to be so by the CMT.



Discrepancies between the ranking of aspects important to real estate users and the ranking of the CMT are also in place. The flexibility of lease contracts is seen as important by the real estate users whilst the management did not see this as an important aspect in real estate strategy. Secondly amenities in the surroundings have been expected to be important whilst they are not ranked so by both scale ups. The final discrepancy is in the ranking of price/quality level, this is ranked low by the CMT whilst both scale-ups value this aspect respectively 3th and 4<sup>th</sup>.

Rating to what extent the campus supplies campus aspects

Table 9 Rating Questions High Tech Campus Eindhoven

	Value to what extent the campus supplies the following aspects	Focus on attracting real estate users in the same sector	Stimulates innovation	Stimulates knowledge sharing	Stimulates healthy rivalry	Facilitates high quality real estate	Facilitates an incubator environment	facilitates in attracting talent (employees)	Stimulates growth of network	Stimulates in improving commercial reputation	General grade (1-10)
EINDHOVEN	MANAGEMENT TEAM	5	4	4	1	3	4	3	4	2	
	SCALE UP 1	4	4	2	3	3	5	5	5	4	7,5
	SCALE UP 2	5	5	5	4	3	4	4	5	5	8
	AVERAGE	4,5	4,5	3,5	3,5	3,0	4,5	4,5	5,0	4,5	7,8
	DEVIATION MT/USERS	-0,5	0,5	-0,5	2,5	0,0	0,5	1,5	1,0	2,5	

According to the CMT the HTCE fully supplies in attracting real estate users active in the same sector. Four other factors have been ranked at 4 out of five. Two factors score respectively a 1 and a 2, according to the management the campus does not supply in stimulating healthy rivalry nor in stimulating the commercial reputation of its users.

The real estate users located at the HTCE value six different aspects at a 4,5 or higher. They value the growth of their network as best supplied aspect of the campus. Despite the campus not aiming to supply in a benefit of attracting talent the users do experience this as an aspect that is supplied. Secondly big deviations are in improvement of commercial reputation and stimulation of healthy rivalry. The CMT states the campus does not at all supply healthy rivalry whilst the users definitely experience this in some way, with one of the interviewees stating “a certain pressure is felt to stand out from the other real estate users located here.”. Next to that a significant improvement of commercial reputation is experienced from locating at the campus whilst this is not an aspect the management actively tries to deliver.

### *Conclusion*

The High Tech campus Eindhoven is the oldest and largest campus in this research and in the Netherlands. The CMT is focussed on maintaining its leading position as tech campus whilst expanding the campus. In this mission they focus on maintaining and strengthening the current ecosystem with a balanced mix of real estate users. Next to that they aim to remain a spine in the triple helix of the Brainport region connecting the campus and its real estate users with the municipality, other campuses and educational facilities. The HTCE stands out for their large public lunch facility and policy which prohibits real estate users from developing a private lunch room in their office. Furthermore the CMT hosts networking and knowledge sharing events and the area bolsters a feeling of togetherness on the job.

Both companies interviewed chose to locate at the campus to shorten ties within their production chain. Next to that they value the atmosphere at the campus as a positive working environment. After locating at the campus both scale-ups praise the amount of collaboration and social encounters between employees of different real estate users. Next to that they value the events organised by the CMT and the working environment. Both interviewees sense a form of rivalry against other real estate users which pushes real estate users to try and stand out from the others. Despite the praise for the ecosystem of the campus both interviewees were less positive about the flexibility with regard to the real estate. Stating the quality of real estate is good but adaptation to personal preferences brings a struggle. The added value of the management, location, logistics and regulations all positively influence the ecosystem and positively influence business operations. Next to that both scale-ups experience positive influence on their recruitment processes.

The HTCE is chosen as a location to support innovation and does so very well, next to that the incubator facility, network benefits, commercial reputation and real estate users in the same sector are experienced as positive benefits of locating on the campus.

This is the only campus that has been identified as a mature campus in the report of Buck consultants that has been selected as a case in this research, and it lives up to this statement. The HTCE supplies the theoretical benefits that have been derived from literature, is a managed real estate agglomeration that has a strict admission policy and stimulates collaboration amongst real estate users. However the findings on the HTCE have been derived from only two interviews, therefore more extensive research would increase the insights in this campus. The negative aspects mentioned of the HTCE were directly related to the recent change of ownership and mostly impacted flexibility and willingness to invest in the real estate provided at the campus. However all other aspects, as can be seen in the rating of the campus, are valued high by both interviewees. What is remarkable is that the HTCE does, to some extent, create a feeling of healthy rivalry; This might be the difference between a campus as a successful real estate agglomeration since this stimulant will not be experienced on a business cluster, where other real estate users are relatively irrelevant compared to a campus situation.

### 3.2.3 Case 3: Pivot Park Oss



#### *Campus management team*

#### *Management policy*

Pivot Park Oss has emerged on the old site of MSD/Organon and is now redeveloped as a campus. The CMT functions as: Point of contact for real estate users, connecting organisation between companies like a broker and is responsible for further development of the real estate of the campus. The municipality and province are involved in managing the campus, both in decision-making as well as financial partners. The campus is focussed on the drug discovery chain and the R&D related to that. For the future they plan to add a production facility to keep larger users on the campus. Secondary some business support companies are allowed to the campus.

The campus has been founded ten years ago and the CMT has ever since focused on attracting companies to the site, since pre-COVID-19 the campus has been fully let out and therefore the scope of the CMT has changed towards expanding the campus. This is currently happening with two new buildings being developed and plans for redevelopment of two of the old buildings in place.

The CMT is positive about the atmosphere on the campus, they state that all different users know each other and it could be described as 'almost like a family'. The CMT plays part in this by hosting events and actively and continuously staying in touch with all their real estate users, but it does help that many people have worked together at Organon or at MSD before locating at Pivot Park again and therefore preliminary know each other.

Next to that Pivot Park offers a wide range of research equipment which is bookable through the CMT. This is a pull factor for start-up companies since equipment is regularly too expensive for a start-up company. Challenging for the CMT is the funding dependency of many of the real estate users, when funding increases fast growth will emerge, when funding is withdrawn this will happen vice versa.

Pivot Park formally collaborates with the Radboud University, University of Leiden and the Hogeschool Arnhem Nijmegen. Start-ups and spin-offs that locate at Pivot Park regularly come from one of these educational organisations.

### Campus in figures

Currently the campus has a vacancy rate of 0%. There is no possibility for current real estate users to rent extra storage nor to expand in any other type of real estate. The new buildings will open end of 2022 but this will not increase the vacancy rate since various real estate users have already requested all of the newly developed floor area. Prices per sqm are above market average, but several extra services are delivered within the contract. For example; Pivot Park delivers nitrogen, electricity, carbon dioxide and argon to all buildings on the campus, these products are regularly used in labs. Next to that Pivot Park is willing to invest in customization of office space or labs to improve the real estate fit for their users.

### Real estate users

#### Choice for the campus

The interviewed start-up has chosen to locate at the campus because of the network of former Organon employees and because several possible clients were located at the park. Especially the added value in reputation and commercial reputation inside the medical work was an extra pull factor to locate at Pivot Park.

For scale-up 1 the history of Pivot Park and their current position within the pharmaceutical market were main reasons to locate at the campus. Secondary aspects were low rental prices compared to the Randstad and internationally the employee salaries in the Netherlands are substantially lower than for example in the US. Facilities nor services have played a role in their choice for Pivot Park.

Scale-up 2 decided to come to Pivot Park because of the availability of specific research equipment and the presence of innovative start-up companies. This allows the company to offload specific analysis to external and skilled parties.

#### Locating at the campus

The start-up has been located at Pivot Park for several years now, over this duration the interviewee is very positive about the services at Pivot Park. The construction that all services and facilities are accounted for in the rent works very well. The services unburden the start-up so it can focus on its core business. The interviewee expresses the feeling that the focus of the CMT switches towards larger companies and quick wins and that the importance of the business case has grown. However, the start-up experiences no hinder from that except an unnecessary move and upgrade to the newly developed building.

Scale-up 1 is moderately positive about locating at Pivot Park. They are positively surprised about the recruitment of talent from the region which was heavily questioned beforehand. Cooperation with other real estate users is negligible for this scale-up except for a scarce screening that is asked from a start-up Pivot Park. The internships that are offered by the scale-up are easily filled with students from the Radboud and the HAN. Despite the new developments are developed too late and the cooperation with the CMT is described rough, the start-up generally is content with the development of the park.

The second scale-up enjoys the pleasant cooperation with several other real estate users at the campus and therefore is content they localized at Pivot Park. On the CMT however they have some criticism with regard to their ability to act upon changing circumstances. This mainly points towards the new developments taking too long to be delivered. They do state that the CMT is quickly professionalising and therefore increasingly well-functioning. The campus is not experienced as a competitive area since most users deliver different services.

### Effects on business operations

The start-up fully acknowledges the positive role of locating at Pivot Park for its business operations. The park has grown over the duration the start-up is located on it and this is directly related to a growth in business. Next to that the CMT actively connects the start-up with internal and external parties which stimulates the development of the start-up and provides growth that would not have been achievable in another location.

Scale-up 1 enjoys lower rent rates and is positively surprised by the recruitment possibilities in the region of Oss. This recruitment takes shape in both the form of employees as well as interns. The scale-up will make use of the newly developed buildings but states that these are finished too late, partially because of the involvement of municipality and province, and that it currently prevents the company from achieving their expected growth. Apart from that they state no notable benefits nor negatives from locating at a campus.

Scale-up 2's current situation is temporary and undesirable because the real estate is below their own standards and the market standards. They too will enter the new developments at the start of 2023 and were aware of this situation before locating at Pivot Park. Besides the current suboptimal housing the scale-up is positive about the impact of the campus, they can offload business within the campus network and benefit from improved commercial reputation and network benefits. They see the CMT is professionalising over the past few years but point out there are still steps to be taken in terms of the management.

### Numeric valuation

#### Ranking aspects on importance in real estate strategy

Innovative cooperation and shared research & production facilities rank highest at Pivot Park Oss. Second most important real estate aspect is accessibility expect one of the scale-ups ranking this on place 8/10. Availability of parking, on average, is ranked as lowest real estate aspect with external appearance ranking second lowest despite one company ranking this in third place.

Accessibility, external appearance and flexibility of lease contract all have one score that deviates significantly from the rating of others.

The CMT has ranked five aspects either similar to the most given answer (external appearance) or close to the average rating given. The management has rated accessibility and sustainability substantially different from the real estate users on the campus.

Table 10 Ranking questions Pivot Park Oss

	Real estate aspects related to importance for real estate strategy	External appearance	Quality	Sustainability	Flexibility of lease contract	Availability of parking	Accessibility	Shared research & production facilities	Amenities in surrounding area	Innovative cooperation	Price/quality level
OSS	MANAGEMENT TEAM	10	6	3	4	9	7	2	8	1	5
	SCALE UP 1	10	4	6	7	9	8	2	5	1	3
	SCALE UP 2	3	9	6	10	8	1	2	5	4	7
	START UP 1	10	6	7	4	9	1	3	8	2	5
	AVERAGE	7,7	6,3	6,3	7,0	8,7	3,3	2,3	6,0	2,3	5,0
	DEVIATION MT/USERS	-2,3	0,3	3,3	3,0	-0,3	-3,7	0,3	-2,0	1,3	0,0

#### Rating to what extent the campus supplies campus aspects

The CMT of Pivot Park Oss aims to supply real estate users active in the same sector and in improving commercial reputation. Despite two scale-ups acknowledging these aspects they do not have the highest average rating.

The start-up rates three aspects at 2/5 stating the campus does insufficiently supply in attracting users in the same sector, stimulating innovation and facilitating in attracting talent. Whilst high quality real estate, growth of network and improvement in commercial reputation are valued at a full supply.



This contrasts with the ratings of both scale-ups interviewed. Both scale-ups are rating the supply of aspects comparably, both ranking three aspects on a 5/5. All users being active in the same sector, stimulation of knowledge sharing and stimulating growth of network are ranked highest.

The largest differentiation with the managements rating is found in three aspects; Focus on attracting real estate users active in the same sector is disagreed on by the start-up which causes the deviation. The difference in valuation of the quality of real estate is also caused by the start-up, this time valuating higher than the CMT and the scale-ups. Whilst finally the growth of network is acknowledged by all interviewed real estate users whilst the CMT does not value this at 5/5.

Table 11 Rating questions Pivot Park Oss

	Value to what extent the campus supplies the following aspects	Focus on attracting real estate users in the same sector	Stimulates innovation	Stimulates knowledge sharing	Stimulates healthy rivalry	Facilitates high quality real estate	Facilitates an incubator environment	facilitates in attracting talent (employees)	Stimulates growth of network	Stimulates in improving commercial reputation	General grade (1-10)
OSS	MANAGEMENT TEAM	5	4	4	3	3	3	4	4	5	
	SCALE UP 1	5	4	5	2	4	4	5	5	4	8
	SCALE UP 2	5	5	5	3	3	3	3	5	5	7
	START UP 1	2	2	4	3	5	4	2	5	5	8
	AVERAGE	4,0	3,7	4,7	2,7	4,0	3,7	3,3	5,0	4,7	7,7
	DEVIATION MT/USERS	-1,0	-0,3	0,7	-0,3	1,0	0,7	-0,7	1,0	-0,3	

### Conclusion

Pivot Park in Oss is focussed on the drug discovery chain and houses a variety of real estate users that work together in a semi hierarchical structure, scale-ups pass on work to the specialized start-ups on the site, without the intention of competing with each other. This creates an family-like atmosphere at the campus. The campus has a wide range of research equipment available and offers connections to various universities and higher educational facilities in the Netherlands. The management is actively managing the community by hosting events and connecting the different users.

The opinions about Pivot park from the start-up and both scale-ups differentiate quite a lot. The start-up experiences benefits from the network, commercial reputation and is positive about the ‘all-inclusive’ lease contract. One of the scale-ups enjoys a wide range of cooperation within the campus whilst the other does not. All and all both scale-ups are moderately positive about their current situation, however they are positive about future changes and the way the campus is developing.

Despite varying opinions about the quality of services, all participating real estate users highly value the knowledge sharing, growth of network and positive impact on their commercial reputation gained from locating at Pivot Park.

Pivot Park can be seen as a knowledge intensive campus with high levels of collaboration between start-ups and scale-ups. The interviewees have been critical on some aspects of the management performance, however it is expected that this lack of appropriate management is induced by the shared ownership between executing management, local municipality and the provincial governance. This results in decision making becoming a political process which lags processes surrounding the campus.

In comparison to the HTCE, Pivot park scores substantially lower on some campus aspects, however the user satisfaction taking shape in the general grade is very similar. This might imply that the campus as a real estate agglomeration can significant improvements. However, as confirmed by multiple interviewees, Pivot Park has an international reputation in the drug discovery chain. Therefore locating at the respective campus results in locating with relevant peers and boosts the network and commercial reputation of the respective real estate user, given it is active in the drug discovery chain. In conclusion, Pivot Park can be seen as a campus that excels the differences between good and excellent agglomeration benefits. However, the real estate, facilities and management are not at the desired performance level which diminishes the added value the campus could generate for its users.

### 3.2.4 Case 4: Novio Tech Campus Nijmegen



#### *Campus management team*

##### *Management policy*

Despite having real estate users of significant size the CMT of the Novio Tech Campus Nijmegen underlines that the campus is currently still in a pre-mature phase and that ambitious plans are in place for the campus. From the municipality the area development plan contains a masterplan where the Novio Tech Campus triples in size. The former Philips real estate and identity forms the basis of the campus and therefore it focusses on chip development and medical technology.

Currently the CMT tasks consist of branding, external communication and commercial reputation. The real estate management is handled by Kadans who are owners of most of the buildings and exploit them. The CMT does cooperate with Kadans and mediates between real estate users and Kadans. The land ownership however does lie with the CMT and therefore they are focussed on adding new developments to the campus with a campus community building having first priority.

The NTC carries out a strict policy with regard to admission to the campus, Kadans also respects this policy and therefore the campus is able to maintain their focus on the two specific sectors. The CMT has developed an app to stimulate community building, through this app real estate users located at the NTC and external companies connected to the NTC can easily stay in touch. Next to the app the CMT is connected with several educational institutes; ROC Nijmegen, Hogeschool Nijmegen, HAN, Radboud University and TU Delft. For the near future plans are in place for cooperation with Windesheim Zwolle and Saxion Deventer.

### Campus in figures

Because Kadans owns most of the real estate on the NTC, and therefore yields the rent, the NTC is not financially independent. Currently the campus is financially supported by the municipality and province who are both financially and politically involved. The campus houses over 70 different real estate users of which 30 start-ups with a current vacancy rate of 1% the campus is entirely rented out. In order to facilitate growth and to attract more real estate users the first building of 6000 sqm will be finalized in 2023, followed by a growth plan of up to 150.000 sqm of real estate participating in the campus.

### Real estate users

#### Choice for the campus

For start-up 1 the main drivers to locate at the NTC were location, connection with Radboud UMC and the innovation focussed environment. Secondary goals were to increase the network of the start-up and look for possible development partners at the NTC. Start-up 2 decided to locate at the campus after a world-wide comparison, the choice for the Netherlands and the NTC was based on the availability of national and international talent and the infrastructure surrounding Nijmegen. These drivers were important since the biotech start-up is very internationally oriented.

Scale up 1 has never actively made the choice to locate at the campus since it was located at the site already. The firm however acknowledges the added value of a campus concept and is actively involved in the development of the NTC. Scale-up 2 would like to join the campus community and is located on the same site. The interviewee sees the campus concept as valuable for recruiting and keeping employees and secondly would value the connection with educational organizations. However the interviewee states that none of these aspects are currently on the level it should be and therefore have not played a role in their location choice.

#### Locating at the campus

Since locating at the campus start-up 1 has been actively aided in expanding their network. With the help of the CMT they have connected with partners and suppliers and profited from an incubator service supporting their business development. The campus offers various options for cooperation with other real estate users which are regularly used by the start-up. For example they use chips and semi-conductors produced by other companies in their devices, next to that both practical and high-end research devices are shared between real estate users located on campus. A down-side mentioned is the ageing real estate on the campus, specifically the energy performance and maintenance being required more frequently, however this is adequately taken care of. The start-up is unaware of rental prizes in other locations but is happy with the extra services delivered by the NTC and willing to pay a significant price premium for that. Services mentioned are network assistance, filtering questions from municipality and environmental inspections, events and informal contact with other real estate users.

Start up 2 is also positive about locating at the campus. The quality of the labs and office space is good and they value the services delivered by the NTC. The cooperation with other real estate users at the campus is not as expected beforehand. The start-up has no formal cooperation and does not experience knowledge sharing on the campus. They state this might be caused by rapid growth the start-up has experienced which might have induced too little resemblance with other real estate users. Next to that a downside is the separate landlord and management of the campus, the start-up thinks the vision for the campus is great but that the basics should be improved first.



Scale-up 1 does not experience cooperation within the campus. They acknowledge that the campus concept works with regard to recruitment of employees and the pleasant working environment. However, they experience the campus is still in a development phase. The informal connections are in place, but formal cooperation has not emerged yet. Next to that the connections with educational facilities are not at the level they should be in order to generate benefits.

Scale-up 2 is narrowly involved in the development of the campus and is positive about the added value the concept generates. Locating with companies active in the same sector opens up for collaboration and making use of each other's strengths. The possibility to discuss problems with companies that might experience similar problems is valued. The scale-up has several cooperation's within the campus and values the effort of the CMT in organising network events and handling facility management. The scale-up does experience rivalry on the campus, despite everyone tries to stay out of the business segments of other real estate users in a 'gentlemen's agreement'.

#### Effects on business operations

Start up 1 states the campus has had a large positive impact on their business operations. When clients visit their office the campus makes the start-up look larger and more professional. The start-up thinks that being part of a bio-tech ecosystem helps to convince clients and funders. They state this is because it increases the confidence of clients and funders in the start-up's capability of overcoming problems they might face in the future. The start-up has compared the growth of the organisation with the growth in their former location and estimates that its development has happened at three times the speed it did in their former location.

The effect of locating on a campus on the business operations of start-up 2 have always remained limited. The start-up states they would not expect to leave soon since they are satisfied on the NTC but beforehand the benefits of locating on a campus were expected to be bigger. Despite that they experience the NTC as a pleasant working environment. This results in the main benefit they experience which is the image of the campus which benefits employee recruitment.

Scale-up 1 experiences positive effect on their business operations with regard to recruitment and employee satisfaction. However, the scale-up is critical about the effects of the campus. They state the campus is on the verge of generating positive impact, however several key factors are not at the level they should be which currently results in limited effects on their business operation.

Scale-up 2 states that the impact of the campus on their business operations is limited. They experience positive effects in their recruitment for (international) talent but also see possibilities for improvement in that sector. They state there are ambitions for more collaborations with educational institutes which could be beneficial in the future. The scale up is looking forward to further development of the campus and is positive about future impact the campus will have on their business operations.

#### Numeric valuation

##### Ranking aspects on importance in real estate strategy

On the NTC there are two points that have a high level of agreement between all interviewed parties. All parties rate price/quality level as an important aspect although it is never mentioned as most important. Furthermore all parties agree on sustainability being unimportant in their real estate strategy scoring 9/10. Other aspects stand out because the wide spread in differentiating answers.

Comparing this to the management ratings given is hard. The lowest deviation is +1/-1 which is scored on four different aspects. Only on the importance of shared research & production facilities a large deviation of 4,7 is seen. Because only two of the aspects are rated similarly by all real estate users no significant correlation with the management ratings can be found.

Table 12 Ranking questions Novio Tech Campus Nijmegen

	Real estate aspects related to importance for real estate strategy	External appearance	Quality	Sustainability	Flexibility of lease contract	Availability of parking	Accessibility	Shared research & production facilities	Amenities in surrounding area	Innovative cooperation	Price/quality level
NIJMEGEN	MANAGEMENT TEAM	6	9	8	10	5	4	2	3	7	1
	SCALE UP 1	4	8	9	10	2	1	7	5	6	3
	SCALE UP 2	nb	nb	nb	nb	nb	nb	nb	nb	nb	nb
	START UP 1	5	6	9	7	4	1	10	2	8	3
	START UP 2	1	8	9	5	6	7	3	10	4	2
	AVERAGE USERS	3,3	7,3	9,0	7,3	4,0	3,0	6,7	5,7	6,0	2,7
	DEVIATION MT/USERS	-2,7	-1,7	1,0	-2,7	-1,0	-1,0	4,7	2,7	-1,0	1,7

### Rating to what extent the campus supplies campus aspects

In Nijmegen the CMT aims to supply in attracting real estate users in the same sector and secondly wants to provide in the growth of the network of their real estate users. The campus does not want to supply in healthy rivalry and currently does not supply high quality real estate, despite their desire to do so in the future.

Table 13 Ranking questions Novio Tech Campus Nijmegen

	Value to what extent the campus supplies the following aspects	Focus on attracting real estate users in the same sector	Stimulates innovation	Stimulates knowledge sharing	Stimulates healthy rivalry	Facilitates high quality real estate	Facilitates an incubator environment	facilitates in attracting talent (employees)	Stimulates growth of network	Stimulates in improving commercial reputation	General grade (1-10)
NIJMEGEN	MANAGEMENT TEAM	5	3	3	1	2	3	3	4	3	
	SCALE UP 1	3	5	5	2	3	5	3	5	1	7
	SCALE UP 2	nb	nb	nb	nb	nb	nb	nb	nb	nb	nb
	START UP 1	4	4	4	1	3	3	2	3	1	7
	START UP 2	4	4	4	1	2	4	2	5	5	9
	AVERAGE USERS	3,7	4,3	4,3	1,3	2,7	4,0	2,3	4,3	2,3	7,7
	DEVIATION MT/USERS	-1,3	1,3	1,3	0,3	0,7	1,0	-0,7	0,3	-0,7	

The users of the campus value the effort to attract users in the same sector, however not to the extent the CMT think they do. The real estate user do think the campus stimulates innovation and knowledge sharing more than the CMT is aware of.

Healthy rivalry is not in place at the NTC scoring 1,3/5 on average, meaning real estate users experience no competition from one another. The stimulation of commercial reputation is the most deviated answer with two interviewees not experiencing this at all whilst one start-up rated this at 5, this is likely caused because the start-up can profit from commercial reputation of both scale-ups, however with the current development phase of the campus, the reputation of the respective scale-ups is larger than that of the campus. The quality of real estate, supply in attracting talent and improvement of commercial reputation are currently supplied insufficient.

### Conclusion

Most of the real estate on the NTC is owned by Kadans, therefore the CMT of the NTC is responsible for organising the extra services a campus offers in collaboration with Kadans. In the vision for the NTC the management will gradually gain more ownership of the real estate of the campus and will therefore change to a more common organisational structure. Currently the CMT is focussed on realising new developments, community building and building business and educational relationships. The campus concept is in place and current users can benefit from it but, as stated, the campus is still in a pre-mature phase.

A main driver to locate on the NTC is the location, having three airports in relatively close proximity (Eindhoven, Weeze, Schiphol), a city with available housing and an accessible location by both car and public transport. Next to that most parties already located in the real estate have been keen to join the campus concept in order to benefit from a positive working environment, both from an employer's perspective as well as a recruitment perspective. On top of that some key stakeholders in the semiconductor industry have been located on and around the NTC before starting the campus, this supports the development of the campus since knowledge already was in place.

Three out of the four interviewed parties state the effects on their business operations has remained limited, whilst one of the start-ups is very positive about locating on the NTC and the effects of it. Despite limited business effects all parties acknowledge a positive working environment and slight benefits in attracting talent. Despite currently inducing limited positive effects, none of the parties is unsatisfied with their current situation and thus do not expect to leave. Second to that three out of four parties expect bigger impact on their business operations after further development of the campus in the coming years.

In conclusion, the NTC is a campus in the start-up phase. The foundation for the NTC to become a successful campus appears to be in place, however some significant obstacles will have to be overcome first. The divided ownership between a real estate exploitation party and a management is not a desired situation, because the CMT is supposed to diminish time spent on real estate management. But in the current situation the NTC real estate users have to deal with both a landlord and a campus management team. Secondly the lacking of facilities, such as lunch, a meeting centre or sports facilities is a significant element missing for the community building. Finally the lacking of financial clout is presumed to hold back the campus in its development for the coming years. Despite various elements not being at the desired level for a campus to start generating theoretical benefits, the vision of the management and important aspects for a campus foundation are in place already. Therefore it is expected that the NTC will develop into a campus in the long term.

## 4 Analysis

In the previous chapter the interview data of the four different campuses has been presented. The data showed that each campus has its own characteristics and each CMT has its own policy and vision for further development of the respective campus. Next to that it stood out that different real estate users have different views on the strengths, weaknesses and requirements of a campus and also have varying opinions about the performances of the campus they are located on.

In the following paragraph the four cases will firstly be compared on management policy, which has been broken down in the different topics of the interview protocol. Secondly the more practical issues are discussed, which are financial performance and facilities. Followed by the analysis of the real estate user interviews. These have been asked why they have chosen to locate at the campus, how they experience locating on the campus and whether or not they experience effects on their business operations. The analysis is finalized by comparing the numeric valuation of the campus, analysing and discussing both the ranking and rating questions answered by both the CMT's and real estate users.

The four cases will be compared on similarities, differences and key aspects a campus can and should deliver. This will contribute to answering all five sub questions and will lead up to the main conclusion on what benefits a campus delivers are perceived by its real estate users.

### 4.1 Campus management teams

In this paragraph of the cross case comparison the management policy and vision of the four different campuses will be compared, all of the information presented has been derived from the interviews that have been conducted with the CMT's representatives. Different aspects of their policies and choices regarding the campus management that stand out will be presented in tables and discussed. On these aspects the campuses will be compared on the impact of the policy and the functioning of the campus. Each paragraph contains a table with an overview of the stance of each CMT on the respective points, which will followingly be discussed and broken down on what benefits are aimed to be delivered by the campus. Comparing the four different cases has the aim and goal to substantiate a generalised conclusion on the influence of the management teams and the benefits delivered by a campus.

#### 4.1.1 Management policy

##### *Key focus points*

In the interviews all CMT representatives have been asked about the key focus points in their campus policy. These focus points have been derived from the interview transcripts and divided in primary and secondary focus points, based on the description given by the interviewees. The results are presented in the table below.

*Table 14 Key focus points of the campus management teams per campus*

	<b>DUTCH TECH CAMPUS</b>	<b>HIGH TECH CAMPUS</b>	<b>PIVOT PARK</b>	<b>NOVIO TECH CAMPUS</b>
<b>Primary focus points</b>	Asset management and real estate development services	Maintaining the campus ecosystem and expanding the campus	Connecting real estate users and development of new real estate	Expanding the campus and development of community building
<b>Secondary focus points</b>	Improving facilities and expanding mesh of different real estate users	Engaging in cooperating with educational facilities and stimulating human encounters	Realising incubator housing and introducing production facilities to the campus	Branding the campus and owning more real estate on the campus

Three out of four campuses are currently fully let out and have nearly no vacant real estate, next to that all policies contain development plans for new real estate as part of their primary focus points. This means that all CMT's are focussing on increasing supply. Therefore they either expect or know there is more demand for locating at a campus facility or the companies currently located at the campus experience growth and therefore demand more real estate to house their businesses.

The HTCE and Pivot Park combine this expansion policy with a social aspect; maintaining the ecosystem and connecting users, explicitly focussing on the soft aspects of the campus. Whilst the DTC and NTC are more focused on expanding their services and respectively adding shared facilities to their campuses. For the DTC can be concluded that they differentiate in their policy from the other three campuses since there are no social aspects mentioned in their primary nor secondary focus points, they aim to provide real estate that meets demands of their users, a mesh of companies that do not compete but do relate to each other and focus on supplying various facilities.

For the NTC however these social aspects are of secondary importance to physically developing the campus, when looking at the case generics table it can be concluded that the NTC supplies the lowest amount of facilities which makes their focus points sensible.

A substantial difference between the HTC and Pivot Park is that the HTC aims to stimulate encounters between real estate users by providing a framework whilst Pivot Park is actively linking the real estate users itself. This is a different approach for achieving the same principle, stimulating encounters.

The general image of CMT policy focus points is that the policy is a combination of real estate developments, soft skills and generating growth. With the real estate developments focussing on quality, growth and extra facilities and soft skills named are; attracting matching companies, increasing on-campus interaction between different real estate users and extending the service portfolio.

### Admission rules

In the literature study it has been concluded that campuses should focus on real estate users active in the same sector and that these users should have innovation or R&D focussed business. Therefore the CMT representatives have been asked about their admission policy, stating the focus sector of the campus and the admission rules before a real estate user is allowed to locate at the respective campus. The answers given to these questions have been presented in the table below.

Table 15 Focus area & admission rules per campus

	<b>DUTCH TECH CAMPUS</b>	<b>HIGH TECH CAMPUS</b>	<b>PIVOT PARK</b>	<b>NOVIO TECH CAMPUS</b>
<b>Focus area</b>	Smart mobility, ICT, E-health & care	Health & Vitality, Sustainability, Applied Intelligence, Smart environments & Connectivity and Software & Platforms	Biopharma and drug discovery	Semiconductors, chip integration, radio frequency, Digital health, medical tech, bio tech
<b>Admission rules</b>	A new real estate user must fit the focus area and add to or fit in the existing mesh of companies without being a direct competitor.	A new real estate user must be tech and R&D focussed, other departments will not be allowed on campus (E.g. production facilities) Next to that 10% service companies are allowed to settle on campus.	A new real estate user must be an addition to the drug discovery chain and the related R&D. Pivot Park is looking to add production facilities to the campus.	External ballotage committee judging admissions. It is obliged to be active within the focus area and to participate in the campus events.

Firstly it is clear that all campuses have an real estate user admission policy, and none of the interviewees reacted surprised when this was asked from them. This points out that it appears to be important to manage which type of real estate users locate at a campus in order to build and maintain a specific identity and to deliver the intended benefits.

With the findings in literature stating that a campus should aim for housing R&D focussed companies in order to simulate innovation and knowledge sharing two more things stand out.

Firstly, Pivot Park aiming to add production facilities to the site. This contradicts with the strategy of the HTCE refusing departments that are not focussed on R&D and the findings of the literature study stating R&D and knowledge intensive real estate users form the basis of a successful campus. The DTC has admitted non-R&D focussed real estate users to locate on their campus as well, amongst which are a distribution centre and various users having production facilities on site. Which is a different policy from the other three campuses.

On the one hand the HTCE believes its successes have been achieved because of the strict admission rules stating they turn down a significant percentage of the companies applying for a spot at the campus because they do not meet all admission rules. Whilst on the other hand the DTC state they carefully built the mesh of companies despite not having a strict admission rule stating companies have to focus on R&D.

With both campuses thriving in terms of vacancy rates and growth no conclusions can be drawn on whether one of these policies is better, however with regard to the essentials of campus development more innovation and collaboration takes place at the HTCE and therefore the a strict admission policy improves the benefits delivered by a campus.

### Community building

According to the interview outcomes community building is a combination of connecting the real estate users to the campus and connecting them to each other, which has previously been referred to as soft skills or factors. From the interviews can be derived that the campus management teams are actively stimulating this in various ways. The findings surrounding this have been labelled as community building and have been presented in the table below.

Table 16 Organisation of community building

	<b>DUTCH TECH CAMPUS</b>	<b>HIGH TECH CAMPUS</b>	<b>PIVOT PARK</b>	<b>NOVIO TECH CAMPUS</b>
<b>Organisation</b>	Foundation in which all real estate users and the Haagse Hogeschool have representatives.	Campus management team	Campus management team	Campus management team
<b>Measures/activities</b>	Event Haagse Hogeschool, student projects, network meetings	Car-free campus, only a central lunch facility, actively connecting real estate users, social events, network events, sport events, business events	Actively connecting real estate users, network events, knowledge events, sport events	Online application, newsletter, network events, informal drinks, network events, knowledge events, 'Benefits at Work'

The CMT's organise events that scale from sporting events to social events to formal presentations where knowledge is shared. Next to that other creative measures are taken to stimulate encounters with employees from other real estate users. The attendance to these events varies per real estate user, some stating they regularly attend whilst others say only a part of the organisation participates in these events.

The DTC is the only campus where the CMT is not actively engaged in organising events with the foundation organising these, applying a different strategy towards managing the campus. The HTCE is the most active campus in terms of activities and measures, however with regard to their substantially larger size than other campuses it is hard to say whether this makes for a more engaged community nor how this relates to the amount of users on the campus.

What can be clearly derived from the different policies is the importance given to community building, with all interviewees stating a significant part of their policy and tasks is devoted towards community building measures and activities.

### Regional policy

The interest in campuses from both regional and national political levels, as presented in the problem statement, emphasises the entanglement of campuses in their respective regions. Therefore the CMT interviewees have been asked about the campuses independency on both financial and political areas. The response to these questions have been summarized in the table presented below.

Table 17 Regional policy and influence of local politics on the campus

	<b>DUTCH TECH CAMPUS</b>	<b>HIGH TECH CAMPUS</b>	<b>PIVOT PARK</b>	<b>NOVIO TECH CAMPUS</b>
<b>Municipality</b>	Politically independent, CMT represent their real estate users towards municipality	Has written policy outlines for the campus, CMT represent their real estate users towards municipality	Involved in the campus politically	Involved in the campus politically
<b>Province</b>	Politically independent	Spine in the campus network of region Brainport	Involved in the campus politically	Involved in the campus politically
<b>Educational</b>	Dutch Innovation factory, Haagse Hogeschool, MBO Rijnland	No formal connection with university	University of Leiden, Radboud University, HAN University of applied sciences	Radboud University

From the four campuses the DTC is the only campus that is fully privately owned. Secondly the HTCE has the least ties to municipal or regional politics, with a recent financial take-over financial dependency is not at stake. However, the municipality and Philips have laid out a framework with the aim and goals of the campus. Pivot Park has both political and financial dependence towards the local municipality and province whilst the NTC has to deal with third party ownership of the real estate in addition to that.

Despite either having or not having full ownership of the campus, all campuses state they are keen on maintaining a close relationship with their respective municipality and take responsibility with regard to their local and regional impact. Next to that they act as a SPOC for their real estate users, which reduces the time spend by real estate users to deal with municipal/ legislation requests and vice versa. Which allows the municipality to communicate more efficiently with the real estate users located on the campus.

Pivot Park and the Novio Tech Campus both enjoy various subsidies from founding's in their respective provinces. Next to that they also have a political agenda serving as facilities that maintain jobs within their respective regions. The High Tech Campus has not stated to apply for subsidies, however the municipality is a stakeholder in the incubator management active at the HTCE.

It has been derived from the interviews that having political or financial dependency as a campus management team can frustrate real estate users. The cause for this is the inability to act adequately and fast towards demands from real estate users already located on a campus. The lag political decision making introduces directly impacts the quality a CMT can offer its users.



In addition to that, in the definition developed in the literature study it was expected that the difference between a science park and a campus is that a campus does not have a direct relationship with a university. However from the interviews it has been derived that nearly all of the campuses do have either formal or informal ties with local educational facilities. The importance of having these facilities in their network has positively impacted the employee recruitment of on-campus located real estate users, and led to educational facilities connecting and collaborating with various businesses.

### *Future plans*

In order to establish what benefits CMT's intend to deliver for their real estate users future plans provide key insights in their intentions. Therefore the CMT interviewees have been asked about their plans for improving the campus, plans for expanding the campus and what their vision for the future entails. Their answers have been summarized in the table below.

*Table 18 Future plans per campus*

	<b>DUTCH TECH CAMPUS</b>	<b>HIGH TECH CAMPUS</b>	<b>PIVOT PARK</b>	<b>NOVIO TECH CAMPUS</b>
<b>Campus improvements</b>	CMT is planning on improvement of the outside environment of the campus	The CMT is planning to engage more in regional politics within the Brainport region	Expanding and replacing real estate with new offices, adding production facilities	Adding a community building to expand shared facilities, increasing their real estate stock
<b>Expansion plans</b>	The campus owns land with expansion possibilities, development plans are not in place until a real estate user is attracted	Masterplan in place with expansions in the area next to the N2. Adding over 150.000 sqm. growing the total campus size over 1 mln. sqm.	Adding three new buildings of 30.000 m2 in total. Containing two new office/labs combinations and an incubator function	New developments adding 25.000 sqm. in the short term and tripling the real estate stock in the long term with an additional 100.000 sqm. before 2040
<b>Vision plans</b>	The CMT has no intentions to change their vision plans, their focus remains on expanding the matrix of real estate users and delivering tailor made real estate solutions	Improving their real estate services, becoming the world's most sustainable campus, establish a formal partnership with a university	The vision has recently changed from attracting companies to improving services and revitalizing the campuses real estate	The campus exists of an ambitious vision of tripling the size of the campus and further developing the campus ecosystem. Next to that the CMT aims to own more real estate on the campus in the future

The campus improvements for CMT's differentiate. The DTC focussing on improving the aesthetics of the open space on the campus, the HTCE focussing on improvements of their function within the region whilst Pivot Park and the NTC are focussed on improving and expanding their real estate portfolio in terms of facilities and office/lab/storage space.

Generalizing these improvements it can be said that the look and feel of a campus is important, on the HTCE this is already in place whilst the NTC and Pivot Park are firstly focussed on the internal and external qualities of their real estate the DTC invest in the open space of the campus.

Three out of four campuses have pro-active and significant expansion plans respectively growing from 30%, 80% and up to 250%. With the only stand-out being the DTC where the CMT takes on a more passive role and will start development when suitable real estate user has been found. This does allow the DTC to deliver real estate that is developed to the wishes of the user, which is in line with their management policy. The low vacancy rates combined with three out of four campuses developing expansions of over 30% of their current portfolio or more confirm the high demand for locating on campuses.

When asked about the vision plans for the campus the answers given differed, three campuses are generally focussed on supplying real estate and developing new real estate. With one CMT focused on revitalising their current real estate. Two other CMT’s have visions that lean more towards expanding the campus. The HTCE being the standout CMT that is also planning expansion plans however their vision is more focussed on improving sustainability of their campus and improving their regional role as a campus, which are plausible next steps given that the HTCE is a fully developed and functioning campus already.

4.1.2 Campus in figures

Financial policy

In addition to the political policy of the respective campuses, generics of their financial policy have been asked in the interviews as well. These include their financial dependency, the rent level and current vacancy rate of the campus.

Table 19 Financial performance and dependency per campus

	<b>DUTCH TECH CAMPUS</b>	<b>HIGH TECH CAMPUS</b>	<b>PIVOT PARK</b>	<b>NOVIO TECH CAMPUS</b>
Dependency	Financially independent	Financially independent	Financially dependent on municipality and province	Financially dependent on municipality, province and Kadans
Rent level campus	Average 125€ / sqm	Average 165€ / sqm	From 110€ / sqm	Average 125€ / sqm
Rent level city	Average 90€ / sqm	Average 140€ / sqm	N/A	Average 110€ / sqm
Vacancy rate	9%	3%	0%	1%

Rent levels have been derived from CBRE Data360 tool in February 2023.(C.B.R.E., 2023)

Vacancy rates have been derived from interviews with CMT’s in October 2022.

Two of the campuses have stated to be financially independent whilst the other two are not. Being financially independent gives more flexibility in choices and investment. This is seen in the possibility of the DTC to adapt their real estate to their users wishes, which is stated by all interviewees as a strength of the campus. On the HTCE, despite having this independency the interviewees were less positive about their flexibility, however they stated this might have been caused by the change in ownership of the campus, with the former owners postponing investments until after the take-over.

At Pivot Park the CMT is dependant to both the municipality and the province, on policy and financial levels. This entanglement is described as negative in multiple interviews, stating that the decision making processes takes too long because of political influence, causing the campus to be over-full. Second to that the development of new real estate has been experienced as inflexible and rough because of approvals (for either funding or changes) that have to be acquired with the municipality or provincial organisations.

At the NTC the municipal and regional politics are not experienced as a negative influence, these both support the NTC and have development plans in place with a pivotal role for the campus. The influence of Kadans does have large financial impact on the CMT of the NTC, since they do not have ownership of the real estate the rent income is not earned by the NTC but by a third party organisation, leaving the NTC with limited yields from their campus management efforts.

Secondly the rent levels and vacancy rates have been presented. On all campuses the rent levels asked to locate on campus are above the average rent levels of the respective city. From this can be derived that the benefits delivered by a campus are acknowledged by the real estate users, showing a willingness to pay a higher rent price / sqm. than they could pay for locating in the same city on a different location in a different building. This conclusion is strengthened even further by the vacancy rates presented at the different campuses, with respectively 3%, 0% and 1% whilst the DTC has decreased its vacancy rate from 26% to 9% since 2019. Emphasising that there is significant demand for locating at different campuses in different economic area’s amongst a wide variety of real estate users in the Netherlands.

*Facilities*

Shared facilities differentiate a campus from a solitary real estate development and are deemed important in the CMT’s policies. Shared facilities play a pivotal role in the benefits provided by a campus. Because all less-frequently-used spaces are shared with other real estate users a decrease in required real estate floorspace per user has been generated. In addition to that socially oriented shared facilities stimulate human encounters between employees of different on-campus located real estate users which ultimately improves the chances of cooperation and/or innovation being generated through the campus. The available facilities at every campus are presented in the table below.

*Table 20 Facilities delivered per campus*

	<b>DUTCH TECH CAMPUS</b>	<b>HIGH TECH CAMPUS</b>	<b>PIVOT PARK</b>	<b>NOVIO TECH CAMPUS</b>
Central reception	✓	✓	✓	✓
Restaurant				
- Lunch	✓	✓	✓	✗
- Dinner	✓	✓	✗	✗
- Coffee bar	✓	✓	✓	✓
Super-market	✗	✓	✗	✗
Meeting rooms	✓	✓	✓	✓
Central internet	✓	✓	✓	✓
Catering	✓	✗	✗	✗
Security	✓	✓	✓	✓
Cleaning service	✓	✓	✓	✓
Garbage distribution	✓	✓	✓	✓
Mobility services	✓	✓	✗	✓
Sports facilities	✗	✓	✗	✗
Hair dresser	✗	✓	✗	✗

Offering shared facilities to real estate users is something that distinct a campus from a solitary office building. All campuses deliver a central reception, extra meeting rooms and cleaning & garbage services included in the lease contracts. It stands out that the NTC is offering a lower amount facilities to their users than the other campuses, however the CMT has stated in their interview that this currently is their top priority which confirms the importance of offering extra facilities to the real estate users.

What stands out is the DTC nearly checking all boxes whilst it is the smallest campus in terms of sqm, which confirms the statement that they strongly focus on the facilities they deliver. Next to the DTC the HTCE also provides all facilities, despite them having a larger campus which allows for providing more functions, it confirms the importance of offering additional facilities on campuses.

4.2 Real estate users

In the following three paragraphs the interview data from the interviewees representing their respective real estate user are presented. This data contains information on the real estate strategy of the demand side and builds towards conclusions on what benefits real estate users prioritize in their strategy by presenting their reasoning behind locating at a campus. Secondly the benefits real estate users perceive by locating at a campus are presented, these are split between positive & negative experiences whilst being located at the campus and between effects on the business operations of the respective real estate user.

These results will be presented in graphs per subject which entail the key words of the answers given of every real estate user interviewee. The answers given are divided per campus and per interview, with the top of the table showing the answers provided by scale-up companies and the bottom half showing those given by start-up companies. The x’s represent the planned interviews where no participants have been found willing to cooperate in the research.

4.2.1 Choice for the campus

The following graph shows the main reasons of the respective real estate organisations for locating at the campus they are currently located at. These have been derived from the interviews and presented in key-words, per real estate user and per campus.

Table 21 Decisive factors for locating at the campus

	<b>DUTCH TECH CAMPUS</b>	<b>HIGH TECH CAMPUS</b>	<b>PIVOT PARK</b>	<b>NOVIO TECH CAMPUS</b>
Scale up	Strategic location, real estate fit-out, growth of network, parking space, flexibility in lease contract	Clustering with important peers, open innovation system, appearance, commercial reputation, network benefits	Network benefits, commercial reputation, price of real estate	(already located on site before campus concept started) Acknowledges potential benefit of campus community
Scale up	Strategic location, real estate fit-out, appearance, extra services, campus community	Network benefits, students, recruitment benefits, campus community, real estate fit-out	Shared facilities, innovative start-ups, network benefits	Recruitment benefits, connection with university
Start up	Real estate fit-out, shared facilities	x	Network benefits, clustering with important peers, commercial reputation,	Strategic location, network benefits, open innovation system, clustering with important peers
Start up	x	x	x	Strategic location, recruitment benefits, infrastructure

**DTC:**

In all interviews conducted at the DTC the real estate user confirmed they were located at the DTC because of its strategic location within the Randstad, with Zoetermeer providing close proximity to both Utrecht and The Hague and the campus being easily accessible by both car and train. Next to that all parties value the investments made by the respective CMT to adapt the real estate that is either available or to be developed to the wishes of the real estate user. However all real estate users located at the DTC have mentioned they were looking for specifics that are hardly available on the market; e.g. a specific ratio of office space to labs, office space to storage or office space and showrooms.

Next to the aspects stated by all interviewees located at the DTC, some aspects influenced a single real estate user. For example one scale up valued the availability of parking space and flexibility in the lease contract – which allows for the real estate user to rent extra office and/or lab space over the coming years –. The other scale up valued the external appearance of the campus in its entirety, the extra services provided by the DTC and the campus community which increased staff wellbeing and increased informal contact with neighbours. The start-up company has chosen to locate at the DTC because it allowed for renting a smaller office space because of the shared facilities, such as meeting rooms and a restaurant.

**HTCE:**

The factor that made both scale-ups choose to locate at the HTCE only is network benefits, both stating that the HTCE is an established name on both national and international level, and therefore allows for expanding the real estate users network. Next to that one of the scale ups valued to locate with relevant peers on the same campus/region, valued open innovation of the HTCE and expected to benefit from the appearance and increased commercial reputation gained from locating at the HTCE.

**Pivot Park:**

In the strategic choice to locate at Pivot Park all three interviewees stated that network benefits can be gained from locating here. This has to do with both the history and commercial reputation of Pivot Park in the drug development sector, which is also mentioned as an important factor by two of the three interviewees.

Unshared factors that positively impacted the choice to locate at pivot park are; price of real estate, in comparison to Amsterdam or the U.S.A., shared facilities and finally the close proximity of customers, suppliers and/or developers.

**NTC:**

One of the real estate users was located at the NTC before it was organised as a campus, therefore no choice has ever been made to locate at it, however the real estate user has decided to be part of the initiative, positively mentioning the concept. Both recruitment benefits and a strategic location are stated twice to have played a part in locating at the NTC by different real estate users. Whilst the connection with the Radboud university, the open innovation system, pulling together with suppliers and developers and the infrastructure in the surrounding area have been mentioned once.

**Concluding:**

Network benefits is the most mentioned driver for real estate users to locate at a campus, being mentioned in 5 out of 12 interviews. The real estate users deciding to locate at a campus expect their network to grow through the other on-campus located real estate users, to benefit from participating in on-campus events and all users being represented as a collective on national and international level.

In 4 out of 12 interviews the strategic location of a campus has been mentioned, however this aspect has been named for various reasons, on the NTC for the (relatively) close proximity of multiple airports, for the DTC for its location in the middle of the Randstad and accessibility.

Several aspects have been mentioned in 3/12 interviews; the real estate fit-out, innovation, recruitment benefits, commercial reputation, clustering with important peers (suppliers, developers, clients).

What is remarkable is that all aspects mentioned in different interviews are shared by both scale-ups and start-ups, which implies that these type of real estate users do not specifically target different aspects in their real estate strategy. However, the real estate fit-out is the only aspect that is mentioned three or more times which is only stated by scale-up real estate users.

#### 4.2.2 Locating at the campus

In order to get insights in the benefits experienced by real estate users located at a campus the interviewees representing their real estate user have been asked about the positive and negative experiences they have had from locating at the campus. These have been summarized up to key-words in order to compare them and investigate which positive and/or negative experiences are commonly shared and therefore can be generalized as an aspect that is delivered by locating at a campus.

##### *Positive experiences*

In the following table the positive experiences from interviewees have been stated. These have been derived from the entire interview and presented in key-words, per representative and per campus. This way comparison can be drawn per campus, per scale-/ or start-up, between campuses and general positive experiences can be concluded.

Table 22 Positive experiences from locating at a campus

	<b>DUTCH TECH CAMPUS</b>	<b>HIGH TECH CAMPUS</b>	<b>PIVOT PARK</b>	<b>NOVIO TECH CAMPUS</b>
Scale up	Quality of real estate, positive working environment	Campus management team, location, logistics, obliged public lunch facility, network events, recruitment benefits, dynamic location, high quality real estate, proximity of like-minded real estate users, collaboration with real estate users	Connection with educational facility, satisfied with general performance of the campus, proximity of like-minded real estate users	Strategic location, informal contact with other real estate users, recruitment benefits
Scale up	Appearance towards customers, campus facilities, non-business level cooperation between real estate users, proximity of like-minded real estate users, campus management team, connection with educational facility	Pleasant working environment, location, network events, dynamic location, obliged public lunch facility, recruitment benefits, connection with other real estate users	Collaboration with start-ups, professionalization of CMT, network benefits, commercial reputation, proximity of like-minded real estate users	Proximity of like-minded real estate users, knowledge sharing, collaboration with other real estate users, CMT services, campus events, location, recruitment benefits, engagement to educational facilities,
Start up	Quality of real estate, campus management team, campus facilities, additional services, proximity of like-minded real estate users	x	Increase in commercial reputation, increase in workload, collaboration with start-ups, network events, service package, business support, strategic location, growth of the campus	Company guidance by CMT, expanding network, business relationships, more professional and larger appearance of company, proximity of like-minded real estate users, adequate upkeep of real estate, campus ecosystem
Start up	x	x	x	Recruitment benefits, strategic location, lab quality, CMT services, external appearance, informal contact with other real estate users, campus events, pleasant working environment

The first positive experience that stands out from the interviews is 'the proximity of like-minded real estate users'. This has been identified by the CMT representative of the DTC as 'the main driver behind the success of campuses', because real estate users want to locate with other users with whom they can identify themselves. In 10/12 interviews it has been mentioned that the close proximity of real estate users active in a relatable sector is one of the main benefits of locating on a campus. The close proximity has been identified as a positive experience because it creates 'a sense of togetherness' and 'approaching neighbours is easier'. Important to note is that only 6/12 of the interviewed the real state users actually cooperates on a business level. Whilst 4/12 users mention the value of having like-minded real estate users in their direct proximity, but only mention this in an informal setting. Therefore 6/12, half of the participants, mention collaborating with other real estate users located on the campus on a business level as a positive experience.

In 9/12 interviews the performance and/or services of the campus management team have been stated as a positive experience. This positive experiences range from being easily approachable, adequate problem solving, reducing work load with regard to real estate maintenance and soft services delivered by the CMT's. Therefore it can be concluded that a managed real estate development adds value for most real estate users located at a campus and therefore is experienced as one of the benefits stated above.

6/12 interviewees mention they have been able to expand their network by locating on the campus. They have been able to do so because they get in touch with real estate users located on the campus, and then expand their network through the other on-campus located real estate users. Next to that the campus management team stated to actively stimulate users on-campus to meet, this is done through organising events, collaborations and through facilitating a shared lunch area.

Both mentioned 5/12 times, which equals over one third of the respondents, recruitment benefits derived from locating on campus have been mentioned. Recruitment benefits are experienced by real estate users on three occasions: Firstly when attracting employees this is experienced as easier because of the network and appearance of the campus. Secondly maintaining employees is experienced to be easier because the campus provides a positive working environment. Whilst thirdly filling internship spots is experienced to go easier.



### Negative experiences

In the following table the results of asking interviewees about their negative experiences have been presented. These are presented in key-words in order to compare the different interviews and to identify differences between either the campuses of the start- and scale-ups.

Table 23 Negative experiences from locating at the campus

	<b>DUTCH TECH CAMPUS</b>	<b>HIGH TECH CAMPUS</b>	<b>PIVOT PARK</b>	<b>NOVIO TECH CAMPUS</b>
Scale up	Service facilities, too much diversity between real estate users, limited on campus collaboration	Specific research permits not in place	Service prizes are per employee or per sqm., occupy a building that is too small, process of developing new real estate	Separate landlord and CMT, quality of relation with educational facilities, limited on campus collaboration
Scale up	Marketing strategy clashes with Zoetermeer innovation park	Switch of owner of the campus was felt by tenants, landlord-tenant relationship	CMT administrative errors, process of developing new real estate, CMT long term planning	Landlord-tenant relationship, real estate quality, real estate energy performance, no central lunch facility, no sports facilities
Start up	N.A.	x	Many turnovers in CMT, growing importance of financial picture	Dated real estate, no central lunch building, no sports facilities
Start up	x	x	x	Landlord-tenant communication, limited on campus collaborations, separate landlord and CMT

What stands out when comparing the positive and negative experiences from locating at a campus, is that more positive experiences are mentioned in the interviews than the negative experiences. This significant difference is remarkable since all questions from the interview protocol are open questions which can be answered both in a positive and a negative way. However, despite the anonymised data participants of the interviews might not publicly speak negative about their current real estate situation, because of possible consequences for the relation with the CMT or neighbouring users.

Three real estate users have stated that they have negatively experienced the limited collaboration on the respective two campuses. Their upfront expectation was that this would take place more actively and more frequent, however practice turned out differently.

Five different real estate users have negatively mentioned the relationship with their CMT or landlord. Two of them have experienced negative impact from changes in the owner and/or management team of the respective campus, resulting in postponing real estate upkeep and adaptations. Three of them are located on the NTC, where the real estate is owned by an external investment party instead of the CMT, this results in unclear communication and a tough landlord-tenant relationship.

In addition to the negative relationship several mentions of inadequate management of the sites have been stated. These have been mentioned from Pivot Park and the NTC. Pivot Park is currently expanding their campus with new real estate. The real estate users of the park state the development process and timing (too late) as negative experiences. However they do mention significant development in the professionalisation of the CMT, experiencing a reducing amount of errors. At the NTC the negative experiences are related to the current services and facilities available and are stated to be caused by the split ownership.

In addition to the negative experiences mentioned above, interviewees have individual negative experiences. These have been mentioned in the table, however since these cannot be generalised towards answering the main and sub questions these are not further elaborated on.

#### 4.2.3 Effects on business operations

To further elaborate on the experiences real estate users have had from locating on a campus the interviewees have been asked what influence the campus has had on their business operations. The aim of this question was to identify concrete impact of locating on a campus from a business perspective. The results of these answers have been summarized to key words in order to compare the answers of different users and to compare different campuses in order to substantiate generalized conclusions.

Table 24 Effects on business operations gained from locating at a campus

	<b>DUTCH TECH CAMPUS</b>	<b>HIGH TECH CAMPUS</b>	<b>PIVOT PARK</b>	<b>NOVIO TECH CAMPUS</b>
Scale up	-	Improved appearance, marketing, more accessible networking, collaborations with other real estate users	Commercial reputation in medical sector, lower rents than in US, student recruitment benefits	Recruitment benefits
Scale up	-	Knowledge sharing, discussing problems with other real estate users, on campus collaborations, pushed to stand out from direct competitors, close proximity of promising start-ups	Shared research equipment, offload specialist analysis to start-ups in direct proximity	-
Start up	-	x	Increase in workload, collaboration with start-ups, commercial reputation in medical sector	Suppliers at walking distance, campus allowed for rapid business development, business development support, more professional appearance
Start up	x	x	x	Improved appearance, recruitment benefits

Despite all real estate users being positive about the real estate development and the CMT on the DTC, none of them have been able to name concrete effects on their business operations from locating at the DTC. Mentioning that 'no significant collaboration has emerged from locating at the DTC, however this was not aimed for beforehand as well.' However, with other interviewees mentioning non-concrete examples of influence on their business operations it might be possible that the interview question has been interpreted more literally, whereas this would exclude mentioning soft-aspects.

8/12 interviewees mention that locating on a campus has had positive impact on their business operations in various ways. The specific aspects mentioned differ per user, however it can be concluded that locating on a campus will likely have positive influence on business operations of the real estate user.

The area mentioned by the real estate users most is related to cooperation with other real estate users. The possibility a campus presents to have real estate users with similar business profiles leads to cooperations that positively impact business operations. Examples given vary, these can be formal and informal meetings with employees working at other businesses located at the campus. The possibility to discuss problems encountered in the respective businesses of the real estate users positively influences business operations. Next to that formal cooperations in the form of suppliers, clients and or business partners are mentioned as well. With a start-up on Pivot Park experiencing increase in workload from on-campus located scale-ups.

Next to the cooperation soft factors are positively affecting business operations too, with an interviewee stating: 'It cannot be made concrete in terms of impact, but the improved appearance from locating on a campus, which makes us look bigger and more professional, helps us in convincing clients to work with us.' With a similar statement made about recruitment benefits. According to multiple interviewees it is beneficial to locate at a campus for attracting employees, especially international employees. This benefit is prescribed to the community feeling a campus can generate and a campus being described as 'a positive working environment'.

## 4.3 Numeric valuation

### 4.3.1 Ranking the importance of real estate aspects

On the following two pages the results of the ranking questions will be presented. These figures have been derived from a specific section in the interview protocols. This section is aimed towards substantiating qualitative findings of the interviewees with qualitative data. The interviewees have been asked to rank 10 different real estate aspects on their importance in their real estate strategy.

The results of the ranking questions are presented in the tables below and discussed after all tables have been presented. To the rankings two colour schemes have been applied in order to make the data more insightful. Firstly the rankings have been applied a green – to orange- to red grading in order to emphasise which aspects have been ranked high (1st) and which ones have been ranked low (10th). Followingly an average rating is presented with the same colour scheme applied. Whereafter the standard deviation and deviation between CMT ranking and the user ranking have been presented. This colour scheme goes from white (0) with no deviation to red the higher the deviation becomes.

The 5<sup>th</sup> and final table presenting the ranking results presents the campus comparison. This table contains averages and standard deviations of all interviewees of all campuses and compares their answers with those of the management teams. All averages and deviations presented have been applied the same colour schemes as previously stated.

## Ranking the importance of real estate aspects (Tables)

Table 25

	Real estate aspects related to importance for real estate strategy	External appearance	Quality	Sustainability	Flexibility of lease contract	Availability of parking	Accesibility	Shared research & production facilities	Amenities in surrounding area	Innovative cooperation	Price/quality level
ZOETERMEER	MANAGEMENT TEAM	nb	nb	nb	nb	nb	nb	nb	nb	nb	nb
	SCALE UP 1	2	1	3	8	10	4	7	5	6	9
	SCALE UP 2	5	4	3	7	6	2	10	8	9	1
	START UP 1	4	5	8	1	6	3	10	9	7	2
	AVERAGE	3,7	3,3	4,7	5,3	7,3	3,0	9,0	7,3	7,3	4,0
	St. DEVIATION	1,5	2,1	2,9	3,8	2,3	1,0	1,7	2,1	1,5	4,4

Table 26

	Real estate aspects related to importance for real estate strategy	External appearance	Quality	Sustainability	Flexibility of lease contract	Availability of parking	Accesibility	Shared research & production facilities	Amenities in surrounding area	Innovative cooperation	Price/quality level
NIJMEGEN	MANAGEMENT TEAM	6	9	8	10	5	4	2	3	7	1
	SCALE UP 1	4	8	9	10	2	1	7	5	6	3
	SCALE UP 2	nb	nb	nb	nb	nb	nb	nb	nb	nb	nb
	START UP 1	5	6	9	7	4	1	10	2	8	3
	START UP 2	1	8	9	5	6	7	3	10	4	2
	AVERAGE USERS	3,3	7,3	9,0	7,3	4,0	3,0	6,7	5,7	6,0	2,7
	St. DEVIATION	2,1	1,2	0,0	2,5	2,0	3,5	3,5	4,0	2,0	0,6
	DEVIATION MT/USERS	-2,7	-1,7	1,0	-2,7	-1,0	-1,0	4,7	2,7	-1,0	1,7

Table 27

	Real estate aspects related to importance for real estate strategy	External appearance	Quality	Sustainability	Flexibility of lease contract	Availability of parking	Accesibility	Shared research & production facilities	Amenities in surrounding area	Innovative cooperation	Price/quality level
EINDHOVEN	MANAGEMENT TEAM	10	4	7	9	6	5	2	3	1	8
	SCALE UP 1	10	6	5	3	9	8	2	7	1	4
	SCALE UP 2	9	6	2	5	7	8	4	10	1	3
	AVERAGE	9,5	6,0	3,5	4,0	8,0	8,0	3,0	8,5	1,0	3,5
	St. DEVIATION	0,7	0,0	2,1	1,4	1,4	0,0	1,4	2,1	0,0	0,7
	DEVIATION MT/USERS	-0,5	2,0	-3,5	-5,0	2,0	3,0	1,0	5,5	0,0	-4,5

Table 28

	Real estate aspects related to importance for real estate strategy	External appearance	Quality	Sustainability	Flexibility of lease contract	Availability of parking	Accesibility	Shared research & production facilities	Amenities in surrounding area	Innovative cooperation	Price/quality level
OSS	MANAGEMENT TEAM	10	6	3	4	9	7	2	8	1	5
	SCALE UP 1	10	4	6	7	9	8	2	5	1	3
	SCALE UP 2	3	9	6	10	8	1	2	5	4	7
	START UP 1	10	6	7	4	9	1	3	8	2	5
	AVERAGE	7,7	6,3	6,3	7,0	8,7	3,3	2,3	6,0	2,3	5,0
	St. DEVIATION	4,0	2,5	0,6	3,0	0,6	4,0	0,6	1,7	1,5	2,0
	DEVIATION MT/USERS	-2,3	0,3	3,3	3,0	-0,3	-3,7	0,3	-2,0	1,3	0,0

Table 29

	Real estate aspects related to importance for real estate strategy	External appearance	Quality	Sustainability	Flexibility of lease contract	Availability of parking	Accesibility	Shared research & production facilities	Amenities in surrounding area	Innovative cooperation	Price/quality level
ZOETERMEER	Average users	3,7	3,3	4,7	5,3	7,3	3,0	9,0	7,3	7,3	4,0
NIJMEGEN	Average users	3,3	7,3	9,0	7,3	4,0	3,0	6,7	5,7	6,0	2,7
EINDHOVEN	Average users	9,5	6,0	3,5	4,0	8,0	8,0	3,0	8,5	1,0	3,5
OSS	Average users	7,7	5,0	6,5	5,5	9,0	4,5	2,5	6,5	1,5	4,0
	St. DEVIATION	3,0	1,7	2,4	1,4	2,2	2,4	3,1	1,2	3,2	0,6
TOTAL	Average users	5,7	5,7	6,1	6,1	6,9	4,0	5,5	6,7	4,5	3,8
	Average CMT	8,7	6,3	6,0	7,7	6,7	5,3	2,0	4,7	3,0	4,7
	St. DEVIATION	2,3	2,5	2,6	3,2	2,1	1,5	0,0	2,9	3,5	3,5
DEVIATION	CMT avg. - User avg.	2,9	0,6	-0,1	1,6	-0,2	1,3	-3,5	-2,1	-1,5	0,8

## **Ranking the importance of real estate aspects**

The tables presented above have previously been introduced and discussed in the interview results. Therefore the cross case comparison is focussed on the relations between the rankings of different real estate users and CMT's and will discuss data that might be generally applicable to campuses.

The first thing that stands out is the high standard deviations of user averages, these results show whether different real estate users have answered questions in a similar manner across all campuses. Whereas the only real estate aspect that is valued by all real estate users is the price/quality level. This aspect has generally been ranked in the top 4 of the most important aspects and scores the highest average rank amongst all real estate users.

This importance however is not recognized by the campus management teams, who unanimously ranked shared research & production facilities as second most important aspect. On average this is ranked as the most important aspect by all CMT's. The second most important aspects for CMT's is innovative cooperation, however with a high standard deviation with two CMT interviewees ranking this as most important and two ranking respectively 6<sup>th</sup> and 7<sup>th</sup>.

Furthermore very little correlation between the thoughts of individual users, CMT's and between the real estate users and the CMT's has been found. As is presented in the bottom row of the comparison table four aspects have been ranked similarly on average by both the CMT and all real estate users, however the standard deviations as presented above them show that this similarity is caused by taking averages of rankings, not because of consensus on the specific topics.

However, as stated in the interview results, a similar ranking of certain aspects has been given when looking at all users of one specific campus. For example all real estate users of the NTC highly value price quality level, whilst all of them rank sustainability on the 9<sup>th</sup> rank, labelling it as very unimportant in their real estate strategy. Both interviewees located at the HTCE also show little deviation between their answers. And finally on Pivot Park a low deviation is achieved on three topics whilst the other topics are not aligned in their strategy at all.

In conclusion, the results of the ranking questions are inconclusive with respect to generalising them to a consensus of all on-campus located users or management teams. However they do present that real estate users on specific campuses tend to rank aspects more similarly than when being compared to real estate users of another campus.

The lack of correlation found might be caused by a lack of scale, with a limited amount of real estate users and campus managers filling out the numeric valuation. Next to that the research method of asking representatives to answer the numeric valuations adds a large variable, it is very well possible that another employee representing the same real estate user might answer the questions differently. Thirdly not fully succeeding in filling the full interview matrix has not aided in collecting sufficient data, whilst the unwillingness of some interviewees to participate in the ranking questions has further reduced the amount of respondents, possibly increasing the deviation.

On the other hand it is plausible that the results of these ranking questions will never present conclusive results. This can be caused because possible tenants of campuses are represented by a inhomogeneous group of real estate users, which end up locating on a campus for various reasons and from different real estate strategies.

#### 4.3.2 Rating the campus

The data of 'rating the campus' has been collected in a method identical to the data for 'ranking the importance of aspects in the real estate strategy'. After answering the ranking questions the interviewees have sequentially been asked to rate the performance of the campus they are currently located on aspects derived from the literature study. The interviewees have been asked to rate them on a scale of 1-5, with a score of 1 the campus does not at all supply this aspect, with a 5 the campus fully supplies in this aspect. Next to the real estate users the CMT's have been asked the same question in order to make them state the strengths and weaknesses of their campus and to open up for comparison between the demand and supply side. The results of this question have been presented in the tables on the following pages.

The cells in the tables have been applied a colour scheme in order to present the data more insightful. The colour scheme applied to the ranking questions grades from red (1) through yellow (2-3) to green (5). In addition to that the deviation between answers given by real estate users and the deviation between the CMT's rating and the user rating have been presented. To these cells a colour grade passing from white (0) to red at the maximum (2,5) has been applied. The final and fifth table contains the data comparison between the answers given by users and the CMT's. The results of the tables will be discussed after all tables have been presented.



## Rating the campus (Tables)

Table 30

	Value to what extent the campus supplies the following aspects	Focus on attracting real estate users in the same sector	Stimulates innovation	Stimulates knowledge sharing	Stimulates healthy rivalry	Facilitates high quality real estate	Facilitates an incubator environment	facilitates in attracting talent (employees)	Stimulates growth of network	Stimulates in improving commercial reputation	General grade (1-10)
ZOETERMEER	MANAGEMENT TEAM	5	3,5	2	1	4,5	4	5	2	4	
	SCALE UP 1	5	5	3	3	4	4	4	5	4	7,5
	SCALE UP 2	5	3,5	2	1	4,5	4	5	2	4	7,5
	START UP 1	nvt	nvt	nvt	nvt	nvt	nvt	nvt	nvt	nvt	8
	AVERAGE	5	4,25	2,5	2	4,25	4	4,5	3,5	4	7,7
	St. DEVIATION	0,0	0,8	0,5	1,0	0,3	0,0	0,5	1,5	0,0	0,2
	DEVIATION MT/USERS	0,0	0,8	0,5	1,0	0,3	0,0	0,5	1,5	0,0	

Table 31

	Value to what extent the campus supplies the following aspects	Focus on attracting real estate users in the same sector	Stimulates innovation	Stimulates knowledge sharing	Stimulates healthy rivalry	Facilitates high quality real estate	Facilitates an incubator environment	facilitates in attracting talent (employees)	Stimulates growth of network	Stimulates in improving commercial reputation	General grade (1-10)
NIJMEGEN	MANAGEMENT TEAM	5	3	3	1	2	3	3	4	3	
	SCALE UP 1	3	5	5	2	3	5	3	5	1	7
	SCALE UP 2	nb	nb	nb	nb	nb	nb	nb	nb	nb	nb
	START UP 1	4	4	4	1	3	3	2	3	1	7
	START UP 2	4	4	4	1	2	4	2	5	5	9
	AVERAGE USERS	3,7	4,3	4,3	1,3	2,7	4,0	2,3	4,3	2,3	7,7
	St. DEVIATION	0,6	0,2	0,2	0,2	0,5	0,6	0,2	1,0	2,0	1,0
	DEVIATION MT/USERS	1,3	1,3	1,3	0,3	0,7	1,0	0,7	0,3	0,7	

Table 32

	Value to what extent the campus supplies the following aspects	Focus on attracting real estate users in the same sector	Stimulates innovation	Stimulates knowledge sharing	Stimulates healthy rivalry	Facilitates high quality real estate	Facilitates an incubator environment	facilitates in attracting talent (employees)	Stimulates growth of network	Stimulates in improving commercial reputation	General grade (1-10)
EINDHOVEN	MANAGEMENT TEAM	5	4	4	1	3	4	3	4	2	
	SCALE UP 1	4	4	2	3	3	5	5	5	4	7,5
	SCALE UP 2	5	5	5	4	3	4	4	5	5	8
	AVERAGE	4,5	4,5	3,5	3,5	3,0	4,5	4,5	5,0	4,5	7,8
	St. DEVIATION	0,5	0,5	1,3	1,3	0,0	0,5	0,9	0,5	1,3	0,3
	DEVIATION MT/USERS	0,5	0,5	0,5	2,5	0,0	0,5	1,5	1,0	2,5	

Table 33

	Value to what extent the campus supplies the following aspects	Focus on attracting real estate users in the same sector	Stimulates innovation	Stimulates knowledge sharing	Stimulates healthy rivalry	Facilitates high quality real estate	Facilitates an incubator environment	facilitates in attracting talent (employees)	Stimulates growth of network	Stimulates in improving commercial reputation	General grade (1-10)
OSS	MANAGEMENT TEAM	5	4	4	3	3	3	4	4	5	
	SCALE UP 1	5	4	5	2	4	4	5	5	4	8
	SCALE UP 2	5	5	5	3	3	3	3	5	5	7
	START UP 1	2	2	4	3	5	4	2	5	5	8
	AVERAGE	4,0	3,7	4,7	2,7	4,0	3,7	3,3	5,0	4,7	7,7
	St. DEVIATION	1,4	1,2	0,5	0,5	0,8	0,5	1,2	0,0	0,5	0,5
	DEVIATION MT/USERS	1,0	0,3	0,7	0,3	1,0	0,7	0,7	1,0	0,3	

Table 34

	<b>Value to what extent the campus supplies the following aspects</b>	Focus on attracting real estate users in the same sector	Stimulates innovation	Stimulates knowledge sharing	Stimulates healthy rivalry	Facilitates high quality real estate	Facilitates an incubator environment	facilitates in attracting talent (employees)	Stimulates growth of network	Stimulates in improving commercial reputation	Average	Average grade (1-10)
ZOETERMEER	Average users	5,0	4,3	2,5	2,0	4,3	4,0	4,5	3,5	4,0	3,8	7,7
NIJMEGEN	Average users	3,7	4,3	4,3	1,3	2,7	4,0	2,3	4,3	2,3	3,3	7,7
EINDHOVEN	Average users	4,5	4,5	3,5	3,5	3,0	4,5	4,5	5,0	4,5	4,2	7,8
OSS	Average users	4,0	3,7	4,7	2,7	4,0	3,7	3,3	5,0	4,7	4,0	7,7
	St. DEVIATION	0,6	0,4	1,0	0,9	0,8	0,3	1,0	0,7	1,1		
	Total average users	4,2	4,2	3,9	2,3	3,5	4,0	3,5	4,5	3,8		
	Total average CMT	5,0	3,6	3,3	1,5	3,1	3,5	3,8	3,5	3,5		
	Deviation CMT / users	0,8	0,5	0,7	0,8	0,3	0,5	0,3	1,0	0,3		

## **Numeric valuation of the campus**

The aspects a campus supplies most according to the real estate users are stimulation of growth of network (4,5/5), attracting real estate users active in the same sector (4/5) and stimulation of innovation (4/5). Whilst the aspect standing out as least supplied by the respective campuses according to the users is the stimulation of healthy rivalry (2,3/5). Therefore it can be concluded that a benefit of locating on a campus is an increase of network growth, real estate users active in the same sector will be present and innovation will be stimulated.

Whilst the healthy rivalry is ranked lowest there is a high deviation in the answers given to this question, with participants of the HTCE experiencing 'positive pressure to stand out from other real estate users at the campus'. With only one in four campuses experiencing this phenomenon it is less likely aspect to be delivered by a campus. However this might also be caused by the choice of words, with interviewees possibly associating 'rivalry' with a negative aspect and therefore not ranking the aspect similarly to other aspects. Secondly the significant deviation from other rankings might be caused by unclarity about the phenomenon, with multiple interviewees asking for further explanation after this question was presented.

The CMT's rank their campuses as fully supplying in attracting real estate users in the same sector, unanimously ranking this 5/5, whilst their second best rated aspect is that the campus supplies in attracting talent (employees) rating a 3,8/5. The CMT's clearly do not intend to stimulate healthy rivalry between different on campus located real estate users rating this a 1,5/5.

The biggest deviations between CMT rating and those of the real estate users is 1. This is caused by deviation is found at the difference in valuation of growth of network. The CMT undervalue their influence in this, however the real estate users acknowledge that campuses supply in the growth of their respective networks.

Secondly two deviations are 0,8. This difference is given for attracting real estate users in the same sector, where this is mainly caused by the lower appreciations of the NTC and Pivot Park and the remarkably high appreciation of the CMT's. This implies that CMT's really aim for allowing similar real estate users, however the users themselves do not experience that all real estate users are active in the same sector. Next to that a deviation of 0,8 is established at the difference in valuation of stimulating healthy rivalry. As previously explained this might be caused by confusion on the topic, however all interviewees that have asked for further explanation have received this and therefore it can be concluded that CMT's do not supply this aspect/atmosphere intentionally at their respective campuses.

Finally all users have been asked to rate the satisfaction with being located on their current campus on a scale of 1-10. With grades varying between 7 to 9 all campuses have been rated a 7,7 or 7,8 on their average real estate user satisfaction. These ratings all being a 7 or higher implies that all real estate users are positive about locating on their campus. Next to that it has been identified that the different campuses have different strengths and/or weaknesses, apparently these do not significantly influence the average user satisfaction levels.

## 5 Conclusions and implications

### 5.1 Summary and findings

The aim and goal of this research is to reduce uncertainty regarding campuses as an agglomeration real estate development. In order to do so research has been conducted in literature, by conducting interviews and by substantiating this with a numeric valuation from both the supply and the demand side. This results in both the campus management teams and the real estate users located on-campus having been involved in the research. Secondly this research has been conducted in order to establish what benefits are supplied and what benefits are preferred and perceived by locating on a campus. By analysing the data collected an answer to the following sub- and ultimately to the main-question has been formulated;

#### ***What is a campus?***

In order to answer this question a clear definition of what a campus is had to be established. This has been done through literature study and resulted in a spectrum of different real estate agglomerations in which the campus has been positioned. After comparing different real estate agglomerations, the campus as a real estate development has been positioned between the business cluster and the science park and the following definition has been developed:

*'A managed physical real estate development location with an incubator function, utilized by start-ups and other real estate users in related fields of work, that share agglomeration benefits but that is not necessarily linked to an educational facility.'*

This distinguishes the campus from a business cluster in terms of a focus towards a specific economical sector which opens up the possibility to collaborate as real estate users and therefore improves the agglomeration benefits. Whilst on the other end of the spectrum a science park always has a cooperation with a university in combination with real estate users that actively collaborate with the respective university. According to this definition a collaboration with a university is not obliged for a campus which results in real estate users locating at a campus that are less (scientific) research oriented.

Finalizing this research proved that this definition could have been even more strictly defined. This has been concluded because one of the cases selected according to this definition presents itself as a campus, applied to the definition, but, after further investigation proved not to provide all benefits expected of a campus. This confirms the pre-assumed unclarity in the definition of what is a campus.

Therefore, in order to succeed in the aim and goal of the research to reduce uncertainty regarding campus developments an even more strict definition will have to be developed in the future. This definition should emphasise the importance of interaction and collaboration amongst the real estate users and between the real estate users and the campus management team in order for the campus to generate all theoretical benefits established. In addition to that a combination of start- and scale-ups, shared facilities and a management that reduces the time-spent on real estate management of its users are core aspects of a successful campus development.

### ***What are the theoretical benefits of locating on a campus as a real estate user?***

After a definition has been developed the second sub question has also been answered through literature study. The second research question has been formulated in order to comprise what benefits locating on a campus theoretically should deliver. The literature study conducted towards this research question has resulted in the following list of nine campus aspects that are either direct or indirect theoretical benefits delivered to a real estate user by locating at a campus:

The campus:

- Focuses on attracting real estate users active in the same sectors
- Stimulates innovation of on-campus located real estate users
- Stimulates knowledge sharing between on-campus located real estate users
- Stimulates healthy rivalry between on-campus located real estate users
- Provides high quality real estate (in terms of image and prestige)
- Provides an incubator environment for start-ups
- Facilitates in attracting talent
- Stimulates network growth
- Provides positive commercial reputation

It is expected that all of the benefits stated above are delivered to real estate users that decide to locate on a campus. To what extent these benefits are delivered and perceived proved to be dependent on a variety of factors, as has been concluded in the empirical research. Factors that play a part in this are; the quality of the campus, the match between the real estate user and the campus, the presence of relevant peers and the effort of the real estate user to participate in the campus.

Almost all of the aspects established from the literature study have been confirmed to be delivered or expected to be delivered by the campus, both by the supply and the demand side. The empirical research proved that not all aspects expected are delivered by all the campuses selected as a case in this research. The most debatable aspect being healthy rivalry. All of the campus management teams stated they did not intend to deliver this theoretical benefit towards its users, despite it being one of the drivers of agglomeration benefits as described by Porter in 1998. Surprisingly, at the HTCE, the most developed campus that has been researched as a case, both interviewees experienced this phenomenon and described it as 'a certain pressure to stand out from your neighbours'. Which according to the literature study should be a benefit delivered by a successfully operating campus and contributes to a campus delivering the aspects mentioned in the list above and to gain competitive advantage over real estate users that are not located on a campus.

### ***What are the benefits that real estate users prioritize in their choice of location?***

The third sub question has the aim and goal to gain insights in the priorities real estate users have in their localization choice. From the literature study has been concluded that priorities of real estate users can be divided in economic and place image factors, which are split between retention and attraction factors. Priorities are related to amenities, quality and appearance of real estate and having relevant real estate users in the direct periphery. All of these factors ultimately weigh up against the price of the real estate. Which results in real estate users with a higher willingness to pay for these factors will decide to locate at a campus whilst real estate users unwilling to pay a higher rental price per square meter will choose not to locate at a campus.

In the empirical research all real estate user interviewees have been asked why the organisation they represent has decided to locate at the respective campus and which aspects were deemed most important in this choice, this had led to the following results.

Network benefits are deemed the most important driver to locate at a campus. Real estate users deciding to locate at a campus expect their network to grow through the other on-campus located real estate users, expect to benefit from participating in on-campus events and expect to benefit from all users being represented as a collective on regional, national and international level.

Second to that, campuses are regularly located in strategic locations, real estate users state that accessibility through car and public transport are important, the close proximity to airports and in the example of the DTC a location in the middle of the Randstad.

Aspects that are less important in real estate strategies but that have been regularly mentioned are: the real estate fit-out, innovation, recruitment benefits, commercial reputation, clustering with important peers (suppliers, developers, clients).

Start-ups and scale-ups were expected to target different benefits in their real estate strategies, however no outstanding differences have been identified between the two. In addition to that the similarities in real estate strategies and the ranking of importance of different real estate strategies showed very little correlation across all interviewees. But real estate users located on the same campus show a higher correlation in the importance of different real estate aspects than the entire group of interviewees. This suggests that the specialization of a specific campus matches with a specific group of real estate users. But no conclusions on the 'generic' campus real estate user has been found.

***What are the benefits that campus management teams intend to deliver to real estate users located on a campus?***

This research question is focussed on the supply side of the campus and has been answered through empirical research. Four interviews with different campus management teams (CMT's) have been conducted in order to do so. These are focussed on what benefits the CMT aims to deliver for the real estate users located at the respective campus.

The general image of CMT policy focus points is that the policy is a combination of real estate developments and delivering soft skills. With the real estate developments focussing on real estate quality, expansion plans and supplying shared facilities. With the following soft skills being named; attracting real estate users active in the same sector, increasing on-campus interaction between different real estate users and extending the service portfolio.

That attracting similar real estate users is important in order for a campus to generate benefits for its users has been confirmed by all CMT's interviewed. This confirms the findings in the literature study that a campus distinct itself from a business park by mainly having real estate users active in the same sector. All management policies contain admission rules with a focus to one or multiple closely related sectors, whilst most CMT's also maintain specific ratios for start-ups, scale-ups and business support organisations. Going as far as the High Tech Campus, with the most strict admission policy, where branches of real estate users that are not Research & Development focussed are not allowed to locate on the campus in order to strictly focus on research and development.



All management teams except that of the DTC, actively aim to stimulate cooperation between real estate users through policy measures and by organising activities. With two campus management interviewees stating that stimulating human encounters between employees of different real estate users is essential for the campus in order to generate its benefits. This confirms that most of the theoretical benefits that have been established in literature are known by CMT's and are also actively applied in their policies and management strategies of the campus.

Another important driver of a campus are the shared facilities. These are developed so real estate users can efficiently rent real estate whilst low-use spaces are shared with other users located at the campus. The possibility to do this improves real estate floorspace efficiency and allows real estate users to rent a lower amount of real estate. Next to that facilitating shared facilities in addition to the privately rented real estate is used to play a role in stimulating human encounters through central lunch, sport or meeting facilities. The reduction in required real estate surface and the social factors of the campus are the main benefits locating on a campus has in comparison to a solitary real estate location. This nearly always results in a higher rental price per square meter on a campus than in the economic area the campus is located in.

The organisational structure of two campuses is subject to regional politics, whilst the two other campuses are entirely privately owned campuses. Intertwining of local and/or regional politics and campus management, both financially and politically, has had a negative impact on the real estate user satisfaction. Most negative experiences from locating at a campus in combination with mentions of inadequate management where, according to the interviewees, directly caused by this intertwining. Examples mentioned are slow decision making, lacking of financial clout and inadequate (future) development plans.

Despite the definition stating that a campus deviates from science parks by not formally cooperating with a university, all campuses actively maintain or aim to establish connections with educational facilities. This connection benefits real estate users in their recruitment, innovation and commercial reputation. Educational facilities increase access to knowledge, talented students and a network which contribute to the previously stated points.

From the financial policies of the four campuses investigated in this research can be derived that campuses are currently in demand. With all campuses renting out higher amounts of real estate floorspace than the regions they're located in. Next to that the vacancy rates of all campuses are lower than those in their respective regions. This implies that the campus management teams intended benefits match the demand.

### ***What are the benefits perceived by real estate users located on a campus?***

This sub-question has been answered through the empirical research and the numeric valuation and is the last link in the relation between supply and demand. In the interviews real estate user representatives have been asked about their experiences locating at the campus, effects on business operations and finally to rate their respective campuses on aspects that have been established as important in the literature study.

The proximity of like-minded real estate users has been stated as the most significant benefit gained by locating on a campus by nearly all real estate users. Employees engage in both formal and informal connections between different real estate users, however only half of the interviewees have stated that they participate in business cooperations with other real estate users. Therefore it can be said that locating with similar real estate users is not necessarily most important from a business perspective, however the social aspect is highly valued by employees. This has been confirmed by interviewees stating that their respective organisation is located on a campus from a corporate social responsibility perspective as well.

Most interviewees see the performance and/or services of the campus management team as a positive experience. These positive experiences range from being easily approachable, adequate problem solving, reducing work load with regard to real estate maintenance and soft services delivered by the CMT's. Therefore it can be concluded that a managed real estate development adds value for most real estate users located at a campus.

Despite the positive mentions of the campus management teams some negative experiences have been mentioned with regard to this aspect as well. Especially the relationship between a real estate user and a campus management team is described as 'a classic landlord-tenant relationship' when financial profit is at stake. Upfront expectations where that this would take place on a campus in a more collaborative manner.

A growth in network has regularly been experienced as a benefit from locating at a campus by most real estate users. The campus management teams do not actively intend to deliver this benefits towards their real estate users, but they are aware of the possibilities to expand the networks through the campus. In addition to that most interviewees experience recruitment benefits. They state that locating at a campus has made them a more attractive employer, has made it easier to fulfil vacancies and has enabled them to fill internships with students. This benefit has been mentioned by several interviewees and appears to be more important benefit of locating at a campus than literature suggest.

From the rating questions it can be concluded that a benefit of locating on a campus is an increase of network growth, real estate users active in the same sector will be present and innovation will be stimulated. In addition to that it has, in contrary to the literature, proved that healthy rivalry is not regularly present at a campus. These findings are in line with the verbal opinions about the campus and the real estate users have generally been very positive about their experiences of locating on the campus and the benefits they gain from locating there.

### **What are the perceived benefits campuses deliver for its real estate users?**

The conclusion of the research is that there is a variety of different campuses, campus policies and preferences amongst different real estate users. This has led to confirmation of the problem statement that campuses differentiate from each other. Despite the confirmation of this variety, the findings in this research confirm that locating on a campus as a real estate user delivers various perceived benefits. Therefore, regardless of the type of campus, locating at a real estate agglomeration with a campus concept delivers the following benefits;

1. *Growth in network*, by locating with real estate users active in the same sector and because all real estate users can be seen as a collective node in the network.
2. *Formal and informal collaborations with real estate users active in the same sectors*, which has a positive impact on business operations because suppliers / peers and or clients are closely located, but also provides a positive working environment for employees.
3. *A managed real estate situation*, with the campus management team delivering additional services and reducing time spend by real estate users on managing their real estate.
4. *Image benefits*, which results in both recruitment benefits for attracting employees and improved appearance towards potential customers/clients.

The aspects presented above comprise the fundamentals of a campus and the benefits a campus and its management deliver for its real estate users. The conclusion that all campuses differentiate from each other was expected to impact the performance and benefits a campus delivers. However, it has been concluded that is not the case at all. All of the real estate users interviewed describe they experience various benefits from locating at a campus. In addition to that it has been established that a combination of start- and scale-ups, shared facilities and a campus management that reduces the time-spent on real estate management of its users are core aspects of the success of campus developments.

The organisational structure of the campus results in the campus management team becoming more approachable for its real estate users because they operate closely to them. This creates the opportunity to have a constant flow of feedback from the users towards the management. Campus management teams proved to be crucial in the amount of benefits a campus provides. Therefore management teams should actively listen to their real estate users to reduce the last negative aspects established and to continuously keep aligning supply and demand. This will result in improving performances of campuses even further. In conclusion: The campus generates proven benefits.

## 5.2 Research limitations

### 5.2.1 Theoretical limitations

In this research various conclusions have been presented, of which most were coherent to the findings in the literature study. However it remains important to note that this research has been conducted on a relatively small scale and with various limitations. For example; the research only addresses Dutch campuses and has only contained Dutch speaking interviewees. In addition to that not the full interview matrix has been used, which resulted in only two respondents having been interviewed at the HTCE and a limited amount of start-ups has been interviewed. Therefore results and outcomes could differ if the research was repeated with a larger sample size and in a different location or when speaking to different representatives of the same real estate users.

Secondary this research has concluded that healthy rivalry is not actively delivered by campus management teams, nor is it experienced by most of the real estate users interviewed in this research. This might have been caused by the terminology used. Since multiple interviewees have asked for elaboration on the question when it was mentioned in the interviews. Therefore it is expected that this might not have sparked the intended associations towards the interviewees, which was the competitive drive real estate users can experience from locating in a cluster.

The final research limitation rests in the honesty and objectivity from the interviewees. All of the interviewees are currently located on the respective campus. Despite the data and interviews being anonymised it might have prevented the interviewees from speaking up all of their thoughts and concerns about the campus because it might have political consequences for their respective organisation and residency on the campus. This might cause the interview responses to be more positive than they are in practice.

### 5.2.2 Practical limitations

This research contains information on campuses and whilst policies of campus management teams have been presented in combination with figures that can be interpreted as 'successful' there are limitations with regard to these results. Copying, bundling or applying policies as they have been described in this research, either fully or partially does not guarantee the same effects. In addition to that, changing the strategy of any real estate developments towards a campus based approach will not offer guarantees of comparable results.

A comparable situation applies for real estate users translating the findings presented in this research towards their respective real estate strategy. A campus can offer the benefits presented in this research towards any real estate user, however, as stated in the research, not all benefits are experienced by all of the real estate users located on the facility. Therefore moving towards a campus does not guarantee any of the benefits presented.

Finally a significant amount of interviewees stated that they experience recruitment benefits from being located at a campus. These statements have raised the question to what extent recruitment benefits are measurable, in other words; How can it be assessed whether an employee wants to work for you because of being located on a campus? Despite the significant amount of interviewees stating they experienced benefits with regard to this topic the objectivity of these statements is debatable.

### 5.3 Recommendations

This research has been focussed on why real estate users locate on a campus and how management teams aim to provide benefits for its users. However no attention towards real estate users that have decided not to locate at a campus has not been spend. It could add value to the insights in campus developments to obtain more information on real estate users that decided not to locate at a campus. If a profile of the type of real estate users that locate at campuses can be developed this could improve the supply side, could aid the demand side in strategic location decisions and possibly would create an overview of missing campuses in specific areas.

In addition to that the research towards real estate users that do decide to locate at a campus could be expanded. Currently some literature research towards real estate users localization preferences has been conducted to generate a starting point for the interviews. However, this research could be executed in a more thorough instead of explorative manner. This would gain valuable insights on the real estate user preferences of potential on-campus locating businesses.

In hindsight more extensive research could have been conducted towards the emergence of the cases presented in this research. The influence on the current performance of the respective facilities might be influenced . Further research could be conducted towards existing campuses by researching how the development started, essentially the history of the campus, and how this impacts its current performance.

Next to that this research has been conducted in limited time and recourses, therefore the amount of case studies and interviewees were limited. Expanding this amount, either the amount of campuses or the amount of interviewees per campus, would probably benefit the level of detail of the conclusions and deliver more specific insights in different types of campuses and the match between supply and demand.

The research has objectively established differences between various real estate agglomerations, however definitions in literature still widely vary. For future research it could be interesting to extend the research into the differences and similarities between these real estate agglomerations, the real estate users located on them and what benefits are perceived by them.

In addition to the interviews that have been conducted with the respective campus management teams it would increase the knowledge about campus ambitions if a future research would be conducted with a wider variety of different campuses and/or different real estate agglomerations in order to establish differences in focus areas, policies and aims and goals of the respective management teams.

Finally, this research has been conducted solely in the Netherlands. Therefore all recommendations presented above and the research topics discussed in the entirety of this thesis report could be expanded to the rest of the world. This can be done to verify conclusions presented here or to further expand knowledge of campuses in general.

## 6. Research output

### 6.1 Deliverables

At the time of the P4 presentation the following will be delivered:

- A complete literature study towards
  - o Defining the campus
  - o Theoretical benefits of locating on a campus
  - o Localization preferences of real estate users
- Interview protocol for:
  - o Interviews with campus management team representatives
  - o On-campus located start-up representatives
  - o On-campus located scale-up representatives
- Interview data
  - o Qualitative valuation
  - o Audio recordings
  - o Transcription
- Interview analysis in Atlas TI
  - o Coded
  - o Transcribed
  - o Analysed with thematic analysis approach (Terry et al., 2017)
- Draft final report
  - o Final conclusions from literature study
  - o Clear presentation of interview data
  - o Interview analysis
  - o Cross-case comparison
  - o Conclusion and implications

## 6.2 Dissemination & audiences

The dissemination of this research is expected to be in the real estate markets for investors, developers and end-users but also might have political relevance. The research contributes to filling a knowledge gap on what campuses aim to deliver and how this is perceived. Therefore all campus and science park managers might be interested in the conclusions of this research. Furthermore policy makers on regional and national level who have pled to invest in campus related developments would do well to take notice in order to gain better understanding of what they are investing in and what it delivers. Thirdly companies that are planning a change of location and do or do not consider locating on a campus yet might be inspired by the findings of this research. Finally researchers in the field of corporate real estate management, especially those focussed on stimulating innovation and collaboration in the real estate market can find relevant information in this research.

## 6.3 Research plan

In order to successfully work my way towards the P4 moment the following tasks will have to be carried out whilst continuously updating my report with the progress made:

- Plan monthly meetings with first and second mentor
- Develop campus management questionnaire about their policy
- Send questionnaire to campus management teams
- Develop interview protocol
- Select campus sites and companies to participate in interviews
- Plan, execute and record interviews
- Process interview data
- Analyse interview data
- Draw conclusions from interview data
- Answer main- and sub questions

## 7. Reflection

### 7.1 Topic reflection

The research topic of campuses has proven very interesting to me. The topic relates really well to the masters Management in the Built Environment where a lot of attention is spent on the soft side of developing and managing real estate. The aspect of adding value to real estate by adequately managing it and by matching the real estate users located in the buildings can be seen as taking the essentials taught in the masters to the extreme.

Next to that the continuous growth and attention to this type of real estate developments made it a very interesting graduation topic. With significant current attention spent to this subject, new publications becoming available and publications being updated halfway through my thesis also made it tricky to stay up to date with the latest available information.

After conducting this research I am convinced of the added value a campus can generate for both its users and the surrounding area when the right management, users and intentions are in place. The fact that CBRE noticed this trend and inspired me in further investigating this topic has aided me in experiencing a joyful graduation process where great interest in the topic has continuously motivated me.

Looking towards the future I expect to get in touch with campus developments and strategic location choices many more times. Therefore the experience and knowledge gained from this research will (hopefully) prove useful for a significant part of my professional career.

### 7.2 Reflection up to P2

Reflecting on AR3MBE100, I experienced this as a rough course. At first I was overwhelmed by the quick start of the course. The first week was very intense and required a research subject and very definite choices in terms of picking research direction and a mentor. I can imagine one would expect to have some clues on what topic you would like to research by the end of your second semester of MBE, however I did not really have that in place and would have benefited from some communication prior to the course start on what to expect.

The process of developing a subject and topic of research however I did experience as a fun but tough process. It requires way more time and thinking than I expected beforehand but the connection to research methods 2 really helped me through. Having CBRE as a company to do my graduation internship has proven really helpful. Both René van Dijk and Djara Walgien, both in my graduation from the side of CBRE, quickly provided me with meetings which resulted in inspiring discussions about a potential topic. Next to that I was able to visit the SPRYG campus & innovation district event, which really helped to kickstart my knowledge and motivation to the subject I've devoted my graduation thesis to. On the other hand the early involvement of a graduation company felt like an extra burden because keeping both the TU Delft, my mentor and CBRE posted whilst still having time left to make progress proved to be difficult.

Nevertheless I look back on AR3MBE100 as a strict but helpful course. The hard deadlines provided by the course were helpful for me and I have learnt it is absolutely necessary to keep setting those to challenge yourself in keeping up the pace of my research. I look forward to continuing this research with the help of Hilde Remoy and Eric Louw as my mentors and CBRE as graduation organisation.



### 7.3 Reflection up to P4

After not passing the P2 go/no-go moment the first time I have put extra effort in further developing my research method and improving and expanding my literature study. After receiving feedback from both my mentors I was able to improve to a more concrete research plan for writing my thesis. The research plan contained literature study, empirical research taking shape in interviews and an evaluation where the results would be processed and analysed.

The research plan initially contained a total of 20 interviews with both campus management teams and real estate users located on four different campuses in the Netherlands. Supported by clear feedback from my mentors that it would be a challenge to schedule this many interviews I got into scheduling interviews immediately after passing my P2. As can be seen in my research it proved a challenge to schedule all 20 interviews, especially getting in touch with start-up companies proved to be most challenging. However I managed to schedule 16 interviews by making numerous phone calls, using the network of CBRE colleagues and by using the points of contacts within the management teams to get in touch with real estate users located at the campus. Conducting these 16 interviews has been very joyful and an important experience in my research process.

Looking back on developing the interview protocol the written feedback I received from Erik Louw proved very helpful. Initially I developed a framework which was affected by my initial scepticism on the benefits a campus could deliver. After speaking to both Hilde and Erik they guided me to take a figurative step back and look at what I wanted to achieve with every specific question and to relate them to one of the main- and sub-questions of my research. This proved very helpful and has aided me in developing a thorough interview protocol which made me receive various compliments of my interviewees; stating I was well prepared and they enjoyed participating in the interview.

Reflecting on the results I gathered with my interview protocol multiple feelings emerge. On the one hand I am very proud of the amount of (usable) data I have been able to collect. Especially the interviews with campus management teams on their policies and views on real estate management were interesting. Whilst on the other hand, getting insights on what priorities the wide variety of real estate users I have interviewed could will aid me in my future employment at CBRE.

On the other hand I am surprised by the wide variety of variables that have emerged in my research. Beforehand of executing the research it appeared like I had developed a very straightforward research plan, however I have underestimated the variables different real estate users introduce, just start-ups and scale-ups did not result in two clear different opinions. No two real estate users are the same, and this proved difficult in building generalised conclusions on experienced benefits from locating at campuses, since findings often had a very low significance and were only shared by a limited amount of other real estate users.

Looking back at the entire graduation process of the past year I think it has helped me develop both as a person and from a professional perspective. I've come to learn that I highly value the presence of other persons around, therefore I would like to thank CBRE for the opportunity to execute my graduation project with the aid of their organisation and tireless interest and questions I have received from colleagues on whether I had made any significant progress yet. This brings me to the second development I've been through, it has been challenging to work on a big and individual project with just a couple of deadlines provided from the Technical University of Delft. This has learnt me to challenge myself and set my own deadlines. Finally I have greatly developed my writing skills in the past year, both academic writing as well as being able to apply logical structures to texts. It has learnt me to rethink what I write down and to be more extensive in describing my thinking processes, in which I used to forget to describe a significant amount of steps, making my writings more understandable and readable.

#### 7.4 Reflection up to P5

The process of working towards a 99% version required for the P4 has taught me that it is endlessly possible to rewrite pieces of text without making significant improvements. Before receiving feedback from the P4 I already decided that I would not go into detail but firstly analyse what the bottom line of the feedback would be.

Already during my P4 presentation I felt that presenting my results mainly consisted of lists of findings, that lacked depth, explanation and context. After going through the feedback with both my TU Delft tutors, Hilde and Erik, I realised there were still a lot of improvements to make in the coming weeks. Sequentially I shared this feedback with René, my graduation supervisor at CBRE in order to prepare a plan of approach.

I have spent the final weeks of my graduation process on fixing practical issues in introducing new topics and improving the structure of my report, but the most important part that was still missing was my own interpretation. I have learned to write down and present my own interpretation in a scientific manner, and have discovered that this is the fun and rewarding part of a tough year of intensive research. To my beliefs, these final developments have greatly improved the depth, quality and readability of my report. For all of the findings the report now contains relations, dependencies and a positioning towards the findings in literature, but most importantly, it makes the report complete.

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## Appendix

### Appendix A: Anonymised interview summaries

#### CMT Dutch Tech Campus Zoetermeer

The campus site is former Siemen's site, they have developed the first three halls and 5 office buildings, in 2012 everything was sold, and they moved to The Hague with the head office, but several branches of Siemens have remained. In 2012, Ping Properties entered a joint venture to purchase the area. Then, in 2020, a business plan was written, other parties were bought out and they started actively developing a campus.

Since the establishment of the campus, 25,000 m<sup>2</sup> of real estate has been developed and leased and 13,000 m<sup>2</sup> has been redeveloped and let. This is almost three times the total real estate stock that has been rented out in Zoetermeer in previous years.

Management's tasks include asset management and development. This includes marketing, contract and facility management and contact with the municipality. There is a foundation, but campus management does not participate in it. The contact with schools, companies and organizing activities is left to the community and does not fall under the tasks of management, but it is expected that this plays a role in attracting companies.

The DTC positions itself in the competitive area along the A12 (Utrecht-The Hague) and distinguishes itself by offering facilities such as a restaurant, a coffee bar and extra meeting room. In addition, the accessibility by highway and public transport is good. The business parks with which competition is conducted date from the 80s and 90s and the DTC wants to distinguish itself from this by creating an appealing environment.

In addition to the hardware, the real estate, services are an aspect in which the DTC distinguishes itself, organizing company events can be done with the help of the campus board which facilitates in security, catering and a suitable space up to 400 people.

Establishing cooperation and innovation was initially one of the spearheads. This has now been abandoned. The first thing every company does is install a front door with a card reader and gates. Companies work together by providing services to each other, but innovation is not shared, because this is what gives a company its value and is therefore not open and accessible. So, the honest conclusion of several years of practical experience is that an open campus environment is not feasible.

Even though there is no open innovation, there is indeed cooperation between education and the business community. This is done in the form of offering internships and sharing assignments. Setting up a student team that takes on practical challenges under supervision can result in cost savings for companies and a great challenge for students. It is also indicated that spin-offs from the university of applied sciences are establishing on campus, but in the amount of extra sqm rented out is near neglectable, 200/68,000 m<sup>2</sup>.

The appeal of a campus is not due to the innovation between companies but to the presence of a university of applied sciences and the establishment with companies with which one can identify. An IT company cannot identify with, for example, a fashion company and will therefore not establish itself next to it. It is part of the image of your company, for example, look at the south axis. Siemens functions as an anchor party and as a pull factor for companies from outside. The management looks specifically at companies that fit well in the street, in Zoetermeer's case the mobility-related technology. Companies should not be competitors but should be active in the same field. On the ideal campus, a kind of matrix of companies is created that are all linked to each other without getting into each other's

water. When a large part of this matrix has been established, tenants also find the campus itself to fill in the gaps in the matrix.

The campus management team is not actively engaged in marketing, the interviewee feels that the campus is a distinctive product for a competitive price. The price is above the rest of the market, but extra services and a piece of brand awareness are provided for this. "It's more business administration than marketing"

The vacancy rate of the DTC has fallen from 26% to 9% in two years. This has dropped from 10,000 m<sup>2</sup> in the original situation to 4000 m<sup>2</sup>. In addition, almost 26,000m<sup>2</sup> has been added. Currently, extra meters are not considered to facilitate growth, this is not necessary because this space is still there. In addition, the campus still has sufficient development opportunities for new and additional office space on the available campus.

The rent level per m<sup>2</sup> in Zoetermeer is around 90 €/m<sup>2</sup> where on campus the prices grow to almost 150€/m<sup>2</sup>. In this, the management can set a hard price by pointing out benefits that the campus delivers. Partly because of this, the campus does not have to have an active admission policy, companies that want to establish themselves on the campus and benefit from this are also willing to pay the rent premium. This ensures that, for example, financial service providers do not do this and will prefer an alternative location in Zoetermeer to the campus. While companies that identify with the campus culture are willing to do so.

#### *Explanation of ranking questions*

The facilities in the area are not present but we have created them ourselves

A good campus does have educational facilities nearby

The most important factor of establishment is the proximity of like-minded people

The points mentioned are all checkmarks that you must meet in order to deliver a good product as campus management. There are more buildings that can put all the checkmarks in Zoetermeer, but there are no buildings that also have the proximity of like-minded people and the link with an educational facility.

#### *Trends in the real estate market*

We respond to cooperation and consultation in the office by creating a garden that also makes this type of consultation possible outside in a beautiful environment.

The energy label C obligation is irrelevant because all buildings on the DTC already have a label A or B, it is less relevant in the context of a campus, but it belongs to delivering a good product.

The campus is not affected by the postponement in real estate choices, in fact everything just continues.

The choice for high-quality real estate / high quality is something that benefits the campus, the campus is an attractive environment, so the demand for it increases.

The DTC management does not believe in working from home, the office should be a pleasant environment where you like to go, in this it also tries to facilitate as much as possible. Here you don't eat a sandwich behind your desk.

The huge outflow of staff in various industries is caused by a lack of cohesion, as a result of which CEOs from the DTC network would like to have the staff back to the office and the DTC responds to this by realizing facilities.

The incubator function has been replaced by the DTC but is managed and located in the building of the university of applied sciences.

## Scale-up Dutch Tech Campus Zoetermeer

This company is a spin-off of another company based on the DTC. That is why they moved within the campus. The previous building started to become too small and no longer met the standards of the now considerably grown company. A few years ago, a total evaluation took place and there was an opportunity to leave. However, there was a suitable building which was further developed in collaboration with Ping Properties to all the wishes of the customer. The current building has all facets of the new office, meeting rooms, focus areas, much more hybrid technology. A lot of money has been put into this by the campus organization and in return a long-term lease has been concluded. We are very happy with the current office situation.

Decisive elements were the accessibility of the location and the additional network. For the price we could easily have sat somewhere else. In addition, facilities from the old Siemens are also used. In terms of cooperation, the DTC is more of a business park, this is nil. The choice of location for Zoetermeer is strategic, in the middle of the Randstad and easy to reach for our employees. Finally, the possibility to grow, we have extra space within this office building and the option to rent an extra floor. We expect to need this in the short term. It is also important that the location facilitates our sustainability ambitions.

In terms of facilities in connections, waste processing and power supply, real steps can still be taken. For example, we still employ a facility manager ourselves, with this rent this should not be necessary. I do expect this to improve in the short term, it is because only recently has real throttle been given to the creation of a campus. There is the possibility to rent extra storage, this is done compartmentalized and is flexible. But shared facilities are not really the case. This is partly due to the fact that everyone has their own security layer and with your real deep developments you obviously do not want to give third parties access. You can't just lose that technology and that's why you can't easily share our labs.

Cooperation with other companies is marginal, which is not why we went here. I also think the diversity of companies is quite large, hearing aids and agriculture do not really fit into the rest of the street. We also have our cooperation contracts with external companies outside the campus. In principle, you could pick up our company, apart from our employee base, and put it somewhere else. Although most work is in the Randstad, so that remains a condition.

Nevertheless, we are very satisfied with the good working environment here. We would also be open to more cooperation in the future if this is also facilitated more.



### Scale-up Dutch Tech Campus Zoetermeer

For the scale-up located on the Dutch Tech Campus, it was decisive that Ping Properties could make investments in the combination of office space and warehouse facilities. The intended proportions were difficult to find in the market supply. In addition, the company did not want to move too far from their previous location and because it is a head office, the appearance was very important. The company had been planning a move for some time but was really persuaded by the campus concept and the campus management team to establish itself on the DTC.

However, it is emphasized that at the bottom of the line it must be a good business case. What is paid and what do you get in return. The appearance of the campus, the quality of the buildings, the service of the management team and the marketing concept are certainly considered. The company emphasizes that the marketing strategy of the Zoetermeer Innovation Park clashes with that of the Dutch Tech Campus.

Within the campus, the company experiences cooperation between companies, but this does not apply to a business level. However, the municipality is devising initiatives to set up collaborations. This does apply to contact with educational institutions. It is indicated that students can regularly do assignments and that the company uses facilities of the educational institution for meetings, for example.

The company is happy that it is on campus and is very pleased with the management at the park. However, it was basically not looking for this, the choice fell on this due to the specific building requirements of the company. It now sees the added value of the campus. This is mentioned in relation to the appearance at customer reception and the facilities on campus that are used.

### Start-up Dutch Tech Campus Zoetermeer

During a search for a specific type of business space next to the office, the DTC ended up. This turned out to be difficult to find on Fundi. The company has great growth ambitions so was also looking for flexibility. Company found the campus itself in its search and put the real estate question to campus management. In consultation, the current office space was determined, and the necessary adjustments were made. The company also has an option on a business space that may soon become available.

In addition to the flexibility offered, the facilities and services also play a major role in the choice of campus. A small company has a great need for a public lunchroom and a cleaning team, and the extra meeting rooms are also used. Apart from some small things, we are very satisfied with our current housing. The possibility to join the campus network did not play a role in the choice of location. The connection with other companies in the tech and the appearance that the site has plays an important role in this. The decisive factor was the flexibility and the extra facilities/services offered.

The collaboration with The Hague University of Applied Sciences has not yet been used, but this is planned. Even though everyone automatically becomes a member of the foundation that maintains contact with this, the director of the company was not aware of this. The influence of the campus on the growth of the company is not worth mentioning, although a piece of appearance is appreciated. Furthermore, the company operates as a solitary organization that happens to be located on a campus.

## CMT High Tech Campus Eindhoven

The High-Tech Campus Eindhoven was founded by Philips, they left the site when they moved production facilities to the outside area, but because they owned the buildings, they were looking for a suitable new concept. Philips has always kept its R&D facilities on site but started the open innovation concept in 2000. The site is now almost a square kilometer in size and has a large central building where lunch facilities sports facilities, a supermarket and other functions are incorporated that are accessible to all companies.

Since the Eindhoven region has been labelled 'Brainport' by the government, there has been a triple helix model, business, government and education. The campus management focuses on maintaining these contacts and tries to keep contact accessible. The campus focuses on R&D oriented companies, production facilities do not belong on campus. The focus is on Smart finance, Sustainable energy & storage and on artificial intelligence software (AI).

The campus sets up field labs to allow companies to work together, this is done on the campus itself. The management says it's unique that the entire site is privately owned, making this kind of thing possible in the outdoor area of campus. The vision of the campus is to become more sustainable, to grow and to stimulate the attraction of talent in the coming years. The essence here remains that campus management is still a real estate organization. Facilitating and managing the real estate must be in order, in addition, the ecosystem that they want to create is being built. On campus you can find a mix of multi nationals, scale-ups, start-ups and service companies that are actively kept in balance.

The origin of Philips ensures that there is no connection with the university, so far this collaboration is limited, this is high on the agenda to improve. Management believes that part of the campus' success is due to the strict admission requirements for businesses on campus and the focus on tech. Also, only R&D branches of tech companies are allowed.

The campus is a car-free area, one is obliged to walk from the parking lot to his / her building. Lunch facilities are only available in the central building, so everyone must leave their office.

The management believes that a campus needs knowledge carriers and must ensure that people come together and meet each other. The combination of research, development and looking at the added value of new companies ensures a healthy ecosystem. It is essential that you have a clear focus on a sector and do not go for quick wins. The role of the campus management team as broker and connector between companies also plays an important role in this.

A policy plan has been drawn up for the campus, which has been drawn up by Philips in collaboration with the municipality of Eindhoven. This results in strict regulations for the further development of the campus, especially for the type of companies that are allowed to establish. The campus is researching short stay apartments for expats. Currently, the campus has a vacancy rate of 3%, which the management thinks is too low because companies have too few career opportunities within the campus. The new developments have been in the pipeline for some time but have been delayed by the COVID pandemic and the change of ownership of the campus.

The price of the campus is in the high segment. However, you can make a lot of use of facilities here so that you must rent fewer square meters. Below the line, the rent is probably at a competitive level with the rest of Eindhoven. However, the campus initially wants to focus on the ecosystem and not on rent. For start-ups, there are arrangements that they can rent cheaply and pay more per year on campus.

### Incubator MT High Tech Campus Eindhoven

The organization is an on-profit organization that provides start-ups and scale-ups with housing, help with current issues and business guidance. The organization has four public shareholders: Municipality of Eindhoven, Tu Eindhoven, Brabant Development Society and Brain port. Rabobank is involved as a private shareholder. The organization has buildings on both the TU campus and the High-Tech Campus. The purpose of the campus is to promote and maintain economic growth in the region.

Unlike most other incubator parties, this organization does not take shares in the company, it only provides real estate. The party owns just under 5% of the real estate on campus and serves 25% of the companies on campus.

The incubator organization relates to the campus management team as an almost equal party. The daily tasks are similar, only this party focuses specifically on its two own buildings and facilitating smaller start-ups or scale-ups as well as possible. In addition, the admission requirements are the same as those of the campus. This party also allows a small percentage of service organizations on campus, which are then focused on the incubator parties. The campus management and the incubator party have a monthly meeting to discuss growing parties in the transition from incubator to campus real estate.

The incubator party also facilitates in a network for the tenants, by bringing them into contact with other companies or organizations with requests for help and by organizing events. These events are both separate from the campus and in collaboration with the campus.

Due to the non-profit set-up of the organization, it can offer commercially unprofitable concepts, for example housing at an a-location below the market price. In order to maintain this function as a springboard for start-ups, there are strict rules for the inflow and outflow of the incubator buildings. The leases, on the other hand, are very flexible, the maximum term is 7 years and contracts have a notice period of 4 months.

### Scale-up High-Tech Campus Eindhoven

\*Two interviews have been conducted for this company\*

Interview 1; facility manager

The company established itself on the High-Tech Campus at an early stage of development of the campus. At the time, this was a move from the TU campus to the HTC. This choice was made because the academic ties could be maintained but more rapprochement with the industry was sought, suppliers, manufacturers, etc. In the opinion of the company, the TU campus was too closed, and they were looking for a more open and innovative ecosystem. In addition, the company was able to establish itself on campus with favorable conditions in the start-up phase.

The company is very pleased with the location on campus. The management, location, logistics and regulations to stimulate meetings by banning their own lunchrooms. The company can also cite concrete examples of collaborations that have resulted from these meetings. Compared to the TU campus, it was possible here not to speak to anyone from another company for three months while they are in the adjacent building. The choice for the campus is also in line with both core values and the strategy of the company, so they are mainly focused on the combination of a university and innovative companies.

For larger companies, it is interesting to have low threshold contact with the university. This is already done through the staff, but the network events are certainly an added value. The network events are also interesting for visiting companies and entering collaborations. In addition, there is added value in attracting talent in the form of attractive employment by establishing itself in a dynamic location.

In addition to the soft side of the campus, the company is also pleased with the high standard of real estate developments. However, all these aspects can also be seen in the rent that is far above the average market price in Eindhoven. For this, a lot of flexibility is possible for less or extra square meters and leases of 5 years.

Interview 2; employee on campus

The employee is satisfied with the location on the HTC but says that settling on the TU campus also had its advantages in contact with academics. However, there would be room for improvement in improving research facilities and associated permits, this is sometimes a limiting factor. Through organized events and its own network, the company has a lot of contact with other both small and larger companies that are on campus. It helps that physical distance is limited.

The interviewee is not directly involved in contact with campus management but sees the influence in facilities, idea development, setting up initiatives and stimulating cooperation. The company is actively involved in various collaborations for both short and long term. However, it is expected that these collaborations would also have been possible if the company were not located on campus, but the campus facilitates this. The ecosystem helps, but common ground in the sector in which companies are active is more important.

The company is located here for a piece of appearance, a piece of marketing and more accessible networking. However, it does not exclude that you may have gone through the same work and development outside of a campus. The company certainly sees the advantages, but from some perspectives there are also disadvantages, for example: Facilities are arranged well and quickly, but when customization is required, this is often difficult.

The campus management actively supports in entering collaborations with companies but also in collaborations with education in the form of recruitment. However, vacancies are not actively filled. In attracting talent, it is an advantage to be on campus, but there are also many competitors who aim for the same kind of staff. Employees also regularly change employers within the campus.

Scale-up High-Tech Campus Eindhoven

Compared to other locations in other countries, it is very pleasant for this company that suppliers, customers and students come together on campus. That is why the company is extremely satisfied with the location in Eindhoven. The company does aim for an efficiency improvement with a possible move within the campus, this is not optimally supported because the company leaves buildings empty, which seems undesirable from the management. Larger tenants each have a quarter of a meeting with the management team, in which any adjustment wishes are discussed, but the flexibility in this is not optimal.

Contact with other companies is stimulated by campus management. They organize sufficient meetings on a wide range of topics to which different companies are involved. Problems are discussed here and even though everyone is focused on their own company, knowledge sharing often takes place here.

Despite the higher rent, you get a lot in return in the form of facilities and a pleasant working environment. The feeling that you are all working with so many different companies is experienced as

very pleasant. Not everyone uses the public lunch area, especially older employees, but they also leave the office to have their own lunch or walk. From an efficiency point of view in office space, it is also nice not to have your own lunchroom. Parking, bicycle facilities and electric charging stations are top arranged. The campus is taking steps towards more sustainable waste processing. The biggest advantage remains in attracting and retaining talent as an attractive employer.

In addition to the social benefits, there is also a sense of standing out as an individual tenant above other companies, not necessarily as a rivalry but more from taking an exemplary role. Because the company is an innovation-dependent for its *raison d'être*, it is very nice that there are many start-ups on the campus and that they can work together with them when they have promising ideas.

In recent years, the campus has been working a lot on making the buildings more sustainable. However, with the change of owner, there has also been more discussion about which costs are for the tenant and which are for the landlord. This is experienced as a disadvantage. Even when things that fall under the landlord break down, it takes effort to get this solved. No information is known to the interviewee about the relationship with educational institutions.

#### CMT Pivot Park Oss

Pivot Park Oss originated on the old site of organon / MSD. The management at Pivot Park Oss acts as a point of contact for tenants, connects tenants with each other as a kind of real estate agent and is responsible for the further development of the campus' real estate. This is done in consultation / cooperation with the municipality and province, these parties are partly responsible for investments in the campus. When admitting companies, the campus focuses specifically on the drug discovery chain and the associated R&D, in the future they also want to add part of the production in order to be able to keep large companies on campus. In addition, some facility parties are also allowed to establish themselves on campus, for example for legal assistance and patent application.

The campus has been around for 10 years and until a few years ago there was always room for attracting new companies. Now that the campus is full, this changes the role of the management team, the focus shifts from attracting companies to expanding the campus. The campus is developing three new buildings; two office buildings and a renovation project in which an incubator and publicly accessible lab facilities will be realized. The campus notices that the financial involvement from the municipality and province processes slows down enormously. The expansion plans have been put on hold by the municipality and provincial elections, which means that the campus is now lagging the facts. There is a plan to sell the campus as a business case to an external party, like what happened in Eindhoven.

All buildings on the site are owned by the campus, they also manage all connections for the companies, including nitrogen, electricity, CO<sub>2</sub>, argon. This creates a complex piping. They also advise in the organization and planning of labs, a service that is included in the rental price.

In terms of atmosphere and ecosystem, the campus is doing well, all companies know each other and there is an almost family atmosphere. The pharma-related equipment is shared on a large scale and services are also purchased from each other. It is an advantage that all expensive equipment is present at different companies. It is important to realize that the equipment is worth many times more than the real estate of the campus.

Challenges for a campus in pharma are that many start-ups depend on financing, when it stops or increases, companies can unexpectedly grow or shrink enormously without this really being predictable.

The appeal of the Pivot Park comes from the establishment in a knowledge region, the availability of research facilities and the network within the pharma industry. Pivot Park also has a party in the arm that ensures that research equipment can be shared via a booking system, for example, for this can be paid per hour or per month and then the devices can be used under supervision.

According to the management, the definition of a campus is that this is an enclosed area where there is certain technology and focus on a sector, the location must have a management team that is both engaged in real estate and facility management but also tries to establish an ecosystem. This is reflected in internal events, networks to the outside world and connections with foreign companies. This also includes a bit of guidance for smaller companies in networking and marketing.

The pivot park maintains ties with Radboud University, Leiden University of Applied Sciences and Arnhem Nijmegen University of Applied Sciences. These are also directions from which start-ups and spin-offs that settle at Pivot Park come.

Currently, Pivot Park has a vacancy rate of 0%, there is also no more room for companies to rent storage or extra office space. A new building will be delivered at the end of this year, but this will not increase the vacancy rate because all already established companies already have demand for extra m<sup>2</sup>. Rental prices on campus vary per building and depend on the quality of the building. Some startups have a discount on their rental price, this is because they are in a basement / basement of a building. Pivot Park is at the top of the market in terms of rent, but many services are offered for this, and the leases include part of the investments in the buildings that are made specifically for users. The campus runs when it has full occupancy at a profit and is in any case cost neutral.

#### Start-up Pivot Park Oss

For this start-up, the network of former Organon employees was one of the reasons to establish at Pivot Park. There are several companies that purchase the services at the pivot park. Other choices were Amsterdam, Utrecht or Nijmegen, which in all cases involved campuses or science parks. This is especially necessary for a piece of extra commercial reputation within the medical sector.

The management of pivot park seems to have made a shift in focus over the past 5 years; from smaller innovative companies to larger companies and rapid growth, it seems to be more about the financial picture than before. The company does not experience any inconvenience from this. However, due to these changes, the company must move the building to make room for expansion plans, so the rent goes up considerably while the current situation is good enough.

At Pivot Park there is a lot of cooperation between the companies, from large to small and between the small companies. The large companies do not do this among themselves, they only purchase services from smaller companies. The management plays an active role in having assignments carried out within the park where possible by actively networking. In the management team of Pivot Park there is a lot of turnovers, this does not benefit continuity and quality. However, the company is happy with the growth of the park, this can be seen in a growth in orders that it receives, and this would not have been possible without the park.

The company is very pleased with the service package of Pivot Park, everything is included and is passed on in the rent. This really relieves startups. The accessibility of the campus by both public transport and by car is also good.

### Scale-up Pivot Park Oss

At the time of establishment, the company had doubts whether it would be possible to attract the right staff in Oss, but it turned out that this is going well. The decisive factor was the history of Pivot Park and its good position within the pharmaceutical industry. In addition, it is attractive that rents are much lower than in the Randstad. Also from an international perspective, it is pointed out that the wage level in the Netherlands is lower than, for example, America.

The company hardly uses facilities from Pivot Park because these are supplied from the parent company with a higher standard. There is also little cooperation, there is a single company that carries out specific screenings located at the park, other things are solved internationally.

At pivot park you pay for the services per staff member or per m<sup>2</sup> in the rent, so it is very unprofitable to be one of the larger parties. In addition, the energy price is a problem throughout the park because the medical / lab equipment consumes a lot. There are educational collaborations with HBO programs and with Radboud Nijmegen, courses are taught on campus and many internships at the Pivot Park are filled with these students. Despite some skepticism, the company is satisfied with the performance of the park.

The company is currently growing out of the current building and has a major expansion in prospect, which will be realized in the new buildings at Pivot Park. However, the development of these buildings is difficult, the management of the park has little experience with this. In their opinion, the extensions also come a few years too late, in which the interference of the municipality and the province is mentioned as part of the reason.

### Scale-up Pivot Park Oss

The company has returned to pivot park because of the equipment and old employees who are now located there as spin-offs. Since the location on campus, many collaborations with small companies have started at the park, this is a win-win situation, the company can lose its sales of specialist analyses and the spin-offs get employment.

In the current situation, the company is not satisfied with the quality of the real estate and the labs. Fortunately, this will change upon completion of the new development, this was known in advance, and it was still decided to establish at pivot park. According to the company, the management of the park regularly drops stitches, they see progress in this, but the growth of the park has gone many times faster than the professionalization of the management. This development can be seen in improving the ties between different parties and commercial reputation. However, it still falls short in the financial (administrative) area, when there is a need for rapid action and the long-term development of the park (growth opportunities). This is strongly reflected in the development of the new building.

The pleasant cooperation with other companies at the park is the big reason why the company is happy to establish on pivot park, although it is mentioned that it is more use of services. There is no competition here, all companies provide different types of services.



## CMT Novio Tech Campus Nijmegen

The campus exists 18 years. The site is former Philips and NXP terrain and the campus concept originated when 4 of the 5 Philips factories were moved abroad, leaving the site empty. Recently, the challenge of the campus is to triple in size. This plan stems from the area development vision of the municipality of Nijmegen. It follows that there is an ambitious master plan for the site on and around the campus. On the one hand, this is the management team that is busy with branding, external communication and brand awareness. But is also in the hardware and buildings that need to be (re)developed.

The origin from the Philips site still forms the basis of the Novio Tech Campus, with NXP and Experian the focus is on chip development. There is a lot of contact with Radboud UMC for attracting new companies, they have also made investments in the campus. There are currently 30 start-ups at the NTC of a total of 70 different companies. The expansion plans calculate with a growth from 3500 to 7000 employees and a tripling in meters.

The NTC clearly focuses on two sectors; half on semiconductors and the other half on med-tech, for this there is a ballot committee that enforces the admission requirements. Even though Kadans owns a large part of the real estate on campus, they also adhere to this in hiring tenants. In addition to these two sectors, there is room for 10% supporting companies. Currently the campus is completely full, next year new developments will be delivered to continue the growth. Community building is done through a newly developed app, a newsletter and regularly organizing networking events, both formal and informal.

The NTC has collaborations with various educational institutions, ROC Nijmegen, Hogeschool Nijmegen, HAN, Radboud and TU Delft. The collaborations are mainly aimed at developing start-ups and retaining knowledge in the region. In the facility area there is cooperation, it is possible for companies of the NTC to use research equipment from the Radboud UMC. In addition to the facilities, there is an active program to help students with internships/graduation and a job for the long term. For the future, there are plans to bring educational lines to the campus in Nijmegen; for example, an AI program of Radboud, Windesheim and Saxion.

The municipality of Nijmegen, the province of Gelderland and the development company PostNL have all contributed financially and policy-wise to the design of the campus. They are involved in the form of land acquisition and subsidies. This cooperation becomes more business-like because it is mainly loans that must be repaid in the long term. Financially, the campus is not independent, this is because the NTC owns the land, but not the buildings. As a result, a large part of the rent flows away to Kadaster, leaving little left for the campus. The campus wants to change this by developing three buildings itself and changing the leases for which the community management can be paid. The NTC tries to keep the quality of the campus high through market forces. Kadans' position is not uncontroversial as external investors are given the opportunity to step in at the end of each contract period. Tenants on campus pay a campus fee per square meter. There are also companies that participate in the community, which pay a community fee. The campus is affiliated with an international campus network.

According to the interviewee, a campus distinguishes itself on the ecosystem, establishing itself with companies in the same sector, radiating quality and identity, car-free terrain, central facilities, link with education and added value in networks.

### Start-up Novio Tech Campus Nijmegen

The choice to settle on this campus was made by the location, the link with Radboud UMC and the innovative environment. The step to the campus was taken to broaden the company's network and to look for partners for product development. In addition, the NTC is actively helping to develop small businesses. At the time of establishing the company, this was still in a start-up phase. This guidance has developed well, and the company is positive about that.

Since the establishment on campus, partners, suppliers and business guidance have been made possible by the NTC. The campus also unburdens the company's marketing and communication to increase awareness. Various collaborations can be found within the campus, for this company it is about using chips and semiconductors from other companies to develop their own equipment. It is also possible to use each other's equipment, this is done with both practical and high-quality devices. Sometimes this is done for a fee but also out of collegiality. The campus management plays a major active role in this, when a company is new to the campus, this is proposed to the other companies in the first months to make all useful contacts.

For the appearance to customers, it helps to be able to invite them to the campus, making the company seem larger and more professional, in which the ecosystem is also named. Due to the proximity of like-minded companies, there is growing confidence that the company can overcome problems and is robust enough to grow into a large company.

The real estate of the NTC is not new, this is noticeable in the energy efficiency and that cracks sometimes occur in walls. However, the role of the NTC / Kadans in this is very good, they act adequately when there are defects, offer sufficient flexibility to grow and adjust the building and in the opinion of the company get the most out of it.

The interviewee is not aware of market prices and cannot make any statements about price/quality level. However, he is willing to pay extra for services, facilities and settling with his current neighbors. For example, the campus contacts environmental inspections and other bodies where they serve as a filter for questions. Also, in the social field it is pleasant for the company to establish with other companies, examples of activities from the campus are mentioned. In addition, the company holds drinks on Fridays with other companies from the same building, this social aspect is highly appreciated by employees. However, there is still a central building with lunch or sports facilities missing, which would complete the campus.

In terms of development, it is estimated that it may have happened three times as fast as if the company had been in, for example, the Radboud UMC. They are enthusiastic about the ecosystem at the NTC and have their suppliers within walking distance.

### Start-up Novio Tech Campus Nijmegen

We looked at the choice of location worldwide, the choice for both the Netherlands and the NTC was made based on infrastructure and the possibility of attracting international talent. The connection with research institutes and a technically oriented city have been decisive in this. It works well in Nijmegen to settle as a foreign employee, better than in, for example, Amsterdam. Due to the focus on biotech, the company is quickly internationally oriented, making the proximity of Schiphol or Düsseldorf very pleasant.

The company is satisfied with the location and with the labs/office space it rents at the NTC, even though communication with the landlord sometimes does not go smoothly. The idea of the cross-pollination of knowledge finds this company at the NTC a little less, this is possibly caused by the steep growth curve that the company has gone through and that the company has almost outgrown the start-up phase after a few years. As a result, the company does not find the connection that it would have liked, from this it is concluded that the company did not have to establish a tech campus for the general business. Nevertheless, they are very pleased with the services and the appearance of the campus, employees use all activities and have regular contact with other companies.

Although there is contact with other companies, no formal collaborations or services provided arise from this, it is referred to that in Belgium campuses are developed more directly on cooperation for developments of specific products. It is said that this does not exclude that this takes place between other companies.

The separation between a landlord and a campus management team remains difficult. The vision of the campus management is to the company, but it would be nice if the basics were first put in order, for example charging stations for electric cars. The company is more enthusiastic about the campus management team than about the landlord. With this, they have classic tenant-landlord discussions about the rent and which adjustments may and may not be made to the building and the labs.

The impact of the campus on business operations is limited. The image is mainly used for recruitment because it is a pleasant working environment. The company would not leave quickly, unless the campus changes its policy and, for example, attracts competitors, then there is a fear of transferring confidential information or knowledge. The company also has all the labs, equipment and office space for itself. However, it does use the shared meeting rooms. A shared lunchroom would be an added value.

### Scale-up Novio Tech Campus Nijmegen

The NTC owns four buildings on campus, but all other buildings are owned by Kadans. The campus idea is alive in a way, but it is happy to be difficult because it is two parties, in our eyes it is more of an ambition than a campus, nevertheless the company would like to join the concept. The company would like to be part of this for attracting staff and community value for future employees. They are looking for a piece of social cohesion to be able to retain these specific technicians from abroad.

In the current situation, there is little substantive contact with and between the larger companies at the NTC. However, there is informal contact in the form of a pot of football or the barbecue that is organized from the NTC. In addition to informal contact, a connection with educational institutions is also a big advantage, this is currently not at the level at which it should be.

The company is connected to the NTC through various producers. In the choice of location, the fact that the workforce came from the Nijmegen region was strongly considered. With the current labor market, the company felt that it was not possible to lose some of its staff due to a move.

### Scale-up Novio Tech Campus Nijmegen

The company was already on campus before its establishment. As a result, there has been no active choice moment to settle on campus. The company is now closely involved in the developments of the campus and actively thinks along with this. The company recognizes the added value of the campus because you are active in the same sector and encounter similar problems. Here one learns from each other and can use each other's competencies. On the other hand, the semiconductor industry is not that broad, and the companies are in a sense also each other's competitors. This is dealt with by staying out of each other's waters where possible, but this does not always work, which sometimes also creates competition between neighbors.

The company also has collaborations on campus, in the form of suppliers but also consultations about developments. This is both with start-ups and with scale-up companies. The campus stimulates management by organizing social events, and they are mainly focused on facility matters.

The quality of the building is not high because it is an old building. Also, at this company there are tenant-landlord discussions about the price and who is responsible for making improvements to the property. Especially energetically, the current building is substandard. However, the company does have the option to dispose of part of the building. However, the company expects growth, which is why it will probably expand within the NTC.

The company is very pleased with the location of the NTC, Nijmegen is well located near Eindhoven where a lot of knowledge comes from. The accessibility by train, car and the parking options are also very pleasant.

However, the campus has no influence on business operations. However, the campus does support in attracting (international) talent. This could be improved by facilitating, for example, temporary housing for international employees. The company is also pleased with the movement to set up more cooperation with various educational institutions. The company expects that if it had its own real estate development that it would have more difficulty attracting staff because the NTC is attractive to employees.

The campus currently lacks a central restaurant/lunch facility and sports facilities for employees would also be an improvement. The company says that it is currently not realistic but that it will certainly be included in the future.

## Interview protocol

Real estate users

Interviewer: Koen Broekhuizen

Technical university Delft - Faculty of Architecture and the Built Environment

Student number: 4534522

Graduation organization: CBRE

Interviewee:

Duration: 45-60 min.

### Introduction (5 min)

Informed consent reminder -

Could you please introduce yourself?

Could you shortly state what is the main business of the current company you work at?

### Main questions (30 min)

#### Choice for the campus

For how long has this company been located at this campus?

Why has your company decided to locate at a campus?

Is your company pleased with their current real estate situation?

If your company, hypothetically, would have to make a location choice again, would you decide to locate at a campus again?

Would this be at the same campus?

#### Locating at the campus

How would you describe the relationship between different real estate users on this campus?

For example; informal contact, cooperating or competing? Possibly competing in the same sector?

How would you describe the contact your company has with other real estate users?

For example; only formal / or also informal? Having mixed lunches? After work drinks?

Attending events?

Could you make an estimation of the contact you have with different real estate users, and describe how this takes shape?

For example; weekly, monthly, yearly. Spontaneous encounters, planned meetings?

How do you experience the role of the campus management?

For example; Do they stimulate contact or cooperations? Do they organise events? What facilities do they offer?

Can you name concrete examples where the impact of the campus management team is noticeable?

#### Building

- Is the company satisfied with their current building?
- Price quality level?
- Flexibility of floors/ flexible amount of space?
- Length of contract?
- Energy label?
- Accessibility?

## **Business operations**

How would you describe the influence of locating on a campus on the growth of your company?

Do you think this development would have happened in a similar way if you would not have been located on a campus?

Can you name concrete examples of business opportunities that have presented itself by locating on a campus, that otherwise would not have been possible?

## **Ranking questions (20 min)**

Ranking of different location aspects:

Could you rank the following aspects from most to least important for the real estate strategy of your company? (Rank 1 is the highest and rank 10 the lowest)

- Building appearance
- Building quality
- Building sustainability
- Flexibility of the lease contract
- Availability of parking
- Accessibility
- Shared research & production facilities
- Amenities available in the surroundings
- Innovative collaboration
- Price/quality level

Please rate to what extent the campus supplies in the following aspects; With 1 does not supply at all and 5 fully supplies this aspect.

- Focuses on attracting real estate users active in the same sector
- Stimulates innovation
- Stimulates knowledge sharing
- Stimulates healthy rivalry
- Facilitates high quality real estate
- Facilitates an incubator environment for start-ups
- Facilitates in recruitment of talent
- Stimulates in the growth of network
- Stimulates commercial reputation

In order to finalize the interview, would you rate your satisfaction from locating at the current campus on a scale of 1-10, with 10 fully satisfied and 1 not at all satisfied.

## **Interview wrap up - (5 min)**

I would like to thank you for participating in this research

Are you interested in the results of this research and would you like to receive them upon completion of the research.

I intend to anonymise all personal data shared in this interview conform the informed consent letter, do you have any other objections I might have to take into account?

## Interview protocol

Campus management

Interviewer: Koen Broekhuizen

Technical university Delft - Faculty of Architecture and the Built Environment

Student number: 4534522

Graduation organization: CBRE

Interviewee:

Duration: 45-60 min.

### **Introduction (5 min)**

- Informed consent -

Could you introduce yourself first?

In addition, could you briefly explain your position within the campus management team?

### **Main questions (30 min)**

#### **Management**

Could you briefly take me through the emergence of the campus?

With what intention was the campus established?

Could you describe what the daily business of the management of a campus entails?

- How many people are actively involved in the management of the campus?
- What falls within the tasks of the campus management team?

What kind of admission policy is there to locate at the campus?

What is the (long-term) vision for the campus?

#### **Locating on campus**

What requirements do you think a campus should meet?

What are the main benefits that this campus offers its users?

What facilities does this campus offer?

- Are these accessible to everyone on campus?

Could you describe the collaboration between companies on campus?

- What is the role of management in this?

How would you describe the contact with educational facilities?

- Do real estate users also utilise this?

#### **Occupancy of the campus**

What is the vacancy rate on campus?

How is space facilitated for the growth of companies?

What are roughly the percentages for start-ups/scale-ups located on campus?

- In number
- In occupancy of sqm

Do you expect the campus to grow further in the future?

## **Ranking questions (20 min)**

**Ranking of different real estate aspects:**

**You can rank the following aspects from most important to least important for attracting businesses to campus.**

- Appearance of the building
- Quality of building
- Sustainability building
- Flexibility in lease contract
- Parking
- Accessibility
- Shared research or production facilities
- Amenities in the area
- Innovative collaboration
- Price/quality level

**Trends:**

**Rate the impact of the following trends on your campus. Do this on a scale of 1 to 5; with 1 no impact and 5 a lot of impact.**

- Increase in working from home / hybrid working
- New function of the office; shift towards collaboration and consultation
- Energy label C obligation/ general growth in attention to sustainability
- Temporary postponement in making decision with regard to real estate
- Decrease in high-quality real estate to attract talent

**Rate to what extent the campus provides the following aspects, do this on a scale from 1 to 5: with 1 does not provide and 5 provides completely.**

- Focuses on attracting companies that are active in the same sector
- Stimulates innovation
- Stimulates the knowledge sharing
- Stimulates healthy rivalry
- Facilitates high-quality real estate
- Facilitates an incubator environment for start-ups
- Facilitates in attracting talent
- Stimulates the growth of the network
- Stimulates commercial reputation



**What are the 3 aspects that established companies value most about this campus? These may also be aspects that have not yet been addressed.**

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**What kind of trends do you expect to have a major impact on this campus in 5 years' time?**

**Interview wrap up - (5 min)**

Thank you for participating,

Are you interested in the results of the research?

Discuss possibility of anonymizing data

## Informed consent letter

Delft, 28-09-2022

Dear Sir/Madam,

Through this document, I would like to formally inform you of all information regarding participation in this research.

- The research is carried out by Koen Broekhuizen and covers a 1 on 1 interview of approximately 60 minutes. The interview will be recorded with an audio recording and will be automatically transcribed with Microsoft Teams.
- Through policy of the Delft University of Technology it is obliged to ask for separate permission for the recording and processing of the data relating to the interview.
- This data will be stored on an online storage secured by TU Delft and will only be shared in non-anonymized version with those directly involved in the research, this concerns; graduation supervisors from both TU Delft and CBRE, and myself, Koen Broekhuizen.
- The anonymized version of the interviews will remain available on request via Delft University of Technology as a dataset for reference and possible follow-up research.
- No personal data will be published in the final report and resulting publications, nor will the name of your company be mentioned herein. However, the name of the campus on which you are located will be mentioned, which, in combination with other published data, may make it possible to trace which company has stated specific comments.
- The results of the research will be fed back to the four campuses on which the research will take place, respectively the Novio Tech campus, Pivot park, High Tech Campus and the Dutch Tech campus.
- If desired, the results will also be fed back to all participating companies.
- The research and the results will be shared with both CBRE and the TU Delft.
- On the next page, the abstract of the study has been written out to confirm that you are aware of the research in which you are participating.

## Research abstract

Campuses have recently drawn attention from governing organisations in the Netherlands and are identified as promising types of office- and university development on national, regional and company levels (Ministerie van Economische Zaken en Klimaat, 2019). Millions of dollars are invested in campuses by local and regional governments in order to attract businesses and jobs towards the respective regions and to stimulate innovation and Research & Design (Baggerman, 2020; Campussen subsidie, 2022; Versnellen campus-ontwikkeling, 2022; Ministerie van Economische Zaken en Klimaat, 2019) However, the title of campus is not protected nor has an undisputed definition and therefore is subject to inflation (Magdaniel et al., 2018). This leads to the contradiction that public money is invested in initiatives that can differ in various ways and therefore remain unclear in how they should be managed successfully and what they deliver for their users. Researches state that clustering people and businesses leads to more innovation (Belso-Martínez et al., 2020; Bolter & Robey, 2020; Glaeser, 2010; Guzman, 2019). Campus developments rest on the same principles. However, when approaching a campus from the demand side a campus should deliver the user preferences demanded by real estate users. This in order to attract them to the physical location and play a positive role in incubating and facilitating the respective real estate users (Ng et al., 2020; Remøy & van der Voordt, 2014). In order to reduce uncertainty surrounding campuses for policy makers, managers and users, these developments have to be redefined on what they are, what they intend deliver and whether or not that what is supplied matches the demand. Therefore the following main question will be answered; *What are the perceived benefits campuses deliver for its real estate users?* This will be answered by making use of literature study covering the definition and theoretical benefits. Secondly a case study towards four different campuses will be executed. This case study will consist of semi-structured interviews with both start-up and scale-up companies and the respective campus management teams in order to establish what benefits are delivered by locating on a campus.

If you participate, I ask you to put your signature at the bottom of this letter and return it to me as a PDF. When I quote your words, I promise not to use your name and I make sure that it is not clear who may have said this. Your name and contact details will be destroyed at the end of the research.

**To be signed by interviewee and student**

I declare that I have been informed in a clear manner about the nature, method, purpose and burden of the research.

My questions have been satisfactorily answered.

I understand that the sound and/or visual material (or the processing thereof) and the other collected data will be used in scientific presentation and publications and that the results of the research will be shared within CBRE.

I reserve the right to terminate my participation in this study at any time, stating the reasons.

**I have read this form or the form has been read to me and I agree to participate in the study.**

- I would like to receive a short summary of the results of the research at the end of the research. For this reason, I grant permission to keep my name and address details until the end of the investigation.**

Place:

Date:

----- (Full name, in block letters)

----- (Participant's signature)

'We have explained the investigation. We declare our willingness to answer outstanding questions about the research into wealth.'

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Koen Broekhuizen

Images have been retrieved from the following links and were publicly accessible through google:

<https://hightechcampus.com/storage/content/1605728573.jpg> (High Tech campus website)

<https://pbs.twimg.com/media/E2YjwkMWUAlfapH.jpg:large> (Twitter; @Brabantisbright)

<https://propertynl.com/media/newsarticles/96/22/75/82/96227582-ec7b-4f35-b0d3-0c427f0722c3/images/dutch-tech-campus.jpg> (Property NL, news website)

<https://images.fd.nl/amHV1NsQV3JT2X8DxFIQDfhSIVQ.jpg?auto=format&w=1280&q=45> (Financieel dagblad)