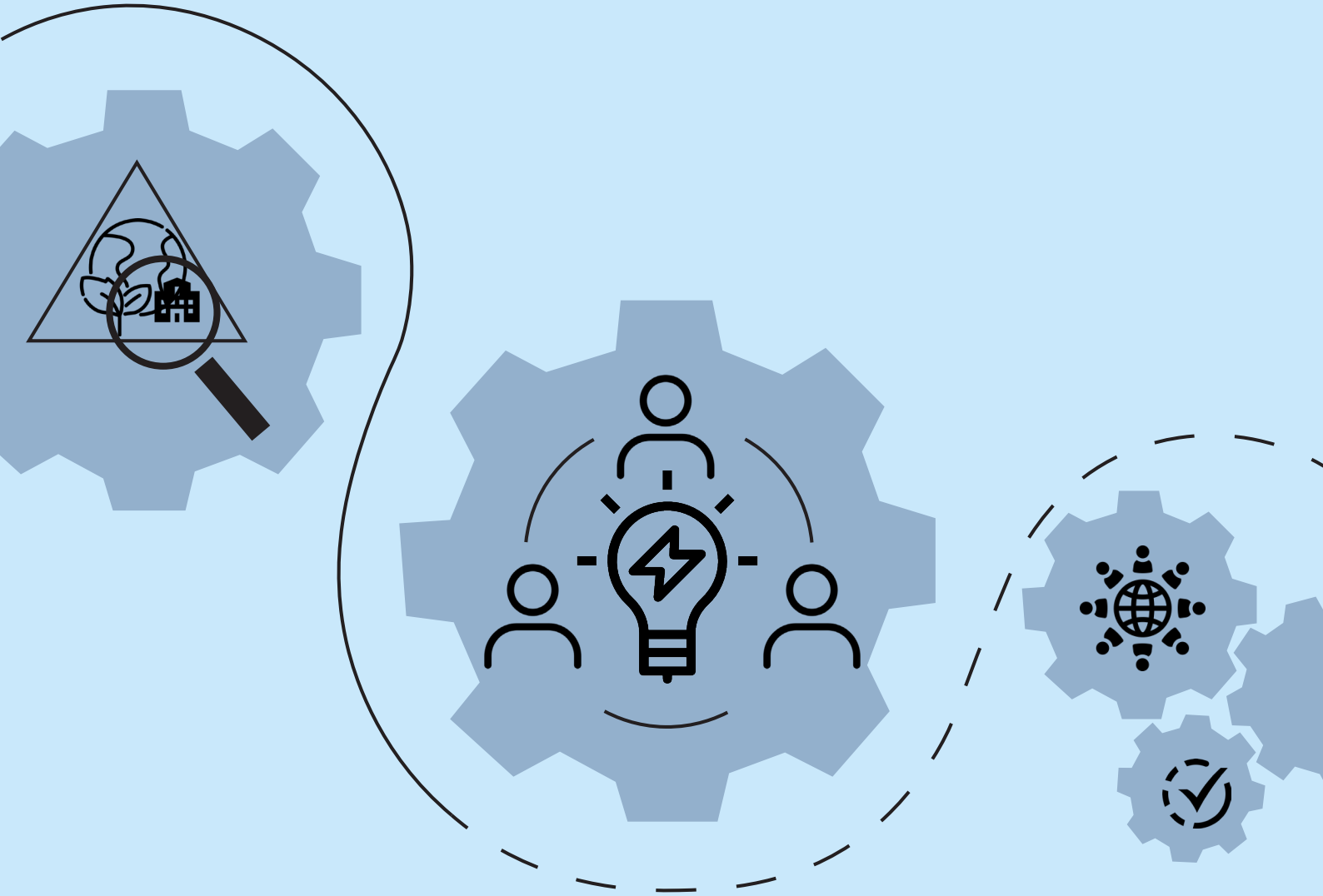
THE USE OF KNOWLEDGE TRANSFER IN CAMPUS REAL ESTATE MANAGEMENT ABOUT SUSTAINABILITY

AN EXPLORATORY STUDY



Neva Wardenaar

Master Thesis

June 2023

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Colophon

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AN EXPLORATORY STUDY

PERSONAL DETAILS

Name:	N.O. (Neva) Wardenaar
Student number:	4593308

REPORT DETAILS

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EDUCATIONAL DETAILS

Institution:	Delft University of Technology
Faculty:	Architecture & the Built Environment
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SUPERVISION

1st mentor:	Prof. dr. ir. A.C. (Alexandra) den Heijer
2nd mentor:	Prof. dr. A.H. (Alfons) van Marrewijk
Examiner:	Dr. J.A. Mejia Hernandez

GRADUATION COMPANY
TU Delft Campus Research Team

TU Delft BK Bouwkunde
Department of Management in the Built Environment

Preface

Dear reader,

This thesis presents my graduation research for the master track Management in the Built Environment at Delft University of Technology. This thesis is the result of almost a year of work, starting from September 2022. With this project, my time at the Faculty of Architecture, and my study career comes to an end.

Throughout the process I had the help from a lot of people, who have contributed in various ways. I would like to thank my supervisors, Alexandra den Heijer and Alfons van Marrewijk for their guidance, input and feedback during the research process. Also, I would like to thank Monique Arkesteijn, who helped develop my research topic in the first weeks but unfortunately had to hand over the mentorship.

In addition, I would like to thank all the people who allowed me to interview them, invited me to their campus and showed me around. I also really appreciate it that you let me join the network meeting and that you were all very open about everything. This all helped me form a better image about campus management and let me gain valuable insights.

Finally, I would like to thank everyone else who supported me during my studies, and helped me throughout the graduation process. I know I was not the easiest person to be with during this stressful period. I want to say sorry for all the frustration, grumpiness, and absent moments.

I hope you enjoy reading my graduation thesis.

Sincerely,

Neva Wardenaar
Delft, June 2023

Abstract

The Dutch national climate agreement mentions important goals related to sustainability. The task is to reduce CO2 emissions by 49% in 2030 compared to 1990 and by 80 to 95% in 2050. To achieve these goals, every sector, including public real estate like universities, needs to contribute. This study focuses on the 14 Dutch universities. Universities are urged to set an example because of their socially responsible character. In 2008, the Dutch universities signed a covenant to reduce their energy consumption and CO2 emissions. However, there is still a lot of improvement needed. A network of academic experts for knowledge exchange can help with this. Exchanging knowledge within an inter-university network could give many new and valuable insights for implementation. At this moment, universities are mainly reinventing the wheel instead of exchanging insights with others. This research is about the different existing networks, drivers, barriers, and tools of knowledge sharing between universities and provides an answer to the main research question: *"How can inter-university knowledge transfer support university campus managers to achieve the universities' sustainability goals?"*. It serves as exploratory research for the larger Campus NL research from the TU Delft Campus Research Team. One of the topics they are going to research is campus learning. Through an extensive literature review, 10 in-depth semi-structured interviews, strategy-analysis, and observations, this research concludes that every university has the same goals, and by working together, they might find possible ways to achieve these goals sooner. They can stick together to get more funds or guidance and get insights into what others are doing. This research provides an overview of the barriers and drivers of knowledge transfer that campus managers working on the energy transition are experiencing at this moment and therefore contributes to the debate of knowledge transfer and campus management. In addition, it serves as a starting point for the Campus NL research.

Keywords | Knowledge transfer, campus management, barriers and drivers, sustainability goals, real estate

Executive summary

Introduction

The Dutch national climate agreement mentions important goals related to sustainability. The task is to reduce CO2 emissions by 49% in 2030 compared to 1990 and by 80 to 95% in 2050. To achieve these goals, every sector, including public real estate like universities, needs to contribute. Universities are urged to set an example, because of their socially responsible character. In 2008, the Dutch universities signed a covenant to reduce their energy consumption and CO2 emissions. However, there is still a lot of improvement needed. A network of academic experts for knowledge exchange can help with this. Exchanging knowledge within an inter-university network could give many new and valuable insights for implementation. At this moment, universities are mainly reinventing the wheel, instead of exchanging insights with others.

This research is about the different existing networks, drivers, barriers, and tools of knowledge sharing between universities. It serves as an exploratory research for the larger Campus NL research from the TU Delft Campus Research Team. One of the topics they are going to research is campus learning.

Research questions

The aim of this research is to find out how knowledge transfer between Dutch universities about the implementation of their real estate sustainability goals occurs and how this can help real estate managers achieve the sustainability goals. Therefore, the main research question is: *"How can inter-university knowledge transfer support university campus managers to achieve the universities' sustainability goals?"*

To answer the main question, the following sub-questions were formulated:

1. *What are the barriers, drivers, and tools of knowledge transfer?*
2. *What does the sustainability task of university real estate management entail?*
3. *How and to what extent are universities transferring knowledge to other universities about their real estate?*

Theory

All buildings on the 14 university campuses in the Netherlands occupy a total of about 4.4 million m^2, which is about 6% of the total public real estate in the Netherlands. A campus can be defined as all the buildings and land that host universities and university-related functions. This does not mean that every building of a university needs to be in one location. In the Netherlands, university buildings are owned by the universities, and campus management is carried out by campus or real estate managers. Campus management affects the university's performance since decisions such as location, buildings, and facilities have an impact on students' and academics' lives, work, and innovation. This is done by integrating stakeholder perspectives such as condition, location, user demand, benefits and costs, institutional goals, and energy aspects. These aspects can be grouped into four perspectives: the physical perspective, the functional perspective, the financial perspective, and the organizational perspective.

Inter-organisational knowledge transfer is the transfer of knowledge between two or more organisations. Knowledge is the lifeline of organisations. In order to be successful, organisations depend heavily on knowledge. Managing knowledge and, therefore, knowledge transfer is important due to its many positive effects, such as increased productivity, higher performance, and better

innovation capability. Many articles refer to this phenomenon in different sectors. There is one article that mentions this in the university sector. In practice, every campus reinvents the wheel, while exchanging knowledge within an inter-university network could give many new and valuable insights for implementation.

There are different barriers and drivers related to knowledge transfer at different levels. These can be grouped on an individual level, on an organizational level, and on a technological level. Table 1 shows an overview of the barriers and drivers mentioned in the literature.

Barriers	Drivers
Individual level	
Lack of time	Willingness
Fear	Asking for help
Bad communication	Skills
Lack of social network	Central point
Lack of trust	
Lack of motivation	
Lack of openness	
Overload on information	
Organisational level	
Lack of integration	Integration
Poor leadership	Good leadership
Lack of support	Rewards
Lack of rewards	Contact
Lack of space	Culture
Culture	Networks
Lack of networks	Structure
Structure	Training
Financial constraints	Help
Time pressures	Information methods
Technological level	
Lack of integration	Central point
Lack of support	Support
Unrealistic expectations	Communication
Mismatch	Time
Lack of training	
Overload	

Table 1. Barriers and drivers of knowledge transfer

There are also tools that help people share tacit knowledge that otherwise sticks in their minds. These tools can be either digital or physical. The digital tools consist of IT structures such as a knowledge repository. The physical tools are coaching, mentoring, or storytelling. The digital tools cannot replace the personal, trust-based relationship, and therefore a combination of both works best.

Methods

To gain insights into knowledge transfer between universities, an empirical research was conducted. This graduation thesis is an exploratory research for the larger Campus NL research, where one of the subjects is campus learning. This thesis consists of three parts: a theoretical part, empirical research, and conclusions. A theoretical background is laid out in the first part. Here the concepts of campus management, knowledge management, knowledge transfer, and the sustainability challenge of universities are explained. The empirical part consists of an analysis of the real estate and sustainability challenge of the 14 Dutch universities, observations during a network meeting, and in-depth interviews with 10 campus managers and coordinators working on the energy transition. In the last part of the research, the findings of the theoretical and empirical parts are combined and conclusions are drawn.

Findings

Real estate and sustainability strategy

In the real estate and sustainability strategies, different documents of the 14 Dutch universities were analysed on their sustainability goals and whether they mentioned something about collaborating with other universities or, more specifically, knowledge exchange between them. Table 2 shows a summary of the analysed universities, what the main source of information was, and if they mentioned anything about collaboration and knowledge exchange.

University	Found	Document or website	Collaboration / knowledge exchange mentioned
Erasmus Universiteit Rotterdam	✓	Document	✓
Maastricht University	✓	Website	✗
Open Universiteit	✓	Website	✗
Radboud Universiteit Nijmegen	✓	Website	✗
Rijksuniversiteit Groningen	✓	Document	✓
Tilburg University	✓	Website	✗
TU Delft	✓	Document	✗
TU Eindhoven	✓	Document	✗
Universiteit Leiden	✓	Website	✗
Universiteit Twente	✓	Document	✓
Universiteit Utrecht	✓	Document	✗
Universiteit van Amsterdam	✓	Document	✓
Vrije Universiteit Amsterdam	✓	Document	✓
Wageningen University	✓	Document	✗

Table 2. Overview of analysed universities

The real estate and sustainability strategies of the 14 universities all mentioned their sustainability goals. These goals are related to the Trias Energetica: minimizing energy use, using sustainable materials, and making efficient use of fossil fuels. The tasks of reducing CO2 emissions by 49% in 2030 compared to 1990 and having full circularity in 2050 were also mentioned, although some universities had more ambitious goals. Not every university had a document publicly available; in that case, the website was taken into account as well. Some universities mentioned something about collaborating with other universities or other partners, and one university even said something

about knowledge transfer. But this is in a different context than sharing knowledge about their sustainable real estate with other universities.

Interviews and observations

During the interviews, interviewees were asked about their job within the university, what networks they participate in, and which networks they are familiar with. After that, they were asked about barriers and drivers they experience; statements were posed to help with this; and possible tools were discussed. The interviews ended with the question of what they were missing in the knowledge sharing process. The interviewees mentioned that they are missing a lack of structure in the current system for knowledge sharing.

This could be due to the fact that there is a difference in organization or the lack of time the interviewees have to fully incorporate knowledge sharing into their job. They mentioned, specifically or between the lines, different tools for knowledge sharing, the different networks they participate in, and the digital environment to share documents and use the chat function. Although this environment is available, they prefer meeting in person on a regular basis to exchange information, share problems, and find solutions.

The observations were made during a network meeting with energy coordinators hosted in Wageningen. This day was meant to make agreements on the future of the network; they discussed relevant topics and structure. In the afternoon, presentations with information from different organisations was shared.

Conclusion

Knowledge transfer can help by sharing problems and ideas and getting insight into what others are doing. A possible tool for this is network meetings. However, there needs to be someone who can take the lead and provide a clear structure. The most important thing is communication. Every university has the same goals, and by working together, they might find solutions for their problems sooner. They can also stick together to achieve more guidance from higher up.

Limitations

This research is bound to limitations. Here the limitations are stated, and how they can be solved.

- In this research, the data collection is done through purposive sampling. The interviewees are all on the same network. This provided insights into the barriers, drivers, tools, and wishes for that network. but did not show any results on whether people not in a network also feel the need to share knowledge with other universities. To have a more complete understanding of this, it could be useful to also include participants who are not already in a knowledge-sharing network.
- Due to limited time, only one person from each university was asked to participate in the research. The results are therefore only based on one perspective of the university. Adding different perspectives from each university could make the research more valuable.
- The data for the strategy analysis consists of only documents or websites that could be found online. During the interviews, the participants were asked whether information was available online, which was not the case for every university. While this also says something about the openness of universities to share their goals, it can also mean that important notions were missed. By asking the universities directly for their sustainability strategy or real estate strategy, this could have been prevented.

Recommendations

Based on the results of this research a couple of recommendations are formulated. These are for future research and for practical implementations.

Practical recommendations Campus NL research

- Since every university has a different organizational structure, knowledge sharing is more challenging. It is useful to take this into account.
- This study only took into account people working on the energy transition. It would be interesting to see if there are differences between other types of campus managers.
- The participants in this research are experiencing a lack of time for their knowledge-sharing activities. It might be useful to attend a network meeting that is already scheduled since people have already cleared their schedules for that.
- Filling out large sheets for dashboards or questionnaires is considered a burden for some. A balance in the length of the questionnaire and interviews should be found; when it is too long, people will not participate.
- According to the interviewees, there are some commercial networks that are also focusing on knowledge sharing. For this thesis, time was limited, and therefore it was not possible to dive into these networks, but by doing so, insights about why they work or why universities are not participating in those networks could be gained.
- This research and the claims made by participants are not checked and verified by other organizations such as the "Universiteiten van Nederland" (UNL), or the Dutch government. It would be good to include their perspectives as well.

Practical recommendations for knowledge sharing between universities

- There is motivation and willingness to share knowledge, and people find it useful. It is therefore important that people keep meeting on a regular basis.
- Meeting regularly makes it easier to share knowledge; there will not be an overload of information at once, and people will get to know each other better.
- Face-to-face meetings work best, and creating or maintaining a structure for the meeting is necessary.
- Because of the experienced lack of time, it might be useful to release budget, hire an external person who can facilitate meetings, make notes, and make sure that everyone is well informed before and after the meetings.
- This could potentially be someone from the Universiteiten van Nederland, since they are the umbrella organisation of all Dutch universities. They know what the task is, and information could be shared more directly.

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1. Introduction

The Dutch National Climate Agreement mentions important goals related to sustainability. The task is to reduce CO2 emissions by 49% in 2030 compared to 1990 (Ministerie van Infrastructuur en Waterstaat, 2021) and by 80 to 95% in 2050 (Planbureau voor de Leefomgeving, z.d.). To achieve these goals, every sector, including public real estate, needs to contribute. The public real estate sector includes healthcare, sports, monuments and museums, community real estate, primary and secondary education, and higher education with a social purpose. These buildings may also serve as examples for other parts of the Netherlands. (Rijksdienst voor Ondernemend Nederland, 2022). Universities are urged to set an example since they are socially responsible institutions that are committed to solving societal challenges and stimulating sustainable development (Curvelo Magdaniel et al., 2019). Dutch universities are focusing increasingly on sustainability through the environment, academia, engagement, innovation, and management. Collectively, they acknowledge that this is something that they have to work on. A covenant to reduce energy consumption and CO2 emissions on campus by 30% in 2020 and 50% in 2030 was signed in 2008 (den Heijer, 2021). However, according to research, there is still a lot to improve, and conditions differ per university. In 2016, 51% of campus real estate was not in a good condition (den Heijer et al., 2016), and 33% of the buildings are outdated and need major investments (Algemene Rekenkamer, 2018).

In the Netherlands, all the university buildings of the 14 universities together take up approximately 4.4 million m^2, which is about 6% of all the public real estate in the country (VSNU, 2019). These buildings are located on a university campus. The campus is a "collection of buildings and land, used for university and university-related functions and not necessarily in one location" (den Heijer, 2021, p. 31). The university buildings are owned by the universities, and campus management is carried out by their campus or real estate directors. Campus management integrates stakeholder perspectives such as condition, location, user demand, benefits and costs, institutional goals, and energy aspects to affect the university's performance. Decisions that campus management makes regarding the location, buildings, and facilities on campus have an impact on students' and academics' lives, work, and innovation (Rymarzak et al., 2020).

Since 2000, all Dutch universities have collectively funded research to improve the effectiveness and efficiency of campus management (Rymarzak et al., 2020). The campus manager needs support from other public real estate managers who are doing the same job. A network of academic experts for knowledge exchange can help with this (den Heijer, 2021). Managing knowledge and knowledge transfer is important due to its many positive effects, such as increased productivity, higher performance, and better innovation capability (Asrar-ul-Haq & Anwar, 2016). Exchanging knowledge within an inter-university network could give many new and valuable insights for implementation (Hopff et al., 2019).

1.1 Problem statement

Since the covenant to reduce energy consumption and CO2 emissions was signed in 2008 (den Heijer, 2021), the universities have participated in the national long-term energy saving agreements (MJA3). Every year, it was checked whether the participating organizations were still on track with their energy savings. However, this MJA3 ended in 2020 (Rijksdienst Voor Ondernemend Nederland, 2017).

In the next 10 years, universities need to increase their efforts to meet the goal of having a CO2-neutral campus by 2050. To accomplish this, the VSNU made a roadmap for universities based on the Dutch Climate Agreement. Their strategy is based on the following five points: (1) Interventions will be done at natural moments of replacing and renovating the buildings; (2) the trias energetica has to be implemented everywhere; (3) natural gas is being phased out; (4) every building has LED lights; (5) universities will renew a major part of their real estate (VSNU, 2019).

Achieving this energy transition requires a shift in power generation, distribution, and consumption (Dall-Orsoletta et al., 2022). Next to this, universities want to make their campuses more circular and have an important role in guiding circularity development. A circular development process needs other ways of thinking and collaborating in networks to stimulate the exchange of knowledge between different actors like clients, designers, consultants, etc. (Hopff et al., 2019). Also, for the energy transition, technological, social, and organizational changes are necessary (Dall-Orsoletta et al., 2022). Every university faces the same challenges; they have the goals of the National Climate Agreement and the VSNU Roadmap. Collaborating and exchanging knowledge to meet these goals seems like an obvious solution since this could provide valuable insights (Hopff et al., 2019).

Universities are eager to exchange information and learn from similar circumstances (Curvelo Magdaniel et al., 2019). However, knowledge transfer is one of the most complex challenges managers encounter in inter-organisational partnerships (Milagres & Burchart, 2019). And in particular for universities, collecting, using, and sharing information about campus management is becoming more relevant and, at the same time, more complex (Curvelo Magdaniel et al., 2019). Campus managers need support from other public real estate managers, and a network can help with this (den Heijer, 2021). However, in practice, every university is working on their own island and reinventing the wheel for their campus (Hopff et al., 2019).

1.2 Aim and objectives

The aim of this research is to find out how knowledge transfer between Dutch universities about the implementation of their real estate sustainability goals occurs. Curvelo Magdaniel et al. (2019) mention that more research into knowledge management in universities and campus management is needed. The TU Delft Campus Research Team has made several research missions, and one of them is that a network of academic experts for knowledge exchange can help campus managers (den Heijer, 2021). However, they have not researched this phenomenon in detail yet, so this graduation thesis can help their research by exploring how knowledge transfer between Dutch campus real estate managers is perceived, what barriers and drivers are occurring, and finding out what campus managers are missing to provide some guidelines. So, more specifically, the aim of this thesis research is to find out what knowledge transfer tools, barriers, and drivers there are between Dutch universities and if they are different from the literature. This can serve as a starting point for the new Campus NL research from the Campus Research Team.

In 2006 and 2016, the TU Delft Campus Research Team conducted research into the real estate of Dutch universities under the name Campus NL. The research team is currently strating up a

new campus study. Campus NL aims to bundle the knowledge and experience of the 14 Dutch universities in order to jointly tackle the challenges on campus – innovative, sustainable, affordable, inspiring, efficient and healthy – and to improve campus management within each of the universities to organize (more) efficiently.

One of the topics that the Campus NL research will investigate is "campus learning," which concerns how the knowledge from the research can be disseminated within the universities. The aim is to build a knowledge-sharing organization step by step. This graduation research is an exploratory study into how knowledge exchange is currently taking place, what campus managers like about it, what can be improved, and thus forms an additional starting point for Campus NL research.

1.3 Relevance

Societal relevance

The sustainability challenge is something that everyone needs to comply with, and to make it happen, collaboration is needed. However, at this moment, things are not going as fast as needed. Universities have a social responsibility to solve societal challenges and improve sustainable development.

Knowledge transfer is an important process for people to learn and innovate. However, people need to be motivated to do so; otherwise, it will not work. Knowledge sharing helps people work together and build shared knowledge. Also, it stimulates the search for innovative ways to improve property. By transferring knowledge, communities are built and a learning culture arises. Knowledge transfer also creates better experiences and makes people feel good. Knowledge sharing can help create innovative solutions and work together on the same subject.

This research provides practical implications for real estate managers who are responsible for university real estate. By exploring how knowledge transfer between universities works, the research may provide significant insights and practical direction for applications in the real world. Because of the socially responsible character of universities, examples can be set for the rest of the public sector. Knowledge transfer can also be useful between other types of public real estate, such as the Dutch Government Real Estate Agency, municipalities, and hospitals, for example.

This can also be seen in much broader societal relevance. When looking at the Sustainable Development Goals, in particular goal 17, which emphasizes the importance of collaboration and knowledge sharing for sustainable development (SDG Nederland, 2022). This research is very small, but in that sense it can also contribute to the SDGs.

Scientific relevance

This research is scientifically relevant because, even though knowledge transfer is a well-established area of research in the academic world, there is a limited amount of research on knowledge transfer between universities. Curvelo Magdaniel et al. (2019) suggest that more research into knowledge management in campus management at universities is needed. By investigating how inter-university knowledge transfer can facilitate achieving sustainability goals, this research adds to the existing literature on knowledge transfer by exploring a new context and different challenges.

Next to that, the topic of sustainability is one that is relevant for not only Dutch universities but also universities worldwide. And even beyond that, the whole built environment. This research can provide valuable insights and add to the already existing campus real estate management literature

by adding the factor of knowledge sharing. In Dutch campus real estate, everyone drives a similar boat, but it is not necessary for everyone to reinvent the wheel themselves. That is why knowledge sharing is so important. Universities are knowledge-sharing institutes that work together on different types of research. However, it is not yet known if this is also the case in regards to sustainability and their real estate.

This research explores the fields of sustainability, knowledge transfer, and real estate management. Because it combines those fields, it has the potential to contribute to interdisciplinary knowledge and understanding. Something that seems necessary for solving complicated issues such as sustainable development.

The TU Delft campus research team is currently starting a new Campus NL research project in which they also focus on knowledge sharing. This thesis could serve as exploratory research and might give insights that can be used as a starting point in the first phases of the Campus NL research. Therefore, it can have direct scientific relevance.

1.4 Research questions

The main research question of this research is:

"How can inter-university knowledge transfer support university campus managers to achieve the universities' sustainability goals?"

Sub-questions:

1. *What are barriers, drivers, and tools of knowledge transfer?*

2. *What does the sustainability task of university real estate management entail?*

3. *How and to what extent are universities transferring knowledge to other universities about their real estate?*

The following questions are part of sub-question three:

a. *What knowledge transfer tools do they use?*
b. *What barriers and drivers do they experience?*
c. *How satisfied are university real estate managers about knowledge transfer or what can be improved?*
d. *To what extend is knowledge transfer about real estate incorporated in their real estate strategy?*

1.5 Conceptual model

Based on the literature on knowledge management and knowledge transfer, the sustainability requirements, and the goals, a conceptual framework for knowledge exchange between universities is developed for this thesis. Figure 1 shows the conceptual model.

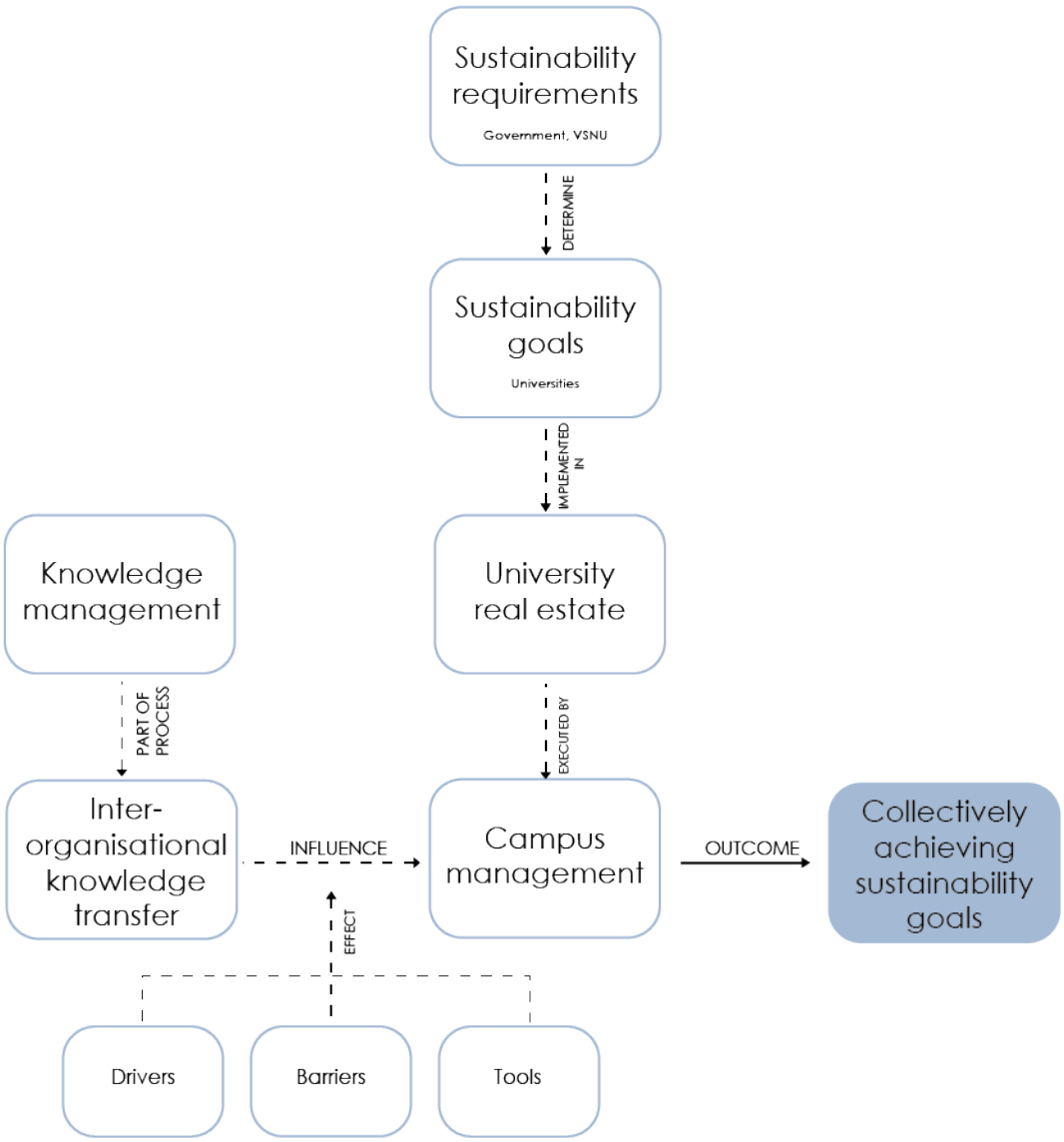

Figure 1. Conceptual model. Own figure.

The research consists of three parts. The first part focuses on the principles of knowledge transfer, campus management, and the sustainability challenge. In the second part, an analysis of the available campus and sustainability strategies is conducted by means of desk research. This is to investigate what universities themselves see as goals and if they mention knowledge transfer in achieving them. The last part of the research is to get a perspective on knowledge sharing between the managers working on the sustainability goals.

2. Methods

This chapter describes the research methods of this thesis. The research design and methods used in this study will be provided.

2.1 Research type

The research aims to find out the barriers and drivers in knowledge transfer between Dutch university real estate managers to propose recommendations for knowledge transfer between universities and for the upcoming Campus NL research. To achieve this, a qualitative, empirical research method is used to analyse the knowledge transfer process as it occurs right now.

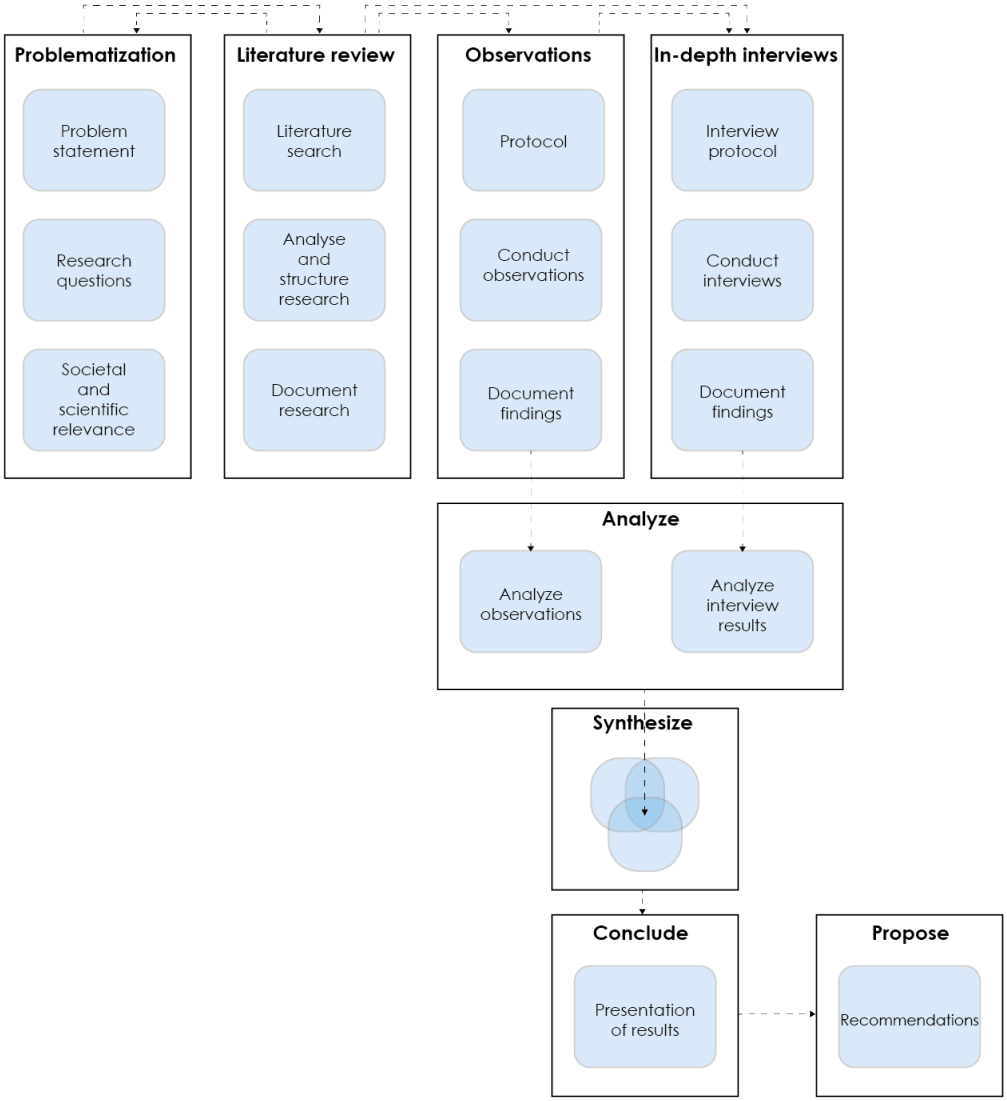

Figure 2. Research Framework. Own figure.

Figure 2 provides an overview of the research framework. The literature review explains knowledge transfer and the different barriers and drivers that come with it. Hereafter, empirical research was conducted to understand the sustainability challenge of university real estate departments and provide insight into how universities transfer knowledge. This consists of two components. First, desk research has been done to explore the real estate strategies of universities, gain insight into the current state of university real estate, and see whether they have public information available or not. Second, the empirical research goes more in depth on how knowledge transfer between university real estate departments works. This is done through observations and interviews. In the final part of the research, the interpretation of the research findings will be described, conclusions will be drawn, and recommendations will be made.

2.2 Research methods

Desk research

When starting research, it is important to find out what information is already available. This can be done by researching academic papers, existing data, or other documents. Researching existing information can also be described as "desk research" (Baarda et al., 2012).

Problematization

The problem statement has been made after researching existing literature on the subject of knowledge transfer and the sustainability of Dutch university real estate. The knowledge gained from this literature study forms the basis for the problem statement. Following this problem statement, research questions are developed to address and explore the problem more. After this, societal and scientific knowledge will be used to address the relevance of the research.

Literature review

With a literature review, a better understanding of the main subjects of the topic was gained. It serves as a possible source of ideas or theories (Blaikie & Priest, 2019) about knowledge transfer. The literature consists of several papers retrieved from Scopus, the TU Delft repository, and Google Scholar. The literature has been found based on the following keywords: knowledge management, knowledge governance, knowledge transfer, inter-organisational knowledge transfer, barriers, drivers, universities, sustainability, circularity, strategies, organisational learning, campus real estate, and competitive advantage. These keywords were searched individually and in different combinations, such as “inter-organisational knowledge transfer universities” and “sustainability university campus real estate."

Field study

Blaikie & Priest (2019) refer to "field research" as when a researcher is immersed in the (work) lives of the people being studied. This involves a combination of methods, of which participant behaviour may be the main one. In this research, doing interviews, making observations, and analysing reports will be used as methods.

Reports

In the Netherlands, there are 14 universities, and most of them are the owners of their real estate (den Heijer et al., 2016). For this research, the available campus or sustainability strategies of these universities were reviewed to see if they mentioned anything about knowledge sharing with other universities and what they mentioned about the sustainability task. The reports have been reviewed on sustainability aspects such as energy labels and circularity plans. In addition to that, the search consists of keywords like "networks," "collaboration, "knowledge transfer," and "knowledge sharing." These documents, together with the theoretical background of knowledge transfer, will form the basis for understanding the topic and the creation of the interview questions.

Interviews

Data obtained from the literature review has been analysed and served as the basis for the semi-structured interview questions. The interviews were conducted with real estate managers working on the energy transition at universities. A semi-structured interview refers to an interview where the interviewer has a framework of interview questions, the interview protocol, but is able to vary the sequence of questions or ask further questions based on given answers (Bryman, 2016). This type of interviewing is chosen to allow room for follow-up questions. 10 people working on the energy transition at different universities were interviewed. Three others were contacted but were not available or did not respond. Because of the Open Universiteit only having real estate for employees, it was decided not to include them in the interviews. By doing the interviews, a better understanding of the barriers and drivers of their knowledge sharing process in the field of Dutch

university real estate will be gained.

The interviewees are only described anonymously in this report. However, they are known to the supervisors. In this report, they will be mentioned as follows:

(1)	Energy coordinator	(University A)
(2)	Head facilities and energy	(University B)
(3)	Energy coordinator	(University C)
(4)	Facilitator energy transition	(University D)
(5)	Sustainability manager	(University E)
(6)	Advisor energy management	(University F)
(7)	Head of energy department	(University G)
(8)	Sustainability advisor	(University H)
(9)	Sustainability manager	(University I)
(10)	Quality manager	(University J)

Interviewing was done based on an interview protocol. The interview protocol can be found in Appendix 1.

Observations
In addition to the interviews, observations were also made at a meeting for knowledge sharing between campus managers working on the energy transition. During this meeting, there was note-taking on the discussed subjects and comments made by participants, and in addition, some questions were asked to participants afterwards.

Synthesise, conclude and propose
Once the data was collected through the previously mentioned methods, the findings could be summarized and conclusions drawn for each sub-question. In addition to this, recommendations were made for both the existing networks and the upcoming research at Campus NL.

Figure 3 shows the connection between the research questions and the methods used in this research.

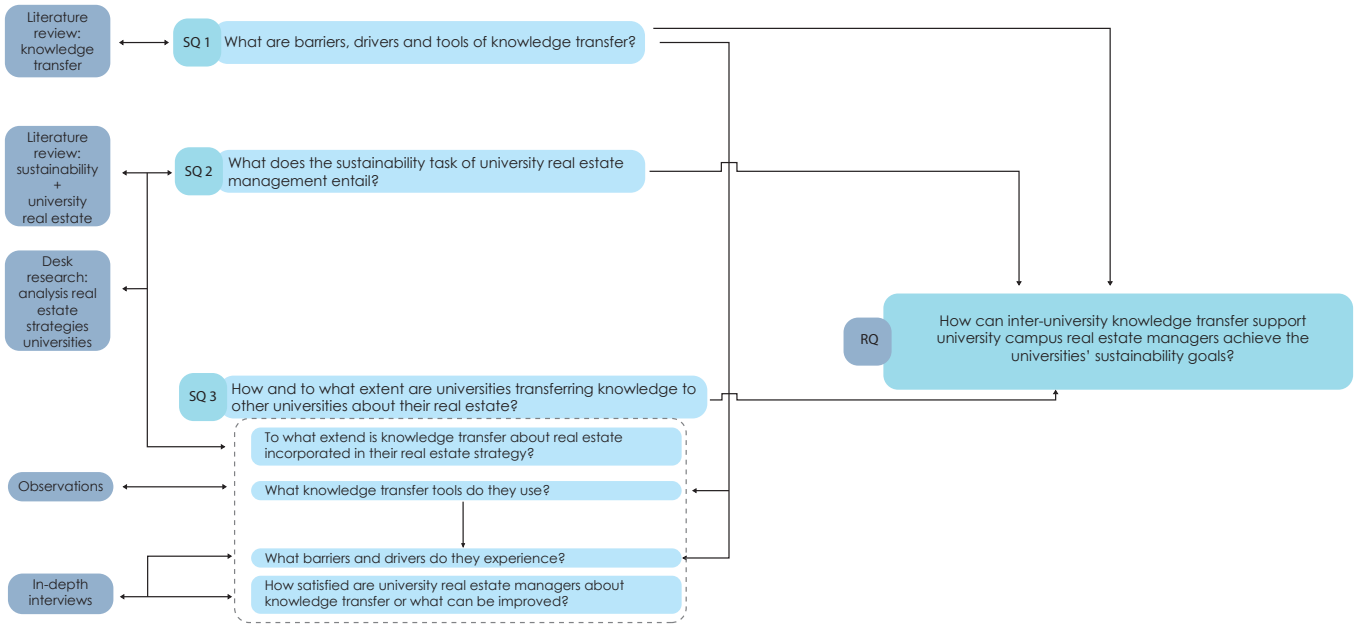

Figure 3. Research Framework with questions. Own figure

2.3 Data collection

According to Blaikie & Priest (2019), both collecting and generating qualitative data are possible. In contrast to quantitative procedures, qualitative methods often involve a process through which data emerge. Bryman (2016) divides any study into two types of data: primary and secondary. The primary data, or first-hand information, of this study is collected by observing in workshops and by interviewing campus real estate managers. The secondary data is available in publications, articles, and reports. These methods are already explained in Chapter 2.2 research methods The participants in this study will be chosen through purposive sampling. This is frequently used to do interviews with individuals who possess relevant and useful information related to the research problem (Miles & Hubermann, 1994). Campus managers (working on the energy transition) from 13 of the 14 Dutch universities were asked to participate.

2.4 Data analysis

An extensive literature study was used to collect background information, get an understanding of the topic, define various tools for knowledge transfer, and provide the basis for the interview questions. The in-depth interviews were conducted and transcribed. The interviews were recorded to make transcribing afterwards easier; of course, this was done with the participants' permission. After that, the data was qualitatively analysed using Atlas.ti software and by highlighting important quotes and notions in the transcripts. Atlas.ti is a tool for the qualitative analysis of, for example, interview transcripts. First, the recorded interviews were replayed and the interview notes read. This and the interview protocol provided the coding for recurrent topics. After this, the topics were categorized into themes to be analysed. Table 1 gives an overview of the used coding.

Table 1.
Coding Atlas

Code group	Barriers	Drivers	Tools	Organization	Sentiment
Codes	Time	Willingness	Digital	Networks	Positive
	Fear	Help	Physical	Internal	Negative
	Communication	Skills		External	Neutral
	Social network	Central point		Expectations	
	Trust	Integration			
	Motivation	Leadership			
	Openness	Rewards			
	Overload	Contact			
	Integration	Culture			
	Leadership	Networks			
	Support	Structure			
	Rewards	Training			
	Space	Information			
	Contact	Support			
	Structure	Communication			
	Resources	Time			
	Financial				
	Culture				
	Expectations				
	Mismatch				
	Inexperience				
	Training				
	Skills				
	Central point				

Note. Own table

The outcomes of the literature study, the real estate strategies, and the themes that derived from the interviews as well as the observations were used to answer the research questions. This research contributes to an understanding of the barriers and drivers in knowledge transfer about

sustainable real estate between universities, and based on the outcomes, recommendations to improve were made.

2.5 Data plan

This thesis uses the FAIR Data Principles (Wilkinson et al., 2016). These principles are Findability, Accessibility, Interoperability, and Reusability. The research will be findable and accessible through the repository of Delft University of Technology (https://repository.tudelft.nl/). The thesis is written in English and is therefore interoperable. Although, the interviews were held in Dutch, which means that the results were translated. The methodology is explained in detail, and a reference list in APA format is provided at the end of the thesis. This improves the reusability of the thesis.

Before the research started, data management was done in DPMonline. This data management plan was sent to the data steward of the faculty of architecture. A data management plan describes how data will be gathered, handled, stored, and made available throughout the study, as well as how it will be shared when the research is done. The data management plan assists in determining how to handle data efficiently, effectively, and securely. Furthermore, planning proper data management from the beginning decreases the chance of data loss, data quality loss, or other risks that might render the data inaccessible or worthless (e.g., software obsolescence).

2.6 Ethical considerations

When doing research, it is important to take ethical aspects into account. Especially when the research involves human interactions, which is the case when doing observations and interviews (Polonsky & Waller, 2019), This research was completely voluntary, and people were able to opt out of it at any moment. There were no mandatory questions that need to be answered, even though this can be a limitation of the research. The results were anonymized, and only the data needed for this thesis research was collected and saved confidentially.

By doing so, the participants were not subjected to any harm in any way whatsoever, and their privacy was ensured. Before participating in the interview, every participant was asked for informed consent. Before participants gave informed consent, the goal of the research, the data collection, and the data analysis were made clear to them. Also, participants could opt out at any time during the research. The participants needed to sign the informed consent form before the interviews were conducted. The informed consent form can be found in Appendix 2.

Next to the ethical issues when conducting the research, ethical issues regarding the communication of results also need to be taken into account. Things to be aware of are plagiarism, academic fraud, and misrepresenting results (Polonsky & Waller, 2019). These are all issues to which a researcher should not commit. By referencing and citing in a correct (APA) way, the plagiarism part can be tackled. Most of the time, results are not as expected. However, for this graduation thesis, the final outcome is less important than the process. When keeping this in mind, the chances of committing academic fraud are almost zero. Reducing the chance of misrepresenting the results is slightly more difficult. Nevertheless, the supervisors are experienced in doing research, so by communicating all steps during the process and receiving feedback, this problem can be solved (Polonsky & Waller, 2019).

Another ethical issue that might arise is how participants see the researcher. Because of the relation to the Campus NL research, the participants might think that their answers will be used and compared to other universities to provide a ranking. This can affect the way they respond to the questions, and therefore, a bias could be formed. It can also feel like the participants' work is being checked, even though this is not the case. Participants could feel uncomfortable sharing information

about their way of working or their personal opinion, which could result in incomplete data. The impact of this issue can be reduced by explaining that all data will be shared anonymously.

3. Theoretical Framework

In this chapter, the results of the literature review are stated. First, the sustainability goals of the Dutch government and Dutch universities are laid out. Secondly, the concept of campus management is discussed. Next, an explanation of knowledge transfer will be given. And lastly, the drivers, barriers, and possible tools of knowledge transfer are explained.

3.1 Sustainability goals universities

The Dutch National Climate Agreement has set important goals related to sustainability, including the task of reducing CO2 emissions by 49% by 2030 compared to 1990. To achieve this, every sector needs to contribute. The public real estate sector includes healthcare, sports, monuments and museums, community real estate, primary and secondary education, and higher education with a social purpose. Civil society organizations also need to make their buildings more sustainable to achieve this. These buildings may serve as examples for other parts of the Netherlands (Rijksdienst voor Ondernemend Nederland, 2022). Also, universities are urged to set an example since they are socially responsible institutions that are committed to solving societal challenges and stimulating sustainable development (Curvelo Magdaniel et al., 2019). Next to the CO2 reduction, the Dutch government also set goals to have a circular economy by 2050 (Ministerie van Infrastructuur en Waterstaat, 2021).

All 14 university buildings occupy a total of about 4.4 million m^2, which is about 6% of the total public real estate in the Netherlands (VSNU, 2019). Research done by den Heijer et al. in 2016 shows that from 2006 to 2016, the deferred maintenance of campus real estate has decreased significantly. However, conditions differ between universities. In 2016, 49% of the campus buildings had good quality; in 2006, this was 36% (den Heijer et al., 2016). The Algemene Rekenkamer researched the real estate of six Dutch universities in 2018. They state that 33% of the buildings are outdated and need major investments in the next few years to be up to standards (Algemene Rekenkamer, 2018).

Universities are focusing increasingly on sustainability through the environment, academia, engagement, innovation, and management (Curvelo Magdaniel et al., 2019). It has been on the agenda of Dutch universities for more than ten years now. A covenant to reduce energy consumption and CO2 emissions on campus by 30% in 2020 and 50% in 2030 was signed in 2008 (den Heijer, 2021). In addition to this, Hopff et al. (2019) mention that campus managers at Dutch universities are largely working on the subject of circularity. Den Heijer (2021) also mentions that circularity is an important subtheme of sustainability, that it has become a driver for campus strategies, and that sustainability is an important criterion for most campus projects. Universities play a crucial guiding role in the continued development of instruments and processes as a driver of circularity (Hopff et al., 2019). New construction projects meet the highest Building Research Establishment Environmental Assessment Method (BREEAM) standards and energy labels. Also, innovation is important in technological developments both on campus and at the building level. Next to this, flexible use of buildings is essential to extending the life span of buildings (den Heijer, 2021).

Previous research by Rymarzak et al. (2020) looked at the campus goals of Dutch universities. In these goals, sustainability is also mentioned, but the research is not limited to this. The most common Dutch campus goals are "reducing footprint" and "supporting user activities." The first goal is mentioned as one of the key elements to support the sustainability frameworks in which all Dutch universities are involved (Rymarzak et al., 2020).

3.2 Campus management

In the Netherlands, university buildings are owned by the universities themselves, and campus management is carried out by them and campus or real estate directors (Rymarzak et al., 2020). Before the definition of campus management can be given, a definition of the "campus" needs to be laid out. Den Heijer defined the campus in 2011 as follows: “the collection of buildings and land, used for university and university-related functions and not necessarily on one location” (den Heijer, 2021, p. 31). She also states that there are three physical states of the changing university. The first one is the traditional university and campus and can be seen as "solid." Structures are fixed, and there is a need for territory. The second one can be described as the "liquid" model; there

is a network university and campus. This represents flexible structures that are multidisciplinary, open, and interconnected, with shared spaces on campus. The last one is the "gas" model, which represents the virtual university and campus. There is mobility and freedom to work and study online or off-campus. All three types of campus will remain in the future, according to the university and campus managers (den Heijer, 2021).

Campus management has the task of supporting the university's performance in the best possible way. Campus management affects the university's performance since decisions such as location, developments, quality of facilities, and type of buildings have an impact on students' and academics' lives, work, and innovation (Rymarzak et al., 2020). They are also important in finding the best balance between solids, liquids, and gases on campus (den Heijer, 2021). This is done by integrating stakeholder perspectives during the management process and incorporating condition, location, user demand, benefits and costs, institutional goals, and energy aspects (Rymarzak et al., 2020). These aspects can be grouped into four perspectives: the physical perspective, the functional perspective, the financial perspective, and the organizational perspective (den Heijer, 2011).

These perspectives and the related campus goals affect sustainable development, users' productivity and well-being, the profitability of the university, and competitive advantage (Rymarzak et al., 2020). The organizational perspective brings strategic choices for continuity to the table, like policy documents, visions for the future of the university, and choices for the following academic year. The financial perspective brings a reality check for the strategic choices, like feasibility studies, financial sustainability, and the balance between investments in the campus and in education and research. The functional perspective looks at individual needs and what users demand from the campus. The last perspective is the physical perspective. This perspective looks at environmental issues. This can be energy efficiency or circularity, for example (den Heijer, 2021).

All these perspectives need to be connected to each other. The campus manager is assigned to do so; however, this is a very complex task because all the different goals, values, and opinions need to be taken into account. Since 2000, all Dutch universities have collectively funded research to improve the effectiveness and efficiency of campus management (Rymarzak et al., 2020). The TU Delft's Campus Research Team supports universities' decisions about their campuses. Den Heijer (2021) specified this into four societally relevant missions: networks, theories and methods, cases and databases, tools, and dashboards. The campus manager needs support from other public real estate managers who are doing the same job. A network of academic experts for knowledge exchange can help with this. Theories need to be gathered and methods need to be developed to support the decision-making process; this needs to be done with all the stakeholders at the table. Benchmarks are needed to compare the solutions of different universities. A database with cases can identify patterns in campus strategies, themes, and trends. And lastly, by designing tools and dashboards, the consequences of decisions based on multiple indicators can be monitored (den Heijer, 2021).

The supporting information that is required in the decision-making process can also be defined as "campus management information" (Curvelo Magdaniel et al., 2019). In their research, they state that universities are eager to participate in campus management research in exchange for information and the opportunity to learn from similar circumstances while contributing to the expansion of campus management information. In addition to this, they state that more research into knowledge management in universities and campus management practice is needed (Curvelo Magdaniel et al., 2019).

3.3 Knowledge transfer

Knowledge transfer is part of the knowledge management process. Knowledge management (KM) focuses on the management of knowledge. Pemsel et al. (2014) talk about KM as a cycle of processes to enable knowledge sharing, application, creation, and identification within the organization. This can also be described as knowledge generation, storage, distribution, and application (Ranjbarfard et al., 2014). Wunram et al. (2002) describe the process of knowledge management as the exploitation of existing knowledge, the creation of new knowledge, process orientation, goal orientation, value orientation, improvement orientation, and innovation orientation.

It is important that knowledge be effectively managed since this has positive outcomes. These positive effects include increased productivity, higher performance, and better innovation capability. Especially knowledge that is not shared—tacit knowledge that stays in people's minds—corrodes easily, so this must be shared (Asrar-ul-Haq & Anwar, 2016). However, this refers to knowledge management within an organization. Wunram et al. (2002) propose the following definition of knowledge management in inter-organizational cooperation: "Knowledge management is the systematic, goal-oriented application of measures to steer and control the tangible and intangible knowledge assets of organizations, with the aim of using existing knowledge inside and outside of these organizations to enable the creation of new knowledge and generate value, innovation, and improvement out of it." In knowledge management between organizations, knowledge sharing is primary between the people who are acting under specific organizational, social, economic, strategic, and legal conditions. When looking at interorganizational cooperation, one must put the individual employee at the center of the observations. Like Pemsel et al. (2014) and Ranjbarfard et al. (2014), who also mention intra-organizational knowledge management, in inter-organizational circumstances, the processes of knowledge identification, generation, storage, structuring, retrieving, applying, evaluating, and sharing are also known to manage knowledge (Wunram et al., 2002).

In this research, the focus will be on the distribution of knowledge, which can also be referred to as the transfer of knowledge. This means spreading and sharing the knowledge that already exists within an organization (Ranjbarfard et al., 2014). McElroy describes the activities used for knowledge transfer as broadcasting, searching, teaching, sharing, and other social activities (Ranjbarfard et al., 2014). Although Bektas (2013) also mentions that knowledge transfer can be achieved through tools, she also states that knowledge transfer mainly happens through social interactions. She divides knowledge into two types: indirect and direct knowledge. Indirect knowledge can be shared with tools and direct knowledge with social interactions (Bektas, 2013). With tools, digital technologies like BIM and CAD are meant. These tools are more for collaborative design.

An extensive amount of literature on knowledge sharing and knowledge transfer is directed to the field of interorganizational relations (Bosch-Sijtsema & Postma, 2010). Knowledge transfer is hard to define as a concept since the distinction between transferring knowledge and creating knowledge is not always clear (Bosch-Sijtsema & Postma, 2010). In this research, "dissemination of existing knowledge among organizations and bringing new knowledge into the organization from the external environment" will be used as the definition of knowledge transfer (Rosen et al., 2007). To put this into simple words, this means that knowledge from one organization will be transferred to another organization to bring new knowledge into that organization.

The success of knowledge transfer depends on how the source and recipient communicate and the type of relationship they have. Also, a common goal and openness play a part (Bosch-Sijtsema & Postma, 2010). Furthermore, knowledge about a specific subject is difficult to spread due to inertness, stickiness, and ambiguity (Bosch-Sijtsema & Postma, 2010). There are several more drivers and barriers to knowledge transfer; they will be laid out in the next section.

3.4 Drivers and barriers

Drivers

Drivers for knowledge transfer are also known as facilitators, enablers, or levers. They all have the same definition and are aspects that improve, stimulate, or promote knowledge flow (Rego et al., 2009). Al-Gharibeh (2011) states that there are several types of enablers for knowledge transfer. However, he mostly mentions enablers for knowledge management. Since knowledge transfer is part of the knowledge management process, it can be assumed that these enablers are also applicable to knowledge transfer.

Enablers for knowledge management can be defined into different groups (Al-Gharibeh, 2011). Lee and Choi (2003, in Al-Gharibeh, 2011) have divided the enablers into seven categories:
(1) collaboration - the degree in which there is active support and help to share knowledge
(2) trust - how people have faith in intentions, behaviour, and skills
(3) learning - the opportunities, encouragement and satisfaction of learning and development
(4) centralization - authority and control of decisions
(5) formalization – formal rules, procedures, and standard policies
(6) T-shaped skills – understanding peoples tasks
(7) information technology support – IT support for communication, storing, collative work.

While Aurum et al. (2007, in Al-Gharibeh, 2011) only mentions four enablers for knowledge management:
(1) leadership – managing knowledge
(2) technology – the technological aspect of knowledge management
(3) culture – the knowledge sharing environment and how it is promoted to share knowledge, and
(4) measurement – finding out if there are effective measures for the success or failure of KM practices in the organisation.

Rego et al. (2009) divide the drivers for knowledge transfer into different types of categories: individual level, socio-organizational level, and technological level. The willingness to share is an important driver of knowledge sharing on an individual level. Organizational culture and face-to-face contact are socio-organizational enablers. Knowledge repositories and software to transfer knowledge are facilitators on a technological level (Rego et al. 2009). Bosch-Sijtsema & Postma (2010) state that trust is the most important driver for knowledge transfer. Also, Rego et al. (2009) mention this in their literature review. Tables 2-4 give an overview of the drivers based on the categories of Rego et al. (2009) and the different enablers mentioned in the literature.

Table 2.
Drivers on an individual level

Driver	Explanation	Literature
Trust	The level of trust in others' intentions, behaviours, and abilities to achieve certain goals.	Rego et al. (2009); Bosch-Sijtsema & Postma (2010); Al-Gharibeh (2011); Lee & Choi (2003)
Willingness to share	How much people are willing to share, if people do not want to share knowledge, nothing useful is transferred.	Rego et al. (2009)
Collaboration	The degree in which there is active support and help to transfer knowledge. People working together on a shared goal.	Al-Gharibeh (2011); Lee & Choi (2003)
Learning	The opportunities, encouragement and satisfaction of learning and development.	Lee & Choi (2003); Al-Gharibeh (2011)

Note. Own table based on drivers mentioned in literature

Table 3.
Drivers on a social-organisational level

Driver	Explanation	Literature
Culture	The knowledge sharing environment and how it is promoted within and between organisations to share knowledge.	Al-Gharibeh (2011); Aurum et al. (2007)
Face-to-face communication	Knowledge is transferred easier when communicating in real life.	Von Krogh et al., (2000); Al-Gharibeh (2011); Rego et al. (2009)
Leadership	Managing knowledge effectively drives knowledge transfer	Al-Gharibeh (2011); Lee & Choi (2003)
Centralization	Having authority and control of decisions	Al-Gharibeh (2011);
T-shaped skills	Understanding own and other people's tasks	Al-Gharibeh (2011); Lee & Choi (2003)
Measurement	Finding out if there are effective measures for the success or failure of KM practices in the organisation	Al-Gharibeh (2011); Aurum et al. (2007)

Note. Own table based on drivers mentioned in literature

Table 4.
Drivers on a technological level

Driver	Explanation	Literature
Technology	IT support for communication, storing, collative work	Al-Gharibeh (2011); Rego et al. (2009); Lee & Choi (2003); Aurum et al. (2007

Note. Own table based on drivers mentioned in literature

Barriers

Barson et al. (2000) categorized the barriers to knowledge transfer into three groups: people, organizational, and technological. Ranjbarfard et al. (2014) added the characteristics of knowledge and barriers related to the environment to that. Although Wunram et al. (2002) propose only two groups of barriers related to inter-organizational knowledge sharing: people and organizations, Tables 5-8 show the barriers related to people, technology, processes or organizations, and the characteristics of knowledge since these seem the most likely to occur in knowledge sharing between universities.

Table 5.
Barriers related to people

Barrier	Explanation	Literature
Lack of slack times and heavy workload	People should have time available to use KM methods and tools, and organizations should train people.	Riege, (2005); Ranjbarfard et al. (2014)
Fear of loss of ownership and control of knowledge property and individual competitive edges/professional identity	Knowledge is a source of people's power and if they share it they think they will lose that power. It is a fear of losing ownership over the knowledge and intellectual property. People think that by sharing knowledge they will feed competitors.	Yih-Tong Sun and Scott, (2005); Thoben et al., (2002); Wunram et al. (2002); Riege, (2005); Ranjbarfard et al. (2014)

Trust/reliability of knowledge source or recipient	People should trust the source/recipient to use the knowledge correctly. They should agree with the decisions that will be made based on the received knowledge. When a source is seen trustworthy and knowledgeable the knowledge will be transferred more easily. This can be enhanced by facilitating face-to-face communication.	Yih-Tong Sun and Scott (2005); Wunram et al., (2002); Ranjbarfard et al. (2014)
Poor communication and interpersonal skills	The political and social skills of the people who generate ideas or new knowledge have an impact on the acceptance of the receivers. Stories must be told in a way that it captures people's imaginations. Different languages are also barriers.	Riege (2005); Yih-Tong Sun and Scott (2005); Ranjbarfard et al. (2014)
High level of stress and fear of disadvantage/risk	People have fear of sharing knowledge because it might reduce their job security. They also think that their knowledge is unimpressive and shows their lack of knowledge.	Riege (2005); Yih-Tong Sun and Scott (2005); Wunram et al., (2002) Thoben et al. (2002); Ranjbarfard et al. (2014)
Lack of motivation	People see knowledge sharing as extra work and therefore do not support it. Motivation to share and accept received knowledge is both important. Motivation can be both intrinsic of extrinsic. Intrinsic motivation is intangible, but extrinsic can be rewarded in a tangible form.	Riege (2005); Singh and Kant (2008); Ranjbarfard et al. (2014)
Lack of top management support	Managers play an important role in knowledge sharing. If the management don't support idea's it will be difficult to achieve collective action based on innovation. Lack of leadership and managerial direction also affects communicating the benefits of knowledge sharing.	Riege (2005); Ranjbarfard et al. (2014)
Divergent aspiration of teams	People and teams may have different interests and aspirations that are not compatible with the ideas they are supposed to implement. They rather work within their comfort zone instead of doing innovative things. This means that innovation is a threat.	Yih-Tong Sun and Scott (2005); Ranjbarfard et al. (2014)
Different individual characteristics	It can happen that people show (almost) no knowledge-sharing activities due to differences in education, language, experience, gender of personal characteristics.	Thoben et al. (2002); Riege (2005); Ranjbarfard et al. (2014)

Note. Own table based on barriers mentioned in literature

Knowledge is a source of people's power and if they share it they think they will lose that power. It is a fear of losing ownership over the knowledge and intellectual property. People think that by sharing knowledge they will feed competitors (Yih-Tong Sun and Scott, 2005; Thoben et al., 2002; Wunram et al. (2001); Riege, 2005) Also, people see knowledge sharing as extra work and therefore do not support it. Motivation to share and accept received knowledge is both important (Riege, 2005; Singh and Kant, 2008 in Ranjbarfard et al., 2014).

Table 6.
Barriers related to technology

Barrier	Explanation	Literature
Lack of available technology	Without technology, it is difficult to analyse and collect data and to distribute knowledge and information. Even if technology is available but inappropriate it can also result in resistance to use it. IT-systems should support ones work process and communication flows instead of making it a barrier.	Riege (2005); Yih-Tong Sun and Scott (2005); Ajmal et al. (2010); Ranjbarfard et al. (2014)
Trash information	Too much information makes it difficult to identify useful information and measure it.	BenMoussa (2009); Ranjbarfard et al. (2014)
Legacy systems	A legacy system is large, old, heavily modified, difficult to maintain, and old fashioned. They are however necessary because of their specialty in certain operations. Connecting these systems to other ones where there is no compatibility makes it difficult to create a knowledge transfer system.	Thoben et al. (2002); Ranjbarfard et al. (2014)
Useless technology	People can show reluctance to use integrated IT systems and tools due to the lack of familiarity and experience with these systems.	Riege (2005); Ranjbarfard et al. (2014)

Note. Own table based on drivers mentioned in literature

Table 7.
Barriers related to processes/organisation

Barrier	Explanation	Literature
Poor targeting of knowledge	It is important to clearly identify the areas and specify the needed information to generate knowledge for a KM system to function effectively. Information has to be relevant to a moment and situation to support knowledge generation and application.	BenMoussa (2009); Scarborough et al. (1999); Ranjbarfard et al. (2014)
Distance/arduous relationship	Geographical distance has an impact on knowledge sharing. Also a working environment and layout of the area can restrict knowledge transfer. The most efficient way to share and transfer knowledge is face-to-face communication. This is difficult in most organisations due to the distributed nature. Arduous relationship means lack of easy communication between knowledge source and recipient.	Riege (2005); Rego et al. (2009); Nonaka and Takeuchi (1995); Ranjbarfard et al. (2014)
Leadership styles	Poor leadership and managerial direction are a hinder for knowledge management.	Riege (2005); Rosen et al. (2007); Ranjbarfard et al. (2014)
Culture	The companies culture may not support sharing and reuse of knowledge. The organizational culture should be supportive to have effective knowledge management.	De Long and Fahey (2000); Ajmal et al. (2010); Bures (2003); Levy et al. (2010); Hofstede (1983); Ranjbarfard et al. (2014)

Decentralization	A high degree of labour division is a barrier to the development of new ideas about overarching problems. In organisations it is mostly about making their own project as efficient as possible, and ignoring what is going on in the other projects.	Riege (2005); Rego et al. (2009); Ranjbarfard et al. (2014)
Inconsistent organizational strategy, systems, policies, practices and KM processes	This barrier occurs when an organization fails to align and integrate its KM strategy with the way in which knowledge is created, shared, and maybe kept and utilized inside the department or business unit. This type of irregularity could be caused by high turnover in top management.	Riege (2005); Ranjbarfard et al. (2014)
Need for rewards	Goals cannot be achieved without integrating motivation and rewards towards people. Individuals should be motivated to create, share and use knowledge within their organisation. This is important for both tacit and explicit knowledge.	Rego et al (2009); Ajmal et al. (2010); Singh and Kant (2008); Singh and Kant (2008); Ranjbarfard et al. (2014)

Note. Own table based on drivers mentioned in literature

Most organizational barriers are related to knowledge management within an organization. However, decentralization can also be a barrier that makes knowledge sharing more difficult for inter-organizational knowledge transfer. In organizations, it is mostly about making their own projects as efficient as possible and ignoring what is going on in other projects (Ranjbarfard et al., 2014). It can be assumed that with the decentralized culture of Dutch universities (Algemene Rekenkamer, 2018), this is also the case.

Table 8.
Barriers related to the characteristics of knowledge

Barrier	Explanation	Literature
Causal ambiguity	Exist when people do not know exactly what information/knowledge is supposed to be used for. The more implicit and difficult the relevant knowledge skills, the higher the ambiguity is. This means that the speed of transfer and the risk of imitation by competitors will be decreased since knowledge and skills cannot be easily coded and thought.	Sheng et al. (2013); Ranjbarfard et al. (2014)
Perceived irrelevance of the knowledge for future purposes	Organisations that think that certain learning results are irrelevant for the future ignore to store it. They focus on present requirements, not on what must be known in the future. This is a planning-related barrier to knowledge management	BenMoussa (2009); Ranjbarfard et al. (2014)

Note. Own table based on drivers mentioned in literature

Combined table

An overview of the barriers and drivers that Rego et al. (2009) mention in their literature review are shown in tables 9–11. The barriers and drivers are given a keyword that matches the description. As can be seen in the different tables, on most levels or types, the same kind of barriers and drivers are experienced, and the drivers and barriers are related to each other. These keywords can serve as a starting point for the interview questions and things to look for during the observations.

Table 9.
Barriers and drivers on an individual level

Barriers	Keyword	Drivers	Keyword
Lack of time to interact and share knowledge	Time	Individual's willingness to incur failures	Willingness
Apprehension or fear that sharing my reduce or jeopardize people's job security	Fear	Help-seeking behaviours	Help
Fear of loss of ownership, of knowledge control, and of individual's competitive advantage	Fear	T-shaped skills	Skills
Poor verbal/written communication and interpersonal skills	Communication	Qualified human resources	Skills
Lack of social network	Social network	Honesty, willingness to learn and to share knowledge and ideas	Willingness
Lack of trust in people	Trust	"Boundary-spanning individuals" and "technological gatekeepers"	Central point
Lack of motivation for sharing and receiving knowledge; lack of absorptive and retentive capacities)	Motivation		
Lack of openness to ideas	Openness		
Information overload	Overload		

Note. Own table based on Rego et al. (2009)

Table 10.
Barriers and drivers of socio-organizational processes

Barriers	Keyword	Drivers	Keyword
Missing or unclear integration of KM strategy into the organization's goals and strategic approach	Integration	Integrating KM with the organization's vision and mission	Integration
Poor leadership and managerial direction	Leadership	Leaders as supporters, facilitators, and knowledge-sharing models	Leadership
Team leader constraints on knowledge sharing	Leadership	Leaders as shapers of a trustful and psychological safe team culture	Leadership

Lack of support from managers	Support	Incentives and reward mechanisms to encourage cooperation and sharing	Rewards
Lack of appropriate reward, incentives and recognition systems	Rewards	Face-to-face contacts	Contact
Shortage of formal and informal spaces to share, reflect, and generate (new) knowledge	Space	Discussion of key issues with colleagues and other professionals	Contact
Physical location, office design, and geographic boundaries	Space	Periodic internal panel discussions	Contact
Lack of formal and informal activities to cultivate knowledge sharing	Contact	Organizational culture facilitating cooperation and the knowledge flow	Culture
Organizational culture that does not provide support or foster cooperation and sharing	Culture	Culture of tolerating failures, using them as tools for learning	Culture
Low-trust interactions and culture	Culture	Learning culture	Culture
Rigid organizational structure, organizational “silos”, and ‘islands of knowledge”	Networks	Developing, nurturing, and institutionalizing social networks	Networks
Many fragmented and diversified research areas	Networks	Caring among organization members	Contact
Power barriers	Structure	Fluid, flat, decentralized, and open organizational structures that improve interfunctional communication and the knowledge flow	Structure
Limited resources allocated to loosely coupled communities	Resources	Matrix teams	Structure
Financial constraints	Financial	Interface between disciplines, technologies, business units, functions and businesses	Structure
Time constraints and deadline pressures	Time	Education and training	Training
Cross-cultural constraints	Culture	Mentoring	Help
		“Cleanup” methods for addressing the problem of information overload	Information
		Balanced scorecard	Reward

Note. Own table based on Rego et al. (2009)

Table 11.
Barriers and drivers on technology

Barriers	Keyword	Drivers	Keyword
Lack of integration of IT systems and processes	Integration	Centralized knowledge repository	Central point
Diversity of media and the lack of integration	Integration	KM portals to connect individual informational systems and facilitate collecting, screening, and displaying internal and external knowledge	Central point
Lack of technical support and immediate maintenance of integrated IT systems	Support	Yellow pages	Central point
Unrealistic expectations of employees as to what technology can and cannot do	Expectations	Technology supporting a culture of sharing and speeding search of information for its reuse	Support
Mismatch between individuals' need requirements and integrated IT systems and processes	Mismatch	Adopting IT that is appropriate for the particular organization	Support
Reluctance to use IT system due to lack of familiarity and experience with them	Inexperience	Adapting technology to the team needs	Support
Lack of training regarding employee familiarization of new IT systems and processes	Training	Enterprise resource planning system	Support
Time spent scanning large volumes or marginally relevant information	Overload	Creativity tools	Support
IT may become an inhibitor if the organization focuses all of its energy on developing IT systems without adequate attention to other facilitators/enablers	Mismatch	Communication software facilitating anonymous brainstorming and nominal group decision making	Communication
		Management software programs useful for dealing with time constraints and deadline pressures	Time
		"Chat rooms" to facilitate informal communications	Communication

Note. Own table based on Rego et al. (2009)

3.5 Tools

Improve

Knowledge transfer tools enable people to share tacit knowledge with one another (Mazorodze & Buckley, 2020). Most of the tools mentioned in literature are technological tools, such as an IT structure with a centralized knowledge repository, communication software, and management software (Rego et al., 2009). Also, Mazorodze & Buckley (2020) mention that organizations must develop means to document their organizational knowledge. Research has shown that online knowledge sharing forums in the first place worked for people who had the same geographical location and hierarchical status. After participants gained experience with the software, these boundaries disappeared. The key motivators for sharing knowledge through a software system are enhancing one's reputation and rewarding others (Argote & Fahrenkopf, 2016). However, Noack & Jacobsen (2021) argue that digital tools cannot completely replace personal, trust-based relationships.

More people-related tools of knowledge transfer are coaching (Abbot, 2014), mentoring (Rego et al., 2009), and storytelling (Whyte and Classen, 2012). With coaching, immediate problems and opportunities are the focus. Whyte and Classen (2012) see story telling as an essential technique for transferring tacit knowledge since this can increase expertise within an organization. Next to this, also installing a knowledge broker (Du Preez et al., 2022), who is responsible for establishing connections, facilitating networks, and finding projects of mutual benefit, can be considered a knowledge transfer tool. A network, in general, is also a tool for sharing knowledge.

Assess

Next to tools to improve knowledge sharing, there are also tools that are specifically designed to assess knowledge transfer and exchange processes and products, as well as ones that are theory-driven. The measurement of knowledge depends on how knowledge is defined, how it is used, and the perspective of the person using it (Bhawra & Skinner, 2020).

Within organizations, surveys and questionnaires, interviews, and focus groups are the most commonly used tools to evaluate and assess knowledge transfer. Next to this, there are also frameworks that can be used (Bhawra & Skinner, 2020). However, for this research, the tools to improve knowledge sharing are the most important, so the assessment tools are not further elaborated.

4. Strategy Analysis

In this chapter, the results of the strategy analysis are presented. In this analysis, the campus and/or sustainability strategies of 14 Dutch universities are explored.

Table 12 provides an overview of the universities. The documents used for this analysis can be found in Appendix 3. The search for documents consisted of a Google search with a maximum duration of 10 minutes. The information and documents that could be found within this time period were the ones that were analysed. A summary of the strategy and sustainability goals of each university is given below. Figure 4 shows the location of the Dutch universities.

Table 12.
Overview strategy analysis

University	Document or website	Collaboration / knowledge exchange mentioned	Students (UNL, peildatum 2022)
Erasmus Universiteit Rotterdam	Document	✓	30.955
Maastricht University	Website	✗	21.129
Open Universiteit	Website	✗	16.940
Radboud Universiteit Nijmegen	Website	✗	24.100
Rijksuniversiteit Groningen	Document	✓	34.633
Tilburg University	Website	✗	19.927
TU Delft	Document	✗	26.620
TU Eindhoven	Document	✗	12.816
Universiteit Leiden	Website	✗	33.232
Universiteit Twente	Document	✓	12.194
Universiteit Utrecht	Document	✗	37.675
Universiteit van Amsterdam	Document	✓	42.143
Vrije Universiteit Amsterdam	Document	✓	31.761
Wageningen University	Document	✗	12.994

Note. Own table, student numbers based on Universiteiten van Nederland (2022)

Figure 4. Dutch universities. Adapted from Campus NL (2016)

Erasmus universiteit Rotterdam
In their real estate strategy, Erasmus University Rotterdam mentions the use of sustainable energy sources. They want to purchase and use sustainable materials and conserve greenery and water. The campus will be made more sustainable through more efficient use of energy (20% compared to 2010), the introduction of sustainable forms of energy, increased biodiversity, and green business operations by separating waste, for example. They mention the MJA3 covenant and the objectives that were stated there. They want to attain a high SustainaBul sustainability ranking, and BREEAM Excellent is pursued. In their real estate strategy, a chapter with adjustments and measures is also added.

They also mention that interests reinforce each other and that they work together with Rotterdam University of Applied Sciences on sustainability and the creation of an attractive campus.

Maastricht University
The website of Maastricht University mentions that for its campus, their ambition is in line with Dutch climate objectives, mostly phasing out natural gas. They also have a roadmap for sustainable real estate. Their goals are to provide insight and reduce indirect emissions in the chain. They also mention that they are working on the MJA3 until 2020.

Also, Maastricht University has shown its energy performance on their website, as well as the MJA3 business report.

Open Universiteit
Open Universiteit does not have a campus like the rest of the universities. Their study programs are mostly online. They have a couple of study centers and some buildings in Heerlen for their staff, teachers, and personnel. Open Universiteit does have a Green Office, a platform with an inspiring and advising role that consists of students and staff of the university. They have five pillars: (1) creating visibility; (2) inspire, (3) gain and share practical experience; (4) connection or community; and (5) improve education with regards to sustainability. In this, they gave themselves four roles: (1) knowledge exchange; (2) community building; (3) inspire and stimulate behavioral change; and (4) advise.

Radboud Universiteit Nijmegen
The Radboud Universiteit Nijmegen mentions the Energy Policy Plan 2021–2024. This consists of the following three points: (1) saving on gas and making electricity more sustainable; (2) a package of measures; and (3) organization and behavior. They want to be energy neutral in 2050, and they "strive for a green and healthy campus with a positive impact in terms of climate and circularity." In their energy policy plan, they also mention their campus strategy. However, there was a broken link, so this could not be reviewed.

Rijksuniversiteit Groningen
The Rijksuniversiteit Groningen has three focus areas: (1) healthy aging, (2) energy, and (3) sustainable society. They are working towards the future, and sustainability in strategy, concept materials, and energy consumption is the key. Sustainability in property not only means sustainable development, building work, and usage but also includes sustainable demolition at the end of a building's lifespan. Sustainable materials, future-proof concepts, and flexible layouts are the mainstays of all new building and renovation work, more efficient use of space as well. They have the Energy Academy Europe, which is an example of sustainability.

Their ambitions on energy are in accordance with the statutory requirements of 2% energy savings

per year. All buildings have to comply with label C in 2023 and label A in 2030. The standard for new buildings is BENG (almost energy-neutral buildings). In 2026, 25% of all energy will come from renewable sources. They also mention the VSNU roadmap: their campus in Zernike will be gas-free in 2026, and they will aim for BREEAM standard "excellent."

The Rijksuniversiteit Groningen acknowledges that they also must make use of expertise from the construction sector. They state that "mobilizing and applying the knowledge and experience of market parties is an important goal."

Tilburg University

Tilburg University mentions their ambition on their website. They want to (1) offer a high-quality and flexible learning and working environment; (2) increase the efficiency of the use of space; and (3) further integrate sustainability into their housing policy. Their sustainability ambitions are integrated into their housing policy through both visible and invisible solutions. In existing buildings, less m^2 with more quality contributes significantly to sustainability goals. For their new construction, the starting point is the BREEAM Excellent or Outstanding certificate and complying with the BENG standard. They also have the ambition to achieve Frisse scholen klasse A. Next to that, circular construction also plays an important role in their projects, both in new construction and renovation.

Technische Universiteit Delft

Delft University of Technology has a very extensive sustainability vision, ambition, and action plan. In their strategic framework for 2018–2024, they state that they intend to be carbon neutral and circular by 2030. In 2019, they made a roadmap that draws a clear picture of the challenge of getting net-zero carbon by 2030.

TU Delft describes the terms used under sustainability as: sustainable, greenhouse gases, global warming potential, climate neutral, carbon neutral, energy neutral, fossil-free, circular, and regenerative.

The ultimate goal of TU Delft is to become regenerative; this can only be achieved in a particular order. They state the objectives of a sustainable campus to be achieved by 2030 as the 4 C's: carbon neutral, circular, climate adaptive, and contributing to quality of life. Next to this, they want to expose its excellence and sustainable character on campus.

For their buildings, they have the following general aims and principles: make buildings jointly "Paris-proof," make new buildings energy-producing, circular, and climate-adaptive; avoid demolition; renovate existing buildings to (nearly) zero energy; make 50% of the buildings on campus energy neutral; renovate existing buildings in a circular fashion; make technical maintenance circular; involve external parties on campus; use total cost of ownership for financial decisions; create possibilities for living labs; involve researchers and students in building projects. They also mention aims that are still being investigated. Next to all this, there is also a summary of the performance of the campus in the TU Delft document.

The general aims regarding the energy system are to establish an entirely sustainable energy system on campus, develop the TU Delft campus as a smart city of its own, and make the campus' energy system smartly managed and controlled.

Technische universiteit Eindhoven
The Technische Universiteit Eindhoven states that “sustainability is one of the key strategic priorities of the university." "They separate their waste, provide environmentally friendly catering, and are making use of renewable energy on campus when possible." Also in research, scientists are contributing to the sustainable development goals, which are integrated into education.

Universiteit Leiden
Universiteit Leiden is working on a sustainable, green, circular campus. Their goal is to have a major energy reduction by 2050. This is all described in their roadmap for the energy transition. Their ambitions and goals are connected to the climate agreements of 2030 and 2050. They strive to have a 65% reduction of building-related CO2 emissions in 2030 (compared to 1990) and a 95% reduction in 2050. They are continuing this process by focusing on sustainable purchasing policies, waste prevention and recycling, sustainable mobility, more green on campus, and increased biodiversity.

Universiteit Twente
Universiteit Twente has a long-term strategic real estate plan for 2020–2030. The public version of this plan is available online. Their mission, vision, and strategy have the working title "Shaping 2030." This vision has the following keywords: hub, meeting, open, sustainable, enterprising, experience and experiment, inclusive and international, Kennespark, infrastructure, facilitating campus.

So sustainability is one of the key aspects. This means that every housing initiative on campus needs to have a sustainability section with attention to the Trias Energetica. BENG and gas-less are the base lines, as are the climate goals. This is the case for new construction, but also for renovations if possible. In addition to this, a Green Hub Twente will be introduced to set an agenda for a healthy and sustainable campus in order to gain more policies in this area. Universiteit Twente wants to work towards a sustainable campus. When possible, they want to make this visible. Sustainability relates to energy consumption and the reduction of CO2 emissions.

The Universiteit Twente mentions their collaboration with the VU Amsterdam.

Universiteit Utrecht
Sustainability is one of the main tasks in the business operations of the Universiteit Utrecht, according to the Strategic Plan 2025. One of the pillars is "sustainable development." The themes that are connected to this are biodiversity, zero waste, CO2-neutrality, diversity, and a healthy work and study climate. Universiteit Utrecht uses the Sustainable Development Goals as an instrument for naming the challenges. In addition to the strategic plan, they also developed a sustainability plan for business operations in 2023. In this plan, their ambitions and goals for sustainable development are formulated, as is the progress on certain points.

This plan consists of 11 themes: area, future-proof buildings, energy and emissions, purchase and procurement, catering, logistics, waste, water, diversity and inclusion, awareness, and information technology. In the sustainable business operations plan for 2023, they also mention their energy strategy. However, this document could not be found online.

Universiteit van Amsterdam
The Universiteit van Amsterdam has a roadmap for the energy transition. Their goal is to be Paris-proof—all electric. To achieve this, they will follow the trias energetica: first reducing the energy demand, then using resources as efficiently as possible, and then generating sustainable energy. In the upcoming years, they will make their buildings more sustainable at a natural moment when

a renovation or major maintenance is planned. To make sustainability more concrete, they use the following themes: energy, circularity, and climate. In their roadmap, they also use references to other plans. The UN-climate agreement of Paris, the national climate agreement, the sectoral agreements, and the agreements made with the VSNU.

They also acknowledge that sustainability is more than just energy. This roadmap is part of a broader approach to making buildings more sustainable. However, these plans are not yet ready.

The Universiteit van Amsterdam mentions different collaborations with partners, like the municipality of Amsterdam. They state that this helps their ambitions in campus development, sustainability, and innovation.

Vrije Universiteit Amsterdam
The Vrije Universiteit Amsterdam has made a sustainable roadmap for 2020–2025. One of the chapters of this roadmap is on knowledge transfer. This is one of the core activities of the university. Only knowledge transfer about sustainable development goals is mentioned. Next to this document, they also have a sustainability page on their website.

On their website, Vrije Universiteit Amsterdam states their sustainability goals for the campus. Energy and climate: in 2040, they want to be a gas-less university, which means that they want to use 100% green electricity and almost no gas. Next to this, they also formulated goals for food and drinks, sustainable purchases and mobility, green, and renewal. For the buildings on campus, they are using the SDG method.

Wageningen University
Central themes for Wageningen University about sustainability are biodiversity, climate change, the circular economy, feeding the world, healthy food, healthy living, and artificial intelligence. They state that 80% of the campus is already climate-neutral.

For real estate, the goals are in line with the Trias Energetica: WUR uses no natural gas in 2050, so a CO2 neutral built environment Continue to focus on sustainable energy generation and a total energy reduction in 2050 of 72% compared to 2005.

5. Field study

This research section will describe the combined findings of the interviews, observations, and strategy analysis. The first subsection will elaborate on the known networks and organizations. The second and third subsections describe the barriers and drivers found. The last subsection is about the tools for knowledge transfer.

During the interviews, interviewees were asked about their job within the university, what networks they participate in, and which networks they are familiar with. After that, they were asked about barriers and drivers they experience; statements were posed to help with this; and possible tools were discussed. The interviews ended with the question of what they were missing in the knowledge sharing process.

5.1 Organisation and networks

After a brief introduction, the first interview question posed to the interviewees was about the different existing networks. During the interviews, the participants were asked directly what networks were known to them. *"There are various informal and formally informal partnerships that exist; they really are there,"* the participant from University A mentioned. The interviewee from University E went a bit more in detail on that: *"There are a lot of them. Of course we have the VSNU, which is the consultation between all environmental coordinators in the Netherlands ... there is the informal consultation about sustainability at the universities ... then we also have consultations between universities, also informally, about biodiversity. which we all think is a very important subject, and we just started with that. Then we also participate in consultations throughout Europe."* The three most frequent mentioned networks that the interviewees participate in are the energy coordinators, the sustainability coordinators, and the environmental coordinators. As one of the interviewees explains, these consultations have been there for a while already: *"I joined there myself in 1998, but it has been here for much longer. And there is now also an environmental coordinator's consultation. That is also quite old, but about 6 years ago, a sustainability consultation also started in the same form, so in principle there are 3 of these networks"* (University F). According to the interviewee of University A, the meetings probably emerged because of the MJA, *"the 'dienstconvenant' in which all universities participated. The MJA started about 13 years ago. And at that moment meetings started, I think, or at least became firmer,"* thus the participant.

In addition to the networks the interviewees participate in, they also know quite a few other networks. *"I know that MVO-coordinators have a fairly active knowledge exchange ... and of course you have the meetings with real estate directors, and I know that our head of maintenance and construction also consults with his colleagues from other universities,"* thus the participant of University A. However, it is not known to everyone what networks there are, as the interviewee of University I mentions: *"I do know the network of sustainability. I know them well from the sustainability coordinators, for example, but not from the real estate mix people."* The participant from University J mentions, *"well, which networks or consultations there are is a bit hazy. But the most important consultation is the one for the energy coordinators"*.

In addition to the networks with other universities, some also have connections with other sectors: *"we have a strong link here with the university hospital"* (University C), and *"we work quite a lot with the hospital from my real estate position"* (University I). Also, there is a commercial network, VEMW, a trade association that organizations can become a member of. They have to pay a contribution fee based on the energy consumption of the organization. *"There is a lot of knowledge there, if there are changes to the law, things like that. Then they very often take a position on this on behalf of the industry ... So I think it would be good if we also let our perspective emerge"* as the participants of University C explains. But he recognizes that universities are hesitant to join: *"But I notice that not all universities have that. That in their opinion VEMW costs more than the benefits of it. Because you have to pay a kind of membership for that. That costs them more than it brings them. Others sometimes look at it differently"*. This is confirmed by the participant of University F: *"We were members for a long time, then I just said at a certain point that we pay so much money for it and we actually get nothing out of it. So we just decided to opt out"*.

Even though sustainability is embedded in different processes of the business operations, there is a difference in how well the participants know the existing networks. This might be explained by the fact that every university has a different organization. For example, one participant mentioned that he is working both in facilities and energy: *"That is split in most universities, but not here"* (University B). The interviewee of University A had a similar notion: *"For example, there are few people who oversee all aspects. What also often plays a role is how energy is organized in the organization. I am part of, and positioned within real estate and housing. Sometimes energy is positioned outside real estate and housing, which makes cooperation in the field of energy a bit more difficult."* This is also explained by the participant of University I: *"I can image that one has a sustainability coordinator, who has an overview, or that they have an energy coordinator who knows a lot about energy. But they don't know about real estate."* This was also acknowledged by the organization of the last energy coordinator meeting. They asked if the term 'energy coordinators-consultation' was the right title for the meeting, since every university has a different organization (Observations meeting Wageningen, 6-4-2023). They did not decide on a new title yet, although they would think about a more suitable name.

Because of the different organizations within the universities, it is sometimes unclear at what meetings certain people could be present. The interviewee of University I mentioned *"the meeting for the energy coordinators, I find it very difficult, because I didn't go there, for example, because I have that sustainability network that has more the sustainability coordinators in it."* The participant from University J mentions that this is covered by smaller and shorter meetings, or sub-groups for a certain theme.

One of the questions posed at the meeting on April 6th was what themes should be discussed in the future. During the discussion, the participants agreed upon the following themes: roadmap, purchasing, monitoring, transition, energy generation, laws and regulations, expectations, exchange with RVO, and involving Universiteiten van Nederland (Observations meeting Wageningen, 6-4-2023). This was mostly in line with the problems the interview participants wanted to discuss during a knowledge exchange meeting. Although, there is slight difference for the interviewees that also participate in sustainability meetings, *"at the sustainability meetings you see the SDGs emerging. Then it is also about mobility, waste, and those sort of things. And also equal rights for people"* (University E).

In addition to the themes, both during the consultation and the interviews, everyone agreed that knowledge sharing is a positive thing. They see it as a way to make contacts, and establish a network: *"I am very positive about the meetings and knowledge sharing. Knowledge sharing and learning from one another, that is what it is about. Not reinventing the wheel, but also working together"* (University F). During the meeting in Wageningen, it was agreed upon that knowledge sharing is the main goal of the network, and they want to continue meeting each other on a regular basis. This means twice a year at a physical location. When the question of a location was posed, multiple organizations were willing to host the event next time. Because of that, the locations for the meetings after that could already be decided. However, when it came to deciding who would be willing to lead the network, the whole room remained silent (Observations meeting Wageningen, 6-4-2023).

The main consensus from the meetings, but also from the interviews, is that they experience the meetings and networks as positive. In addition to that, all universities have the same sustainability goals, with some subtle differences. So, knowledge sharing should be going very smoothly, then, right?

5.2 Numbers

During the interviews, participants were asked to answer a number of statements with "agree," "disagree" or "not applicable." These statements were in line with barriers and drivers found in literature. Table 13 presents an overview of the results from the statements. When looking at the table, almost all interviewees agree on most statements. Expect for having a central point, and on finances.

Table 13.

Results statement questionnaire

There is ... to share knowledge with other universities	#	Agree	Disagree	N/A
Enough time	10	100%	0%	0%
Oral or written communication	10	90%	10%	0%
A social network	9	89%	11%	0%
Trust	8	100%	0%	0%
Motivation	10	90%	10%	0%
Openness	10	80%	10%	10%
A lot of information	10	90%	0%	10%
Tools	10	70%	20%	10%
Central point	9	44%	56%	0%
Financial	8	25%	75%	0%
Frequent contact	8	88%	12%	0%
A feeling of loss of ownership	7	0%	100%	0%

Note. Own table.

In addition to the statements, different barriers and drivers were mentioned during the interviews. The results will be laid out based on the barriers and drivers identified in the literature. Table 14 shows a frequency table of the mentioned barriers. Table 15 shows a frequency table of the mentioned drivers.

Table 14.

Frequency table barriers

Barrier	#
Structure	14
Time	10
Communication	7
Culture	7
Financial	6
Motivation	6
Skills	6
Openness	5
Integration	4
Overload	4
Social network	4
Support	4
Central Point	1
Contact	1
Fear	1
Inexperience	1
Expectations	0
Leadership	0
Mismatch	0
Resources	0
Rewards	0
Training	0
Trust	0
Space	0

Note. Own table.

Table 15.

Frequency table Drivers

Driver	#
Willingness	15
Networks	9
Time	7
Communication	6
Culture	5
Integration	4
Rewards	4
Structure	4
Help	3
Contact	2
Information	2
Central point	1
Leadership	1
Training	0
Skills	0
Support	0

Note. Own table.

5.3 Barriers

As stated in the previous section, it is often unclear what networks are available and who to approach. As the interviewee of University H states: *"when we are working on activities within our organization and we run into something, it is often quite difficult to make the link at which university to approach to see how they deal with it"*. The participant from University A mentions that "you are often in your own perspective, from your own university. That is quite narrow, and universities are quite internally focused." This was also mentioned quite a few times during the meeting on April 6th, people are feeling 'alone' and 'working on an island' in their organization (Observations meeting Wageningen, 6-4-2023). This was also specifically stated by the interviewee of University F: *"In my organization there is only one, and that is me. So if you want to brainstorm with someone, you just have to go outside"*. And the participant of University C mentioned: "universities are in their own boat with their own things".

During the interviews, most of the interviewees mentioned that they would like to have more time for knowledge sharing or that they lack the time to do so. The participant of University C mentioned: *"Look, everyone is pretty busy ... going and organizing those consultations for knowledge exchange is something that people do a little on the side. That is at the expense of the quality."* The interviewee of University I added that *"there is very little, or no time of people involved. It is simply done in addition to their own work. It might be possible to get more out of it if it were organized better"*.

Lack of time is also an argument why the participant of University J would not visit other universities: *"there is also a lack of time that you need to go there"*. The interviewee of University H mentioned that he would like to share information, but that *"sharing information often simply costs time and energy. And that is lacking ... we simply don't have the time to dive into it."* Another comment participants made was that sometimes they are asked to fill out questionnaires or sheets for a dashboard, for example. This is a lot of work, and they have to fill in a lot of information for that, too much since people stopped filling it out: "*it is so much manual work to fill it all in ... and I have now dropped out and it has already cost me one week of typing"* (University A). Multiple others also mentioned that filling those things is a 'crime'.

Another point made on the dashboard they had to fill out was in relation to a lack of IT-services. This was either not having the right software services, or the dashboard that they had to fill out. They did not find that user friendly, or useful according to the participant of University C: *"a consultancy firm has made a dashboard. I can honestly say that it was a 'crime' to fill in, but well ... But I also don't quite have the idea that that is really the solution. A: I never watch that. B: I don't know those buildings at all either, so what does it mean if some building from university E uses half of us. So yes, no idea. I wonder how much that really helps."*

Due to a limited or no amount of time to share knowledge and the corona crisis with different priorities, information to share has piled up. This was also recognized during the consultation on the 6th of April. A lot of subjects to discuss were mentioned, and arrangements for smaller theme-groups were made. But because of the large number of themes, not all themes are starting right now (Observations meeting Wageningen, 6-4-2023). Also, there is a lot of documentation that is shared, through e-mail, on subjects: *"Well, of course, sometimes it is a lot. And I don't read everything either. I read what interest me and what I need. Sometimes I also get things that make me think, well, what am I supposed to do with that"* (University E). Also, there is a lot of information available, however this is not always findable: *"We don't have such a good library that you can easily find what you are looking for or what it contains, so you also spend a lot of time reading through old documentation"* according to the interviewee of University I. The participant of University A makes a similar notion: *"They still see the server as the sanctuary. Because that is the*

digital copy of the filing cabinet, and they start making folders, subfolders, subs ... you only make it more difficult for searchability".

So, they store documentation somewhere. However, a central point, or database, which can also be considered a tool, is something that at least the participant of University C thinks is missing: *"A central point where knowledge is shared or stored. I don't think there is ... I have the impression that it happens a bit ad hoc via e-mail."*

The main way of communicating differs for the participants, the communication can be either written or oral. The participant of University I mentioned that *"written communication is limited"*. Whereas the interviewee of University A points out that communication is mainly through e-mail, something he dislikes: *"we are old-fashioned after all. It is barely searchable, not transparent, especially in emails. Only receiver and sender know what it is about"*. In addition to this he also mentioned that people lack skills to adapt to new ways of working and sharing knowledge: *"There are actually insufficient skills. In the professional landscape, people just don't know how to work with the new digital tools at their disposal and are unable to do so. I really see that as an obstacle for many aspects of the work ... But we find it too easy to always e-mail. E-mail is not that helpful, not clear, not many other things."*

Interviewees also talk about communication from the VSNU/Universiteiten van Nederland, and the government. They state that the information flow from them is limited and that they do not communicate anything until they are completely sure. They did provide universities with starting points. The participant of University H mentioned: *"I found those starting points to be quite poor, we couldn't really do much with them."*

More participants mentioned that it is quite unclear what is expected of them since the MJA3 ended: *"The MJA ended in 2020, and then corona came and the story got a bit sloppy"* (University A). And University F mentioned: *"there is not really a big stick anymore ... there is a lack of obligations ... now it is all in isolation, and also just free"*. And the interviewee of University C stated: *"as long as the information flow is not yet there, a very large proportion of real estate owners have no idea what is expected of them."* During the interviews the participants were asked what they were missing in regards to knowledge sharing. Most of the interviewees mentioned that they are missing some support or structure from the top, so from the VSNU/Universiteiten van Nederland or even the government. *"We have so little support from the VSNU. When I see what the 'Vereniging van Hogescholen' does for its members , and what 'Universiteiten van Nederland' does, there is a night and day difference"* (University F). The participant of University J explains that he finds it unclear what the role of the VSNU is *"they do something, but I always find it a bit confusing and vague what ... I think that they could have reported on their site or at least send a letter to the persons concerned what they are currently doing on sustainability"*.

Knowledge sharing also depends on whether there is someone who is willing to take the lead: *"you really need someone, a leader who takes a position like this and then something arises. When something is coordinated universities start working together. But it is a the initiative of an individual from one of the universities. It often depends on that. And, I notice that in a lot of knowledge sharing, it does not happen that way"* (University I). The participant of University F mentioned that his internal motivation varies because he has the feeling that people are hesitant to share their challenges: *"You notice that it is often a beautiful story about how well people approach their story. I think it is much more interesting that you discuss your challenges."*
Even though most participants agreed with the statement that there was openness to share between universities, the participant of University I also had a sidenote on this. *"It is often difficult*

to share problems because you are together with one large group and everyone has different experiences". Also, sometimes universities don't want to share things because the plans are not fully finished yet: *"it is not described in detail anywhere. That is more in my head, so it would be good to put that on paper. But as I just said, there are still a lot of uncertainties"* (University H). The fact that not everyone feels the same level of openness is a point of irritation for the interviewee of University G: *"then I thought, oh, why now that we are sitting together, everyone pretends that it is all going very good. You know, just be honest about it, because then you can bundle together"*. Knowledge sharing is not a standard practice for every university, according to the interviewee of University G: *"It hadn't been done proactively yet, so not like people sharing their information every time, not really."* And the participant of University H said: *"the university does not encourage participation in consultations"*. The difference in organizational culture has already been explained in the first section. Knowledge sharing is not always integrated in the business operations of the universities. When asking directly about why there were no or little documents on sustainability goals available online, the participant of University F mentioned that for them it has something to do with management: *"I must say that in the past we opened up much more to the public than today. That also has to do with our new management team that is somewhat, how should I say that, a bit more reserved about that sort of thing"*. The participant of University J said that not everything is shared online because time can be better spend on something else: *"that is actually not necessary according to my boss and that only costs time and we can best spend it on something else."*

In literature, power barriers, were mentioned as a barrier of structure. During the interviews it became clear that the interviewees see structure as a barrier, but not as a power barrier. Some mentioned it directly, like the participant of University B: *"It is also bit of the structure that is missing. How high you put in on the agenda"* and *"I mean, there is little structure in making notes. There is no secretary who, for example, makes a report and puts standard documents on a permanent team site"*. The participant of University C also explained what he thinks is missing in the organization of knowledge sharing: *"making minutes can be organized a little more tightly ... so actually quite a lot is shared among others, but not always very structured. Sometimes it is just small fragments of things that were discussed, that someone says he will forward it via email."*
Another barrier in structure that was mentioned is that some participants think it is difficult to share information because of the difference in real estate, as the participant of University G mentioned: *"I think that campuses and real-estate differ way too much ... of course, you can always learn from each other, but you will have to focus more on which things are the same".*

Also, the fact that was already mentioned as a network barrier. Universities are working on their own little 'island'. As the participant of University A stated: *"you are often in your own perspective, from your own university. That is quite narrow, and universities are quite internally focused"*. This is also explained by the interviewee of University B: *"we are a facility organization. We have to ensure that the primary process runs, so we can be very ambitious and sustainable ... but bread has to be put on the table, so things have to run".*

Knowledge sharing, or providing a place, time, or network for knowledge sharing, does have a price tag, and not everyone is willing or able to pay for this. This is illustrated by the statement made at the energy-coordinators meeting. They all agreed that the university organizing the next meeting is responsible for the chair, location and all other costs. As a result, some parties did not want to host the next meeting (Observations meeting Wageningen, 6-4-2023). Another example for financial barriers is that there is also a trade association that helps large energy users by sharing knowledge. Some universities participate in that trade organization, but the participant of University C noticed that not every university is willing to do so: *"I notice that not all universities have that.*

That they have something like that trade association costs us more. Because you have to pay a kind of membership for that. That costs us more than it brings us." Although, there is an organization that all universities are already a member of, the VSNU/Universiteiten van Nederland. However, as already mentioned, not all universities are very fond of their services. One of the problems that the participant of University H named is that *"the VSNU simply doesn't have a budget for it, and don't want to make it available either"*.

In addition to the participants stating the VSNU doesn't have budget, they also feel that knowledge about sustainability is lacking for their representative at the Universiteiten van Nederland, as explained by the interviewee of University F: *"Our representative was a real estate director from a university, who had no background knowledge of energy at all"*. The interview participants noticed a difference in the level of knowledge of different people that are in the network. As the participant of University G mentioned: *"the level of knowledge is quite different"*, and the participant of University B quotes "*You see differences in knowledge levels between certain universities. At the meetings there are universities and academic hospitals by the way, and you can see a considerable difference in knowledge there"*.

Sharing information with people who have less knowledge can also feel like feeding the competition. Although, this was not mentioned by the participants. On the contrary, they mentioned that they don't feel any competition towards other universities. This will be elaborated upon in the drivers section. The participant of University F mentioned: *"basically we just want to share information, we don't have any secrets so it can just be shared ... it doesn't have any negative things in it, but somehow, they are also afraid to release everything"*.

5.4 Drivers

The interviewees are most content about the openness of people during the meetings, this makes it easier to share knowledge. As the participant of University I explains: *"The consultations really do offer space, also to ask questions and we know that the sustainability coordinators of the universities are often long-term people, so I think that group has been active for so long and knows each other so thoroughly that there is room to openly report your problems. There is certainly that trust and, let's say, that safety is also there"*. This is confirmed by the participants of University H and University F as well: *"There is also room to introduce problems, certainly ... I think everyone is open in general"*, and "I think the best thing about our meetings is that we are completely open to each other".

Help seeking behavior is not something the participants mentioned directly as a driver for knowledge sharing. However, during the interview some of their answers indicated that they actually ask for help when they need it, as the participant of University I mentioned: *"I myself am often open about the dilemmas we encounter when having a problem. That is exactly where you can help each other"*. They also don't have a feeling that people are afraid to ask for help *"usually when you have a problem, then you know that others also have or are going to have the same problem or something. So no, it is not an embarrassment to ask for things"* (University F). A reason mentioned to why they are so open towards each other, and willing to share knowledge is because they *"don't want to reinvent the wheel"*, according to University B and the participant of University F also states: *"I actually see zero competition, say between universities in this area"*.

Fore some participants it has gotten easier to share knowledge, and therefore they are more willing to do so: *"I have to say, I think it has gotten better. Particularly because of the consultation structure ... I have the policy to have my doors open. And other universities do that too"* (University

E). And for the participant of University F: *"it is in my genes. I am really in favor of sharing knowledge"*. University I describes it as *"we are knowledge organisations, I think we stand for sharing knowledge"*. For most participants it is also something that is stimulated or supported by their organization. Having the right support from the leaders of the organization is a driver for knowledge sharing. The participant of University J particularly mentioned that knowledge sharing is *"something my boss says we should do. I don't know if the director knows about it right away, but my boss obviously does. He does support those meetings"*. The participant of University C described the need for integrating knowledge sharing with other universities as *"we really have the same interest at some points"*. And that is also how the meetings started in the past, according to the interviewee of University A, because of the 'dienstconvenant': *"and at that moment, such consultation started, or became firmer then".*

The structure of the meetings as it is now, is conducive to the transfer of knowledge. Interviewees mention that they: *"cannot afford to settle on our own islands. Achieving the sustainability goals is a problem that we all have, and it needs to be solved together. We cannot make it some kind of individual competition and only look at our own goals"* (University C). They also talk about sticking together: *"I share knowledge and learn from others, that is what it is really about. Not reinventing the when, but also pulling together"*, according to University F, and *"the sustainability people are very much looking for each other, to not reinvent the wheel for their organization"* (University I). However, for some people, the structure of the meetings is not what is the most important driver. It is the contact, similarities and networks that they create by meeting. They see it as *"very valuable to know what other universities are doing"* (University H). The fact that there is a lot of information to be shared is one of the drivers for the knowledge sharing meetings. *"I set the last meeting up because I wanted to share information about the 'informatieplicht'"*, and *"I do feel that everyone has the need to share information"*, according to the participant of University J.

One of the reasons of knowledge sharing mentioned by the interviewees is that they get something out of it. "*Joining is more for self-interest. Often you put in that time because there is something to be gained because when you consult with others, you discover that there are things already there"*, as explained by the participant of University I. A similar notion was made by the interviewee of University G: *"you have to make time to share knowledge ... I also think that if you are smart about knowledge sharing, and you actually spend half a day on it, some people may have solutions for you. You might also find that out in three days of thinking. But by hearing the solution in advance, then you can also save time"*. The interviewees mentioned different things about time. The first one is that you can make time. They mention that *"if you think it is important, you should make time for it"* (University H), and *"you make time, I think we are all autonomous people"* (University A). The second one is, that if you share knowledge, you can actually save time because, as University I states: *"if you have to do that kind of thing all by yourself in your organization, it just takes a lot of time"*, and *"take the time you invest in it, it often yields with something"*.

Another reward that interviewees mentioned, and why they are open about what they are doing on sustainability is the different university rankings. As explained by the participant of University A: *"We would like, and consider it important, to be the most sustainable university. Or at last score high on it. That is why we participate in rankings and by being transparent in this kind of thing. That helps with that."*

"Universities are no competitors at all", according to the interviewee of University C, *"If we have learned certain things and they can do it better, then I think that is only beautiful"*. The participant of University E emphasizes on the fact that they work at a university, a knowledge sharing institution "*we share knowledge, that is really one of our goals"*. For most participants it is no problem to share

knowledge with other universities and it is sometimes even welcomed to do so. A side note that the interviewee of University F mentioned is that: *"sharing with other universities is sometimes easier than sharing within your own university"*.

Good communication and having frequent meetings helps with knowledge sharing, according to the participant of University E: *"you meet other people, it is good for your network and when you talk to people the stories are always better than online"*. They often met their colleagues from other universities at the meetings, as the interviewee of University E further explains: *"I know the contacts through the consultations, and we have known each other for a long time. So contacting them is a step that is quickly made ... yes, that is really super important such a network"*. Also, because of the meetings it is easier to speak about problems and also have communication outside the consultations: *"I notice, and I often do it, if you know the network well, and know what is going on with whom, then you exchange extra information one-on-one, and you really benefit from it"*, and *"That you know those people because you see them regularly, you can just knock on their door. And that also applies mutually, yes"* (University I).

The networks are a good start for exchanging knowledge and getting to know the people to learn more from. The interviewee of University I states: *"It is often that you first have a conversation. You get to know more, and you start exchanging things one-on-one. That often gives me more input"*. The participant of University G explains: "what we often do is to visit the universities that are campus wise closer to us. And then of course we have a link with certain universities".

5.5 Tools

There are a few different tools that are currently being used for knowledge sharing about sustainability. One of those are the several meetings that are being hosted about different subjects, as already mentioned in section 5.1. All the different consultations have a MS-teams site: *"there is a teams-site, that is begin hosted by one of the universities"*, according to University A. This teams-site was also introduced at the meeting on April 6th, a lot of the participants of the meeting were already aware of the site, although few of them had actually looked at the page already (Observations meeting Wageningen, 6-4-2023). Also Sharepoint, another digital environment used to share documents was mentioned by University E as a tool.

Other digital tools that were being used according to University H were LinkedIn, *"For the sustainability platform, we used to have a LinkedIn page, but that is before teams. We actually did not used it"*, and WhatsApp *"I think we used to have a WhatsApp group as well, but I think that died silently"*. The participant of University E answered that there is a central point to share knowledge: *"There is also a central point, we used to have Surfnet for that. I think that doesn't work so well anymore and we have moved on to something new ... if you give a presentation at a meeting about a subject that more people want to know about, then those kind of sheets are always shared in the Surfnet"*

The interviewee of University D mentioned that within their organization they have a so called transition table, a small network with internal stakeholders to give the sustainability task a boost. For them, this internal tool works really well.

5.6 Synthesis

In this section the results from the analysis are synthesized.

Findings on barriers

The research has shown that the interviewees mentioned different barriers related to knowledge sharing. The most comments were made about the structure of the current knowledge sharing system and the lack of time they experience to fully embrace knowledge sharing in their work activities. Interesting to see is that during the small survey with statements, everyone said they had enough time to share knowledge. Table 16 shows a summary of the findings on barriers.

Table 16.

Comparison theoretical and empirical findings barriers

	Theoretical findings	Empirical findings
Central point	-	There is not always a central point to share and store knowledge
Communication	Bad oral or written communication	There is oral and written communication. Although, this is mainly 'old school' through e-mail. The communication from higher up (VSNU/government) is considered limited and poor.
Contact	Lack of formal and informal activities to share knowledge	-
Culture	Cross-cultural constraints	There is a difference in organization and building portfolio of the universities. This makes it difficult to compare universities and to know who to contact for information.
Expectations	Unrealistic expectations of workers on what technology can or cannot do	-
Fear	Fear to jeopardize peoples work, fear of loss of ownership or loosing advantage.	There is some fear to share everything with other organizations, even though there are no secrets.
Financial	Financial constraints	Not everyone is willing to pay for things related to knowledge sharing. For example, a membership for a trade association. In addition, the association they are all a member off does not have budget for providing knowledge sharing according to the participants.
Inexperience	Not using the IT-system because of a lack of familiarity and experience with it	Some people lack the skills to adapt to new ways of working and sharing knowledge through digital tools.

Integration	Lack of integration on KM-strategies in the goals of the organization. Lack of integration of IT-systems and processes, diversity of media and lack of integration.	Knowledge sharing is not always integrated in the business operations of the universities. Not every universities has shared documents about sustainability online.
Leadership	Bad leadership, insufficient knowledge of the manager on knowledge sharing	-
Mismatch	Mismatch between the needs of individuals and integrated IT-systems and processes	-
Motivation	Lack of motivation to share, or receive knowledge	The internal motivation of participants varies. It is not known what is expected of them, and no one wants to take the lead.
Openness	Lack of openness for new ideas or perspectives	Some people have the feeling that others are not sharing all their problems, and it is sometimes difficult to share things that are not finished yet.
Overload	Overload on information	There is a lot of information that can be shared, the digital library is not always easily accessible and not all the information that people receive is useful for them.
Resources	Limited resources allocated to loosely coupled communities	-
Rewards	Lack of sufficient reward-systems	-
Skills	-	Some participants notice a difference in the level of knowledge of other people in the network, and at their representative of the VSNU
Social network	Lack of social network, fragmented and diversified research areas, knowledge islands.	It is often unclear what networks there are. People generally work from their own, internal perspective.
Space	Lack of formal or informal spaces to share knowledge, reflect and generate	-
Structure	Power-barriers	The participants miss structure in the meetings, for example in taking notes. Also the different structures in organization is mentioned as a barrier. Universities are internally focused.
Support	Lack of support from managers, lack of technical support of IT-systems	There is mostly a lack of support from higher up (VSNU) mentioned. Also, the IT-services are not always user friendly.

Time	A lack of time to share knowledge, time constraints and deadline pressures	The participants feel that there is not enough time to share knowledge, also going to meetings takes time. However, in the questionnaire no one said to that time was a problem.
Training	Lack of training to make new IT-systems and -processes familiar to workers	-
Trust	Lack of trust in people	-

Note. Own table based on theoretical and empirical findings

Findings on drivers

Next to the barriers, also the drivers were investigated. The interviewees most mentioned the openness and willingness to information. Everyone seems very open about their problems. This helps during the network meetings, something they also find very useful. Meeting people on a regular basis to exchange information, share problems and find solutions. A summary of the drivers found during the research is shown in table 17.

Table 17.

Comparison theoretical and empirical findings drivers

	Theoretical findings	Empirical findings
Central point	"Boundary-spanning individuals" and "technological gatekeepers", centralized knowledge repository, KM portals to connect individual information systems and facilitate collecting, screening, and displaying internal and external knowledge, yellow pages	There is a MS Teams page to share knowledge.
Communication	Communication software facilitating anonymous brainstorming and nominal group decision making, "chat rooms" to facilitate informal communication	Communication and having frequent meetings helps knowledge sharing, according to the participants. Building a network from the meetings is the reason why people also communicate outside the meetings and contacting each other easier.
Contact	Face-to-face contacts, discussion of key-issues with colleagues or other professionals, periodic internal panel discussions, caring among organization members	The networks and contacts they make by meeting frequently is something that is considered valuable.

Culture	Organizational culture facilitating cooperation and knowledge flow, culture of tolerating failures, using them as tools for learning, learning culture	According to the participants, universities are no competitors of each other. Sometimes it is easier to share knowledge with other universities than within their own university. Knowledge sharing is one of the universities goals since they are knowledge sharing institutes.
Help	Help-seeking behavior, mentoring	Participants ask for help when having a problem.
Information	“cleanup” methods for addressing the problem of information overload	There is a lot of information that can be shared and uncertainties that can be discussed, that is why some interviewees felt the need to set up the last network meeting.
Integration	Integrating KM with the vision and mission of the organization	Universities are knowledge sharing organizations, participants mention that it is what they stand for. And therefore it is integrated in the organization.
Leadership	Leaders to support and facilitate knowledge sharing, creating a trustworthy and safe culture to share	Knowledge sharing is something that some managers really stimulate according to the participants
Networks	Developing, nurturing, and institutionalizing social networks	The networks are a good start for exchanging knowledge an getting to know the people.
Rewards	Reward-system to encourage knowledge sharing, balanced scorecard	The interviewees mentioned that they are sharing knowledge because they also gain something from it, it is just as much for self-interest as to help others. Also getting better themselves helps with higher rankings on sustainability.
Skills	T-shaped skills, qualified personnel	-
Structure	Fluid, flat, decentralized, and open organizational structures that improve interfunctional communication and knowledge flow, matrix teams, interface between disciplines, technologies, business units, functions and businesses	The structure of the network and meetings as it is now is necessary because universities cannot afford to stay at their own ‘islands’ and need to work together to contribute to the sustainability challenge

Support	Technology supporting a culture of sharing and speeding search of information for its reuse, adopting IT that is appropriate for the particular organization, adapting technology to the team needs, enterprise resource planning system, creativity tools	-
Time	Management software programs useful for dealing with time constraints and deadline pressures	Time is seen as something that one can create if they think it is important. It also saves time to share knowledge because solutions may come up earlier.
Training	Education and training	-
Willingness	Honesty, willingness to learn and share knowledge and ideas. Willingness to make mistakes.	The participants are content about the openness of people, this makes it easier to share knowledge.

Note. Own table based on theoretical and empirical findings

Findings on tools

During the research a few tools for knowledge sharing were mentioned. First the networks that are set up to share knowledge, although not specifically mentioned as tools. They did mention the MS Teams platform as a tool for sharing knowledge. The findings on tools are summarized in table 18.

Table 17.

Comparison theoretical and empirical findings tools

	Theoretical findings	Empirical findings
Digital	IT structure, centralised knowledge repository	There is a MS teams hosted by one of the universities that every university has access to. Here documents are shared, as well as a list with members and their occupation. There is also a chat function. LinkedIn and Whatsapp were also mentioned as tools, but are not used anymore.
Physical	Storytelling, knowledge broker	The different types of networks were not specifically mentioned as tools, but can be considered as tools for knowledge sharing. One of the universities introduces a transition table to get all the stakeholders together in a small network to give the sustainability challenge a boost.

Note. Own table based on theoretical and empirical findings

6. Conclusion

The aim of this research was to find out how knowledge transfer between Dutch universities about the implementation of their real estate sustainability goals occurs. Therefore, the main research question of this thesis was: *"How can inter-university knowledge transfer support university campus real estate managers to achieve the universities' sustainability goals?"* To answer this question, several sub-questions were posed. In this chapter, the conclusion of the research will be described, and the different research questions will be answered.

The first sub-question *"What are barriers, drivers and tools of knowledge transfer?"* can be answered based on the theoretical framework. Barriers, drivers, and tools of knowledge transfer are extensively researched and written out in literature. They can be either within an organization or between organizations. For this thesis, the barriers, drivers, and tools for inter-organizational knowledge transfer were researched. The barriers are grouped into different categories by multiple researchers. There are two types of barriers to inter-organizational knowledge transfer: organizational and people-related barriers , although some also mention barriers related to technology and the characteristics of knowledge as possible types. The most frequently mentioned barriers to knowledge transfer in literature are a lack of trust and a fear of feeding competitive organizations. Knowledge is a source of power, and if they share it, there is a chance that this power will be lost. Also, a lack of motivation to share and decentralization are mentioned as large barriers in the literature.

The drivers can be grouped into different types, also known as levels: individual, socio-organizational, and technological. On an individual level, the willingness to share is an important driver for knowledge sharing. Face-to-face contact and the organizational culture are drivers on a socio-organizational level, and on a technological level, knowledge repositories and software to transfer knowledge are important drivers. Other important drivers mentioned are trust, centralization, collaboration, and leadership. The barriers and drivers mirror each other. For example, the organizational culture should be supportive to have effective knowledge management. Not supporting sharing and reusing knowledge has the opposite effect.

Knowledge transfer tools enable people to share tacit knowledge with others. There are digital and physical tools for knowledge sharing mentioned in literature. An IT structure with a knowledge repository is a digital tool, and coaching, mentoring, and storytelling are physical tools. The digital tools cannot replace the physical tools entirely since personal, trust-based relationships work best for knowledge sharing. So a combination of both physical and digital tools is recommended.

The second sub-question *"What does the sustainability task of university real estate management entail?"* can be answered based on the findings of the desk research on sustainability and the campus and real estate strategies . The government has set sustainability goals in the National Climate Agreement (Klimaatakkoord). The task is to reduce CO2 emissions by 49% in 2030, compared to 1990. In addition to that, they want to have a full circular economy by 2050. The built environment in the Netherlands has to meet these goals, including public real estate like university campuses.

In 2008, all Dutch universities signed a covenant to reduce energy consumption and CO2 emissions on campus by 30% in 2020 and 50% in 2030. This covenant is called the MJA3 and has ended in 2020. After this, a roadmap was made by the VSNU to guide universities to sustainable real estate. In their campus strategies, or sustainability plans, the Dutch universities mention that they want to use sustainable energy sources, phase out the use of natural gas, reduce indirect emissions, have efficient use of energy, and be energy neutral in 2050. All in line with the "trias energetica" and be Paris Proof. They also want to increase biodiversity, purchase and use sustainable materials, make efficient use of space, and receive high rankings. For example, on the different sustainability rankings or the certificates for their buildings, From the analysis of the campus and/or sustainability

strategies of the 14 Dutch universities, it becomes clear that all universities have the same goals, with some nuances here and there.

The next sub question *"How and to what extent are universities transferring knowledge to other universities about their real estate"*, can be answered based on the empirical research, which includes interviews and observations. At this moment, the universities are using different tools to transfer knowledge. The first are the different networks they set up on a variety of topics, for example, sustainability, energy, biodiversity, and the general campus directors' meeting. In addition to this, for at least the sustainability and energy networks, there is also a digital Microsoft Teams page where every university can share documents or use the chat function to ask questions.

During the interviews, the most mentioned barriers were the lack of structure in the current system for knowledge sharing, the difference in organization among the universities, and the lack of time to fully incorporate knowledge sharing into their work. The most mentioned drivers are openness and willingness to share information and knowledge, but also to discuss the arising problems. In-person meetings are something that they experience as useful, so meeting people on a regular basis to exchange information, share problems, and find solutions for this.

In general, the interviewees experience the knowledge-sharing network as positive. However, the lack of structure in the digital database, the uncertainty about what is expected, and the lack of time are things that could be improved. This indicates that a knowledge sharing network is indeed something they want to have, however they don't want to put too much effort in it.

The last sub-question was *"To what extend is knowledge transfer about real estate incorporated in their real estate or sustainability strategy?"*. This question is about real estate and sustainability strategies and can therefore be answered based on the analysis of these documents and the interviews. Knowledge transfer is only briefly mentioned in some strategies. Only collaborating with other universities is mentioned; it is not specified what this collaboration entails or if they share knowledge about their real estate. One university had a chapter on knowledge transfer; however, this was knowledge transfer about sustainable development goals and not about real estate.

So, to conclude and answer the main research question: *"How can inter-university knowledge transfer support university campus real estate managers to achieve the universities' sustainability goals?"*. Knowledge transfer can help by sharing problems and ideas and getting insights into what others are doing. This can be done through network meetings. However, for this, someone who is willing to take the lead and a clear structure are needed. A person or organization that is taking on this role could be the VSNU/Universiteiten van Nederland; they are supposed to have an overview of all the universities, and right now people are experiencing a lack of guidance from them. To do so, sufficient funds are needed, something the university itself does not have. When someone outside the universities takes the lead in the meetings, more time is created for knowledge sharing between the different managers. The most important thing that universities need to do to exchange knowledge about their sustainability goals is to communicate. They all have the same goals, and by working together, they might find solutions for their problems better, and they can stick together to achieve more guidance from organizations at the top.

7. Discussion

This chapter will review and discuss the research and its findings. Next to this, recommendations for future research and practice will be made.

7.1 Main findings

The goal of this study was to find out how knowledge transfer between Dutch universities about the implementation of their real estate sustainability goals occurs. Therefore, the sustainability goals, campus management and knowledge transfer were researched. For this research, it was assumed that knowledge sharing already occurs because there are already networks for knowledge sharing. Participants from those networks were interviewed.

The findings of the real estate and sustainability strategies are in line with the goals set by the Dutch government. However, since universities are urged to set an example, it might be expected that the goals set by the universities would be more ambitious than the Dutch National Climate Agreement. While this is the case for some universities, most strategies only go as far as the standard goals. An explanation for this could be that universities do not know what is expected of them, as they mentioned during the interviews, and are therefore copying what the government states. Research (Curvelo Magdaniel et al., 2019; Den Heijer, 2021; Hopff et al, 2019; Rymarzak et al, 2020) shows that universities are largely working on the subject of sustainability, which was also confirmed by the interview participants. However, since the primary process of a university is providing education, sustainable buildings is not the main subject of interest for the universities. Other than exploring the sustainability goals set by the government and finding out how universities are dealing with these goals, this thesis did not look into the specifics of the sustainability implementations.

According to Rymarzak et al. (2020) campus management, and the campus itself, affects the university's performance because location, developments, facilities, and type of buildings have an impact on the lives, work, and innovation of students and academics. To achieve the best possible performance, four perspectives need to be integrated; the physical, functional, financial, and organizational perspective (den Heijer, 2011). This is not something that was mentioned specifically by the interviewees. While this could be due to the fact that the case study group consisted of people working on the energy transition, and that they are not working as campus managers. It could also be that in Dutch universities, campus management is not a priority and only something that is necessary for universities to perform their prime task; providing education.

In literature, it was mentioned that campus managers need support from other public real estate managers and that a network of academic experts for knowledge exchange can help with that (den Heijer, 2021). This is in line with what the interviewees mentioned, they need each other because they have the same goals and do not want to reinvent the wheel.

Previous research on knowledge transfer, as part of knowledge management, showed the different barriers and drivers for knowledge transfer in various sectors. Campus real estate was not one of the already researched areas. Based on the theory, the expected challenges of knowledge sharing between universities were a lack of time to share knowledge, a lack of formal and informal activities like a network, and that universities were working on their own small "islands." A lack of trust and fear of losing an advantage are also mentioned in literature as barriers. However, this seemed less applicable to the universities due to their shared goals. It was also expected that because everyone has to comply with the same rules and regulations, they will have the same goals, and there should be a lot of motivation to share knowledge with others.

To start with the first expectation, a lack of time to share knowledge. It is known that a lack of time, time constraints, and deadline pressures are large barriers to knowledge transfer (Rego et al., 2019). It was expected that this would also be the case for the participants in this research. During the interviews and the observations at the network meeting for energy coordinators, it became clear that everyone has the feeling that they lack time to share knowledge, organize meetings, or even attend them. This is completely contradictory to the results of the statement questionnaire,

where everyone said that there was enough time to share. They made a side note that they have to make time for it when they find it important. For most interviewees, they find it important, so they make time for it. However, this also raises the question of whether the barrier here really is a lack of time or if it has something to do with motivation.

Motivation is, according to literature, a barrier to knowledge sharing. In literature, it is mentioned that people see knowledge sharing as extra work and therefore do not support it. So motivation to share and accept knowledge is important to make knowledge transfer work (Riege, 2005; Singh and Kant, 2008; Ranjbarfard et al., 2014). During the interviews, all but one mentioned that they were motivated to share knowledge. The person who did not feel motivated to share knowledge mentioned that it was mainly because he did not feel that everyone was talking openly about their problems.

There were more participants that mentioned that it is sometimes difficult to talk about problems, although most agreed that everyone is very open. Because everyone is open, there is room to report problems. People feel safe sharing things and trust that their problems or information will not be abused. They do not feel any competition between universities in the area of energy transition. In literature, a lack of trust (Yih-Tong Sun and Scott, 2005; Wunram et al., 2002; Ranjbarfard et al., 2014) and fear of losing a competitive advantage (Yih-Tong Sun and Scott, 2005; Thoben et al., 2002; Wunram et al., 2002; Riege, 2005; Ranjbarfard et al., 2014) are mentioned as barriers for knowledge sharing. These barriers do not seem to exist in the knowledge-sharing network with universities about the energy transition. The participants mention that this has something to do with the fact that they are getting to know eachother by going to the meetings and having a regular structure for that.

Literature research shows that, having an open, flat organizational structure improves knowledge flow. Power barriers are not stimulating this process (Rego et al., 2009). During the empirical research, it became clear that the interviewees do mention the structure of the meetings as a barrier, but not in the same context as mentioned in the literature. The things they mention are more in line with contact: having face-to-face contacts, periodic meetings, discussion of key issues, and culture, tolerating failures; using them as tools for learning; facilitating cooperation, and facilitating the knowledge flow (Rego et al., 2009). There are meetings for this energy coordinator network as well as for other subjects related to sustainability. However, since it is not always clear what meetings there are, they may not be used to their full potential.

In addition to this, it also appears to be unclear what is expected of the campus managers, working on the energy transition; there is a lack of information about the rules and regulations. Also, there is little motivation to take the lead in the network meetings and share knowledge. This is something that is important according to previous studies; poor leadership in knowledge sharing is seen as a large barrier. In literature, they mean the leadership within the organization, but in this graduation research a lack of leadership is something that the participants mentioned they experience in organizing the meetings. Right now, the meetings are set up by the universities themselves, and this takes a lot of time. There are no other organisations involved, not even the Universiteiten van Nederland/VSNU, the umbrella organization of all universities who is supposed to have an overview of all universities. If they would facilitate the meetings, it will ease the burden the universities feel right now. It is interesting to see that real estate is not one of their key aspects.

Face-to-face meetings take up a lot of time, when also experience a lack of time already, so it seems contradictory to host them live. However, when having regular meetings, people get to know one another and build a network. That way, when they experience a problem, they know who to

contact and can gain insights on their issue much quicker. In that way, eventually it saves time by first spending time.

Another interesting finding is that the interviewees mentioned that there is no big stick or obligation to discuss and share knowledge with other universities, or a deadline for which they have to deliver certain documents to the government. In the past they had the MJA3, which required them to hand in reports. The MJA has been mentioned as a driver or starting point for the network meetings. By having to comply to the regulations of the MJA, the different universities had a same goal, a same deadline, knew what was expected of them and therefore some sense of urgency to discuss this witch each other. In this case, a deadline or obligation to deliver something works as a driver for knowledge sharing. This is contrary to the literature, where they mention deadlines as a barrier (Rego et al., 2009).

Universities are knowledge-sharing organizations; they have mentioned that multiple times during the interviews. One would assume that because of this, knowledge sharing about their business operations would also occur. However, based on the literature and empirical research, in general, the barriers and drivers of knowledge transfer do not differ from those of other types of organizations. This research therefore adds a new context to the knowledge transfer debate, and shows that most barriers and drivers are the same, even when there is trust and no competition between organisations.

7.2 Limitations

Every research has its limitations, and therefore also this research is bound to constraints. This limitations are about methods, time, and data collection.

In this research, the data collection is done through purposive sampling. Concretely, this means that the first interviewee was chosen based on its activities within the energy coordinators' network. The first interviewee provided a list of people from the network, and they were approached next. This list did not include all the interviewees; some were approached after the network meeting. However, this still means that all people are already in a network. This provided insights into the barriers, drivers, tools, and wishes for that network. But it did not show any results on whether people who are not in a network yet also feel the need to share knowledge with other universities. To have a more complete understanding of this, it could be useful to also include participants who are not already in a knowledge-sharing network.

In addition to this, due to the timeframe of this research, only one person from each university was asked to participate in the research. The results are therefore only based on one perspective of the university. As the participants also mentioned, the structure is different for every university, and adding different perspectives from each university could make the research more valuable.

Next to that, the data for the strategy analysis consists of only documents or websites that could be found online. During the interviews, the participants were asked whether information was available online, which was not the case for every university. While this also says something about the openness of universities to share their goals, it can also mean that important notions were missed. By asking the universities directly for their sustainability strategy or real estate strategy, this could have been prevented.

7.3 Recommendations

The practical recommendations arising from this research can be divided into recommendations for Campus NL research and more general recommendations for knowledge sharing between universities. For example, campus managers or other people working on the energy transition at Dutch universities.

Practical recommendations Campus NL research

Since this research is an exploratory study for the Campus NL research that is starting soon, a few practical recommendations are made:

- This study looks at knowledge sharing between universities. However, every university has its own organizational structure. It might be useful to also look at this structure and knowledge sharing within the university.

- For this thesis, people working on the energy transition were interviewed and researched. Some problems that they encounter might not be present for other campus managers. It would be interesting to see if and what differences there are between different types of managers working in campus real estate.

- The participants in this research are experiencing a lack of time for their knowledge-sharing activities. Therefore, it might be difficult to get their full attention when exchanging their experiences with researchers. If it is hard to get respondents, it might be useful to attend a network meeting that is already scheduled since people have already cleared their schedules for that.

- Filling out large sheets for dashboards or questionnaires is considered a burden for some. For this research, it worked well to combine the interviews with a small questionnaire. Although, if the answers to the questionnaire could have been analysed before conducting the interview, more in-depth questions could have been asked. A balance in the length of the questionnaire and interviews should be found; when it is too long, people will not participate.

- According to the interviewees, there are some commercial networks that are also focusing on knowledge sharing. Some universities are also participating in these networks or at least know about them (VEMW, Neerlands Diep). For this thesis, there was not enough time available to dive into these networks, but by doing so, insights about why they work or why universities are not participating in those networks could be gained.

- This research and the claims made by participants are not checked and verified by other organizations such as the VSNU/UNL or the Dutch government. It would be good to include their perspectives as well.

Practical recommendations for knowledge sharing between universities

For individuals at Dutch universities working on the energy transition, there is motivation and willingness to share knowledge; people find it useful. However, most of the time, the universities are working from an internal perspective; they stay on their own isolated islands. This is very unfortunate because most universities are facing the same problem. Working together or sharing knowledge can save time because already known solutions or attempted steps do not have to be created again. This research shows that people are reluctant to take the lead in organizing such a knowledge-sharing network and are not sure what their task is. For a well-functioning network, it might be a good idea to release a budget for appointing someone to lead this platform for knowledge sharing. Because of the lack of time people are already experiencing, it might be a

good idea to use an external person for this, whose only task is to facilitate the meetings, make notes, and make sure that everyone is well informed beforehand and after the meetings. It could be useful to appoint someone from the Universiteiten van Nederland since they are already the umbrella organization of all the universities. They also know what the tasks of all the universities are, so information can be shared more directly. This would also solve the barrier that universities are experiencing now: not receiving enough information about what they are supposed to do.

However, this takes time and may not be possible at all. In the meantime, it is important that campus managers, energy coordinators, sustainability coordinators, or everyone that is working on real estate continues to share knowledge from their expertise. Meeting on a regular basis makes it easier to share knowledge. This way, there will not be an overload of information at once, and people will get to know each other better, which creates a feeling of familiarity and therefore trust and openness. Face-to-face meetings work best, and creating or maintaining a structure for this is necessary to make it work.

Figure 5 shows an infograhpic of the recommendations. The figure can be seen in full size in appendix 5.

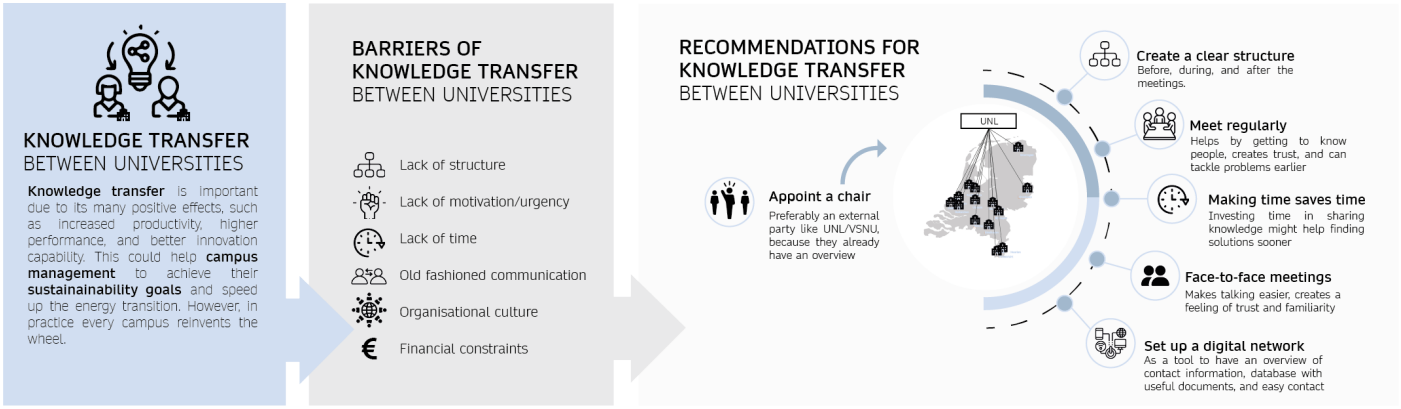

Figure 5. Infographic recommendations. Own figure.

8. Reflection

This chapter reflects on the research, based on the guidelines given by the Management in the Built Environment department. Also, a reflection on the graduation process is given in this chapter.

8.1 Reflection MBE

The MBE reflection guidelines mention that students should reflect on the relationship between the graduation topic, master track, and master program. Reflect on methodology and data collection, and elaborate on the relationship between the project and its wider social and scientific relevance. Lastly, ethical issues and dilemmas need to be discussed.

Relation between graduation topic and studies

The Management in the Built Environment department strives to have a sustainable built environment. Within the master track, different solutions for developing and maintaining the buildings and portfolio are being learned. The master's track Architecture Urbanism and Building Sciences is known for exploring innovative ways to create a more sustainable environment. The topic of this thesis is exploring knowledge transfer between university real estate managers on the sustainability of their buildings. This is a new and innovative way for real estate managers to manage their real estate portfolio.

Methodology

In this thesis, the barriers, drivers, and tools of knowledge transfer between universities about their sustainability goals are researched. The main aim of this research is to understand how this works. An empirical research method is used to generate data on people's perspectives and expectations. This is exploratory research that could be placed in the bigger picture of campus management and knowledge transfer.

The research was done based on theory and a literature review on knowledge transfer, sustainability, and campus management. Hereafter, empirical research followed. This consisted of two steps. First, the real estate and/or sustainability strategies of the Dutch universities were analysed to see what universities are openly sharing and to find out what their real estate sustainability goals are. After this analysis, in-depth semi-structured interviews and observations at a network meeting were conducted to find out what campus managers working on the energy transition actually experience in relation to knowledge sharing. The findings on all three aspects—theory, strategy analysis, and interviews—were synthesized to draw conclusions and come up with recommendations.

Data collection

A problem that arose during the strategy analysis was that not every university had its real estate or sustainability strategy documents online. Also, every university uses different terms for the same type of plan. In the end, it was decided that every document that could be found within a 10-minute search would be taken into account. If this did not suffice, the pages on sustainability on the university's website were also analysed. Another solution could have been to ask the universities for their documents. Although having information publicly available on their website also provides interesting insights.

Finding participants for this thesis was done through purposive sampling; this is exploratory research for a larger project. Looking for participants was not really difficult. The first person was found through a network that one of the supervisors participates in. After the first interview, other participants mentioned by the interviewee were contacted. Also, at the first interview, an invitation to a network meeting was received, so the last interviewees were asked after that meeting. A difficulty was the availability of the interviewees. Therefore, there was some time pressure to transcribe and analyse all the interviews at the end of this research. The availability of participants is something that is difficult to change.

For this research, theory, observations, interviews, and strategy analysis were used to come to the conclusion. The same people who were interviewed were also present at the meeting. This research

could have been stronger if also people who are not participating in the network were interviewed to gain more insights into why they are not going to those meetings. However, due to the time span of this thesis, this was not possible. For future research, like the Campus NL research, it might be useful to also include those people.

Relevance

This research is relevant from a societal perspective because everyone needs to comply with the sustainability goals, and to make that happen, people need to know what they have to do. Currently, the speed of achieving those goals is not meeting the required pace. Universities have a social obligation to address and solve societal challenges and improve sustainable development. Knowledge transfer is an important process for people in order to learn and innovate, and innovative solutions are needed in order to meet sustainability goals. By researching knowledge transfer between universities about their sustainability challenges, this research provides practical implications for campus managers on how knowledge transfer helps meet sustainability goals.

This research explores the fields of sustainability, knowledge transfer, and real estate management. Because it combined those fields, it contributed to interdisciplinary knowledge and understanding. Something that seems necessary for solving complicated issues such as sustainable development. Knowledge transfer is a well-established area of research, although there has been little research on knowledge transfer between universities. By researching how inter-university knowledge transfer might help achieve sustainability goals, this research adds new information and context to the debate on knowledge transfer. It shows that most barriers and drivers are the same as in other sectors, even without competition and a lot of trust between organisations. By knowing this, the drivers of knowledge transfer known from literature could be useful for knowledge transfer between universities as well.

In addition to that, at this moment the TU Delft Campus Research team is starting a new Campus NL research project to investigate the real estate of Dutch universities. One of the subjects they are going to research is "campus learning." This thesis serves as an exploratory study, providing insights on the barriers, drivers, tools, and experiences of knowledge sharing between a small focus group of people working on the energy transition at Dutch universities.

Ethical issues and dilemma's

At the start of the empirical research, one of the ethical issues that was expected was how participants would see the researcher. Because of the relationship with Campus NL, participants might think that their answers will be used and compared to those of other universities to provide a ranking. which could lead to a reluctance to answer honestly. It seems like this was not a problem at all; on the contrary, Because of the mention of the Campus NL research, participants felt like they could explain their problems and had a feeling that something would be done with their results. They also mentioned that they were happy with the previous Campus NL research.
Another issue that was expected at the start of the research was that it could feel like the participants were being checked on their work, even though this is not the case. This was actually mentioned by someone during the observations. By explaining that during the observations no comments about specific universities would be noted and that the observations were purely about how knowledge was shared and not about substantive problems, it seemed like everyone was comfortable sharing their stories.

8.2 Graduation process

September – January towards P2

The foundations of this thesis lay in the theme presentations in the first week of the semester. Although the subject of public clients as learning organizations was not presented due to the illness of the person leading this subject, it immediately drew my attention. Over the summer, I was working on a research project on making primary and secondary education buildings more sustainable, and one of the recommendations from that research was creating a database or network where schools could exchange information.

During the first weeks, I tried to contact the person who initiated the subject; however, due to personal reasons, this did not work. Then I had a meeting with Alfons van Marrewijk, their PHD mentor, and he agreed to help me as a second mentor. However, this research went in a slightly different direction because of difficulties in finding a first mentor. When I asked Monique Arkesteijn if she could guide me through my thesis writing process, she was enthusiastic about my ideas and asked if I would direct them at universities because the campus research team was going to start a new Campus NL research project with knowledge sharing as one of the themes.
Although I had some struggles finding mentors, I had already started doing some literature research about knowledge management and knowledge sharing. And at the time of the P1 presentation, the majority of my literature study about knowledge management was actually already there. The only problem was that the link and the problems that occurred between the knowledge part and the university real estate challenge were not that strong. In the period between P1 and P2, I tried to improve this.

The last weeks of the P2 period have not been without a struggle in terms of mentors. Monique Arkesteijn is not available for mentoring anymore, unfortunately. However, I am very happy that Alexandra den Heijer stepped in and provided me with new insights, literature, and knowledge to work on. In the last couple of weeks of the P2 period, I focused on finding the right methods to conduct the research. Luckily, due to the connection of the campus research team with the existing campus management networks and the topic of knowledge sharing, I had an "in" with these networks and campus managers. By writing my method section and talking to my mentors about the research, I began to see the pieces coming together.

February – June towards P5

After the P2 presentation, it was time to sharpen the research proposal and start with the empirical part. In February, the first participants were contacted, and appointments to visit their universities for an interview were made. The first interview went smoothly, and it was interesting to visit another university and walk around the campus. The participant provided me with a list of people in his network to contact. This resulted in sending out invitations to more participants. Unfortunately, not everyone responded or had time within a few weeks. Nevertheless, more appointments were made. In March, Alexandra attended a meeting with the real estate directors of the Dutch universities and presented a slide that I provided to ask for more participants. This also resulted in a participant. At the first interview, I got an invitation to a network meeting for the energy coordinators, which I attended on the 6th of April. This was very interesting because the morning program consisted of a brainstorm and making decisions about the network and future knowledge sharing activities.
On the 13th of April, the P3 was planned. Because of the availability of the participants, at the time of the P3, only four of the 10 interviews were conducted. The results of these interviews were presented, and we talked about what conclusions could already be drawn. The weeks after the P3 were very busy with another six interviews. Due to the availability of the participants, public transport problems, and a limited amount of time, most interviews were conducted online. I am glad that there was a possibility to still do the interviews; however, I would have preferred to go to the universities and conduct the interviews face-to-face since I learned that knowledge sharing is

done more effectively that way. and it would have been a nice excursion. After the P3, I also made three more appointments for meetings with Alexandra and Alfons; each meeting gave me new insights and sometimes made it more confusing and clear what to do at the same time.

On the 25th of May, I presented my work to the mentor team and delegate of the exam committee. I received useful feedback to work on for the next couple of weeks. After that it was 'just' finishing up my thesis. Which eventually turned out more difficult than expected. However, now everything has come together, and I am happy with the result.

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Appendix

Appendix 1 - Interview protocol

Geïnterviewde: _____
Functie: _____
Universiteit: _____
Interviewer: Neva Wardenaar_____
Onderwerp: Kennisoverdracht tussen universiteiten_____
Extra: _____

Introductie
Allereerst zal ik mijzelf voorstellen. Ik ben Neva Wardenaar, masterstudent Management in the Built Environment aan de TU Delft. Dit interview is onderdeel van mijn afstudeerscriptie dat gaat over kennisoverdracht tussen universiteiten op het gebied van duurzaam vastgoed.
Ik ben bij dit onderwerp terechtgekomen door mijn interesse in publiek vastgoed en een onderzoeksproject naar verduurzaming van onderwijsvastgoed waar ik afgelopen zomer aan mee heb gedaan. Hierbij was een van de conclusies dat een gezamenlijke database of netwerk om informatie en kennis uit te wisselen eigenlijk ontbreekt. Bij het zoeken naar een begeleider hoorde ik dat het Campus NL onderzoek, dat dit jaar start, ook een onderdeel heeft over kennisuitwisseling dus voor mij sloot dit mooi aan op het onderzoek dat ik heb gedaan. Ik ben erg benieuwd naar wat ik allemaal te weten kom.

Introductie protocol
Ik zou dit interview graag op willen nemen zodat ik nu met volle aandacht het gesprek kan voeren en bij het uitwerken nog eens terug kan luisteren. Mocht u het formulier voor de 'geïnformeerde toestemming' nog niet getekend hebben, wil ik u vragen dit alsnog te doen. Ook wil ik u op de hoogte stellen dat alleen onderzoekers van het project toegang hebben tot de opnamen en persoonlijke gegevens. U kunt ervan uitgaan dat alleen ik dat ben, en in bijzondere gevallen mijn begeleiders. Alles wordt anoniem verwerkt en gegevens worden vernietigd na het project. Het formulier 'geïnformeerde toestemming' stelt dat: (1) alle informatie zorgvuldig behandeld wordt, (2) uw deelname vrijwillig is en u op elk moment kunt stoppen als u dit wil, en (3) ik niet van plan ben om u enige schade toe te brengen.

Het interview zal niet langer dan een uur duren. Tijdens dit uur zal ik u een aantal vooropgestelde vragen stellen om meer te weten te komen over uw functie, duurzaamheidsdoelen van de universiteit en kennisuitwisseling.

Introductie onderwerp
In 2006 en in 2016 heeft het Campus Research Team van de TU Delft onderzoeken gedaan naar het vastgoed van de Nederlandse universiteiten onder de naam Campus NL. Op dit moment is het Campus Research Team van de TU Delft bezig met een nieuw campusonderzoek. Campus NL heeft als doel de kennis en ervaring van de 14 Nederlandse universiteiten te bundelen, om de uitdaging op de campus – innovatief, duurzaam, betaalbaar, inspirerend, doelmatig en gezond – samen te kunnen tackelen en het campusmanagement binnen elk van de universiteiten (nog) efficiënter te kunnen organiseren.

Een van de onderwerpen die het Campus NL onderzoek gaat onderzoeken is 'campus learning', het gaat hierbij om hoe de kennis uit het onderzoek verspreid kan worden binnen te universiteiten. Het doel hierbij is om stap voor stap een organisatie voor kennisdeling op te bouwen.

Mijn afstudeeronderzoek loopt hier op vooruit en het doel hiervan is om een verkennend onderzoek uit te voeren naar hoe kennisuitwisseling op dit moment plaatsvindt, wat hieraan bevalt, wat beter kan en zo een extra startpunt voor het campus NL onderzoek te vormen.

Omdat het voor een afstudeeronderzoek veel te groot is om alle vormen van campus management te onderzoeken, ligt de focus hierbij op duurzaamheid. Het is een feit dat universiteiten hun campus willen, en moeten, verduurzamen. Hiervoor is bijvoorbeeld een circulair ontwikkelingsproces nodig, die andere manieren van denken en samenwerking nodig heeft. Denk bijvoorbeeld aan netwerken om kennis uit te wisselen tussen verschillende actoren zoals opdrachtgever, gebruiker, ontwerpers, consultants etc. Op dit moment proberen nog veel universiteiten zelf het wiel uit te vinden voor hun campus (Hopff et al., 2019).

Onderzoeksvraag
"Hoe kan kennisoverdracht tussen universiteiten campus management helpen om de duurzaamheidsdoelen van de universiteit te behalen?"

Achtergrondvragen
Persoonlijk/introductie
- Kunt u iets over uzelf vertellen? Studie en werkachtergrond?
- Hoe zou u uw functie omschrijven?

Duurzaamheidsdoelen
- Wat zijn jullie grootste duurzaamheidsdoelen?
- Waar zijn deze (openbaar) te vinden?
- Hoe zijn deze opgesteld?

Netwerken, overleggen
- Welke overleggen/netwerken over duurzaamheid en vastgoed van universiteiten kent u?
- Neemt u deel aan overleggen tussen universiteiten?
- Wat voor onderwerpen komen er aan bod bij deze overleggen?
- Worden er aantekeningen/notulen gemaakt tijdens de meetings?
- Op welke manier en met wie worden deze gedeeld?
- Wat is uw ervaring met het delen van informatie binnen deze overleggen?

Barriers en drivers
Zou u onderstaande stellingen kunnen beantwoorden? Het gaat hierbij om kennis over uw vakgebied met andere werknemers met een gelijke functie bij andere universiteiten. Als u een toelichting wilt geven op bepaalde stellingen dan kan dat. Bij elke vraag zijn de opties eens/oneens/n.v.

Stelling	Eens	Oneens	n.v.t.	Toelichting
Er is tijd om kennis te delen met andere universiteiten.	O	O	O	
Er is mondelinge of schriftelijke communicatie tussen mij en andere universiteiten.	O	O	O	
Er is een sociaal netwerk voor het delen van kennis met andere universiteiten.	O	O	O	
Ik heb vertrouwen in het uitwisselen van kennis met andere universiteiten.	O	O	O	

Ik heb motivatie voor het uitwisselen van kennis van kennis met andere universiteiten.	O	O	O
Er is openheid over zaken die spelen in mijn vakgebied tussen universiteiten.	O	O	O
Er is veel informatie die gedeeld zou kunnen worden.	O	O	O
Binnen mijn universiteit is het vanzelfsprekend dat informatie gedeeld wordt met andere universiteiten.	O	O	O
Er zijn hulpmiddelen om kennis te delen met andere universiteiten.	O	O	O
Er is regelmatig contact met andere universiteiten voor het delen van kennis.	O	O	O
Er is een centraal punt waar kennis gedeeld, en opgeslagen wordt.	O	O	O
Financiën spelen een rol bij het delen van kennis.	O	O	O
Verlies van eigendom van kennis is een reden waarom bepaalde dingen niet gedeeld worden.	O	O	O

Tools

- Gebruikt u tools (database/website oid) om informatie te delen met andere universiteiten?
- Mist u hier iets in/wat is uw behoefte?

Appendix 2 - Informed consent

Delft, <date>

Betreft: geïnformeerde toestemming deelname interview afstudeeronderzoek kennisoverdracht tussen universiteiten

Geachte heer/mevrouw,

U bent uitgenodigd mee te doen aan een afstudeeronderzoek over kennisoverdracht tussen universiteiten over vastgoed op het gebied van duurzaamheid. Dit onderzoek wordt uitgevoerd door Neva Wardenaar, masterstudent Management in the Built Environment aan de TU Delft.

In 2006 en in 2016 heeft het Campus Research Team van de TU Delft onderzoeken gedaan naar het vastgoed van de Nederlandse universiteiten onder de naam Campus NL. Op dit moment is het Campus Research Team van de TU Delft bezig met een nieuw campusonderzoek. Campus NL heeft als doel de kennis en ervaring van de 14 Nederlandse universiteiten te bundelen, om de uitdaging op de campus – innovatief, duurzaam, betaalbaar, inspirerend, doelmatig en gezond – samen te kunnen tackelen en het campusmanagement binnen elk van de universiteiten (nog) efficiënter te kunnen organiseren.

Een van de onderwerpen die het Campus NL onderzoek gaat onderzoeken is 'campus learning', het gaat hierbij om hoe de kennis uit het onderzoek verspreid kan worden binnen de universiteiten. Het doel hierbij is om stap voor stap een organisatie voor kennisdeling op te bouwen.

Het afstudeeronderzoek van Neva Wardenaar loopt hier op vooruit, en het doel hiervan is om een verkennend onderzoek uit te voeren naar hoe kennisuitwisseling op dit moment plaatsvindt, wat hieraan bevalt, wat beter kan, en zo een extra startpunt voor het campus NL onderzoek te vormen. Omdat het voor een afstudeeronderzoek veel te groot is om alle vormen van campus management te onderzoeken, ligt de focus voor deze scriptie op duurzaamheid. Het is een gegeven dat Nederlandse universiteiten willen, en moeten, focussen op duurzaamheid. Dit komt voort uit doelen die de overheid gesteld heeft, maar ook uit een convenant dat alle universiteiten in Nederland in 2008 hebben ondertekend. Hierin wordt gesteld dat universiteiten hun CO2-emissie op de campus met 50% te hebben gereduceerd in 2030 (en 30% in 2020). In de meeste campusplannen is duurzaamheid dan ook een expliciet thema, en bij de meeste campusprojecten een belangrijk criterium (den Heijer et al., 2016).

Universiteiten proberen vaak zelf het wiel uit te vinden voor hun campus (Hopff et al., 2019), terwijl ze wel het belang onderschrijven van het vastleggen van campusdata, gemeenschappelijke managementinformatie en het vergelijken van campusstrategieën. Netwerken als het DFB en HOI, waarin de directeuren faciliteiten of huisvesting plaatsnemen, zijn hier al mee bezig (den Heijer et al., 2016).

Door middel van een interview zou ik graag meer te weten komen over hoe u, als campusmanager, denkt over kennis delen over uw duurzaamheidsstrategieën met andere universiteiten. Of u deelneemt aan bepaalde overleggen, netwerken of toegang heeft tot databases om dit te vergemakkelijken en wat u hier bijvoorbeeld bij mist. Het interview duurt ca. 45 tot 60 minuten. Graag zou ik het interview op willen nemen om het achteraf uit te kunnen werken en (anoniem) te verwerken in mijn afstudeerthesis.

Vanuit de universiteit ben ik gewend om nog eens apart te vragen of u mee wilt doen aan het

onderzoek en of u het goed vindt om dit interview op te nemen. U mag ook nu zeggen dat u liever niet deelneemt. U kunt u ook later nog bedenken en uw deelname intrekken zonder opgave van reden. U bent ook niet verplicht om iedere vraag die ik zal stellen te beantwoorden.

Als u meedoet, dan vragen we u om uw handtekening onderaan deze brief te zetten en een pdf aan ons te retourneren. Ik zet dan ook mijn handtekening. De procedure is zo, zodat u zeker weet dat er vertrouwelijk omgegaan wordt met uw gegevens en antwoorden. Ook krijgt uw organisatie het interviewverslag niet te zien of te horen. Ik verwerk uw antwoorden, en dat van meerdere mensen met een gelijkwaardige functie, anoniem in mijn scriptie. Als ik uw woorden aanhaal, dan beloof ik om uw naam niet te gebruiken en zorg ik dat het niet duidelijk is wie dit gezegd kan hebben. Ik zal uw naam- en contactgegevens meteen na afloop van het onderzoek vernietigen.
Als u vragen heeft over dit onderzoek, kunt u contact met mij opnemen: Neva Wardenaar, n.o.wardenaar@student.tudelft.nl, +31657302234. Ook kunt u contact opnemen met mijn afstudeerbegeleider: Alexandra den Heijer (a.c.denheijer@tudelft.nl).

Als u mee wilt doen aan dit interview, zou u dan onderstaande verklaring willen invullen en ondertekenen?

Met vriendelijke groet,
Neva Wardenaar

In te vullen door de geïnterviewde & student

Ik verklaar op een voor mij duidelijke wijze te zijn ingelicht over de aard, methode, doel en belasting van het onderzoek.

Mijn vragen zijn naar tevredenheid beantwoord.

Ik begrijp dat het geluids- en/of beeldmateriaal (of de bewerking daarvan) en de overige verzamelde gegevens uitsluitend voor analyse, en verwerking in de masterthesis en publicaties zal worden gebruikt.

Ik behoud me daarbij het recht voor om op elk moment zonder opgaaf van redenen mijn deelname aan dit onderzoek te beëindigen.

Ik begrijp dat ik niet verplicht ben te antwoorden op vragen.

Ik begrijp dat persoonlijke informatie (zoals naam, e-mailadres, functie), niet gedeeld zal worden buiten de student en afstudeerbegeleider en dat deze data na het onderzoek zal worden vernietigd. Ik ga ermee akkoord dat mijn antwoorden, mening of andere input in de vorm van geanonimiseerde quotes gebruikt kan worden in de onderzoek output.

Ik geef toestemming dat de geanonimiseerde interviewoutput die vanuit dit interview gegenereerd wordt opgeslagen mag worden in de 4TU.repository zodat het gebruikt kan worden voor toekomstig onderzoek.

Ik begrijp dat deze 4TU.repository open-access is.

Ik heb dit formulier gelezen of het formulier is mij voorgelezen en ik stem in met deelname aan het onderzoek.

O Graag ontvang ik aan het eind van het onderzoek een korte samenvatting van de resultaten van het onderzoek. Om deze reden verleen ik toestemming om mijn naam- en adresgegevens tot het eind van het onderzoek te bewaren.

Plaats:

Datum:

_ _
(Volledige naam, in blokletters)

_ _
(Handtekening deelnemer)

'Ik heb toelichting gegeven over het onderzoek. Ik verklaar mij bereid nog opkomende vragen over het onderzoek naar vermogen te beantwoorden.'

Neva Wardenaar

_ _
(Handtekening student)

Referenties

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Appendix 3 - List of analysed strategy documents

Erasmus Universiteit Rotterdam
Building New Perspectives Campus in Ontwikkeling III 2017-2020 (September 2017)
Sustainability report 2022 (z.d.)
https://www.eur.nl/over-de-eur/duurzaamheid (geraadpleegd maart en april 2023)

Maastricht University
https://www.maastrichtuniversity.nl/nl/over-de-um/duurzaamheid/bedrijfsvoering/vastgoed-campus-biodiversiteit (geraadpleegd maart en april 2023)

Open universiteit
https://www.ou.nl/green-office (geraadpleegd maart en april 2023)

Radboud Universiteit Nijmegen
Energiebeleidsplan 2021-2024 (2 maart 2021)
Campusplan 2022 – in het kort (7 juni 2022)

Rijksuniversiteit Groningen
Accommodation plan 2015-2024 (april 2015)
Roadmap sustainability 2021-2026 publieksversie (z.d.)
https://www.rug.nl/about-ug/profile/facts-and-figures/duurzaamheid/ (geraadpleegd maart en april 2023)

Tilburg University
https://www.tilburguniversity.edu/nl/over/bestuur-en-beleid/profiel/duurzaamheid (geraadpleegd maart en april 2023)
https://www.tilburguniversity.edu/nl/campus/ontwikkelingen (geraadpleegd maart en april 2023)
https://www.tilburguniversity.edu/nl/campus/ontwikkelingen/duurzaamheid (geraadpleegd maart en april 2023)

TU Delft
Sustainable TU Delft – Vision ambition and action plan v5.3 (27 september 2022)

TU Eindhoven
Vastgoedstrategie Campus 2030 verkorte versie (z.d.)
https://www.tue.nl/en/our-university/about-the-university/sustainability/sustainable-tue (geraadpleegd maart en april 2023)

Universiteit Leiden
https://www.universiteitleiden.nl/dossiers/de-duurzame-universiteit/duurzame-campus (geraadpleegd maart en april 2023)
Routekaart energietransitie – Op weg naar CO2-neutrale campussen in 2050 (z.d.)

Universiteit Twente
Lange termijn strategisch huisvestingsplan 2020-2030 publieke versie (december 2019)
https://www.utwente.nl/nl/duurzaamheid/duurzaamheid-op-de-campus/#themas (geraadpleegd maart en april 2023)

Universiteit Utrecht
Huisvestingsstrategie Universiteit Utrecht (september 2019)
Visie Programma Duurzaamheid 2019-2022 (z.d.)

Duurzaamheidsplan Bedrijfsvoering editie 2023 (z.d.)

Universiteit van Amsterdam
Huisvestingsplan UvA 2022 (25 november 2021)
Routekaart energietransitie UvA (3 juni 2020)

Vrije Universiteit Amsterdam
Roadmap to a Sustainable VU Amsterdam 2020-2025 (November 2020)
https://vu.nl/nl/over-de-vu/meer-over/duurzaam (geraadpleegd maart en april 2023)

Wageningen University
Strategisch plan 2019-2022 (oktober 2019)
Duurzaamheidsverslag 2021 (oktober 2022)
https://www.wur.nl/nl/duurzaamheid.htm (geraadpleegd maart en april 2023)

Appendix 4 - Overview of universities

Erasmus Universiteit Rotterdam

Amount of students (UNL, peildatum 2022)	30.955
Amount of m2	?
Campus type (Campus NL, 2016)	Campus as area in the city

Maastricht University

Amount of students (UNL, peildatum 2022)	21.129
Amount of m2 (Jaarverslag, 2020)	250.000 (GFA)
Campus type (Campus NL, 2016)	Campus as area in the city, campus integrated in the city

Open Universiteit

Amount of students (UNL, peildatum 2022)	16.940
Amount of m2	?
Campus type (Campus NL, 2016)	?

Radboud Universiteit Nijmegen

Amount of students (UNL, peildatum 2022)	24.100
Amount of m2 (Campusplan, 2022)	101 ha (campus)
Campus type (Campus NL, 2016)	Campus as area in the city

Rijksuniversiteit Groningen

Amount of students (UNL, peildatum 2022)	34.633
Amount of m2 (accommodation plan 2015-2024)	432.500 (GFA)
Campus type (Campus NL, 2016)	Campus as area in the city, Campus integrated in the city

Universiteit Tilburg

Amount of students (UNL, peildatum 2022)	19.927
Amount of m2	?
Campus type (Campus NL, 2016)	Campus as area in the city

Technische Universiteit Delft

Amount of students (UNL, peildatum 2022)	26.620
Amount of m2 (Facts & Figures 2020-2021 TU Delft, 2020)	161 ha (campus)
Campus type (Campus NL, 2016)	Campus outside the city, Campus as area in the city, Campus integrated in the city

Technische Universiteit Eindhoven

Amount of students (UNL, peildatum 2022)	12.816
Amount of m2 (Vastgoedstrategie 2030, 2018)	283.000 (campus)
Campus type (Campus NL, 2016)	Campus as area in the city

Universiteit Leiden

Amount of students (UNL, peildatum 2022)	33.232
Amount of m2	?
Campus type (Campus NL, 2016)	Campus as area in the city, Campus integrated in the city

Universiteit Twente

Amount of students (UNL, peildatum 2022)	12.194
Amount of m2 (LTSH 2020-2030)	235.000 (NFA)
Campus type (Campus NL, 2016)	Campus outside the city

Universiteit Utrecht

Amount of students (UNL, peildatum 2022) 37.675
Amount of m2 ?
Campus type (Campus NL, 2016) Campus outside the city, Campus as area in the city, Campus integrated in the city

Universiteit van Amsterdam

Amount of students (UNL, peildatum 2022) 42.143
Amount of m2 ?
Campus type (Campus NL, 2016) Campus as area in the city, Campus integrated in the city

Vrije Universiteit Amsterdam

Amount of students (UNL, peildatum 2022) 31.761
Amount of m2 ?
Campus type (Campus NL, 2016) Campus as area in the city

Wageningen University

Amount of students (UNL, peildatum 2022) 12.994
Amount of m2 ?
Campus type (Campus NL, 2016) Campus as area in the city

KNOWLEDGE TRANSFER
BETWEEN UNIVERSITIES

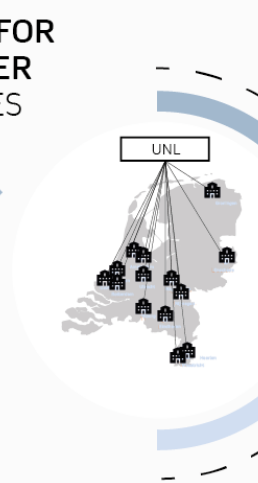
Knowledge transfer is important due to its many positive effects, such as increased productivity, higher performance, and better innovation capability. This could help **campus management** to achieve their **sustainainability goals** and speed up the energy transition. However, in practice every campus reinvents the wheel.

BARRIERS OF KNOWLEDGE TRANSFER
BETWEEN UNIVERSITIES

- Lack of structure
- Lack of motivation/urgency
- Lack of time
- Old fashioned communication
- Organisational culture
- Financial constraints

RECOMMENDATIONS FOR KNOWLEDGE TRANSFER
BETWEEN UNIVERSITIES

Appoint a chair
Preferably an external party like UNL/VSNU, because they already have an overview



Create a clear structure
Before, during, and after the meetings.

Meet regularly
Helps by getting to know people, creates trust, and can tackle problems earlier

Making time saves time
Investing time in sharing knowledge might help finding solutions sooner

Face-to-face meetings
Makes talking easier, creates a feeling of trust and familiarity

Set up a digital network
As a tool to have an overview of contact information, database with useful documents, and easy contact


TU Delft
Department of
Management in the
Built Environment
BK Bouwkunde