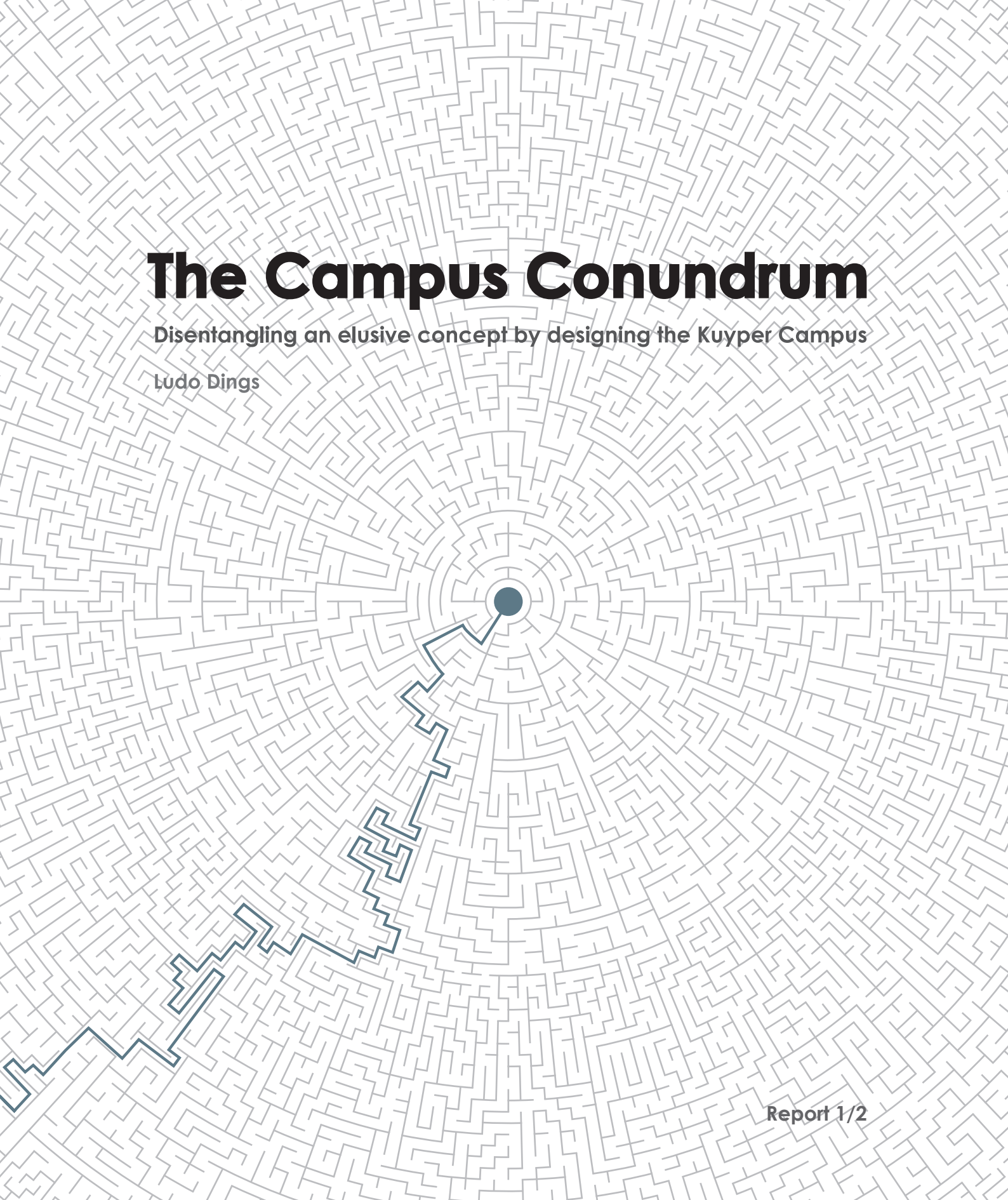
The Campus Conundrum

Disentangling an elusive concept by designing the Kuyper Campus

Ludo Dings



Report 1/2

The Campus Conundrum

Disentangling an elusive concept by designing the Kuyper Campus

By

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A thesis submitted In partial fulfillment of
the requirements for the degree of:

MASTER OF SCIENCE

IN LANDSCAPE ARCHITECTURE

at

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Part 1/2 [Report]

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For quality of life

A thesis submitted in partial fulfillment of the requirements for the Master of Science degree in Landscape Architecture at Wageningen University, at the Landscape Architecture Chair Group.

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PREFACE

Walking over campuses time after time made me think about the nature of a campus and why the American campuses that regularly pass by in movies or books, seem to be so much more successful landscapes than the ones I have encountered in the Netherlands. A satisfying answer seemed nearly impossible after being confronted by the immense variety of different landscapes that we identify as 'campus': ranging from sewage treatment facilities to leading international universities. Analysing the WUR campus as a student-assistant at Wageningen University fuelled my fascination with the 'campus phenomenon'.

The choice for the exploration of the campus phenomenon is related to the intriguing vagueness of the concept and the complexity of designing and integrating multifunctional campus landscapes into urban environments. The goal of this research is to acquire an elaborate understanding of the campus phenomenon and to apply this knowledge to create a suitable campus design for VU Amsterdam, which aims to rigorously redevelop and expand into a campus. I intend to utilise this knowledge in my career as a landscape architect to create high quality (campus) landscapes.

This thesis has broadened my perspective and provided me with in-depth knowledge on the campus phenomenon and on the design of complex urban landscapes. I have enjoyed working together with Kevin Knevels on our quest to explore, question, identify and describe the core of the campus phenomenon in relation to its real-world setting. I have experienced this thesis as interesting, challenging and delightful and I would therefore like to thank Adriaan Geuze in particular for his inspiring, motivational and critical supervision. He showed me to approach landscape architecture from an exciting and inspiring perspective. I would also like to thank Rudi van Etteger for his valuable input during my 'green-light' presentation and I would like to thank Ab Flipse for providing me with detailed information on the history of VU Amsterdam. Finally I would like to show my gratitude towards Mirna Edinga and Roy Dings for their support during the process of this thesis.

Ludo Dings, September 2015.

SUMMARY

VU Amsterdam requires change, because the current campus is unable to cope with the growing number of students and the buildings have become outdated (Lucas 2014). However, the meaning of a 'campus' seems to be somewhat ambiguous, since we use it to define a multitude of different spaces, ranging from the grounds of universities to corporate business parks. Even in literature there is no consensus on what it should entail. The campus has become a conundrum, which makes us unable to comprehend and design a campus. Moreover, this inadequacy of suitable knowledge causes the quality and value of a campus to deteriorate, which has become apparent by the excessive focus on infrastructure (Balsas 2002). In addition, it causes us to disregard the opportunities and potential of a campus, such as the positive effects of a green environment on educational performance (Zandvliet 2013). This thesis investigates the campus phenomenon from an overarching and integral perspective, by exploring its main characteristics and abstract campus typologies. This is achieved through a literature study, an elaborate reference study and a typological analysis. These results are integrated and tested through the design of the Kuyper Campus by design scenarios and a cyclic iterative design process.

Results have indicated the development of a campus from encompassing 'the university grounds' to an overarching design concept. A campus is concerned with the chemistry that blends the character of the place with its users and the use of its physical environment. Its success is attributable to the simplicity of the structure and its holistic character, rather than a collection of individual components. The campus is mainly characterised by a human-centred space which supports a vibrant community and motivates knowledge exchange in a beneficial park-like environment. Among others, these characteristics have proven to be instrumental for landscape architects and spatial planners to get a grip on the essence of a campus. Moreover, they are valuable anchor points to evaluate a campus design during a cyclic iterative design process. Four campus typologies have been established: the Enclaved Campus, the Urban Campus, the Parkland Campus and the Multi-cluster Campus. These posed useful tools to get a grip on the phenomenon and to initiate an abstract design direction on a specific location. Moreover, they contribute to consider the situation from multiple perspectives while reducing the design possibilities from an innumerable variety to a comprehensible, and most probable, few. This is not only likely to increase the quality of the design, but it also enhances the effectiveness and efficiency of the design process.

The proposed design is in line with the characteristics that define a campus and with the goals of VU Amsterdam. It reconnects the new Kuyper Campus with Amsterdam and integrates a green and human-centred enclave into the dynamic Zuidas district. The design respects the small-scale- and introverted character of the VU and creates a vibrant and coherent campus where one can meet, study, work or live in an interesting diversity of several interconnected atmospheres. It utilises the benefits of a green campus environment by optimising indoor-outdoor relations and by motivating the use of the outdoor spaces as a working, study or leisure environment. The significance of this design is related to the implementation and testing of the campus phenomenon into a real-life situation. The campus community of VU Amsterdam specifically benefits from this study through a proposed design which is based on the foundations of the campus phenomenon, as derived from elaborate research. Furthermore, this multifunctional landscape is also beneficial for its environment, by i.e.: increased water storage capacity and a bicycle highway.

The systematic and thorough layout of the present study provides the foundations for progressive research towards a full understanding of the campus phenomenon on multiple levels of abstraction, which extends the quality and impact of this thesis.

04 De Kuyper Campus

05 Evaluation

1.0

INTRODUCTION

This chapter aims to introduce the present thesis by discussing the problem statement, knowledge gap, aim and significance of this research (fig. 1.1). A preliminary introduction illustrates the campus phenomenon in a wider perspective and announces the case study of VU Amsterdam.

1.1 | INITIAL CLARIFICATIONS

The question: 'what is a campus?', initially seems to be an easy question to answer. A common answer is something like: 'well, those are the grounds of a university with monumental buildings in a park-like environment'. But when you start to consider the spaces that we identify as campus, then this definition soon becomes obsolete. Strictly speaking we also use this term to indicate industrial areas and business parks, which seem to be contradictory to the general campus notion. The campus poses an increasingly popular phenomenon or design concept, which is implemented through a large variety of appearances worldwide. It is considered a social construct without a proper description, which has gradually changed the campus phenomenon into something ambiguous and equivocal. This is particularly relevant, since many campuses have become outdated, are unable to live up to contemporary expectations and are incapable of coping with change (Hashimshony and Haina 2006). The same applies for VU Amsterdam (Lucas 2014). Hence, how can we design a suitable campus environment for VU Amsterdam, when the campus seems to be conceptually elusive?

The contemporary campus is under more pressure, is changing more rapidly and is facing more issues than ever before (Perry and Wiewel 2005; Sharp 2009). At the same time, the spatial- and organisational structure of a campus has drastically increased in complexity and responsibility (Hashimshony and Haina 2006; Wiewel and Perry 2008; Alshuwaikha and Abubakar 2008). In addition, the campus is forced to change in order to keep up with advancements in science and technology. These for example teach us the benefits of a green environment in relation to educational pedagogy and stress reduction (Groenewegen et al. 2006; Zandvliet 2013). This causes us to redefine the link between indoor- and outdoor spaces, which subsequently influences the composition of a campus. Moreover, the twenty-first century is characterised by changing preferences and needs, which requires a more integral and multifunctional landscape of science, business and living (Kenney et al. 2005). Imagine the amelioration of technology which has drastically transformed the use of the campus. The outdoor space suddenly becomes a landscape of uncompromised working stations through technology such as WiFi. But changing learning needs, such as the virtual campus also influences the use of the physical campus environment, since knowledge is no longer place-based (Lucia et al. 2008).

"The world is engaged in a desperate, unprecedented struggle to harness knowledge for the advancement and for the very preservation of mankind" (Dober 1996, p.3). Studies predict that the knowledge economy will keep expanding the next couple of years (den Heijer 2011). This further increases the number of students and academics, which therefore requires campuses to develop and expand (Chapman 2006; Wiewel and Perry 2008). The pivotal design issue is continuity, which in turn leads back to the need for some sort of overarching campus character (Dober 1996). Moreover, it is crucial to remain up to date by studying design concepts such as the campus, due to our ever changing society (Southworth 2014). In particular, because a campus is inextricably linked to the full complexity of its surrounding (urban) landscape. It becomes even more important, since a campus is generally one of the major employers in the city with a significant impact on its surroundings (Wiewel and Perry 2008; Wissema 2009; den Heijer 2011). It therefore requires us to redefine and comprehend the campus as a twenty-first century phenomenon.

1.2 | PROBLEM STATEMENT

VU Amsterdam requires change, because the current campus is unable to cope with the growing number of students and the buildings have become outdated. Moreover, the users have changing needs and preferences, such as a multifunctional and inspiring environment (fig. 1.1). The VU aspires to facilitate this growth through the development of a campus, which incorporates working, studying, living and meeting in an inviting and vibrant environment (Vrije Universiteit 2010; den Heijer 2011; Lucas 2014). However, the meaning of a 'campus' seems to be somewhat unclear, since we use it to define a multitude of different spaces, ranging from the grounds of universities to corporate business parks. Even in literature there is no consensus on what a campus should entail. This has gradually changed the meaning of a campus into a conundrum, while the campus phenomenon is slowly descending into a conceptual crisis. The inadequacy of suitable knowledge causes the quality and value of a campus to deteriorate, which has become apparent by the excessive focus on infrastructure and a lack of human scale (Bromley 2006; Chapman 2006). Moreover, it makes us unable to design a suitable campus, because there are no specific characteristics or typologies to hold on to, while an integral and overarching perspective is deficient

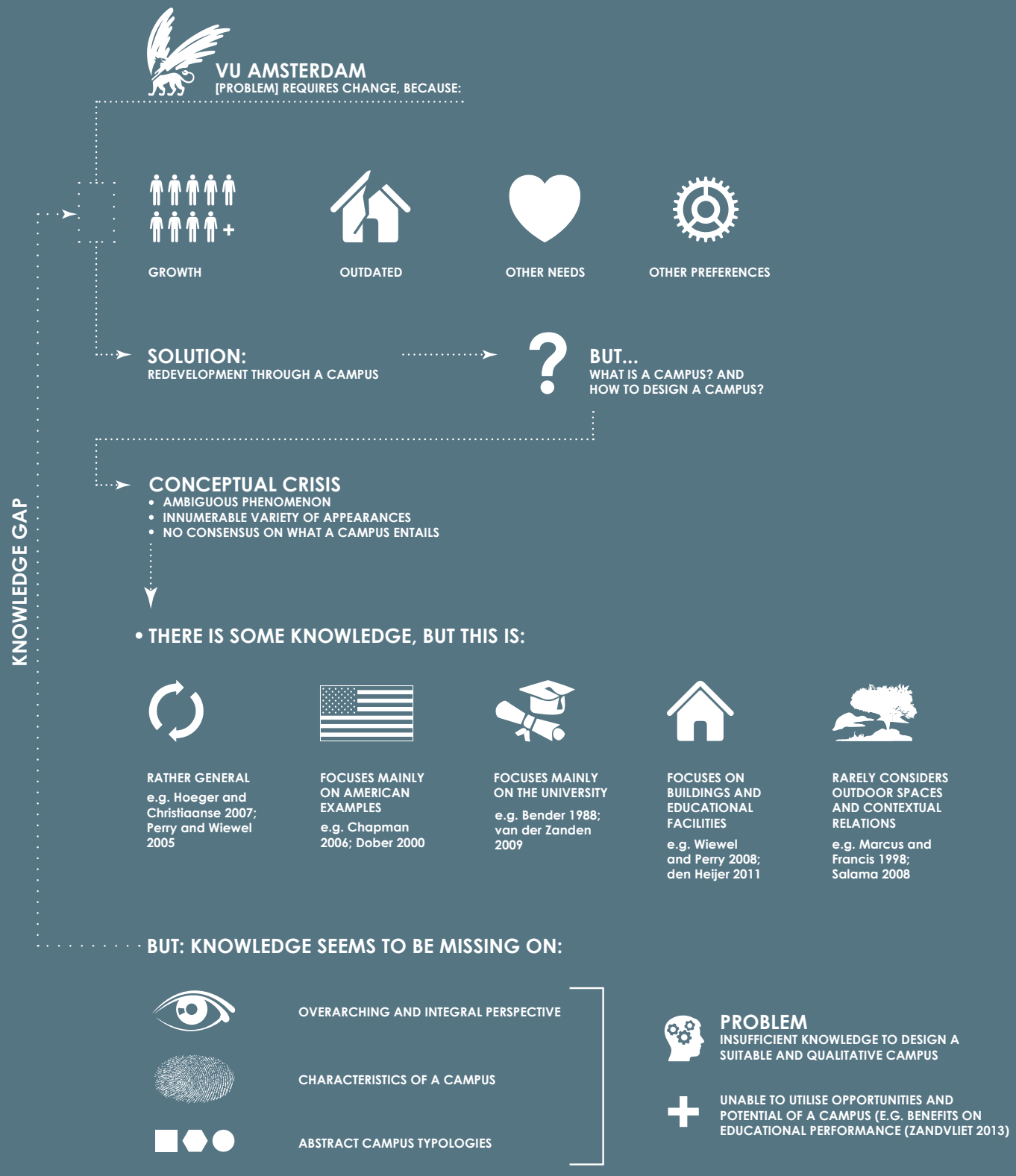

Fig. 1.1 | Schematic representation of the problem statement and knowledge gap.

(Dober 1996; Chapman 2006). In addition it also causes us to disregard the opportunities and potential of a campus, such as the positive effects of a green campus environment on educational performance and the ability of a campus to regenerate its surroundings (Wiewel and Perry 2008; Zandvliet 2013).

1.3 | KNOWLEDGE GAP

There is some literature available on the description, development and appearance of a campus (fig. 1.1), but this literature is rather general (e.g. Perry and Wiewel 2005; Hoeger and Christiaanse 2007), focuses mainly on the university (e.g. Bender 1988; van der Zanden 2009; Goddard and Vallence 2013), primarily evaluates American examples (e.g. Turner 1987; Dober 2000; Chapman 2006) and generally considers only buildings and educational facilities (e.g. Hashimshony and Haina 2006; Wiewel and Perry 2008; den Heijer 2011). The outdoor campus spaces and their contextual relations are rarely the focus of rigorous study (Marcus and Francis 1998; Perry and Wiewel 2005; Salama 2008). Most importantly, there seems to be no consensus on what a campus is and what it should entail. This has caused the campus phenomenon to become somewhat ambiguous, resulting in a vast array of rather vague descriptions.

An overarching and elaborate integral understanding of a campus is necessary to design and construct a high quality campus due to its complexity and interconnectedness. Moreover, a common understanding and a sense of order are required to enhance the utility of the campus as a concept. However, existing literature does not suffice clarity on the campus phenomenon while considering an overarching and integral perspective. Moreover, existing literature on abstract campus typologies to provide structure for the wide variety of different campuses seems to be absent. In addition, the search for literature did not establish a clear description of the characteristics that define a campus.

1.4 | AIM OF THIS RESEARCH

This study aims to bridge the knowledge gap by establishing an elaborate understanding of the campus phenomenon and to create an integral campus design for VU Amsterdam by investigating the development and characteristics of a campus, through developing campus typologies and by incorporating this knowledge into the design process. This is accomplished by answering the following main research question: *'what characterises the campus phenomenon and how can VU Amsterdam become a campus which is in line with these characteristics?'* This is further specified by the following research sub-questions:

- What characterises the campus phenomenon regarding its definition, development and composition from an overarching and integral perspective?
- What abstract campus types can be distinguished and what are their main characteristics?
- How can VU Amsterdam become a high quality campus which is in line with the characteristics that define the campus phenomenon?

1.5 | LANDSCAPE ARCHITECTONIC PERSPECTIVE

This study investigates and designs the 'campus' phenomenon through the lens of a landscape architect, which engages with the world through a multifunctional, multidisciplinary, overarching and context driven perspective and is concerned with maintaining, integrating and enhancing; the functionality, beauty and sustainability of landscapes (Thompson 2000; Vroom 2005; Girot et al. 2013; de Vries 2013). The overarching and integral perspective on the campus phenomenon distinguish this study from other research, because it combines research and design. It is a landscape architect's nature to search for ways in which knowledge can be integrated into a design process, which unites separated elements into a solution (Crewe and Forsyth 2003; Deming and Swaffield 2011). This study therefore emphasises design related research to utilise the strength of a landscape architect and to move beyond literature by creative and novel design solutions (Nijhuis and Bobbink 2012; Lenzholzer et al. 2013). The campus phenomenon is explored from a pragmatic worldview, which uses multiple worldviews and methods in order to manage the complexity of the campus phenomenon (Creswell 2009). This worldview aims to make sense of a campus in a qualitative, quantitative and contextual manner, which is typical for a landscape architect (Lenzholzer et al. 2013).

1.6 | SIGNIFICANCE OF THIS STUDY

The academic significance of this study is related to the overarching and integral perspective on the campus phenomenon, which is currently missing. Moreover, this study generates primary data in the form of systematic, detailed and thorough campus analyses and it produces an elaborate understanding of the development, characteristics and types of a campus. This data can be utilised for other campus-related research and it generates a more comprehensible understanding of a campus as a

design concept in relation to other spatial entities such as business parks. This contributes to strengthen the academic position of the landscape architecture discipline and to reach 'intellectual maturity' (Armstrong 1999; Brown and Corry 2011; Van den Brink and Bruns 2012).

The landscape architectonic significance of this study is related to an improved understanding and the establishment of abstract campus typologies, which can act as tools for the landscape architect or spatial planner to determine the main possible layouts of a campus. These typologies provide structure and order from a rather abstract perspective, which can guide the landscape architect through an innumerable variety of options for campus design. These typologies contribute to bridge the gap between academic knowledge and practical applicability, which also enhances the utility of the campus as a design concept (Lenzholzer et al. 2013). This is particularly relevant since the campus is an increasingly used concept to cope with change at universities and other spatial entities worldwide (Chapman 2006; den Heijer 2011).

The social significance of this study is related to the improved quality of campus design in general through a more elaborate understanding of the phenomenon. This is particularly relevant, since a campus is a growing phenomenon and is considered an increasingly significant employer in the city, which has a considerable impact on the campus community and massively influences its surroundings (Perry and Wiewel 2005; den Heijer 2011). This study contributes to a more suitable integration of the campus phenomenon into its surroundings, which benefits the community on a local-, national- and international level. The campus community and surroundings of VU Amsterdam specifically benefit from this study through a proposed design which is based on the foundations of the campus phenomenon, as derived from elaborate research.

1.7 | GUIDE FOR THE READER

This report is meant to be read as a printed version. When reading this digitally, please use the 'two page view' mode and select one cover page in order to read this two-sided report as intended. Chapter two elaborates on the research strategy and discusses each research method individually in depth. A detailed analysis on the campus phenomenon can be found in chapter three. This chapter approaches the campus phenomenon from several perspectives and elaborates on its etymology, history and development. The results of detailed analyses are then represented through the character of a campus and abstract campus typologies, which are subsequently synthesised in a concluding subchapter. Chapter four provides a detailed description of the campus design for VU Amsterdam. An introduction is followed by a detailed problem statement and design assignment, which are subsequently translated into design scenarios. These scenarios form the base of the design for VU Amsterdam, which is elaborated through a masterplan, detailed designs, cross-sections, visuals, descriptions and calculations. Finally, chapter five evaluates and critically reflects on this thesis through a discussion, conclusions and recommendations. Definitions and concepts are explained in the glossary in the back of this report. The appendix is added to this report as a separate booklet in order to distinguish between rough data and the interpretation of this data to enhance the readability of this report.

Fig. 1.2 | Traditional conception of a campus (Yale 2015).

2.0

RESEARCH DESIGN

This chapter aims to elaborate on the research strategy and the research methods that are being used to accomplish the aim of this research as indicated in chapter one.

2.1 | RESEARCH STRATEGY

Standard approaches to campuses seem to aim for a list of necessary conditions. For example, a campus must have characteristics X and Y (e.g. knowledge institute and park-like environment). However, there always seem to be exceptions to this list. That is, there are always things that people would call a campus that do not fit all criteria. Moreover, it might be that there is no consensus about what these criteria would be at all. Ludwig Wittgenstein's notion of 'family resemblance', which has gained a lot of adherence in a wide range of disciplines, provides an elegant solution to this conceptual mess (see glossary). According to this notion, we should not try to find a single list of necessary conditions when trying to define a concept. We should rather consider different characteristics and differences in configuration, to constitute a certain concept (Wittgenstein 1958). The same seems to hold for campuses. The wide range of campus appearances is therefore investigated to identify general characteristics and campus typologies that indicate a certain combination of these characteristics. The steps as indicated in figure 2.1 are explored simultaneously to create an integrated research and design process, where the results constantly complement each other.

A mixed method approach is conducted to search for convergence among quantitative, qualitative and design related research in order to achieve a triangulation of methods and to deal with the complexity of the campus phenomenon (Patton 1999; Creswell and Miller 2000; Milburn and Brown 2003). The results are interpreted separately and subsequently merged into a combined result to offset the weaknesses of a single method with the strengths of another (Creswell 2009). This enhances the trustworthiness, rigor and quality of the research in general (Golafshani 2003). However, this study mainly relies on qualitative research in order to study the campus in its natural context and to extract the most valuable insights (Patton 2002; Kumar 2012). Design as a research method is integrated throughout the entire study in order to move beyond the ordinary means of research and utilise the strengths of the landscape architectonic perspective (Cross 2006). Design contributes to this research as a vehicle for thinking, since the representations of 'how' something can be perceived in the future, moves beyond what can be investigated in the present (Nijhuis and Bobbink 2012). Triangulation is also achieved by investigating and evaluating the implementation of the campus phenomenon by a second researcher (Kevin Knevels) for the case of Maastricht Health Campus. This in turn enhances the validity and reliability of this research.

2.2 | RESEARCH METHODS

The main research question is answered through the following sub-questions and methods:

•What characterises the campus phenomenon regarding its definition, development and composition from an overarching and integral perspective?
[Literature study and reference study]
•What abstract campus types can be distinguished and what are their main characteristics?
[Literature study, reference study and typological analysis]
•How can VU Amsterdam become a high quality campus which is in line with the characteristics that define the campus phenomenon? [Case study, reference study, design scenarios, iterative design process, additional analyses]

2.2.1 | Literature study

A literature study has been conducted to acquire an elaborate understanding of the campus phenomenon regarding its definition, development and characteristics. This has been achieved by a systematic literature review, which has determined a general body of literature through the search engines: Scopus, Google Scholar and Wageningen UR library catalogue (Gatrell et al. 2012). The relevance of the search results has been confirmed by scanning the titles and then reading the abstracts of key results through judgemental sampling (Deming and Swaffield 2011). Additional literature has been identified through 'snowballing', while the point of saturation has been established by checking for cross referencing and by assessing the quality and relevance of the literature (Kumar 2005).

2.2.2 | Reference study

A reference study aims to identify the characteristics and composition of a campus. A list of all universities in Europe and the USA (fig. 2.2) has been constructed by a systematic data search per country through the search engines Google and Bing (Creswell 2009). A focus was established on Europe and the USA to create a feasible dataset with a relation to the origin of the campus and to limit cultural differences. A simple random sample has been selected in Microsoft Excel by randomising the dataset through the function '=rand()' and subsequently sorting the data on size (Nasser 2008). A sample size of forty universities has been determined by the point of saturation, with a minimum of twenty and a maximum of forty samples due to time constraints (Deming and Swaffield 2011). This sample was then systematically analysed to optimise comparison, through literature, panoramic street level imaging and map analyses, according to the following

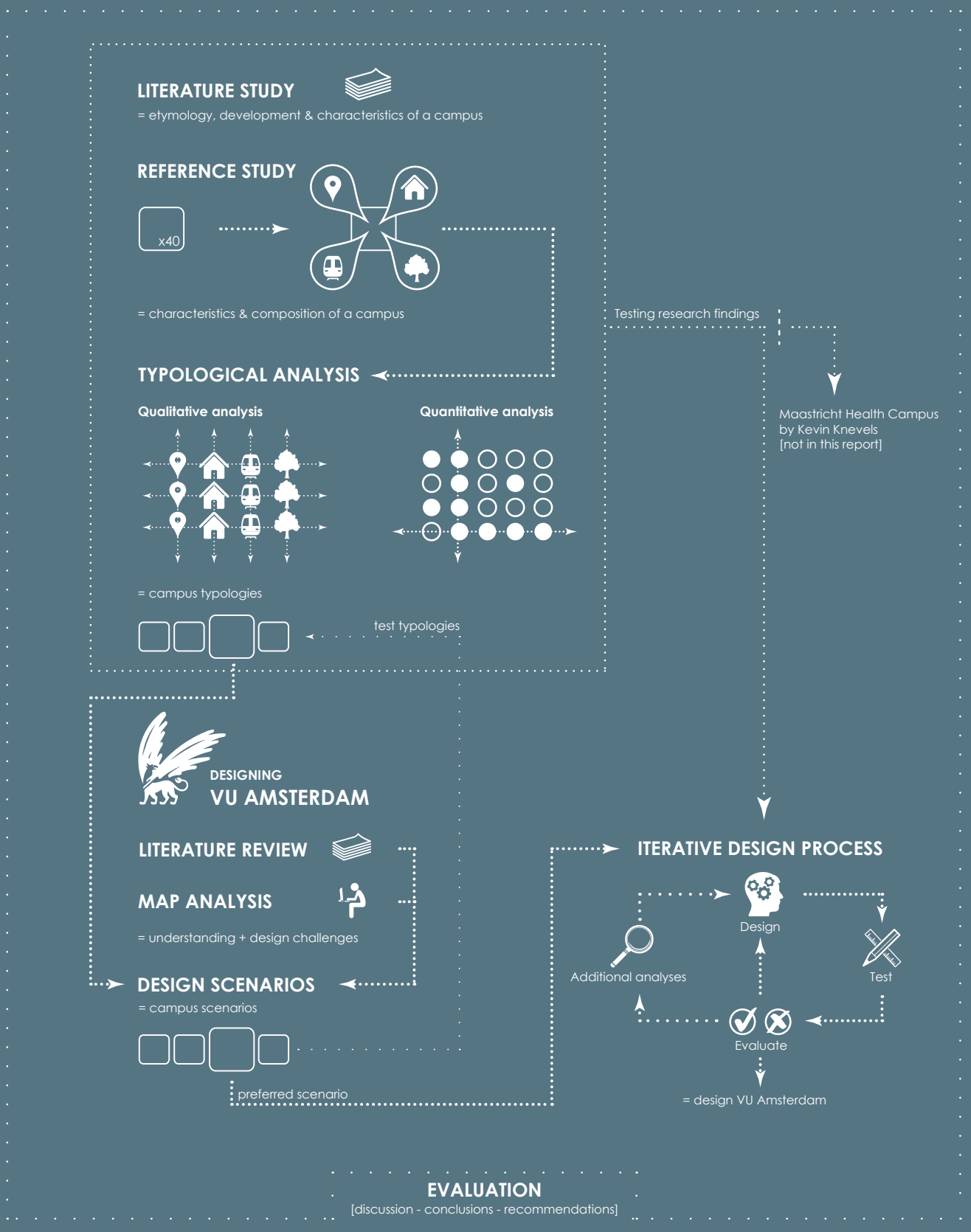

Fig. 2.1 | Research and design process.

Fig. 2.2 | Random sample reference study.


40
universities
investigated
1. University of Athens
2. Aurora University
3. University of Kassel
4. University of New York
5. Basilicata University
6. University of Cambridge
7. Adelphi University
8. Kent State University
9. University of Murcia
10. University of Medicine and Pharmacy of Târgu Mure
11. National Military University
12. Washington University
13. Aarhus University
14. University of Catania
15. University of Limerick
16. Karolinska Institutet
17. University of Vienna
18. Maryville University
19. University of Helsinki
20. Paul Valéry University of Montpellier
21. University of Warsaw
22. Saint Edward's University
23. Technical university of Sofia
24. Delft University of Technology
25. University of Notre Dame
26. University of Bologna
27. Harvard University
28. Pennsylvania State University
29. Brown University
30. University of California - Berkeley
31. Samuel Merritt University
32. Winthrop University
33. Ashford University
34. Charles de Gaulle University – Lille III
35. University of Zadar
36. Graz University of Technology
37. Fairfield University
38. Indiana University Kokomo
39. San Francisco State University
40. Uppsala University
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criteria: functions, location, contextual relations, buildings, infrastructure and vegetation.

2.2.3 | Typological analysis

A typological analysis aims to define typologies in order to enhance the utility of the campus as a design concept. This has been conducted by analysing the interrelationships between forty reference studies from an overarching and integral perspective (fig. 2.2). On one hand by quantifying the data through matrices to increase the level of abstraction, to deal with the complexity of the campus phenomenon and to discover hidden patterns. On the other hand by searching for similarities through qualitative comparison, because the complexity requires multiple perspectives. This was done by analysing each reference independently on the following criteria: location, buildings, infrastructure and vegetation (fig. 2.3). The references were then split up by grouping the areas relative to their independent criteria (fig. 2.4), followed by analysing and grouping the areas integrally on similarities between all criteria per area (fig. 2.5). Finally, these results were cross referenced with the quantification matrices. This data was then represented and compared through visual aids such as graphs and matrices to discover hidden patterns in the data and to form typologies (appendix D) (Deming and Swaffield 2011). This has been accomplished by focusing on essentials and rejecting particulars to become detached from the context and to allow generalisation as a typology (Klaasen 2007; Nijhuis and Bobbink 2012). Triangulation is achieved through multiple methods and researchers. These typologies are subsequently tested through design scenarios.

A small secondary typological analysis has been conducted to compare everything that is named 'campus' in the Netherlands to form categories by searching for similarities with other spatial typologies such as business parks. This is done to consider the campus in its widest perspective and to get to the core of the phenomenon. A list has been created by using prior research on Dutch campuses such as Buck Consultants International (2014) and supplement them with an elaborate search through the search engines Google, Google Maps and Bing until the search results did not show the name 'campus' on two consecutive pages of search results. This search is not meant to be fully exhaustive, but to capture the largest amount of campuses in order to deduce its main associations. This dataset is then compared to discover categories, which are subsequently compared to literature on campuses and on other spatial typologies such as business parks in order to deduce similarities (appendix B).

2.2.4 | Case study

VU Amsterdam was investigated through a single case study design in order to obtain a holistic exploration of the phenomenon within its real-life context to provide detailed input for the design process (Francis 2001; de Vaus 2001; Yin 2003). This is accomplished through a literature review, map analyses, site visits and interviews. The results encompass an elaborate understanding and an integral campus design for VU Amsterdam through design scenarios and a cyclic iterative design process.

2.2.5 | Design scenarios

Alternative spatial organisations are created for the campus design of VU Amsterdam in order to deduce the preferred future from multiple possible futures and to test the campus typologies in a real-life situation (Marien 2002; Hidding 2006). These scenarios are based on the campus typologies as derived from the typological analysis. They are constructed by creative leaps, through design activities such as brainstorming and sketching (Wollenberg et al. 2000; Martin and Hanington 2002; Nijhuis and Bobbink 2012). These scenarios are transforming and normative by nature, because they focus on how the different campus typologies can be integrated into the context of VU Amsterdam (Börjeson et al. 2006). These are evaluated by a multi-criteria analysis through a rubric in order to emphasise the advantages and disadvantages of each scenario (Haswell 1998). The evaluation criteria were derived from the collected data to allow new insights (Hsieh and Shannon 2005; Thomas 2006). However, these criteria can never be fully exhaustive due to the complexity of the campus phenomenon. In addition, a campus is too complex to become fully quantified. The results are therefore used to eliminate major differences and to establish a focus for a qualitative analysis, which aims to explain the results of the quantitative evaluation in more depth and analyse the scenario from a wider perspective. The design scenarios also test the campus typologies on their relevance and on their ability to be implemented into a specific case. This is supplemented by data from the thesis of Kevin Knevels. The preferred scenario forms the starting point for the design process of VU Amsterdam.

2.2.6 | Cyclic iterative design process

Design is considered the main activity in landscape architecture and is incorporated in this study by utilising designing as a research method. It is used to search for creative design solutions and to generate new research questions throughout the process, which are investigated

by additional analyses (Cross 2006; Brown and Corry 2011). This is accomplished through a cyclic iterative design process, which is characterised by 'research driven design' or 'research through designing' in the form of sketching, modelling, brainstorming, testing and data analysis (Boekhorst 2006; Duchhart 2011; Nijhuis and Bobbink 2012). Designs are therefore not merely intuitive but they rely on systematic data and research (Steenbergen et al. 2002; Groat and Wang 2002). A constant visual representation of the process is a fundamental tool of design, because visual representations are considered vehicles for visual thinking and communication. Design therefore implies the generation of ideas through the creation, inspection and interpretation of visual representations of the formerly non-visible. Design is not only appropriate for knowledge discovery and the creation of novel solutions, but they are also instrumental in recording, manipulating and expressing ideas (Nijhuis et al. 2011; Nijhuis and Bobbink 2012).

The 'design studio approach' provides the ability to break the standard pattern by critical and creative thinking to achieve novel and new design solutions that move beyond literature (Armstrong 1999; Ibrahim and Utaberta 2012). Designing combines learning by experiencing, doing, reflecting and thinking (Demirbaş and Demirkan 2003). It offers the ability to identify and specify emerging problems and requirements that have formerly been denied or oversimplified (Salama 1995). This integral and overarching perspective provides the potential to examine and solve problems through individual components and their interrelationships (Kuhn 2001; Milburn and Brown 2003). In addition: this integral and engaged nature of designing also obtains results through the unconscious incubation of ideas, which is termed by psychologists as 'sudden solution' (McInerny 2013). In contrast with theoretical research, creative design has the potential to depart from a generally unknown situation or to rigorously restructure the situation to arrive at novel solutions (Ibrahim and Utaberta 2012). This design process is constantly fed by research to generate a research informed design, also referred to as 'research for design' (Benson 1998; Lenzholzer et al. 2013). The combined results aim to develop an elaborate understanding of the case in order to create a suitable design for VU Amsterdam and to test the campus phenomenon in a real-world setting, which also contributes to bridge the gap between academic knowledge and practical applicability (Lenzholzer et al. 2013). Specific details on additional analyses are indicated in appendix E.1 through E.11.

Fig. 2.3 | Analysis by searching for similarities as a whole.

Fig. 2.4 | Analysis by interrelationships between criteria.

Fig. 2.5 | Analysis by integral comparison per area as a whole.

3.0

CAMPUS ENIGMA

A campus has become an increasingly ambiguous phenomenon, a real enigma due to its many appearances. This chapter aspires to disclose the core of the campus phenomenon by investigating its etymology, definition, development, characteristics and typologies from an overarching and integral perspective to deal with its complexity and interconnectedness. This chapter functions as a theoretical framework for the campus design of VU Amsterdam and aims to answer the following research questions: 'what characterises the campus phenomenon regarding its definition, development and composition from an overarching and integral perspective?' and 'what types of campus can be distinguished and what are their main characteristics?'

3.1 | WHAT IS A CAMPUS?

A campus can be interpreted as a spatial- and organisational structure or a specific type of landscape, which is used in city planning. The campus phenomenon is increasingly emerging throughout the world and is characterised by many appearances. These spaces hold a wide variety of particular characteristics and their goals seem rather divergent. This has caused a campus to become somewhat ambiguous, so what is a campus and how has it evolved?

The results from thirty small interviews indicate that the general community mainly associates a campus with: a cluster of buildings on which a university is positioned in a green, park-like environment, where people study, live and work (fig. 3.1). However, the answers are rather diverse (see appendix A). This diversity is acknowledged by a wide variety of different spaces that possess the name 'campus' in the Netherlands (fig. 3.2). A typological analysis has indicated that this variety of examples can be subdivided into multiple categories that resemble existing types of institutions, such as business parks (fig. 3.2 and appendix B). These different typologies are mainly associated with a campus, because they represent a cluster of buildings in a green, park-like environment. However, their appearances differ remarkably (fig. 3.3), which acknowledges their distinction with a campus. This distinction is further strengthened by the major differences between stakeholders, functions, use and users (appendix B).

The etymology of the word 'campus' is derived from the Latin word, meaning 'field' (Longstreth 1987; Perry and Wiewel 2005). Most notably adopted from 'Campus Martius', an open field along the Tiber in Rome (Kooij 2015). The first recorded use of the word 'campus' was to identify the grounds of Princeton University in 1774 by a letter between Charles C. Beatty and Enoch Green. The word 'yard' was formerly used to identify the grounds of the university, with its initial use at Harvard University in 1639 (Leitch 1978). These words were used interchangeably for a large number of years, until 1833, when the word 'campus' first appeared in a book by James Finch. Shortly after, in 1851, Benjamin H. Hall noted that "the college yard is denominated the Campus". The term 'campus' was then fixed in a dictionary and became the new term to name the grounds of the university (Leitch 1978; Chapman 2006). To make it even more complex, these words were also used to describe specific locations within the grounds of a university, such as 'Harvard Yard', being a central and communal green space. The word 'campus' has a solid relationship with its origin, the university, but it is increasingly used to term the territory of other types of institutions, such as residential buildings and holiday parks (Hoeger and Christiaanse 2007; Kooij 2015). This indicates the equivocal contemporary meaning of the word 'campus', which is often the case due to misconception: people associate green, park-like environments with campuses. Moreover, the word 'campus' is also used for 'branding' in order to associate with the quality and atmosphere of the university to improve the image of a certain institution (Bromley 2006; Allen 2007).

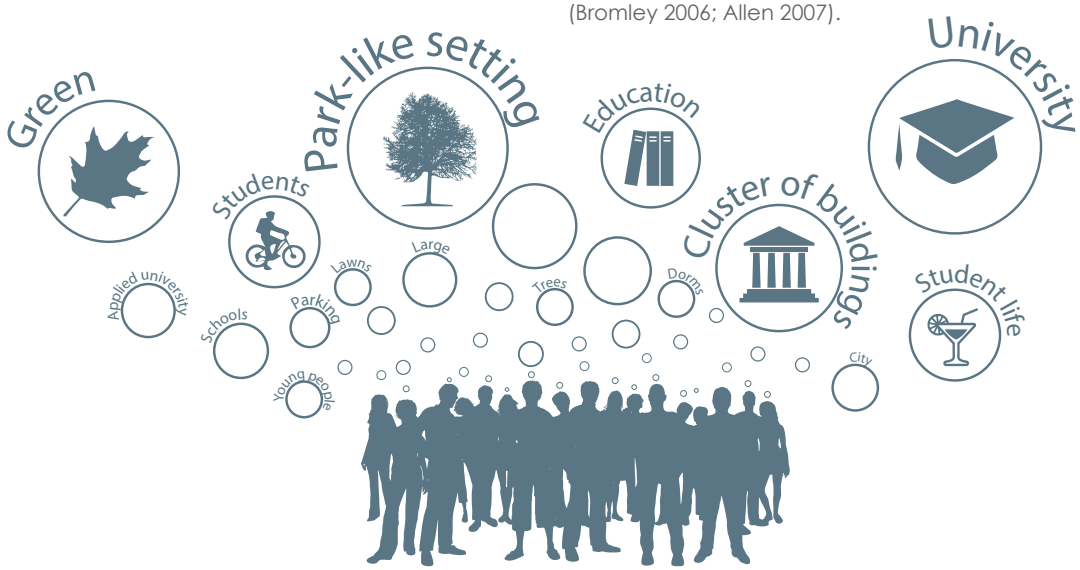


Fig. 3.1 | Results interviews on campus associations.

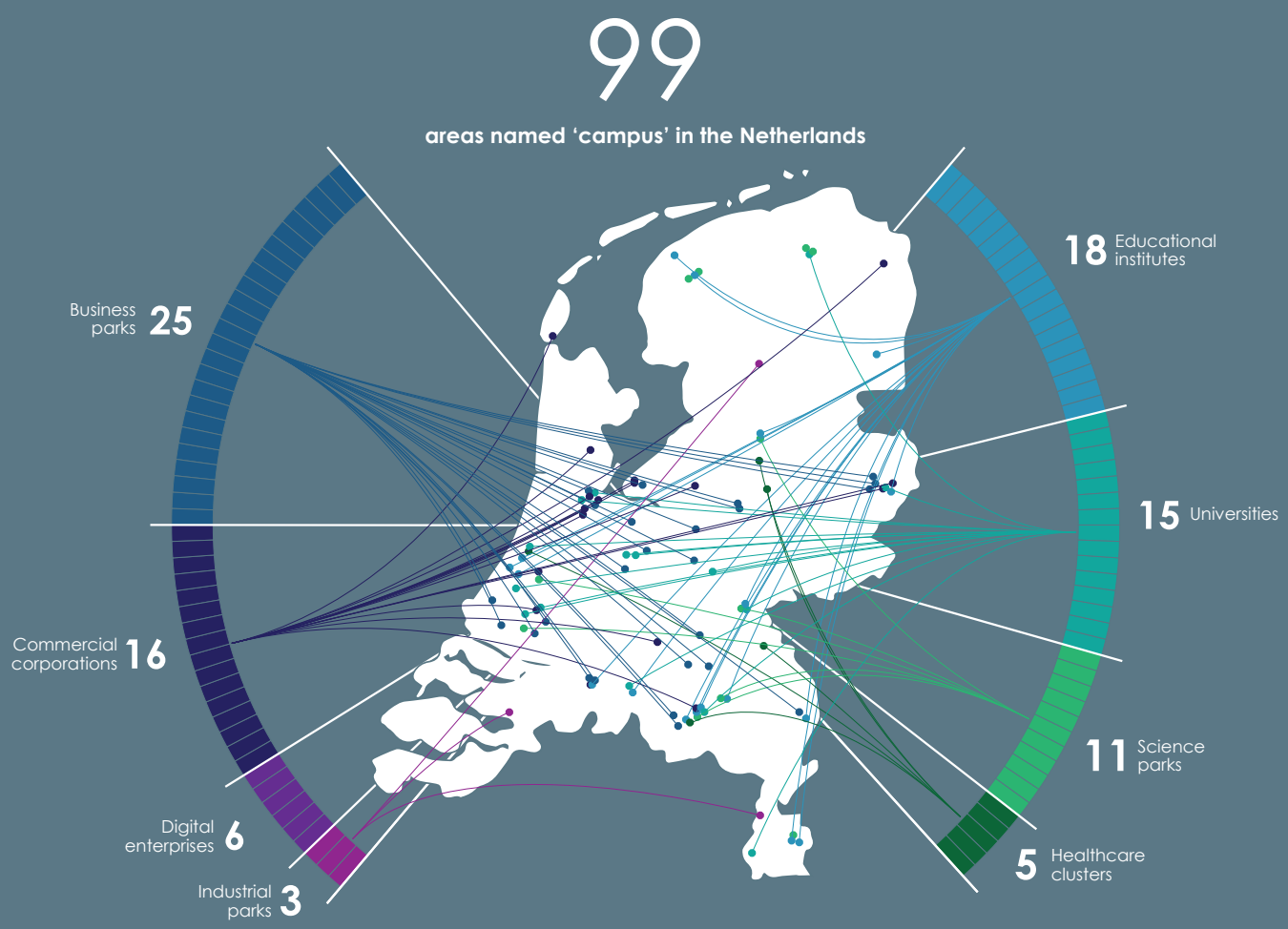


Fig. 3.2 | Typological analysis on places named campus in the Netherlands.

The previous paragraphs have indicated that we are increasingly using the word campus to name similar institutions such as business parks. This causes the campus phenomenon to become somewhat ambiguous, which becomes apparent by dozens of vague definitions that one can find in a dictionary. These definitions mainly consider a campus as 'the grounds and buildings of a university or college'. This shallow definition represents a specific location as a container for vague contents (Dober 1996; Perry and Wiewel 2005). "This term underlines the self-containedness of the institution and thus its separateness" (Muthesius 2000, p.24). More specific literature defines the campus as: 'the lands or grounds of a university, with a cluster of buildings, in a park-like setting' (e.g. Turner 1990; Dober 1996; Hashimshony and Haina 2006; den Heijer 2011). This is most accurately captured by the following definition: "its dominant unifying feature is most likely a park-like landscape, in which stately individual buildings are arranged sometimes formally, sometimes informally" (Chapman 2006, p. xxviii). These definitions are characterised by the virtue of simplicity, however, they fall short in explaining the meaning of place and in eliminating similar typologies (Chapman 2006). The superficiality of these definitions enhances the ambiguous character of the campus phenomenon. In order to clarify the meaning and characteristics of a campus, it is necessary to study its history and development.

3.2 | CAMPUS HISTORY AND DEVELOPMENT

The definitions of a campus have indicated the inherent character of the university, which predates long before the establishment of the campus phenomenon. The origin of the campus can be traced back to the origin of the university in Athens at the Academy of Plato in 387 B.C. (Russell 1946). This educational system has grown until 1088 when a university started to develop in Bologna and became a self-governing community (Bender 1988; van der Wusten 1998). The first university was established around the turn of the 12th century due to the needs of the urban society for professional training. The early universities operated from singular existing buildings that were scattered throughout medium-sized cities (Hashimshony and Haina 2006). As the number of students and faculties increased, it became necessary to cluster activities at one location. The creation of a coherent structure marked the establishment of the independent institution (Cobban 1975). The first collegiate experience can be traced back to the medieval cloisters, where students and teachers worked, studied and lived together in so called 'quadrangles', with a communal green space in the centre (Turner 1990; van der Zanden 2011). These green centres were often named 'quad' or 'court' from the early English colleges such as 'Mob Quad' in Oxford (1167) and 'Old Court' in Cambridge (1209). These English colleges adopted the cloister concept and multiplied the quadrangles into a village of interconnected quadrangles to separate themselves from the city and to facilitate a community (Horn 1973; Turner 1990).

The invention of the printing press and the first English printed book (1475) had a major impact on the university, because it allowed people to stay in one place to study. This caused central locations such as the university campus to expand (den Heijer 2011). Around the year 1500, functions such as dining and social life were added to the university, which gradually expanded into larger clusters. Harvard University (1636) then became the first university in America to be built on the English college ideals. The Englishmen aimed to pass on their religious values and to re-create a bit of old England in the new land (Chapman 2006). Instead of duplicating the traditional English colleges, they radically created a three-sided space, thrown open to the surrounding town, which connected the university with nature and society (Turner 1987; Gumprecht 2007). Mary College in Williamsburg, Virginia (1699) shows initial evidence of premeditated architectural composition by arranging college buildings based on site conditions and intentionally creating an overall design, based on a programme (Dober 1996). Although this structured the base of a campus, the word 'campus' was not used until 1774 to replace the former word 'yard' at Princeton University to define the grounds of the university, as discussed earlier (Leitch 1978).

Around the turn of the nineteenth century, the campus was still heavily influenced by European historical idioms. The campuses were opened up to the surrounding landscape and they possessed a spacious and transparent character, even though their surroundings became heavily industrialised and urban (Chapman 2006). In 1809 Wilhelm von Humboldt pioneered with a new teaching system and introduced research and science as new functions within the university. This increased the freedom of academics and redefined the role of the university campus in society (van der Wusten 1998; Kerr 2001). A few years later, the first comprehensive 'campus plan' was realised by Joseph Jacques Ramée for Union College (NY), while rejecting the monastic self-containment principle. This campus plan poses the base of the contemporary American campus (Dober 1996; Turner 1996). This notion was further strengthened by the conception of the university campus as a community in the 'Academical Village' by Thomas Jefferson in 1817 (Turner

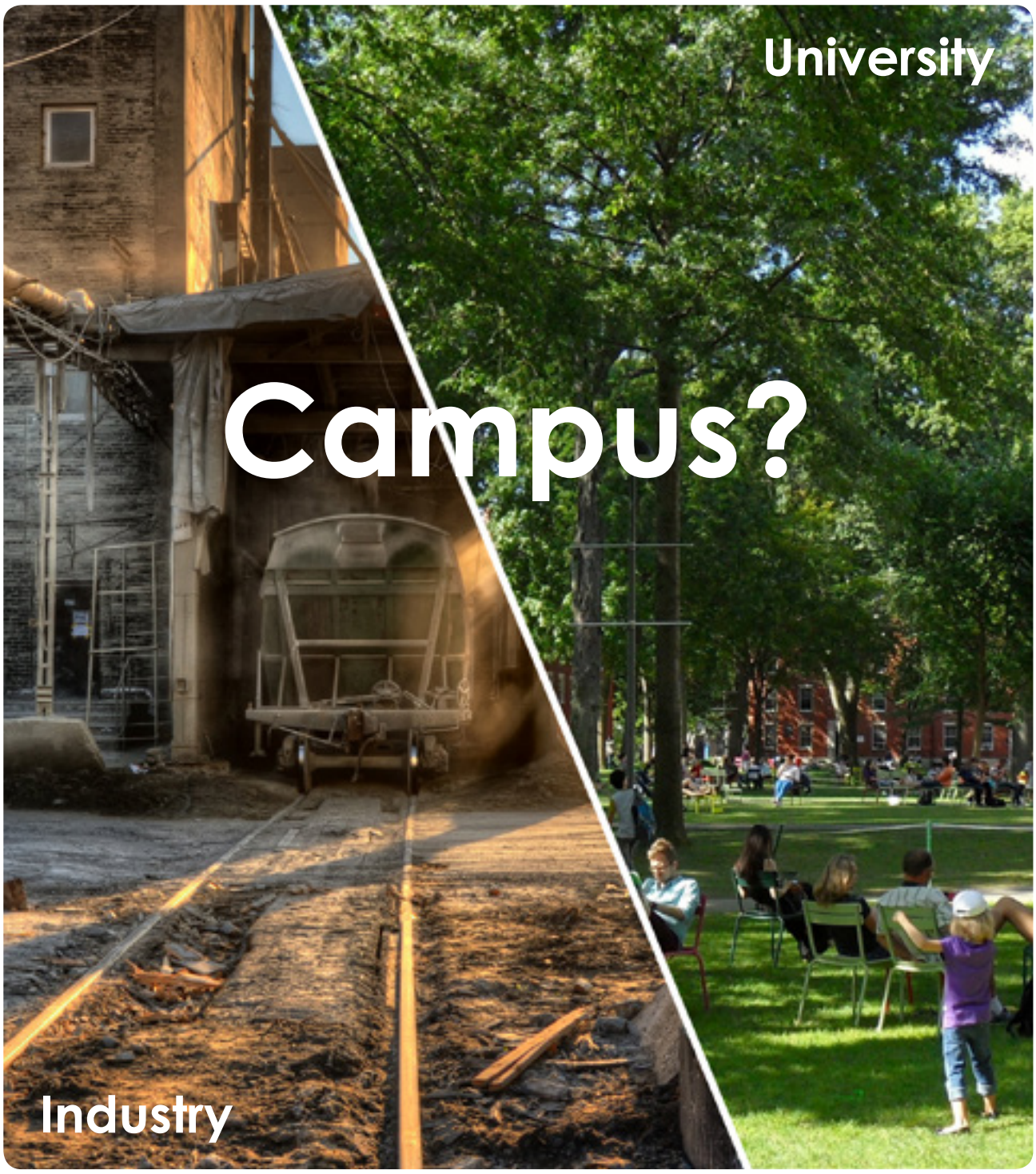


Fig. 3.3 | The contrasting conception of a campus.

Timeline campus development

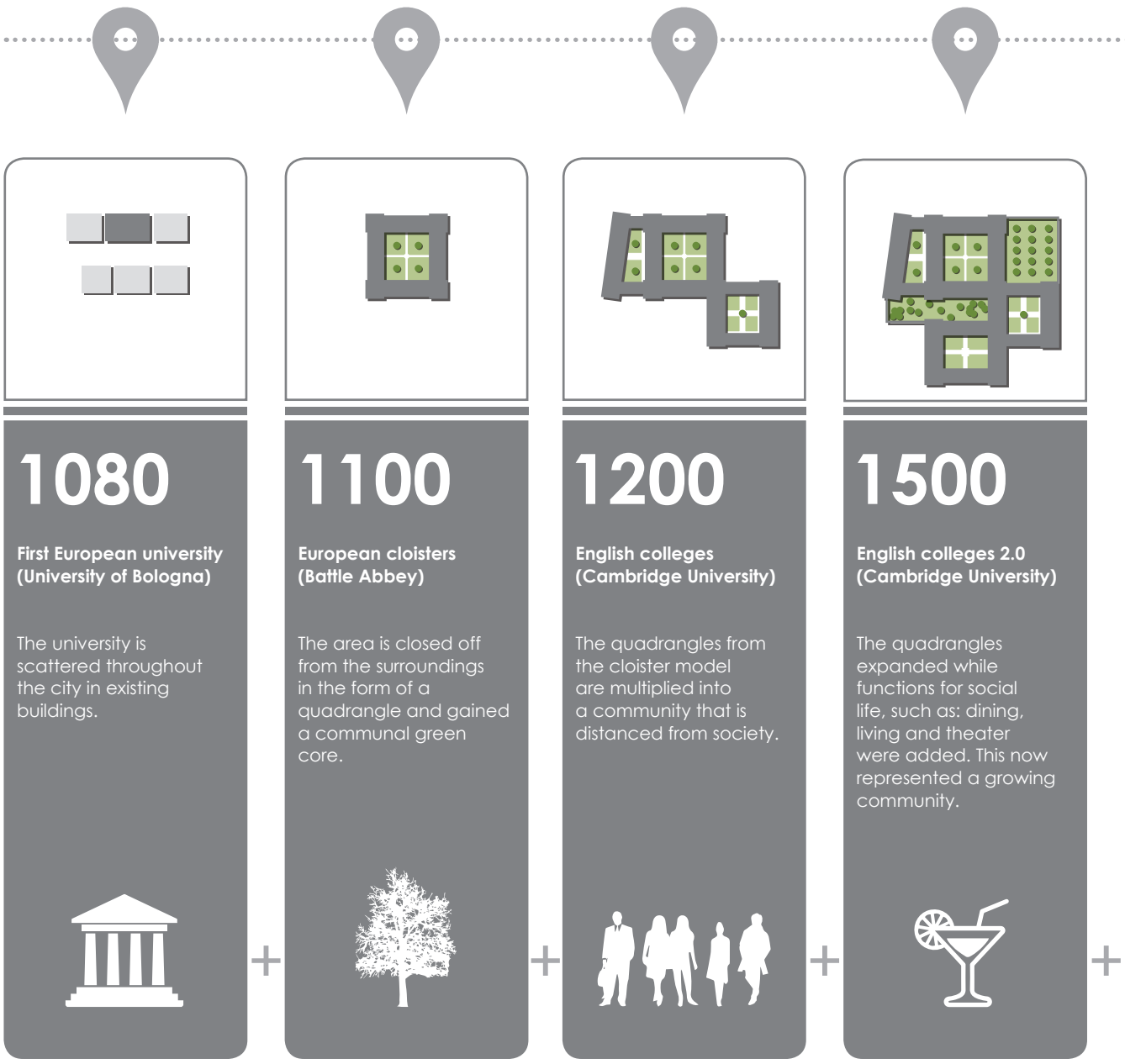


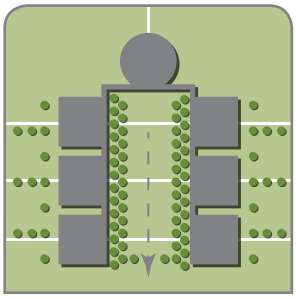
Fig. 3.4 |Schematic timeline of campus development.

1774 Initial use of the word 'campus' after the word 'yard'.

1636

First American university (Harvard University)

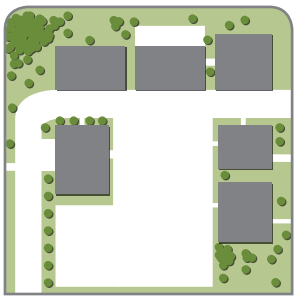
The cloister model was rejected and the campus is radically opened up to the landscape and thereby creating a connection with the community and the landscape.



1817

The Academical Village (University of Virginia)

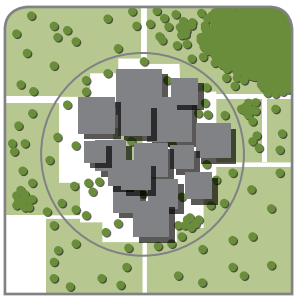
One of the first planned campuses with a focus on integrating the human scale through design in order to create a place to meet and a cohesive community.



1970

Automobile infestation (Aurora University)

The car becomes an increasingly valuable mode of transportation. Parking lots, roads and signage start to dominate the campus. Buildings are now oriented towards infrastructure instead of a park or green space.



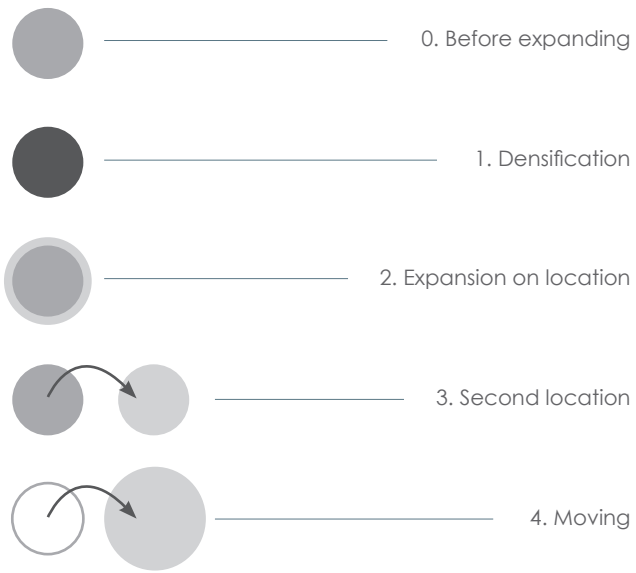
2010

The digital age (Google campus)

Advancements in science and technology increase environmental awareness, change pedagogy, add business and becomes increasingly digital. This creates the multifunctional campus.

1984; Helsper et al. 1990). With this new form of campus he aimed to establish an intimacy of scale to nurture the exchange of ideas between academics and students. The perfection of proportions, the exquisite way in which the site is placed between civilisation and wilderness and its physical form provide a strong symbolism which is truly sublime. This sense of community is expressed by the idyllic campus green, which is scaled to recognise each other's faces (Dober 1996; Chapman 2006).

Around 1850 the campus started to become more urban, because the surroundings were often growing rapidly (Chapman 2006). About a decade later, most of the traditional colleges had become university campuses and the American universities more than tripled in numbers between 1870 and 1900, causing campuses to drastically expand (Dober 1996). This major increase of students was



facilitated by a residential housing system, which revitalised the cloister ideology by integrating academic- and social life. The period after the Second World War is also called 'the Golden Age of Academia', because the number of students showed another drastic increase. Especially in the 1960's when the baby boomers reached college age. This has caused the campus and the surrounding city to massively expand and thereby creating an increasingly urban campus with a different contextual relationship (Chapman 2006). The expanding campus could facilitate this growth in four ways (fig. 3.5), first: the campus grew through densification by filling up interstitial spaces. This had a major impact on the original plan. Second: the campus expanded on the same location by buying properties along its borders, which massively changed the contextual relationships and the existing infrastructure became a major border on campus. Third, the campus remained at its original location, but expanded to several other small locations and thereby created a network, or the so called 'satellite campus'. This decreased a sense of community, but maintained the cultural- and historical values of the initial campus plan. Fourth: the campus moved to a new location on the edge of the city, creating the so called 'green field campuses'. This completely erased most cultural and historical values, because the former campus would be left behind. Most universities showed a combination of these solutions (Bromley 2006; den Heijer 2011). This is illustrated by the growth of Harvard University, which started out with scattered buildings and is now forced to expand through both densification and new centres at nearby locations due to its dense urban surroundings (fig. 3.6). The central green spaces are kept open, even though there is no space left for expansion on site. This indicates the importance of these spaces for the campus.

This massive growth also poses the end of classical heritage and the beginning of the large scale expansions within campus planning. The structure of the campus was reshaped again in the 1970's due to an explosive growth in car use, which invaded the tranquil pedestrian domain. Vegetation was replaced by parking facilities and the main functions became oriented towards infrastructure (Helsper et al. 1990). This caused the pedestrian to become inferior to the car, which was soon counteracted by the creation of a traffic loop around the campus to facilitate a pedestrian friendly core (Balsas 2002; Chapman 2006). However, this traffic loop created a major boundary between the university and its surroundings. The mid 1990's are again characterised by a spectacular growth of students and the campus expands by investing in technology (den Heijer 2011). Universities started to attract business- and science parks to their campuses, which caused them to become a multifunctional unity (van der Wusten 1998; van der Zanden 2011). This massive increase in combination with the establishment of businesses on campus, caused the appearance to become more industrial and functional. Large scaled buildings,with industrial materials became oriented towards large scale infrastructure, to the extent of megastructures (Hashimshony and Haina 2006). This is in conflict with the traditional conception of a campus as an intimate and comfortable environment which is focussed on the human scale. The campus did not only grow, but it also attracted a larger number of different people to the campus, with a large

Fig. 3.5 | Schematic representation of the expanding campus.

Development Harvard University

Further densification and expansion to the other side of the river, because the surrounding urban tissue does not provide any space for expansion.

2001-2015

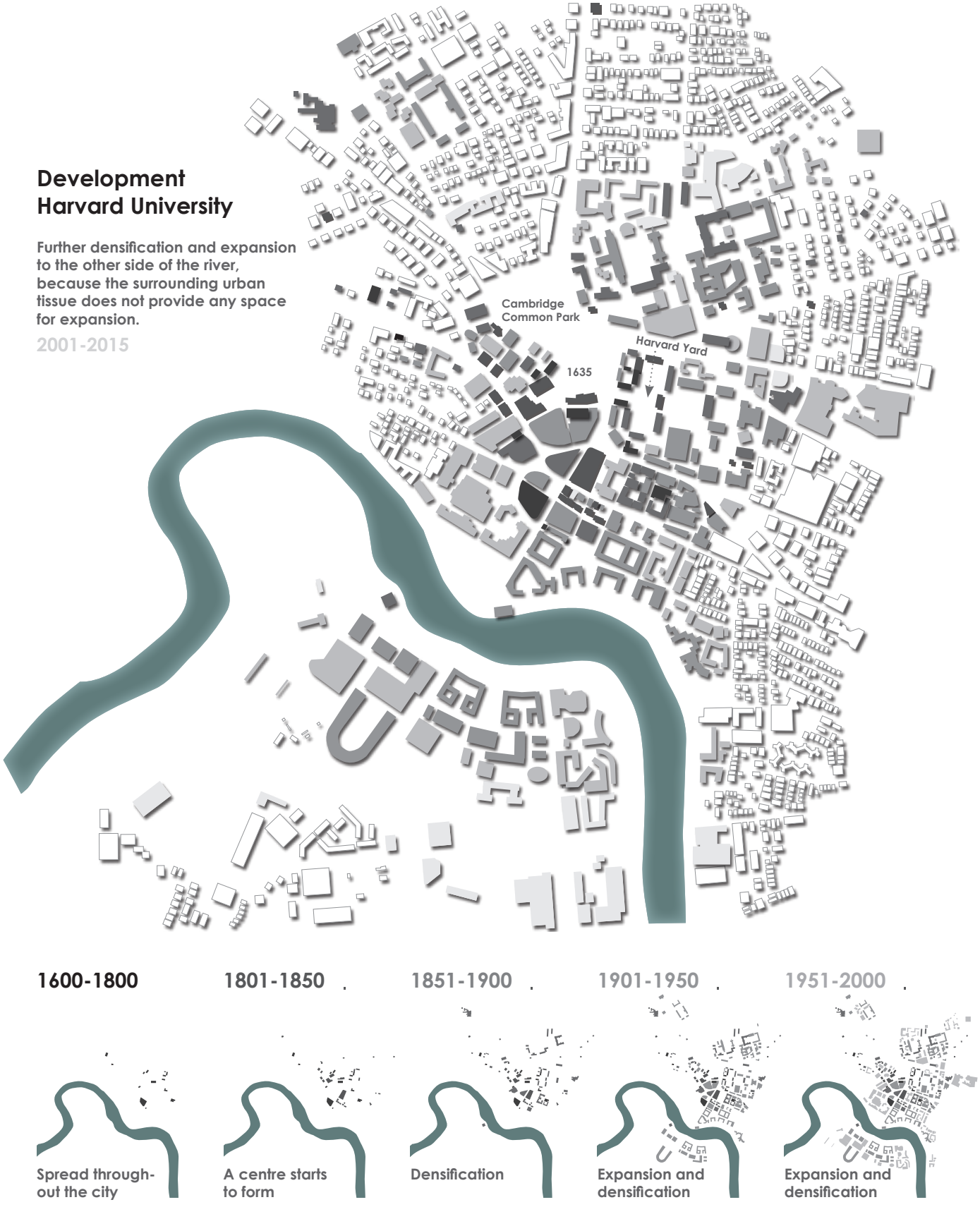


Fig. 3.6 | The development of Harvard University.

variety in use and needs, such as businessmen, students and project developers. This caused the surroundings to become increasingly urban with an increased complexity of its spatial- and organisational structure (Kerr 2001; Kenney et al. 2005; Wiewel and Perry 2008).

The beginning of the new millennium is characterised by an increasing awareness about the impact of climate change and universities acknowledge the critical role of higher education in becoming more sustainable. This causes the campus to become more green and to invest in sustainable solutions (Cortese 2003; Hirokawa and Salkin 2009). Advancements in science and technology, in combination with changing educational methods, reshape the campus (van der Wusten 1998). The introduction of the 'digital campus' poses a major impact on the campus by making student less dependent on the location of the campus and by creating a 24 hour learning culture (Lucia et al. 2008). The university facilitates this by including more functions to the campus in order to stimulate 'campus life' and 'lifelong learning' (Chapman 2006). This is often accomplished by adding social functions such as pubs and shops, but also by study facilities such as Wi-Fi all over campus. Around 2005, business- and science parks increasingly use the term 'campus' to define the grounds of their institutions, while they have often become separated from universities (Hashimshony and Haina 2006; den Heijer 2011). This gradually changes the campus into something ambiguous. The campus is currently still expanding and studies predict that the number of students in 2020 will show an increase of forty percent relative to the year 2007 (den Heijer 2011).

The campus phenomenon originates from the university, which became supplemented by research- and business institutions during the end of the twentieth century. Van der Zanden (2011) argues that the university has evolved from education oriented, to research oriented and currently to valorisation oriented. This indicates the importance of business to the contemporary university. Since the beginning of the twenty-first century, businesses started to form large entities, which often completely separated from the university as a spinoff (Chapman 2006; Kooij 2015). This caused individual business- and science institutions to increasingly identify themselves as 'campuses' (appendix B). For example, Google Campus used to be a science park which formed a part of a university campus. But the science park gradually evolved and became an innovative business park on its own, while adopting the characteristics of the former university campus. This signifies the evolution of the campus phenomenon. However, this does not mean that all institutions are campuses, because they often manifest themselves rather differently. Especially when considering the misinterpretation

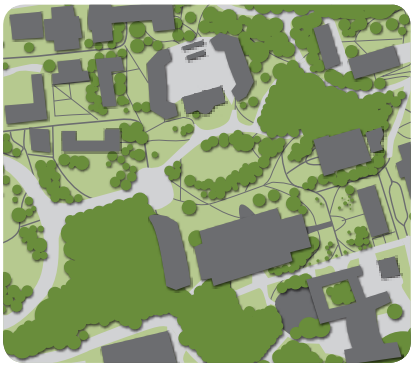
1. The integrated urban university

The integrated urban university consists of a single building or several single buildings that are scattered throughout the city. These can be placed near each other or form clusters, but they do not own the grounds or infrastructure that is surrounding them. This type of university is typical for large cities and for the earlier universities, which did not poses any private properties (Chapman 2006; Bromley 2007).

2. The megastructure university

The megastructure university is characterised by a very large building that interconnects several facilities into one giant complex. It is isolated from its surroundings and people barely come outside the building, because everything is connected by buildings. This megastructure forms a major contrast to its environment both physically and experientially (Hashimshony and Haina 2006).

3. The campus university



The campus university is characterised by a cluster of buildings in relation to a park-like setting. This type of university makes use of its surroundings and forms a coherent entity which is mostly in line with its context. The university is characterised by a green appeal and is less functional and efficient than the megastructure.

Fig. 3.7 | Different types of university.

of the campus concept due to its ambiguous character. Buck Consultants (2014) acknowledges the possibility that a science park adopts the campus phenomenon, but they are not clear on the characteristics that determine this. The 'business campus' as a physical construct can be rather similar to a 'university campus', but many differences persist, such as: use, stakeholders and users. These blend the spatial character of a campus into a place. One can for example imagine that the impulsive behaviour of students causes a completely different use of the spaces, at different moments of the day and with a different intensity than businessmen during working hours. However, it is possible in some cases for business parks to adopt the campus concept, but they should be in line with the campus characteristics that make a campus a campus.

The university can be expressed through three typologies (fig. 3.7). The single scattered buildings were mainly used by the early European universities, because they did not possess any private properties (Chapman 2006). The expanding campus became larger entities which expressed itself through a campus or a megastructure. The megastructure typology was abandoned in the late 1960's because its size was not in line with the human scale and was difficult to integrate into its surroundings (Hashimshony and Haina 2006). The campus is therefore the most popular typology of the contemporary university, which appears in a drastically evolved form (Shapiro 2005). Its development contributed decisively to our modern conception of what a campus should be (van der Wusten 1998). The campus is mostly considered as 'the norm' in higher education, something which institutions aspire to own and improve (Bromley 2006). The campus narrative originates from the early European universities, but the contemporary campus shows most resemblance to the American campus, which has been 'extroverted' and creates a connection with landscape and society (Gumprecht 2007). This 'New World' spirit transcends the 'Old World' academic traditions. Figure 3.4 illustrates the increased complexity of its physical form and its development over time, but this does not define what a campus is and why it is what it is. This indicates that the character of a campus is not only about the definition and its development, but also about the physical structure, its appearance and about a sense of place, since this is not a physical abstraction, but it is concerned with the chemistry that blends the character of the setting with the activity of use and its users (Chapman 2006). So, what is this character and what makes a campus a campus?

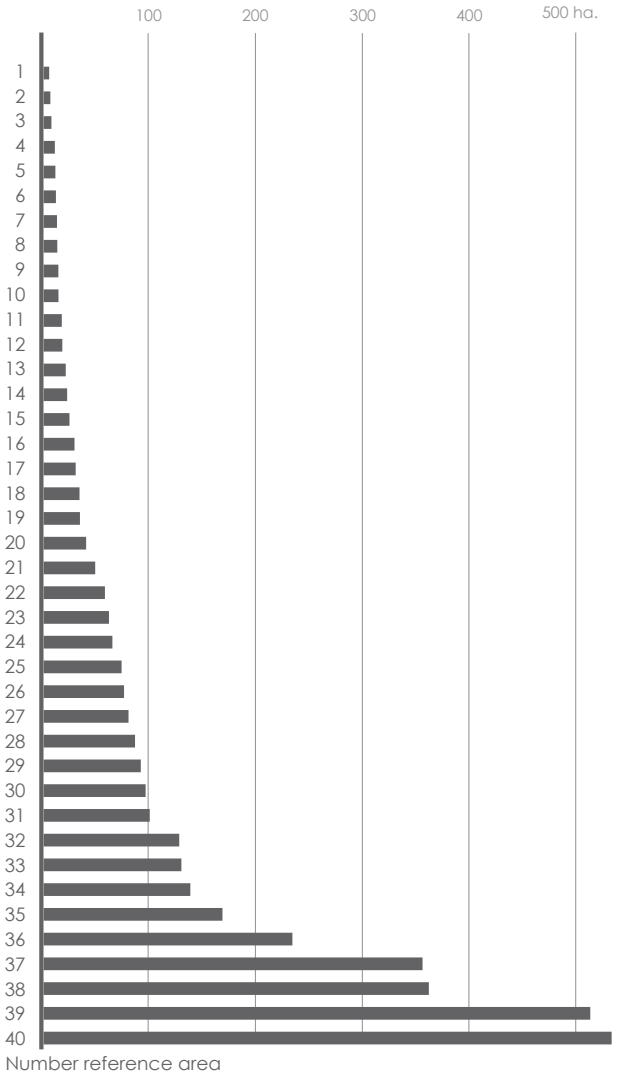


Fig. 3.8 | Campus size of the reference areas.

3.3 | THE CHARACTER OF A CAMPUS

The characteristics of a campus have been investigated by a literature study, a reference study and a typological analysis, covering a total of forty universities (fig. 2.2), which are analysed from an overarching and integral perspective (appendix C). University campuses have been analysed because they form the origin of a campus, stand central in its development, have evolved during a large number of

years and the results are directly applicable to the design for VU Amsterdam. A campus can be regarded as a phenomenon or a concept, which manifests itself through many appearances. There is no typical prototype with certain percentages, proportions or compositions, because a campus is subjected to a diverse blend of goals, cultural- and contextual influences. This can be illustrated by the investigated examples, which range from 6ha to 530ha with a large variety in functions and appearances (fig. 3.8). Even best practice examples such as Harvard University show a mixture of several architectural styles to the extent that every architectural style, except for Turkish architecture, is represented on campus (Dober 1996). This forms a major contrast to Cambridge University, which is characterised by uniformity in architectural styles, even though the university is over 800 years old.

The results as displayed in appendix A to D indicate that a campus consists of several essential and interrelated components that are characterised by an innumerable variety of appearances, especially when considering the possible cultural backgrounds, context and Zeitgeist. Comprehending and utilising this concept therefore requires a more abstract and holistic perspective. Individually these components can have multiple meanings: a park-like environment can for example also be a city park. But the combination of these interrelated components is what makes a campus a campus. These components are not only spatial elements, but a campus is concerned with the chemistry that blends the character of the place with its users and the use of its physical environment. The appearance of a campus is by far the most influential characteristic and its success is attributable to the simplicity of the composition and the focus on the campus as a holistic entity instead of individual components. A campus is generally distinctive from its environment, but is always embedded into its context and is in line with the character of the place. The outdoor spaces are characterised by the human scale in terms of distance between buildings, the size of spaces and the ability to act as a meeting place. The composition of this environment is superior to its functionality in a sense that infrastructure is adjusted to the composition of buildings and that this composition is based on the qualities of the green spaces. These green spaces mostly form a central location which is pedestrian oriented and serves as a meeting place to facilitate a sense of community. A more elaborate explanation of the campus is provided through several subheadings as deduced from the combined analysis of the reference study and the literature study:

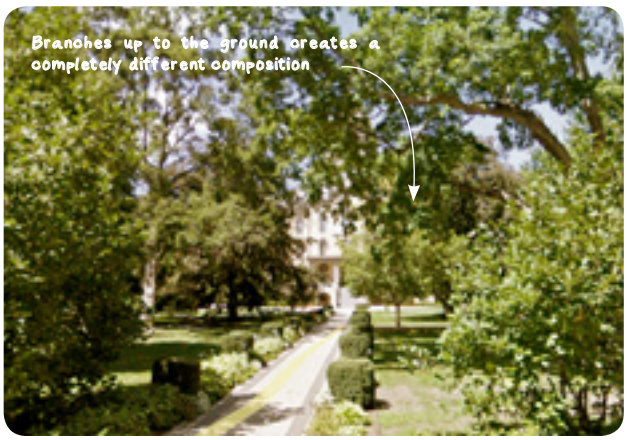


Fig. 3.9 | The buildings are mainly hidden by vegetation, but you are able to catch a glimpse of the entrance (Google 2015).

Fig. 3.10 | The centre of the building has become visible, but vision is mainly dominated by vegetation (Google 2015).

Fig. 3.11 | Vegetation suddenly opens up at a close distance to the building which reveals details and allure (Google 2015).

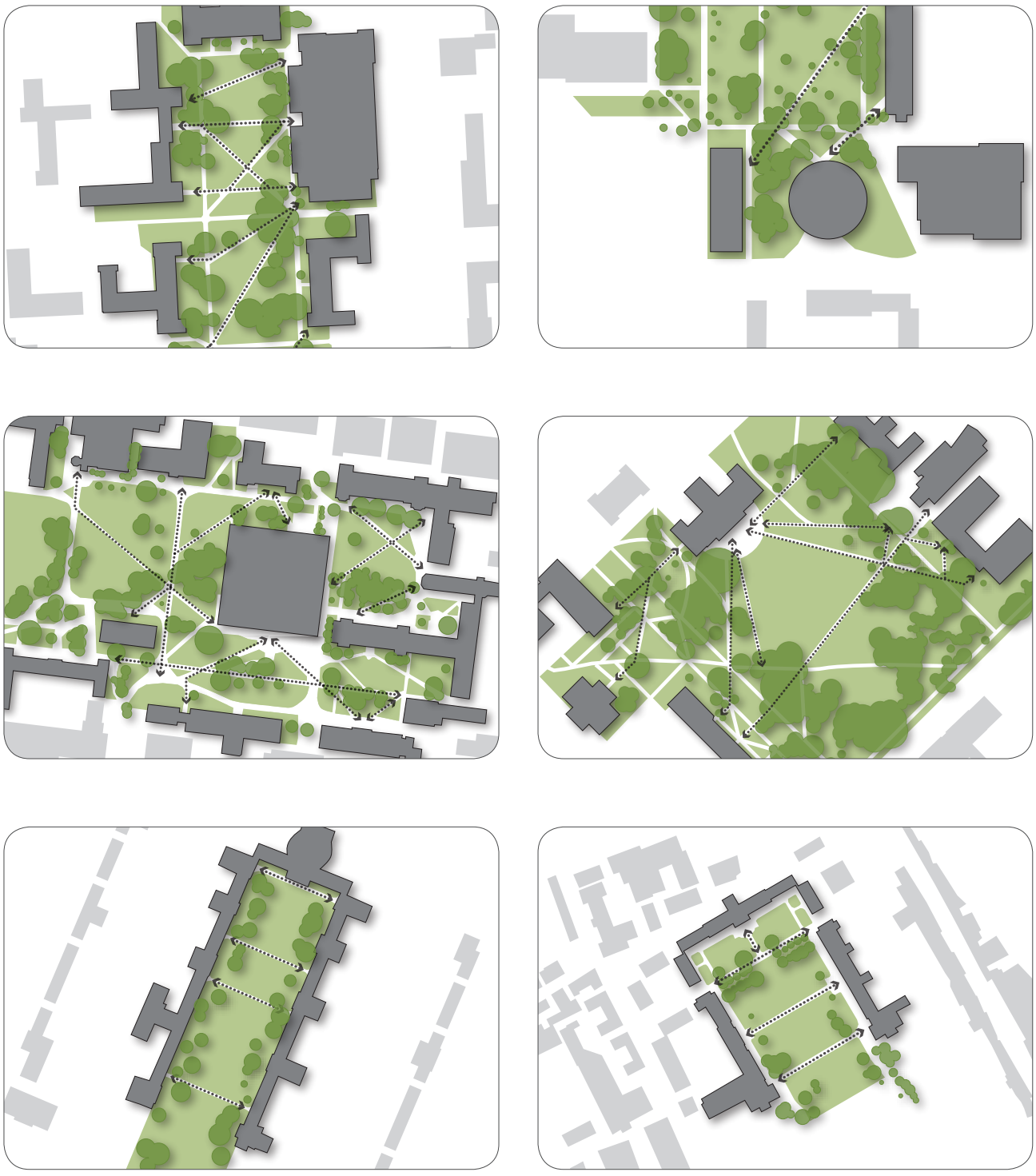


Fig. 3.12| Trees are positioned along the buildings, while the centre of the area is very open. This creates a very green atmosphere, because the buildings remain hidden untill one comes very close. The paths arrive at a slight angle, which creates a changing composition of the trees.

Grounds of a knowledge institution

As discussed earlier, the term 'campus' was initially used to describe college grounds, with its initial use at Princeton University in 1774 (Leitch 1978). The meaning of this term gradually incorporated all university compounds and is currently used to describe the entire property of the university, including buildings and infrastructure (Hashimshony and Haina 2006). Muthesius (2000) argues that this term also distinguishes the university from its context and that it emphasises its isolated and independent character. The term campus is increasingly used to describe the grounds of other institutions such as hospitals, business parks and schools (den Heijer 2011). But this is not limited to the property of one local site, because a campus is a highly complex institution with global interrelationships. A campus often consists of several locations to facilitate its growth and to house different functions (Bromley 2006).

A cluster of buildings

A campus consists of multiple buildings that create a cluster and show coherency on a larger scale. This coherency is mainly expressed through similar physical characteristics, but also by a sense of community. The buildings are mainly oriented towards each other or towards a central green space, which is often identified as 'quad' or 'yard'. These spaces are central for meeting, recreation and the (semi-) enclosed character creates a comfortable and safe atmosphere, which is mostly dominated by pedestrian infrastructure. The buildings engage in a dialogue, because they are positioned according to a predetermined spatial- and experiential composition. The relatively small distances between the buildings increase a sense of intimacy and they motivate the multi-sensory experience of social contacts, because the more short-distance senses such as smell and touch come into play (Grahn and Stigsdotter 2010; Bell 2012). These short distances also increase the visual recognition of faces, which increases the number of meetings (Gehl 2010). However, a pedestrian oriented core generally suggests a ring road structure for motorised traffic, which creates a boundary with the context. When the campus expands it even becomes an internal boundary. A campus can have a single cluster of buildings or several clusters, which can be both oriented inwards and outwards. This orientation is a dominant feature of a campus and it determines its inclusiveness. Moreover, the infrastructure is inferior to the configuration of buildings and vegetation, and is mainly used to enhance the functionality of these spaces. This functionality is inferior to the composition and the size of the area is not necessarily related to its scale. The campus of the University of Notre Dame (530 ha) is for example more in line with the human scale than VU Amsterdam (35ha), which is mainly focussed on functionality and infrastructure.

The buildings are mostly monumental with striking architecture and a sense of allure. This enhances their character to impress and inspire. They disassociate the campus from its context to the extent of elitism. Most buildings are tall enough to impress, but they are in line with the human scale to feel comfortable and to develop a sense of place. Moreover, these buildings are often announced by revealing just a glimpse of their appearance, while the rest is covered by trees and plantings that create a green atmosphere (fig. 3.9-3.12). When getting closer to the building, the trees and plantings make way for a dramatic appearance of the building, which is often characterised by a high level of detailing and quality to impress and astound. This also creates a certain narrative and intimacy between the observer and the buildings. In addition, this effect is often strengthened by pedestrian paths, which are mostly situated perpendicular to the building. The straightness and smoothness of the path increases a more upright and distanced visual focus onto the buildings, which intensifies the experience of the buildings due to the changing image by the trees (Dings 2015). The pedestrian speed makes us also able to discover a higher amount of details, while the contact between indoor- and outdoor spaces is strengthened by doors and windows on eye height (Gehl 2010). This also increases a sense of safety and enhances the liveliness of outdoor spaces. The buildings are often surrounded by a green perimeter which consists of shrubs and flowering plants. This creates a gentle transition from the large outdoor spaces to the more confined indoor spaces by a difference in scale and intimacy (fig. 3.18). These spaces are also used to enhance the buildings by the dramatic effect of a pedestal.

A park-like environment

The park-like environment is the most unifying feature of a campus, which gives it a green and comfortable appeal and acts as the main connecting element. This park-like environment reflects a space that is similar to a park, which is characterised by its green atmosphere, its recreational use and its purpose as a meeting place. It originates from 'the common grounds' of 16th century Europe, which were used to graze livestock prior to being sold (Jellicoe and Jellicoe 1975). A park-like environment is of strategic importance to ensure quality in our highly urbanised contemporary society (Chiesura 2004). A park has purpose, such as a place to walk the dog, to enjoy scenery and to watch people. It has benefits, such as tourism, social cohesion, urban cooling and biodiversity. But it is also characterised by meaning, such

Fig. 3.13 | Green structure: a central garden.
A park is positioned at the centre of the campus and the buildings have been placed around this central green space. The attention is focused on the outdoor space, creating a cosy and intimate experience, which is rather similar to a garden. It functions as an aesthetic object from both indoor- as outdoor spaces and the vegetation is rather detailed with high quality maintenance of flowerbeds, millimetre perfect lawns and park trees. This space represents the experience of a sequence of paintings in an art gallery, which are mainly respected for their quality and appeal from a distance.

Fig. 3.14 | Green structure: buildings in a park.
The entire campus consists of a park-like base layer on which several individual buildings have been placed that interact with the park. The vegetation causes uniformity and coherency. The experience can be compared to a sculpture garden, through which you walk while enjoying the quality of the sculptures. In this case the scattered buildings. The park-like environment is enjoyed for its simplicity and uniformity. It is therefore characterised by lawns, park trees and greenbelts around the buildings, which you enjoy from a distance and as a whole instead of its details.

Fig. 3.15 | Green structure: a landscape structure.
Several building clusters are divided and penetrated by an ongoing park-like structure which connects several central spaces into an overall structure. The central spaces show a higher amount of details than the ongoing structure, which often consists of lawns, meadows, bushes and forest. The ongoing structure causes a green and natural atmosphere throughout the area, while the central core areas represent the more specific aesthetic and recreational qualities.

Fig. 3.16 | Green structure: scattered parks and structures.
Multiple park-like spaces are scattered all over campus and are connected by landscape elements such as tree lanes, bushes or flowerbeds. These central spaces are used for both their aesthetic and functional properties. They function as central meeting places and the attention is focussed on the quality of the space and the interplay between audience and spectators. Landscape elements such as tree lanes give the entire area a green appeal and connect the central spaces.

as a sense of freedom, the place of your first kiss and the image of the city. This multifunctional use of this space is part of what makes a campus a campus. The green appeal is often so strong, that campus planners start by defining park-like spaces before the buildings. In some cases, the trees were planted way before the buildings were constructed (Gumprecht 2007). This park-like environment mainly consists of perfectly maintained lawns, which create unity and coherency all over campus. In addition, these lawns also have a more poetic meaning by reflecting the green landscape. The quads at Cambridge for example, reflect the English landscape through a strictly cultivated lawn at the centre of a secluded community. This presents a sense of longing and belonging to the surrounding landscape. These lawns are often accompanied by park trees that are either solitary, form clumps or bushes. The trees are mostly located near the buildings or next to infrastructure, while the centre of larger spaces is mostly opened up and filled with light to create a sense of spaciousness (fig. 3.9). This also increases the greenness of the environment while the view onto the buildings opens up during the approach (fig. 3.10). The trees in these spaces are often branched to the ground or they are pruned at a height of two meters, which creates a more cosy atmosphere than the trees next to infrastructure, which are generally pruned up to a height of over four meters. The vegetation around the buildings is mainly characterised by flowerbeds and shrubs that create a gentle transition with the buildings (fig. 3.11). This creates a much more intimate experience and forms a pedestal for the building, while enhancing its allure. This park-like environment manifests itself through four different types of appearance (fig. 3.13-3.16).

The park-like environment is much more than just a green space that connects buildings. It is the pleasant park-like feel of the campus which is significant in attracting and retaining its users (Francis 1987; Temple 2009). A campus is used to inspire and to nurture the appreciation for beauty and refinement (Gumprecht 2007). Some argue that the manifestation of these spaces is used as 'a silent teacher' for 'message-sending' through signals about the importance of scholarship (Edwards 2000; Temple 2009). The greenness of the campus is also used to attract students and funding. University brochures cleverly make use of photographs to convince students to visit their campus. A student spends the largest amount of time in lecture halls and classrooms, but these campus brochures are filled with much more attractive photographs of beautiful campus gardens, trees and lawns, than educational facilities (Kenney and Dumont 2005; Gumprecht 2007). These physical aspects are increasingly incorporated into the 'institutional brand' (Temple and Shattock 2007). Some universities are even defined in the public minds by the physical appearance of the outdoor spaces, such as the Gothic architecture of Cambridge University and the confined space at Harvard Yard. Branding incorporates the perception, experience and feelings of an institution and includes both visible and invisible characteristics, which reside in the minds of the public (Allen 2007). Branding can therefore create an atmosphere which would otherwise not have been there with the same physical layout. However, international student satisfactory surveys indicate that students attach relatively low importance to the physical layout of the university relative to the campus experience (Temple 2009). This indicates the importance of the campus atmosphere over the physical structure which produces this atmosphere.

But the campus also contains functional properties such as spaces for events, water infiltration, air purification, living labs, sports and biodiversity (fig. 3.13). These outdoor spaces often hold a practical purpose, such as teaching botanical knowledge, recreation or lunch on a sunny day. This park-like atmosphere performs as a backyard for students who live on campus. It also enhances thermal comfort and has a positive effect on health by shading and evapotranspiration (Brown et al. 2015; Klemm et al. 2015b). It thereby contributes to mitigate the 'urban heat-island effect', which decreases work productivity and concentration during warm periods (Klemm et al. 2015a). This is especially relevant for the increasingly urban campus which facilitates student residences. The green atmosphere of a park-like environment invites and activates its users to engage in physical activities, which positively influences the mental- and physical health of the campus community (McCormack et al. 2010). It also possesses the potential to improve concentration and productivity, to reduce stress and to increase general wellbeing, which may lead towards higher quality education and research (Maas et al. 2006; Groenewegen et al. 2006). The park-like spaces are therefore often seen as a space which combines practical activities with a comfortable and inviting atmosphere. This is in line with the utilitarian belief of a park to provide attractive open spaces, with the romantic desire to bring back nature into the city and a sense of civic pride (Yuen 1996). Olmsted admired the recuperative forces of nature and the spaciousness of park-like spaces, because one cannot achieve this feeling inside buildings (Chapman 2006).

A place to meet

Campuses are generally characterised by their central park-like spaces that are named 'yard', 'quad' or 'court'. The

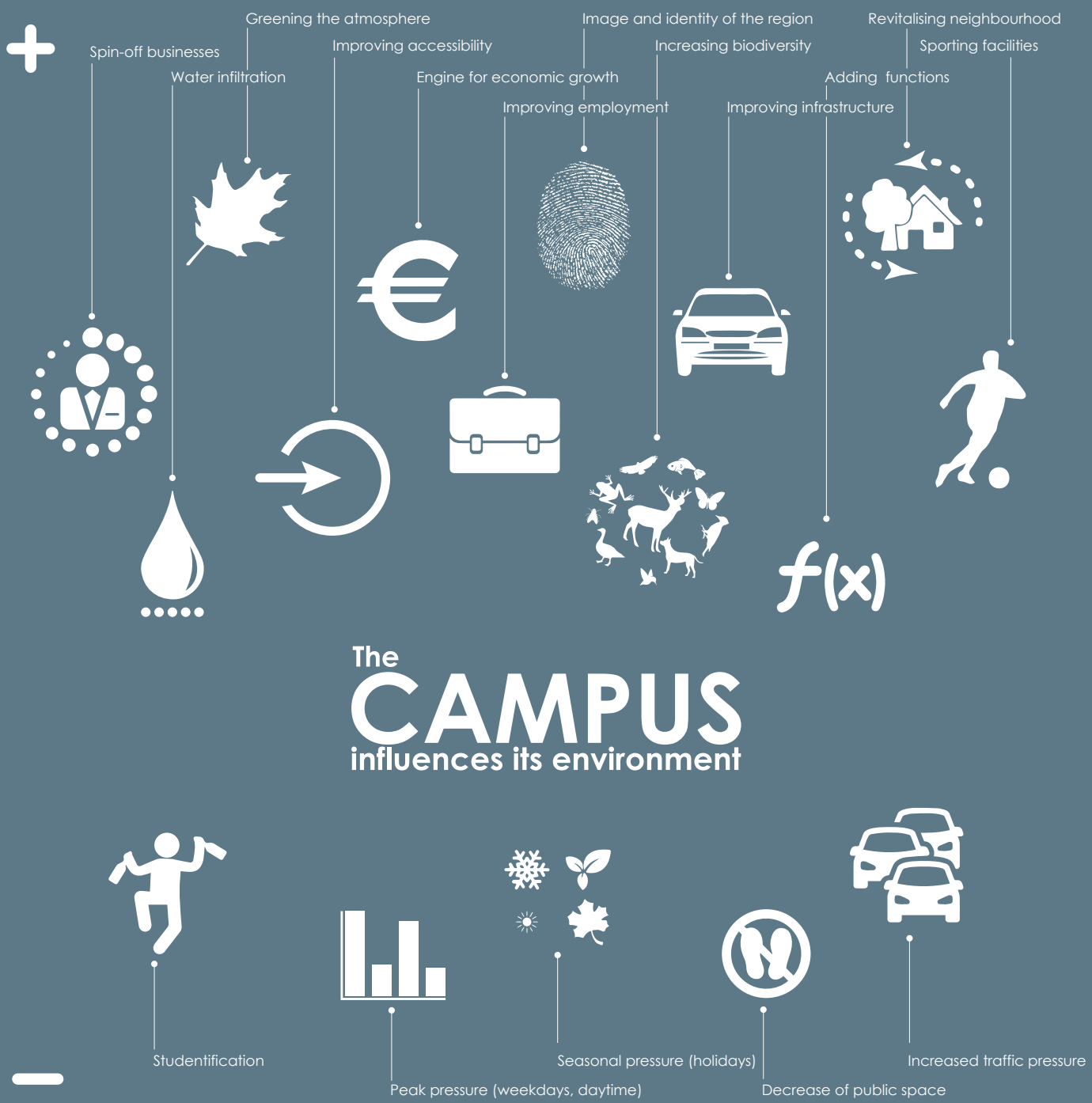


Fig. 3.17 | The influences of a campus on its environment.

fact that these spaces have been given a name, indicates the importance of these spaces as a central meeting place. They often date back to the origin of the campus and they are generally the only spaces that withstand the destructive processes of densification and expansion. 'Cambridge Commons' and 'Harvard Yard' date back to the origin of Harvard University, but even though the university has drastically expanded over the years, these spaces still exist (fig. 3.6). This indicates the importance of these spaces within the campus community. They are mostly situated on a central location which is highly recognisable and is characterised by a strong identity. These spaces are meant for knowledge exchange and campus gossip (Edwards 2000; Dober 1996), but they also serve as informal meeting places to integrate students and staff into one coherent academic community (Chapman 2006). These spaces are made comfortable and attractive to motivate the exchange of ideas, which is considered to be very important. The physical environment became planned to facilitate and increase the amount of both accidental and deliberate meetings. The first completely planned University of Virginia was provided with the greatest number of intersections to maximise the number of meetings, while discouraging congestion. Their aim was to design the infrastructure in such a way that it became virtually impossible to go from one building to the other, without coming into contact with at least one entirely different person from another faculty (Temple 2009). The number of meetings was also directed by influencing its inhabitant's behaviour by blending living, working and leisure activities through collegiate organisation (Muthesius 2000). The earlier universities deliberately excluded external communities from these meetings, but the contemporary urban university is attempting to integrate the university into its surroundings by providing meeting places on the boundary of the university (Lee et al. 2014). These meetings are also motivated by strategically placed opportunities to sit in the form of lawns and benches, but also by moveable chairs, which is the case at Harvard Yard (fig. 3.19). A campus is characterised by a wide variety of people, of which some do not wish to be disturbed by other people, such as the visitors of an academic hospital for instance. The availability of places that act as a sanctuary for peace and quiet is therefore essential.

Sanctuary

The campus is characterised as a sanctuary, a refuge, a space for contemplation, where thinkers can think and dreamers can dream (Gumprecht 2007). Especially because it disassociates itself from its context and it creates a secluded community, which is in line with its origins. As discussed earlier, a campus originates from the medieval cloister, which was very introvert and offered a secluded central space. Cambridge University adopted this concept and separated itself from the city by creating a cluster of interrelated quadrangles (Chapman 2006). Most earlier campuses were designed on the periphery of the city to escape any distractions and to get away from the corrupting forces of the city (Turner 1990; Perry and Wiewel 2005). This romantic notion of being isolated from the city and civilisation came to its purest expression in the earlier American campuses which were located outside the city to get in touch with nature. This ideology has changed over time due to a stronger collaboration with external institutions such as businesses, but it still remains separated (Hashimshony and Haina 2006). The campus is often used as a place for contemplation, inspiration and self-discovery

Fig. 3.18 | Green border creates gentle transition (Glyn Fletcher 2013).

Fig. 3.19 | Moveable chairs at Harvard Yard (Deniz Cataltepe 2015).

(Gumprecht 2007). It is characterised as a green enclave in the busy urban city. Most campuses show a clear distinction with their surroundings through borders by infrastructure or by buildings that are oriented inwards. The park-like environment offers a large variety of social spaces and individual spaces where people can retract in a comfortable environment. This can reduce stress and provide a sense of tranquillity (Chiesura 2004). Especially when one can associate with this atmosphere from indoor spaces, which is often strengthened by a large amount of windows on eye height (Hartig 1993). A campus is also often considered as an 'ivory tower', because it is self-centred. But this is unrealistic because a university or knowledge institution seeks to transmit and use knowledge (Bender 1988; Wiewel and Perry 2008). It can therefore be regarded as self-centred, but not as an ivory tower.

Campus community

The campus community is characterised by a wide variety of different people, organisations and activities. These all have specific requirements and use the spaces in a variety of ways at different moments of the day. This creates a vibrant environment. The majority of the people are highly educated and consists of teachers and students, but also by businessmen, researchers, staff, visitors and people from the immediate vicinity. Most knowledge institutions are internationally oriented, which causes a melting pot of different cultural values and habits. Students often live on campus and create a 24 hour community with a sense of belonging, which is often strongest on the urban campus. This strong sense of community and identity is what changes the campus as a space into a place (Temple 2009). This sense of identity is further strengthened by student associations, alumni, activist groups, fraternities and faculties. The campus makes use of the functions in the immediate vicinity of the campus and the surrounding neighbourhoods often use a campus to walk the dog or to engage in events or sports. A commercial strip is generally positioned on the border of the campus, where students live in adjacent neighbourhoods. This causes 'studentification' of the immediate vicinity (Bromley 2006). In addition, a campus influences its environment in several ways, generally more positive than negative (fig. 3.17). Many campuses have their own sporting facilities and teams, which create a strong community and identity, especially when competing against other institutions. The campus community disassociates itself from the general community by all of the specific factors mentioned above. They constantly engage with each other through study, work, living and recreation. Institutions use this sense of community to create a strong identity through branding (Allen 2007). This identity becomes visible by signs at the borders of the campus, by names on buildings, by the presence of the 'campus community' on site, through clothing and by the coherency of the site. The institution is inextricably connected to the campus both physically, symbolically and digitally.

3.4 | CAMPUS TYPOLOGIES

The previous paragraph has pointed out the main character of a campus, which is characterised by several appearances. These different appearances increase the ambiguous character of a campus and they make it difficult to pinpoint the essence. It becomes even more complex when a landscape architect is obliged to design a campus, because the definition is still too vague to create a coherent and high quality campus design. A typological analysis has therefore been conducted to unite similarities and form typologies, which can serve as inspiration and can act as a tool for landscape architects and spatial planners to determine the basic layout of a campus and provide structure for the wide campus variety (appendix D). They enhance the utility of the campus phenomenon and potentially improve the quality and efficiency of campus design. In addition, they are also used in this thesis to determine the most suitable conditions for VU campus through design scenarios, which are subsequently used to test the applicability of the campus typologies through reflection.

Four campus typologies have been established: The Enclaved Campus, The Urban Campus, The Parkland Campus and The Multi-cluster Campus. These are based on their main differences from an overarching and integral perspective. All typologies are in accordance with the characteristics that make a campus a campus. However, the different manifestation of these characteristics is reflected in the typologies.

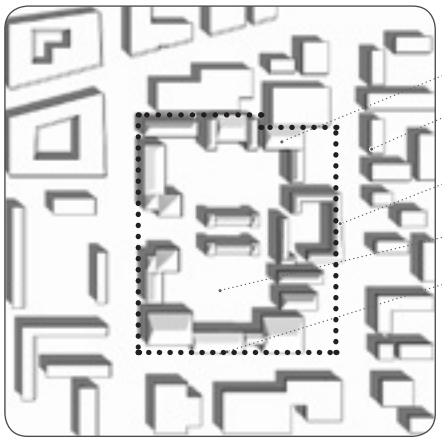
1 | THE ENCLAVED CAMPUS

A green enclave as a safe and secluded environment in the busy city

The Enclaved Campus is characterised by a single cluster which is oriented towards a central green space. It forms a green oasis, which distances itself from the busy urban surroundings. This enclosed character creates a sense of intimacy and safety. It acts as a world in itself. Moreover, this typology consists of small to medium sized campuses, which create a very abrupt transition with their context. Coherency is mainly established by the shape of the campus as an inward oriented cluster, while the borders are often strict and the core is mainly pedestrian oriented. This secluded campus holds some functions on site and uses the functions in its direct vicinity. The surrounding urban areas do not use the functions on campus, because the spaces are often very private with limited accessibility. It is difficult for this type of campus to expand into the immediate vicinity, because additions to the inwardly oriented structure as a single cluster will require major revisions. Growth is therefore mainly possible by small additions, through densification and by the establishment of a secondary campus.

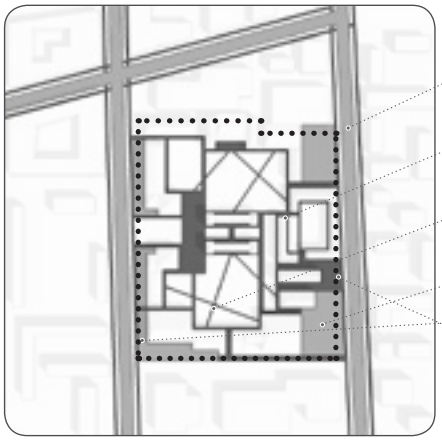
The Enclaved Campus shows most resemblance to the 'Hortus Conclusus', which represents a walled garden for relaxation and recreation (Clifford 1967). This landscape style is characterised by enclosure and safety and is closely related to the concept of a 'garden' and 'yard'. This enclosed structure creates the illusion of paradise within the busy city (Geuze 2014). This typology is also closely related to the layout of medieval cloisters and monasteries with a centrally positioned enclosed garden or courtyard, which is completely detached from the context.

Fig. 3.20| Impression of the Enclaved Campus typology.



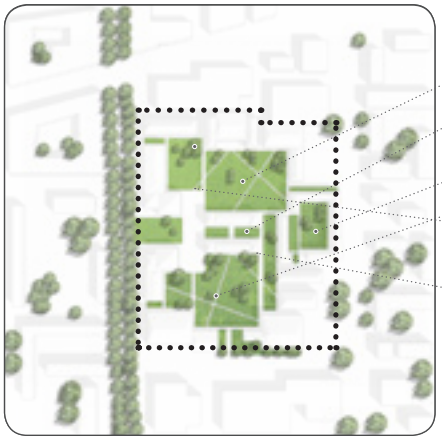
Buildings

- One major cluster is placed around a central green space.
- The cluster is integrated with its surroundings and is confined by infrastructure.
- Differentiates with the context by unity in architecture, shape and size.
- Oriented towards the central green spaces.
- Forms a closed façade with an abrupt transition to the surroundings.



Infrastructure

- Primary infrastructure for motorised traffic is situated on the boundaries of the campus.
- The core is dominated by pedestrian infrastructure, which is based on functionality.
- Internal infrastructure is shaped to stimulate social interaction by providing opportunities for people to meet each other.
- Parking facilities are small and are located directly to the backside of the buildings.
- Most parking facilities are located in the adjacent urban tissue.
- Low accessibility and private central spaces.



Vegetation

- One major green space forms the centre of the campus.
- Aesthetics and the visual perception are the leading elements in shaping the green spaces.
- The centre of the spaces are kept open.
- The park-like atmosphere is central for meeting and recreation.
- The vegetation consists of lawns, solitary trees, clumps of trees and flowerbeds.
- Flowerbeds and shrubs create a gentle transition with the buildings.
- The level of maintenance is very high and the spaces are often rather small.

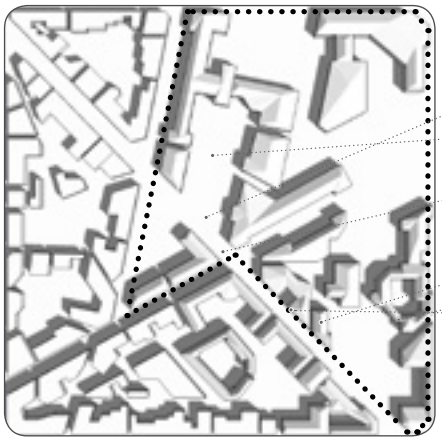
2 | THE URBAN CAMPUS

Integrated into urban surroundings, life in the busy city with central green spaces to retreat

The Urban Campus is characterised by its integrated urban character, interspersed by public city parks. This causes a strong connection with its urban environment in terms of use and exchange of functions. The Urban Campus is medium sized, very urban and interwoven with its surroundings, which creates a very unclear boundary. However, it is easily accessible and the edges are very diffuse. The atmosphere resembles life in the busy city, with public green spaces to escape the hectic city atmosphere. This typology is shaped by functionality and infrastructure is often leading in the composition of buildings and vegetation. There is barely any space for expansion in the immediate vicinity, but it is easy to add adjacent buildings without massively changing the campus structure. This also provides the opportunity to revitalise the surroundings of the campus (Chapman 2006).

The Urban Campus shows most resemblance to the urban park concept, which entails a centrally positioned park within an urban environment. It provides recreational facilities and a place to meet in a pleasant green atmosphere that forms a contrast and refuge from the surrounding urban tissue (Cranz 1982). The urban park aims to connect visitors with the illusion of nature by mimicking natural landscapes in a rather cultural way by emphasising aesthetics (Geuze 1993).

Fig. 3.21 | Impression of the Urban Campus typology.

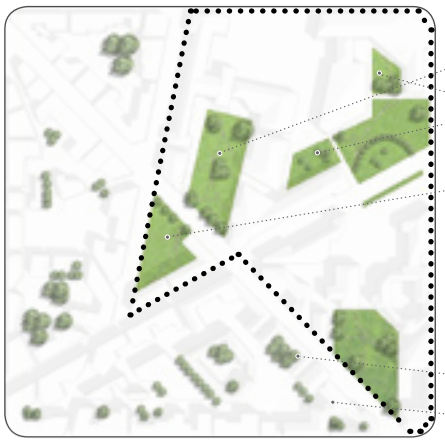


Buildings

- Forms a major cluster which is integrated into the urban tissue.
- Borders with the context become visible by subtle differences, such as a slightly larger scale or differences in architecture.
- Oriented towards infrastructure or central green spaces.
- Functionality supersedes composition in terms of location, size and shape.
- Often not continuous, but interrupted by other buildings.
- Rather high building density.
- Form semi-closed facades along open spaces.
- Resembles the organic growth of a city.

Infrastructure

- Infrastructure is a dominant shaping element.
- Crossed by primary infrastructure for motorised traffic.
- Secondary infrastructure for motorised traffic forms a meshed network throughout the area.
- Forms major boundaries on campus.
- Pedestrian traffic is concentrated in green spaces and squares between buildings.
- Types of traffic are bundled.
- Infrastructure acts as a shared space which stimulates social contact and provides openness for navigation.
- Parking facilities are scattered throughout the area by medium sized parking lots and along the streets.



Vegetation

- Consists of a few central park-like spaces, which are connected by landscape elements.
- Strategically placed and often fill leftover spaces.
- Parks are rather small.
- Central park-like spaces act as landmarks and for meetings.
- Each space is different and unique, which helps to orientate.
- Vegetation in the park-like spaces consists of flowerbeds, shrubs, park trees and lawns.
- These spaces are connected by trees or tree lanes.
- Low amount of vegetation on the surface besides the parks.
- Act as retreats from the busy city life.
- Parks are intensively used by the surrounding community.

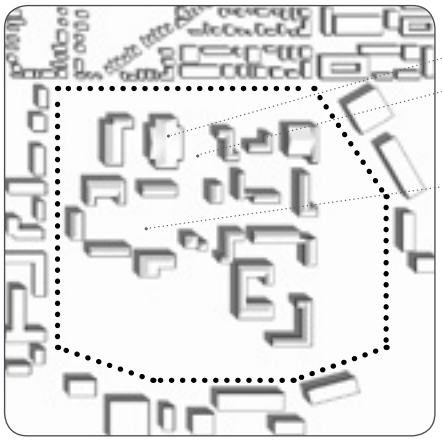
3 | THE PARKLAND CAMPUS

Dispersed buildings on a uniform park-like base layer with a green atmosphere

The Parkland Campus resembles a massive park due to the dispersed buildings and the ongoing green atmosphere. The entire space is rather uniform, but continuously changes due to differences in buildings, vegetation and infrastructure. This is mainly the case because all spaces are interconnected and the vegetation acts as a fluid base layer. This creates a very spacious atmosphere with gradual transitions between several subspaces. This campus is medium to large sized and is semi-integrated with its context by semi-gradual transitions through a boundary of vegetation. This causes the campus to become distinct from its surroundings, even though it is semi-integrated. Most functions are located on campus and the edges of the adjacent urban areas are often characterised by a strip of commercial activities such as pubs and stores. Expansion of the campus is possible through densification, but careful attention is required not to disturb the composition of existing buildings and sightlines. Expansion into the immediate vicinity often creates an infrastructural border on campus, which creates a massive distinction with the expansion areas (Chapman 2006).

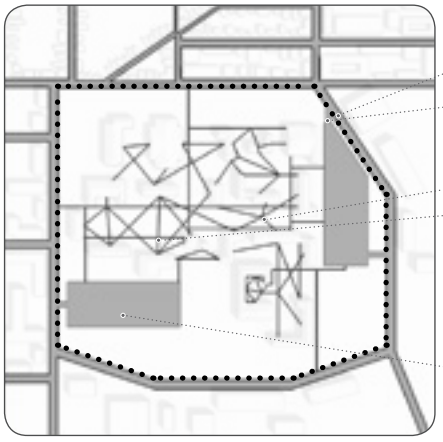
The Parkland Campus shows most resemblance to the 'English Landscape Style' which is characterised by an idealised and cultivated perspective on nature through sight lines onto a composition of vegetation and folly's (Steenbergen and Reh 2003; Curl 2006). Composition is key in this landscape style. This is also noticeable in campus examples such as the University of California (Berkeley) which was based on sight lines to the surrounding landscape, waterfalls, San Francisco and the Golden Gate Bridge (Chapman 2006).

Fig. 3.22| Impression of the Parkland Campus typology.



Buildings

- Dispersed single buildings on a uniform park-like base layer.
- Oriented towards a park-like environment and towards each other.
- Some buildings form clusters.
- Distance between buildings is based on the human scale.
- The composition of the buildings is dominant.
- Creates very transparent edges due to their dispersed structure.
- Seem to stand in a park.
- Act as sculptures in a green décor.
- They all stand in dialog with each other and the park.



Infrastructure

- Primary infrastructure for motorised traffic is positioned on the boundaries with the area.
- Secondary infrastructure mainly connects the primary infrastructure with parking facilities.
- The largest part is characterised by pedestrian traffic.
- These paths are abundant and very functional, which creates a forma composition.
- Paths are cut into the uniform green layer which appears to flow through.
- Different forms of traffic are detached.
- Parking facilities are concentrated on a few major parking lots at the borders of the area, creating a car free core area.

Vegetation

- Consists of a uniform park-like base layer which interconnects the entire campus.
- The park-like layer forms the base of the campus on which infrastructure and buildings have been draped.
- Composition of vegetation is leading to create a park-like atmosphere.
- Consists of lawns, solitary trees, clumps of trees and bushes.
- Wrapped in a layer of shrubs and flowerbeds which creates a gentle transition with the buildings.
- Forms a boundary between campus and the context.
- Gives a rather cultural impression.
- A high amount of vegetation.

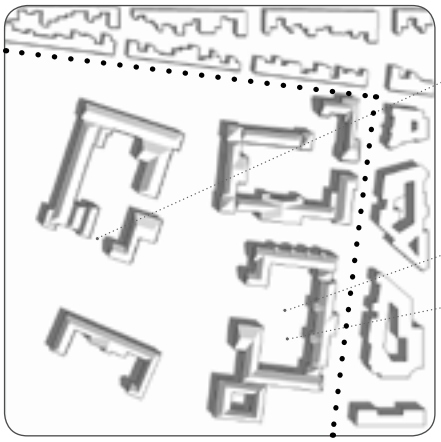
4 | THE MULTI-CLUSTER CAMPUS

Several clusters with secluded green cores are interconnected by a park-like structure

The Multi-cluster Campus is characterised by several clusters that are positioned separately in a landscape environment, which encloses green courtyards. These confined and cultural internal spaces create a major contrast with the open and natural external spaces. The clusters are both introvert and extrovert relative to each other. This type of campus is medium to large sized and is positioned in a landscape environment. The boundaries with the context are rather abrupt, but a soft boundary of vegetation creates a semi-gradual transition. The clusters create a semi-diffuse border, because large parts are blocked by buildings. Unity and coherency is established through the ongoing park-like structure that connects multiple clusters to each other. The central spaces are semi-private and contain some functions, but the campus also uses its context and vice versa. This typology can expand by increasing the size of the clusters and eventually filling up all interstitial spaces, which then starts to resemble the Parkland Campus. This campus type is often positioned at the edge of a city and can therefore easily expand into the landscape beyond.

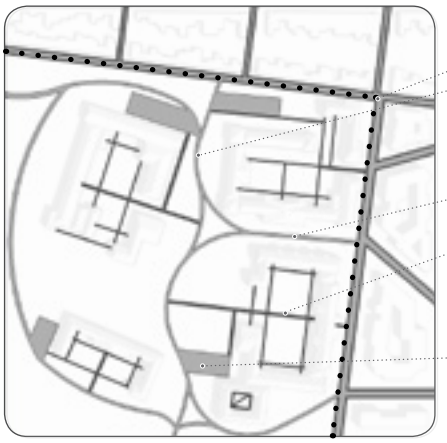
This typology shows most resemblance to the early Italian Renaissance style, which uses classic ideals of order and beauty while connecting with the natural landscape beyond, which serves as stage for contemplation (Steenbergen and Reh 2003; Attlee 2006).

Fig. 3.23 | Impression of the Multi-cluster Campus typology.



Buildings

- Positioned in multiple clusters, which are mostly opened up to the park-like structure.
- This composition is situated on a uniform surface.
- Located towards the centre of the area, instead of the edges.
- Oriented inwards, towards the central green spaces, but they are often also oriented to the outsides of the cluster.
- Creates several semi-private spaces with an enclosed atmosphere.
- The clusters are related to each other through similarities in architecture, size and shape.



Infrastructure

- Major infrastructure on the borders or outside the area.
- Secondary infrastructure for motorised traffic is situated on campus in the form of ring roads around the clusters or an ongoing road that connects all clusters.
- These roads form minor barriers on campus.
- The core of the clusters is dominated by pedestrian traffic and creates a contrast to the atmosphere between the clusters.
- Pedestrian infrastructure between the clusters is limited.
- Motorised- and pedestrian traffic are separated.
- Several smaller parking lots placed at the edge of each cluster. These facilities dominate the experience from the buildings because they are positioned near the buildings.

Vegetation

- Consists of a major park-like structure in between the clusters, which connects all central spaces within the clusters.
- The park-like structure is characterised by a larger scale than the more confined courtyards.
- This structure creates a unity throughout the area.
- Vegetation in all directions creates a very green atmosphere.
- Clusters consist of flower beds, lawns and solitary trees.
- Park-like structure consists of meadows, lawns, trees, bushes and landscape elements such as swamps and forests.
- Maintenance within the cultural clusters is far greater than in between the clusters, which is more natural.

3.5 | SYNTHESIS

The campus phenomenon originates from the medieval European university, but the contemporary campus shows most resemblance to the 'extroverted' American campus, which creates a connection with landscape and society. Its meaning has developed from encompassing 'the grounds of the university' to becoming an overarching design concept which is applicable to a wide variety of spatial entities, such as business parks.

A campus is difficult to define and design due to its ambiguous character, which is expressed through an innumerable variety of appearances. There seems to be no typical prototype campus with certain percentages or compositions. In addition, a campus is concerned with the chemistry that blends the character of the place with its users and the use of its physical environment. Its success is attributable to the simplicity of the structure and its holistic character, rather than a collection of individual components. Comprehending and utilising this concept therefore requires an overarching and integral perspective, while considering its characteristics and abstract typologies.

Le Corbusier observed that these spaces are in fact worlds in themselves and much more than just an institution (Gumprecht 2007). They are concerned with the total experience of life within a place where people work, study, party and sleep. Where the human scale is nurtured to enhance the exchange of ideas and to create a coherent community with a strong identity. Its basic atmosphere is characterised by a park-like environment with clustered buildings that have been united by timeless design. A coherent and strong identity is formed by several different, seamlessly connected, sub-spaces. These create a diverse campus environment which supports a variety of different users and functions. Moreover, a clear and overarching structure provides pedestrian oriented cores that are sufficiently simplistic to allow flexible use and spontaneous events. In addition, these spaces are used for inspiration, contemplation and prestige. But the green environment is also beneficial to i.e. increase educational performance or stress reduction by connecting indoor- and outdoor spaces (Maas et al. 2006; Groenewegen et al. 2006). These spaces show both sublime aesthetic and functional quality through subtlety and attention to detail.

The abovementioned properties of the campus character (fig. 3.25) express themselves in specific combinations through four distinctive campus typologies: The Enclaved Campus, The Urban Campus, The Parkland Campus and The Multi-cluster Campus. These typologies and characteristics are implemented into the case of VU Amsterdam to test their applicability onto a real-life setting and to increase the quality of the campus design (see chapter 4.4).

1. The Enclaved Campus

2. The Urban Campus

3. The Parkland Campus

4. The Multi-cluster Campus

Fig. 3.24| Use of the campus characteristics in the design process.

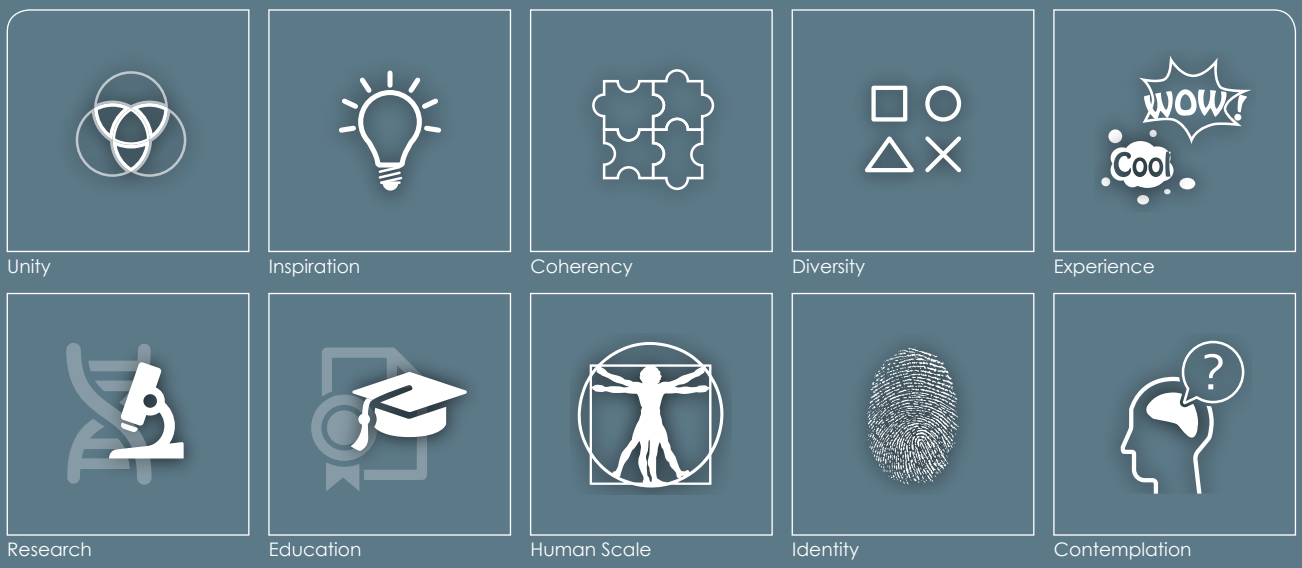


Fig. 3.25| Impression of the main campus characteristics.

3.6 | CAMPUS SIGNIFICANCE

Significance of a campus as a comprehensible concept
The campus phenomenon is massively expanding worldwide and is considered an increasingly significant typology in landscape architecture (den Heijer 2011). However, the use of this phenomenon is not limited to a single concept and is becoming increasingly ambiguous. This results in a wide variety of appearances, which subsequently causes misinterpretations and a loss of the original concept. It not only makes us unable to understand and design a campus, but it also leads to a lack of quality, since people start to distort the concept to suit their own interests.

As a result this leads to a loss of quality in the minds of the public, due to the association with a wide variety of environments that are in conflict with the qualities of the original concept. The problem is therefore based on the campus as a social construct (Creswell 2009). The image of a campus as a high quality green environment can for example become distorted when it is continuously associated with sewage treatment facilities. This is not desirable since the campus is initially used as a concept to provide a clear aim for a certain quality. Moreover, it contributes to provide guidance and it acts as an understandable reference. When the concept becomes incomprehensible, it simultaneously loses its initial application and therefore becomes obsolete. This illustrates the significance of a campus as a uniform and comprehensible concept to ensure the qualities which a concept should encompass in the first place.

Significance of a campus for landscape architects
This research responds to the conceptual crisis by providing a comprehensible description of the campus phenomenon from an overarching and integral perspective. It projects its main characteristics and abstract typologies to utilise the full potential of a campus as a concept which is in line with its initial qualities. This contributes for landscape architects and spatial planners to translate a complex spatial entity into susceptible notions that safeguard the essence of the campus phenomenon, while including its beneficial effects on its context and users. In addition, the campus characteristics can be used for guidance, as anchor points during a cyclic iterative design process and they pose valuable references for landscape architects and spatial planners. Moreover, the abstract typologies can be used to initiate a campus design from multiple perspectives to quickly consider the most likely options, to enhance decision-making and the use as a reference to existing examples. This illustrates the added value of a campus as a concept for landscape architects and spatial planners.

Significance of a campus relative to other spatial concepts
The campus is considered a concept among others, but what is the advantage of a campus in relation to other spatial typologies such as business parks? There is no straightforward answer to this question, since the applicability of a certain concept is dependent on a specific context and with a certain aim. However, the campus concept distinguishes itself from other spatial typologies such as business parks by a specific focus on the comfortability of people. A campus creates a pedestrian space which is based on the principles of the human scale. It aims to inspire and to promote knowledge exchange. Whereas a business park often emphasises the economic appeal of buildings or the functionality of infrastructure and thereby centralises the car instead of the people.

A university can for example be designed as an urban university, a megastructure or a campus (fig. 3.13-3.16). The specific context and goals determine the most suitable option, but the campus is often the preferred solution. This is mainly the case, because a university is characterised by education, innovation, knowledge exchange, meeting and a diversity of people. The campus, unlike the urban university or megastructure, for example utilises the benefits of a green environment to stimulate peoples imagination and to enhance work productivity (Zandvliet 2013). It also has the ability to create a coherent community with a strong identity on a central location, which enhances the likeliness of meetings and interaction (Chapman 2006). This illustrates some of the advantages of a campus over other spatial entities, which emphasises its significance as a concept.

Campus

Fig. 3.26 | Informal and multifunctional spaces represent freedom (Qunu 2013).

Fig. 3.28 | Comfortability, beauty and a lack of barriers (Laframboise 2015).

Fig. 3.30 | Inspiring and a strong indoor- outdoor relation (Houston University 2014).

Business park

Fig. 3.27 | Functionality by very specific spaces and uses (Mount Dennis 2012).

Fig. 3.29 | Functionality by centralising parking facilities and roads (Zing 2015).

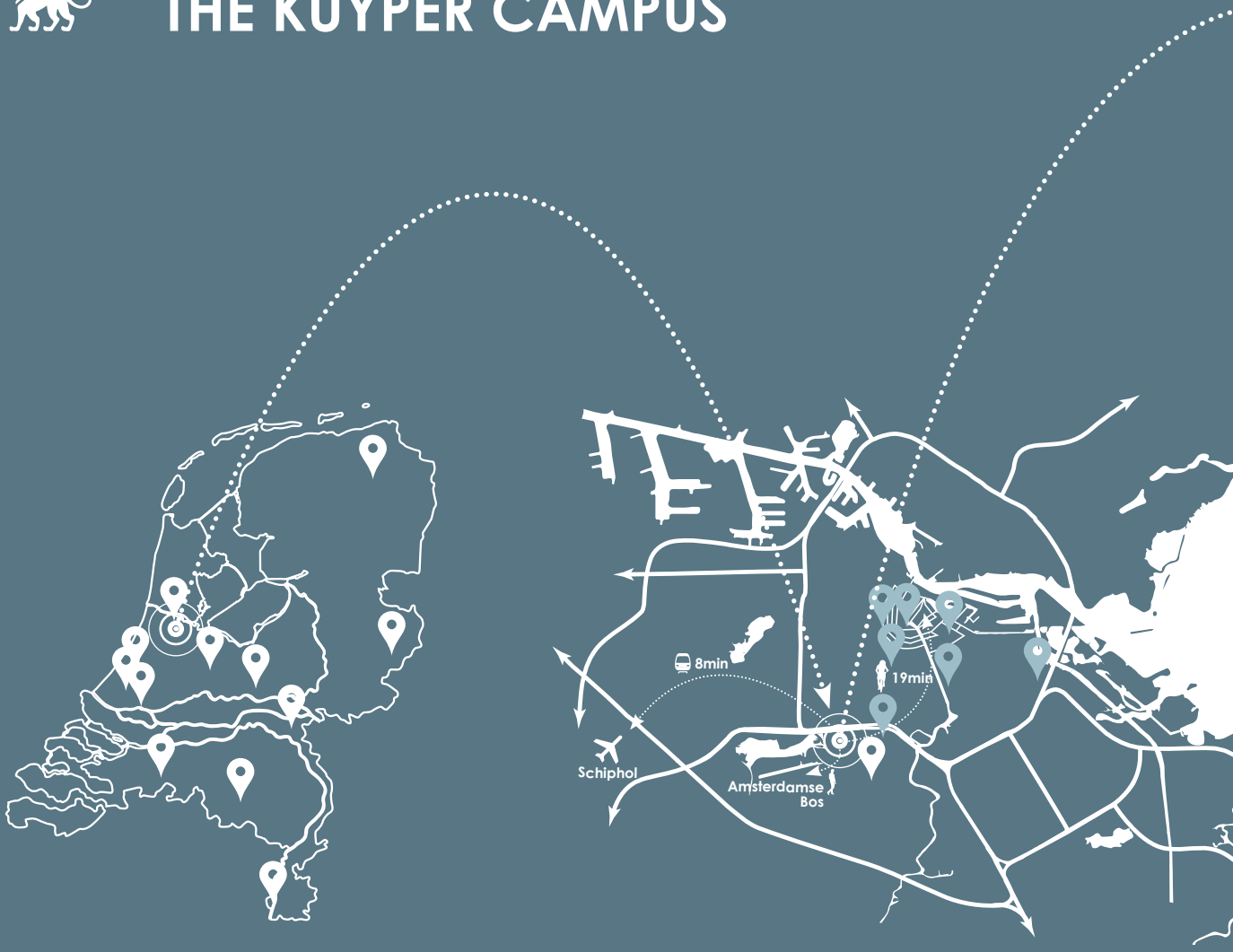
Fig. 3.31 | Focus on the functionality and economics of buildings (ABT 2010).

4.0

THE KUYPER CAMPUS

This chapter aims to provide an elaborate understanding of, and integral campus design for, VU Amsterdam, while answering the following research question: 'how can VU Amsterdam become a high quality campus which is in line with the characteristics that define the campus phenomenon?' In addition, this chapter tests the research findings from the previous chapter by integrating the campus phenomenon as a design concept into an elaborate design for VU Amsterdam.

DESIGNING
THE KUYPER CAMPUS



1 of 13 Dutch universities

VU UvA

Fig. 4.1 | Introduction and location VU Amsterdam.

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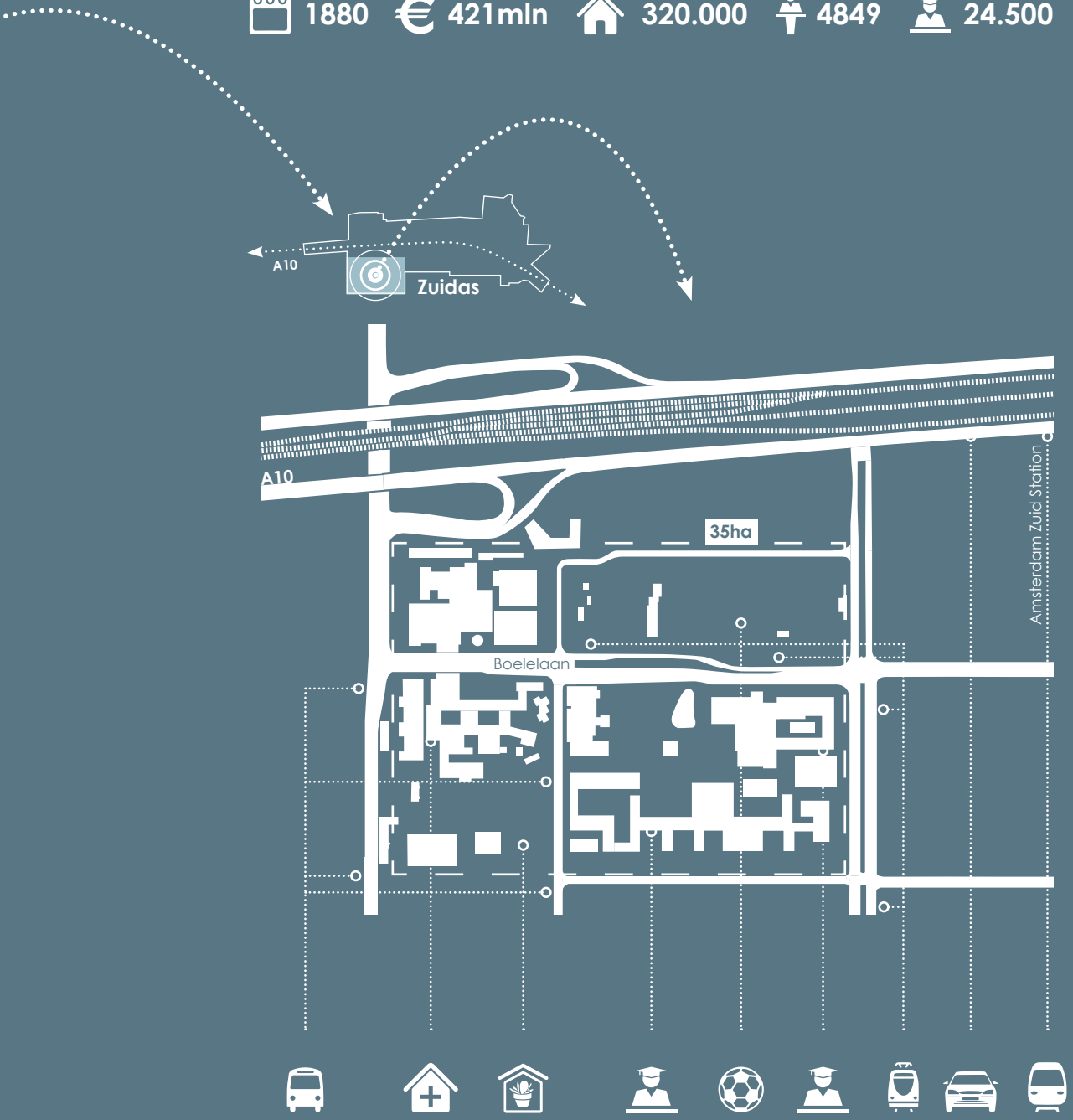


4.1 | INTRODUCING VU AMSTERDAM

VU (Vrije Universiteit) is one of the two universities in Amsterdam and is concentrated on one main campus in the Zuidas district and on satellite campus Uilenstede, which is used for student housing and sporting facilities (fig. 4.1). The campus is characterised by an excellent accessibility and forms an integral part of the vibrant Zuidas district, which is rapidly expanding as an important international asset (fig. 4.1). The position of the campus is unique, because it is the only Dutch university which forms an integral part of a leading (business) centre with a high quality research network and expertise in a dynamic urban environment.

The VU was founded on the 20th of October in 1880 by Abraham Kuyper as the only Dutch private university. That is, the VU was the only Dutch university that was not controlled by church or state. This created a very coherent community, which collected funds by the typical 'VU cans' in each living room (fig. 4.2). Abraham Kuyper, a prominent minister, journalist and politician, thought that the Christian religion should embrace all forms of life, and therefore also science. The university was initially only open to Reformed Christians, but difficulties in financing around the 1960's caused the VU to become open for everyone, while being financed by the government. This indicates the character of the VU as being different from other universities and free from the outside world (Werkman 1973; Wieringa 1980; van Deursen 2005; Tervoort 2005; den Heijer 2011). This is also indicated by its name, meaning 'free university'.

The VU initiated in 1880 from a single rented building along the Amstel with only five students and five professors. Shortly after, in 1884, VU obtained its first building along the Keizersgracht, which was supplemented by more than twenty buildings scattered throughout the city centre around 1960, while encompassing over 2000 students. This created a very typical atmosphere (fig. 4.4). The massive growth was facilitated by concentrating the university on a campus at the city's edge in Buitenveldert, while all buildings in the city centre were sold (Tervoort 2005; van Deursen 2005). This plot of land was originally meant for residential buildings to facilitate the city's expansion through the AUP (Algemeen Uitbreidingsplan). This was designed by Cornelis van Eesteren with the characteristics of the garden city movement by Ebenezer Howard. The AUP was based on the principles of functionality, light, air and space. According to van Eesteren himself, it was the best example of how he intended the design of the AUP (Milanovic et al. 2011; Van Onna and van der Werf 2012; Lucas 2014).

The VU was the first Dutch university to undergo such massive change and to concentrate its buildings as an enclave outside the city. The main university building became the largest building in Amsterdam and separated the university from its context (Uitermark 1980). Constructing a completely new campus on an empty and desolate landscape required the university to establish a brand new identity on an empty canvas (Werkman 1973). This resulted in a loss of the typical Amsterdam atmosphere along the canals in the city centre. The VU has always been an enclave in an alien environment, since it was never strongly connected to its location, which can be illustrated by their contact information which worded: 'provisionally located in Amsterdam' (Uitermark 1980). The campus underwent only minor adjustments between 1970 and 2010, but the outdated buildings and growth of students, partnerships and the academic hospital, require the university to expand (Lucas 2014).

Currently, the VU campus is characterised by its introverted character, which forms an enclave in the busy Zuidas district. The core of the area is very busy and bursts with activity in the form of shops, pubs, espresso bars, temporary events and food trucks (fig. 4.3). This variety of use is in line with a high diversity of different users from the (applied) universities, businesses, medical centres, the botanical garden and immediate surroundings. Yet the area is not very inviting, because the entrances are very modest and are difficult to find. Mainly because they are not in line with the surrounding infrastructure. The campus is generally considered as chaotic and diverse in terms of users, materials, architecture and functions. This diversity causes the campus to become unrecognisable as an identity and it gives the outdoor spaces a sense of cheapness (fig. 4.6). Most of the outdoor spaces are not very attractive, because they are dominated by infrastructure and pavements, which creates a rather grey impression (fig. 4.5). The VU describes the university as 'small-scale' and cosy, whereas the campus does the opposite by large scaled buildings and the openness of the outdoor spaces. Some small-scale implementations, such as the small planted radius around the trunk of the trees, try to implicate this cosy character, but they are in conflict with the massive spaces. The campus and Amsterdam in general are characterised by a bicycle and walking culture, but the area is crossed by several major infrastructural connections, which divide the area into multiple islands. The VU campus seems to act as an enclave in an alien environment, which does not engage with its roots or with the typical character of Amsterdam. It lacks a clear identity.

Fig. 4.2 | Typical 'VU cans' in every livingroom (Petersen 2014).

Fig. 4.3 | A vibrant and interesting core area.

Fig. 4.4 | Former VU atmosphere along the canals (Flipse 2015).

Fig. 4.5 | Pavements and buildings create a rather grey experience.

Fig. 4.6 | The diversity and chaos of materials feels rather cheap.

4.2 | PROBLEM STATEMENT AND DESIGN ASSIGNMENT

The VU requires change, because:

- The buildings have become outdated
- The current campus is unable to facilitate the required growth of students, research and business relations
- Changing needs and preferences of users require adaptations, such as the campus as a multifunctional place to meet, work, study and live (Vrije Universiteit 2010; Lucas 2014)

The VU aims to cope with this required change by expanding and developing a new campus. Their main goals are to create a multifunctional and efficient campus environment with an emphasis on meeting and knowledge exchange. They aim to improve the connection between indoor- and outdoor spaces, while creating a vibrant campus which is used around the clock. In addition, there is increased pressure to develop residential areas, offices and facilities on campus and in the immediate surroundings (Milanovic et al. 2011; Lucas 2014). However, the existing plans depart from the current situation and work towards a plan, which in both cases is not in line with the campus concept as established in chapter 3, because they are (appendix E.1) (fig. 4.7):

- Lacking unity and coherency due to major internal barriers and a large variety of materials
- Missing a clear identity by merging into the commercial Zuidas district in terms of structure, scale and character
- Lacking a green, park-like atmosphere
- Lacking a clear, timeless and recognisable structure
- Annihilating any semblance of human scale

The main design challenge is therefore to design a suitable campus for VU Amsterdam which is in line with the campus concept as established by research and meets the goals of the VU.

- A strong sense of unity, coherency and identity
- An inspirational, green and park-like environment
- A multifunctional place to meet, live, study and work
- A connection with Amsterdam and the Zuidas
- Connecting indoor- and outdoor spaces
- Create spaces that are in line with the human scale

4.3 | CAMPUS SCENARIOS

The four campus typologies as derived from the research described in chapter 3.3 and 3.4 are utilised and tested through design scenarios, to establish the most suitable scenario for the VU campus design and to determine the applicability of the campus typologies. These scenarios are elaborated and visualised on the following pages.

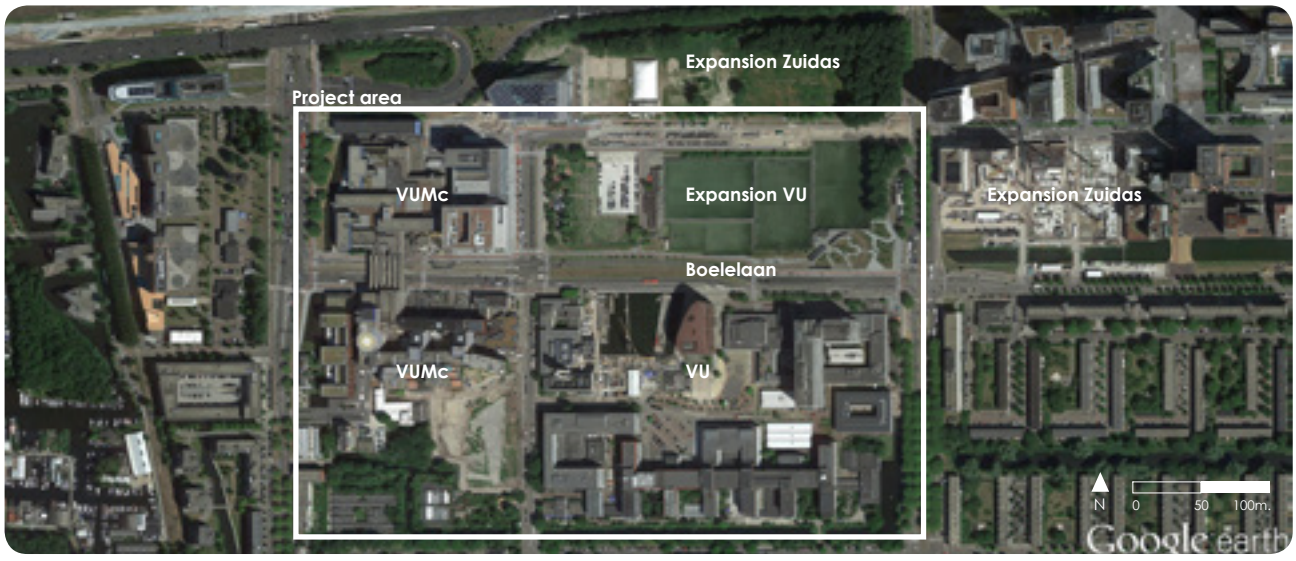


Fig. 4.7 | Existing situation (Google 2015).

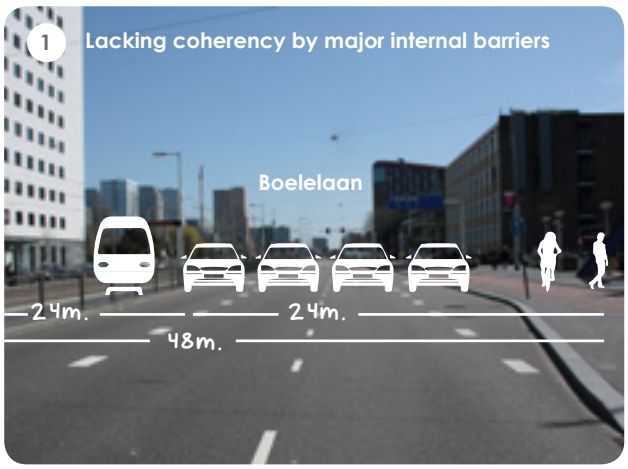


Fig. 4.8 | Analysis of the existing situation.

Fig. 4.9 | The Enclaved Campus scenario illustrated.

N 0 50 100m.

1 | The Enclaved Campus scenario

The Enclaved Campus scenario forms a green enclave in the busy and highly urban Zuidas. Two rings of buildings enclose a central green space, which resembles the effect of Central Park, New York. The outer edge is closed off from its surroundings, which resembles the distinctive character of the VU, while the scale of these buildings integrates the campus into the Zuidas. The core of the area functions as a central meeting place, while the space between the inner- and outer layer of buildings resembles the atmosphere of a busy street. This creates several interconnected atmospheres that characterise a campus. In order to create this, the Boelelaan is removed and the roads on the northern- and southern borders are upgraded to suit the extra traffic from the Boelelaan. This creates a strong identity, unity and coherency, because there are no internal boundaries and the campus is self-centred. The building density is relatively high while the atmosphere is very green. That is, it utilises the full potential of this high end location. The edges of the area are in line with its context, while the area itself is very different on the inside. This scenario can easily grow through densification and expansion is possible to the south due to the aging residential buildings and the local infrastructure.

Fig. 4.10| The Urban Campus Scenario illustrated.

2 |The Urban Campus scenario

The Urban Campus scenario can be regarded as a 'streets' campus, where buildings are dispersed over several small islands in a sea of infrastructure and pavements. This infrastructure forms major internal barriers, which decreases a sense of unity, coherency and identity. A central boulevard with a major crossing is used to connect both sides of the Boelelaan, which still remains a visual and physical barrier. This requires the materialisation to represent unity and coherency on a smaller scale. In addition, the main infrastructure remains the same and requires only minor adaptations. The main structure is in line with the scale and orientation of the Zuidas, which causes the campus to become integrated into its context. This is in line with overarching plans, but it diminishes the distinctive character of the VU as a separated and individual entity. The same applies for the large scale of the buildings in relation to the high amount of pavements, which creates a rather 'grey' appearance similar to the Zuidas. Growth is not possible on campus due to the high amount of buildings, but it is rather straightforward to expand into the surrounding urban areas, because the building structure is similar to the context.

Fig. 4.11 | The Parkland Campus scenario illustrated.

3 | The Parkland Campus scenario

The Parkland Campus scenario consists of an ongoing green base layer with individual buildings that form a composition with the surrounding scenery. The greenness, the small scale and the dispersed character of the buildings stands in contrast to the surrounding urban tissue, which is in line with the distinctive character of the VU. Unity, coherency and identity can only be created by closing the Boelelaan for cars and by creating access roads on the northern- and southern border of the area. The small scale of buildings allows only a rather minimal floor surface of buildings, but the absence of major roads efficiently utilises the green character of the setting and the small scale of the buildings allows them to be positioned at a small distance. This also creates a pedestrian-oriented domain, which can be accessed by a major bicycle highway that crosses the area to connect the city centre and Zuidas with 'Het Amsterdamse Bos'. It is difficult to expand into the surrounding urban tissue due to the small scale of the buildings and the infrastructure along the borders. Densification is only possible to a certain extent because the narrow space will destroy its green identity.

Fig. 4.12| The Multi-cluster Campus Scenario illustrated.

N 0 50 100m.

4 |The Multi-cluster Campus scenario

The Multi-cluster Campus scenario consists of a landscape structure which connects the 'Amsterdamse Bos' with a green structure along the Boelelaan, which reaches all the way up to the Amstel Park. The clusters are equally dispersed to maximise the width of the landscape structure between the clusters and the edges. Each cluster is characterised by a main function, while the cultural cores represent a contrast to the natural landscape structure. The large amount of vegetation forms a contrast to the surrounding urban areas, especially the Zuidas. However, there is insufficient space for this scenario to bloom, because the landscape structure requires a large amount of space. Such a natural structure this close to the Amsterdamse Bos and the Amstel valley seems rather superfluous. Especially when considering that this scenario requires expansion into the neighbourhoods in the south, an improved connection to the Amsterdamse Bos and one can only build a relatively low amount of buildings on a very expensive location. It is very difficult to grow on location, because this will affect the landscape setting. Expanding to the surrounding urban areas will require a large amount of space and a reconfiguration of the existing infrastructure.

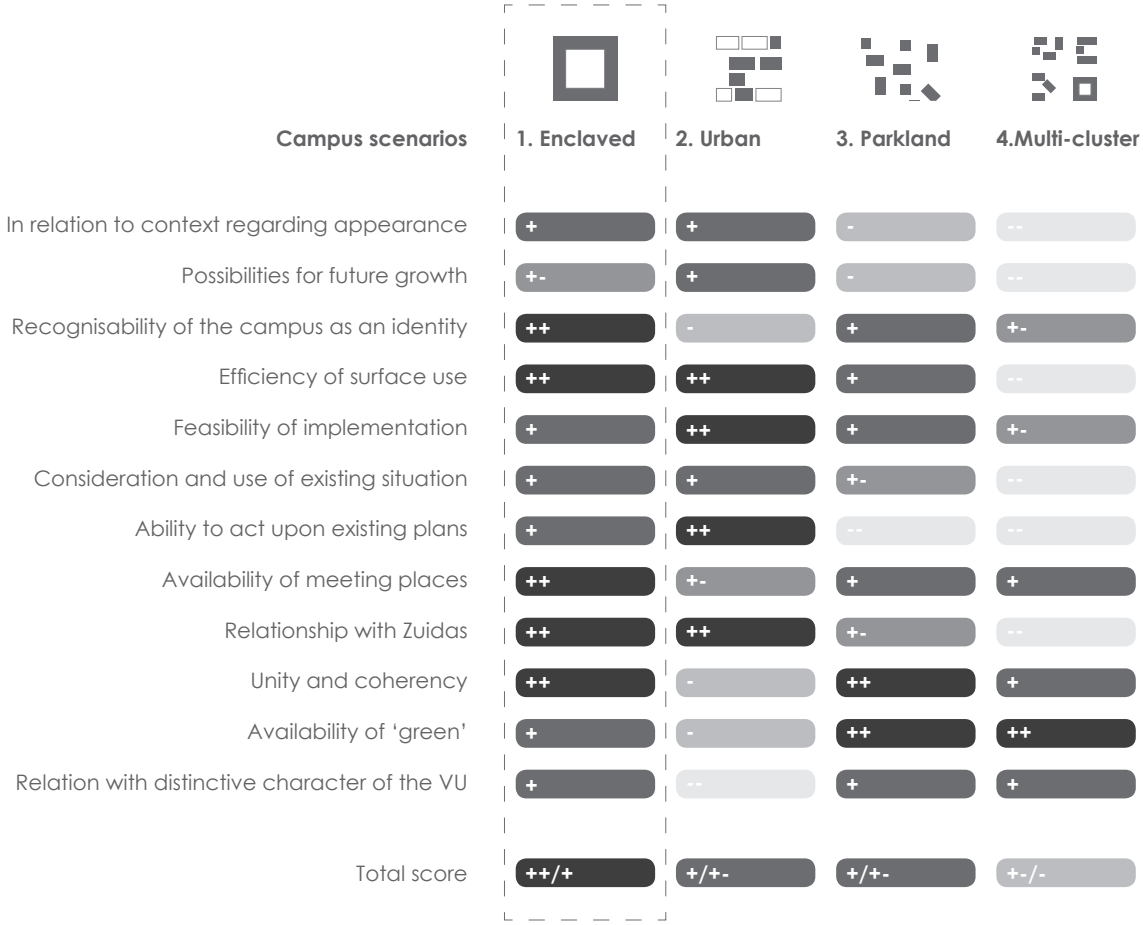


Fig. 4.13| Evaluation design scenarios as based on rubric (appendix E.2).

Evaluation

The scenarios as described above are evaluated through a quantitative and a qualitative evaluation, because it is impossible to fully quantify a campus scenario due to an infinite number of criteria and their relative weight. The scenarios are therefore quantified according to the main criteria which have come forth from the data on the research regarding the characteristics of the campus phenomenon. These results are subsequently assessed through a qualitative evaluation to deal with the complexity of the campus phenomenon and to consider the scenarios in a wider perspective. The rubric for the quantitative analysis can be found in appendix E.2. The quantitative analysis (fig. 4.13) points out that the Enclaved Campus is the preferred scenario, because it:

- Is best in line with Zuidas in terms of scale and appearance
- Is best in line with the distinctive character of the VU
- Shows much potential through a high building density and a large green area
- A multitude of different atmospheres supports a vibrant and diverse community
- Incorporates a very clear identity with strong coherency

The Multi-cluster Campus is no realistic scenario, because the area is too small, is not in relation to its context, requires major adjustments and growth is nearly impossible. The Parkland Campus and the Urban Campus have a similar score and are both valued scenarios. The Urban Campus is able to blend into its surroundings and can easily expand. However, it does not differentiate from its surroundings, which is not in line with the distinctive character of the VU and it is therefore difficult to recognise the campus as a coherent identity in the Zuidas. The Parkland Campus does have the ability to differentiate from its surroundings due to the smaller scale and the massive green environment, but it does not relate to the Zuidas and current plans. We can therefore conclude that the Parkland Campus and the Urban Campus scenario are both viable options, but the Enclaved Campus scenario is the most suitable option for the design of VU Amsterdam.

The design scenarios have indicated that the campus typologies can be implemented into a real-life situation. They have contributed to the selection of a specific design direction by guiding the design process through the four most distinctive solutions rather than an innumerable variety. This did not only save time and effort, but it also helped to respect their individual advantages and disadvantages, which caused the selection of a different design direction than initially expected. This caused the approach of the case from several perspectives, which contributes to novel design solutions that could not have easily been acquired from a singular perspective. The campus typologies are therefore relevant options to consider when designing a campus. The Enclaved Campus scenario is tested in the following pages to study the possibilities of how VU Amsterdam can become a campus through designing.

MASTERPLAN

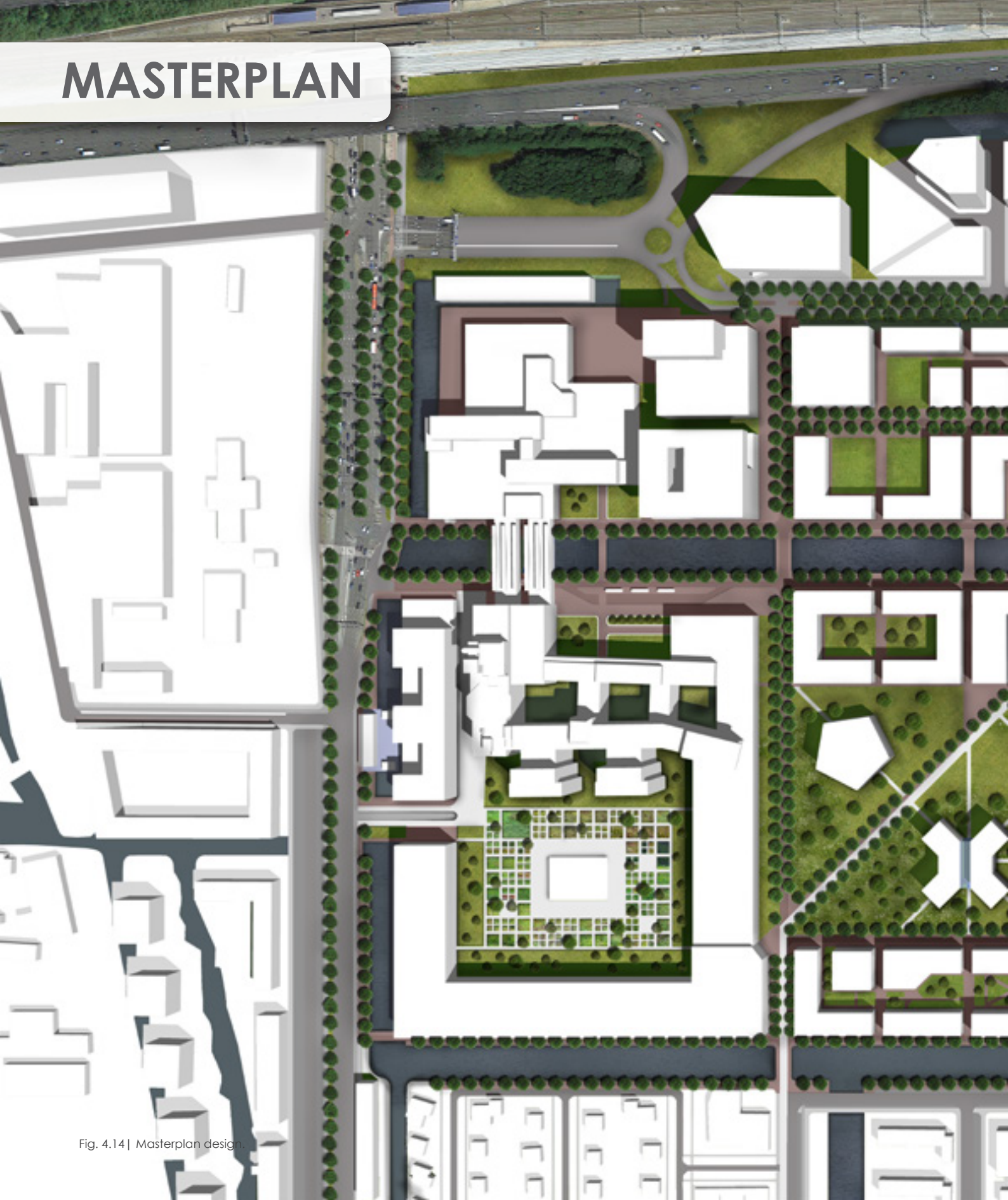
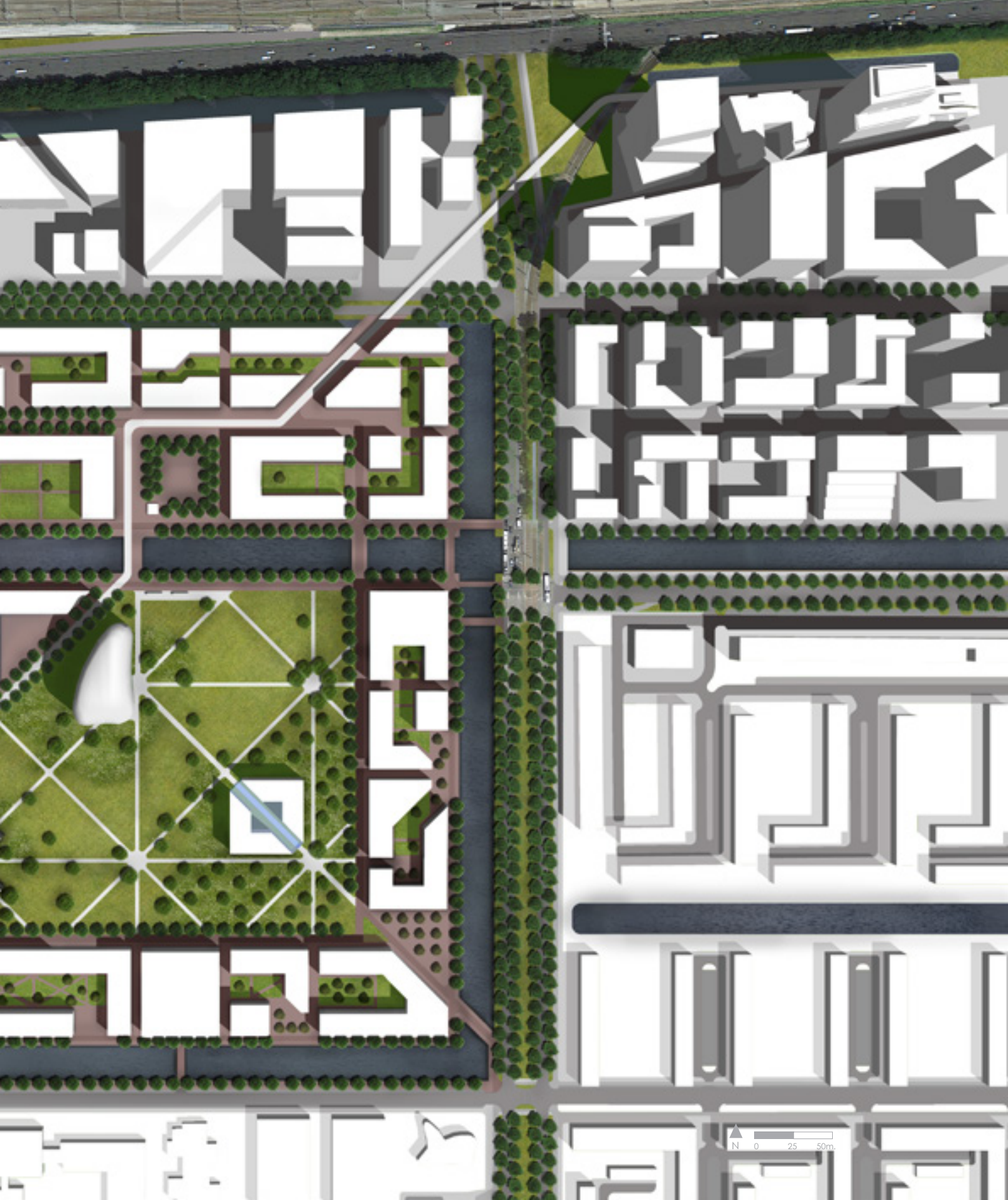


Fig. 4.14| Masterplan design.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4.4 | MASTERPLAN

This masterplan integrates and tests the campus phenomenon into the case of VU Amsterdam to facilitate its requirements for expansion and modernisation. The design reconnects the campus with its roots as an idyllic university along the intimate canals of Amsterdam. It utilises this identity to integrate a green and human-centred enclave into the dynamic Zuidas district, which is characterised by the smell of success and making profit. Moreover, the design respects the small-scale- and introverted character of the VU and creates a vibrant and coherent campus where one can meet, study, work or live in an interesting diversity of several interconnected atmospheres, which motivate the use of outdoor spaces. This masterplan acts as a study of how the conceptual masterplan can be developed (fig. 4.15).

The campus design is characterised by a recognisable, simplistic and timeless structure which reflects the identity of Amsterdam and the Zuidas. It consists of five different atmospheres (fig. 4.15): (1) the Amsterdam canals, (2) a robust urban edge with green courtyards, (3) the VU Square, (4) the Campus Park and (5) Hortus Botanicus VU. They show a strong coherency and identity individually, but they are also seamlessly integrated into the campus as a whole. Mainly by coherency in materials, architecture and a robust green-structure. This also enhances orientation and wayfinding (Lynch 1960; Darken and Peterson 2002). A grid structure embeds the campus into its context by connecting to existing landscape structures (appendix E.3). In addition, the design is integrated into its environment by adopting the design principles of the area from the AUP (Algemeen Uitbreidingsplan): functionality [grid-structure], light [human scale buildings], air [green atmosphere] and space [a spacious core area]. Moreover, the simplicity of this structure allows a flexible use which is able to cope with changes and spontaneity. This allows events, food trucks or parked bicycles to become assets instead of eyesores. They contribute to create a vibrant and versatile campus where people work, study, live and recreate with each other.

An ongoing water structure of canals forms the echo of Amsterdam. It creates unity with a clear identity which reflects the origin of the VU at the centre of Amsterdam. The Abraham Kuypergracht cuts straight through the area to make the typical Amsterdam identity visible at the heart of the campus. In addition, these canals emphasise the landscape structure, connect the campus to the city centre by navigable water and they act as a major water buffer. Moving the Boelelaan to the north of the campus creates an uninterrupted and coherent pedestrian space, while improving traffic access to the Zuidas. A bicycle highway diagonally cuts through the campus to create an improved connection with Amsterdam Zuid station, but it also creates a beneficial connection between the Amsterdamse Bos, Amsterdam Zuid station and the city centre. The VU Square acts as the meeting heart of the campus and is strategically positioned at a major intersection of the primary entrances, movement patterns and tram station. Moreover, it connects the diagonal bicycle highway to the intimacy of the courtyards, the Abraham Kuypergracht and the openness of the Campus Park. Its location symbolises the primary functions of this square: connecting and meeting. It forms a symbiosis of intellect and an entanglement of thoughts.

The campus is embraced by a robust edge, accompanied by canals, which creates coherency and recognisability. It thereby strengthens the identity of the campus as an introverted entity within the Zuidas district. This edge is formed by urban blocks which relate to the structure and size of the Zuidas. However, they are internally divided to form human scale buildings and a series of interconnected courtyards, while maintaining the illusion of larger blocks. These courtyards are characterised by a secluded world of intimacy, contemplation and academic reflection. Each courtyard is unique, but coherency and continuity are established by a uniform floor, similar architecture and materialisation. This edge interconnects the entire campus with an orientation to the green heart: the Campus Park. The orientation towards a green environment potentially enhances educational pedagogy and stimulates people's imagination (Perry and Wiewel 2005; Zandvliet 2013). It also possesses the ability to improve concentration and productivity, to reduce stress and to increase general wellbeing, which may lead towards higher quality education and research (Maas et al. 2006; Groenewegen et al. 2006). The park acts as a green oasis in a dynamic and urban environment. It contains a variety of educational and leisure facilities, such as innovation pods and a hammock meadow.

The hospital expands to the south by embracing and revitalising the Hortus Botanicus to maximise health benefits, since a view on a natural environment has the potential to decrease stress and to increase the recovery rate of patients (Kaplan and Kaplan 1989; Hartig 1993). The five atmospheres are further elaborated upon individually to emphasise their identities and integration into the campus as a whole. But first, the masterplan is further elaborated.

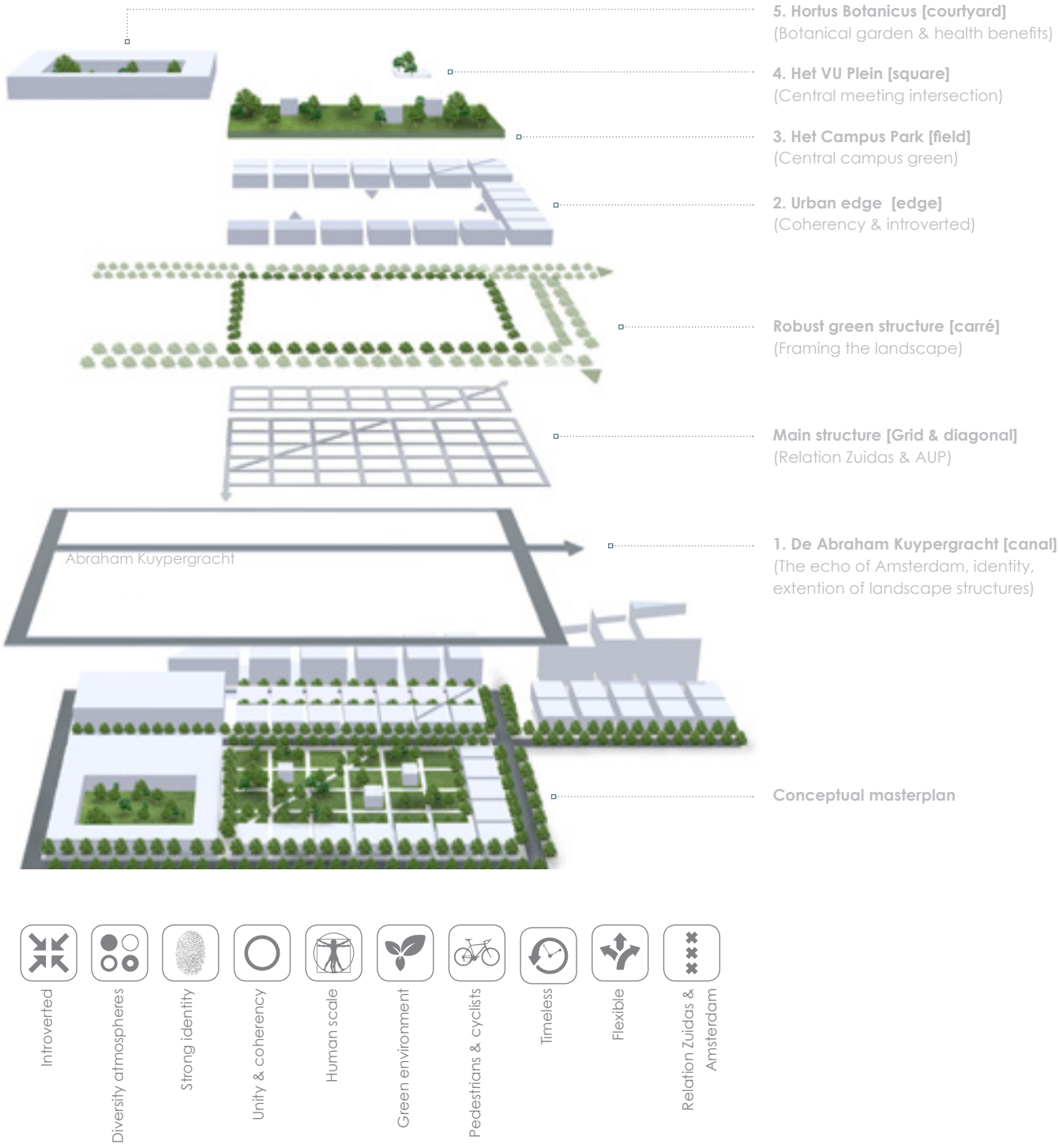
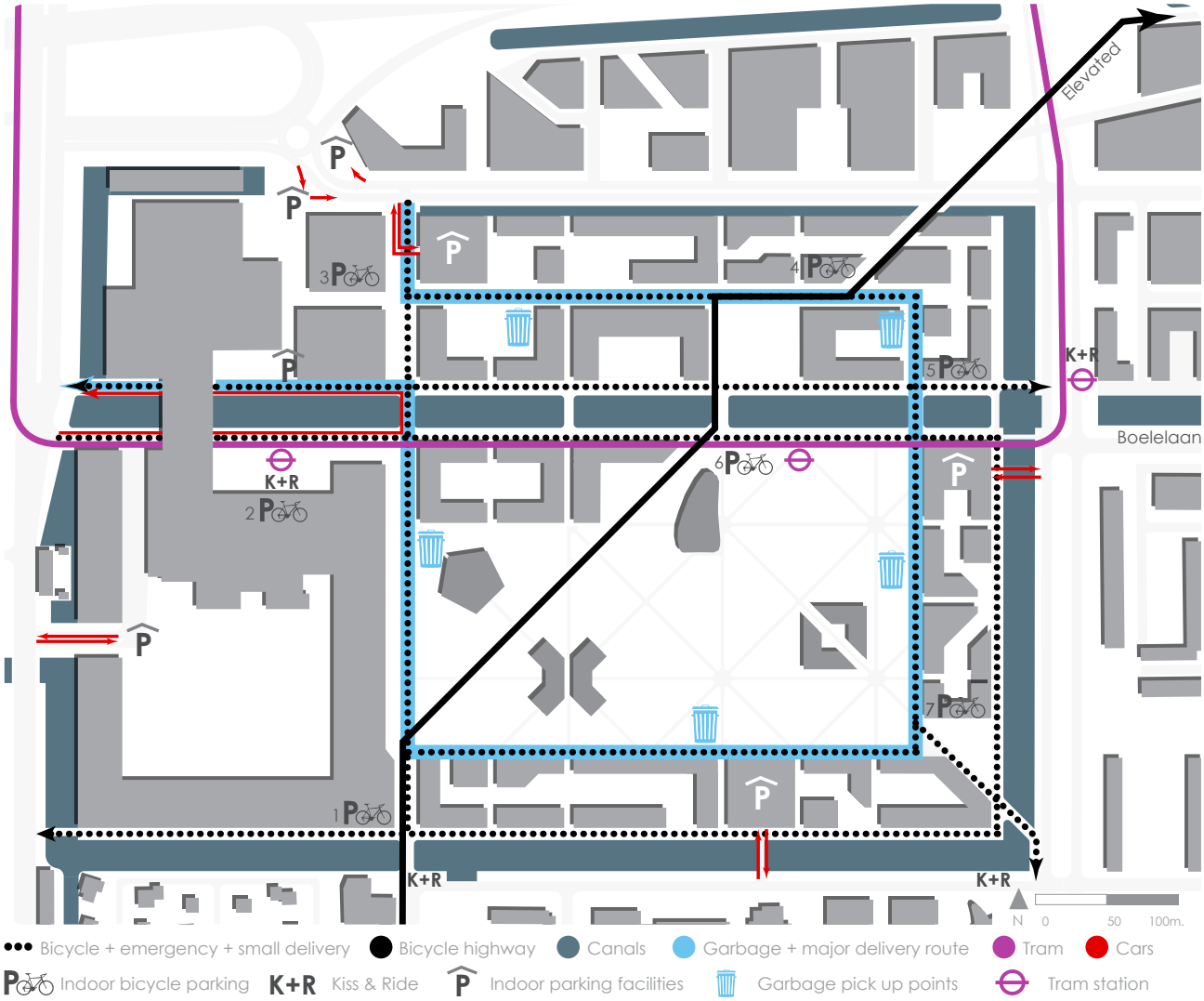


Fig. 4.15| Abstract representation of the conceptual masterplan.



Infrastructure

The Boelelaan is moved north of the campus, because it divided the area into multiple parts, it formed a major barrier and it created a car-dependent campus. The campus now represents unity and coherency by an uninterrupted pedestrian space on human scale. Moving this road is also beneficial to more quiet surroundings, improved traffic access to the Zuidas and it saves ongoing traffic two out of four traffic lights to gain access to the highway. The campus is pedestrian- and cyclist oriented and offers wide paths and a bicycle highway to connect the Amsterdamse Bos with Amsterdam Zuid station and the city centre. All bicycle routes are two directional and can also be used as a one directional delivery route for small trucks and for emergency access. A major delivery route runs along the inside of the robust edge and is also used for garbage collection. Delivery can only take place early in the morning and in the evening to minimise traffic on campus during peak usage. The tram is introduced in the streetscape and offers three stops on campus while providing a typical Amsterdam atmosphere. The car- and bicycle parking facilities are situated indoors with extra capacity relative to the campus goals. See appendix E.4 for more detailed information and calculations.

Fig. 4.16| Schematic representation of the infrastructure on campus scale.

Water structure

The canals extend the existing water structures and they connect the campus and Zuidas to the city centre by navigable water. This not only creates the ability to do interesting boat tours to inspire people with the Amsterdam culture, but it also acts as a major water buffer. This is particularly relevant since the expansions in the Zuidas require compensation in the form of water storage to deal with existing water problems (Milanovic et al. 2011).

Bicycle highway

Connects the city centre with Amsterdam Zuid (station) and Amsterdamse Bos by an attractive and fast route with minimal stops, a corner radius of at least ten meters, a smooth surface made out of concrete and a width of at least five meters. It is elevated with a gentle slope (1:25) from the inside of the robust edge on the north side of the campus to cross two major infrastructural connections without any stops and without influencing motorised traffic. The bicycle highway subsequently passes along the north side of the Zuidas, where it lowers to ground level to arrive at Amsterdam Zuid station.

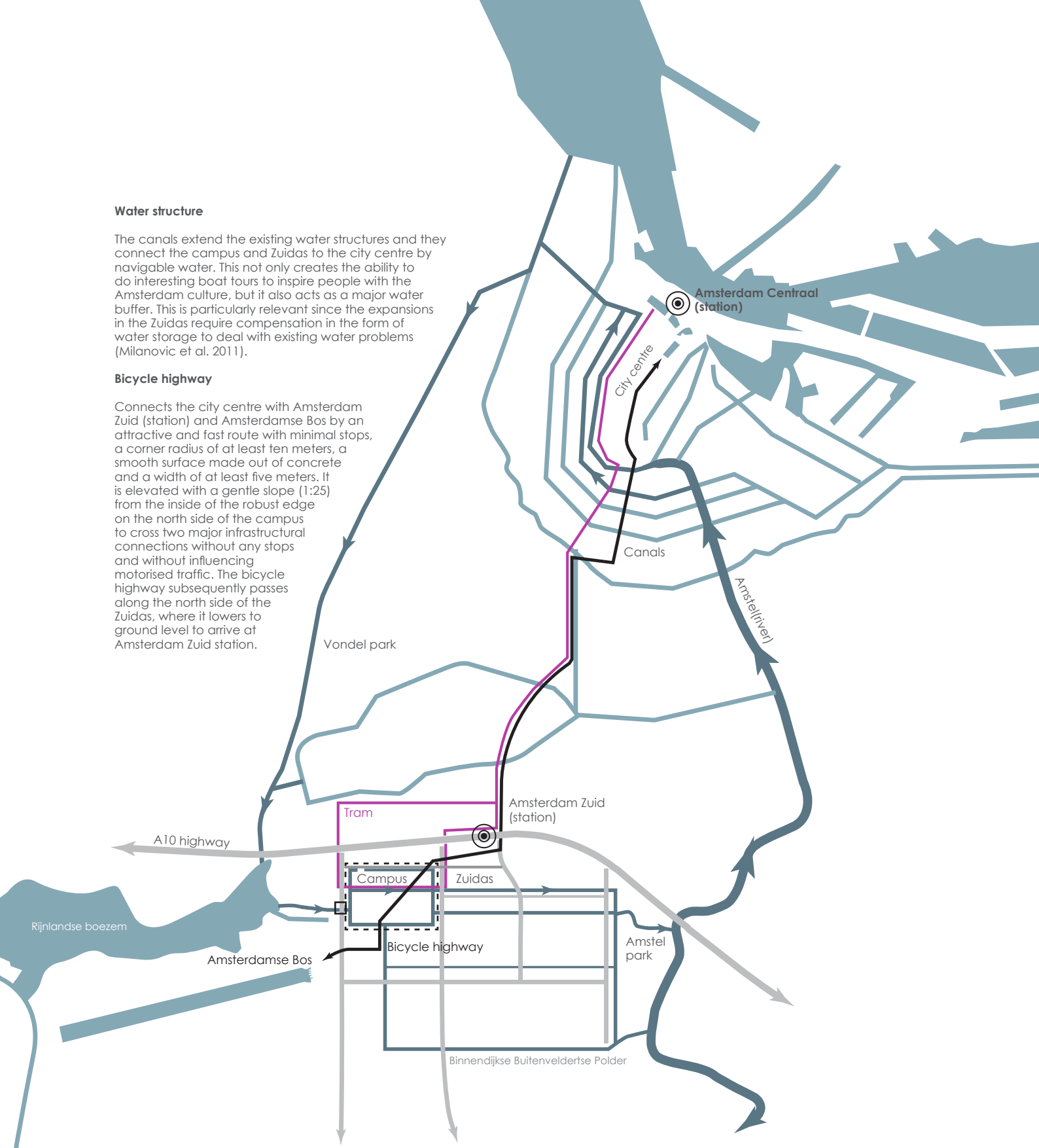


Fig. 4.17| Schematic representation of the infrastructure on city scale.

Programme

This masterplan has the ability to provide for the desired capacity, with a potential extra of 21.665 m² to cope with future growth (fig. 4.18 & 4.19)(appendix E.5). The programme has been mixed to create a diverse and vibrant campus around the clock. The commercial functions, such as shops and pubs, have mainly been situated on the ground floor along the central canal and around the campus square (fig. 4.18). Housing and commercial functions contribute to create a place to live rather than to visit. Education and research, such as labs, lecture halls and offices have been mixed with residential purposes, which are situated on the upper floors of the buildings. They are situated in- or next to the 'Campus Park', because a green and natural environment has the ability to enhance educational performance (Wiewel and Perry 2008; Zandvliet 2013). Health-care facilities have been situated around the botanical garden, which provides space for relaxation, study and contemplation. Hospital beds, the Ronald McDonald house and waiting rooms are situated towards the inside to offer a nice view on a comforting and green environment, which has the potential to decrease stress and to increase the recovery rate of the patients (Kaplan and Kaplan 1989; Hartig 1993).

Fig. 4.18| Programme for the design of the Kuyper Campus.

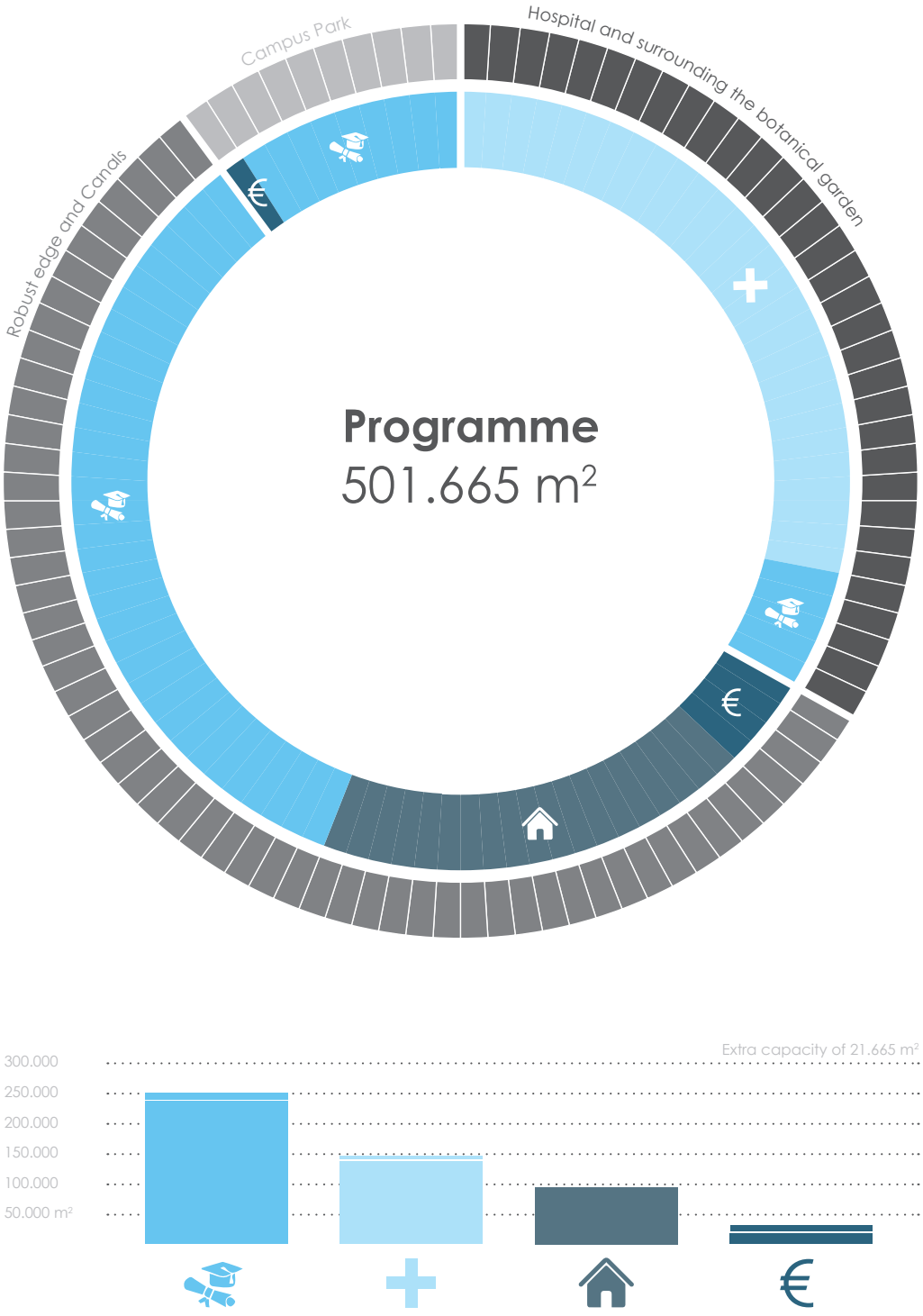


Fig. 4.19| Schematic representation of the programme for the Kuyper Campus (appendix E.5).

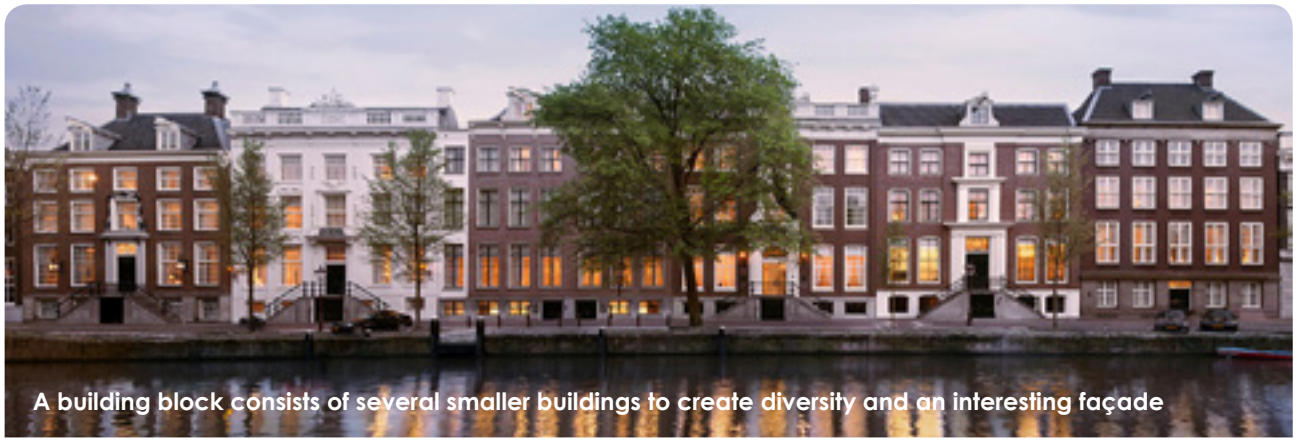
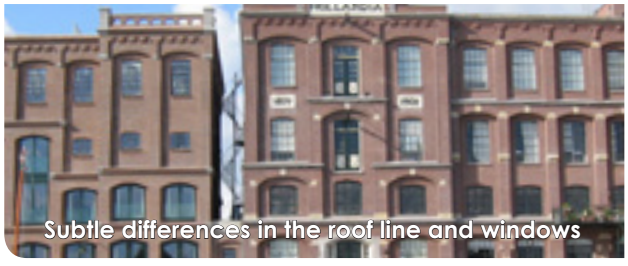


Fig. 4.20| Representation of the architecture on site to create the desired atmosphere.

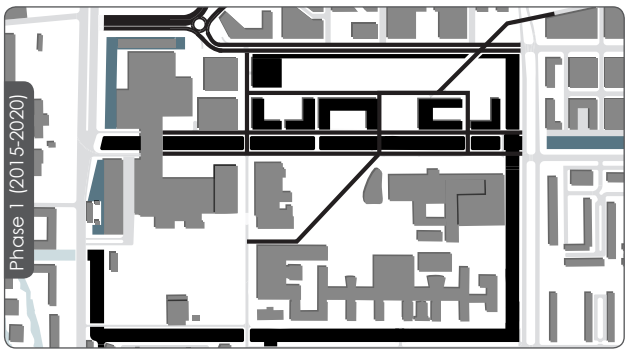
Facilities on the first floor create a relation with the streetscape and terraces create a subtle transition


Façades are partly covered by vegetation to create a green and diverse appearance


Large windows and lots of light improve the connection between indoors- and outdoors. Spaced windows imply a sense of human scale


Subtle differences in the roof line and windows

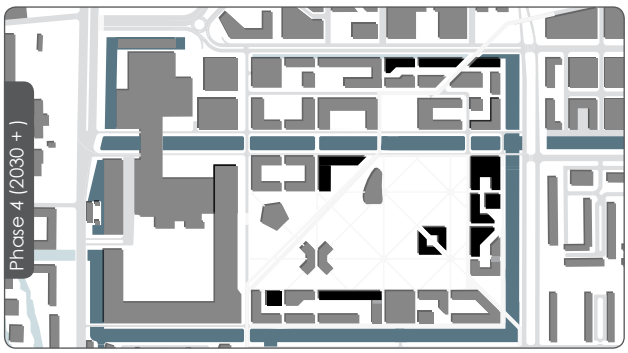

Buildings in the Campus Park are oriented to all sides with a strong connection to the park landscape through glass and orientation (Kamsma 2015)



- The Boelelaan is moved to the north to create unity and an uninterrupted pedestrian zone
- The canals are constructed to create a strong and unique identity with a relation to Amsterdam, which also creates unity and coherency by framing the area
- The outer edges in the northern area are constructed to create unity and an enclaved central atmosphere
- The main green structure is planted so they can start growing. The priority of greening the campus from the start is typical for a campus (Gumprecht 2007).
- The main infrastructure and the bicycle highway are constructed to increase functionality

- The northern edge is completed to frame the inside world and to create a multitude of different and interconnected green spaces (semi-private) which creates a unique atmosphere on campus
- An outdated building on the south side of the Abraham Kuypergracht is demolished to make room for new buildings which enclose the central canal to create a human scale atmosphere
- The hospital is expanded by enclosing the botanical garden, which is also revitalised. This creates a unique atmosphere for relaxation, study and contemplation
- The Campus Square creates a unique meeting place

- The southern buildings are gradually demolished and replaced by new buildings to form a robust edge on the southern side, which frames the area, creates coherency and strengthens the identity
- A central park zone is further developed to create another unique atmosphere and a green central core
- The bicycle highway is extended into its final alignment
- Residential features and leisure functions are added throughout the area to cope with the growing number of users



- The main building is demolished and is being replaced by new buildings to finalise the coherent and robust edge
- The University Park is being finalised and is extended to the canal
- All interstitial spaces are filled within the robust framework to maximise the built-up surface
- Quality is increased by motivating outdoor use, strengthening green spaces and organising events
- **Time planning and programme are in tune with planning documents and this illustrates an example of the flexible structure (Milanovic et al. 2011; Lucas 2014)**

Fig. 4.21 | Schematic representation of the phasing process.

Five different atmospheres / one coherent campus

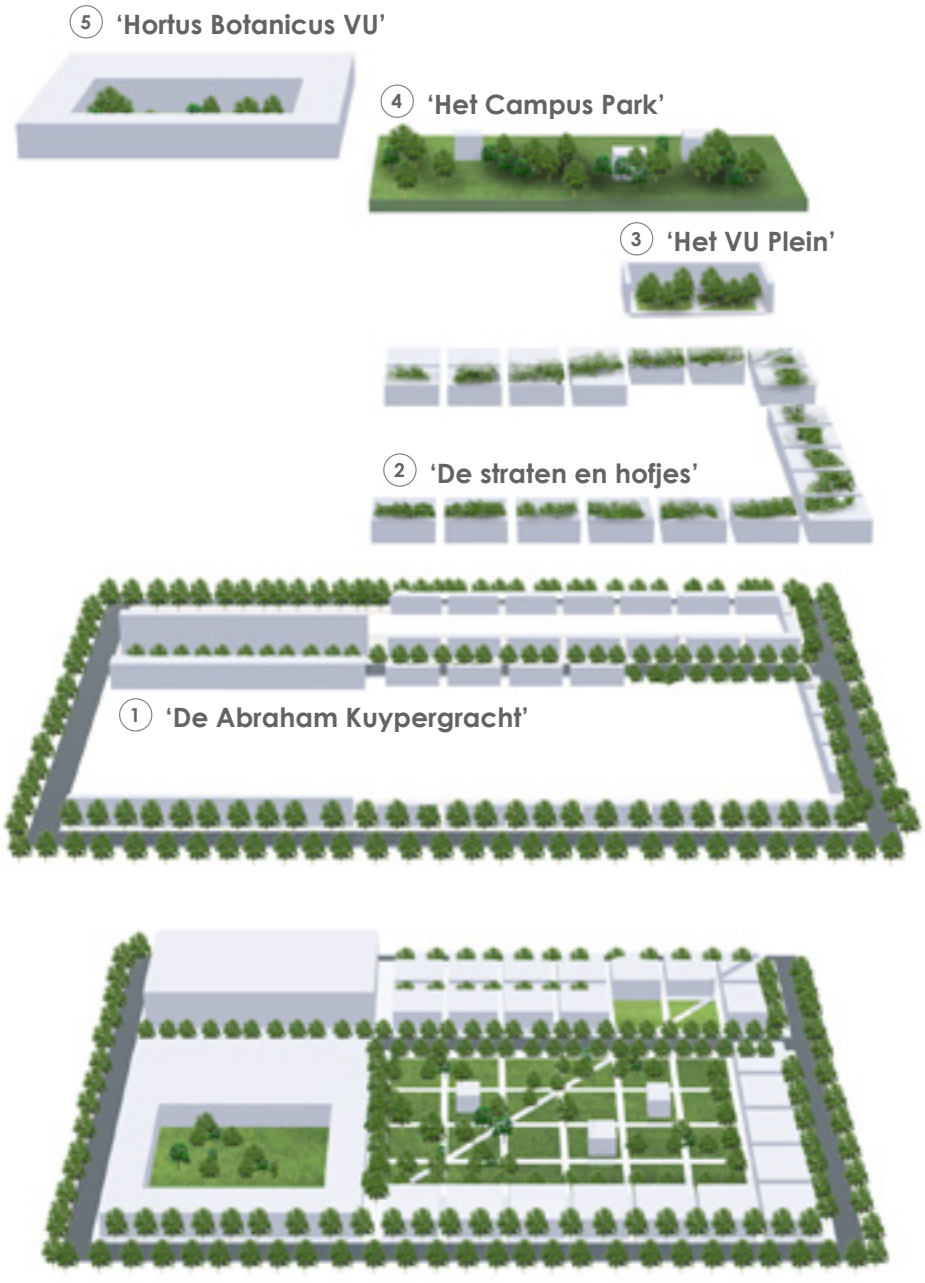
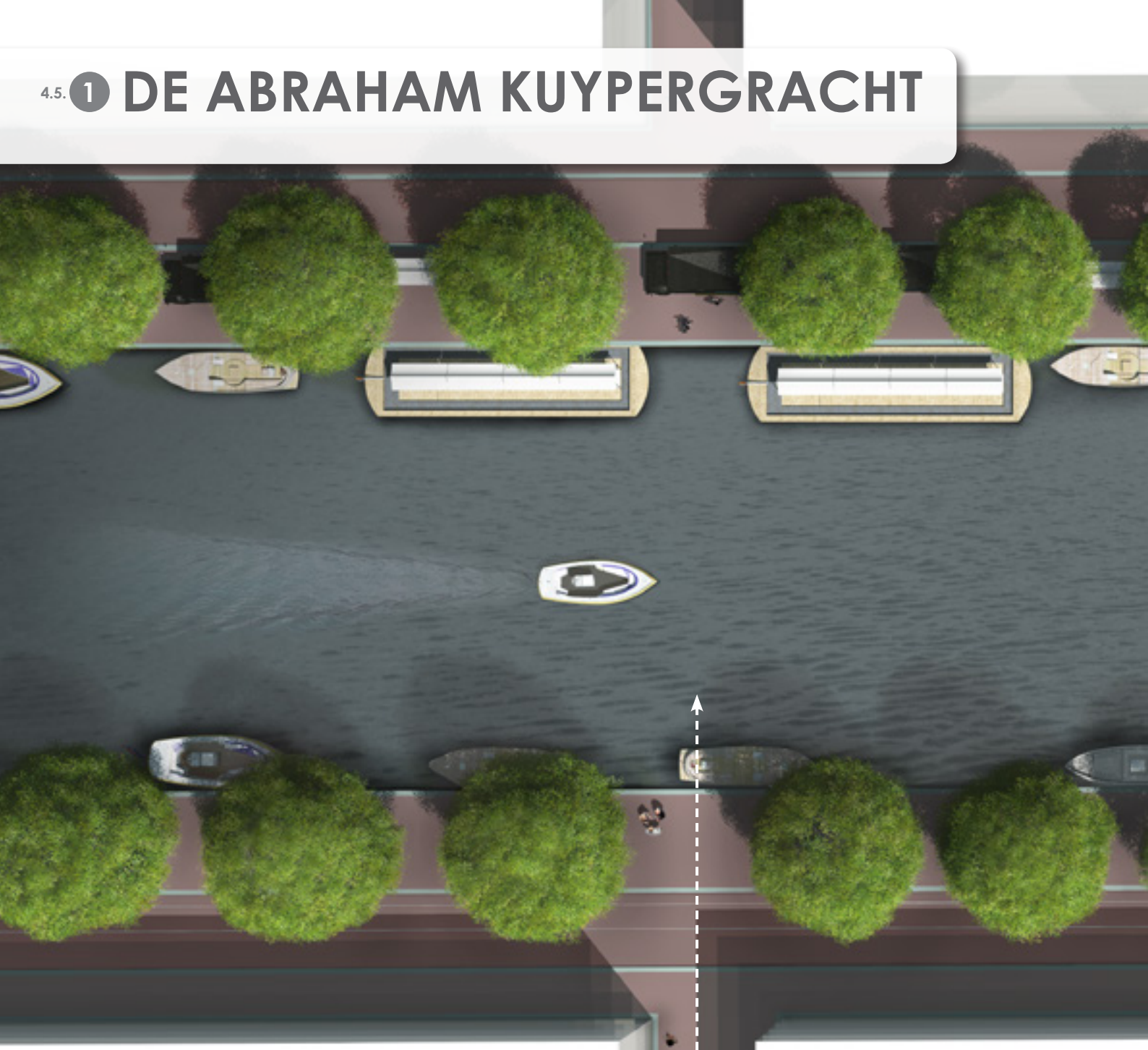


Fig. 4.22| Schematic representation of the five different atmospheres in the design.

4.5. 1 DE ABRAHAM KUYPERGRACHT

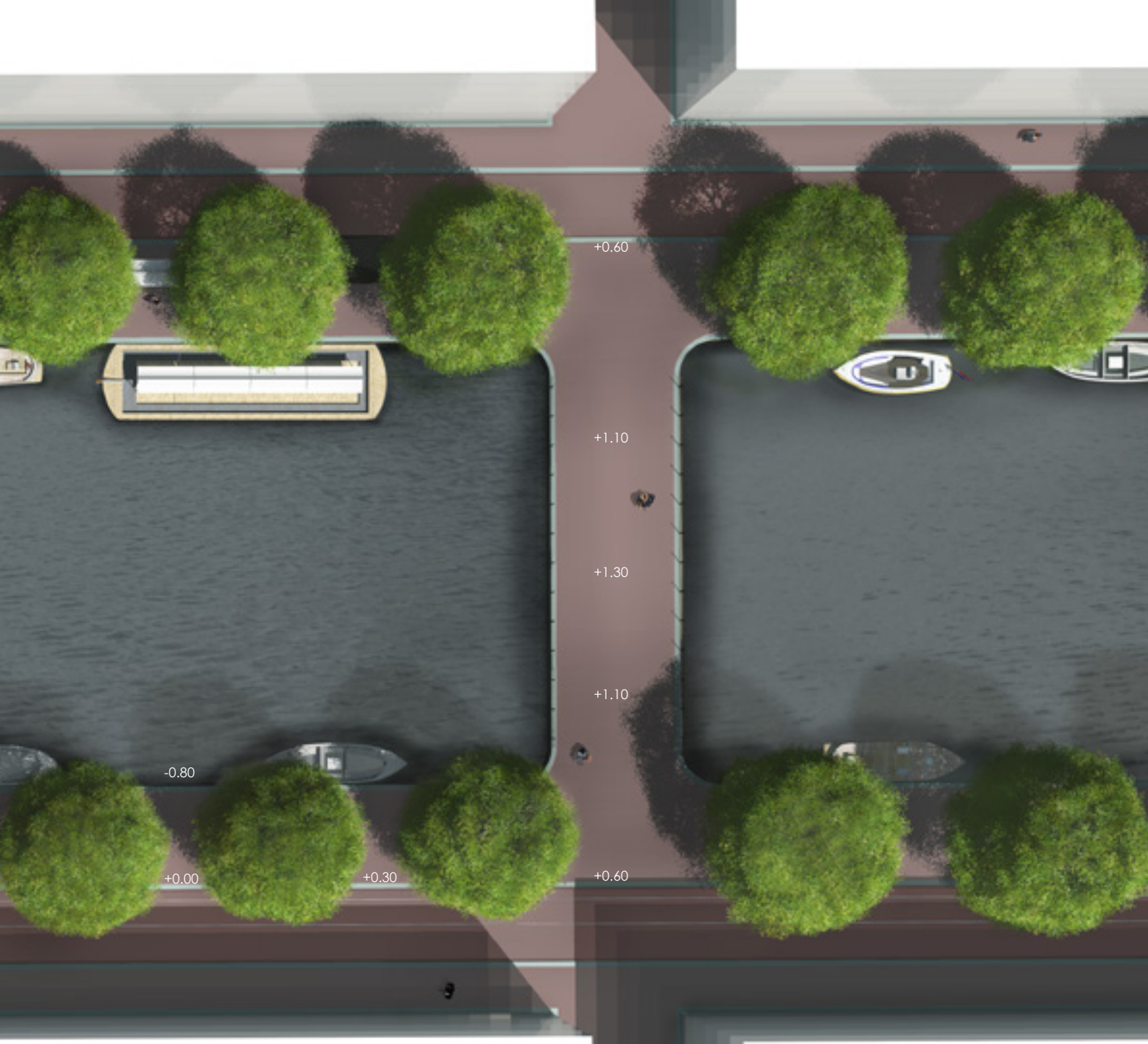


A structure of canals embraces the campus and forms the echo of Amsterdam. They increase the coherency and recognisability, while reflecting the origin of the VU along the canals of Amsterdam. The Abraham Kuypergracht extends the existing water structure and trades a busy road for intimacy along an Amsterdam canal. It thereby makes the typical Amsterdam atmosphere visible at the heart of the campus. In addition, these canals connect the campus to the city centre by navigable water and they act as a major water buffer to cope with the expansion of the Zuidas (Milanovic et al. 2011). The structure is characterised by simplicity which acts as a flexible framework for activities and generally improves orientation and wayfinding (Passini 1992; 1996; Raubal and Worboys 1999).

Fig. 4.23| Top view of the Abraham Kuypergracht.

A boulevard connects the streetscape with the canals and provides space for a market on the north side, which is half on the water and half on land to emphasise the Dutch tradition on water. It also acts as a flexible space for terraces, markets, bicycle parking and food trucks to facilitate a vibrant community. The south-side is mainly used for bicycle parking and walking due to less sun and a passing tram.

N 0 5 10m.



A busy Amsterdam street along the canal, where you can smell the typical scent of the canals and where the water gently splashes against the quayside when boats pass by. A lively atmosphere of conversation is created by the dialogue between the loud shouts of market vendors, people on terraces and people on foot. During a market the air gets filled with a wide variety of scents, ranging from flowers to herbs and spices. A flexible space where food trucks make the air taste delicious, where you can rent a boat to discover the world of the canals and where you can park your bike next to the waterside. Integrating this identity anchors the campus into its context (Geuze and Skjonsberg 2012).

The visual impact of the bridges has been minimised by gradually raising the surface before the beginning of the bridge. This requires only a minimum height difference on the bridge to have sufficient clearance for small boats. This height difference is very gradually where the tram passes, since sudden height differences create a less comfortable ride. [heights are relative]

Fig. 4.24 | Impression vibrant Abraham Kuypergracht with 'water-market'.

A -

* Measurements in meters.
* Identical materialisation at both sides.

.8 | 2.5 | 15 | 2.5 | 3.5 | 2.5 | 2.5 | 0.3

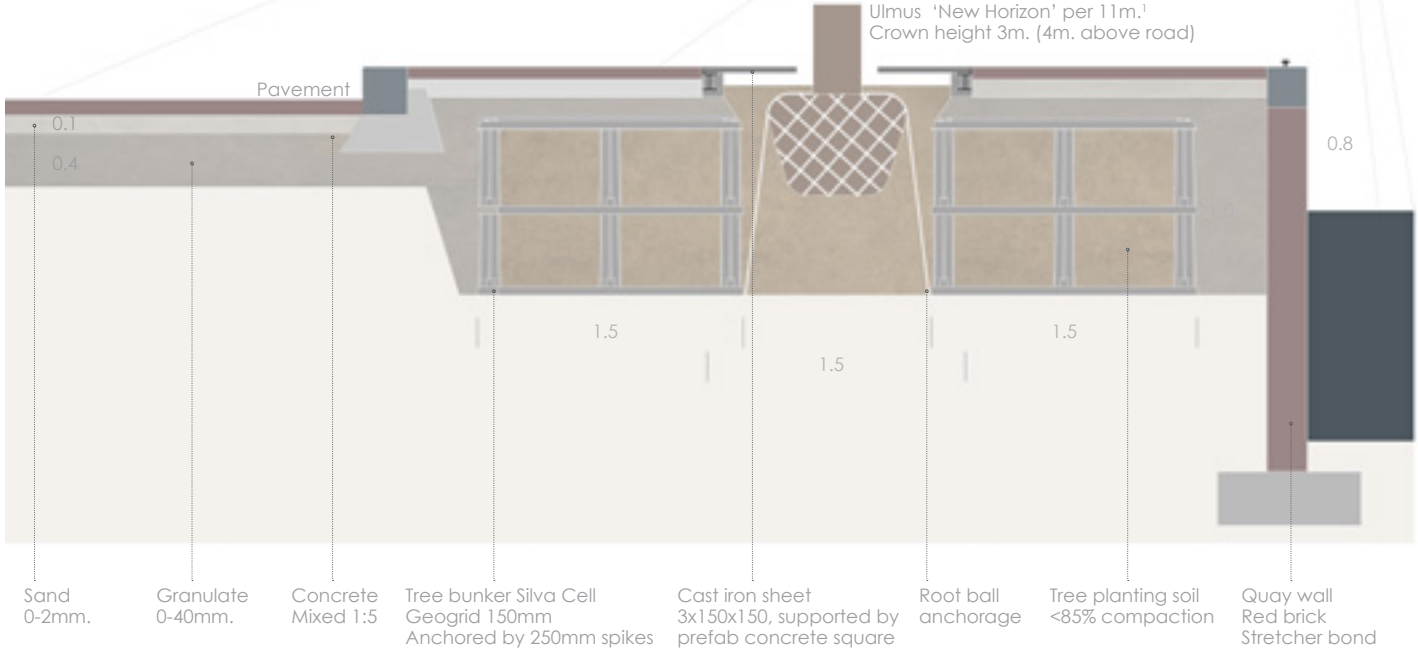
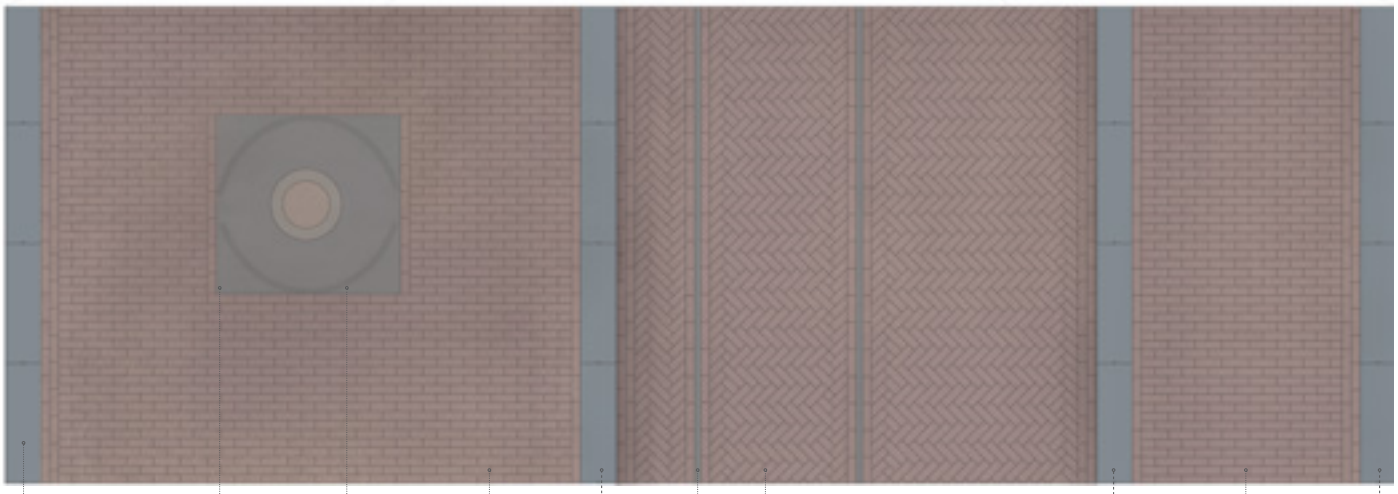


Fig. 4.25| Typical cross section Abraham Kuypergracht (A - A').

25 0.3 2.5 2.5 .6 1.4 2 2.5 15 2.5 - A'



Bluestone kerb 300x300x1000mm.

Tree brackets Falcocurve Galvanised

Cast iron 3x150x150cm

Red brick Stretcher bond 70x100x200mm.

Tram rail tracks

Red brick 70x100x200mm. 45° herringbone bond, Rounded profile 2%

Bluestone kerb 280/300x300x1000mm. With integrated drains

Red brick Stretcher bond 70x100x200mm.

4.5. 2 THE URBAN EDGE

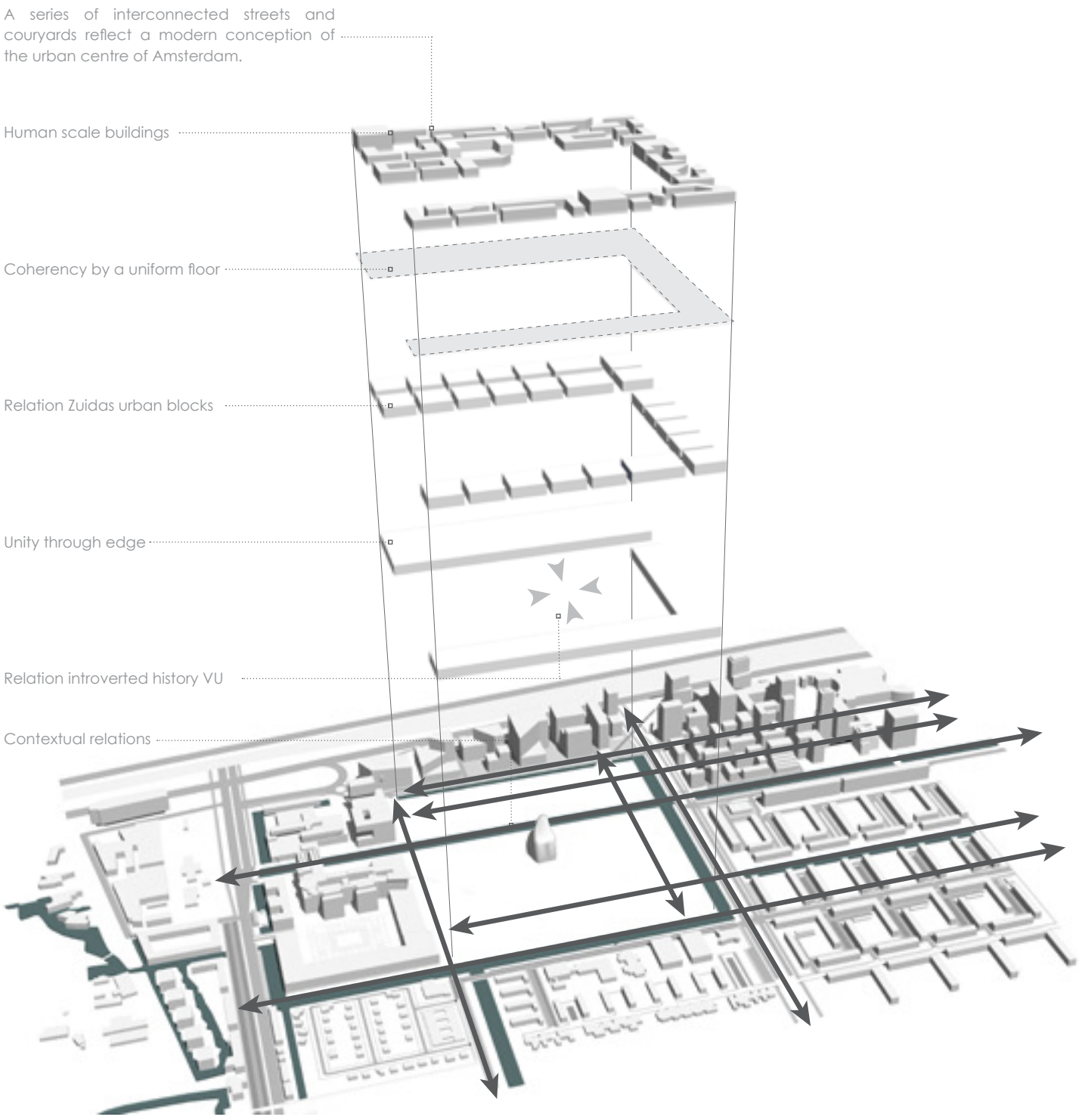


Fig. 4.26| Schematic representation of the design intentions on the urban edge.

The campus is embraced by a robust edge, accompanied by canals, which creates coherency and recognisability. It thereby strengthens the identity of the campus as an introverted entity within the Zuidas district. This edge is formed by urban blocks which relate to the structure and size of the Zuidas. However, they are internally divided to form human scale buildings and a series of interconnected streets and courtyards. These spaces are characterised by a secluded world of intimacy, contemplation and academic reflection. Each space is unique, but coherency and continuity are established by a uniform floor, similar architecture and materialisation. This edge interconnects the entire campus with an orientation to the central green heart: The Campus Park. Attention to detail and a sense of simplicity are required to keep the series of interconnected spaces recognisable and clear. This is also noticeable at the traditional campus courts such as at the University of Cambridge (see appendix E.7). The ongoing structure is characterised by this simplicity through a uniform brick pavement with bluestone details, solitary trees, façade plantings, lawns and flower bulbs to integrate the Dutch character. However, the atmosphere of these spaces is inspired by Amsterdam streets and courtyards which possess a sense of intimacy (appendix E.7). The finish of the details determines the quality of these outdoor spaces. The grid structure within the urban blocks creates a connection every fifty meters to the canals and to the Campus Park. This rhythm, uniformity and the relation to other recognisable identities improves orientation and wayfinding (Darken and Peterson 2002). These green outdoor spaces are also beneficial for the indoor working environment, since a view on a green environment has the potential to decrease stress and to enhance concentration and productivity (Maas et al. 2006; Groenewegen et al. 2006).


Flower bulbs reflect the Dutch culture


Impulsive plantings


Red brick pavement with a high quality finish creates uniformity


Intimacy (Howe 2013)


A variation of open and closed spaces (De Jonge 2014)


Cosiness and a variation of uses (AH 2013)


Uniform lawns create coherency (Monsarc 2009)


Lawns with solitary trees as a flexible space (mvvainc 2009)

Fig. 4.27 | Simplicity of the atmosphere in the ongoing structure of interconnected courtyards.

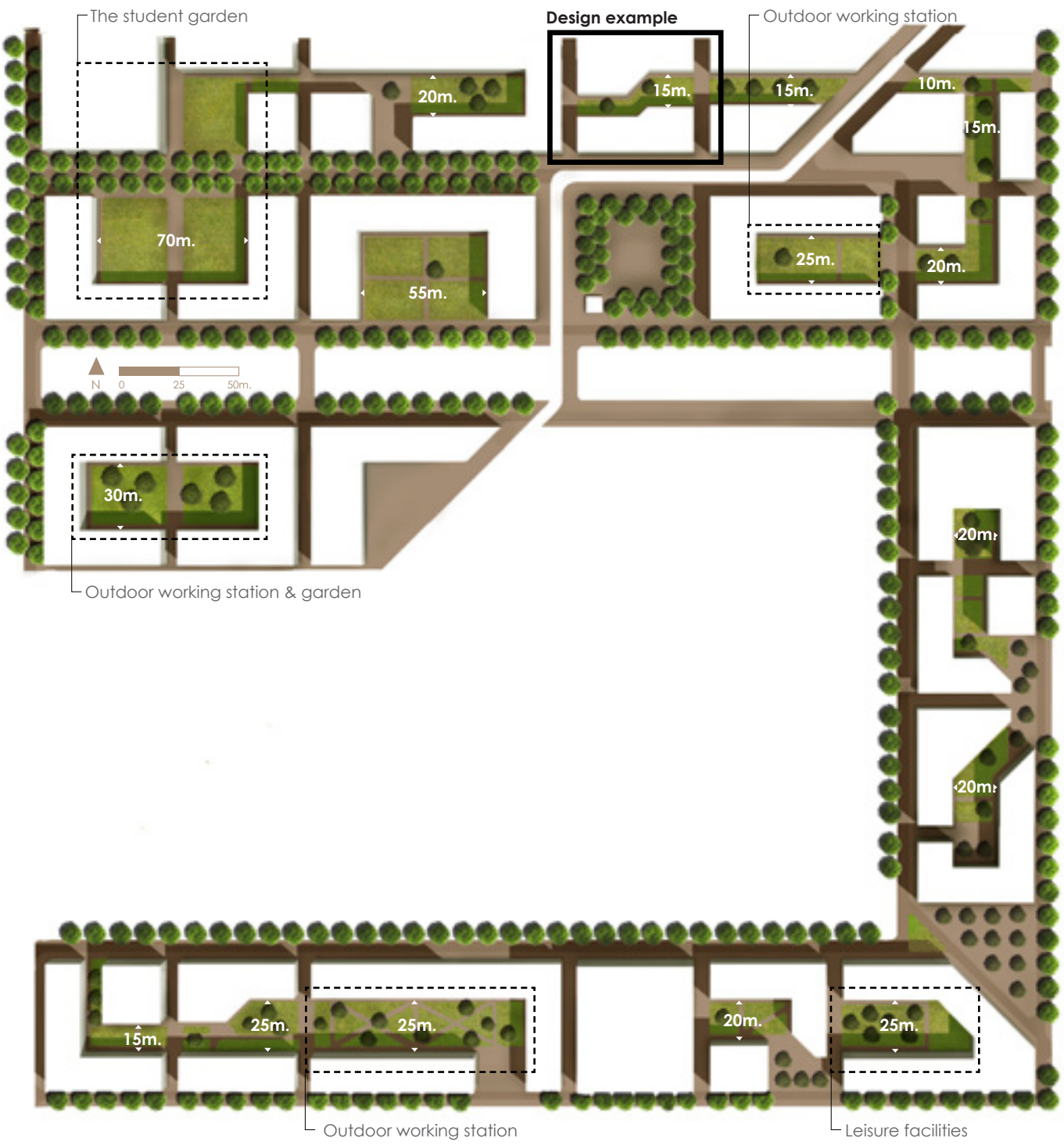


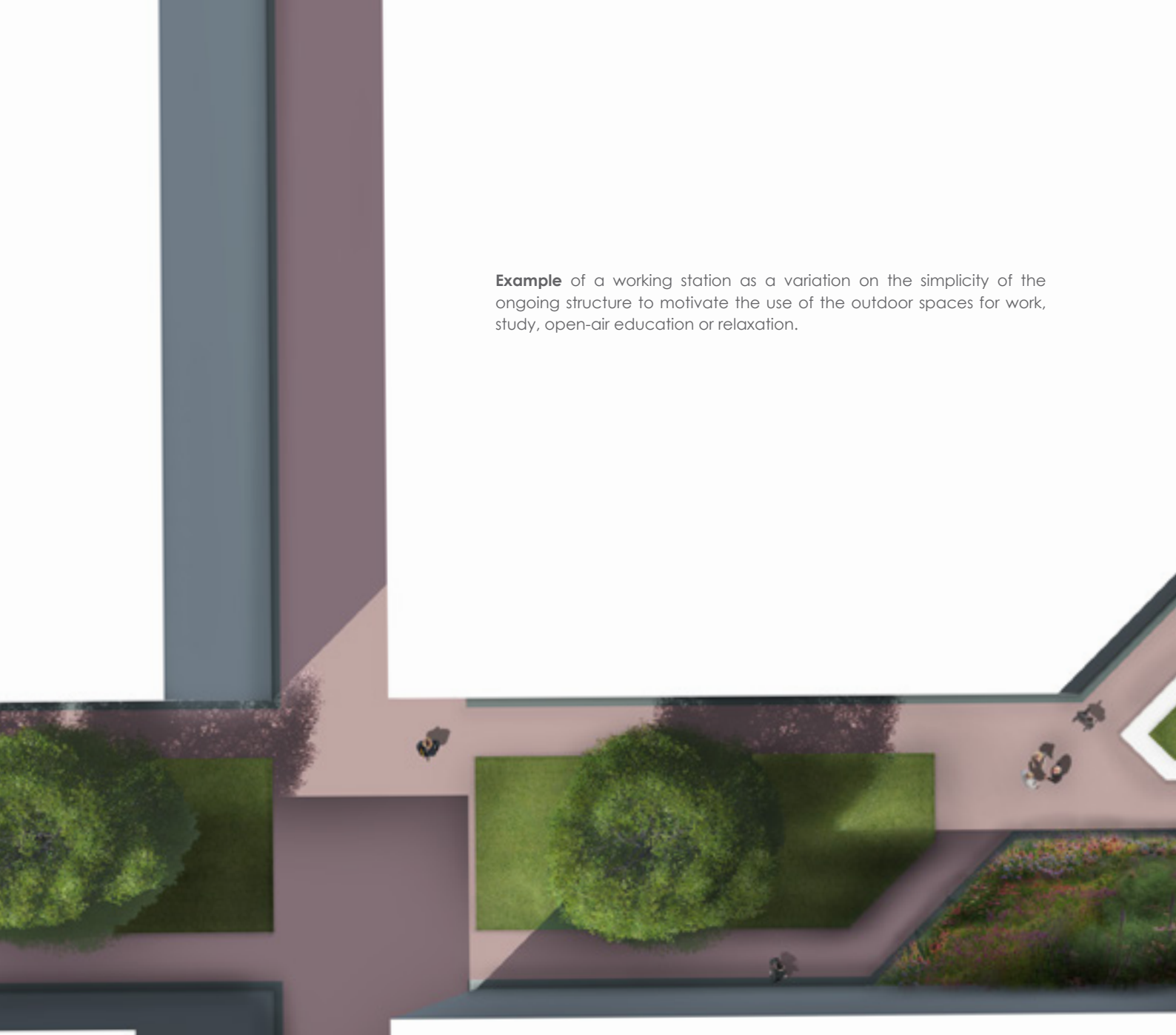
Fig. 4.28 | Schematic representation of the interconnected streets, courtyards and the locations of the specific spaces.

Specific locations create an interesting variation on the simplicity of the ongoing structure (fig. 4.28). They motivate the use of outdoor spaces for study, work and relaxation through a variety of spaces and positions (fig. 4.32). They form an office for university employees, a different perspective for students and a backyard for residents. These spaces are characterised by their cosiness and intimacy through an alternation between plantings, lawns, edges, red brick and trees, which is typical for the Amsterdam 'hofjes' (appendix E.7). They form a modern conception of the interconnected spaces throughout the centre of Amsterdam. The location of these spaces has been determined by the use of their environment, programme, the direction of the sun, shade patterns, wind and views, in order to create a comfortable and inspiring environment to work, study or relax (appendix E.8). The structure is flexible and can respond to changes by incorporating more facilities. The design as illustrated on the next pages, shows the smallest location as an example of how they are positioned within this world of interconnected spaces.

Most buildings are between four to five layers high (fig. 4.18) and the urban profiles are mainly between 20 and 30 meters wide, with a minimum of 7 meters in the north-south oriented streets and a maximum of 65 meters in the large central spaces. They are positioned to maximise sunlight, while creating a diverse and a relatively high density urban environment (appendix E.8). These dimensions are in line with traditional campus examples such as Harvard and Cambridge, but also with the urban centre of Amsterdam (appendix E.9). This illustrates that the dimensions of these internal spaces reflect comfortable environments that are characterised by intimacy and a rather urban atmosphere. The urban blocks consist of multiple buildings, which contain a variety of functions. These buildings are in line with the human scale, not only by their height, but also by their size. Imagine a colossal building where you have to visit room 210 on one of the many wings, where you first cross long hallways before arriving at your destination, which is the same room as the rest of the building. This does not resemble a campus-like experience.

In addition, having multiple smaller buildings instead of a few larger ones also strengthens the campus narrative. Large buildings often contain a flexible mix of a large variety of users during different moments of the day and at different moments of the week. These spaces lack a sense of belonging and character. They are often very anonymous. People get into such buildings in the morning and leave them in the evening without coming into contact with the campus. Walking from building to building enforces the campus narrative as a specific experience. It provides a moment for the mind to settle and to take in the influences from nature. A moment when you can feel the wind blow in your face, you can smell the freshly cut grass and you become physically active. Furthermore, walking from building to building enhances the likeliness of meetings on neutral terrain. It provides a sense of tranquillity because you are shortly detached from the stress which characterises the indoor spaces. The green outdoor spaces also contain the potential to enhance motivation or to decrease stress (Maas et al. 2006; Zandvliet 2013). A variety of smaller buildings are therefore much more suitable for such a campus environment than massive megastructures.

Example of a working station as a variation on the simplicity of the ongoing structure to motivate the use of the outdoor spaces for work, study, open-air education or relaxation.



An outdoor working station has been integrated into the series of interconnected spaces as a separated element to emphasise its distinction. A robust concrete edge wraps around a central working station, while differences in height and form create several working positions (fig. 4.32). The adjacent lawn is characterised by several slopes to provide a variation of positions, while the central crossroad enhances the likeliness of meetings (Chapman 2006). The red brick pavement, elevated centre piece, lawns, typical architecture and flower beds mimic the typical Amsterdam 'hofjes' atmosphere (appendix E.7).

Fig. 4.30 | Design example of a working station within the robust edge.

This design is characterised by its flexibility, because the different shapes do not force a single use, but they can provide different affordances (Rietveld and Kiverstein 2014). This element can for example act as a classroom for lectures, but it can also form a platform for outdoor cinema in the evening. The key to the use of outdoor spaces for work and study is the availability of facilities. This working station is therefore equipped with a variety of working positions, power sockets, internet access, comfortable materials and a beamer. Moreover, it is sheltered from the wind, it is positioned at a quiet space, offers protection against the sun, but it is mostly positioned in the sun. This is necessary to quickly dry the grass and materials after a rain shower to promote outdoor use. The orientation to the south also decreases the reflections of the sun on visual devices such as notebooks, tablets or a beamer. During hot days one can use the shade of the trees and buildings or temporary additions such as shadow cloths to enhance the microclimate (Klemm et al. 2015a).

N 0 2 4 6m.

Fig. 4.31 | Impression of the 'working station' with an Amsterdam atmosphere.

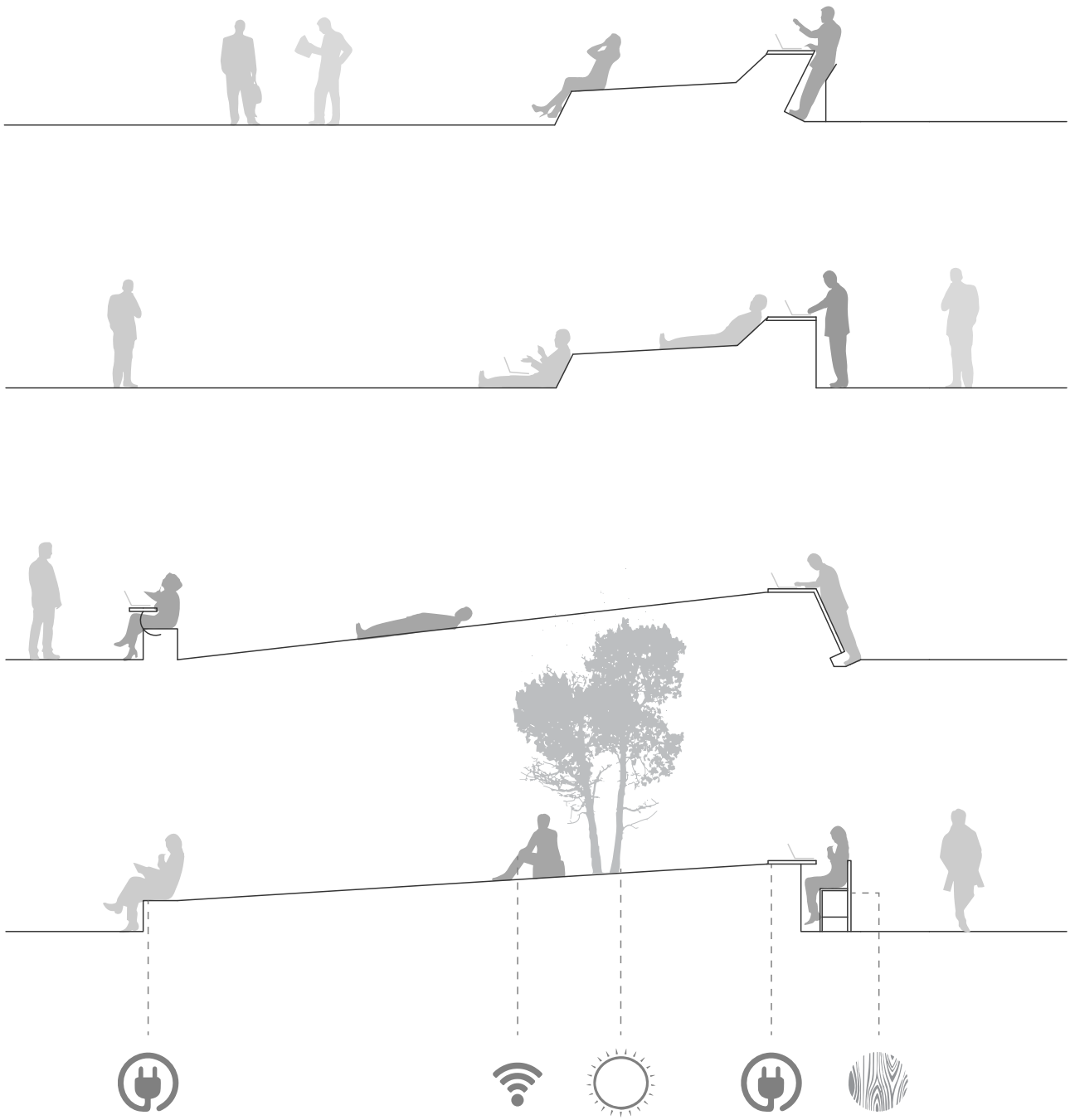


Fig. 4.32| Schematic representation of the different working positions within the design.

We should not unquestioningly design and adapt our environments to the current habits of people, but as "landscape architects [we] should provide them with the [necessary] tools for their behaviour" (Geuze 1993, p.39). This means that we are supposed to design creative environments that reflect the latest results of science to change people's mind-set and to familiarise them with novel environments that are potentially more interesting, more functional, better for their health, and perhaps even sublime.

RAAAF [Rietveld Art Architecture & Affordances] has recently demonstrated with their symposium 'The End of Sitting' that we are constantly designing environments which emphasise 'sitting' in a singular position, even though evidence from medical research tells us that this is not desirable. Sitting is considered a passive position and does therefore not actively utilise several important muscles. This, in combination with a singular position, can result in multiple disorders and can lead to long-term health problems (O'Sullivan et al. 2002; Beach et al. 2005; Studebaker and Murphy 2014). The extent of this problem becomes clear when considering our daily pattern: we sit and have breakfast, we then sit in the car to work, where we continue to have meetings in a seated position, before we go home by sitting in the car to end up sitting at the dinner table and then we can hopefully relax our bones while sitting on the sofa. The time we work or study takes up a large part of the day, which we should facilitate with a diverse range of workspaces both indoor and outdoor.

There is often a threshold in utilising outdoor spaces to work or study, because people are not familiar with this and there are barely any facilities. Using outdoor spaces is becoming increasingly important due to the scarcity of space in the city and a global increase of temperatures, which causes the 'urban heat-island effect' (Brown et al. 2015). This in turn causes heat-stress, which subsequently decreases work productivity, the ability to concentrate and can even lead to health problems (Klemm et al. 2015a). Air-conditioning is not our best option, since energy becomes increasingly scarce and it generates even more heat (Stremke and Koh 2011). We should therefore try to cope with these changes by facilitating well-equipped outdoor workspaces. A university campus seems to be the perfect location to experiment with this, since it is easily controllable by scientists. Academics are also more likely to respond to such innovative projects and can then easily promote their new way of working on the job market.

The theory of 'affordances' provides useful insights on the perception of the environment's resourcefulness, which can contribute to influence our environment through design in order to create a diverse landscape of standing affordances (Rietveld and Kiverstein 2014). "The affordances of the environment are what it offers the animal, what it provides or furnishes, either for good or ill" (Gibson 1986, p.127). They can be considered as possibilities for action provided to an animal by the environment – by the substances, surfaces, objects, and other living things in it (Chemero 2003; Rietveld 2010; Rietveld and Kiverstein 2014). Affordances solicit a certain behaviour, which can be influenced and directed through design. This notion of affordances is used in this design to reach beyond our ordinary conception of creating a workspace by offering a chair and a table.

The courtyards of the robust edge are the ideal spaces to promote outdoor use, since they are situated next to the buildings, form a quiet environment which is secluded from the wind and offer both sun and shade. The design (fig. 4.31) illustrates a possibility on how these workspaces can be implemented into the outdoor public space.

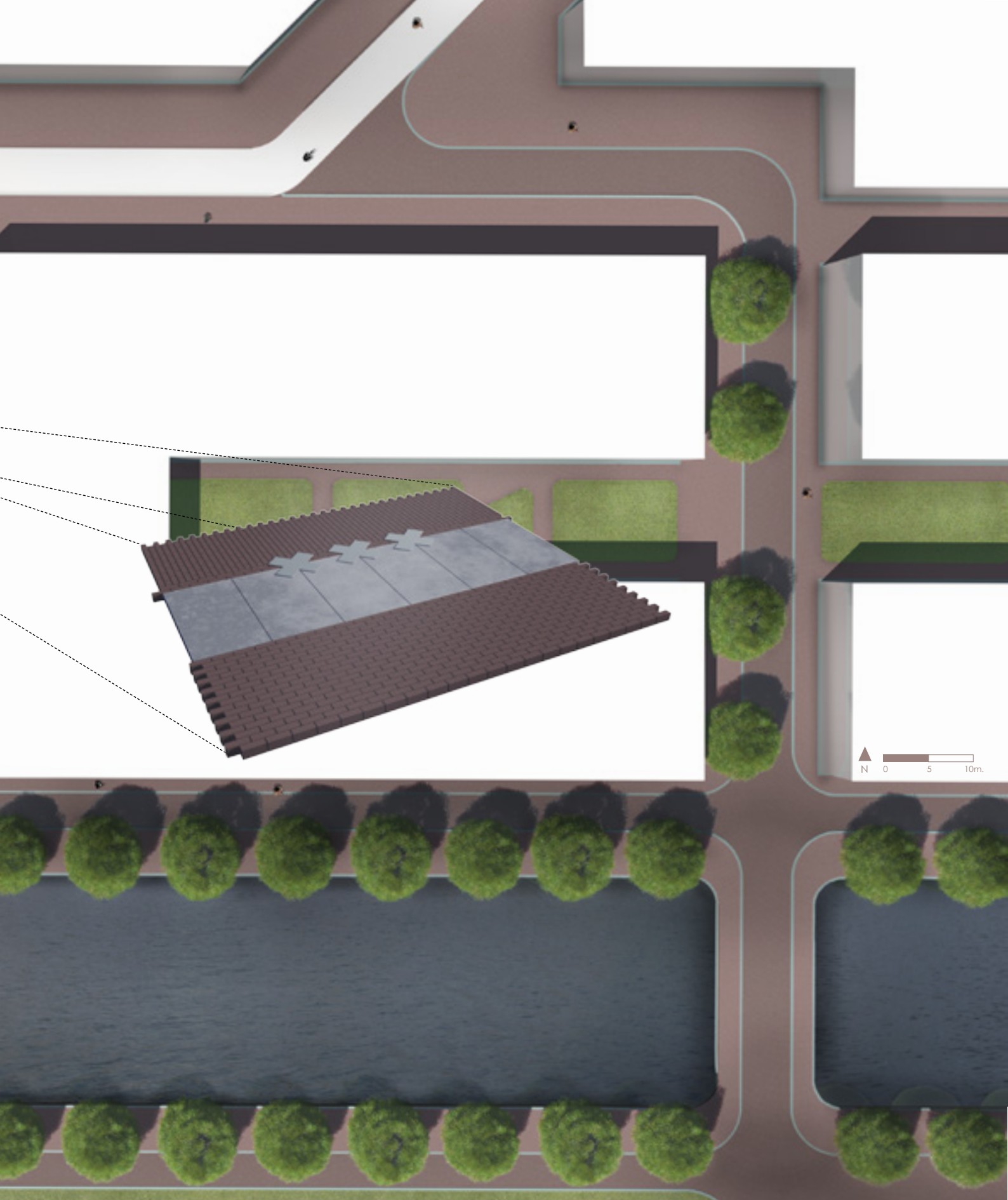
4.5. 3 HET VU PLEIN

The VU Square acts as the meeting heart of the campus and is strategically positioned at a major intersection of the primary entrances, movement patterns and tram station. Moreover, it connects the diagonal bicycle highway to the intimacy of the courtyards, the Abraham Kuypergracht and the openness of the Campus Park.

Restaurants, pubs and shops surround the square and create a vibrant interplay between people.

Moveable chairs and tables create a dynamic space. Custom furniture enforces a dialogue with the identity of the campus.

Fig. 4.33 | Design campus square.


N
0
5
10m.

The VU Square acts as the meeting heart of the campus and is strategically positioned at a major intersection of the primary entrances, movement patterns and tram station. Moreover, it connects the diagonal bicycle highway to the intimacy of the courtyards, the Abraham Kuypergracht and the openness of the Campus Park. It thereby forms the ideal location for a central meeting place, which is a primary characteristic of a campus and a major goal of VU Amsterdam (Lucas 2014). Its location symbolises the primary functions of this square: connecting and meeting. It forms a symbiosis of intellect and an entanglement of thoughts.

The square is integrated into the overarching grid-pattern by a double row of trees, which creates a secluded square in the centre and a protected space between the trees. This core area is inspired by the diversity of 67 different types of pavement that one can find on the existing campus (fig. 4.36). A patchwork of pavements is stitched to the uniform floor. Moreover, this patchwork composes a homely atmosphere and acts as a stage. The simplicity of the square allows spontaneous events and active use without creating chaos.

The diagonal bicycle highway is folded around the square to create interaction with the square and to motivate views into different directions (fig. 4.34). This square is ideal for meeting, since the size of the square is based on the recognition of faces. This motivates a multi-sensory experience and improves the likeliness of meetings (Chapman 2006; Gehl 2010). In addition, the square poses an intersection of primary movement patterns, which also enhances the prospect of meetings. A kiosk is located on the corner of the square to facilitate these movement patterns while acting as a magnet for users. Bicycles can be parked at indoor parking facilities (fig. 4.16) or in between the trees on the north and west side of the square.

The square is characterised by the interaction with its surroundings. It forms a world of actor and spectator, where shops, restaurants and pubs surround the square and create a vibrant interplay of people. Moveable chairs and tables create a dynamic space which contains the ability to meet the continuously changing needs of the user. You can for example choose to sit in the sun or shade, in a large group or alone. Custom made furniture enforces a dialogue with the identity of the place. The litter bins for example integrate the history of the VU into the contemporary campus by mimicking the traditional 'VU cans' which one used to find in every living room to collect money for the university (fig. 4.35).

Fig. 4.35 | Litter bins, inspired by the symbolic and typical 'VU cans' which one used to find in each living room to collect money for the university. In a time when sustainability becomes increasingly dominant, the VU is now collecting and recycling litter by these cans as the contemporary good cause.

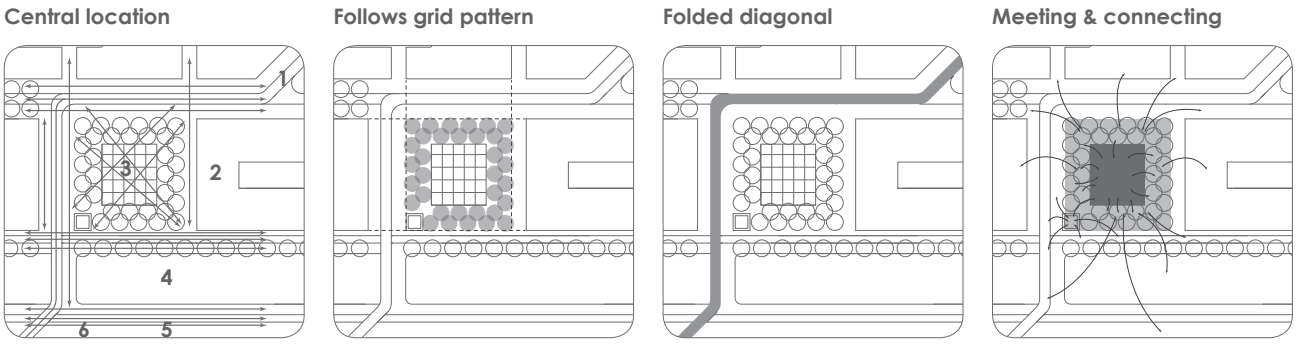


Fig. 4.34 | Principles of the design.

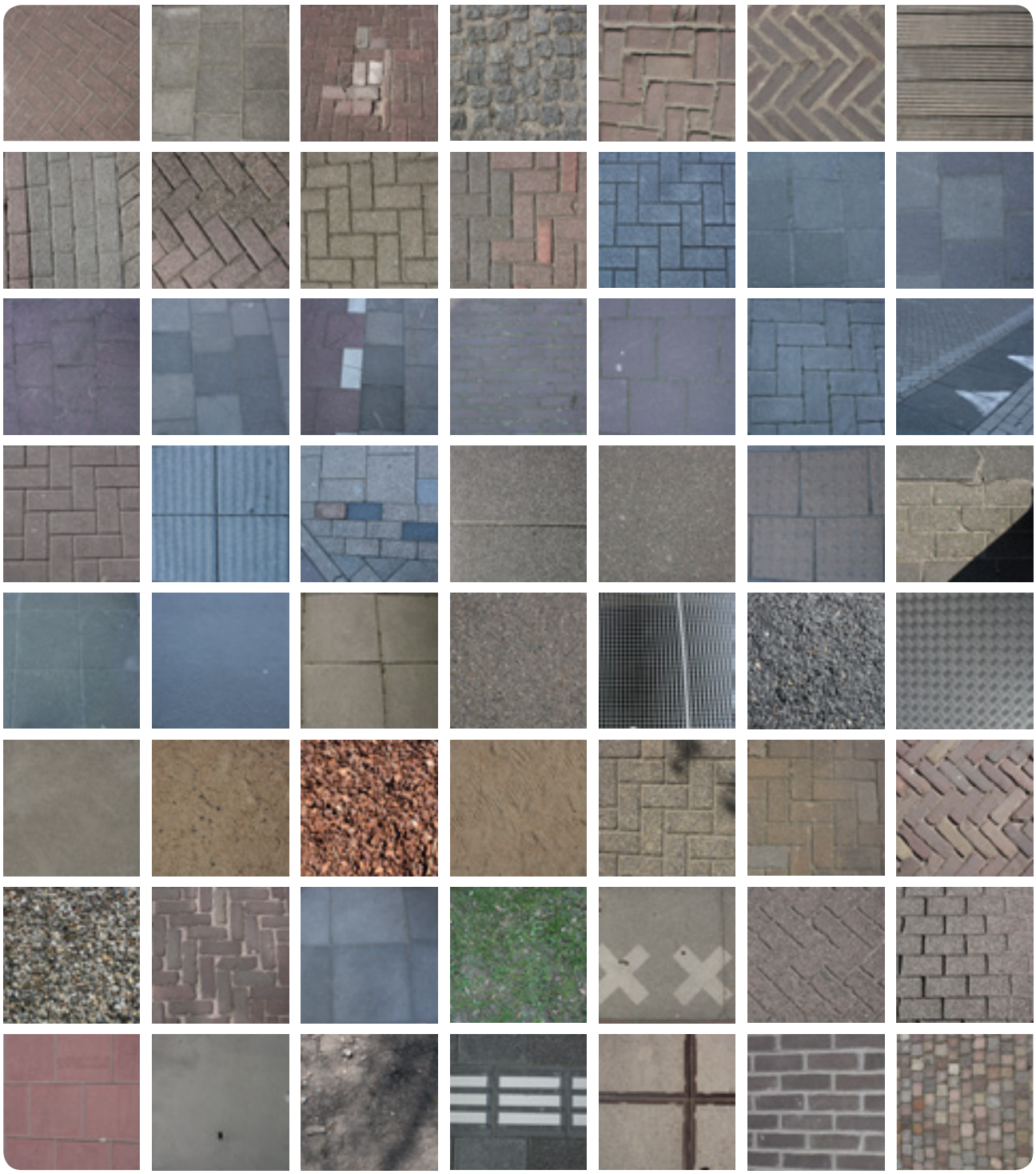


Fig. 4.36| Impression of the 56 out of 67 different types of surface coverage on campus.

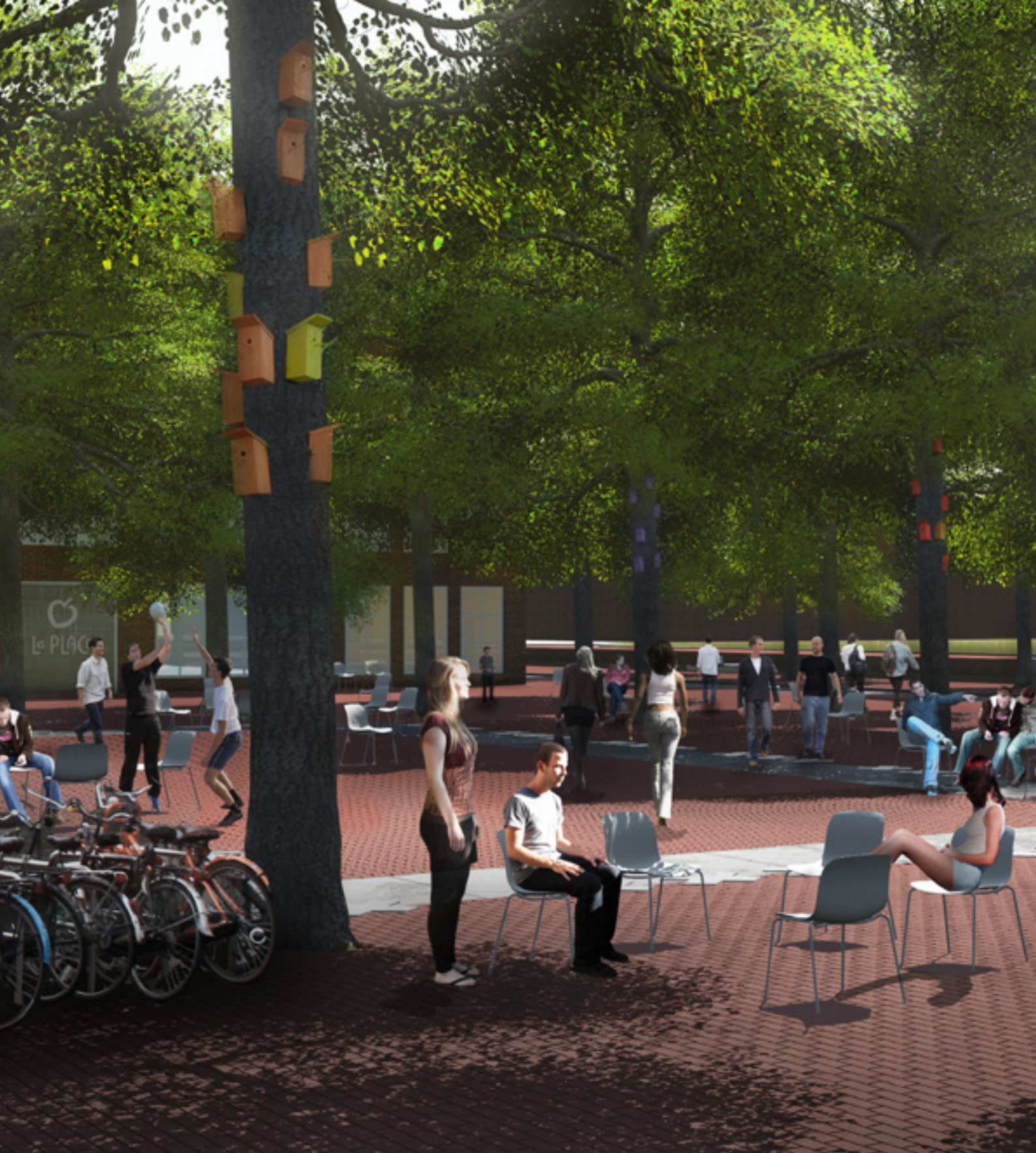


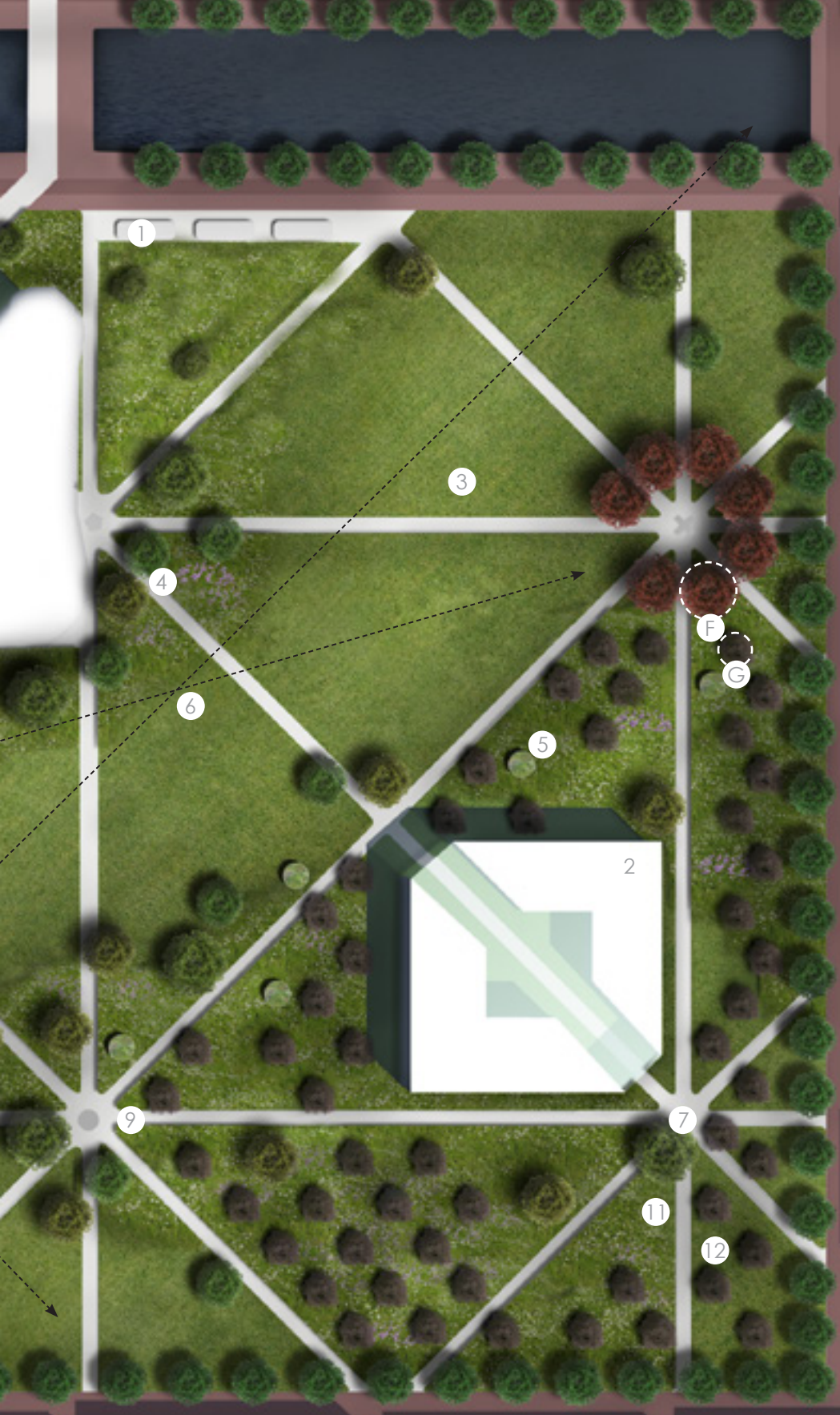
Fig. 4.37 | Impression campus square.

4.5. 4 HET CAMPUS PARK

The Campus Park acts as the green heart of the campus enclave and it creates the typical park-like atmosphere that characterises a campus. This is beneficial for all buildings surrounding the park, since a green environment has the potential to enhance educational pedagogy and to stimulate people's imagination (Zandvliet 2013). It also creates a spacious green environment where you can retreat and sit back against a tree, to feel the cold grass under the bottom of your feet and to hear the birds and insects dance around you. A diverse use of this green environment is encouraged by a multitude of different facilities such as: innovation pods, a hammock meadow, open-air education and barbeque facilities. These are accessible by a functional grid-structure which is based on the overall campus grid and connects all entrances to the robust edge with courts. Moreover, it creates interesting crossings to increase the number of meetings and to provide a diversity of routes (Chapman 2006).

See next page for elaboration

Fig. 4.38 | Design of the Campus Park.



1. Tram station.

2. The buildings stand in the park and show interaction with their environment by a focus on the connection between indoor- and outdoor spaces. This is mainly achieved by their orientation and a high amount of translucent surfaces. The park progresses into the core of the buildings through large atriums.

3. The centre of the park has been kept open to facilitate events such as the university's introduction week, graduation ceremonies and sports.

4. Park trees have been situated close to buildings in order to develop a narrative with the buildings on the approach. On every step, a different part of the building is being revealed through sight lines. This is typical for a campus as derived from the research in chapter three.

5. 'Innovation pods' as small and private workspaces within a green environment to create an inspiring perspective. They are scattered throughout the park to create different working environments.

6. Sight lines offer long views through the park, which optically increases the size of the park and the activities within the park become visible to invite people into the park. This also develops a sense of spaciousness within the green oasis.

7. The grid structure supports both functional- [easy access], social- [potential for meeting at crossings] and aesthetic benefits [sight lines]. The crossings are designed as meeting spaces and lounge areas.

8. The green atmosphere invites and activates its users to engage in physical activities, which positively influences their mental- and physical health (McCormack et al. 2010).

9. Barbeque facilities and moveable chairs

10. A hammock field for relaxation

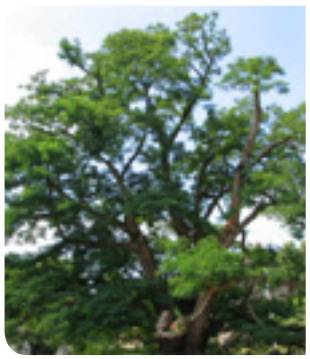
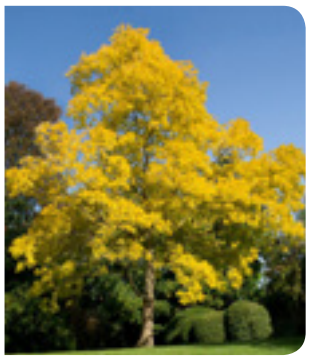
11. Flower meadows

12. Mown lawns







A. Ulmus 'New Horizon'
Supports the main green structure on campus, which enhances the recognisability and coherency of the interconnected spaces. It embraces the entire campus by accompanying the canals and it encloses the central Campus Park by a major square structure. The elm tree has been selected, because it creates a relation to the identity of Amsterdam as the 'elm capital' with over five thousand elm trees in the city centre alone. In addition, it is a relatively fast growing tree, which is necessary to create a robust green-structure within a reasonable amount of time. Moreover, it is very well resistant to the 'Dutch elm disease'.

B. Ulmus 'Columella'
Accompanies the ongoing bicycle highway by a tree lane, which cuts straight through campus. It is only partly opened up to one side to draw the user into the Campus Park. The narrow and high form emphasises the straightness and speed of the bicycle highway. The trees are pruned up to two meters to relate with the human scale. In addition, it offers protection from wind and sun. Moreover, it creates a relation with Amsterdam as the 'elm capital' and is completely resistant to the 'Dutch elm disease'. Right photo in courtesy of: Plant & Grow 2014.

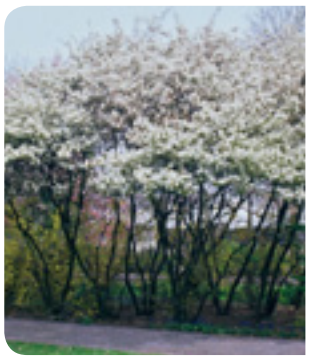
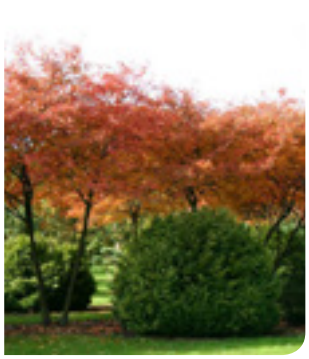
C. Pterocarya fraxinifolia
Forms one of the three major park trees which are scattered through the Campus Park to create an interplay between sun and shadow and to create a narrative with the buildings by blocking certain views. It is characterised by its wide canopy and robust trunk, which are ideal for shade. It has pinnate leaves which appear very robust and large bunches of catkins. It is pruned to the minimal height for a lawn mower to pass in order to create a typical park-like atmosphere. The low branches on a human scale are typical for a campus as deduced from the research in chapter three. Photos in courtesy of: van den Berk 2015.

D. Robinia pseudoacacia 'Frisia'
Forms one of the three major park trees which are scattered through the Campus Park to create an interplay between sun and shadow and to create a narrative with the buildings by blocking certain views. The robust and capricious form is its main beauty during winter time, but during fall it first turns spectacularly yellow. In addition it has a fresh green colour and it becomes a very wide tree. Each tree will have a different height in branches to emphasise diversity and to block specific views. Photos in courtesy of: Melantrys 2009 & Mareshal 2015.


E. Reuse of several existing trees
Combination of several existing trees from within the area. Some are positioned at their existing place and most of them are yet small enough to be moved to a more suitable space. Only the best specimen will be used to ensure campus quality, since some of them are damaged due to poor growing conditions. More information on the existing trees can be found in appendix E3. The existing species are: Quercus robur, Aesculus hippocastanum 'Baumanii' and Catalpa bignonioides.


F. Fagus sylvatica 'Atropunicea'
Acts as an eye catcher from the bicycle highway at the other end of the park by its purple red reflection which is contrasting with the green background of the other trees. It encloses a central meeting space where several paths merge. They create a dark ring of shade around an open space, which encloses the space and emphasises the sunlight from above. The trees are branched to the ground while leaving major entrances pruned around the paths to emphasise the enclosed character of the space. Photos in courtesy of: Hellooo 2010; Appeltern 2015.


G. Prunus x yedoensis
Creates a major field of low branched capricious trees that reflect a mysterious atmosphere. This is also their beauty during the winter months. In spring they bloom exuberantly while colouring the entire field with a fresh pinkish colour. These are planted as multi-stemmed trees to emphasise their capricious character on eye height. This creates confined but open spaces, because they are planted at a slightly larger distance to mimic the character of an old orchard. Photos in courtesy of: Flanuki 2015; Tak1701d 2015.

H. Amelanchier lamarckii
Creates a field of low branched capricious trees that reflect a mysterious atmosphere while allowing a view underneath. This is emphasised by planting multi-stemmed trees in an irregular pattern. They create a 'gazing window' due to their umbrella shape in combination with the high herbaceous vegetation underneath. In addition, this tree is characterised by blooming intensely white during spring and a beautiful mix of autumn colours during fall. In the winter all what remains is its beautiful silhouette. Photos in courtesy of: Plant & Grow 2014; Appeltern 2015.

Fig. 4.39 | Impression Campus Park.


Innovation pods

4.5. 5 HORTUS BOTANICUS

This enclosed garden acts as a secluded green paradise where one can achieve insight and study the world by deliberately being excluded to focus and gain a different state of mind (Geuze 2014). It is characterised by silence while the pallet of aromas changes on every corner of the grid. One can search for contemplation, while being part of a lively spectacle between man and nature, which is enjoyed by the sick and weak from inside the walls of the buildings, through large panes of glass.

The hospital extensions are situated around the botanical garden to maximise health benefits, since a view on a natural environment has the potential to decrease stress and to increase the recovery rate of the patients (Kaplan and Kaplan 1989; Hartig 1993). But it also allows visitors to take a relaxing walk while waiting for their loved ones inside.

Laid-out in a grid-pattern, which enforces the systematics, order and categorisation that characterises the botanical garden as a collection and as an object for study. It also enhances the functionality of the garden by being able to approach each plant within a close distance to maximise a multi-sensory recognisability (Grahn and Stigsdotter 2010; Bell 2012). This is especially relevant for close-distance senses such as smell and touch (Porteous 2006; Pallasmaa 2012).

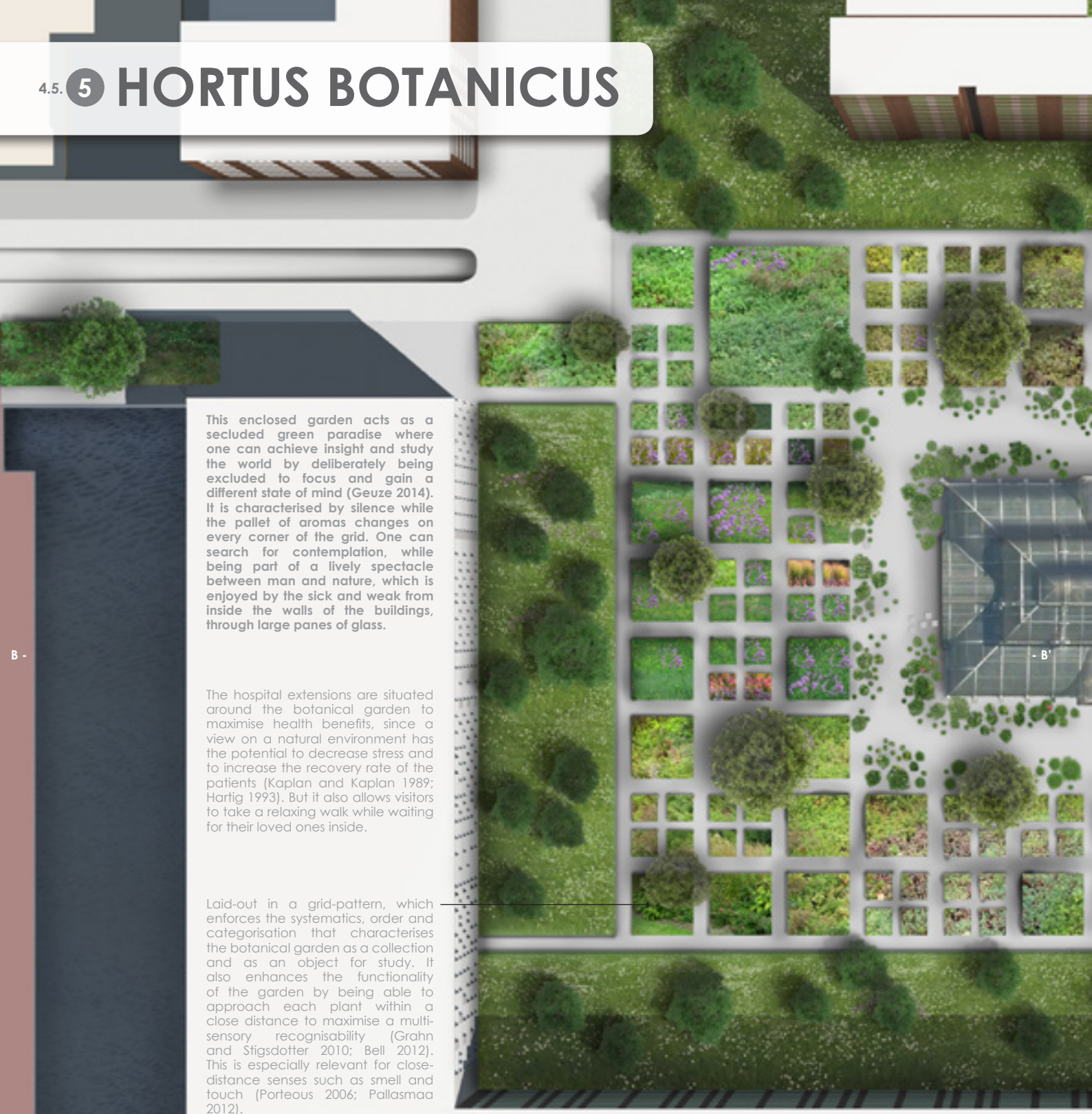


Fig. 4.40| Design of the Hortus Botanicus.

The size of the pockets corresponds with the size of the plants.

The plant composition overrules the grid structure, which creates a variation between open and secluded spaces.

The greenhouse is surrounded by a wide paved surface to emphasise the greenhouse and to create a dynamic space for flower pots and chairs which can be repositioned to allow for diversity and relaxation. A pergola offers a space for climbing plants and it creates a tunnel effect with chairs in the shade.

The grid also offers spaces to rest, for contemplation or to free your mind.

A greenhouse forms the heart of the garden and acts as a focal point where the top of the collection is literally displayed on shelves. This is especially relevant since the VU Botanical Garden is characterised by a collection of tropical plants, namely cacti.

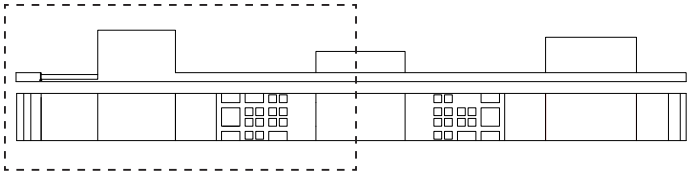
The grid is surrounded by a linear space which acts as a buffer zone to increase comfort for the people indoor by decreasing the visual recognisability from people outdoors (Gehl 2010). But it also creates a transition from the buildings to the garden by a unity of herbaceous vegetation, interspersed with bulbs and multi-stemmed trees.

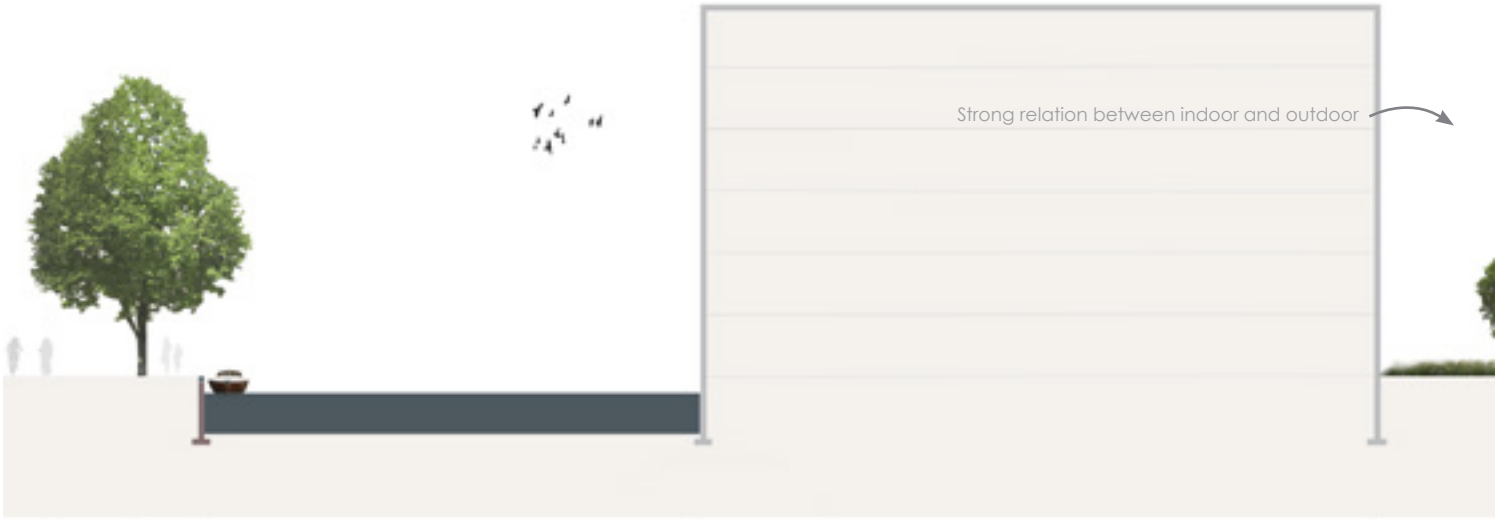
N 0 5 10 15m.

The garden is easily accessible and is closed by automatic gates between dusk and dawn.

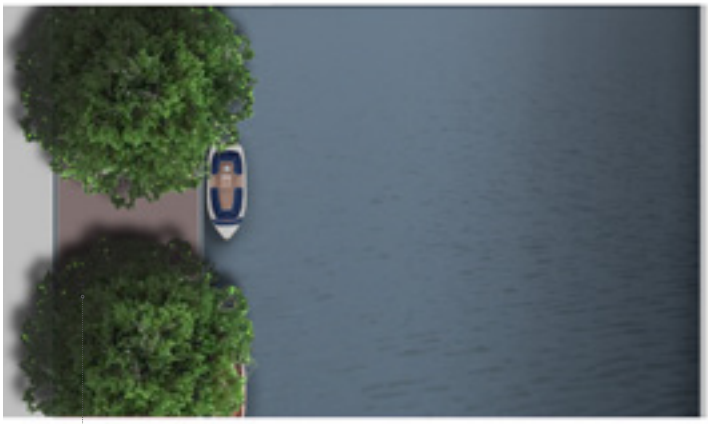
The paths are 2.1 m. wide to allow disabled people to pass one another with some overhanging plants.

Fig. 4.41 | The relation between indoor- and outdoor spaces offers health-benefits.





B- 3 | 3.5 | 3.5 | 24 | 32



Width and height are in line with newly constructed hospital building

Pavement detail

Promenade towards the main entrance of the hospital, with benches, lighting and litter bins to accommodate visitors. Consists of red brick in stretcher bond with a bluestone kerb.

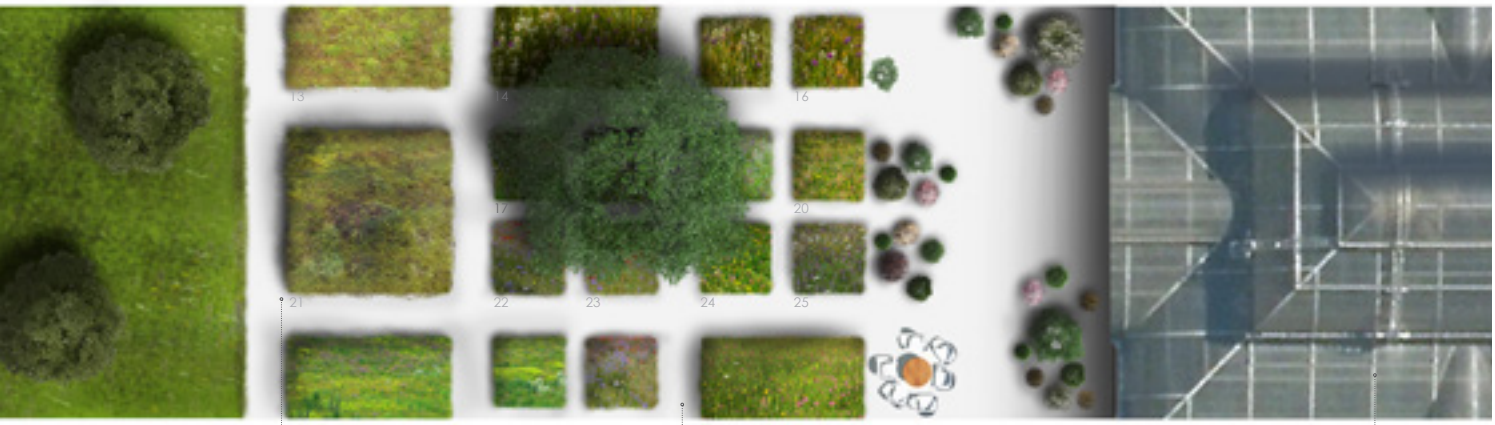
All measurements are in meters unless indicated otherwise.

Path section has a maximum depth of 36 cm unlike asphalt or other options which are at least 50-60cm. This leaves the largest possible space for plants to root. The large concrete slabs are also barely deformed by tree roots and require a low amount of maintenance, while maintaining their quality.

Concrete, grain diameter <14mm, 350 kg cement/m^3, contraction joint (3mm) each 4m. in length, expansion joint every 50m. (4mm), drain (1-2%) to one side, slightly power floated to create a smooth finish.

Fig. 4.42| Typical cross section Hortus Botanicus (B - B').

18 | 2.2 | 7.8 | 2.2 | 7.8 | 2.2 | 3.3 | 1.2 | 3.3 | 12 | -B'



The numbers of the squares are integrated into the concrete path with a depth of two centimeters in order to make it clear and recognisable while retaining the simplicity of the grid-structure.

The paths are made out of a light coloured concrete to emphasise the simplicity and coherency of the grid-structure, which in turn emphasises the diversity of the plants.

Greenhouse to accommodate the top of the collection and the large collection of tropical plants, namely cacti, which are typical for the VU Hortus Botanicus. The greenhouse also acts as an icon in the centre of the botanical garden.

5.0

EVALUATION

This chapter aims to examine this thesis in a wider perspective by discussing its implications and limitations. The main conclusions are presented and recommendations are proposed to extend the range of this research and to utilise the results of this thesis to improve campus design in general.

5.1 | DISCUSSION

5.1.1 | Significance of this research

I will discuss the significance of this research by means of the following five topics: (1) a study from an overarching perspective, (2) campus characteristics instead of a definition, (3) abstract campus typologies for order and understanding, (4) a design for the Kuyper Campus and (5) the campus as a design concept.

(A) A study from an overarching and abstract perspective

Other than existing research, this study utilises the strength of the landscape architectonic mind-set by considering the campus from an overarching and integral perspective (Vroom 2005; de Vries 2013). This is particularly relevant since the campus concept has become somewhat ambiguous and requires a more integral and overarching perspective (Chapman 2006). By doing so, this study supplements existing literature and is valuable for landscape architects and spatial planners to understand and design a contemporary campus.

(B) Campus characteristics instead of a definition

The complexity and interconnectedness of the campus phenomenon make it impossible to create a uniform definition. Mainly because there always seem to be conditions which exclude an area from being a campus or the definition becomes too general to possess any significance. This causes the ambiguity that characterises existing definitions and literature. Wittgenstein's notion of 'family resemblance' (chapter 2.1) is used to establish characteristics instead of a definition (Wittgenstein 1958). These characteristics provide a general overview on what a campus stands for. They have proven to be instrumental to get a grip on the essence of a campus. Moreover, they are valuable anchor points to evaluate a campus design during a cyclic iterative design process. This in turn enhances the quality and efficiency of the process. The campus characteristics are therefore considered to be relevant tools for landscape architects or spatial planners to take into consideration while designing a campus.

(C) Abstract campus typologies for order and understanding

Existing literature searches for typologies to enhance the order and understanding of a campus, but these are often rather specific (Hoeger and Christiaanse 2007). There seems to be no literature which considers campus typologies from an overarching and integral perspective. This is a particularly crucial, since a campus is inextricably linked to the full complexity of the surrounding (urban) landscape. The abstract campus typologies as developed in this study supplement existing literature and have proven to be useful tools to get a grip on the phenomenon and to initiate an abstract design direction on a specific location (chapter 4.3). Moreover, they contribute to consider the situation from multiple perspectives while reducing the possibilities from an innumerable variety to a comprehensible, and most probable, few. This is not only likely to increase the quality of the design, but it also enhances the effectiveness and efficiency of the design process.

(D) A design for the Kuyper Campus

The design of the Kuyper Campus integrates and tests the campus as a design concept into the Zuidas district, by incorporating the campus characteristics and by completing the design assignment as indicated in chapter 4.1. See appendix E.9 for an elaborate evaluation of the campus design. Unlike the existing location and preliminary masterplan, the design in this thesis creates an environment which is true to the principles of a campus and it illustrates the applicability of the campus as a design concept. The research on the campus phenomenon in relation to the characteristics and typologies, proved to be instrumental in creating this design and to overcome its vagueness.

The relevance of a campus, other than a megastructure or urban university, is mainly based on the aim of the VU to develop a space which at least resembles the atmosphere of a campus (Lucas 2014). Furthermore it creates a green and human-centred environment, which takes the comfortability of people as a starting point. The design utilises the benefits of a green campus environment to enhance productivity, to inspire, to decrease stress and to increase the wellbeing of people in general (Maas et al. 2006; Groenewegen et al. 2006; McCormack et al. 2010). Amongst other examples, the human-centred environment contributes to increase the association with the area as a place, which enhances its recognisability and improves wayfinding (Darken and Peterson 2002). The design thereby creates an environment which is based on the wellbeing of people through the beneficial use of the campus characteristics. Other possible university implementations, such as a megastructure or an urban university are reflected in contemporary plans. These mainly emphasise the functionality and economic reasons of a university and thereby miss the potential of a campus. In addition, these types of implementation do not respect the introverted, small-scaled and coherent identity that characterises the VU. They do not support the notion of the

strong community, which used to finance the very existence of the VU. The VU as a campus university creates a strong identity, while creating a distinction with the UvA, being an urban university. This not only provides the VU with a strong (international) competitive position, but it also creates a strong centralised community with a variety of functions and a beneficial green environment at a highly dynamic and accessible location.

(E) The campus as a design concept
Chapter 3.5 illustrates the development of a campus from terming the 'university grounds' to becoming an overarching concept which is applicable to a variety of spatial entities. A campus is not a reflection of an absolute landscape, it is rather an abstraction from dimensioned reality. The design for the Kuyper Campus and the design for Maastricht Health Campus by Knevels (2015), illustrate a successful implementation of the campus concept into an urban- and a suburban context. The activity of design(ing) has proven to be a necessary tool to comprehend the campus phenomenon and to successfully implement the variety of characteristics into a suitable design for a specific location. Existing literature does not possess a strong link with design concepts or interventions. There is some literature, but this mainly focuses on very specific elements, such as how to design or implement a campus path (e.g. Turner 1987; Dober 2000). This study utilises design as a research method, which tests the campus characteristics and typologies through a cyclic iterative design process and design scenarios. This illustrates the ability of these findings to function as part of a design concept. This is particularly relevant since the activity of designing goes beyond what can be investigated in the present (Nijhuis and Bobbink 2012). In addition, the campus as a design concept has the potential to increase the quality, effectiveness and efficiency of a campus design in general, because it provides guidance, it serves as a tool and it contributes to simplify the design. This illustrates the value of the campus as a design concept for landscape architects and spatial planners.

5.1.2 | Limitations of this research
This thesis aims to provide an elaborate understanding of the campus phenomenon by investigating forty campuses worldwide. Restrictions in time and resources have limited the study of these campuses to map analyses, street-level imaging and literature reviews. Mainly because each campus had to be comparable in order to deduce their main characteristics and to discover patterns in the data to form campus typologies. This limits the validity of the data and depth of the results, since they cannot be analysed from a three-dimensional perspective. This has only had a minor impact on the results, since they aim to consider the campus from an abstract perspective, which does not necessarily require detailed observations on site. In addition, the systematic and thorough descriptions allow additional research from a three-dimensional perspective to improve the validity of this study.

It is impossible to cover the full complexity of a campus within an MSc thesis due to the large amount of variables and restrictions in time and resources. However, the complexity, interconnectedness and vagueness of the campus phenomenon requires an overarching perspective and a conceptual analysis to provide clarity. This thesis copes with this vagueness by investigating the campus phenomenon in its widest sense possible and then focusses on defining the core of the campus phenomenon. Standard approaches to campuses seem to aim for a list of necessary conditions to do so. However, there always seem to be exceptions. Ludwig Wittgenstein's notion of 'family resemblance' states that we should not try to find a single list of necessary conditions when trying to define a concept. We should rather consider different characteristics and differences in configuration (Wittgenstein 1958) (chapter 2.1).

However, these characteristics can never be fully exhaustive, neither can the evaluation criteria be completely objective, since this would require a complete understanding of all variables. This forms the main limitation on the results of this study, since the characteristics are based on a limited analysis, which are therefore not exhaustive. It makes us unable to pursue the dogmatism of science, which states that it is capable of absolute and complete knowledge (Merleau-Ponty 2004). The urge for complete and perfect scientific objectivity might obstruct necessary advancements within campus design. We can therefore ask ourselves to what extent is complete objectivity required to achieve these advancements? This thesis aims to illustrate the core of the campus phenomenon by providing its main characteristics. Although not completely objective, they actively respond to the existing confusion regarding the campus concept. They have been deduced from systematic data which allows additional research and reproduction. This thesis can therefore be considered a first step towards a full understanding of the campus phenomenon, which helps to constrain the limitations of this research.

5.2 | CONCLUSIONS

The present study investigates the campus phenomenon from an overarching and integral perspective, while testing these findings through a suitable campus design for VU Amsterdam. This thesis thereby aims to answer the following main research question: 'what characterises the campus phenomenon and how can VU Amsterdam become a campus which is in line with these characteristics?', through the following three research sub-questions:

- What characterises the campus phenomenon regarding its definition, development and composition from an overarching and integral perspective?

The campus phenomenon originates from the medieval European university and has gradually evolved into a multifunctional and dynamic landscape of science, business and daily life. The meaning of a campus has matured from encompassing 'the grounds of a university' to becoming an overarching design concept, which is applicable to a variety of spatial entities, such as universities and business parks. Forty elaborate campus analyses and an extensive literature study have established its main characteristics. A campus is concerned with the chemistry that blends the character of the place with its users and the use of its physical environment. Its success is attributable to the simplicity of the structure and its holistic character, rather than a collection of individual components. People are centralised in a beneficial park-like environment which nurtures the human scale and promotes meeting, knowledge exchange and inspiration. Moreover, clustered buildings create a variety of outdoor spaces, while utilising the relation with indoor spaces to accommodate the comfortability of people indoors, by i.e. stress reduction, increased productivity and stimulation of people's imagination (Maas et al. 2006; Groenewegen et al. 2006; McCormack et al. 2010). These spaces support a clear identity through unity and coherency, while supporting a cohesive community.

- What abstract campus types can be distinguished and what are their main characteristics?

Four abstract campus typologies have been derived from an extensive typological analysis (quantitative and qualitative), based on an elaborate and integral analysis of forty campuses worldwide. Each typology is distinctive according to a wide variety of characteristics, ranging from the transition with the context to the integration of green on site. The Enclaved Campus is mainly characterised as an introverted urban campus with an abrupt transition to the context and one main pedestrian-oriented green core. The Urban Campus is typified as an integrated urban campus with a gradual transition to the context and a variety of several subspaces which are interconnected by green-structures. The Parkland Campus consists of all-sided buildings which act as folly's on a uniform park layer. Finally, the Multi-cluster Campus is formed by several clusters which are divided by a landscape structure and create a contrast to the more intimate core areas.

- How can VU Amsterdam become a high quality campus which is in line with the characteristics that define the campus phenomenon?

The design for VU Amsterdam illustrates the implementation of the campus concept and is in line with the characteristics that define a campus as illustrated in appendix E.10. Moreover, the design responds to the goals of the VU and the municipality of Amsterdam as indicated in chapter 4.2. This illustrates the applicability of the campus as a design concept and it creates a high quality campus design for VU Amsterdam. The design reconnects the campus with its roots as a university along the canals of Amsterdam by reflecting the typical Amsterdam identity and intimacy. It utilises this identity to integrate a green and human centred enclave into the dynamic Zuidas district. Moreover, the design respects the small-scale- and introverted character of the VU and creates a vibrant and coherent campus where one can meet, study, work or live in an interesting diversity of several interconnected atmospheres. The design utilises the benefits of a green campus environment by optimising indoor-outdoor relations and by motivating the use of the outdoor spaces as a working, study or leisure environment. This multifunctional landscape is also beneficial for its environment through additions, such as: increased water storage capacity, a bicycle highway and a multitude of facilities.

5.3 | RECOMMENDATIONS

The present study provides the foundations for a progressive study towards a full understanding of the campus phenomenon on multiple levels of abstraction. I would recommend to extend the quality and impact of this research by studying the campus phenomenon in more depth and by testing the findings of this study through the activity of designing.

The systematic, thorough and comparable campus analyses as performed in this study, are particularly suitable to strengthen its foundations and to extend its boundaries. This will in turn enhance the reliability, validity and generalisability of this research. I will discuss four possible approaches to achieve this: firstly, I would recommend to extend the generalisability of this research by studying multiple campuses worldwide by using the same approach and by comparing this data to the results of this thesis to draw conclusions from a larger dataset. Secondly, I would recommend to improve the reliability of this research by studying the same examples used in this study and by evaluating the results of this thesis by multiple researchers. Thirdly, I would recommend to improve the validity of this research by studying and testing the campuses used in this research from a three-dimensional perspective to offset the weaknesses of a two-dimensional map analysis with a systematic analysis on location (Creswell 2009). This can for example be achieved by site visits, photo analysis or three-dimensional models. The process of this thesis did not allow such an analysis due to restrictions in time and resources. Finally, I would recommend to improve the validity of this research by testing the findings through the activity of designing, since design can be used as a vehicle for thinking. It possesses the ability to generate ideas through the creation, inspection and interpretation of visual representations of the formerly non visible (Nijhuis et al. 2011; Nijhuis and Bobbink 2012).

Maybe most importantly, I would recommend landscape architects and spatial planners to utilise the findings of this research to cope with the inescapable complexity of the campus as a multifunctional and interrelated component in the (urban) landscape. The overarching and integral perspective, in relation to an elaborate description of the history and development of a campus, provide useful insights regarding campus design. The abstract campus typologies have the potential to act as design concepts. They can be used through design scenarios to deduce the preferred future from a comprehensible range of four core concepts (Marien 2002; Hidding 2006). The main campus characteristics provide a clear overview of what a campus entails. These characteristics can be used throughout the process to detect possible problems and to continuously test the campus design by a cyclic iterative design process (Boekhorst 2006). The findings of this research possess the potential to enhance the efficiency and effectiveness of campus design regarding time and resources. The abovementioned points will contribute to enhance the quality of campus design in general, while remaining true to the principles of the campus phenomenon.

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Affordances
"The affordances of the environment are what it offers the animal, what it provides or furnishes, either for good or ill" (Gibson 1986, p.127). They can be considered as possibilities for action provided to an animal by the environment – by the substances, surfaces, objects, and other living things in it (Rietveld 2010; Rietveld and Kiverstein 2014). A familiar object such as a chair can evoke interaction by the urge to sit. The object 'affords' a place to sit, which we perceive as an 'affordance' (Rietveld 2011).

Family resemblance
Ludwig Wittgenstein's notion of 'family resemblance', mentions that we should not try to find a single list of necessary conditions when trying to define a concept. Rather, we should consider different characteristics and differences in configuration, to constitute a certain concept (Wittgenstein 1958). Wittgenstein uses the example of a family to illustrate this. Imagine a family, the Smiths, with twelve sons. Nine of them have beards, four of them have glasses, five have red hair and seven have black hair. Importantly, there is no single son who has a beard, glasses and both hair colours (which is what would have to be the case to give a 'traditional' definition of a Smith-son). Wittgenstein's solution is to say that the different configurations of the characteristics we have identified (i.e. beard, glasses, et cetera) constitutes what might be called a 'typical' son in the Smith family. But again, there need not be a son which actually fits this prototype (Wittgenstein 1958).

Landscape architect
A landscape architect, being the practitioner of landscape architecture, investigates the world from a multifunctional, multidisciplinary and context driven perspective and is concerned with maintaining, protecting and enhancing: functionality, beauty and sustainability of landscape (De Vries 2013; Vroom 2005).

Landscape architecture
A definition is provided by the European Council of Landscape Architecture (ECLAS):

"Landscape architecture is the discipline concerned with mankind's conscious shaping of his external environment. It involves planning, design and management of the landscape to create, maintain, protect and enhance places so as to be both functional, beautiful and sustainable (in every sense of the word), and appropriate to diverse human and ecological needs" (De Vries 2013, p.29).

Abstract

The meaning of a campus is rather ambiguous and there is no consensus what it should entail. This makes us unable to comprehend and design a campus. This thesis investigates the campus phenomenon from an overarching and integral perspective, by exploring its main characteristics and abstract campus typologies. This is achieved through a literature study, an elaborate reference study and a typological analysis. These results are integrated and tested through the design of the Kuyper Campus by design scenarios and a cyclic iterative design process. Results have indicated the development of a campus from encompassing 'the university grounds' to an overarching design concept. A campus is characterised by a human-centred space which supports a vibrant community and motivates knowledge exchange in a beneficial park-like environment. Four campus typologies have been established: the Enclaved Campus, the Urban Campus, the Parkland Campus and the Multi-cluster Campus. The design reconnects the Kuyper Campus with Amsterdam and integrates a green and human-centred enclave into the dynamic Zuidas district. It respects the small-scale- and introverted character of the VU and creates a vibrant and coherent campus where one can meet, study, work or live in an interesting diversity of several interconnected atmospheres.

Keywords: campus phenomenon, design, conceptual research, typological analysis, VU Amsterdam, landscape architecture.

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