Evaluating Gender Blindness and User Satisfaction in Dutch CampusMap Creation

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Abstract

This thesis evaluates the presence and implications of gender-blindness in the design of campus maps at five Dutch universities. Through a combination of literature review and case study analysis, the research explores how feminist critiques of mapping practices — particularly the accusation that maps claim neutrality, unknowingly neglecting certain perspectives and user needs — apply to campus map design. The universities examined include Delft University of Technology, Vrije Universiteit Amsterdam, Erasmus University Rotterdam, Wageningen University & Research, and Eindhoven University of Technology. The methodology involves qualitative interviews with map makers and a quantitative survey of campus users, combined with qualitative comments and follow-up interviews, offering insights into both the creation and evaluation of the maps. The findings suggest that a lack of awareness of gender-related issues, along with limited incorporation of diverse perspectives and technical constraints, may result in the neglect of the needs of different campus users. However, the potential negative consequences this has on (spatial) inequalities on campus seems limited, as campus users appear not to be frequent campus map users.

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1 Introduction

There has been a growing awareness in recent years that many products and services, initially thought to be designed for a "neutral" or "default" user, are in fact shaped by the needs and experiences of men, often to the exclusion of other groups [Criado-Perez, 2019; Lobben et al., 2015; Henriques et al., 2023]. Scholars like Criado-Perez [2019] have criticized this gender-biased approach, pointing out that designs based on a male default can marginalize or exclude users who fall outside this definition, by not meeting their needs.

This critique extends to cartography, where maps are often presented as neutral, objective and disembodied displays of space [Falahatkar, 2024; McLafferty, 2002; Fileborn, 2023; van Houtum, 2024; MacAya et al., 2021]. However, as scholars such as Carton [2007]; Dittus and Graham [2022]; van Houtum [2024]; Ramon and Monk [2007]; Harley [1989] and Martini [2021] have argued, maps are far from neutral; they reflect the intentions and biases of their creators and exert power over how space is perceived and used. The assumption of neutrality, and a lack of consideration for different perspectives in maps is a concern raised by feminist critiques of cartography and geography [Falahatkar, 2024; Mclafferty, 2005; Lobben et al., 2015; MacAya et al., 2021; Monk and Hanson, 1982], and can be referred to as "gender-blindness", similar to the critiques on the gender-biased approach by Criado-Perez [2019], MacAya et al. [2021] and Henriques et al. [2023].

As maps become more readily available at any moment, for example through the use of mobile phones, they have a potentially increasing influence on how map users interact with and navigate the space around them [Dittus and Graham, 2022; Ramon and Monk, 2007], such as a Google Maps user deciding where to go, based on Google Maps reviews [Dittus and Graham, 2022]. Therefore, maps might exacerbate spatial inequalities [MacAya et al., 2021; Libertun de Duren et al., 2023], when not accounting for diverse, or marginalized user needs [Lobben et al., 2015; MacAya et al., 2021; Criado-Perez, 2019; Dittus and Graham, 2022].

Not only is the way we use maps changing, but the way they are being produced has evolved as well. Mapping has shifted from a creative process based on travelers' stories [van Houtum, 2024; Dittus and Graham, 2022] and an exclusive process accessible only to experts with expensive tools [Dittus and Graham, 2022], to a digitally enabled process where 'anyone can make a map' [Tyner, 2010]. The trust in technology and data to provide us with the 'truth' [Dittus and Graham, 2022; van Houtum, 2024; Harley, 1989] and the tendency of mapping platforms to present their maps as neutral and objective [Dittus and Graham, 2022] may strengthen the belief among users of modern day maps that maps are unbiased and objective [van Houtum, 2024]. This unawareness can lead to unknowingly adopting conventional representations without being able to 'read between the lines' of a map [van Houtum, 2024], while these representations, shaped by traditional practices, may continue to reproduce ways of viewing the world or power structures that further marginalize already marginalized groups [Boys, 1996; MacAya et al., 2021].

Universities are increasingly focused on fostering inclusive environments, with feminist initiatives aimed at improving campus safety, promoting LGBTQ+ inclusivity, and encouraging the representation of diverse identities in academic spaces [Sheridan and Jacobi, 2014; Coulter and Rankin, 2020; Self and Hudson, 2015; Falahatkar, 2024]. These efforts include addressing issues such as sexual assault prevention [Coulter and Rankin, 2020], promoting inclusive practices through LGBTQ+ centers [Self and Hudson, 2015], and integrating diverse perspectives into the curriculum [Faulkner et al., 2021]. However, as maps shape perceptions of space, campus maps have the potential to either reinforce or disrupt dominant ways of thinking about campus environments [Fileborn, 2023], and may contribute to or detract from these inclusivity efforts.

This thesis aims to investigate whether campus mapping processes in the Netherlands exhibit gender-blindness and what the potential implications of this are for students and other users based on their gender.
Through a case study of five Dutch universities, this research will explore to what extent the mapping process is inclusive or whether it marginalizes certain groups, particularly based on gender. By testing the feminist critiques of cartography on the campus mapping processes, and exploring the satisfaction of students, this thesis aims to contribute to the feminist discourse around cartography and mapping.

1.1 Research Objectives and Research Questions

The main objective of this thesis is to examine to what extent feminist critiques on cartography of neglecting certain perspectives and needs, resulting in a gender-blind approach to mapping, are applicable to the mapping process of campus maps. Additionally, by retrieving users' opinions, the goal is to examine to what extent campus maps meet or neglect user needs, and whether there is a clear indication of certain groups being neglected, specifically based on gender. According to the literature, current cartographic practices are shaped by conventions that have developed over time, and critics call for a re-evaluation of the practice of mapping. Therefore, this thesis explores gender-blindness in campus mapping practices in the Netherlands through a case study approach.

This leads to the following main research question:

To what extent is gender-blindness present in the mapping process of campus maps in the Netherlands?

The following sub-questions were established:

1. What does the discipline of mapping currently look like?
2. What does gender-blindness mean in the context of mapping and cartography?
3. What can be harmful implications of a gender-blind approach in mapping and cartography?
4. What does the current mapping process of different campuses in the Netherlands look like?
5. To what extent do the campus maps of different campuses in the Netherlands satisfy user's needs?
6. To what extent is there a correlation between levels of gender-blindness in the making of the campus map and the satisfaction of different user needs?
7. To what extent is there a correlation between the level of satisfaction of these users, and their socio-demographic characteristics, such as gender?

The first three sub-questions focus on theory, specifically examining gender-blindness in mapping and cartography. These questions will be addressed through the theoretical framework (Chapter 2), which reviews the current literature on mapping processes, and the critiques on cartography, geography and mapping feminist scholars have raised. The case study methodology (Chapter 3) then builds on this framework to investigate gender-blindness in campus maps across selected universities, answering sub-questions 4, 5, 6, 7, and finally the main research question.

1.2 Thesis Structure

This thesis is organized in the following chapters:

1. Introduction: The topic of the thesis is introduced, as well as the objective, and the research questions.
2. Theoretical Framework: This chapter presents an in-depth review of literature on mapping processes, gender-blindness, and feminist critiques of cartography. It discusses the concept of gender-blindness in mapping and its potential consequences, and provides strategies from the literature on how to address gender-blindness. Theoretical insights are linked to the first three sub-questions, laying the foundation for the case study that follows.
3. Methodology: This chapter explains how the methodology for the case study was developed based on the findings of the literature review. It includes a detailed description of the case study design, case selection, and the methods used to collect and analyze data. The methodology addresses the remaining sub-questions by investigating gender-blindness in the campus mapping processes of selected universities.
4. Case Study Introduction: The different campus maps that have been investigated in this thesis are presented.
5. Results and Discussion: The main findings from the case study are presented here, including insights from interviews with map-makers and results from surveys and follow-up interviews with students. This chapter links the findings back to the theoretical framework and addresses the limitations of the research.
6. Conclusion: The final chapter answers the research questions and provides recommendations, both for the mapping processes of universities, and for future work based on the insights gained from the study.

2 Theoretical Framework

The theoretical framework is developed through a review of relevant literature including both peer-reviewed scientific papers and essay-type sources that contribute valuable insights into the discourse around critical feminist cartography and geography. The literature research was guided by the first three research questions (see Section 1.1) The insights gained from this framework have shaped the campus map case study that follows.

2.1 Defining Mapping

Before delving into the literature that analyzes and criticizes maps, cartography and map-making, these terms need to be defined. Tyner [2010] discusses the fact that there is no one definition of what a map is. Traditionally, a map has been defined as a tool for communicating generalized spatial information and relationships, often using scale, symbols, and simplification to make complex realities more understandable [Lapaine et al., 2021]. Early definitions of maps excluded certain forms of spatial representation, such as satellite imagery or 3D maps, but contemporary definitions recognize a broader range of map types [Tyner, 2010].

Lapaine et al. [2021] defines the practice of cartography as *"the science, technology and art of cartographic mapping and using maps"*. Which is echoed by Tyner [2010]. There exist different types of cartography with different goals, such as geographic cartography, used by geographers for world studies, and engineering cartography, used by engineers, for example for planning gas lines [Tyner, 2010].

When GIS (Geographic Information Systems) was introduced, the view on cartography changed [Tyner, 2010]. This was partially a result of the increasingly blurry distinction between GIS and cartography, as *"computer cartography"* studies turned into *GIS* studies, and *cartography* remained associated with the manual practice of mapping [Tyner, 2010]. However, Tyner [2010] notes that even though GIS can produce maps and present data, the main strength of GIS was the analysis of data [Tyner, 2010]. However, more recently, increased attention has been given to the *presentation* of data in GIS [Tyner, 2010].

Finally, map-making can be defined more generally, as any method that creates a map, either manually or using a computer, regardless of scale and purpose [Tyner, 2010].

2.2 An Instrument of Framing

2.2.1 A Map is a Reflection, but Not a Mirror

Maps are an abstraction of the complex, three-dimensional world around us [Monmonier, 1996]. A map cannot show everything at once, if it should remain legible [Dittus and Graham, 2022]. A map-maker has the ability to frame the spatial information as they desire, with the intention they desire, based on the purpose they assign to the map [Carton, 2007].

The selection of information, and how to show it, are results of the constraints of the medium, and the way the map-maker has chosen to communicate the intended goal of the map [Dittus and Graham, 2022]. A map can both emphasize and hide spatial elements, based on underlying ideas of what information is important [Carton, 2007]. Monmonier [1996] argues that a map is an instrument to tell a selective story with.

The idea that science and knowledge production cannot be neutral or objective, but is always situated into a political, cultural and social system [D'Ignazio and Klein, 2016], applies to maps as well. Choices that decide the final map, are influenced by the context in which the map is made [Ramon and Monk, 2007; Monk and Hanson, 1982; Carton, 2007; Dittus and Graham, 2022], and the personal beliefs and values of the map-maker [Ramon and Monk, 2007; Harley, 1989; Carton, 2007]. Therefore, many argue that a map has power [Krygier and Wood, 2011; Martini, 2021], and organizes spatial information into a politically, culturally and socially shaped frame of the world [Carton, 2007; Fileborn, 2023]. This makes a map a situated artefact of information [Fileborn, 2023].

2.2.2 Mapping Conventions

In the pre-digital era, geographic information was processed and distributed through institutions like universities, where a select few controlled the production of maps [Dittus and Graham, 2022]. This was partly due to the exclusive access to the tools necessary to produce maps, which led to a location bound, limited engagement with spatial data [Dittus and Graham, 2022]. These limitations have led to a hegemony in spatial representations, over which the control has been used as a way of exerting power, economically, socially and politically [Dittus and Graham, 2022; Ramondetti, 2023; Harley, 1989].

Mapping conventions, or the spatial language used in maps, have been shaped by these hegemonic groups [Self and Hudson, 2015]. Self and Hudson [2015] specifically shines light on the tendencies of geographers in the global North to chart, map, and define spaces, pinning down locations that exist in a complex reality. The spatial language that is used to pin down these places then again impacts how the global North views certain societal phenomena such as public/private spaces or city/country spaces [Self and Hudson, 2015].

Carton [2007] describes the fact that in the Western world, scholars are being exposed to cartographical conventions such as grammar and symbols, and the ways in which cities, roads and boundaries are mapped, simply by the way a map is hung up on a classroom wall. These conventions almost subconsciously shape the way Western scholars think about how to display spatial information, but also are rooted in the way the Western world views things such as territory and land property. In practice, these mapping conventions have led to what Dittus and Graham [2022] calls "hegemonic representations," where maps reflect and promote the interests of powerful social groups. As Ramondetti [2023] explains, maps have historically served as tools of authority.

2.2.3 Recent Mapping Developments

The positivist turn in science during the 19th century had a significant influence on the discipline of cartography [van Houtum, 2024]. During this period, there was a tendency to abstract and generalize worldly phenomena into rational and pure forms, strengthening a rationalized approach to cartography [van Houtum, 2024]. Additionally, this has led to a tendency to view maps as unbiased, emotionless, and authoritative representations of the world, breaking everything down into abstract geometric shapes [van Houtum, 2024], and breaking spatial phenomena down into hierarchical structures [Harley, 1989]. Harley [1989] discusses the belief among cartographers that scientific developments allow for more precise representations of space, which results in a tendency to look down on historic maps, as well as maps of non-Western cultures. By creating a 'standard', everything that did not comply with this standard, could be dismissed, as it was seen as inaccurate or even misleading, and therefore flawed [Harley, 1989]. This aligns with what van Houtum [2024] notes about the shift away from cartography being seen as a creative process based on travelers' stories and imagination, and instead, it began to be seen as an exact science, which is digital and organized. Moreover, Dittus and Graham [2022] describe the phenomenon of western technologies erasing the positionality and social context under which the information is produced, and pretending this "view from nowhere" that the technology offers provides the only truth.

However, with the rise of technologies and the internet, and the increased access to computers, economic and technical barriers to access information have been lowered [Dittus and Graham, 2022], which potentially allows citizens to a bigger role in shaping the construction of knowledge and culture. As Budhathoki et al. [2008] highlights, the advent of interactive online technologies has enabled users to actively contribute to the production and dissemination of spatial data, shifting the role of users from passive recipients to active participants. This shift is facilitated through tools like Google Maps, OpenStreetMap, and other platforms, which allow individuals to generate, modify, and share geospatial data [Budhathoki et al., 2008]. Moreover, Tyner [2010] even suggests that anyone can be a map-maker, not only through making a "professional looking map" on a computer, but also through sketching, using illustration programs and downloading and annotating maps from the internet, indicating a big shift in the discipline from exclusive towards open and accessible [Dittus and Graham, 2022; Tyner, 2010].

Geographic Information Systems (GIS) are often considered a tool tools for allowing broader access to and participation in the creation and sharing of geographic information [Budhathoki et al., 2008]. Both Dittus and Graham [2022] and Ramondetti [2023] question the potential of digitization to challenge the hegemony of cartography, as an uneven digital representation and participation often still reproduce existing power imbalances. Issues regarding the accessibility and opportunity to participate in the sharing and shaping of data are also discussed by van Loenen [2006] and Budhathoki et al. [2008]. The development of Geo-Information Infrastructures (GII) [van Loenen, 2006] has increased the possibility to exchange, manage, and use geo-information, with the eventual goal of providing the end-user with a GI product that fits their needs, in terms of quality, type scale, user interface and type [Van Loenen and Zevenbergen, 2010]. In the process of creating this GI product, several steps are taken, and with each step, value is added to the data. The Value Chain Analysis, divides the Geo-Information chain into the following steps (see Fig 2.1)

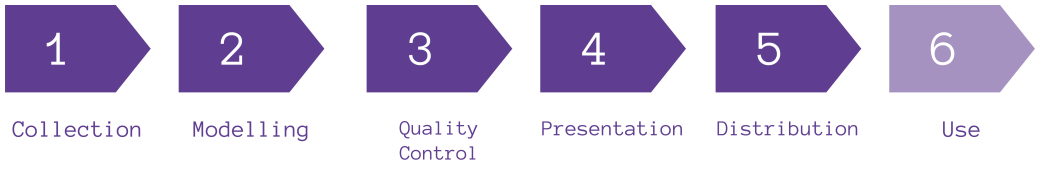


Figure 2.1: Example of a Geographic Information Enhancement Chain Van Loenen and Zevenbergen [2010]

In each step, different contributors can add value to the GI product, depending on factors, such as user needs. GIS and GIIs offer potential for more inclusive and collaborative map-making, yet these systems still face challenges in overcoming power imbalances and ensuring equitable representation across different regions and communities [Dittus and Graham, 2022; Budhathoki et al., 2008]

2.2.4 Map Visualization

MacEachren and Taylor [1994] offers an approach to cartographic visualization which balances between visual thinking, a ”private” activity that explores spatial data to reveal unknowns, and visual communication, a ”public” activity that communicates information and reveals knowns. In figure 2.2 it is indicated where on the axes of the ”cartography cubed” model of [MacEachren and Taylor, 1994], the campus maps as discussed in this thesis fall. The goal of those maps is to present the information that is known to the map-maker, to the public, with the user of the map having only a low level of interaction with the map; the user only has to visually scan the map [MacEachren and Taylor, 1994].

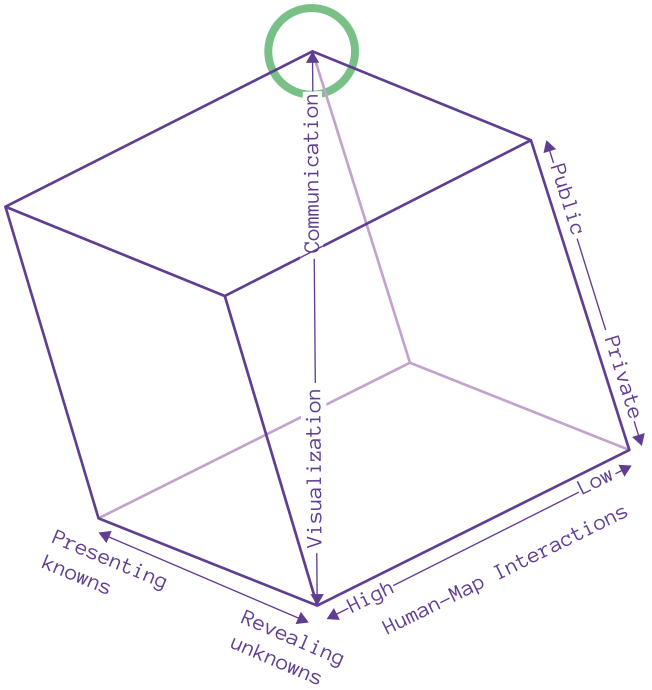


Figure 2.2: The ”cartography cubed” model by MacEachren and Taylor [1994]. Indicated in green where the campus maps discussed in this study fall on the axes of map use

As established earlier, maps are not neutral representations; they are shaped by the choices of the map-maker, which are informed by technologies, design choices, and the cultural context from which they are created. The visual elements that compose a map play a critical role in how information is perceived, influencing the framing of the space being represented [MacEachren and Taylor, 1994; Carton, 2007]. A map can use a visual language to communicate its meaning [MacEachren and Taylor, 1994] or, as Harley [1989] describes it, the cultural text of a map. The elements of which the map is composed can be considered the "grammar" of the visual language or text of a map [Carton, 2007; Harley, 1989]. Recognizing that a map is a cultural text allows for the acknowledgement that it can be interpreted in multiple ways, and that a map provides a narrative [Harley, 1989].

Map Elements

To understand the ways in which these visual elements can contribute to the narrative, or frame that a map sets, several of these elements, as described by Krygier and Wood [2011], Tyner [2010] and Bell [2023] will be discussed below. It is important to note that these map elements are based on the definition of a map that Tyner [2010] and Lapaine et al. [2021] offer, which to some extent exclude alternative definitions of maps.

According to Krygier and Wood [2011], Tyner [2010] and Bell [2023] a map, as defined by Lapaine et al. [2021] and Tyner [2010], is or should be composed of the following elements:

1. Content
2. Layout
3. 2D versus 3D
4. Scale
5. Legend
6. Text
7. Use of Color
8. Symbols

The impact of their application in the map on the usability and readability of the map is explained below:

1. Content

Before the design of map elements and their composition is decided, the content of the map has to be determined. The subject of the map, and the intended purpose and expected audience influence what the map-maker wants to show or not to show. The decision on what to display and what to leave out should be taken into consideration, as the selection of information proposes a certain frame [Krygier and Wood, 2011]. Additionally, the map-maker should try to avoid including information that is deemed unnecessary or incorrect [Krygier and Wood, 2011; Tyner, 2010].

2. Layout

A map layout is the arrangement of various map elements on a page. When composing a layout for a map page, certain things can taken into consideration, which influence the impact the layout has on the way the information in the map is viewed.

The composition of elements can draw the viewer's eye to certain elements, that are deemed more important than others. This can be achieved through size, contrast, and placing on the map. For example, when elements are placed in the visual center of the page, it attracts the attention of the viewer. Elements that are placed lower on the page is less noticable than information on the top of a page. Increasing the size, and the amount of space an element takes up on a page will emphasize this element as well. Moreover, choosing the position of elements on the page should follow a certain logic, to prevent confusion. This involves both the order of the elements that follow a certain visual path, but also the absence of obstructing elements in this path [Tyner, 2010; Krygier and Wood, 2011]. Many viewers view a page from top left to bottom right. It is suggested that information is organized in such a way that what should be seen first (e.g. map title or explanation) is located on the top left, and there is no overload of information that clutters the map and makes it unclear where to look (see Figure 2.3).

However, both Tyner [2010] and Krygier and Wood [2011] note that a map is not a serial form of communication, a map-maker can only try to guide the viewer through the information. There is no one correct layout a map should have, and it is hard to predict a viewers eye movement over the map [Krygier and Wood, 2011]. Therefore, deciding the overall layout is an experimental process which includes intuition and feedback.

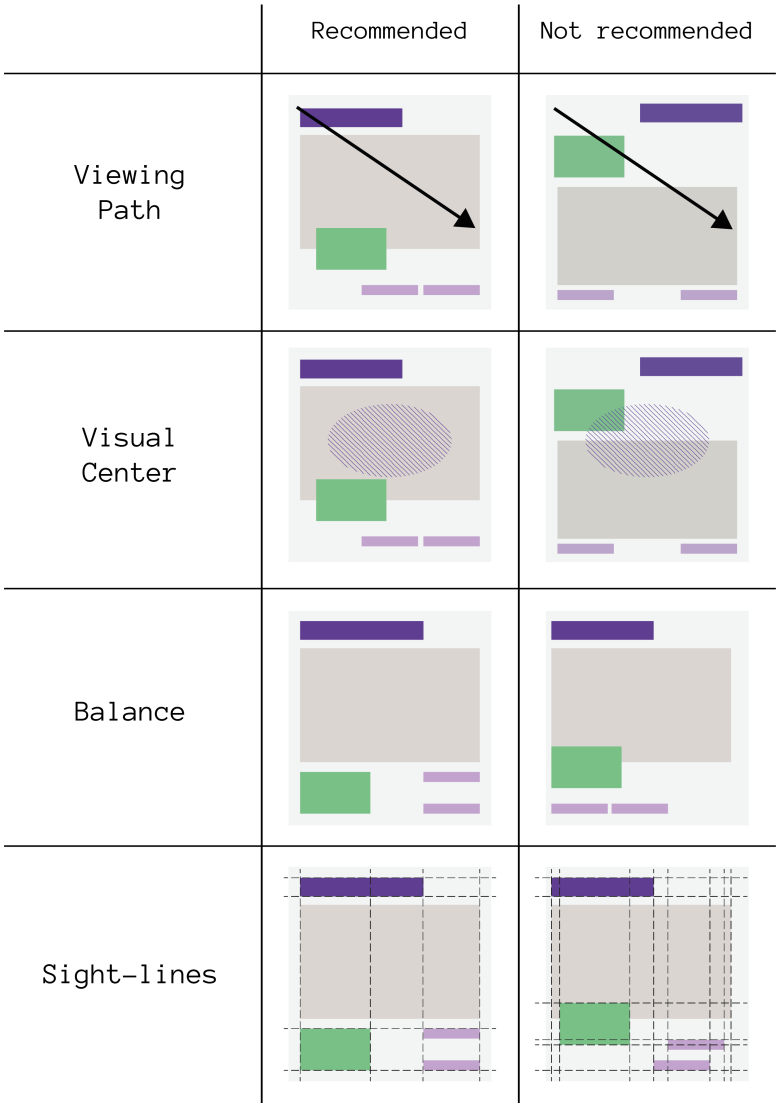


Figure 2.3: Examples of recommended and not recommended visual arrangements, according to Krygier and Wood [2011]

3. 2D versus 3D

The choice to show a map in either 2D or 3D highly impacts the way in which some types information can be displayed in the map, such as building heights, facades, and terrain height differences (see Figure 2.4). This information could also be provided in a 2D map, but then the map runs the risk of becoming overloaded with information. There are claims of 3D maps being more intuitive to interpret [Presagis, 2023] but also research that shows information recall is more effective from 2D maps than from 3D maps [Niedomysl et al., 2013].

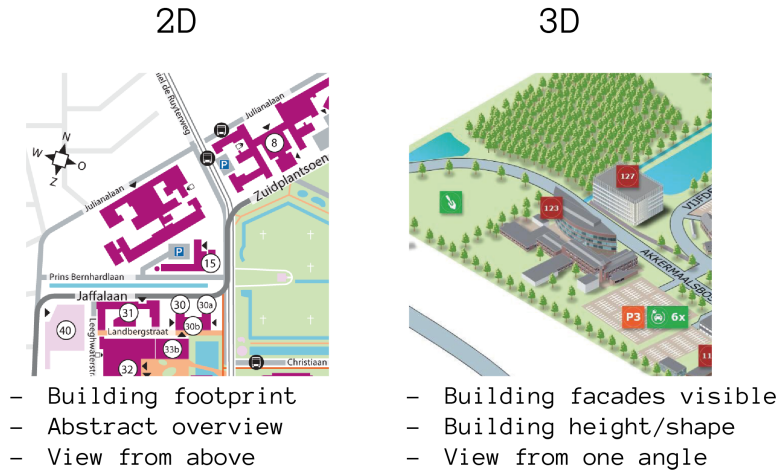


Figure 2.4: Example of different attributes of 2D and 3D maps

4. Scale

The scale should be chosen with care, as it determines the extent of the area that fits on the page, as well as the level of detail which the map can provide without losing clarity. A large scale map is limited in the area that it can show, but can provide much more detail, whereas a smaller scale map can provide a bigger overview with more context, but loses detail (see Figure 2.5) [Tyner, 2010; Krygier and Wood, 2011].

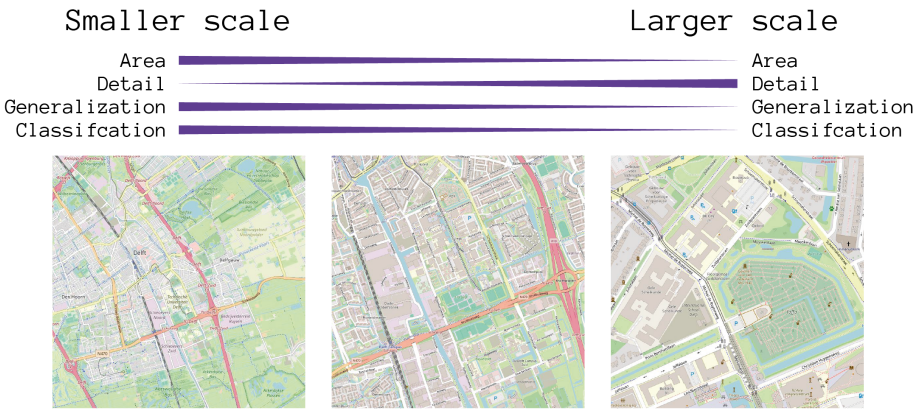


Figure 2.5: Example of how scale changes the level of detail and covered area of the map according to Krygier and Wood [2011]

5. Legend

A legend is the key to understanding the map, and should explain all elements, such as colors or symbols, that the viewer is not familiar with. A legend should be complete, and clear [Tyner, 2010].

6. Text

There are various different forms of test that can exist on a map, such as labels, explanatory text, the title and other text. Labels might indicate the names of features, such as cities, buildings, or bus stops. Explanatory text blocks can be used to further clarify or explain information, for example to provide extra context, or include information that is not easily displayed on the map itself. The title of the map should include the topic of the map. Finally, other text might be included in other map items such as the legend or the scale bar.

Tyner [2010] and Krygier and Wood [2011] both argue that text should only be added if necessary, and an overload of text can cause clutter in the map. Additionally, text can reveal more about the map-makers' interpretation of the information provided, and may leave less to the imagination of the map viewer [Krygier and Wood, 2011].

Not only the content of the text, but also its visual appearance can influence the interpretation of the text. Size, font, and color can emphasize the meaning of the text (see Fig. 2.6), and increase its clarity and readability by making it stand out from the background.

Figure 2.6: Example of the hierarchy in the meaning of the text emphasized through its font and sizing [Krygier and Wood, 2011]

7. Use of Color

Color in a map can be used for different purposes, such as visual appeal, creating contrast for readability, or evoking association through realistic color use (see Figure 2.7). Balance in color use is suggested to improve the clarity of the map and the way it can communicate the information [Bell, 2023]. According to Krygier and Wood [2011], color has a big impact, either positive or negative on the design of a map. The way colors are interpreted by the view depends on the combination of colors used, the saturation (brightness) of the colors, the ability of the viewer to distinguish color (due to color blindness or old age), but also on the symbolic and cultural connotation the color has to the viewer [Krygier and Wood, 2011]. Therefore, color should be caerfully chosen when designing a map [Krygier and Wood, 2011].

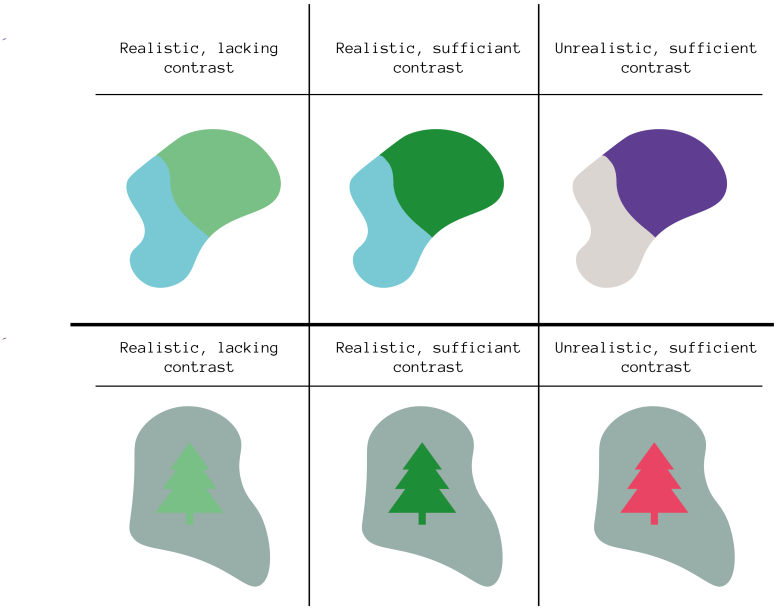


Figure 2.7: Examples of color use for association or contrast, based on Krygier and Wood [2011]

8. Symbols

Symbols can be used to represent certain features, such as buildings, toilets, or bus stops. Tyner [2010] emphasizes that the selection and design of symbols can be considered to have a major role in creating a functional map. Symbols can be divided up into points, lines and areas (see Figure 2.8).

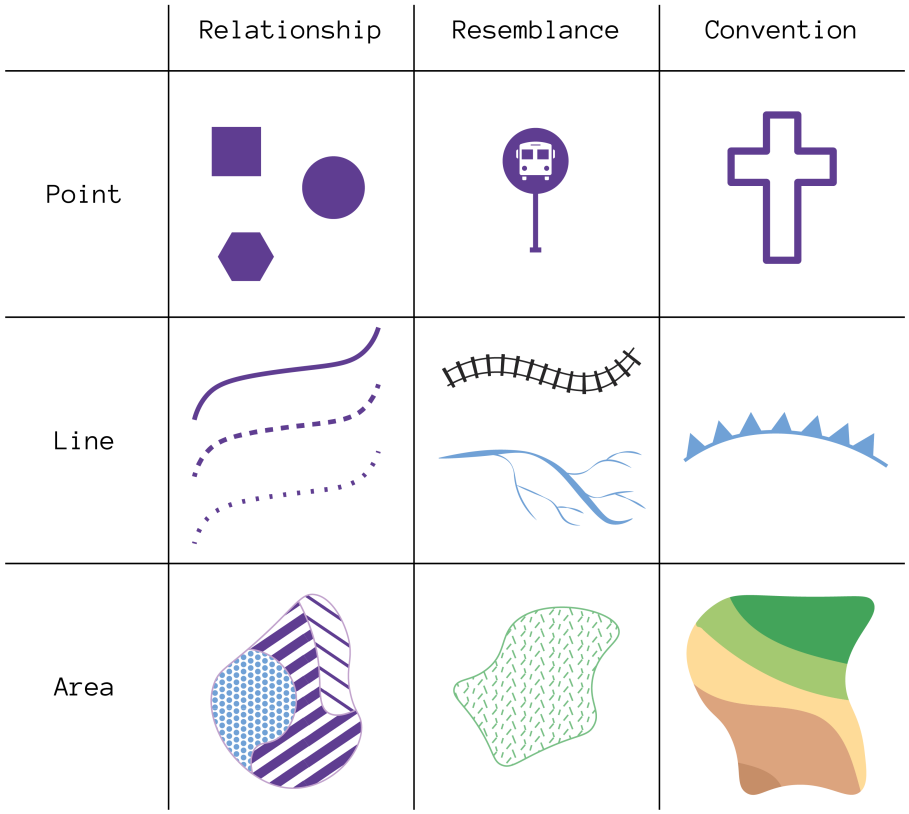


Figure 2.8: Examples of point, line and area symbols that work by relationship, resemblance or convention, as established by Krygier and Wood [2011] and Tyner [2010]

Symbols can work by relationship (e.g. different shapes such as squares, circles and triangles indicating differences in the content), resemblance (e.g. an icon of a tree representing a tree) or convention (e.g. symbols that have often been used to indicate something even though it doesn't resemble this, such as a railway indicated by a black and white blocked line) [Krygier and Wood, 2011]. Examples of each category are shown in Figure 2.8

2.3 Gender-Blindness

The selective nature of maps, as explored in the previous section, raises important questions about whose perspectives and needs are reflected in map-making. A concern has emerged among scholars about the impact of gender-blind product design and service development [MacAya et al., 2021; Criado-Perez, 2019; Henriques et al., 2023]. As Henriques et al. [2023] describes this, gender-blind approaches are based upon the assumption that neutrality is equivalent to equality. The lack of recognition for the subjectivities and biases that are imposed onto the product, as well as the influence on this on the user, often go unnoticed [MacAya et al., 2021; Henriques et al., 2023], or come from the intention of treating everybody the same way [MacAya et al., 2021]. MacAya et al. [2021] defines gender-blindness as failing to acknowledge that *"roles and responsibilities of women/girls and men/boys are ascribed to, or imposed upon, them in specific social, cultural, economic and political contexts"*.

The following general definition of gender-blindness is used in this thesis:
The assumption that treating everyone the same, without considering gender differences, such as roles, responsibilities and experiences that are shaped by social, cultural, economic, and political contexts is equivalent to equality.

This gender-blindness in the design of products or services might lead to the neglect of the unique needs of different users, based on their gender, and fails to address the implicit biases in products or services [MacAya et al., 2021; Henriques et al., 2023].

Gender-blindness can manifest itself in different ways in different contexts. In what ways and to what extent this could be a problem, will be explained in the following sections.

As this thesis tries to investigate the concept of gender-blindness in the creation of campus maps, and how this affects its users, the concept of a "default user" will be discussed, followed by feminist critiques of geography, cartography and (digital) mapping that align with the notion of gender-blindness, as described above. Finally, a definition of gender-blindness in the context of cartography will be proposed.

2.3.1 A Default User

In fields such as product design, and strategic and urban planning, there is a recurring issue where designs and services are developed with a "default user" in mind [Criado-Perez, 2019; Henriques et al., 2023; Lobben et al., 2015; MacAya et al., 2021]. This default user is often based on the male experience and body, leading to a narrow focus that neglects the diverse needs and experiences of those who fall outside of this definition [Lobben et al., 2015; Criado-Perez, 2019; MacAya et al., 2021]. As Henriques et al. [2023] notes, the absence of diverse voices in design spaces creates a gendered imbalance that assumes a normative male default, often leaving other groups unconsidered, which could lead to the neglect of their needs. This issue arises because male bodies and experiences are unconsciously assumed to be the standard, leading to designs that unintentionally exclude others [Criado-Perez, 2019; MacAya et al., 2021; Lobben et al., 2015].

As Criado-Perez [2019] argues, many aspects of our daily lives — ranging from medical needs to transportation habits — have been approached with a focus on male needs and characteristics. Medical studies frequently prioritize male bodies, leading to misdiagnosis or inadequate treatment for women [Criado-Perez, 2019]. Similarly, public infrastructure like transportation systems cater to the typical commuting patterns of men, overlooking the different travel behaviors of women, such as "trip chaining" [Criado-Perez, 2019]. Falahatkar [2024] provides a similar example, emphasizing how men and women engage with and navigate urban spaces differently, due to their different roles, responsibilities, physical abilities and sense of safety. These differences between the usage of public space are often not reflected in the urban fabric [Falahatkar, 2024]. MacAya et al. [2021] highlights how urban policies also often ignore the lived experiences of women and non-conforming gender identities, treating all people as if they experience the city in the same way. These examples may seem obvious in retrospect, but were not recognized for a long time Criado-Perez [2019].

MacAya et al. [2021] and Lobben et al. [2015] argue that a big part of this problem stems from the fact that when assuming a "default" anyone that falls outside of this definition, such as in this case women, or other gender identities, is seen as an exception, or the "other". Henriques et al. [2023] describes this assumption of a default user of products and services as the silent standard of maleness around which the designs resolve, without needing to explicitly acknowledge it. Moreover, MacAya et al. [2021] criticizes the assumption that there even could be a "universal user" at all.

When considering a map as a product that is designed to be used by people, Lobben et al. [2015] critiques the concept of a "mainstream, empowered map user", and calls for the expansion of the definition of map users to include marginalized groups and their needs. Lobben et al. [2015] argues that for a map to properly fulfill its purpose - communicating information to its user - the differences between individual map users should be considered during the design of the map. These differences can be in terms of gender, culture, age or disability.

2.3.2 Feminist Critiques on Geography and Mapping

Seeing a map as a product communicating information to a user [Lobben et al., 2015; MacEachren and Taylor, 1994], and a product made from a certain perspective and with conventions that have been shaped over time [Huffman, 1997; Carton, 2007; Dittus and Graham, 2022] and reflecting the priorities and assumptions of its creators [Dittus and Graham, 2022; Carton, 2007; Monmonier, 1996; Krygier and Wood, 2011], it seems imperative to investigate in what ways the approach to mapping could lead to the neglect of user needs that fall outside of the "default".

Different waves of feminist critics of cartography have pointed out issues in mapping practices over time, and in more recent literature, also in GIS and digital mapping tools [Huffman, 1997; Fileborn, 2023; Monk and Hanson, 1982; Bian and Qiao, 2024; Falahatkar, 2024; Kwan, 2002a; Schuurman and Pratt, 2002; Mclafferty, 2005; Carton, 2007; van Houtum, 2024; Ramondetti, 2023; Crampton and Krygier, 2010]. They challenge traditional approaches and propose new ways of understanding and representing spatial information. In this section the different critiques will be discussed.

What is important to note is that

> "Feminism is "not (just) a women's issue, nor does feminist theory help to inform issues of gender alone. As the binary distinction between male and female, as well as the hierarchical relation that posits male above female, have been abstracted to serve as models for a range of structures and systems, feminist theory has been marshaled in order to challenge the validity of a variety of binaristic and hierarchical configurations" [D'Ignazio and Klein, 2016].

Which means feminist approaches can be used to overturn systems of oppression [D'Ignazio and Klein, 2016], that exist along different axes, such as race, ethnicity, age, sexuality, religion and nationality [Kwan, 2002a; Bian and Qiao, 2024]. Additionally, Varanka [2005] addresses the risk of polarizing gender experiences, which has often happened in traditional research areas that studied the history of women cartographers or the cartography of women-centered issues. With this polarization, the assumption that there is a clear distinction between the male and female approach to making, analyzing or reading maps. Varanka [2005] proposes to see gender as social constructions of femininity and masculinity that have shaped mapping practices, and acknowledge the complex relationships in which people live.

A Male Perspective

Feminist scholars have long argued that knowledge creation reflects the context and priorities of those in power, often leading to the reproduction of dominant perspectives [Monk and Hanson, 1982]. As Monk and Hanson [1982] explains, the traits and perspectives of researchers shape the topics that a discipline prioritizes. In geography, this has meant that research has traditionally not focused on gender roles, leading to a significant omission of women's perspectives in the spatial knowledge that is produced Monk and Hanson [1982].

den Hoonaard [2013] draws the connection between this bias in geographical research and cartographic design, since cartography and visualization shapes the imagination of the geographer and is a tool to create and share geographical knowledge. Moreover, both den Hoonaard [2013] and Huffman [1997] argue that the discipline of cartography specifically has prioritized male perspectives, through mapping representations and orderings of space that reinforce power structures. An example of this is the distinction between public and private spaces, much like Self and Hudson [2015] described, that reflect patriarchal structures [den Hoonaard, 2013]. Feminists from the 80s point out how private space symbolizes restrictions on women, and the public represents freedom assigned to men [den Hoonaard, 2013]. Moreover, spatial metaphors that den Hoonaard [2013] addresses, such as mapping terms (site, space, terrain), belong to masculinist ways of ordering and viewing space, that, according to Huffman [1997], have excluded women in maps.

Mahmoudi and Shelton [2022] explains that what is not mapped is just as significant as what is mapped, as this exclusion shapes the conventional ways of seeing and understanding the world. This exclusion contributes to the invisibility of minority groups and their experiences in spatial data [Mahmoudi and Shelton, 2022; Falahatkar, 2024]. Not including features that consider specific safety needs of women and gender minorities, might limit them in their ability to navigate spaces safely and comfortably [Falahatkar, 2024].

Assuming Neutrality and Objective Truth

Feminist critiques have long challenged the assumption that maps and the process of mapping can be neutral or objective, arguing that traditional cartography has been shaped by masculinist approaches that enable disembodied, ungendered perspectives Harley [1989]; Huffman [1997]; Kwan [2002a]. These perspectives are presented as rational, objective, and unbiased, but they often exclude alternative ways of knowing, particularly those based on emotion, embodiment, and situated experience [Pirani et al., 2020; Huffman, 1997; Kwan, 2002a]. A study by Pirani et al. [2020] suggests that maps created from a traditional, disembodied, and ungendered viewpoint may unintentionally dismiss women's real-world experiences.

The issue with a masculinist approach that assumes that maps can be created from an objective, neutral point of view, detached from human or gendered experience, and sets itself as the standard, contrasting itself against the embodied and gendered female "other" [Kwan, 2002a; D'Ignazio and Klein, 2016; Libertun de Duren et al., 2023]. This reinforces a male-centric, view, which was often presented as an objective "view from nowhere", and pretends the subjective position of the map-maker doesn't exist Kwan [2002a]. Therefore, it ignores gendered experiences, such as accessibility to safe spaces Falahatkar [2024].

Pirani et al. [2020], Fileborn [2023] and Huffman [1997] argue that emotions and affect play a significant role in how people interact with maps, but these aspects have been largely overlooked in cartography and data visualization research. The emphasis on rationality over emotion in traditional map-making reflects a broader trend in science that devalues emotional and embodied knowledge, privileging rational, quantitative methods that align with masculinist ideals Pirani et al. [2020]; Kwan [2002a]; Fileborn [2023]; Huffman [1997]. As Goodchild [2006] notes, while academic geographers have become more sensitive to the social positionality of mapping, the general public and many professionals in planning and GIS fields have not. The rise of accessible tools like Google Earth has made GIS usable by those without formal academic training in geography or cartography [Goodchild, 2006]. Moreover, according to Carton [2007] there is still a risk of map-makers viewing mapping as a purely technical and administrative task, often not recognizing the way they are projecting a frame.

An Indifferent Approach to Technologies

The critiques of cartography's perceived neutrality naturally extend into the realm of Geographic Information Systems (GIS) and digital mapping technologies, where feminist scholars have been challenging the assumption that these technologies are inherently objective or unbiased Schuurman and Pratt [2002]. As Schuurman and Pratt [2002] and Kwan [2002a] argue, GIS promotes the "god trick" perspective, making its users believe they are "seeing everything from nowhere". These critiques are similar to the broader critiques on the tendency of cartography to present itself as neutral and disembodied, however, many feminist critics are concerned about the fact that many technologies such as GIS are expected to provide a more precise, truthful representation of space, which further reduces the awareness of the positionality of maps [Falahatkar, 2024; Fileborn, 2023; Harley, 1989; Kwan, 2002a].

A critique of GIS is its reliance on quantitative data at the expense of qualitative insights, which neglects the complexities quantitative data cannot represent, such as [McLafferty, 2002; Kwan, 2002a].

The perception of objectivity in maps is not just due to the digital presentation. van Houtum [2024] argues that the aesthetic of objectivity in maps is a visual manifestation of an obsession with mathematically calculated order. This approach reflects an ambition to control chance and probability by creating an illusion of classificatory order, distinction, patterns, and predictability [van Houtum, 2024]. Similarly, the reliance on cartesian, Euclidean conceptions of space and the representation of research subjects as spatial entities such as points, lines, and polygons have been identified as limitations of GIS [McLafferty, 2002]. This critique aligns with observations by van Houtum [2024], about the obsession with mathematically calculated order.

Moreover, the assumption that GIS and digital mapping tools provide exact and complete data that represents all genders equally, is faulty, since women are less represented in available spatial data sets [Falahatkar, 2024; Crampton and Krygier, 2010]. This can be partially ascribed to the fact that people of different genders might interact differently with geographical information technology, seeking out different types of data [Falahatkar, 2024]. Moreover, the access to technologies that enable user-generated spatial data and open source mapping remains uneven, reinforcing the digital divide across multiple axes, such as gender, race and age [Crampton and Krygier, 2010].

A great critique on the reliance on digital mapping platforms is that they often prioritize the efficiency of their technology over the equity of their platform [Falahatkar, 2024]. These platforms present themselves as neutral and data-driven, making the user believe they are presenting the truth [D'Ignazio and Klein, 2016; Dittus and Graham, 2022; Falahatkar, 2024]. An example of this is described by Dittus and Graham [2022], where Google Maps aims to "encompass all information" and present it to its user, even though the way the information is presented is based on commercial incentives, such as restaurant reviews.

Lastly, [Schuurman and Pratt, 2002] propose that feminist critique of GIS should engage more directly with GIS practices, as many debates around GIS also came from external fields, such as human geography. These critiques seemed to lack constructive critisism to the technology, which resulted in a defensive reaction of GIS researchers [Schuurman and Pratt, 2002]. Similarly, Lobben et al. [2015] points out the issue that the field of cartography has shown resistance in the recognition of inclusivity related issues.

2.3.3 Defining Gender-Blindness in Mapping

Although many of the aforementioned feminist critics on geography and mapping do not explicitly mention the term "gender-blindness," several parallels can be drawn between general critiques of gender-blindness and

those offered by feminist geographers and cartographers. Both perspectives emphasize the risks in assuming neutrality or universality in the design and development of services, especially when it comes to addressing the experiences and needs of marginalized groups.

Considering a "Default" User:
Lobben et al. [2015] and Falahatkar [2024] discuss the concept of a marginalized map user, whose needs are not being met. Lobben et al. [2015] argues that the definition of map user is too narrow, and doesn't encompass the diverse and unique needs of different groups of users, that fall outside of the definition of the "default". This aligns with gender-blindness as discussed by Criado-Perez [2019], MacAya et al. [2021] and Henriques et al. [2023] who criticize the idea that there is a "universal user" at all, and how this user is commonly based on a male default.

The Positionality of the Product:
Feminist critiques often focus on the positionality of the knowledge and products created, arguing that maps are not neutral or objective, but instead reflect the priorities, biases, and perspectives of their creators [Monk and Hanson, 1982; Harley, 1989; Mahmoudi and Shelton, 2022; Huffman, 1997; Self and Hudson, 2015; Kwan, 2002a; Pirani et al., 2020; Fileborn, 2023]. This mirrors critiques of gender-blindness, where the failure to acknowledge the perspective of the creator results in unnoticed conventions shaping the final product [MacAya et al., 2021; Henriques et al., 2023]. Cartography is criticized more specifically on its tendency to almost actively pretend a map to be an objective and truthful product [Dittus and Graham, 2022; Mahmoudi et al., 2020; Harley, 1989], whereas in the context of gender-blindness in general, this is discussed as an implicit unawareness [MacAya et al., 2021].

Lack of Recognition for Gendered Experiences:
The failure to consider gender as a variable in human behaviour and spatial needs, such as safety, physical ability, and the way space is used and navigated, and therefore different map needs [Falahatkar, 2024; Domosh, 1995; Lobben et al., 2015]. By failing to recognize these different experiences and behaviours, they might be excluded from conventional spatial representations, and therefore, ways of understanding and seeing the world [Mahmoudi et al., 2020; Falahatkar, 2024]. This aligns with arguments of MacAya et al. [2021] and Criado-Perez [2019] who points out how different behaviours and experiences based on gender can lead to different needs in a product or service.

2.4 Urgency of Addressing Gender-Blindness in Maps

As this thesis focuses on the application of gender-blindness within the context of mapping and cartography, it is crucial to address why this issue needs examining. The following section will examine why addressing gender-blindness in mapping is essential. First, it will explore the growing reliance on digital maps, which are often interpreted as neutral and objective despite their role in shaping spatial behavior and perceptions. Second, it will highlight how gender-blind mapping practices risk perpetuating or exacerbating spatial inequalities. Lastly, it will discuss the ongoing efforts to promote inclusivity within the field of cartography and why these efforts must go beyond simply increasing diversity to critically examining the mapping process itself.

2.4.1 Current State of Map Use

The developments of digital maps, and their availability through mobile phone use, has significantly influenced how people understand and engage with spatial data [Ramon and Monk, 2007; Aurigi, 2016; Dittus and Graham, 2022]. For example, the widespread use of applications like Google Maps has transformed the way people navigate their surroundings, plan routes, and explore new places [Dittus and Graham, 2022; Bian and Qiao, 2024]. These digital maps become more than representation of a space; they actively shape our perception and interaction with physical spaces. For instance, the possibility to leave a review of a location on Google Maps, could affect the user's expectations or perception of this place, and could even influence their decision to visit or not [Dittus and Graham, 2022].

Digital maps, particularly those like Google Maps, are presented as objective and accurate, which creates a perception of neutrality among users [Dittus and Graham, 2022; Bian and Qiao, 2024]. This aligns with the point made by Carton [2007] about the way a map is perceived depends on the viewer's association of the map within a certain context or function, which can influence their judgement of the map.

Maps not only have the power to alter our perception of the world but also to influence our actions in ways we might not be fully aware of. van Houtum [2024] suggests that maps might subtly guide people into reproducing

scenarios, without them realizing their ability to change the narrative. This idea is relevant when considering how digital maps like Google Maps shape our interactions with physical spaces [Dittus and Graham, 2022].

Moreover, van Houtum [2024] mentions the fact that a visual representation, such as a map might reveal underlying prejudices or reinforce certain discourses without the viewer being fully aware of their impact. A map might even allow for a depiction of sensitive topics that people might feel uncomfortable speaking or writing about, such as migration [van Houtum, 2024].

As digital maps become increasingly integrated into our daily lives, it seems crucial to develop a critical understanding of how they influence our spatial perceptions and decisions. This awareness is particularly important given the growing reliance on applications like Google Maps, which are often uncritically accepted as objective representations of reality.

2.4.2 Spatial Inequalities

With this change in the role maps play in our daily lives, the shift in how people perceive maps, and the claims by scholars that they have the power to shape people's spatial experiences and behaviours, it seems crucial to recognize that this might have consequences for spatial inequalities.

When studying urban spaces with a gender-blind spot, this might exacerbate existing spatial inequalities [MacAya et al., 2021]. Urban spaces commonly reflect gender roles, since they are often traditionally designed for male users [MacAya et al., 2021; Boys, 1996]. The gendered nature of urban spaces is evident in how men and women engage with and navigate them differently, influenced by distinct responsibilities and spatial-behavioral patterns [Falahatkar, 2024; MacAya et al., 2021]. Examples are transportation services prioritizing commuting over care giving, inaccessible toilets, and insufficient rest areas for older women [Falahatkar, 2024]. These differences stem from historical views on women's roles, limiting them to private spaces while deeming public spaces as male domains [Falahatkar, 2024; Libertun de Duren et al., 2023]. Moreover, [Libertun de Duren et al., 2023] points out how women are more likely to be victims of sexual harassment in public spaces, and public transport.

[Domosh, 1995] discusses the notion that women perceive urban space differently than men. Urban spaces that are defined by patriarchal society are often perceived by women as sites of harassment [Domosh, 1995]. Moreover Cui et al. [2023] presents a study into the difference between the perceived safety of men and women in urban public spaces concluding that men perceive public space significantly higher than women. A map might have the power to influence the way people perceive public space [Dittus and Graham, 2022; Falahatkar, 2024; van Houtum, 2024; Crampton and Krygier, 2010]. Inadequately addressing these types of spatial issues in maps, might result in spaces feeling unsafe or inaccessible to women and gender minorities [Falahatkar, 2024]. When issues with safety occur, this could result in women becoming less likely to participate actively in urban life, due to fear of violence [Libertun de Duren et al., 2023].

However, it's crucial to recognize that gender is not binary, and spatial inequalities affect diverse gender identities. Doan [2010] argues that rigid gender categorizations in urban spaces fail to include intersex and transgender populations, creating a "tyranny of gender" that shapes public and private life experiences. This perspective calls for a more nuanced understanding of gender.

2.5 Campus Maps

As many university campuses are striving to create an inclusive and safe campus environment [Coulter and Rankin, 2020], this section will discuss the current approaches universities take, and the current developments in campus maps.

2.5.1 Inclusivity on Campus

Feminist scholars, such as Sheridan and Jacobi [2014], emphasize the need to question and disrupt dominant academic practices to advance social justice within these institutions. Feminists within these institutions are making contributions towards creating a safe and inclusive campus is addressing sexual assault: A study by Coulter and Rankin [2020] has shown that perceived inclusivity on campus is strongly correlated with a reduction in harmful experiences, such as sexual assault, for gender and sexual minorities. LGBTQ+ centers on campuses have been making efforts in promoting inclusivity [Self and Hudson, 2015]. An important note Self and Hudson [2015] makes is that inclusivity should not only be promoted in terms of gender and sexual orientation, but along multiple axes of marginalized identities. Another approach being taken towards a more inclusive campus environment is the active centering of diverse identities by universities instructors. By doing so instructors can create a more welcoming environment for marginalized students [Faulkner et al., 2021].

The role of the spatial layout of the campus in fostering inclusivity is described by Falahatkar [2024]. Her study suggests that the distribution of gender-inclusive features, such as bathrooms and accessible routes, remains

uneven across many campuses, making it harder for marginalized groups to navigate the physical environment. Moreover, the differences between spatial behaviour of men and women on campus are often not reflected in the physical nor the mapping world [Falahatkar, 2024].

Since the way maps represent space might reinforce spatial inequalities [Crampton and Krygier, 2010; MacAya et al., 2021], a campus map might be able to contribute to this journey towards an inclusive campus, when it adequately addresses issues such as Falahatkar [2024], Coulter and Rankin [2020] and Faulkner et al. [2021] address.

2.5.2 Campus Mapping Developments

Recent literature on campus map development shows a shift towards mobile and interactive technologies. In the era of smartphones, there is an emphasis on creating mobile-friendly campus maps [Akinwunmi et al., 2016]. These maps often have interactive features, such as the ability to find the shortest route between campus locations [Wu et al., 2016]. Researchers have focused on advancing mobile applications to enhance user-friendliness and improve building location services [Wu et al., 2016]. Some institutions have even developed interactive campus maps with a focus on sustainability [Boudrie et al., 2011]. Another example of the technological focus is the development of an OpenStreetMap platform by Maidin et al. [2021], which should increase user friendliness for campus users in finding locations, which should then become a component of "Smart Campus" [Maidin et al., 2021].

The focus in these researches seems to be on improving the technology of the map services to achieve inclusive and user friendly campus maps, rather than what is in the map itself, and how it is presented. This aligns with Falahatkar [2024]'s concerns about mapping systems prioritizing technical efficiency over the equity of the mapping process.

2.6 Towards a Gender Sensitive Approach

As many feminist scholars and cartographers have pointed out, it seems imperative to re-evaluate the practice of mapping to contribute to a more inclusive process [Kwan, 2002a,b; Mahmoudi and Shelton, 2022; Falahatkar, 2024; Varanka, 2005; Bian and Qiao, 2024; Mclafferty, 2005; Schuurman and Pratt, 2002; Thatcher et al., 2015; Crampton and Krygier, 2010].

2.6.1 Mapping for Change and Changing Mapping

As Crampton and Krygier [2010] notes, maps do more than simply represent the world—they actively produce space and shape the political identities of those who inhabit it. This understanding reframes mapping as a political act, capable of promoting social change by challenging established ways of knowing and viewing the world [Crampton and Krygier, 2010; Mahmoudi and Shelton, 2022; van Houtum, 2024; Fileborn, 2023].

Feminist scholars and critical cartographers emphasize the need to reshape mapping practices to address their potential in constructing power dynamics and representations. For example, van Houtum [2024] suggests that academics, artists, writers, and activists collaborate to develop a more humanized approach to cartography, one that better reflects the diversity of experiences in the world. An example of this is pointed out by Crampton and Krygier [2010]: Artists have experimented with alternative mapping practices, to explore how maps serve political purposes, and challenge conventional mapping practices. Ramon and Monk [2007] advocates for the importance of breaking hegemonic practices towards more inclusive gender geographies. Digital mapping can be seen as a way to new ways of mapping since it can bypass "gatekeepers of mapping", according to Bian and Qiao [2024].

Fileborn [2023] argues for the potential of maps to expose, challenge and disrupt power relations, by reframing the world and challenging what is mapped and how it is mapped. For example, a map can function as a tool to highlight the serious harm street harassment can do [Fileborn, 2023]. Mapping incidents of street harassment might disrupt the way the dominant discourse around street harassment is constructed [Fileborn, 2023]. By presenting the issue on a map, it might yield a different type of response and be taken more seriously by institutions [Fileborn, 2023]. Similarly, Marchi and Diantini [2022] underscores the unique potential of a map to become a tool for discussion. GIS is named as an example of a tool that should illuminate gendered experiences, instead of "discovering a universal truth" [Kwan, 2002a].

As Ramondetti [2023] notes: *"Critical cartographies are hybrid, multidisciplinary media used to investigate reality, establish arguments, construct alternative discourses, and develop new scenarios. Such cartographies transcend academic boundaries to generate a shared cultural knowledge."*

2.6.2 Shift the Focus

Transparency and Positionality

Feminist scholars emphasize the importance of acknowledging positionality, suggesting that maps are not neutral but reflect specific cultural, social, and political contexts. For example, Kwan [2002a] emphasizes the need for GIS practitioners to reflect on how their positionality influences the creation and interpretation of visual representations. Transparency in mapping means being explicit about the biases that inform map creation. van Houtum [2024] similarly calls for transparency by acknowledging maps as "intentional aesthetic designs" rather than objective representations. map-makers should be open and honest about their selective and biased take on the world they wish to represent and convey, and not hide political, commercial, or personal interests under the veil of geometric objectivity or standards [van Houtum, 2024]. D'Ignazio and Klein [2016] suggests that visualization should reflect on the situated nature of knowledge and challenge assumptions inherent in data categories, such as gender or race. Similarly, Carton [2007] addresses how cartographers should actively practice their knowledge about framing and become aware of the context sensitivity of the frame they create through mapping and using symbology.

Moreover, focusing on the designer's own subject position can help expose the decisions that contribute to visual choice [D'Ignazio and Klein, 2016]. Huffman [1997] has advocated for the development of feminist atlases and thematic maps that focus specifically on women's issues. These feminist cartographers also employ a reflexivity and transparency about missing data, breaking the silence around women as subjects of cartographic inquiry [Huffman, 1997; Ramon and Monk, 2007].

Embracing Methods for Change

This transparency about the subjectivity of maps should offer opportunity for societal participation, collaboration and enrichment, when the dialogue on mapping is opened, according to van Houtum [2024].

Moreover, digital technologies have opened up new possibilities for experimentation in map making and visual storytelling [van Houtum, 2024]. This notion is discussed by Kwan [2002a], McLafferty [2002], Fileborn [2023] and McLafferty [2002], who advocate for a feminist approach to GIS, that embraces the possibilities of the technology to incorporate layered, qualitative and multimodal information into maps. By overlaying many layers of data, GIS allows researchers to uncover spatial contexts and connections, revealing the complex relationships between people and places [McLafferty, 2002]. An example of incorporating qualitative data is photography-based map making [Fileborn, 2023], which is supposed to capture people's perceptions and emotional connections to places. Kwan [2002a] describes using three-dimensional GIS to visualize women's life paths in space-time. In another study, visual representations were combined with narratives from personal interviews Kwan [2002b] which demonstrated how extensive, scale-sensitive spatial stories can be told about an individual's daily experiences and life situations. The importance of recognizing that no single method is inherently feminist, but that a context-sensitive approach should be taken, is emphasized by Kwan [2002a].

Furthermore, there is a call for incorporating modes of knowing that are often considered local, circumstantial, or non-generalizable, as they could challenge the abstractionism and positivist tendencies in traditional hegemonic cartographic practices [van Houtum, 2024]. Monk and Hanson [1982] underscore the importance of challenging the hegemonic practices that are dominant and therefore excluding alternative practices. An example of this is the study by Pirani et al. [2020], who proposes that emotions should be considered along with quantitative data, asserting that emotional experiences are legitimate forms of knowledge.

Maps can be seen as a form of visual storytelling, using elements such as projection, scale, and symbolization in its "visual narrative" [Marchi and Diantini, 2022]. According to Marchi and Diantini [2022], deconstructing how maps communicate is crucial for understanding their potential in illustrating "citizen geographies", which challenge traditional geographies.

Centering Marginalized Perspectives

According to feminist scholars, actively considering gender and focusing on gender-related issues is crucial in mapping practices. Addressing common concerns for gender minorities, such as safety issues and mapping gender-specific facilities [Falahatkar, 2024], while acknowledging different gendered experiences across women, men, and other identities [Kwan, 2002a], recognizes that marginalized people face unique challenges often ignored in traditional mapping. An example of this are the feminist atlases and thematic maps described by Huffman [1997]; Ramon and Monk [2007], that focus specifically on women's issues, challenging the historically male-centric emphases of traditional maps.

To address these biases, feminist scholars such as Huffman [1997] have advocated for the creation of alternative cartographic practices that better represent women's spaces and experiences. This includes the development of feminist atlases and thematic maps that focus specifically on women's issues, challenging the apolitical and

historically male-centric emphases of traditional maps. These feminist cartographers also employ a gender-sensitive reflexivity and transparency about missing data, breaking the silence around women as subjects of cartographic inquiry [Huffman, 1997; Ramon and Monk, 2007].

Merely acknowledging the new mapping techniques that better illustrate diverse and subjective gendered experiences, and shifting the focus towards generally ignored marginalized perspectives and issues might not be enough to move toward an inclusive mapping practice [van Houtum, 2024; Fileborn, 2023]. To properly explore alternative ways of mapping, and discover which issues need to be illuminated according to marginalized groups, they need to be given a voice [van Houtum, 2024]. User participation is a tool that is often applied with this goal in mind [Till, 2005; van Houtum, 2024; Fileborn, 2023]. Feminist, queer, and critical research methodologies share a common goal: to highlight the experiences of marginalized groups [Fileborn, 2023]. One participatory method widely discussed by scholars for centering marginalized perspectives is counter-mapping [van Houtum, 2024; Fileborn, 2023]. This approach, described as "mapping from below" or "mapping from the margins," seeks to reframe the world by articulating alternative, subversive, and marginalized interests. Through counter-mapping, marginalized groups gain the tools to represent their own spaces and experiences [van Houtum, 2024]. As Kwan [2002a] emphasizes, it is critical that the voices of research subjects, particularly marginalized ones, are heard and respected. Adopting more layered and nuanced mapping methods enables a richer, more complex narrative [van Houtum, 2024; Kwan, 2002a; Fileborn, 2023]. This should, according to Fileborn [2023] allow for a more accurate reflection of the experiences of different communities.

User participation is widely accepted as a key inclusivity strategy across organizations and disciplines [Habitat, 2019; Inclusive Cartography Working Group, 2024]. The Inclusive Cartography Working Group promotes user participation through participatory mapping workshops, community engagement, and co-creation, ensuring diverse perspectives are included at every stage of mapping [Inclusive Cartography Working Group, 2024]. As the geo-information landscape evolves [Van Loenen and Zevenbergen, 2010; Budhathoki et al., 2008], users' roles are changing, and they now provide rich, local spatial information [Budhathoki et al., 2008].

When involving users, attention must be paid to the level of participation. Arnstein's ladder of participation categorizes citizen involvement into eight levels, from "tokenism" to "full citizen control," highlighting the importance of mindful participation [Arnstein, 1969]. Practitioners should consider which level they apply to achieve meaningful engagement (see Figure 2.9).

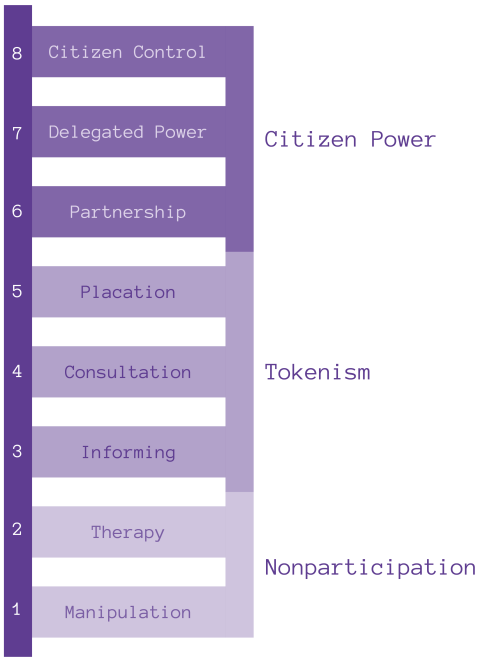


Figure 2.9: Arnstein Ladder of Citizen Participation [Arnstein, 1969]

While Arnstein's model is a good starting point, Till [2005] offers a more nuanced understanding of participation in urban design and architecture. He critiques traditional approaches for failing to address power dynamics and expert knowledge. Instead, Till [2005] advocates for "transformative participation," which seeks to empower users by deeply involving them in decision-making processes, reshaping expectations, and addressing imbalances of power and knowledge.

Till [2005] argues that tensions often arise between designers' intentions and unpredictable realities shaped by

social and political values. This can lead to hesitation to fully engage users, resulting in superficial participation. Till [2005] stresses the importance of transparency, where experts openly communicate their practices to users in accessible ways. Acknowledging and respecting users' knowledge, and recognizing the authority of marginalized voices [MacAya et al., 2021], participation can move beyond tokenism to become truly transformative [Till, 2005].

As Till [2005] notes: *"New knowledge neither grows out of a special method, nor the special mind of a genius, nor from new theoretical monologues... but from the voices of ordinary people in conversation."*

Transformative engagement is also a key element in counter-mapping, as discussed in the beginning of this section. Counter-mapping challenges dominant power structures by articulating alternative perspectives, highlighting geographic information that traditional cartography often overlooks [van Houtum, 2024; Fileborn, 2023].

In the digital mapping and geo-information landscape, Budhathoki et al. [2008] proposes re-evaluating users' roles from passive recipients of data to active contributors. This shift highlights the value of user-generated spatial data in GIS and cartography. Similarly, Lobben et al. [2015] argues for redefining users to include marginalized groups typically seen as "other," moving beyond the "mainstream" empowered user.

Recognizing Complexity and Diverse Experiences

Incorporating user perspectives into mapping presents challenges. Carton and Thissen [2007] notes tensions between users' preferences—such as those of policymakers—and experts' design choices, where experts often prioritize their norms, even when these choices cause confusion among users. Carton and Thissen [2007] recommends that map-makers go beyond technical mastery, listening to and visualizing social concerns.

Similarly, Kwan [2002a] critiques digital mapping techniques for overlooking the subjective differences among users, resulting in maps that fail to capture complex experiences. Fileborn [2023] highlights these challenges in a study using Google Maps for storytelling. While the method aimed to balance power dynamics between researchers and participants, some participants still felt anxious about using the tool correctly.

Despite these challenges, digital mapping can be a productive research method when combined with qualitative techniques like in-depth interviews and participant observation, promoting user-centered research [McLafferty, 2002]. However, Lobben et al. [2015] cautions that incorporating user perspectives may not always lead to a singular, conclusive outcome, stressing the importance of flexibility in design processes to accommodate diverse user experiences.

2.7 Takeaways From the Literature

Maps are not neutral representations but rather reflections of the values, perspectives, and cultural biases of their creators. Scholars such as Monmonier [1996] and Dittus and Graham [2022] have pointed out that maps embed power dynamics and influence how spatial environments are perceived. These power dynamics are often reinforced through selective representation of certain features while omitting others, ultimately shaping public understanding of spaces [Carton, 2007; Falahatkar, 2024; den Hoonaard, 2013; Mahmoudi and Shelton, 2022; Huffman, 1997]. The field of cartography has traditionally been dominated by masculinist perspectives, often neglecting or marginalizing the spatial needs and embodied, gendered experiences of women and gender minorities [Huffman, 1997; den Hoonaard, 2013; Self and Hudson, 2015].

This lack of acknowledgement for the experiences and perspectives of women and minority groups is referred to as gender-blindness [MacAya et al., 2021; Monk and Hanson, 1982; Henriques et al., 2023], which can manifest in several ways in mapping:
Considering a ”default” user for which maps can be made, which is based on male experiences and needs [MacAya et al., 2021; Lobben et al., 2015; Henriques et al., 2023];
Denying the positionality and subjectivity of a map, portraying them as objective and unbiased [Monk and Hanson, 1982; Harley, 1989; Mahmoudi and Shelton, 2022; Huffman, 1997; Self and Hudson, 2015; Kwan, 2002a; Pirani et al., 2020; Fileborn, 2023];
Failing to recognize gender as a critical factor influencing spatial behavior, preferences, and needs, and not paying attention to the way these experiences can be represented in maps [Falahatkar, 2024; Lobben et al., 2015; MacAya et al., 2021; Criado-Perez, 2019; Henriques et al., 2023].

Feminist scholars such as Sheridan and Jacobi [2014] emphasize the importance of disrupting dominant academic practices to achieve social justice, particularly on campuses.

This includes questioning how knowledge is constructed and communicated — maps being a central tool for such communication [MacEachren and Taylor, 1994]. Campus maps, in particular, might have the potential to either support inclusivity or exacerbate spatial inequalities, depending on how they are designed and whose needs they address. Recent research has shown that addressing the needs of sexual and gender minorities on campus, particularly in areas like safety, can improve overall inclusivity and reduce incidents of sexual assault [Coulter and Rankin, 2020; Self and Hudson, 2015], underscoring the importance of inclusive practices on campus. An inclusive approach to map design is necessary, one that acknowledges the situated nature of knowledge and incorporates a wider range of perspectives, as advocated by Kwan [2002a] and van Houtum [2024]. Therefore, it seems imperative that the role of campus maps, and campus mapping is critically examined.

3 Methodology

This chapter explains the methodology used to answer the research questions through literature review and a case study.

3.1 Theoretical Framework

The theoretical framework was developed through a comprehensive review of relevant literature, including peer-reviewed scientific papers and essay-type sources. This has provided an understanding of the current state of the discipline of cartography, mapping processes and map use, introduced the concept of gender-blindness in this context, and explain the potential harmful implications of a gender-blind approach. In doing so, it answers sub-questions 1, 2, and 3. Moreover, the findings from the theoretical framework guide the case study approach, such as defining the guiding elements for the interviews and survey. This will be explained further in the following section (3.2).

3.2 Case Study Design

To effectively explore the inclusiveness of campus maps in the context of gender-blindness, this study uses a multiple case study design, according to the theoretical framework of Yin [1994b]. A case study can provide in-depths insights into a complex phenomenon (gender-blindness) within its real-life context (campus mapping process), when the boundaries between the phenomenon and its context are hard to distinguish [Yin, 1994b]. Therefore, a case study is an appropriate method to investigate the phenomenon of gender-blindness, and its implications in a real-life context, namely the process of campus mapping, and its resulting maps. A case study with multiple cases as opposed to one, can strengthen the results [Yin, 1994b], therefore, multiple cases were selected for this thesis.

3.2.1 Case Selection

The following five universities were chosen as cases in the study:

1. Delft University of Technology
2. Vrije Universiteit Amsterdam
3. Erasmus University Rotterdam
4. Wageningen University and Research
5. Eindhoven University of Technology

Each case's map and context will be further introduced in chapter 4.

The five universities were selected according to the replication logic, as described by Yin [1994b]. Yin [1994b] distinguishes between two types of replication in multiple-case studies: literal replication and theoretical replication. In literal replication, cases are chosen with the expectation that they will produce similar results, helping to confirm a theory across multiple instances. In this case: similar expressions of gender-blindness, such as for example the lack of map elements that cater to women's needs. All universities provide publicly available campus maps that share basic map elements (as described in section2.2.4), which supports the literal replication expectation. In theoretical replication, cases are selected to cover different theoretical conditions, where different outcomes are expected but for predictable, theory-driven reasons Yin [1994b]. In this case, for example a more user-centric approach to campus map design could result in different feedback from users.

In this way, the selected cases allow for the exploration of both common patterns related to gender-blindness across all campuses (literal replication) and context-specific differences (theoretical replication) that arise due to each university's mapping approach and unique campus map design, which will be further introduced in chapter 4.

Delft University of Technology was the focus for more in-depth investigation, as the opinions on the campus maps could then also be linked to the experiences of the students on campus, given that they regularly use the campus.

As this research takes place on the Delft campus, this offers convenient access to people who use the campus for similar purposes. This uniformity in campus use, occupation and age range, allows for isolation of the gender aspect, which aligns with the replication-logic, as described by Yin [1994b]. In contrast to a city, which is complex and diverse, the campus environment simplifies the research focus, making it more manageable to examine specific gender-related needs and preferences.

3.2.2 Source of Evidence in a Case Study

There can be six (major) sources of evidence (SOE) when conducting a case study Yin [1994b]. The different types of information sources are complementary to each other, and thus it's recommended to use as many different sources as possible. For the campus maps case study, each type of source of evidence is described, followed by its strengths and weaknesses (see fig 3.1).

Type of Source	Source Used	Strengths	Weaknesses
1. Documents	X	Stable, unobtrusive, exact	Biased selectivity, reporting bias, limited access
2. Archival Records	X	Stable, unobtrusive, exact, precise and quantitative	Biased selectivity, reporting bias, limited access
3. Interviews	Semi-structured interviews with campus map makers, online survey followed by interviews with survey respondents	Targeted, insightful	Bias due to poorly constructed questions, response bias, innaccuracies due to poor recall, reflexivity
4. Direct Observations	X	Covers events in real time, covers context of even	Time-consuming, selctivity, reflexivity
5. Participant Observation	X	Covers events in real time, insights into behaviour and motives	Time-consuming, reflxivity, selectivity, bias due to investigator's manipulation of events
6. Physical Artefacts	The campus maps of 5 different universities in the Netherlands	Insightful into (technical) operations	X

Figure 3.1: List of Sources of Evidence (SOE) categorized according to theory of Yin [1994b]. The X indicates that that categroy of SOE has not been used in this research.

From these six possible sources of evidence, the following two categories are used:

- Category 3: Interviews The following data collection methods were used during this research, which fall under the category of interviews:
  1. Interviews with campus map makers
  2. A survey filled in by users of the TU Delft campus
  3. Follow-up interviews with a selection of survey respondents

- Category 6: Physical Artefacts Category 6, physical artefacts, was used as the campus maps of 5 different campuses were observed, and their different elements were analyzed according to theory by Wood et al. [2010]; Tyner [2010]; Bell [2023].

Although each source requires a different approach, three principles should be used in all cases.

1. Multiple sources of evidence: It is recommended to use multiple sources of evidence that point to the same conclusion, instead of using one source to draw one conclusion and another source for another conclusion.
2. A case study database: The data gathered from the sources of evidence should be documented separately from conclusions drawn by the investigator so it can be analyzed separately. This data will be in the form of:
   a) Interview notes of interviews with map makers (Appendix C)
   b) Raw survey data (Appendix D.4)
   c) Interview notes of follow-up interviews with survey respondents (Appendix F)

3. A chain of evidence: To increase the reliability of the information, it is necessary to remain transparent and clear about the path from case study questions to case study conclusions. This can be done by proper citing of the case study data, availability of the data that proves the point, and consistency in methods.

3.2.3 Interviews with Campus Map-Makers

The map making process was explored through interviews with the map-makers. They were approached by email. The interviews were semi-structured. The guiding questions for the interviews, with the interview notes taken during the interviews can be found in Appendix C. These questions were based on assumptions from the theory, which will be further explained in chapter 2, aiming to explore the following notions:

- Motives behind the map making process [Carton, 2007; Dittus and Graham, 2022; Ramon and Monk, 2007; Monk and Hanson, 1982; Harley, 1989].
- The level of consideration for user perspectives [Fileborn, 2023; Kwan, 2002a; van Houtum, 2024; Till, 2005; Lobben et al., 2015; Falahatkar, 2024; Huffman, 1997]
- The process of making design decisions for different map elements [Wood et al., 2010; Tyner, 2010; Bell, 2023; van Houtum, 2024; Huffman, 1997]

Due to logistical constraints, not all map makers were available for interviews. The map of the TU Delft campus that the users were asked to evaluate, was a static map, however the maker of this map was not available, and the map maker of the newer, interactive map was available (see Figure 4.1). For the maps of Rotterdam and Amsterdam, the students rated the same maps that were discussed in the interviews with their respective map makers, who were approached through e-mail. For the campuses of Eindhoven and Wageningen, the map makers were not available for an interview; in the case of Wageningen, the maker appeared to be retired, and in the case of Eindhoven, there was no clarity among the people that were reached out to, who was responsible for the map.

3.2.4 Survey

The campus maps were evaluated by the (assumed) users through a survey to investigate in what way the design choices made in the mapping process influence user satisfaction. Maps can emphasize certain aspects while omitting others, shaping what is represented and what remains hidden [Monmonier, 1996; Mahmoudi and Shelton, 2022; Falahatkar, 2024]. This is not only determined by decisions on *what* to display, but also *how* to display it [Monmonier, 1996; Tyner, 2010; Krygier and Wood, 2011]. These decisions might affect how users experience and interact with the map [Lobben et al., 2015; Dittus and Graham, 2022]. The goal of the survey is to understand how students perceived various map elements — both in content and visualization — and whether certain omissions or representations influenced their satisfaction with the map.

The survey consists of five main sections:

- Part A: Demographic questions such as age, gender, connection with TU Delft, nationality, and living location.
- Part B: Questions about campus experience, including visit frequency, activities, faculty, and transportation mode.
- Part C: Participants' usage of campus maps.
- Part D: Rating the content and design of campus maps from five universities.
- Part E: Comparing and ranking the different campus maps based on user preferences.

Content of the Questions

The survey was used to gather quantitative insights into students' opinions about the different campus maps as well as qualitative insights into the reasoning behind their opinions. Through the literature review, critical map elements were identified as significant for rating campus maps, including clarity, legend completeness, scale, color use, and the representation of safety features, as suggested by scholars like Wood et al. [2010], Tyner [2010], and Bell [2023]. These elements informed the evaluation criteria for the case study.

Questions regarding participants' personal experiences and their relationship with the campus were designed to explore how individuals interact with the campus environment and what features they require from a campus map. This approach is grounded in the work of scholars such as Dittus and Graham [2022], Falahatkar [2024], Mahmoudi and Shelton [2022], Criado-Perez [2019], van Houtum [2024], MacAya et al. [2021], and Libertun de Duren et al. [2023]. The goal was to discover whether there are patterns between how people navigate and experience the campus and their specific needs in campus maps, and whether this might correlate with their gender. For example Falahatkar [2024] notes that men and women might have different transportation needs and experiences, therefore the respondents were asked what their main mode of transportation on campus is (see Figure 3.2).

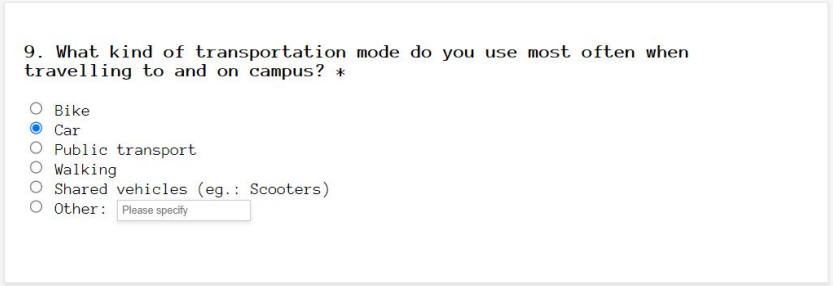


Figure 3.2: The survey question about the main mode of transport of the respondent

Online Survey

To properly present the maps to the respondents, with the possibility to zoom in on the map, and rank and rate the maps on all necessary aspects, a survey website was created, which can be found here: `https://josephinespit.github.io` (a part of the code can be found in Appendix D.3). Screenshots of the different pages of the survey can be seen in Appendix D.2). Denscombe [2017] proposes an online survey as a useful method to efficiently gather large amounts of data and result in easy-to-process data. The survey website was created to be suitable for both computer and mobile phone use, increasing the convenience for respondents [Van Selm and Jankowski, 2006]. Moreover, Van Selm and Jankowski [2006] note how online surveys are an efficient tool to reach a random sample of respondents, and reduces the "interviewer bias" which occurs when the presence of an interviewer influences the type of response that is given. Additionally, allowing the participants to fill in the survey at their own pace and give them the opportunity to re-read questions, could help result in a more thought through answer [Van Selm and Jankowski, 2006].

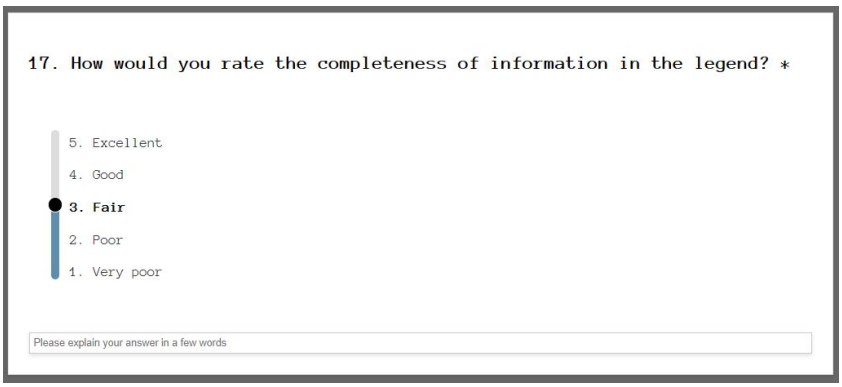


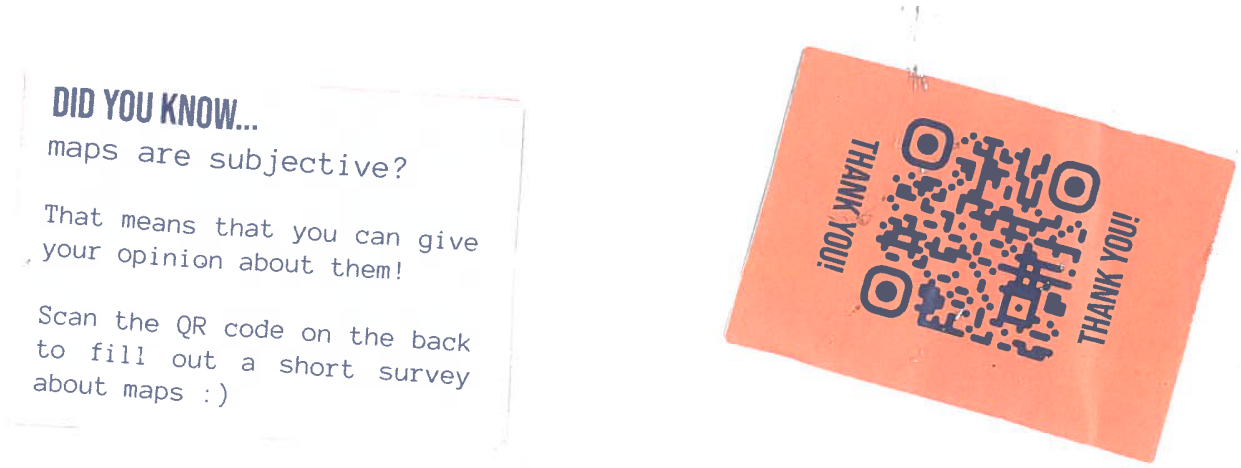
Figure 3.3: An example of the rating slider the respondents could use to rate the map elements

Respondents could provide a rating for each of the map elements, using a slider with a five point scale, ranging from *Very Poor* to *Excellent* (see Figure 3.3). The survey went through two feedback loops with respondents noting what they found clear or unclear in the use of the sliders. According to Klausch et al. [2013], the design of the questions should be unified, trough equal labeling of answer scales, therefore, each rating slider was indicated with the same labels. Moreover, the questions were asked in such a way to avoid guiding the respondents' answers, by posing a neutral question. As Van Selm and Jankowski [2006] suggests, complex questions were avoided, as respondents might be less likely to engage with long difficult questions in an online format.

On all closed questions, respondents were able to provide additional feedback, which provided qualitative insights into the students' opinions complementary to the quantitative ratings [Yin, 1994a; Kwan, 2002a].

Gathering of Respondents

Different approaches were used to gather respondents, including posters placed on campus, handing out cards with QR codes that led to the survey website, WhatsApp messages, emails, and face-to-face conversations (See Figures 3.4 and 3.5).



(a) QR card front

(b) QR card back

Figure 3.4: The QR code cards that were handed out to potential survey respondents

Figure 3.5: The poster that was hung up, with the QR code that led to the survey
[1]

Denscombe [2017] and Van Selm and Jankowski [2006] discuss the non-response bias, which is important to consider because when there is a low response rate, there might be an over-representation of responses from people who tend to be more likely to respond, and whose opinions might differ from those who are less likely to respond. Van Selm and Jankowski [2006] notes that a disadvantage of an online survey is that there is no reliable way of tracking the response rate.

3.2.5 Follow-up Interviews

To gather more insights and allow for a conversation with the assumed campus map users (mainly students), follow-up interviews were conducted. These interviews strengthen the qualitative aspect of the map evaluation [Yin, 1994a]. In the context of feminist research, Ramon and Monk [2007] stress the importance of qualitative methods, in addition to quantitative methods, such as in-depth interviews for revealing hidden activities and perspectives. Therefore, these interviews were intended to gather more in-depth information about the students' opinions and the motivation behind their opinions. These interviewees were contacted through the Email address they filled in in the survey. The questions were tailored to each interviewee, based on their survey responses, to be complementary explanation for their opinions, and provide more in depth insights. They provided the opportunity for a conversation about the maps, instead of just providing answers in an online survey. The interviews were semi-structured; the questions can be found in Appendix F.

3.2.6 Ethical Considerations

Given the fact that the methodology involves surveys and interviews with students, alumni and university staff, several ethical considerations were made.

Regarding the purpose of the study, the map makers were informed orally at the start of the interviews, the respondents at the beginning of the survey, and this information was repeated orally at the beginning of the follow-up interviews.

Important was to ensure participants were informed about the use of their data. This was done through informing the interviewees orally at the start of the interview and the respondents at the start of the survey that their data will only be used for the purpose of the study, will be handled with care, and will be deleted upon completion of the study.

Moreover, the results cannot be traced back to specific individuals without their permission.This is ensured by not including any names, surnames, or contact information of the individuals in the research.

The collected data is stored securely by locally saving the data, not sharing it on any online platforms, creating a local backup and deleting the data upon completion of the study.

Lastly, a central priority throughout the process was maintaining inclusive and respectful communication with all participants.

4 Case Study Introduction

In this chapter, the case study will be further explained. The five universities that were chosen and their campus maps will be presented in the following order:

1. Delft University of Technology
2. Vrije Universiteit Amsterdam
3. Erasmus University Rotterdam
4. Wageningen University and Research
5. Eindhoven University of Technology

Thereafter, the details on the interviews, survey and follow-up interviews are provided.

4.1 The Campus Maps

Each campus map that was used in the case study will be introduced here. Then, for each map, the different map elements, as described in 2.2.4, are explained.

4.1.1 Delft University of Technology

Delft University of Technology (TU Delft), located in the city of Delft, is the largest technical university in the Netherlands. With a focus on engineering, technology, and applied sciences, TU Delft offers a range of programs, including those in civil engineering, architecture, aerospace, and management of technology.

Delft University of Technology has two maps that are being investigated in this research. One is an interactive campus map which can be found here: https://map.tudelftcampus.nl/. For this map, the mapping process was investigated (see Figure 4.1).

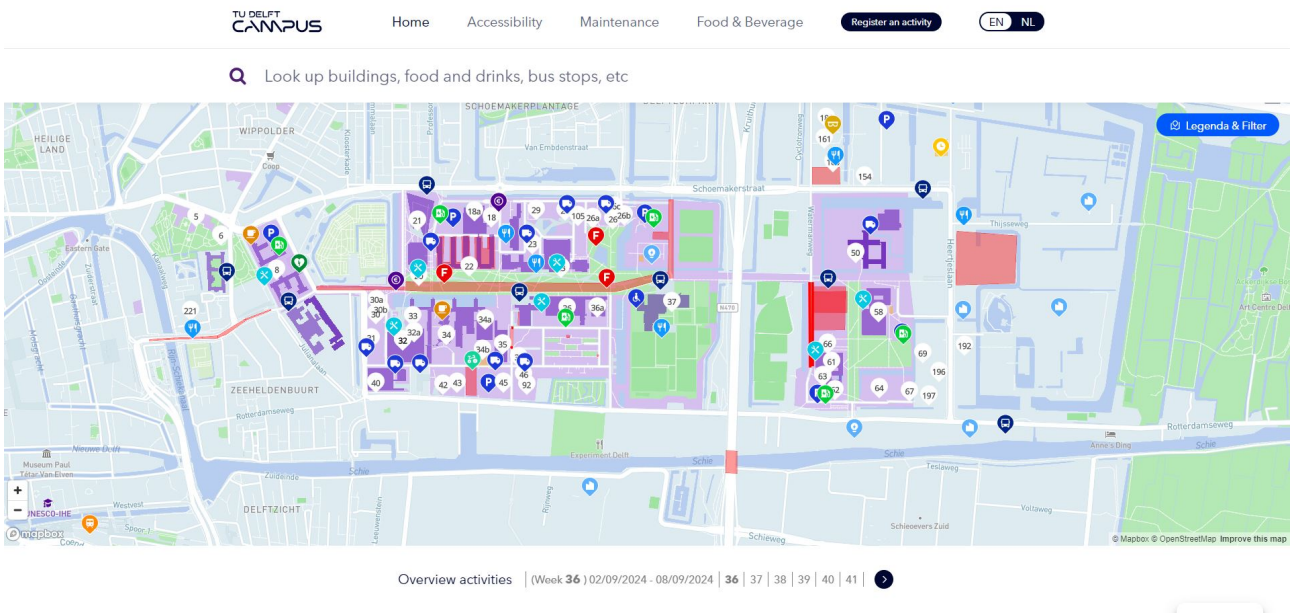


Figure 4.1: Delft University of Technology Interactive Campus Map [TU Delft Campus, 2024a]

The second map that was used, was the static map that can be found on the TU Delft website (see Figure 4.3, full sized map in Appendix B). This map can be downloaded, and was last updated in 2018. A similar map can also be found around campus, on physical signs (See Figure 4.2). This is the map that was evaluated by the students.

Figure 4.2: One of the physical displays of the Delft campus maps

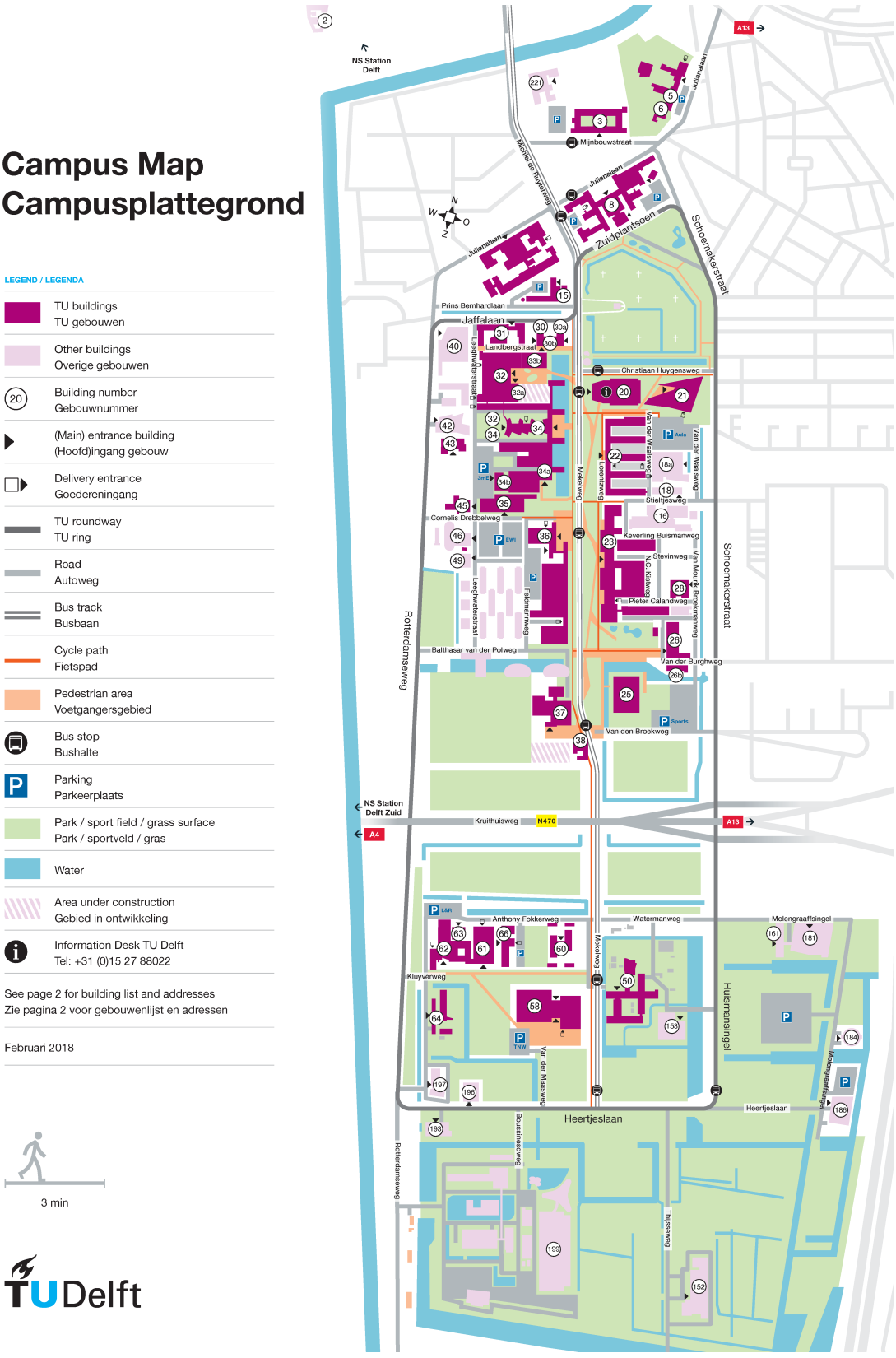


Figure 4.3: Delft University of Technology Campus Map [TU Delft, 2018]

Map Elements

The map elements of the static map are explained in figure 4.4. These are the elements by which the respondents will evaluate the maps.

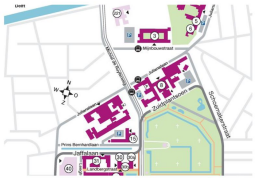
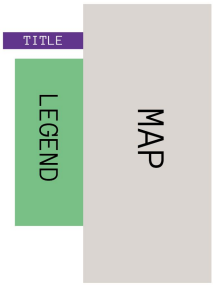
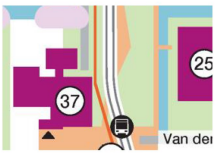
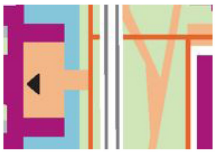
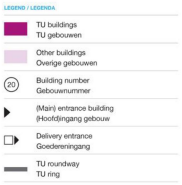
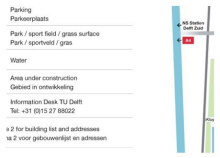
Map Element	Description	Example
1. Content	The map contains a view of the campus isolated from its surroundings. The following subjects are displayed on the map: Buildings, building numbers, main entrances, roads (car, bicycle, pedestrian), bus stops, parking, green areas, water bodies, and construction areas. Moreover, the map contains some arrows pointing to train stations off map.	
2. Layout	The page is oriented vertically, with the legend on the left, and the map on the right. Covering the full page from top to bottom. The legend takes up almost half of the page.	
3. 2D vs 3D	The map is in 2D, providing a top view containing the outlines of buildings.	
4. Scale	The scale of the map allows for general shapes of buildings, green areas and water bodies. It shows different types of roads, and where in a building the entrance is.	
5. Legend	The legend of the map explains the colors used in the map, what the icons and patterns mean, and provides the telephone number of the information desk. Moreover, a stick man drawing is added that indicates the walking distances on the map. The names of the buildings with their corresponding numbers are on a different page.	
6. Text	Other than in the legend, and in the map, there is no additional text on the page. The text in the map indicates road names, faculty buildings and train stations off-map. All text is the same font and black.	
7. Use of Color	Part of the colors used in the map are “realistic”, such as green for green areas, and blue for water. However, the campus buildings are indicated with different shades of purple, which is not a realistic color.	
8. Symbols	There are only a few symbols being used, for parking, the bus stops and the information desk.	

Figure 4.4: Map elements of the Delft campus map

4.1.2 Vrije Universiteit Amsterdam

The Vrije Universiteit Amsterdam (VU) is located in Amsterdam's Zuidas Knowledge Quarter, and has faculties in the humanities, sciences, social sciences, and medical fields.

The Vrije Universiteit Amsterdam has two different maps on their official website: one of the VU Campus and one of Campus Uilenstede. For this research, the VU campus map is used (see Figure 4.5, full sized map in Appendix B).

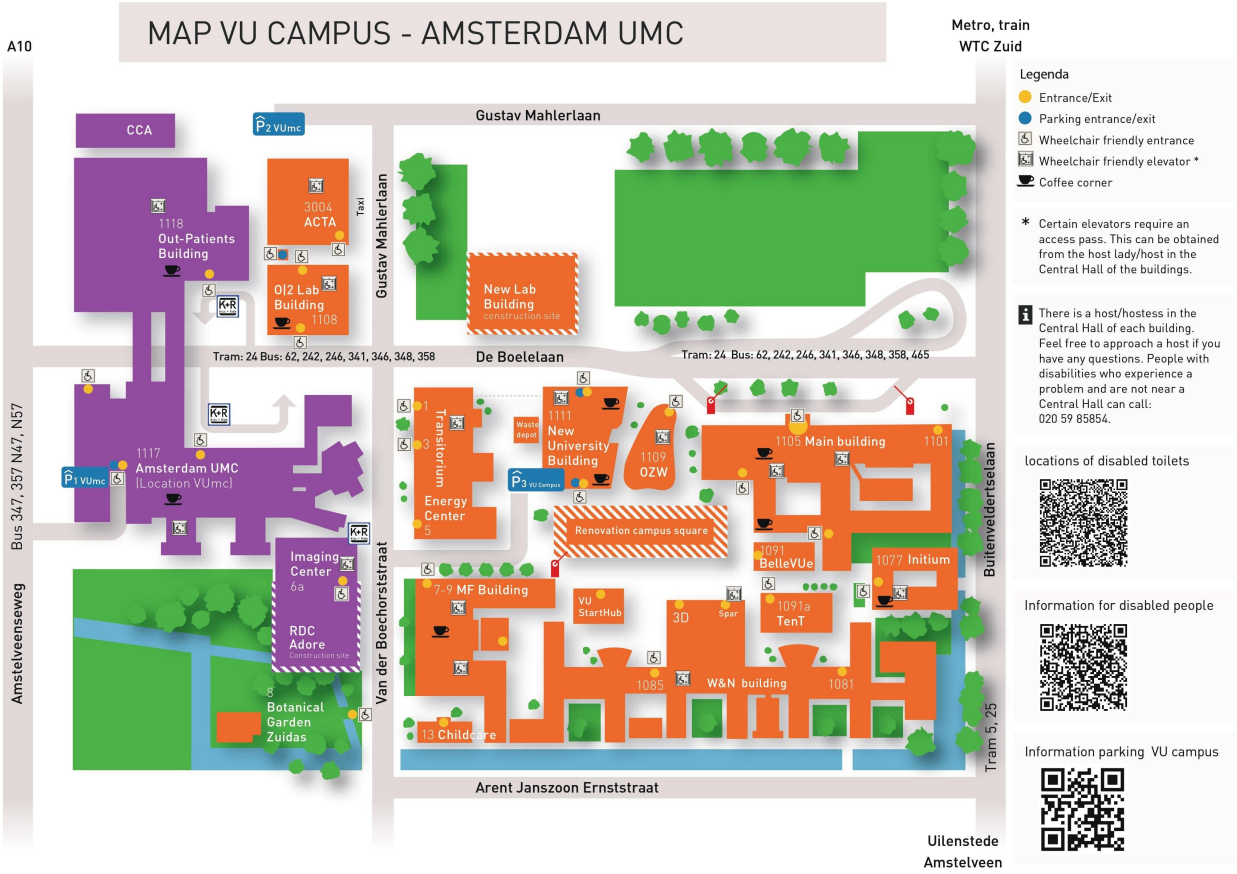


Figure 4.5: Vrije Universiteit Amsterdam Campus Map [Vrije Universiteit Amsterdam, 2023]

Map Elements

The map elements that the map contains are explained in figure 4.6. These are the elements by which the respondents will evaluate the maps and the decisions made on these elements by the map makers are investigated.

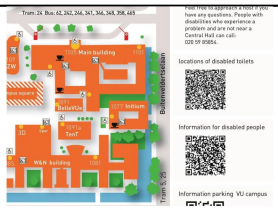
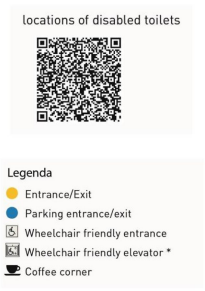
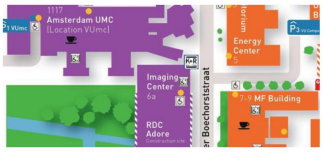
Map Element	Description	Example
1. Content	The map contains a top view of the campus isolated from its surroundings. The following subjects are displayed on the map: Buildings, building numbers and names, roads,parking spots, tram and bus lines, green areas, trees and water bodies. Moreover, the map contains information on wheelchair friendly areas and coffee places.	
2. Layout	The page is oriented horizontally. The map takes up the largest section of the page with the title above it, and the legend on the right.	
3. 2D vs 3D	The map is in 2D, allowing for the outlines of the buildings to be visible, as well as roads and trees. There is a slight 3D effect on the trees and buildings, through the use of shadows underneath them.	
4. Scale	The scale of the map allows for general shapes to be displayed.	
5. Legend	The legend of the map contains the (parking) entrances of buildings, wheelchair friendly areas, and coffee corners. Moreover, 3 QR codes are displayed that lead to more information for disabled people, and information on parking.	
6. Text	There is additional text on the right of the map, that provides more information for diabled people, and mentions the hosts/hostesses in the buildings. Additionally, the bus lines are listed on the roads, as well as the road names.	
7. Use of Color	The colors in the map, used for all elements except the buildings, are “realistic”, such as green for green areas, and blue for water. However, the buildings are orange and purple, which is not further explained.	
8. Symbols	Symbols are used for parking, disabled friendly areas, coffee corners and (parking) entrances.	

Figure 4.6: Map elements of the Amsterdam campus map

4.1.3 Erasmus University Rotterdam

Erasmus University Rotterdam (EUR) is a broad university with seven faculties and various specialized institutes, specializing in fields such as social sciences, medicine, management and economics.

The university offers two different campus maps on their website, of which one is designed by the Erasmus Magazine. This map is used for this research (see Figure 4.7, full sized map in Appendix B). The Erasmus Magazine is an independent journalistic news source, that publishes information about academic and campus life. The magazine is available online through various social media platforms, and publishes a weekly newsletter. The map that the magazine has created is available on the magazine website, and is also available on paper.

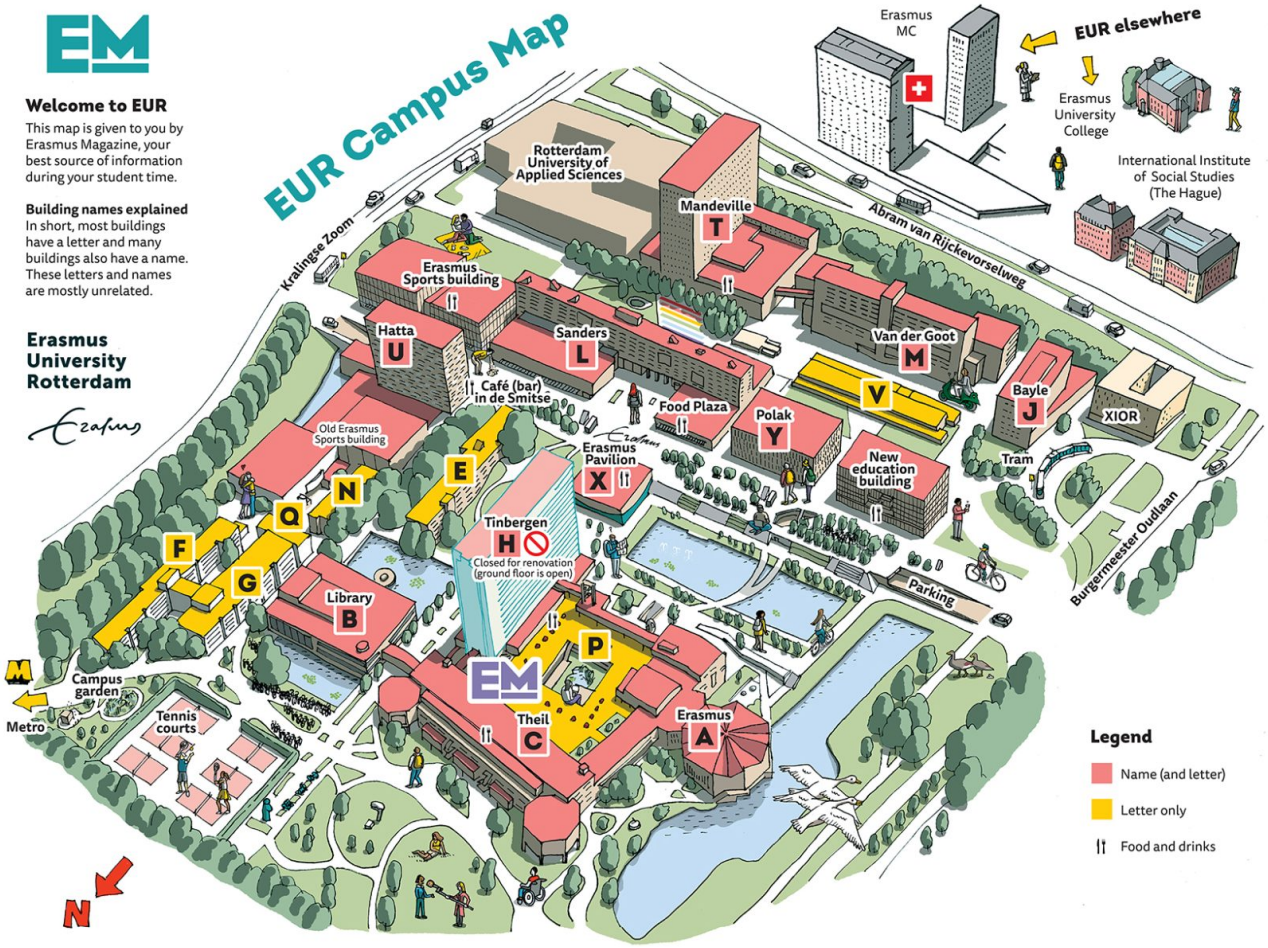


Figure 4.7: Erasmus University Rotterdam Campus Map [Erasmus University Rotterdam, 2022]

Map Elements

The map elements are explained in figure 4.8. These are the elements by which the respondents will evaluate the maps and the decisions made on these elements by the map makers are investigated.

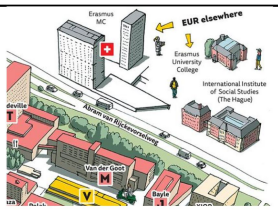
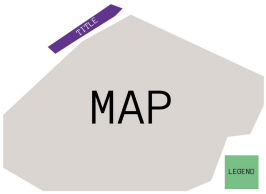
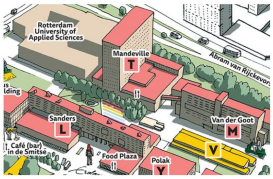
Map Element	Description	Example
1. Content	The map contains a perspective view of the campus isolated from its surroundings. The following subjects are displayed on the map: Buildings, building letters and names, roads (car, pedestrian), subway and tram stops, green areas, trees, water bodies, and the tennis courts. Moreover, the map contains some arrows pointing to places off-map.	
2. Layout	The page is oriented horizontally. Since the map is in 3D, it doesn't take up a rectangular area of the page.The title is placed above the map, diagonally. The legend is small and placed in the bottom right.	
3. 2D vs 3D	The map is in 3D, in illustration style. This allows for building facades, individual trees, and even people and animals to be displayed.	
4. Scale	The scale of the map allows for windows on facades and shapes of trees to be show, as well as people and the acctivities they are partaking in on campus.	
5. Legend	The legend of the map contains the colors of the buildings and how this corresponds to their name or letter, as well as the food and drinks on campus.	
6. Text	The map is introduced with text on the side, hat explains the source of the map, Erasmus Magazine, and further explains the building names and numbers, in addition to the legend. Moreover, the Building names and numbers are placed in the map, using different colors for the buildings letters. Road names are indicated as well as places off-map.	
7. Use of Color	Most of the colors used in the map are "realistic", such as brown for buildings, green for green areas, and blue for water. However, the roofs of the buildings are pink and yellow, corresponding to their name and/or letter.	
8. Symbols	Symbols are used for food and drinks, and for the closed off building.	

Figure 4.8: Map elements of the Rotterdam campus map

4.1.4 Wageningen University and Research

Wageningen University and Research (WUR) focuses on healthy food, agriculture, and living environments. Their campus map can be found on the official website [Wageningen University and Research, 2022]. It can be downloaded as a PDF (see Figure 4.9, full sized map in Appendix B).

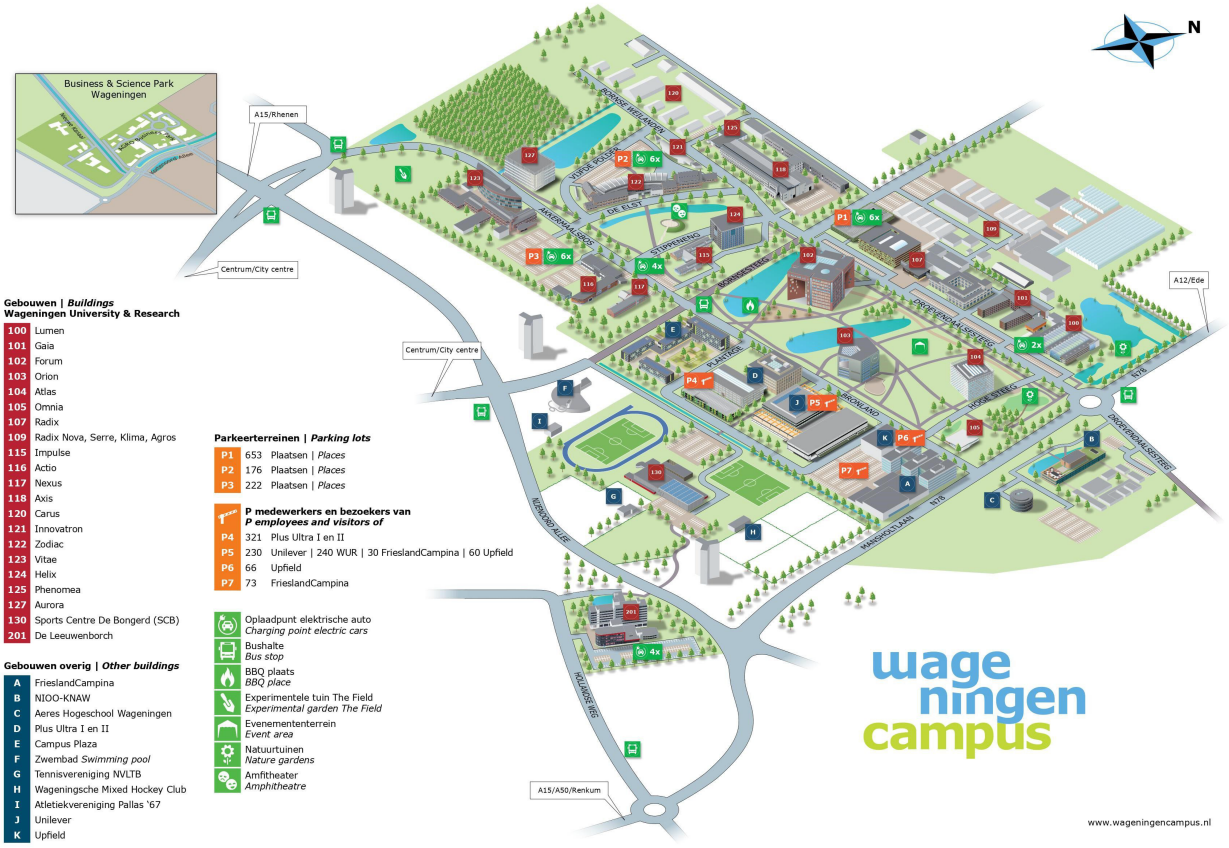


Figure 4.9: Wageningen University and Research Campus Map [Wageningen University and Research, 2022]

Map Elements

The map elements are explained in figure 4.10. These are the elements by which the respondents will evaluate the maps and the decisions made on these elements by the map makers are investigated.

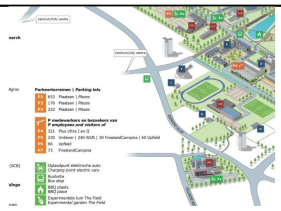
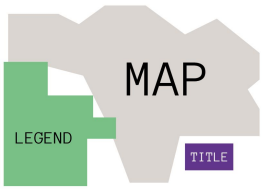
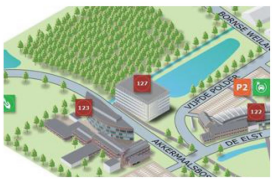
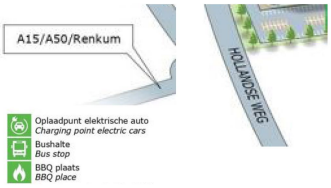
Map Element	Description	Example
1. Content	The map contains a perspective view of the campus isolated from its surroundings. The following subjects are displayed on the map: Buildings, building numbers and names, roads (car, pedestrian), bus stops, parking, green areas, trees, water bodies, and several non-study related places on campus. Moreover, the map contains some arrows pointing to places off-map.	
2. Layout	The page is oriented horizontally. Since the map is in 3D, it doesn't take up a rectangular area of the page.The title is placed under the map.	
3. 2D vs 3D	The map is in 3D, in an AXO view. This allows for building facades to be visible, and trees as 3D elements.	
4. Scale	The scale of the map allows for windows on facades and shapes of trees to be shown.	
5. Legend	The legend of the map contains the buildings, parking lots, and other non-study related places on campus such as Experimental Garden, and Amfitheater. The legend is divided into those different catagories with colors.	
6. Text	Other than in the legend, and in the map, there is no additional text on the page. The text in the map indicates road names, faculty buildings and places off-campus. All text is the same font and black, but the places off-campus are indicated with a speech bubble, and the building numbers are colored according to their category in the legend.	
7. Use of Color	Most of the colors used in the map are "realistic", such as grey for buildings, green for green areas, and blue for water.The legend has color codede icons that also appear on the map.	
8. Symbols	Symbols are used for the parking spaces (orange) and for the non-study related places on campus, such as BBQ spot and Event Areas.	

Figure 4.10: Map elements of the Wageningen campus map

4.1.5 Eindhoven University of Technology

Eindhoven University of Technology (TU/e) offers a range of engineering and technology-focused programs, with specializations in fields such as electrical engineering, mechanical engineering, computer science, and industrial design. The website offers two maps specialized in bicycle parking and repair, and one general map (see Figure 4.11, full sized map in Appendix B). The general map is the one used in this research.

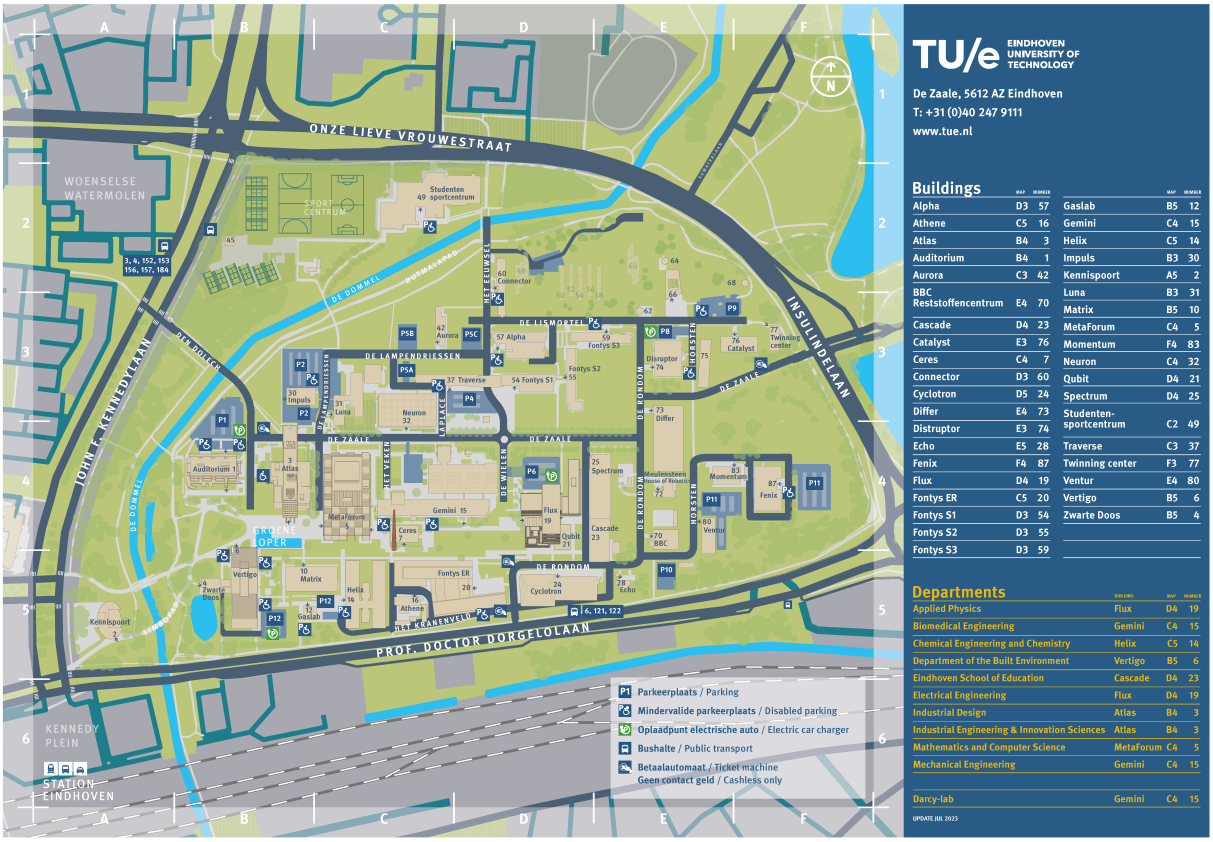


Figure 4.11: Eindhoven University of Technology Campus Map [Eindhoven University of Technology, 2023]

Map Elements

The map elements are explained in figure 4.12. These are the elements by which the respondents will evaluate the maps and the decisions made on these elements by the map makers are investigated.

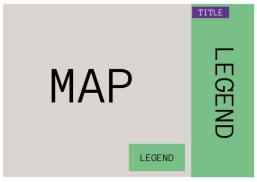
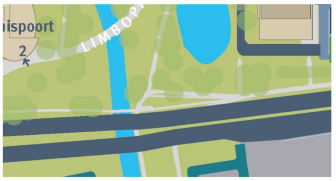
Map Element	Description	Example
1. Content	The map contains a top view of the campus with a less detailed display of its surroundings. The following subjects are displayed on the map: Buildings, building numbers and names, departments, roads, parking spots, bus stops, green areas, trees and water bodies. Moreover, the map contains information on disabled parking and electric car cahrging.	
2. Layout	The page is oriented horizontally. The map takes up the largest section of the page with the legend on the right and the title above it.	
3. 2D vs 3D	The map is in 2D, allowing for the outlines of the buildings to be visible. However, some buildings have a 3D effect, showing some structure of the building facade.	
4. Scale	When zoomed in, more building details become visible such as entrances and even facade structure. Separate trees are visible.	
5. Legend	The legend of the map contains the all buildings names, their number, and their map coordinates. Moreover, there is a separate legend that explains the symbols used in the map.	
6. Text	Besides the legend and the title, and text inside the map the only additional text is the contact details of the university. The text inside the map is road names in white, and building numbers and names in blue.	
7. Use of Color	The colors in the map are mostly “realistic”, such as beige for buildings, green for green areas, and blue for water. The rest of the elements in the map follow a similar color pallette as used for the map itself.	
8. Symbols	Symbols are used for (disabled) parking, ticket machines, bus stops and electric car charging spots.	

Figure 4.12: Map elements of the Eindhoven campus map

5 Results and Discussion

In this chapter, the results of the case study are presented. First, the interviews with the map-makers from the three universities (Delft University of Technology, Vrije Universiteit Amsterdam, and Erasmus University Rotterdam) will be discussed, followed by a comparison of the interview results between the universities and with the literature. Next, the survey and follow-up interview results regarding the campus maps will be presented, providing an overview of students' opinions on the campus maps from the five universities (Delft University of Technology, Vrije Universiteit Amsterdam, Erasmus University Rotterdam, Wageningen University and Research, and Eindhoven University of Technology). Furthermore, the opinions on the different campus maps will be compared across the universities and discussed in relation to the literature.

5.1 The Mapping Process

5.1.1 Delft University of Technology

To investigate the mapping process of the campus map of Delft University of Technology (TU Delft), the person responsible for its development was interviewed on January 17th, 2024, on campus. The interviewee, a man holding the position of content marketeer at the Innovation and Impact Centre, TU Delft, provided insights into the creation and management of the map. Below is an overview of the key takeaways from the interview, with full notes available in Appendix C.

Overview of the Mapping Process

The project to create the current Delft University of Technology campus map began in 2019 but was paused for a time. The first version was completed in early 2021, and by early 2022, it was shared for the first time. The map officially went live in early 2023. The interviewee, along with a student assistant, holds the primary responsibility for the map's development, while the actual implementation and technical updates are carried out by an external company in Rotterdam. The Campus Real Estate and Facility Management (CREFM) team provides updates regarding campus maintenance, such as replacing sewage systems. This team consists of around seven people, and their input is used for keeping the map up-to-date.

Guiding Principles of the Map

The Delft University of Technology campus map was developed under the label *"TU Delft Campus,"* with the primary objective of highlighting specific themes that the university focuses on, especially areas of the campus where businesses are located. The interviewee emphasized that the map is intended to promote TU Delft to investors as an attractive place for startups, entrepreneurs, and visitors. The map is designed to work in a data-driven manner, with the goal of showcasing the university as a hub of innovation. Although the base of the map, education and research, should be sufficient, there is a priority for highlighting startups and entrepreneurship.

Improvements Compared to Previous Maps

The current campus map replaced an older version that was maintained by an external company, leading to unclear ownership and sporadic updates. CREFM would only update the map occasionally, and the map was not widely known. The earlier map did not focus on integrating the campus into society, and TU Delft saw the need for a new version that aligned with its strategic goals. A previous 3D map was abandoned due to technical and financial limitations, particularly related to data input, despite its benefits in making landmarks easily recognizable. The current 2D map was designed to reduce these limitations and provide clearer ownership and management. It includes features that highlight the businesses on campus, marking a shift from the earlier map's focus solely on education and research.

Decisions on Map Elements

Decisions regarding the map's content are the responsibility of the interviewee, who incorporates TU Delft's preferences. While the interviewee has control over what to include, the external map development company implements these decisions. The decision to use a 2D map was driven by the financial constraints of the 3D version. The map is created using MapBox, a system based on OpenStreetMap (OSM), which allows for more

customization and collaboration than Google Maps. MapBox is allows for adding layers of information not available on Google Maps. However, many visual choices are fixed within the MapBox software, such as the color purple for buildings.

Consideration for User Perspectives

While functionality and usability were considered in the map's development, broader user perspectives have not yet been fully incorporated. The map's search functions were tested internally with about 25 employees within the Innovation and Impact Centre, during user testing sessions, focusing on specific features such as search functionality. Another testing session with 40 employees was planned to observe how people interact with the map. However, broader user involvement, particularly from students, has been limited. The map has not yet been widely promoted to students, although there are future plans to do so, when the map is in a further stage of development. The interviewee expressed interest in gathering data about users' interactions with the map, such as their location, time spent on the site, and scrolling behavior. A button labeled "Improve this map" exists as part of the MapBox interface, but it is not being used.

Ongoing Development

The map is still very much a work in progress, and there are plans to introduce new features. One such feature includes displaying the number of available parking spaces, updated in real-time. The interviewee raised the question of how to encourage faculties to promote the map more widely. The interviewee acknowledged the fact that certain user groups' needs might not be accommodated to, but that there is little insight into that information.

Takeaways

The focus of Delft's mapping process currently seems to be mostly on promoting the business and innovation aspects of the campus. The only considerations for user groups mentioned are investors and entrepreneurs. Nothing specifically was mentioned about including different perspectives of groups based on their characteristics, such as gender. However, there is recognition of the fact that groups might be excluded, but no goals mentioned to solve this. The aim of the user test sessions seems to be more on functionality of the maps (such as search functions) than on content and visualization that could. Additionally, content display and visualization options are limited by the software used (MapBox)-resulting in the color of the buildings being purple-and by finances-resulting in a 2D map instead of 3D-since the implementation of new features is done by an external company that works with a set software.

Discussion on Delft University of Technology Mapping Process

The mapping process at Delft University of Technology, as described in the interview, presents a series of decisions that either align with or contradict the critiques found in the literature.

The primary goal behind TU Delft's campus map is to promote the campus as a hub for innovation and attract entrepreneurs. This aligns with the arguments of scholars like van Houtum [2024]; Carton [2007]; Dittus and Graham [2022]; Monk and Hanson [1982], who assert that maps reflect the priorities and values of their creators and tell a selective story. However, this contrasts with critiques from Carton [2007]; Falahatkar [2024]; Kwan [2002a]; McLafferty [2002], who criticize map-makers for often being unaware of their positionality, as the TU Delft map-maker seemed conscious of how the map was being used to frame the campus, unlike the more administrative approach to mapping criticized by Carton [2007], or the fact that digital mapping is increasingly practiced by people without academic training in geography or cartography [Goodchild, 2006]. Monk and Hanson [1982] have similarly noted that maps often reflect the priorities of those in power, which is evident here as the map serves TU Delft's interests.

Moreover, Dittus and Graham [2022] point out that digital maps are often presented as neutral and objective, yet the TU Delft interactive map is accompanied by text that might convey some of its subjectivity. This includes references to the goals of *TU Delft Campus*, that are presented on the same website as the map (see Figure 5.1).

The map consciously highlights themes important to TU Delft's strategy, focusing on integrating the campus into society, reflecting the way a map should be an intentional design, as argued by van Houtum [2024]. However, he argues that it should be an intentional design to disrupt power structures or promote social justice [Sheridan and Jacobi, 2014], but actually, the TU Delft map is an intentional design to keep the intended image that the TU delft desires in tact. Notable is the clear target audience of the map: investors and visitors, rather than students. This lack of attention to student perspectives, and the absence of concern for marginalized groups or gendered experiences, reflects critiques by feminist scholars like Falahatkar [2024], Huffman [1997], Kwan [2002a]. While the map-maker at TU Delft acknowledged that some groups might be excluded, there were no

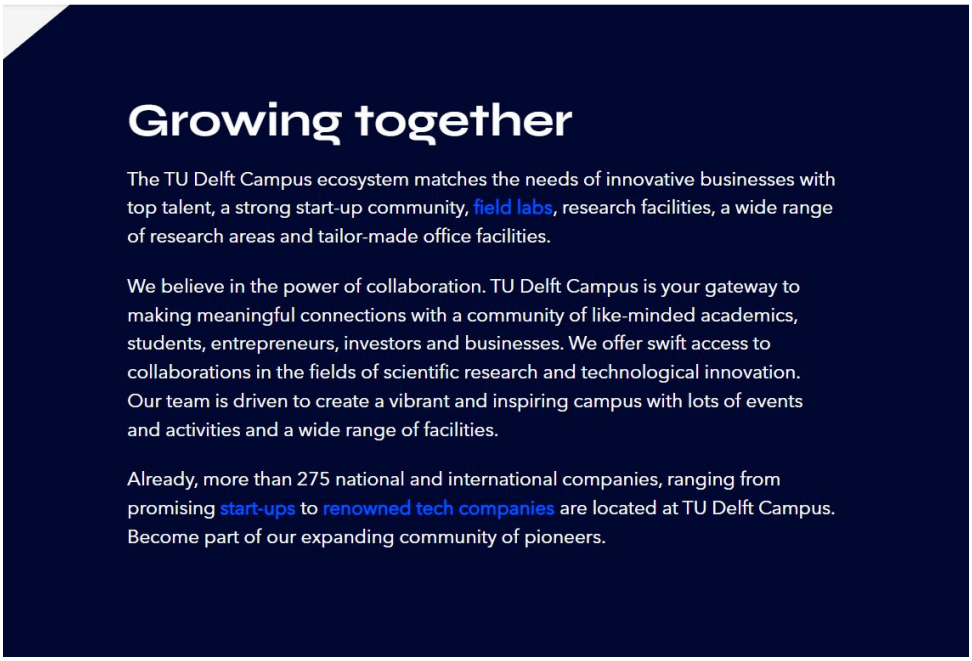


Figure 5.1: A text on the website of *TU Delft Campus*, where the interactive map can also be found [TU Delft Campus, 2024b]

active plans to address these issues. This aligns with the broader critiques of scholars such as Self and Hudson [2015] and Coulter and Rankin [2020], who argue that campus environments should actively promote inclusivity by addressing the diverse needs of all users, including marginalized groups.

A central feminist critique concerns the concept of a ”default user,” typically male, as noted by Lobben et al. [2015], MacAya et al. [2021], Huffman [1997], Henriques et al. [2023] and Criado-Perez [2019]. However, in this case, the map does not even assume a ”default student user” but rather focuses specifically on entrepreneurs and investors. Thus, the issue here is not simply an assumed male default but a very narrowly defined target audience that overlooks many campus users.

Additionally, the interviewee mentioned that the map was still in an early stage of development and therefore ”not ready yet” to incorporate student perspectives or engage with them in a participatory way. This reflects Till [2005]'s theory of experts' reluctance to engage deeply with users from the outset. To foster transformative participation, Till [2005] argues that users should be allowed the power and opportunity to transform the mapping process. So far, the only ”user testing” conducted has been internal, focused on the functionalities of the map, such as the search function, rather than broader inclusivity. This echoes Falahatkar [2024]'s argument that mapping processes should prioritize equity over efficiency, moving beyond merely optimizing technological functions.

While digital mapping tools have the potential to incorporate multiple layers of representation and diverse perspectives, as argued by McLafferty [2002], Kwan [2002a] and van Houtum [2024], the software used for the TU Delft map limits its flexibility. The map-maker highlighted challenges with the software's preset visualization options, making it more constrained in its potential to intentionally illustrate complex and subjective phenomena [van Houtum, 2024].

Moreover, the mapping practice as described by the interviewee is scattered among different parties, who don't all have cartographic expertise: the TU Delft influences decisions on content, the CERFM provides updates on campus maintenance, the interviewee is responsible for managing the map, and the production of the map is outsourced to an external company. This can be linked back to the theory by Van Loenen and Zevenbergen [2010] on Geo-information enhancement chains, where value gets added by different contributors at different steps in the chain. In this case, the collection and quality control of the data lies with the interviewee and parties like CREFM, whereas the presentation is done by the external company in Rotterdam. Therefore, decisions on content and visualization become complex.

Finally, the transition from 3D to 2D reflects the constraints of the Delft mapping process. While the 3D version offered a more engaging depiction of campus landmarks, it was expensive to maintain [Presagis, 2023].

Currently, the map-making process at Delft seems guided by university goals, technical limitations, and trying to improve the interactive functionalities, rather than a deeper reflection on inclusivity.

5.1.2 Vrije Universiteit Amsterdam

To explore the mapping process of the Vrije Universiteit Amsterdam campus map, the person responsible for its development was interviewed on June 5th, 2024, via telephone. The interviewee is a woman holding the position of communications officer at the Facilitaire Campus Organisatie (FCO) of Vrije Universiteit Amsterdam. Below is an overview of the main takeaways from the interview. Full interview notes are available in Appendix C.

Overview of the Mapping Process

The development of this version of the Vrije Universiteit Amsterdam campus map started *"a few years ago,"* as of June 2024 and the map has been updated almost yearly to reflect newly constructed buildings. The last updates were done in 2022. The FCO is responsible for the overall development and management of the map, with the primary objective of providing up-to-date information about campus construction and route changes.

The interviewee independently manages and updates the map, making decisions about its content and design. The department of Ruimteplanning and Ruimtebeheer is responsible for maintaining the detailed floor plans of individual buildings, but these are not included in the campus map. The map's purpose is to provide accessible information on campus navigation and construction updates.

Guiding Principles of the Map

The Vrije Universiteit Amsterdam campus map primarily serves as a navigational tool, used both on the website and as signage on campus to indicate temporary routes and construction zones. Simplicity is a guiding principle in its design, particularly because the campus layout changes frequently due to ongoing construction projects. The map needs to be easily updatable to accommodate these changes. The interviewee emphasized that while the map is used for a variety of purposes, including emergency route signaling, its main goal is to help visitors find their way around the campus, which has become more complicated with the introduction of new buildings and varied entrances.

Improvements Compared to Previous Maps

The interviewee led the development of the current map after being dissatisfied with a previous version created by the communications department. The older map lacked detail and did not contain enough detail, according to the interviewee, which led her to create a more precise version. The current map began as a simple block pattern of buildings but has since evolved into a more realistic representation, built onto Google Maps with added details from the older version.

The first version of the map initially existed in a 3D format, but this posed visibility problems when new buildings were constructed, obstructing views of other campus elements. The shift to 2D resolved these visibility issues, making it easier to update the map and toggle layers on and off. The current version of the map, created in Adobe Illustrator, allows for flexible updates and the creation of different versions depending on need. The layered Illustrator design makes it easy to add or remove elements.

Decisions on Map Elements

The content of the map is primarily based on the older version. The most recent updates included the addition of wheelchair accessibility features, such as logos and QR codes (see Figure 5.2), which were incorporated following a request from the diversity committee. Although the diversity committee wanted the accessibility icons to be more prominent, the interviewee decided to keep them small to maintain the map's readability. Similarly, toilet locations were left off the map to avoid visual clutter.

The color scheme of the map distinguishes the VU campus from the VUMC (VU Medical Center), which was previously part of the university but has since become a separate entity. The choice of colors reflects VU's former house style, although the university's house style has since changed.

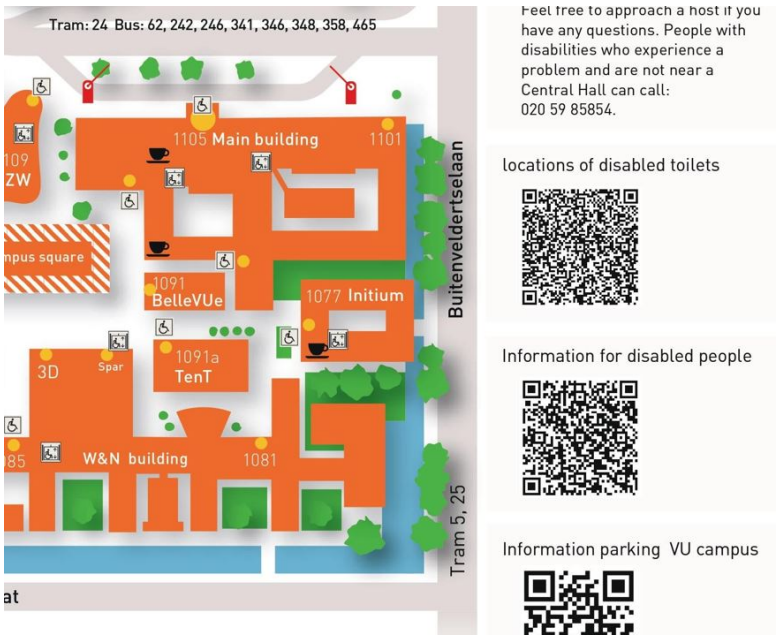


Figure 5.2: A section of the VU Amsterdam campus map, showing wheelchair accessibility icons and QR codes [Vrije Universiteit Amsterdam, 2023]

Consideration for User Perspectives

The map's design process did not systematically involve student input. The diversity committee advocated for the inclusion of wheelchair accessibility icons, which were added in response to their request. However, broader input from students or other user groups has not been systematically incorporated into the map's design process.

Ongoing Development

The map is still a work in progress, with planned updates and ongoing discussions about future improvements. Future additions include incorporating startups and new buildings, as well as potential digital enhancements such as 360-degree indoor navigation for specific campus buildings. The map currently functions as both a physical and digital tool for visitors, primarily aiding navigation and safety during construction. However, there is still a need to update the map on the campus information stands, which currently display an outdated version.

Takeaways

The mapping process at Vrije Universiteit Amsterdam focuses primarily on providing practical information for campus navigation and updates related to construction and safety routes. Simplicity and flexibility were key priorities, allowing for frequent updates as the campus evolves.

Although the diversity committee contributed to the inclusion of wheelchair accessibility icons, broader user perspectives, such as those of students, were not structurally involved in the design. The interviewee prioritized readability, which led to decisions such as not prominently displaying certain icons, like toilets or accessibility features, to maintain clarity.

The map is still a work in progress, with plans to add more features, such as information on startups and new buildings, as well as potential digital enhancements like 360-degree indoor navigation. However, these planned updates do not seem to have an inclusivity focus.

Discussion on Vrije Universiteit Amsterdam Mapping Process

A notable feature of the Vrije Universiteit Amsterdam campus map is its inclusion of wheelchair accessibility icons, which were added after input from the university's diversity committee. This aligns with feminist calls for inclusivity and the integration of marginalized voices into design processes [Fileborn, 2023; Falahatkar, 2024]. Scholars like Fileborn [2023] and Falahatkar [2024] stress the importance of incorporating the perspectives of marginalized groups into cartographic practices, and the inclusion of these accessibility icons represents a positive step in that direction. However, the fact that these features were only included after the diversity committee's intervention reveals that accessibility was not initially a priority in the map's design. This supports the critique by Lobben et al. [2015] and MacAya et al. [2021], who argue that marginalized users are often overlooked in

the creation of maps, where a "default user" is presumed, and their needs are not considered from the outset. Moreover, the integration of the QR codes and styling of the wheelchair symbols was decided upon by the interviewee, without consultation from wheelchair users, which means it cannot be confirmed whether the way the input of the inclusivity committee was included in the map is what the wheelchair users desire [Till, 2005; Arnstein, 1969].

The interviewee mentioned no hesitation to include the wishes of the committee, except for a disagreement on the size of the wheelchair accessibility logos. This illustrates both an open stance to new perspectives, contrary to what Till [2005] notes, but also the tension between addressing specific user needs, and maintaining the map's functionality and readability as Dittus and Graham [2022] discuss. While the interviewee was open to external input, the prioritization of certain design choices, such as the decision not to (prominently) display toilet locations or wheelchair icons, reflects the mapmaker's own perspective on what is most important to put in the map. This is reflected in the literature, as Mahmoudi and Shelton [2022] describe, even seemingly objective decisions, such as leaving out certain features for readability, can exclude certain perspectives.

The absence of structural involvement from students in the mapping process further reinforces this critique. The map-making process did not prioritize the inclusion of user perspectives from the beginning, which is a key point in the critiques of scholars like Kwan [2002a] and Till [2005]. They argue that participatory design should involve users early on to ensure their needs and experiences are reflected in the final product. There was no effort to engage students or other user groups proactively.

In terms of gender inclusivity, the Vrije Universiteit Amsterdam campus map does not explicitly mention considering gender in their mapping process. The focus remains on functionality, with limited attention to how different groups navigate or experience the campus. This aligns with critiques by feminist scholars like Falahatkar [2024] and Schuurman and Pratt [2002], who call for mapping processes that consider the varied spatial experiences of different genders, particularly with respect to safety and accessibility.

The shift from a 3D to a 2D map due to visibility issues caused by new construction underscores not only technical limitations but also the inherent challenges of translating complex physical spaces into simplified visual representations [Monmonier, 1996].

The ongoing development of the map, with plans to incorporate 360-degree imagery, reflects trends in campus mapping, as noted by Akinwunmi et al. [2016]. These digital enhancements aim to improve user experience but do not necessarily address the inclusivity concerns raised by feminist critiques. Scholars like Falahatkar [2024] caution that a focus on technological efficiency can sometimes overshadow equity, and in this case, future plans for the map seem to prioritize technological enhancement and business-related needs, such as incorporating startups, over intentional inclusive design [van Houtum, 2024].

Furthermore, critiques like those by Carton [2007] about mapping being primarily an administrative task seem applicable here, with the map-making process at VU largely driven by efficiency in terms of software choices and practical considerations. This reflects broader concerns raised by Goodchild [2006] that mapping tools are increasingly in the hands of people without formal cartographic training, which can lead to a lack of awareness of the broader social implications of mapping decisions. Moreover, even though the map-maker doesn't seem to be "constrained" by cartographic conventions [Ramon and Monk, 2007], she more so seems to be constrained by the ever-changing physical layout of the campus, and the consequential mapping software choices.

5.1.3 Erasmus University Rotterdam

To explore the mapping process of the Erasmus University Rotterdam campus map, the person responsible for its development was interviewed on June 4th, 2024, on the campus. The interviewee, a woman holding the position of Editorial Assistant and Art Director for Erasmus Magazine, shared insights into the map's creation. Below is a summary of the main takeaways from the interview. Full notes are available in Appendix C.

Overview of the Mapping Process

The development of the Erasmus University campus map started in 2022, with a new version being created each year since then. The idea for the map emerged during the university's Introduction Week, when the Erasmus Magazine team, trying to stand out with their information stand, noticed that many new students struggled to navigate the campus due to confusing building names. To address this, the magazine team decided to create a visually engaging campus map to help students find their way, and promote the Erasmus Magazine.

The Erasmus Magazine collaborated with the illustration company "IkRotterdam" to design the map. One of the illustrators, a friend of the interviewee, had a personal fascination with maps, which made him a fitting choice for the project, according to the interviewee. The first version of the map included sponsorship elements, prominently featuring the Erasmus Pavilion, a campus landmark and meeting point. However, from the second version onward, sponsorship was no longer included (see Figure 5.3).

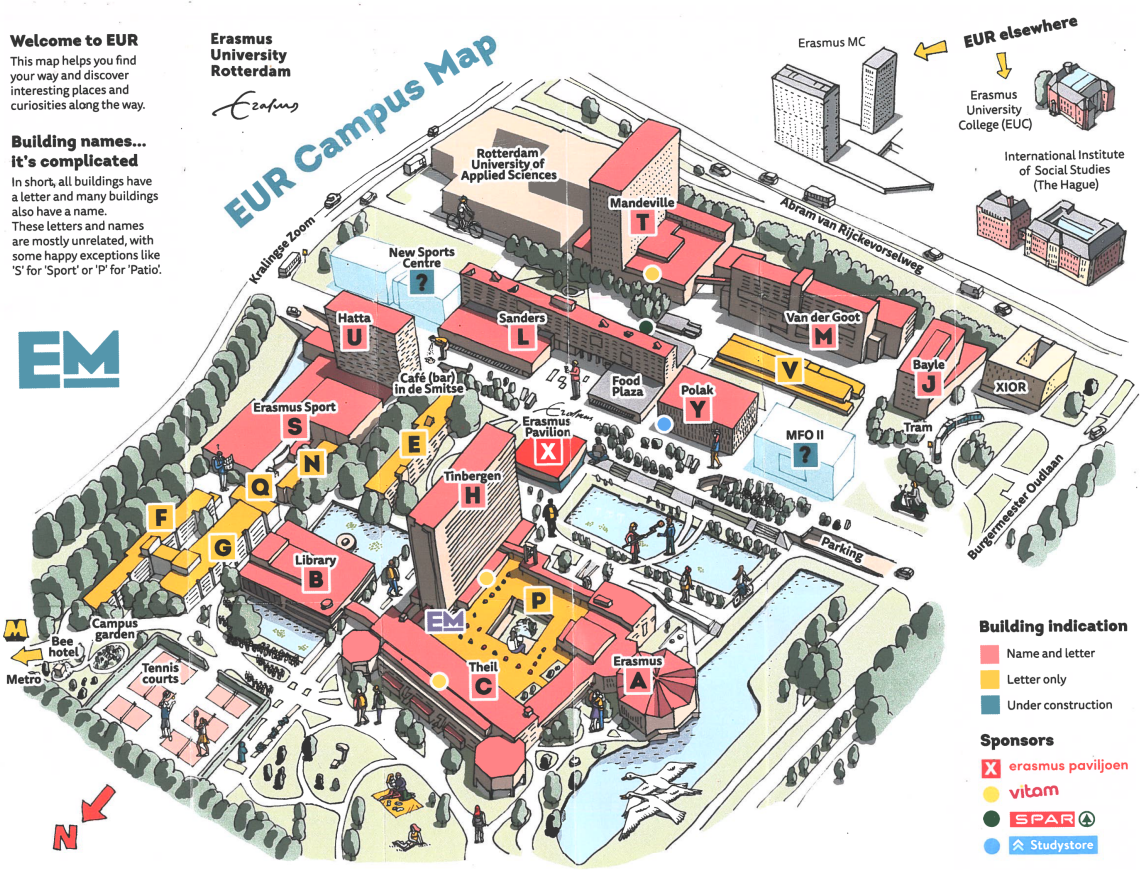


Figure 5.3: The first version of the Erasmus University Campus Map [Erasmus University Rotterdam, 2022]

Guiding Principles of the Map

One of the goals of the map was to stand out and have something to hand out that would grab the attention of the new students, and that they would remember the Erasmus Magazine by. The map was designed with students in mind, focusing on recognizable elements to aid navigation. Buildings that are not part of Erasmus University were intentionally downplayed in the design to avoid confusion, while notable landmarks like the Erasmus Pavilion were emphasized to serve as meeting points. Although the Pavilion was initially featured due to sponsorship, it remained on the map due to its practical function as a recognizable spot for students. As the campus layout is complicated, the map aimed to simplify the experience for students by highlighting landmarks and visually distinct elements.

Improvements Compared to Previous Maps

The Erasmus University campus also features a 2D map, but the 3D map created by the Erasmus Magazine was designed specifically to grab students' attention during Introduction Week. It was intended to stand out from more standard campus maps and was designed to be visually engaging, with landmarks and recognizable campus items placed prominently to help students find their way more easily.

Changes and updates to the map are made annually, with the base structure remaining the same. Small updates, such as changes in color schemes or the addition of new elements (e.g., geese, which are a familiar sight on campus), are made to reflect current campus life and keep the map engaging.

Decisions on Map Elements

The interviewee was responsible for many content-related decisions, such as which building names and letters to include. Building names on the campus are often confusing, according to the interviewee, with some buildings having only letters and others both a letter and a name, so a legend was added to the map to clarify this. Initially, extra information about off-campus buildings was included, but this was later adjusted to reduce confusion. Sponsored elements, such as the Erasmus Pavilion, were initially made prominent because of their sponsorship but were retained in following versions due to their usefulness as meeting points.

In terms of design, many of the visualization decisions were made intuitively by the illustration team at IkRotterdam, with input from the magazine editors. For example, the orientation of the map, with north pointing downward, was chosen because it felt logical to the interviewee, based on the typical routes students take when arriving on campus. The editors, who are familiar with the campus, reviewed the design and decided whether it "felt right" before making any adjustments. The map's design was very much a collaborative effort between the illustrators and the Erasmus Magazine editors, with decisions driven by a mix of intuition and practical knowledge of the campus layout.

Consideration for User Perspectives

The Erasmus Magazine editorial team includes several student interns who were present in some of the meetings where the map was discussed and, according to the interviewee, were able to provide their opinion on the map design. Although the map was not created through a structured user involvement process, the interviewee noted that the editorial team is closely connected to students due to their daily interactions with interns and other students who visit the office.

Ongoing Development

The Erasmus University campus map undergoes continuous yearly revisions, with the base structure remaining the same while small updates are made. Changes typically include updated colors, the addition of new figures, and the inclusion of elements that reflect current campus life, such as protesters or the familiar geese that inhabit the campus. These updates aim to keep the map relevant and engaging while telling an ongoing visual story about the university, according to the interviewee.

Takeaways

The Erasmus University campus map was originally developed to serve as a visually engaging promotional element for Erasmus Magazine's information stand, while assisting new students during Introduction Week and to help them navigate the campus's confusing building names and layout. The first version of the map included sponsorship elements, such as the Erasmus Pavilion, but these were removed in later versions, with the focus shifting to recognizable landmarks that aid navigation. The map is updated yearly, incorporating new elements such as geese or protestors to keep it relevant and engaging. Decisions regarding visualization, such as orienting the map with north pointing downward, were made intuitively by the editors. Although student interns incidentally contributed to the process, the map's development was largely driven by the magazine's priorities of promoting its content and standing out during Introduction Week.

Discussion on Erasmus University Rotterdam Mapping Process

One of the guiding motives behind the Erasmus University Rotterdam campus map is to serve as visually appealing promotional material. This objective led to the decision to collaborate with an illustrator who has a personal fascination with maps. This approach contrasts with the broader shift toward more digital mapping methods, as noted by scholars like van Houtum [2024], Harley [1989], and Dittus and Graham [2022].

Although the map was intended to help new students navigate the campus, student involvement in the design process was more incidental than intentional. Most decisions were made intuitively by the editorial team of Erasmus Magazine, with input from student interns only because they happened to work there. This lack of

structural engagement with students or diverse user groups raises concerns about tokenism, as highlighted by Arnstein [1969] and Till [2005]. There was no evidence from the interview that feedback from a wider range of students or marginalized groups was systematically gathered. Visualization decisions, such as orienting the map in a non-standard direction, were based on the familiarity and intuition of the editors, reflecting a limited consideration of broader user needs, as discussed by Carton [2007] and Dittus and Graham [2022]. As a result, the map may not fully meet the needs of all students, despite its focus on aesthetics and relevance.

An interesting aspect of the Erasmus map is its incorporation of small human figures engaged in campus activities, as well as symbolic features like the rainbow crossing. This move away from a traditional, disembodied approach to cartography, critiqued by Harley [1989], Huffman [1997], and Kwan [2002a], introduces a more humanized representation of campus life. The inclusion of the rainbow crossing, in particular, signals a gesture toward LGBTQ+ inclusivity, as advocated by Coulter and Rankin [2020]. However, while these features suggest a consideration for inclusivity, they still reflect the subjective choices of the map designers, who chose to highlight certain aspects of campus life while potentially overlooking others. Furthermore, these design choices were not the result of active user participation, leaving it unclear whether the users themselves value this type of representation [van Houtum, 2024; Till, 2005].

In this case, while the visual language used on the Erasmus map effectively conveys a story of campus life, it may still miss important aspects that could have been addressed by more consciously including marginalized voices in the mapping process [van Houtum, 2024]. Traditional cartography often relied on human experiences and narratives to shape maps [van Houtum, 2024; Dittus and Graham, 2022], but the rise of GIS and software tools has shifted the focus toward precision and functionality, often at the expense of creativity. However, the artistic approach taken with the Rotterdam map revives this humanized style, incorporating elements like the rainbow crossing and human figures (see Figure 5.4), allowing for a more expressive representation of space.

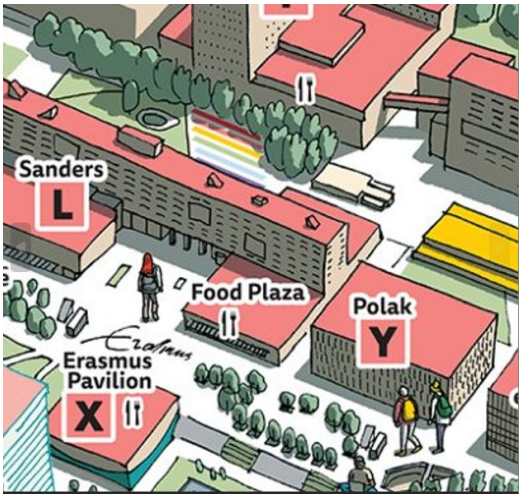


Figure 5.4: The rainbow crossing as depicted in the Rotterdam campus map

In contrast to the more objective presentations of maps like Google Maps, which Dittus and Graham [2022] argue are often perceived as unbiased by users, the Erasmus map's artistic design and humanized elements signal that it is not striving for objectivity. This distinction may influence how users perceive and engage with the map, as argued by Carton [2007]. The subjective nature of this map, though visually engaging, suggests that its purpose is not solely functional, but also cultural, communicating a specific narrative about campus life.

5.1.4 Comparison of the Mapping Processes

The interviews with the map-makers of the three universities reveal several similarities and differences in their mapping processes, motives, and inclusivity efforts, which are described below.

Each university's campus map was created with different purposes in mind. At Delft, the map is primarily designed to promote the campus as a hub of innovation and attract investors. This reflects the broader strategic goals of the university, which is largely focused on external stakeholders like entrepreneurs, rather than students. In contrast, Amsterdam's map is more practical in nature, focused on providing navigation support and safety, with frequent updates to reflect changes in campus construction routes. Meanwhile, Rotterdam's map was developed as part of Erasmus Magazine's promotional efforts, specifically for engaging new students during Introduction Week. This highlights a difference in audience focus, where Delft's and Rotterdam's maps are oriented toward external or promotional goals, whereas Amsterdam's map addresses practical navigation and

safety.

When considering student perspectives and inclusivity, the maps show varying levels of consideration, though none explicitly address gender or marginalized groups. At Delft, there was no direct involvement of students in the initial development of the map, reflecting a limited engagement with user groups. The future potential to involve students remains speculative, as usability testing has so far only been conducted internally. Amsterdam's map, while it did incorporate feedback from the diversity committee regarding accessibility, lacked systematic student involvement. The inclusion of accessibility features came as a reactive decision, not proactively integrated into the design from the outset. Rotterdam's map involved students in the design process only because they happened to be interns at Erasmus Magazine, suggesting their participation was more incidental than intentional. Across all three cases, there was no structured effort to incorporate a wide range of student perspectives or gender considerations into the map-making processes.
financial and technical constraints played a significant role in shaping the maps at Delft and Amsterdam. Delft's map shifted from a 3D to a 2D format due to cost considerations, even though the previous 3D version offered a more engaging visual experience. The software used at Delft, MapBox, also imposes limitations on flexibility and customization, reflecting how technical and financial restrictions impact the visual and functional potential of campus maps. Similarly, Amsterdam's map was designed to be simple and editable to accommodate the changing campus layout. The shift from 3D to 2D here was driven by visibility issues caused by campus construction, resulting in a less detailed map, though one that is easier to update regularly. At Rotterdam, design decisions were based more on intuition and the editor's familiarity with campus routes, rather than structured user feedback or cartographic principles. For instance, the map's orientation, with north pointing downward, reflects the typical route students take when entering the campus.
The processes of the three universities look vastly different, however, in all cases there was one ultimately responsible person. At Delft, the process was divided among different parties, with the map being outsourced to an external company, and updates managed by internal teams. In Amsterdam, the interviewee managed the map independently, with minimal external input apart from feedback from the diversity committee. In Rotterdam, the map was created through collaboration between Erasmus Magazine and an external illustration company, with occasional input from student interns. In all three cases, the key responsible person was not a professional cartographer.

5.1.5 Discussion of All Mapping Processes

The campus mapping processes across Delft, Amsterdam, and Rotterdam reflect diverse motives, varying degrees of consideration for students, and different distributions of responsibilities over the map.

Interestingly, the primary audience for the campus maps is not always students. TU Delft's map is primarily designed to meet the university's goals of promoting innovation and attracting investors, while Erasmus University Rotterdam's map is designed primarily for promotion purposes during Introduction Week, which aligns with the critiques by Ramon and Monk [2007], noting how priorities and values of the map-maker are reflected in the map. Vrije Universiteit Amsterdam's map, however, was more focused on practicalities than promoting the campus in any way.

The technical and physical constraints mentioned by the map-makers of Delft and Amsterdam led to a simplification and limitation of the possibilities for representing the campus in 3D or changing the color scheme. This contradicts the notion that digital technologies expand possibilities for representation, as suggested by van Houtum [2024] and Kwan [2002a]. In contrast, the manually produced map by the map-maker of Rotterdam, actively focused on including intentional subjective experience related elements in the map, such as people partaking in activities.

In all three cases, the responsible person for the map was someone without a profession in cartography. Especially in the case of Rotterdam's illustrated map, this aligned to some extent with van Houtum [2024]'s call for cartography to open up to different disciplines, such as art, as a means to expand towards a humanized approach to cartography, but it also highlights the risk that non-cartographers may not fully grasp the power dynamics embedded in map-making.

However, the map-makers of Delft and Rotterdam seem to be aware of the ability of their maps to project a certain image and use this to their advantage. In Delft, for example, elements are intentionally emphasized to frame the campus in a way that aligns with the university's goals of promoting innovation and attracting external stakeholders [Mahmoudi and Shelton, 2022; Dittus and Graham, 2022; Carton, 2007]. In contrast, Rotterdam's map-maker has taken a more aesthetically focused approach, prioritizing the overall appearance and style, with map elements chosen accordingly.

While these map-makers understand the communicative power of their maps they may not fully grasp the broader social or political implications of their work [Dittus and Graham, 2022; Ramondetti, 2023; Harley, 1989]. Their focus on communication and promotion, rather than a critical engagement with inclusivity or

spatial justice, means that they might not be transparent about the deeper impacts their maps may have on marginalized groups [van Houtum, 2024; Carton, 2007].

The involvement of people without formal cartographic training in the map-making processes suggests a broader definition of who can create maps [Tyner, 2010]. This means the issue raised by Lobben et al. [2015], about the resistance from within the field of cartography to address inclusivity issues, is not entirely relevant in this case. Moreover, this lack of expertise may hinder the ability to systematically disrupt traditional cartographic practices and guide them toward more inclusive outcomes. This aligns with the critique by Schuurman and Pratt [2002], who emphasizes that feminist movements in cartography must come from within the discipline to be truly effective in reshaping it. For instance, while the Erasmus University map includes symbolic elements like the rainbow crossing, which signals inclusivity, these decisions were not rooted in participatory design, nor in a critical approach to mapping. Rather, they were intuitive or aesthetic choices, suggesting that the intentions behind the map remain primarily promotional rather than inclusive.

In terms of student and marginalized group involvement, all three universities demonstrate a lack of structured user participation. While Vrije Universiteit Amsterdam incorporated accessibility icons after input from the diversity committee, this was a reactive rather than proactive decision, reflecting the broader critique by Fileborn [2023], Arnstein [1969] and Till [2005] that participation risks becoming passive, or tokenism. Similarly, in the process of mapping the campus map of Rotterdam, students were sometimes present and able to give their opinion, but never systematically involved.

In summary, the campus mapping processes at Delft, Amsterdam, and Rotterdam highlight the tensions between functionality, aesthetics, and inclusivity. While each map serves its intended purpose, whether to promote the campus, a magazine, or guide students, the lack of participatory design and consideration for marginalized groups is evident in all three mapping processes

5.2 Evaluation of the Maps

The opinions of the students on the different campus maps were investigated in two ways: a survey, and follow-up interviews with a selection of the survey respondents. In the following sections, the survey results and follow-up interview results will be presented. First, an overview of the demographic information, and characteristics of the participants is provided. The raw survey data can be found in appendix D, and the interview notes of the follow-up interviews in appendix F.

5.2.1 Survey Respondents

The sample includes 21 men, 19 women, and 1 non-binary person (see Figure 5.5). Ages range from 19 to 34, with most respondents in their mid-20s. The exact age distribution can be seen in figure 5.6.

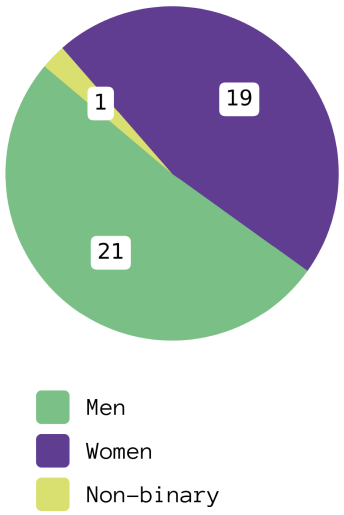


Figure 5.5: Distribution of the gender of the respondents

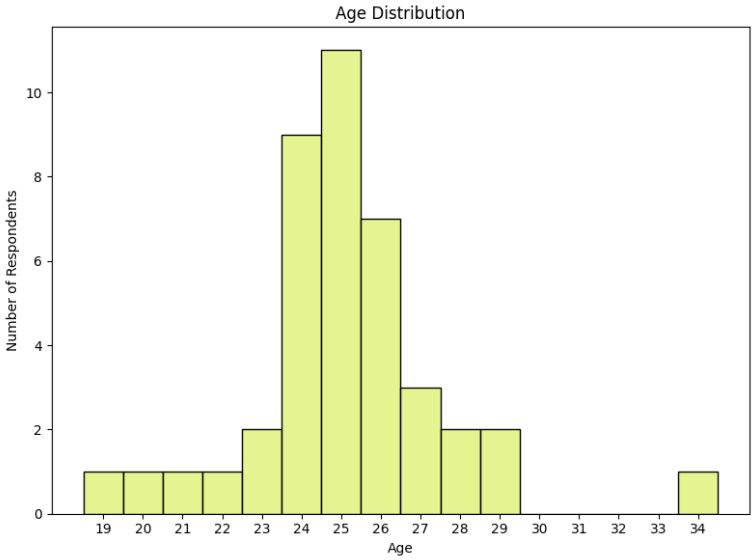


Figure 5.6: The age distribution of the respondents of the survey

The majority of the respondents were master students, and the majority lives in Delft, either on-campus or off-campus (see Figures 5.8 and 5.7.)

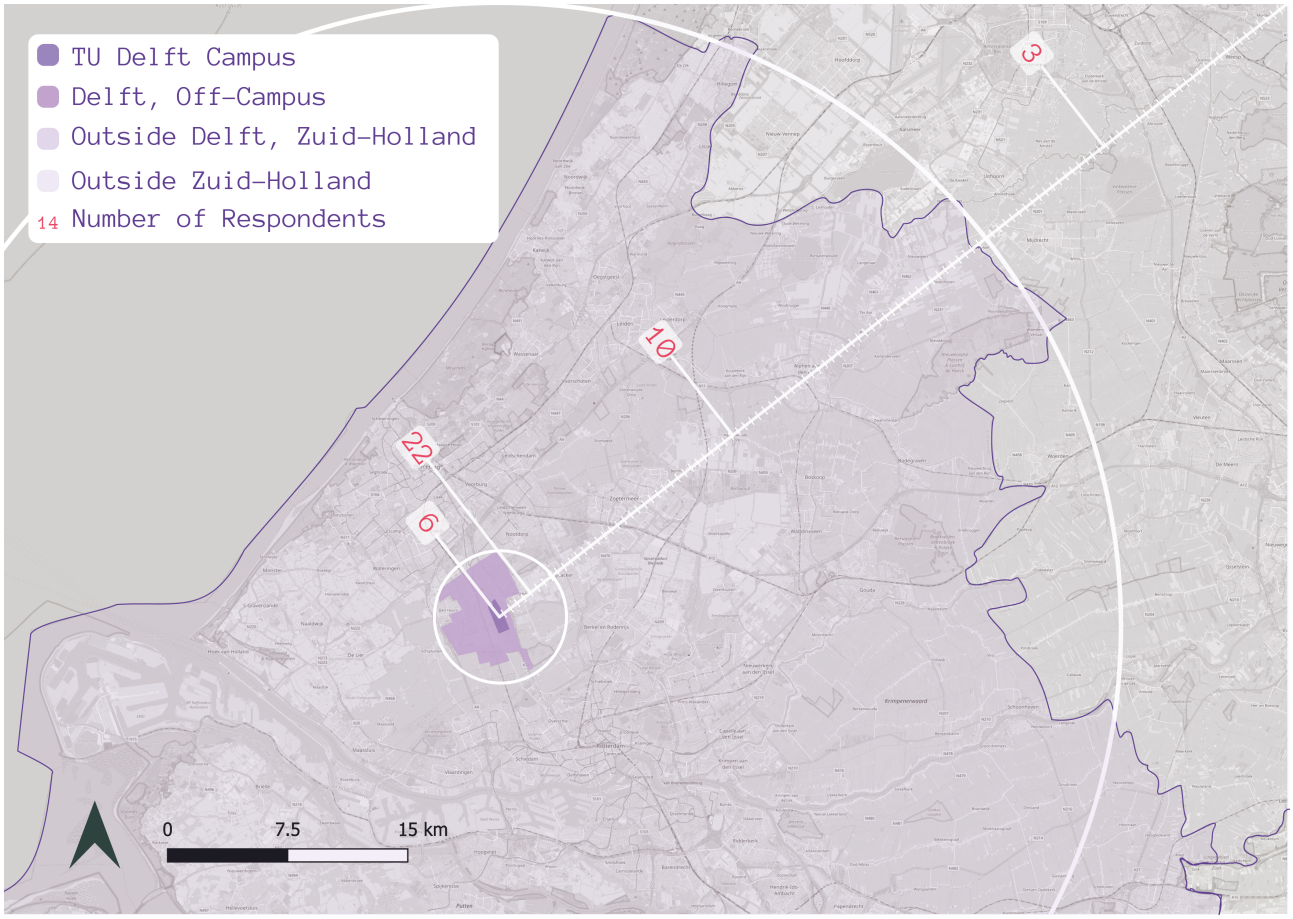


Figure 5.7: Proximity of living location of the respondents to the TU Delft Campus

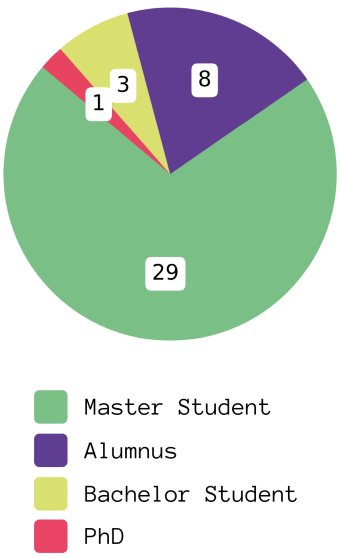


Figure 5.8: The distribution of connection to the TU Delft of the respondents

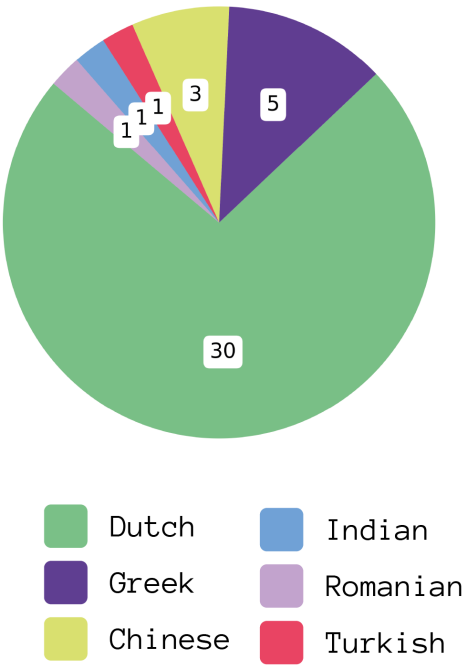


Figure 5.9: The distribution of different nationalities among the respondents of the survey

There's a mix of nationalities among the respondents, with Dutch being the majority (see Figure 5.9).

Most respondents visit the campus frequently (see Figure 5.10). Biking is the most common mode of transport across all genders, followed by walking (see Figure 5.11).

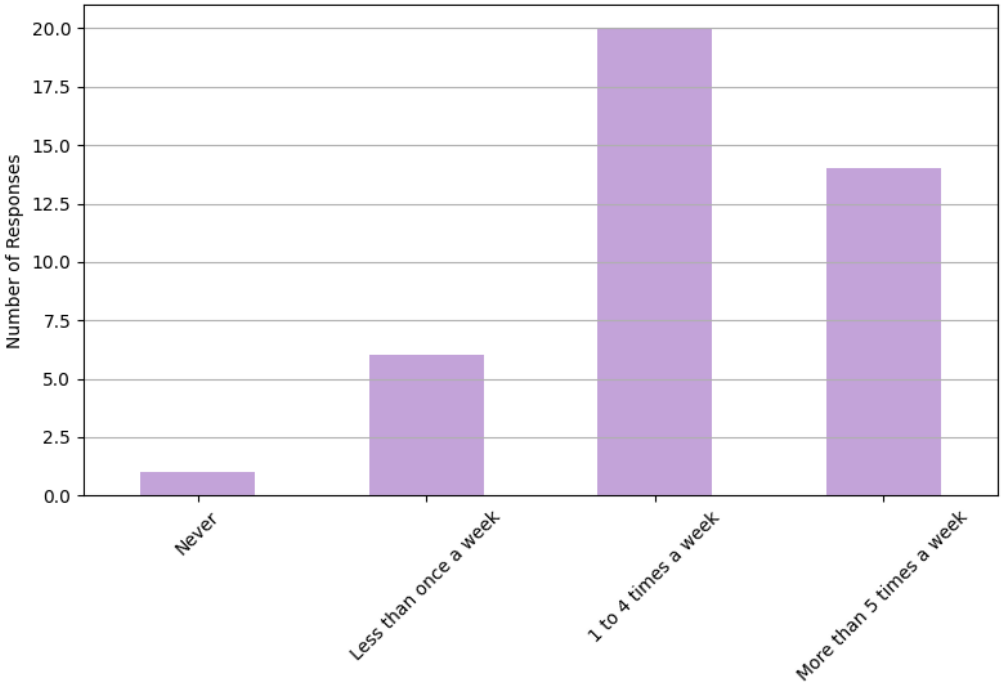


Figure 5.10: Distribution of frequency of TU Delft campus visits per week

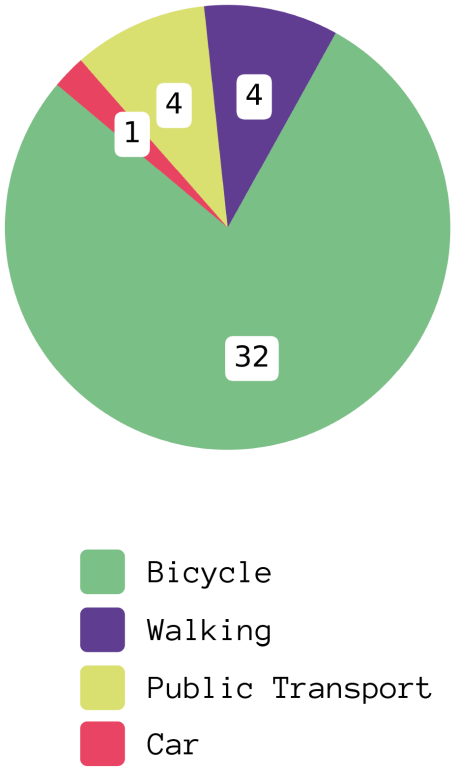


Figure 5.11: The distribution of main transport mode used on campus by the respondents

As can be seen in figure 5.12, there are slight differences in the activities different genders partake in on campus. Women are more likely to practice hobbies, sports, or recreate. Men are more likely to partake in work related activities. Of all respondents, regardless of gender, the vast majority comes to the campus for studying.

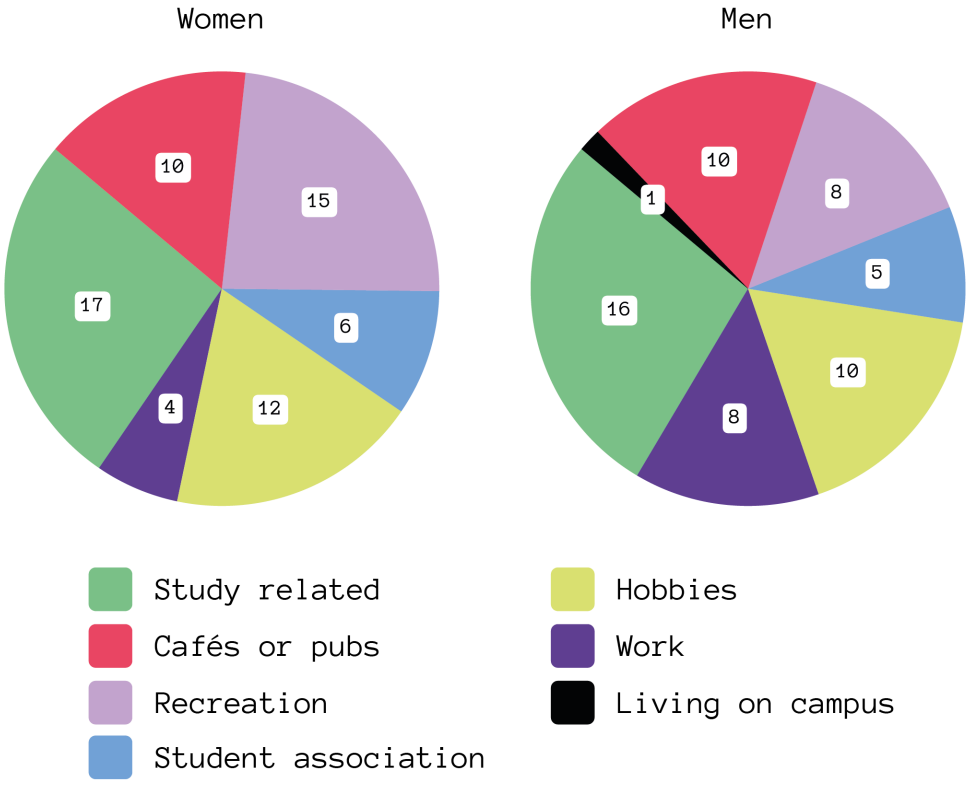


Figure 5.12: Distribution of activities on campus for men and women

5.2.2 Follow-up Interviewees

A follow-up interview was conducted with 11 of the survey respondents, who indicated that they were open for participating in further steps after the survey. Their characteristics, as well as information on their behaviour on campus is provided in Appendix F. The sample consisted of 4 women and 7 men.

5.3 Delft University of Technology

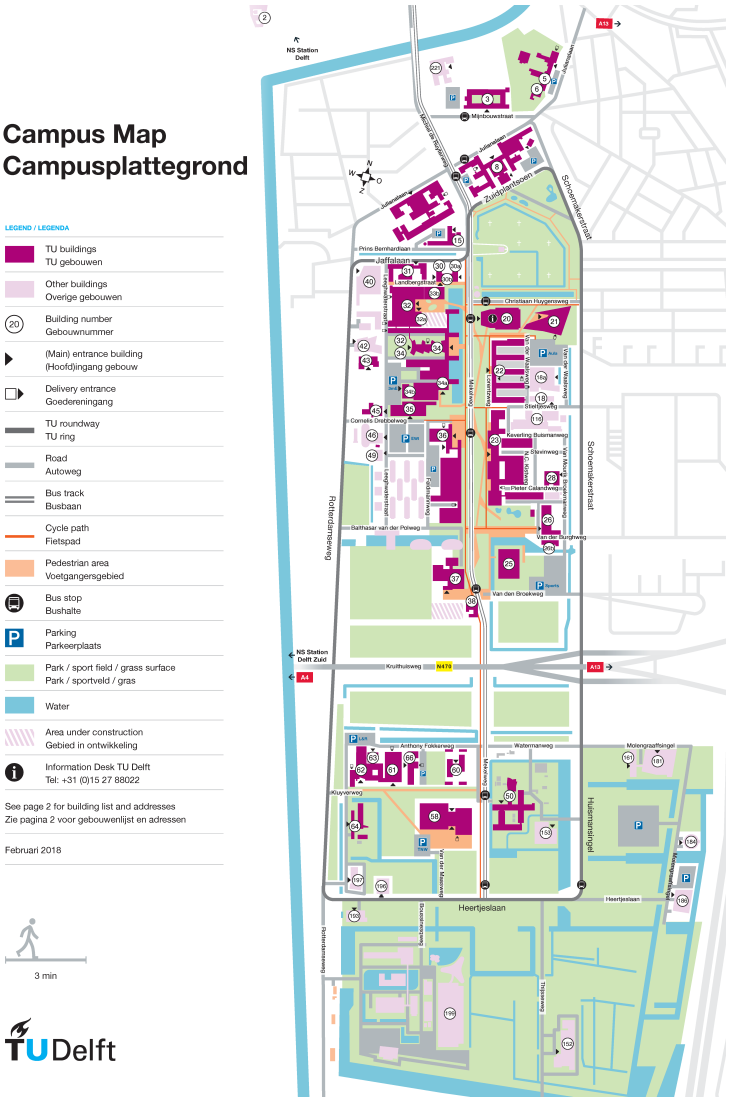


Figure 5.13: The map of the TU Delft campus that was evaluated by the assumed users (campus users)

	A	B	C	D	E	F	G	H	I
			Average Score			Feedback			
1	Element	Aspect	All	W	M	Women		Men	
2						Positive	Negative	Positive	Negative
3	Layout		3.56	3.65	3.57	"Colorful, seems clear" "clear structure" "Good" "Its clear. Nice use of different colors so the different aspects are visibly quite well."	"I'm missing the list of buildings so the text could be more compact to not need another page" "But some parts you need to read are a bit small. "	"Good: legend and a map. All you need" "Clear use of colour to indicate what buildings are part of TU Delft. Nice use of arrows to indicate entrances." "Good legibility" "Clear distinction between legend/map on the page with the vertical split	"North arrow could be bigger." "It's a very busy map to look at" " "It would be nice if a "building landmark" such as Aula, was more visible (for example it was written) so the reader can directly "orient" himself in the map." "Building numbers aren't as familiar as facult y names"
4	2D		3.76	3.7	3.81	"Think 2d is good enough to show how the campus funstions" "makes sense since floors are not included" "I think the use of color is smart. as well as the different icons. " "The map looks clear to me, but I already know what it looks like in 3d. If you don't know it could be handy to recognize the ub by its sloped roof for example."	"Landmarks, like EWI, UB, BK are less visible in 2D" "It looks a bit full, some buildings are shows too literally " "A 3D map would be nice to help identify the buildings. A 2D map only shows the global shape and not the facades"	"Easy to read" "3d does not seem needed" "The spatial layout of the campus is quite simple, you don't need to see the buildings' heights to understand where you are" "3d would not have added much here I believe, the footprints of the buildings are distinguished enough" "Gives a clear overview "	x
5	Information		3.22	3.1	3.33	"It seems pretty clear where to go and where you can park if you look for a certain building." "Everything that you need except for restaurants/ places to eat are shown"	"Id expect the campus buildings to be most important, so it feels incomplete that theres no names for the faculties on there. What does "Other buildings" mean? Very unclear. I do like the walking stick man" "It shows very little information, nothing about the use of the campus" "Can be better, mainly buildings are visible. No other functions. Also it looks like there are many parcs, dont think thats true, maybe show trees or kind of parc" "No classroom numbers, no bike parking sign, no accessibility entrances for handicapped people, no north arrow, no crosswalks, no traffic lights " "It's not clear what each building is"	"Everything is there"	"Does not describe facilities such as cafes or restaurants on Campus, also does not show bicycle parking" "It does not tell which faculty is where. Only which building number." "The names of the faculties are not there (except on parking lots)" "Could have had the names of the buildings" "Faculty names would help"
6	Legend	Completeness	3.02	3.05	3	"Good, the numbers are on a different page so thats fine" "It shows everything that you need"	"Shows the minimal, not the faculty etc" "I need the food station info, coffee shops info" "Not every building is numbered, leaves out things" "Missing the buildings"	x	"Does not describe facilities such as cafes or restaurants on Campus, also does not show bicycle parking" "It's okay, but they are very generous with areas they call 'park'. And sports fields should not be the same category." "Missing building names / faculties" "The stuff that's supposed to be on the back is kind of annoying"
7		Clarity	3.68	3.45	3.9	"Clear and nice that its big" "Colours are clear" "Clear due to white background and spacing" "Colors and hatches make it clear" "Makes sense"	"Green areas are not sufficiently explained" "Only missing the corresponding faculty names with the numbers"	"Clear and simple layout" "All clear"	"Would have done it differently"
8	Text	Relevance	3.54	3.55	3.52	"I do appreciate the street names very much." "English, Dutch, no information that should not be there" "No more than needed, only relevant information" "It's short which is nice" "Only necessary text is shown which is nice"	x	"Nice that they point to other things in the city off map." "All text contains good information."	"Street names? Why?"
9		Visualization	3.66	3.6	3.71	"Zooming in is needed for reading, but not impossible or annoying" "good. The icons are a bit different styles but the difference in colors makes it clear" "nice fontsizes , color is clear. (on my phone where I can zoom in)"	"Very small, although this might be better irl? The parking places seem to be harder to read" "The information at the buildings is unclear, there is no depth" "I find it a bit confusing that the buildings are purple"	"All clear, only thing thats important I think"	"Makes the map look busy" "A bit small"
10	Color	Visualization	3.66	3.75	3.57	"Nice color pallet" "I like the color scheme" "The different colors are not too close together so the different aspects are pretty clear"	"There is too much or too little contract between some of the color combinations"	"It's a map, the visuals dont really matter in a map i think" "The use of purple and green makes the map easy to read"	x
11		Appropriateness	3.68	3.65	3.71	"Works well to associate" "Realistic/recognizable" "It's consistent and makes sense; green is pieces of grass, grey is road.." "Wouldn't necessarily use pink/purple for buildings but it works in this map. It stands out"	x	"Colour use is clear" "All very intuitive so good, building colors match with the real TU building signs. Good choice"	"There is a lot more green on the map than in real life."
12	Symbols	Appropriateness	3.37	3.4	3.33	"It's clear"	"I am missing symbols for faculties, as they are only colour coded. Bus symbols etc makes sense" "The pattern for construction area is too big, and the colour does not fit" "Not so many symbols" "Different types of entrance is confusing"	"Everything you need is there"	"Numbers for the buildings also create a very busy map"
13		Clarity	3.29	3.05	3.52	x	x	x	x

Survey Results

The answers of the survey are presented in table 5.3. Here the total average score per map element is provided, and the average scores by men and women. The score cells are colored along a gradient, according to their value (blue = 1, red = 5). The comments that were added about each element are then categorized in "negative" and "positive" comments, divided by men and women [1]. These results are explained and compared in the following sections.

Comparison of Survey Responses Between Genders

In Figure 5.14 the (average) scores for each element are shown, divided by gender (separate charts, and the non-binary response can be found in Appendix E). In these figures you can see that there are only slight differences in how men and women rated the various elements of the map. Men rated the clarity of the legend and the symbols slightly higher, as well as information completeness and the use of 2D. Women were slightly more satisfied with the visual appeal of the colors.

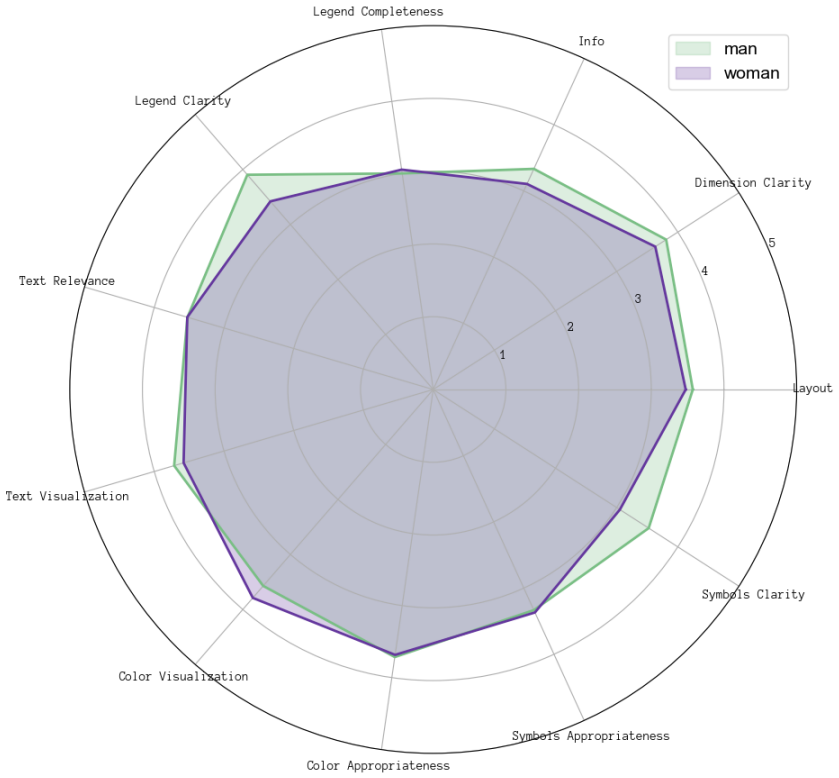


Figure 5.14: The average scores given to each element of the Delft University of Technology campus map, by women and men (N=40)

[1] Since the non-binary respondent provided no additional comments, their scores will be compared to the overall averages of men's and women's responses, but they are not considered in the table with additional comments.

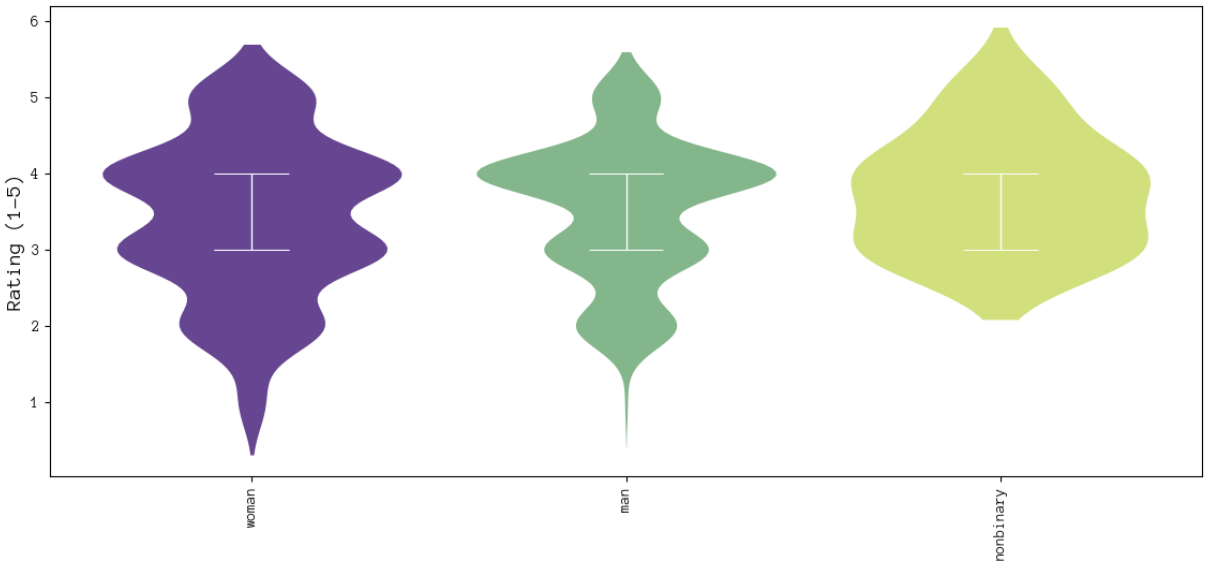


Figure 5.15: The spread of all ratings given on the Delft University of Technology campus map, divided by gender (N=41)

Moreover, all scores are displayed in a violin plot, Figure 5.15, divided by gender. Here you can see the difference in spread of the ratings given divided by gender. This plot demonstrates that the ratings given by men and women show different distributions, with women having a broader spread in their scores, where the scores of men are more concentrated around the score of 4. The non-binary respondent's ratings fit more with the higher scores in the male respondents' range [2].

The average score by all respondents for familarity with the Delft University of Technology campus map is *3.24/5*. The division of the different scores is shown in Figure 5.16. This indicates an overall fairly high familiarity with the campus map.

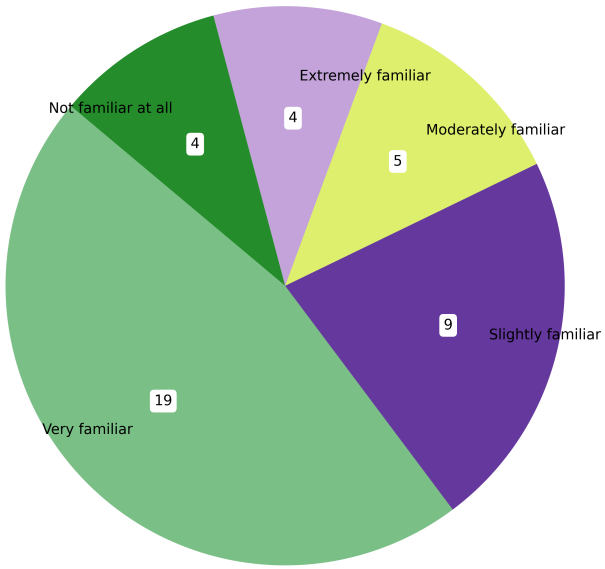


Figure 5.16: Levels of familiarity with the Delft University of Technology campus map

[2]Because the sample includes only one non-binary respondent, the violin plot reflects that individual's responses rather than an average. As a result, the plot may display more 'extreme' scores, but these should not be interpreted as representative of broader preferences.

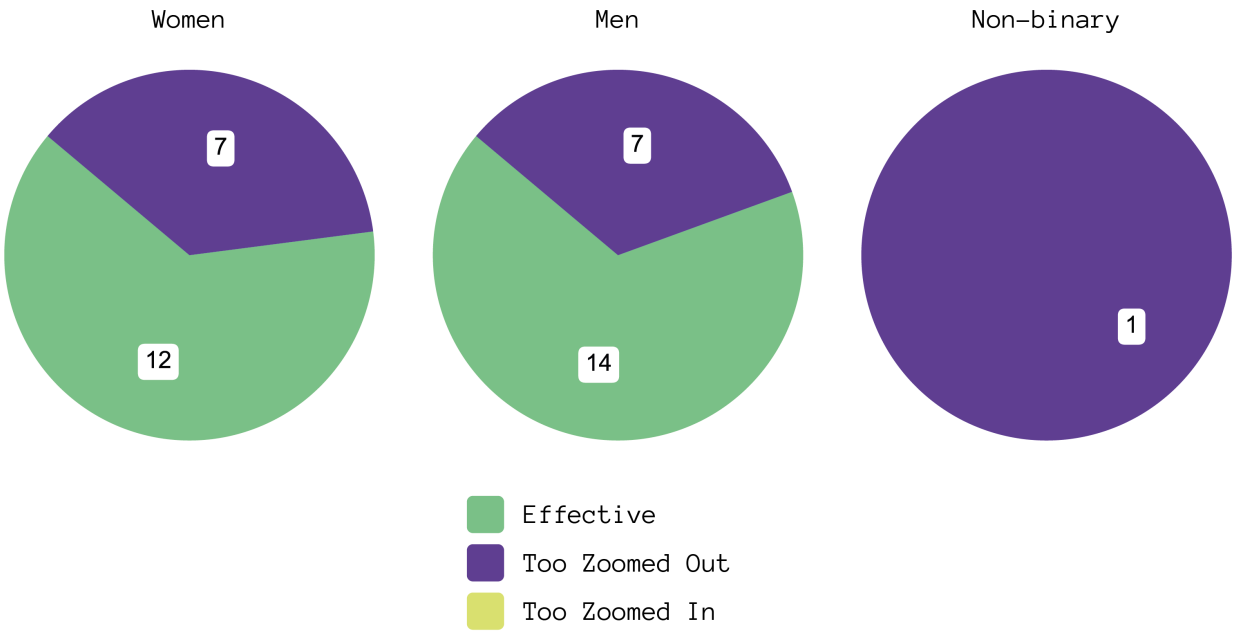


Figure 5.17: The absolute The absolute number of votes for the different appreciations of the scale of the Delft University of Technology campus map, divided by gender (N=41)

The division of the appreciation for the scale of the Delft campus map can be seen in Figure 5.17. There was a similar distribution of ratings between men and women. Although most of the respondents found the scale of the map effective, 37% of women and 33% of men indicated that they found the map too zoomed out. The non-binary respondent also shared this opinion, voting that the map was "Too Zoomed Out." (larger sized figures in Appendix E).

In terms of layout, women provided four positive comments about the clarity and good use of color on the map, but also mentioned two negative points concerning missing faculty numbers and the small size of the text. Men similarly left three positive comments about readability, clarity, and color use. However, they also added three negative comments, specifically pointing out issues with landmarks, faculty names, and the map appearing too busy. Additionally, one male respondent noted that the north arrow was too small.

Regarding the 2D representation, men offered no negative feedback and found the buildings recognizable enough for navigation, with four positive comments to support this. In contrast, women left three negative comments about the lack of recognizable buildings in the 2D format.

When it came to information completeness, women provided four negative comments, citing the absence of critical details such as traffic lights, crosswalks, handicapped entrances, and classroom numbers. Two women also mentioned that faculty buildings were not adequately emphasized, though two positive remarks about the overall information provided were also made. Men offered one positive comment but left five negative comments, primarily concerning missing faculties and one specific remark about the lack of bicycle parking.

In terms of the legend's completeness, men left four negative comments about missing faculties, although one positive comment was made, suggesting that the legend was otherwise complete. Women, on the other hand, provided two positive comments, stating that the legend had everything needed, even if the faculty names were on a different page.

Regarding the legend's clarity, women were more detailed in their feedback, leaving four positive comments highlighting the appropriate size, color, and patterned hatches used. Men, in contrast, left two brief, general comments simply stating that the legend was clear.

As for text relevance, women made five positive comments about the clarity and usefulness of the text, appreciating the use of two languages and the inclusion of street names. However, one man expressed confusion about the street names, while two men left positive comments, with one specifically praising the references to off-map locations.

In terms of text visualization, three women mentioned that zooming in or using a larger version of the map would be helpful, though they did not view this as a significant issue. One woman also commented positively on the font used. Men, overall, made fewer comments, with one saying the text was clear, while two others remarked that the map appeared too busy and that the text was too small.

When discussing color visualization, men expressed fewer opinions, with one noting that visualization didn't matter much in a map, and another commenting on its practicality. Two women, however, made positive remarks, describing the colors as "nice" and expressing their appreciation for the color palette. One woman did mention, however, that there was a lack of contrast in the color use.

Both genders appreciated the "realistic" or "associative" use of color. However, what this meant differed between respondents. One man specifically noted the use of purple for faculty buildings as associative, while one woman mentioned that she would not have chosen that color herself.

Feedback on the appropriateness of the symbols was mixed across genders. One man and one woman gave positive comments, describing the symbols as clear and complete. However, one man mentioned that the symbols made the map appear busy, while four women critiqued various aspects, such as missing faculty symbols, the construction area pattern being too large, and confusion caused by different types of indicated entrances.

No specific comments were made about the clarity of the symbols[3].

Overall, women tended to provide more detailed feedback, both positive and negative, particularly on topics such as text relevance, color visualization, and symbols. Women were also more likely to suggest improvements, even when making positive comments. Men gave fewer comments overall but raised more concerns about missing faculty names and the map being too busy. Men's feedback was typically more concise compared to women's. Both men and women mention the greenery not being well defined, and the fact that landmarks could be more clearly visualized.

Identified Strengths and Weaknesses According to Students, Based on the Survey

The Delft University of Technology campus map was generally appreciated for its clear layout and structure (mentioned 6 times), contributing to ease of use. Color use was highlighted by some respondents as aiding readability (mentioned 6 times). Additionally, the 2D representation was seen as sufficient for understanding the spatial layout of the campus by several respondents (mentioned 8 times).

In terms of identified weaknesses, several respondents noted the absence of faculty names (mentioned 10 times), classroom numbers (mentioned once), restaurants (mentioned 4 times), and bicycle parking locations (mentioned twice). Additionally, 36.6% of respondents found the map too zoomed out. Although color use was appreciated by some, it was described as confusing by others, particularly regarding the use of purple to indicate faculty buildings. The text on the map was also found to be small, only readable when zooming in, although two respondents did not consider this a major issue.

Correlation Between other Factors and Ratings

A deeper analysis was initially considered to explore whether factors such as age, connection to TU Delft, faculty, nationality, and purpose of the map had a significant influence on respondents' ratings of the map elements. However, the distribution of these characteristics was notably unequal (see Figures 5.6, 5.7, 5.9, 5.8, 5.11 and 5.10), making meaningful comparisons difficult. For example, while the gender distribution was relatively balanced between men and women, other factors such as connection to the TU Delft and living situation were less diverse — most respondents were Master's students and lived either in Delft or on campus. These imbalances hindered the ability to draw clear conclusions about how these characteristics might correlate with map ratings. However, some qualitative feedback highlighted unique campus experiences tied to the faculty and transport methods: Two students of the Faculty of Architecture mentioned not visiting the majority of the campus very often, because their faculty is at the edge of the campus. Moreover, modes of transport are highly discussed when talking about the campus: ranging from one respondent being very satisfied with the public transport accessibility, to four respondents being concerned with the long lasting construction of the new tram line, and what will change once it's done. Additionally, opinions on bicycling on campus range from "chaotic" to "great cycle paths", and suggestions to improve signaling of the cycle paths. Another subject that is mentioned by two respondents is the Mekelpark, which is greatly appreciated. Lastly, food facilities are generally appreciated; One respondent mentions affordability, whereas three respondents address the high prices of the food but appreciate the quality and availability. These perspectives reflect a range of campus experiences but also point to recurring themes, such as transport and food facilities. However, no clear correlation was found between students campus behaviour and their map needs. For example, students who frequently visited campus cafés did not specifically raise more concerns for their visibility on the map than students who did not mention visiting cafés. Similarly, there was no correlation between the preferred mode of transport and preferences for how transport should be depicted on the map, or transportation related concerns.

[3]Due to technical complications during the yielding of the survey responses, the additional comments are missing.

5.3.1 Follow-Up Interviews Delft University of Technology Campus Map

Familiarity with Delft University of Technology Campus Map

Different reasons were given for the level of familiarity interviewees had with the map of the TU Delft Campus. Some reasons were shared by different interviewees. The reasons can be found in table 5.18. Interviewee 1 noted that, despite having seen the map, they never needed it due to their familiarity with the campus. Findability of the map itself was also mentioned 5 times as a reason for why students were not familiar with the map (4A, Figure 5.18). Multiple versions exist of Delft University of Technology campus maps, which makes it confusing which one to use. Five interviewees (6A, Figure 5.18) noted that they rely on Google Maps for navigation, and are therefore do not (frequently) use the campus map. This is highlighted by a quote of interviewee 2 (man): *"I've used the digital version, mainly in the first week to check facilities or find cool places. After that, Google Maps was easier and sufficient."* Interviewee 6 (woman), in contrast, found the map essential for navigating specific academic needs, particularly for exams, but found it lacking key details, remarking: *"There are no numbers for classrooms or floors. Without this information, planning your route becomes difficult, especially for those unfamiliar with the campus".*

	A	B	C	D	E	G
		Frequency			Comments	
					Women	Men
1	Recurring Themes	T	W	M		
2	Already familiar with campus	7	2	5	Has never needed it because familiar with campus. Need for the map decreased while becoming familiar.	Map not needed because familiar with campus. Discovers campus through talking to people. Finds way by moving through campus.
3	Faculties	7	3	4	When looking up a room with building number, this map came up. Relied on building names rather than numbers.	Unly needed when finding a building number from timetable. Uses roomfinder to find buildings. Faculty names are not well indicated on this map. No one is going to remember buildings numbers.
4	Findability	5	1	4	Too many different versions online	Many different versions online. It never came up online. It's not in many physical spaces. It might not be advertised enough.
5	Useful when new to campus	5	1	4	In the first year, it gets laid out in rfont of you.	In the first weeks, it's useful for finding facilities and cool places. Useful to explain the way to visitors. It could be useful when you have never been to campus. Knwoing about the map might have made the first weeks easier.
6	Google Maps	5	1	4	Google maps is sufficient. Google Maps provides the route.	Google Maps works fine and is easier to access. Uses Google Maps to look for places. Preference of using Google Maps. It doesn't offer more than Google Maps.
7	Limited use of campus	3	1	2	In Architecture, you don't need to be in other places often.	Doesn't need to be in many different/ unknown places. It could be useful if you have to go to many different places, but that's often not the case.
8	Exams	2	2	0	It's only necessary to find exam rooms. For exams, you had to go to different buildings.	
	Other comments					
9	Awoken interest	1	1	0	After the survey she looked more into maps	
10	Human scale	1	0	1		The map is very impersonal.
11	Recognizability	1	0	1		3D would help with recognizing the buildings.
	Appearance	1	0	1		"I occasionally look at it when I pass by the traffic lights, but only from a distance. I always think about how ugly the colors are."

Figure 5.18: Reasons for level of familiarity of the campus map of the TU Delft, from the follow-up interview (N=11)

Recurring Themes

Interviewees provided deeper insights into the perceived usefulness of the Delft University of Technology campus map (see Figure 5.19). A common theme that emerged was the representation of faculties. Many interviewees agreed that faculties should be a priority on campus maps, and some felt that the TU Delft map was lacking in this area. Interviewees suggested that faculty names should be displayed directly on the map rather than relying solely on color coding. As one respondent (Interviewee 1, woman) noted, the faculties *"should be more than just color-coded"* and should also include distinctive symbols to improve clarity (Figure 5.19).
The representation of transport was another recurring theme, mentioned five times by different interviewees (4A, Figure 5.19).Opinions varied, especially when it came to walkability. One interviewee (Interviewee 1, woman) appreciated the inclusion of the "walking-stick-man" symbol, which they felt helped indicate walkable areas. However, Interviewee 3 (man), was critical of such features, pointing out that *"everybody has a different walking speed, so the time indication does not apply to everybody."* Another critical comment on the display of walkability came from intereviewee 2 (man):
"Why would you point out the pedestrian area? You can walk everywhere anyway."

	A	B	C	D	E	F
					Comments	
		Frequency			Women	Men
1	Recurring Themes	T	W	M		
2	Faculties	5	2	3	List of faculties is missing, faculties are only color coded, which doesn't help finding the buildings. Lacking information about the buildings.	The map is adequate for finding faculties. Faculties are not on the same page which is annoying. Faculty names are missing
3	Contrast	2	1	1	Hard to distinguish paths	Curious about how it would be if the green would be less present, so the buildings really stand out.
4	Transport	5	4	1	"Walking stick man" helps indicate whether you can walk. "The pathways on the campus aren't very clear on the map, making it harder to navigate." "The map doesn't clearly distinguish between roads for cars and other paths." It's not clear that it's a car-free campus.	"Why would you point out the pedestrian area? You can walk everywhere anyway."
5	Map style	4	2	2	The map is too abstract. The map does the minimum, does not display complexity of buildings.	The map is general but useful for most. It looks neat.
6	Color Use	4	2	2	The green and blue colors on the Delft map are logical, and the purple buildings stand out. "I don't associate purple with a building, the use of color is inconsistent and confusing."	"The dark purple is confusing; I expect them to be grey." "The purple color used for the buildings makes them stand out, and it's easy to associate with the real TU signs on campus."
7	3D/2D	4	1	3	It doesn't show how you move through the campus.	2D doesn't work for recognizing the buildings. 3D would help finding the way.

Figure 5.19: Recurring themes in the responses of interviewees (N=11)

When asked how the campus map aligned with their use of the campus, Interviewee 7 (woman) explained that the map didn't reflect how they navigated the space:
"It doesn't at all. Especially compared to the 3D maps. Those show how you move through the campus, and you recognize buildings and parks. The only thing I recognize in Delft is the long axis going through the middle. I wouldn't look at this map for fun, but only to find something."

The use of color on the map also generated divided opinions. Some participants found the use of purple to indicate buildings clear and intuitive, while others were confused by the color choices. As Interviewee 6 (woman) expressed, the purple coloring was not easily understood (6A, Figure 5.19, Figure 5.20).

Interviewee	Gender	Quote
1	w	“Delft misses contrast and details, making navigation harder.”
6	w	"It also needs a north arrow and details like traffic lights and crosswalks. The color use works fine but is too functional."
7	w	"The green and blue colors on the Delft map are logical, and the purple buildings stand out. In contrast, the color use in Eindhoven doesn’t pop as much."
9	w	"I don’t associate purple with a building. The use of color is inconsistent and confusing. The grey parts are also confusing, as some buildings are light purple. It would be easier to recognize buildings if the colors were more realistic."
2	m	"The dark purple of the buildings really stands out and is confusing. Most of the time, the buildings are grey."
3	m	"Realistic color use works well for orientation.”
10	m	"The purple color used for the buildings makes them stand out, and it’s easy to associate with the real TU signs on campus. It’s intuitive and helps with recognition."
11	m	“I’ve seen it hanging by the traffic lights, so I look at it from a distance and think the colors are ugly.”

Figure 5.20: Examples of both similar and diverging comments on the color use of the Delft University of Technology campus map (N=11)

Suggested Improvement	Frequency			Interviewee Quotes
	T	W	M	
Make the Map 3D	4	2	2	Interviewee 6 (woman): “Adding information like 3D representations of buildings would help people understand the structure and entrances better.”
				Interviewee 7 (woman): "Maps like Wageningen’s 3D ones show how you move through the campus, and you recognize buildings and parks.”
				Interviewee 10 (man): "At first I thought 2D was fine, but after seeing the other maps, 3D increases recognizability, so you easily know where you are and where you should go."
				Interviewee 11 (man): "3D would help make the buildings more recognizable."
Add Faculty Names to the Map	5	2	3	Interviewee 1 (woman): "The map shows where buildings are, but it doesn’t indicate important things like the faculty. Adding clearer symbols for faculties would make it more useful."
				Interviewee 6 (woman): "Adding faculty names and clearer indications would make the map better suited for navigation."
				Interviewee 3 (man): "It would be helpful if the faculty names were included on the map for people who have never visited the campus."
				Interviewee 10 (man): "It’s annoying that the faculties are listed on the back. It would be better if everything were on one side for easier reference."
				Interviewee 11 (man): "Including the faculty names directly on the map instead of on a separate list would help."
Improve Detail	2	2	0	Interviewee 1 (woman): “The map misses contrast and details, making navigation harder. It’s not clear that it is a car-free campus.”
				Interviewee 6 (woman): "The map isn’t detailed enough for complex buildings. There are no room numbers or floor indicators, which makes it less useful for finding classrooms."
Change Colors	1	0	1	Interviewee 9 (man): “I don’t associate purple with a building. It would be easier to recognize buildings if the colors were more realistic.”
Focus on Green Spaces	4	2	2	Interviewee 6 (woman): "It would be helpful if the map showed different types of green spaces, like grassland or forests. This could also be useful for safety concerns, as some areas, like forests, might feel unsafe to women. You could also plan your route according to what is nice to see."
				Interviewee 7 (woman): “I’d like to see more focus on green areas, parks, picnic spots, and different kinds of spaces.”
				Interviewee 3 (man):"The Mekelpark area could be made clearer on the map, showing that it’s a nice area. It could be shown with a different shade of green or tree symbols."
				Interviewee 11 (man): “It would be better if the map distinguished between different kinds of spaces like parks, sports fields, and green areas.”
Improve Pedestrian and Bicycle Pathway Signaling	2	2	0	Interviewee 1 (woman): “The pathways on the campus aren’t very clear on the map, making it harder to navigate.”
				Interviewee 6 (woman): “It would also be helpful if traffic lights and crosswalks were indicated on the map."
Improve Navigation for New Students or Visitors	2	1	1	Interviewee 1 (woman): “A physical location where the map is displayed would be helpful for new visitors."
				Interviewee 11 (man): “For new students, it would be nice if there was a map that helps them feel connected to the campus. The TU Delft map is very factual, but it doesn’t help you build a connection.”
Highlight Additional Functional Information	3	2	1	Interviewee 6 (woman): "Adding information like room numbers, floors, accessibility entrances for handicapped people, and bike parking would make the map more helpful."
				Interviewee 9 (woman): "A list correlating building numbers with faculties would be helpful, but entrances and service points are useful additions."
				Interviewee 3 (man): "It would be helpful if landmarks like the Aula were labeled more clearly so people could use them as reference points."

Suggestions for Improvement

One of the main suggestions for improvement for the Delft University of Technology campus map was including the faculty names on the same page as the map, and not on a separate page (Figure 5.3.1). Moreover 4 interviewees suggested that displaying the map in 3D would help recognizing the campus easier, especially since special building shapes of landmarks such as the Aula and the EWI are then much more recognizable. This suggestion often was paired with a comparison to the 3D aspect of the maps of Wageningen and Rotterdam, which were praised for the recognizability of their campus buildings. 2 interviewees expressed that more detail on the map could improve its usability. For example, Interviewee 6 expressed that more information about the floor plans and classrooms of complex buildings would improve navigation using the map. A much discussed subject was the distinction between green areas on the map. 4 Interviewees wanted clearer differentiation between types of green spaces, but for different reasons:

Interviewee 6 (woman): *"It would be helpful if the map showed different types of green spaces, like grassland or forests. This could also be useful for safety concerns, as some areas, like forests, might feel unsafe to women. You could also plan your route according to what is nice to see."*
Interviewee 3 (man): *"The Mekelpark area could be made clearer on the map, showing that it's a nice area. It could be shown with a different shade of green or tree symbols."*

Comparison Of Interview Answers Between Genders

Both men and women expressed limited reliance on the Delft University of Technology campus map once they became familiar with the campus. For example, Interviewee 1 (woman) mentioned that despite having seen the map, she never really needed it because she knew the campus well. Similarly, Interviewee 3 (man) indicated that he didn't need to use the map often since he had learned his way around the campus (Figure 5.16). Both men and women mentioned using Google Maps for navigation once they became familiar with the campus. Interviewee 2 (man) specifically mentioned that after the first week, Google Maps was "easier and sufficient". Similarly, Interviewee 9 (woman) mentioned that Google Maps was enough to find the buildings (Figures 5.18 and 5.19). One interviewee highlighted the need for more detail on the map, specifically to improve usability and safety. For instance, Interviewee 6 (woman) expressed concerns about the lack of detailed information for navigating complex buildings and the importance of indicating different types of green spaces, mentioning that "forests might feel unsafe to women" (Figure 5.19, which is not a type of concern mentioned by the male interviewees. When it came to transport representation and walkability, there were differing opinions. Interviewee 1 (woman) appreciated the "walking-stick-man" symbol for indicating walkability, whereas Interviewee 3 (man) criticized it, arguing that everyone walks at different speeds, so the time indication does not apply to everyone (Figure 5.19).

5.3.2 Discussion Delft University of Technology Campus Map Evaluation

The appreciation for the clear layout and structure aligns with the notion that clarity and structure in the layout of the map are essential to achieving a readable map [Krygier and Wood, 2011; Tyner, 2010]. Concerns raised by respondents about text clarity and color contrast largely align with Krygier and Wood [2011], Tyner [2010], and Bell [2023], such as appreciation for associative colors and sufficient contrast. However, the color use in this map evoked polarized opinions, and there was no consensus about whether the use of purple for the buildings was appropriate this underscores the importance of careful consideration for color choice [Krygier and Wood, 2011], as well as the notion that it is hard to find a solution that satisfies all users, even when their opinions are voiced [Lobben et al., 2015].

While the overall ratings between men and women were similar, the follow-up interviews revealed some gender-specific concerns that were not immediately evident from the survey data.

Presagis [2023] advocate for the use of 3D maps as more intuitive, as they offer a more realistic view of space and help users navigate by recognizing landmarks. This was reflected in the critiques by 3 women in the survey, saying the 2D representation was not sufficient to recognize landmark buildings like the Aula and the EWI (Elektrotechniek, Wiskunde en Informatica) buidling, while men in the survey found the 2D representation sufficient to navigate the campus. However, during the follow-up interviews, 3 men mentioned the fact that 3D would help in recognizing landmarks.

Safety concerns related to the map, as emphasized by Falahatkar [2024] and Criado-Perez [2019], were not a dominant theme in the women's responses. Only one woman mentioned that certain green spaces (e.g., forests) might feel unsafe, which, due to the small sample size might still indicate an area to investigate further.

The suggestion to include different shades of green or tree symbols for Mekelpark supports the notion that even small design changes can significantly affect how users interpret a map's visual language [Tyner, 2010; Krygier and Wood, 2011]. Men were generally more satisfied with the map than women, though opinions on certain elements, like color use, were not divided strictly by gender. For example, four women commented

on the color use, with opinions ranging from ”fine” and ”functional” to ”confusing” and ”inconsistent,” while male opinions ranged from ”easy to associate” and ”works well” to ”confusing” and ”ugly.” This variability in responses supports the argument by Lobben et al. [2015] that there cannot be rigid guidelines for map design based on user feedback, as perspectives vary greatly. The mixed opinions also highlight the subjective nature of map readability [Carton, 2007; Harley, 1989]. The use of color can either enhance or hinder a user's understanding of space, and in this case, the color choices were not universally intuitive. Similarly, the way the faculties were represented was a subject for debate; many interviewees felt that faculties should be a priority, and some suggested that faculty names should be displayed directly on the map rather than relying solely on color coding, where others found the purple color effective enough for distinguishing the faculty buildings from other buildings. This highlights how the ”visual grammar” Tyner [2010]; Harley [1989]; MacEachren and Taylor [1994] of a map can work to emphasize certain elements over others, indicating their importance [Harley, 1989; van Houtum, 2024; Carton, 2007], and the way this ”visual grammar” can be interpreted in different ways [Carton, 2007].

Despite the relatively high familiarity with the map (3.24/5), students frequently mentioned relying on Google Maps for navigation after becoming familiar with the campus, as Google Maps was sufficient for their navigation needs. This reflects the growing dependency on digital map services, such as Google Maps [Dittus and Graham, 2022] and raises questions about the relevance of static (campus) maps when digital maps can offer personalized experiences. As interviewee 2 (man) noted, *”Google Maps was easier and sufficient after the first week”*, suggesting that the campus map may not offer enough added value to justify its continued use. Moreover, the issue of multiple versions of the campus map available online complicates map accessibility, as respondents mentioned being confused about which version to use. This lack of a unified, accessible map may undermine its effectiveness.

5.4 Vrije Universiteit Amsterdam

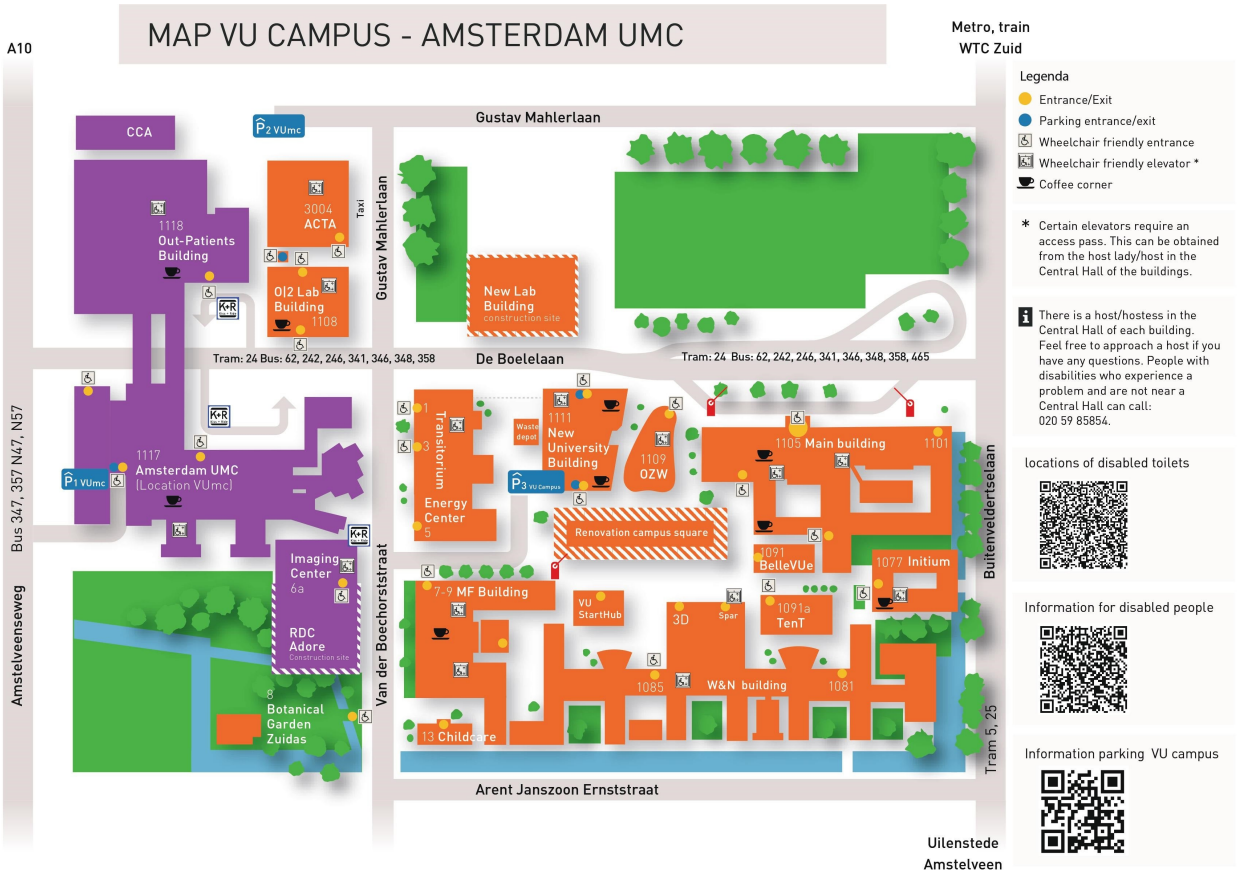


Figure 5.21: The map of the Vrije Universiteit Amsterdam campus that was evaluated by the assumed users

	A	B	C	D	E	F	G	H	I
			Average			Feedback			
1	Element	Aspect	All	W	M	Women		Men	
2						Positive	Negative	Positive	Negative
3	Layout		3	2.9	3.1	"Compact"	"Roads missing between buildings" "It is a bit chaotic with the text and the symbols in the buildings and it makes it hard to find a certain building" "Seems bit chaotic" "no clear separation of legend and map content" "Confusing, don't know whereto look" "Its is a bit messy and crowded. More white and bigger background would be better"	"Not much to say" "Simple to understand at one glance" "Very to the point"	"Very ugly and full"
4	2D		3.1	3	3.3	"Clear" "It's compact so 3D might have been less clear" "2D map shows a clear overview"	"There are shadows which is a bit unclear" " does not show look of buildings. The depth effect is not necessary"	"Provides a clear overview" "makes is quite clear" "3D for such a small location wouldn't have worked well" "fine choice, because everything is packed here unlike Wageningen"	x
5	Information		3	3.3	2.9	"A lot of information, more than TU and Wageningen" "the only one which includes elevators and handicapped access points, number of trams and buses included is a pro." "I like that they added the bus numbers, and I like that the names of the buildings are actually on the buildings." "It is nice that wheelchair related places are shown. And a public transport lines" "locations for disabled people is very nice"	"Missing context around the campus" "don't know, I don't know the campus" "Why are different colors used and why do some buildings have a striped pattern around them?" "feels the most empty compared to the rest." "It feels like something is missing such as bike lanes and stand places"	"Everything has a name"	"Does not seem to say much but I am not sure" "Seems a bit simple" "There is no legend. What am I looking at?"
6	Legend	Completeness	2.4	2.6	2.2	"Apart from the purple and orange colors, I think everything is explained in the legend" "The display helps in not needing a very extensive legenda"	"Colors of buildings not mentioned" "it seems a bit small" "nearly nothing explained in the legend" "There is not much in the legend" "quite poor, missing the information of wha tdifferent colors mean in the map, and which one is the building symbol?" "Feels like the meaning of the colors should be added"	"Most of the info is in the map itself, so the legend is fine"	"Does not really say much." "Very small legend, doesn't cover use of colours" "What is the different between purple and orange buildings?" "Do dislike the color choice though" "They chose to not put uni buildings in the legend, so that makes it smaller. Doesn't make it better per se"
7		Clarity	2.7	2.8	2.7	"What it includes is pretty clear" "What there is is clear"	"Too much text, too little items" "Very much dislike the QR code use" "Still poor" "it's missing where the different buildings are" "It feels crowded"	"All things are easy to find" "The few things are clear"	"a lot of extra text"
8	Text	Relevance	2.8	2.9	2.7	"Its fine but it could be shaped better"	"Too much going on" "not sure what everything is, a symbol would help (f.e. 3D)" "Bit much on the right" "it is not clear who the map aims to address. wheelchair users and people looking for a coffee corner seem to be the main target groups" "The info has too much text in proportion" "There is top much text or more white space should be added"	"Some nice extra info on the side"	"A lot of text on the map itself, seems focused on public transport a lot" "The host/hostess thing is not very relevant I think to the map" "a lot of text in the map does not help"
9		Visualization	3	2.8	3.2	"Think its fine, white works, size is okay" "Color and size is nice"	"Looks messy, badly placed, to squished or stretched" "the title is not clearly distinguishable, some labels on the buildings are extremely small to be readable" "It is pretty ugly, the colors are intense and do not make a lot of sense since they are not explained"	"Clear, so good!" "Readable for the amount of text there is"	"High contrast with the image" "Makes the map chaotic"
10	Color	Visualization	2.7	2.6	2.9	"simple, clear, makes sense (colours follow real-world patterns)" "Clear colors"	"Very contrasting, not necessarily pleasant to look at" "Color is much, dont know where to look" "Colors not explained, and intense, and no color scheme used?" "The colors could be a bit less bright" "The colors are hideous. Too bright and therefore overwhelming and it feels crowded"	"Does its job" "Looks clear"	"Very ugly to look at. harsh colours" "Not a beauty" "I dislike the yellow entrance"
11		Appropriateness	3	2.9	3.1	"It represents" "It works"	"Buildings colors are very different, too much variety" "I don't get why purple and orange for buildings" "orange for the building was maybe not needed" "buildings could have been different" "I guess grass is green and water is blue but they are just as intense as the purple and orange which makes it look like a building" "poor, hard to distinguish the buildings/squares, etc" "The colors aren't nice"	"the greenery is fine and clear"	"The detail does not add more clarity " "Green overlaps trees and buildings" "I guess they are trying to split 2 groups of buildings? Dont know why"
12	Symbols	Appropriateness	2.9	2.9	3	"Symbols are clear" "I like that the coffee is indicated"	"All over the place" "Dots in not great colors, yellow is badly visible on orange"	"Easy to see where the coffee corner is" "Not a lot of symbols, fine I guess? "	"Entrances are yellow dots? Why?" "dots for entrances do not feel natural" "Fine, maybe entrance/ exit some other symbol?"
13		Clarity	2.9	2.8	3	"Good idea of adding entrances to the buildings tho"	"The map looks like a random collection of colours, names and icons" "Symbols don't impact clarity much since there aren't a lot, but map is less detailed than others." "Yellow dots are entrances, green dots are random trees, makes it a bit vague"	x	"Bit small, hard to see" "Still not really clear where the elements are." "A dot as entrance symbol is less clear than arrow imo" "Seems randomly placed, not clear" "It is all a bit full and therefore chaotic, I think the combination of the text and the symbols in the map make it this way. "

Survey Results

The answers of the survey are presented in table 5.4. Here the total average score per map element is provided, and the average scores by men and women. The score cells are colored along a gradient, according to their value (blue = 1, red = 5). The comments that were added about each element are then classified as "negative" and "positive", divided by men and women [4]. These results are explained and compared in the following sections.

Comparison Of Survey Responses Between Genders

In Figure 5.22 the average scores for each element are shown, divided by gender (separate charts, and the non-binary response can be found in Appendix E). There is a slight difference visible between the ratings between men and women, with the most notable differences being women appreciating information completeness, text relevance, and the overall quality of the legend more than men, and men especially appreciating text visualization, color visualization, and the 2D aspect more than women. The non-binary ratings are slightly higher than the averages of men and women, except for the aesthetic value of color use.

Figure 5.22: The average scores given to each element of the Vrije Universiteit Amsterdam campus map, by women and men (N=40)

[4] Since the non-binary respondent provided no additional comments, their scores will be compared to the overall averages of men's and women's responses, but they are not considered in the table with additional comments.

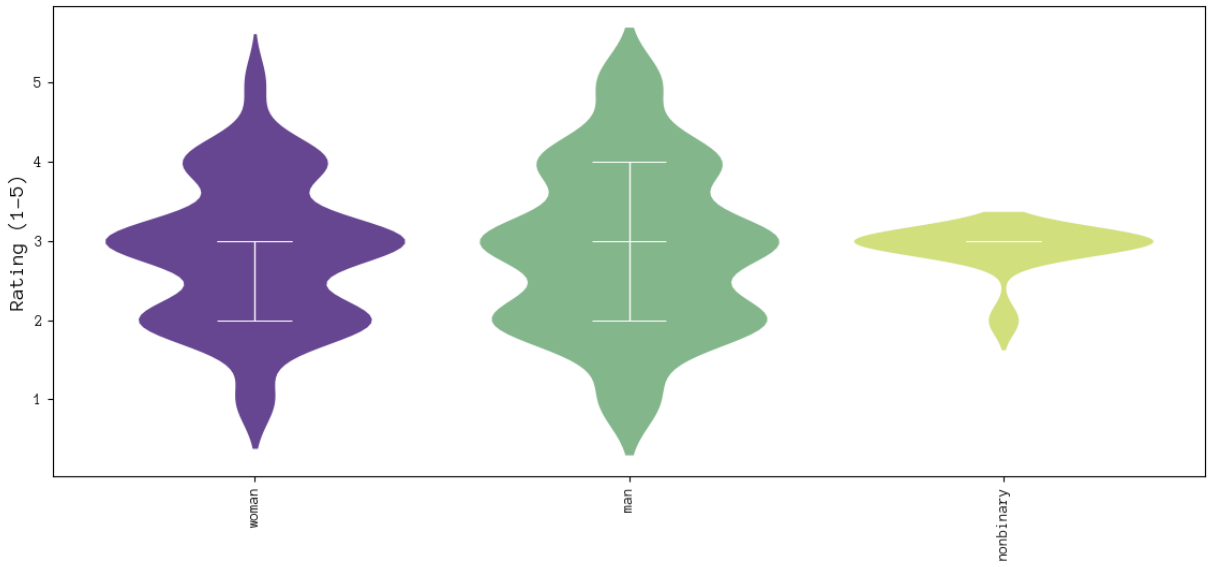


Figure 5.23: The spread of all ratings given on the Vrije Universiteit Amsterdam campus map, divided by gender (N=41)

In addition, all scores are displayed in a violin plot, Figure 5.23, divided by gender. Here you can see the difference in spread of the ratings divided by gender. A slight difference can be found between the spread of the ratings. Mainly, it becomes visible that a larger portion of women's ratings is concentrated around the 3 and 2, while the men's ratings are more spread among 2, 3 and 4. The non-binary respondent's ratings fall within the general range of women's scores, being concentrated around the 3 [5].

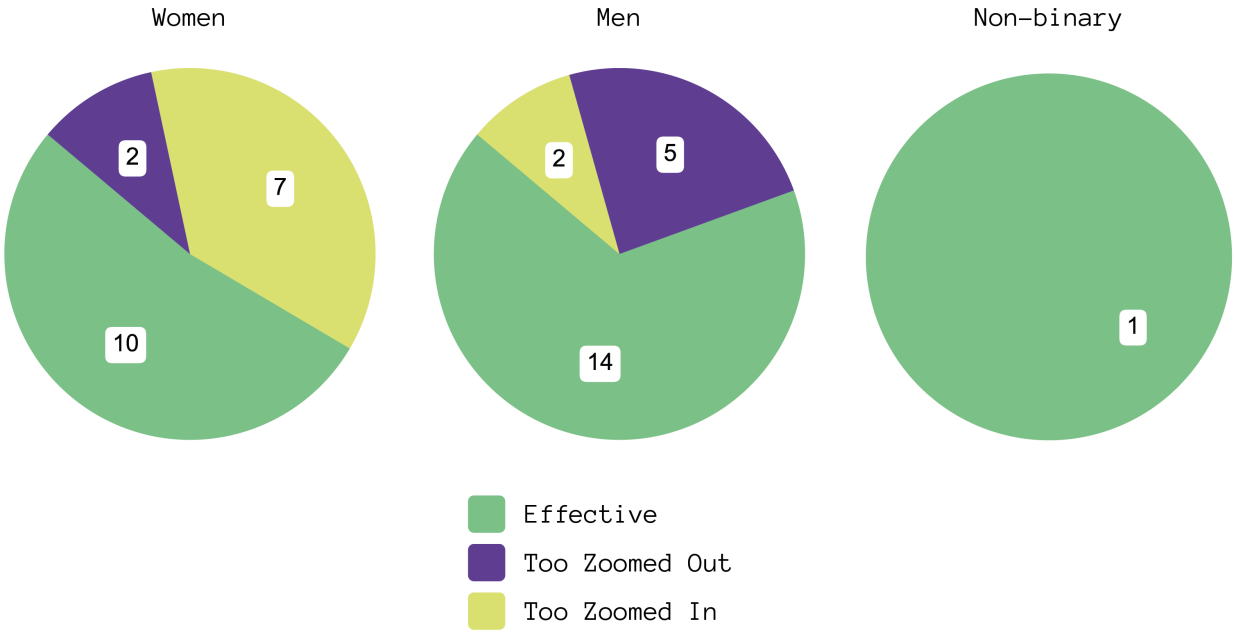


Figure 5.24: The absolute The absolute number of votes for the different appreciations of the scale of the Vrije Universiteit Amsterdam campus map, divided by gender (N=41)

The division of the appreciation for the scale of the campus map of Amsterdam can be seen in Figure 5.24 (larger sized figures in Appendix E). The figures show some differences in the appreciation for scale: More men are satisfied with the scale, and the majority of dissatisfied men vote for "Too zoomed out", while the major-

[5] Because the sample includes only one non-binary respondent, the violin plot reflects that individual's responses rather than an average. As a result, the plot may display more 'extreme' scores, but these should not be interpreted as representative of broader preferences.

ity of dissatisfied women votes for "Too zoomed in". The non-binary respondent's scale appreciation is "effective".

In terms of layout, women provided more specific negative feedback compared to men, with six comments describing the layout as chaotic, messy, and crowded. They pointed out issues such as the lack of clear separation between the map and legend, as well as missing roads between buildings. In contrast, only one man commented negatively, describing the layout as "ugly and full." However, two men gave positive feedback, noting that the layout was easy to understand and to the point.

Regarding the 2D format, both genders expressed that it worked well for the campus layout. Two women commented that the 2D format was fine, with one explaining that the campus layout is too packed for 3D to be effective. Similarly, two men agreed that 3D would not work for this specific campus layout. There were no negative comments from men regarding the 2D format, while two women mentioned that the shadow effect used on the map was unnecessary.

When it came to the information provided on the map, women were generally more positive than men, particularly when it came to information for disabled individuals. Three women commented positively about the information, whereas no men mentioned it.
In terms of the legend's completeness, one man and one woman felt that an extensive legend wasn't necessary because most of the information was already presented on the map itself. However, four women and four men commented on the absence of explanations for the colors used in the map. Regarding clarity, both two men and two women agreed that the information provided in the legend was clear. However, one man and one woman mentioned that there was too much extra text. Women also provided additional critiques, with one woman disliking the inclusion of the QR code and another feeling that the legend was too crowded.

As for the relevance of the text, both men and women mentioned that there was too much extra text. This point was raised by one man and four women. Additionally, one woman suggested that a symbol could be used to help clarify the information. One man expressed dissatisfaction with the focus on public transport and felt that the information about the host/hostess was irrelevant. In terms of text visualization, women left more extensive negative feedback, with three women describing the text as "ugly," "messy," "intense," and "unreadable." Two men also briefly commented on the chaotic nature of the text and the high contrast with the image.

In terms of color visualization, one woman noted that the colors made sense, and two others mentioned that they were clear. Similarly, men were not particularly enthusiastic, with two men stating that the colors "do their job" and "look clear." However, three men left negative comments, describing the colors as ugly, harsh, and unattractive, with one man specifically criticizing the use of yellow dots for entrances. On the women's side, five women remarked that the colors were too intense, calling them overwhelming and overly bright. One woman even described the colors as "hideous."

Regarding color appropriateness, there were very few positive comments from either gender. Any positive comments that were made were often followed by a "but". There was confusion about the color choices, with one man not understanding the division into two colors and four women similarly unsure about what the use of colors meant. One man mentioned that the green overlaps between trees and grass made it difficult to distinguish between elements, while one woman said that the intensity of both the greenery and the buildings made them look like the same category.

When discussing the appropriateness of the symbols, three men commented that the dot used for entrances felt inappropriate or unnatural, while one woman remarked that the symbol's color lacked sufficient contrast. One man and one woman mentioned that they liked the symbol used for the coffee corner. In terms of clarity, one woman appreciated the addition of building entrances to the map, but no men left positive comments about symbol clarity. However, one man reiterated his critique about the dot used for entrances, and one woman mentioned that the dots used for entrances and trees made the map unclear.

Identified Strengths and Weaknesses According to Students, Based on the Survey

Several users appreciated the Vrije Universiteit Amsterdam campus map for its relatively simple and compact design. The map was praised for including accessibility features such as wheelchair friendly entrances and elevators. Respondents appreciated that public transport routes and stops were represented clearly. The placement of the buildings names directly on the buildings was seen as effective, with users mentioning that it allowed for easier identification of faculties without needing to refer back to the legend.
Less appreciated map aspects were that the map layout felt cluttered and chaotic, with too many elements crammed into a small space. Many respondents noted that the legend was incomplete, lacking explanations,

especially for the colors used on the map. Some respondents found the use of bright colors overwhelming and distracting, reducing the map's readability. Symbols such as dots for entrances were often seen as unclear or not intuitive, contributing to confusion.

5.4.1 Follow-Up Interviews Vrije Universiteit Amsterdam

Recurring Themes

The recurring themes brought up by interviewees are presented in table 5.25.

	A	B	C	D	E	F
					Comments	
		Frequency			Women	Men
1	Recurring Themes	T	W	M		
2	Color Use	5	2	3	Only two colors and little detail makes it hard to understand. Overwhelming because the colors are confusing.	Poorly explained, the colors and text combination are not clear. Color choices are not ideal. Colors make it feel chaotic.
3	Chaos	3	1	2	Too much going on, not clear where to look.	Lack of detail makes it chaotic. Looks like it was made in Paint.
4	Information	3	2	1	Coffee, parking, and wheelchair access, is not the basic information for students. “The large buildings and lack of roads make it unclear. The map feels like it's missing a lot of information.”	“The map feels empty despite including accessibility features like elevators andaccess points, but it lacks detailed information such as indoor navigation or study areas.”
5	QR Codes	3	2	1	QR codes are confusing. QR codes add unnecessary steps	QR codes could be useful

Figure 5.25: Recurring themes in the responses of interviewees

A common shared opinion about the Vrije Universiteit Amsterdam campus map was the critisism on the color use. The colors were found not ideal (3 men), and confusing because of a lack of explanation (1 man, 1 woman) (2A/E/F, figure 5.25). Moreover, the layout of the map was seen as chaotic (1 woman, 2 men. See 3A, Figure 5.25). Moreover, two women commented on the QR codes being confusing or not useful, while one man said that it could be useful for things such as public transport information (5E, Figure 5.25).

The following quote illustrates the critiques on color use: *”On some maps, like the Amsterdam map, color choices could be improved, especially for distinguishing between trees and grass. Important features should stand out. A color blind person could probably not use the Amsterdam map.”* - Interviewee 5 (man)

Moreover, one interviewee mentioned that seeing the maps printed out next to each other, made them reconsider his ranking, as he first ranked the Amsterdam map as the second best out of five:
”Amsterdam’s map has unclear entrances; the dots don’t feel like proper entrance markers. They could be improved with arrows or lines. It doesn’t really matter if a map is ugly. Now I look at the maps again, maybe the Amsterdam map scores lower. It’s not that clear after all. - interviewee 8 (man)

Comparison Of Interview Answers Between Genders

The follow-up interviews offer deeper insights into the critiques. For example, respondents frequently criticized the color palette, with one female respondent (interviewee 1) stating that the map has poor visual quality. Both men and women felt like the map was missing information, while still looking cluttered.

5.4.2 Discussion Vrije Universiteit Amsterdam Campus Map Evaluation

As demonstrated by the survey results and follow-up interviews, the Vrije Universiteit Amsterdam campus map evoked varied responses regarding its design, functionality, and usability. The mixed, and above all, strong opinions on color use, layout, and the clarity of information illustrate how design choices on map elements influence how the information is perceived [MacEachren, 2008; Lobben et al., 2015]. The chaotic layout and poor color choices of the Vrije Universiteit Amsterdam map were frequently noted as detracting from its usability, which aligns with Krygier and Wood [2011]’s emphasis on careful consideration for color use. According to several respondents, the bright colors were not only visually unappealing but also contributed to confusion about the map’s content. This aligns with MacEachren [2008]’s work on cartographic communication, which stresses the need for maps to be both visually and functionally coherent.

The interviews revealed that although the Vrije Universiteit Amsterdam map included some accessibility features (e.g., QR codes for wheelchair entrances), these elements were not sufficiently integrated into the

overall design of the map. As one respondent mentioned, relying on QR codes adds an extra step that could be challenging for people with disabilities, indicating that accessibility features might have been an afterthought and designed with a ”default” in mind, and disabled people do not fall into this category of ”default” [Criado-Perez, 2019; Lobben et al., 2015]. The fact that only women raised the issue of wheelchair accessibility, and did so positively, could reflect what Self and Hudson [2015] emphasize regarding the importance of promoting inclusivity across multiple dimensions of marginalization, beyond just gender and sexuality, and by doing so, creating a safer and more welcoming environment [Faulkner et al., 2021]. Even when wheelchair accessibility did not affect the women that commented on it personally, it might signal consideration for marginalized needs in general.

5.5 Erasmus University Rotterdam

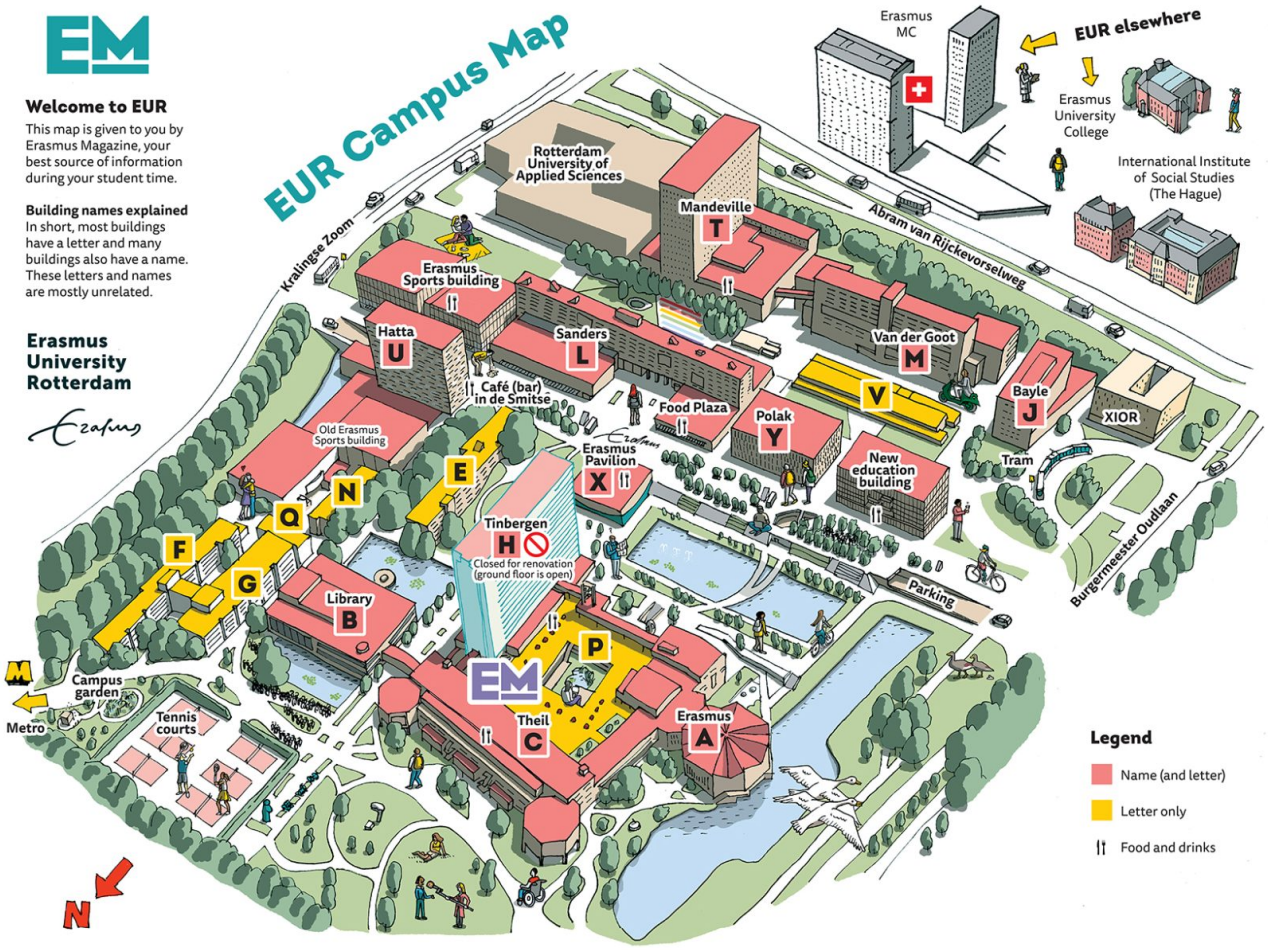


Figure 5.26: The map of the Erasmus University Rotterdam campus that was evaluated by the assumed users

	A	B	C	D	E	F	G	H	I
			Average			Feedback			
1	Element	Aspect	All	W	M	Women		Men	
2						Positive	Negative	Positive	Negative
3	Layout		3.37	3.45	3.29	"Fun to watch" "Compact" "Gorgeous, love how they incoporated off campus stuff" "I like it" "Nice use of white"	"A little bit messy" "Seems a bit packed, all over the place" "A bit unclear"	x	"A bit chaotic though" "Too playful, over the top" "Very chaotic" "I would've put all extra info to one side"
4	3D		3.39	3.35	3.43	"I actually like the 3d maps :)" "pretty"	"Not necessary" "I dislike the "extra" cute stuff like the people kissing , the birds, etc. seems like a wheres waldo picture, which imo impacts its clarity. while it is a gorgeous map it is quite full and this makes it chaotic" "Not really clear" "Not al paths are visible "	x	"Unclear" "Because of it, you don't see a lot of roads that go behind buildings." "I think you should always be able to see some part of the road, should have had less tilt" "Not as good as wageningen, maybe 2d was better here"
5	Information		3.15	2.9	3.38	"Seems pretty accurate. glad it includes both the titles of the buildings and the letters (I've struggled with those before)"	"No explanations of how a map works should be necessary" "instead of letters, the names of the buildings are better" "Not everything is there things like bike lanes are missing"	"Everything is there" "Has mostly what you need"	"Roads/reachability not readable" "Feels like an amusement park map" "No extra info on bathrooms or the like"
6	Legend	Completeness	2.71	2.65	2.76	x	"Legend is confusing why specify how many letters you put in instead of what the colour means" "No, a lot seems missing" "Not really a lot of legend, only color with a statement which you can see yourself (the letter vs full name)"	"Explains everything, but there is little to explain"	"Not much described" "Why should I care wether a building has just a letter or both a letter and a name - especially when they are unrelated? Why can't they be the same colour?" "Small legend, i wouldve put all buildings in the legend i think"
7		Clarity	3.02	2.85	3.19	x	"very poor. not relevant to the elements on the map" "Bit simple and short" "Don't take the easy way in making a map"	"Easy to understand" "Not much to say"	"but everything is well visualized so maybe there is no need for a more detailed legend" "Not sure, don't know the significance of letter " "Name and letter, and letter only. Very vague concepts"
8	Text	Relevance	3.12	3	3.24	"I like that they mention that the closed building has an accessible lower floor"	"Poor" "Not all relevant for using a map" "Too much extra information, unnessecary" "Not all text is necessary"	"Everything is somewhat important to know"	"'the buildings and their letters have no correlation' what kind of "explanation" is that?" "Not really prepared to read it, too much " "Why is there suddenly a whole explanation for ISS and ot the rest? Some streets have a name, others don't" "Is it relevant for the map to show whether a building is open?"
9		Visualization	3.51	3.35	3.67	"Nice white lining around the letters" "I like hte white background stuff" "clear"	"Poor, hard to find useful information" "I don't know what the colors of buildings mean" "Titles are not very clear"	"Clean font, clear contrast" "Text is mostly readable" "Very readable" "White around the letters makes it easily readable"	"Could be clearer"
10	Color	Visualization	3.98	3.98	3.95	"Nice colors" "Pleasant, Efteling like" "Absolutely stunning. I like maps that are a bit more "drawn" (although like i said before this is too much wheres waldo vibes)" "Nice use of color" "It looks fun and is clear"	x	"Map looks nice"	"Looks like an amusement park map" "It's a bit much" "They did their best on it. Not sure if i like it personally "
11		Appropriateness	3.73	3.73	3.62	"Works well" "Clear"	"Poor" "A bit too much detail and not enough actual information" "Maybe buildings bit too bright"	"Clear" "Works" "Realistic in some way"	x
12	Symbols	Appropriateness	3.44	3.44	3.57	"I see the little drawings as symbols as well, thats nice"	"Poor" "barely any symbols used" "Symbols for letters for buildings could be a different color"	"Great categorization and names"	"Use of numbers and letters is a bit vague, could be clearer" "Not many symbols" "I miss stuff like parking, not listed bery clearly I think"
13		Clarity	3.46	3.46	3.33	x	x	x	x

Survey Results

The answers of the survey are presented in table 5.5. Here the total average score per map element is provided, and the average scores by men and women. The score cells are colored along a gradient, according to their value (blue = 1, red = 5). The comments that were added about each element are then classified as "negative" and "positive", divided by men and women [6]. These results are explained and compared in the following sections.

Comparison Of Survey Responses Between Genders

In Figure 5.27 the average scores for each element are shown, divided by gender (separate charts, and the non-binary response can be found in Appendix E). In the radar chart can be seen that men appreciate the overall quality of the text and legend, as well as the completeness of the information more than women. Women appreciate the appropriateness of the color and the clarity of the symbols slightly over men.

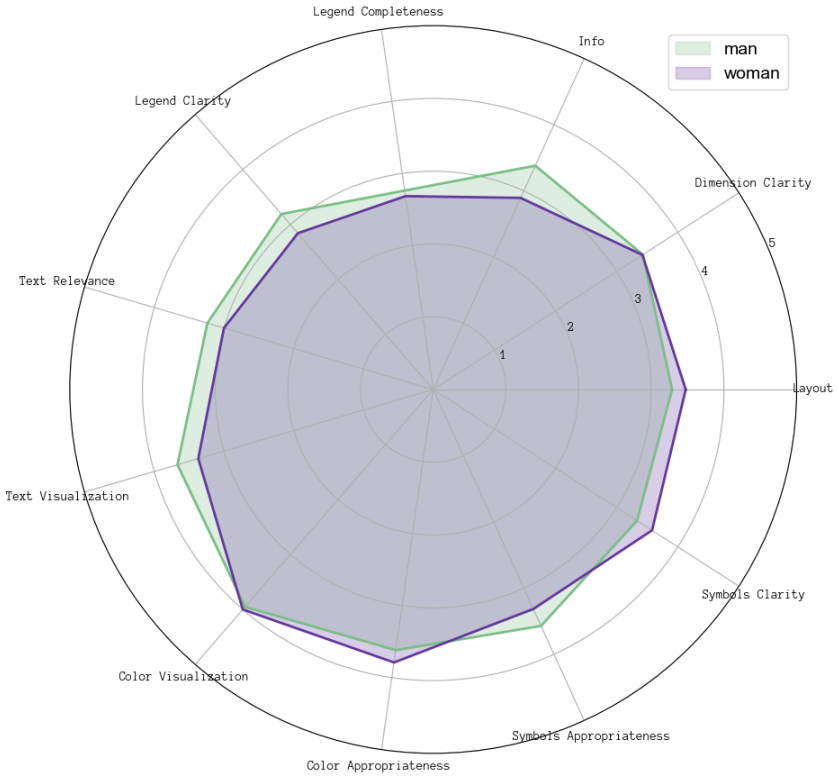


Figure 5.27: The average scores given to each element of the Erasmus University Rotterdam campus map, by women and men (N=40)

[6] Since the non-binary respondent provided no additional comments, their scores will be compared to the overall averages of men's and women's responses, but they are not considered in the table with additional comments.

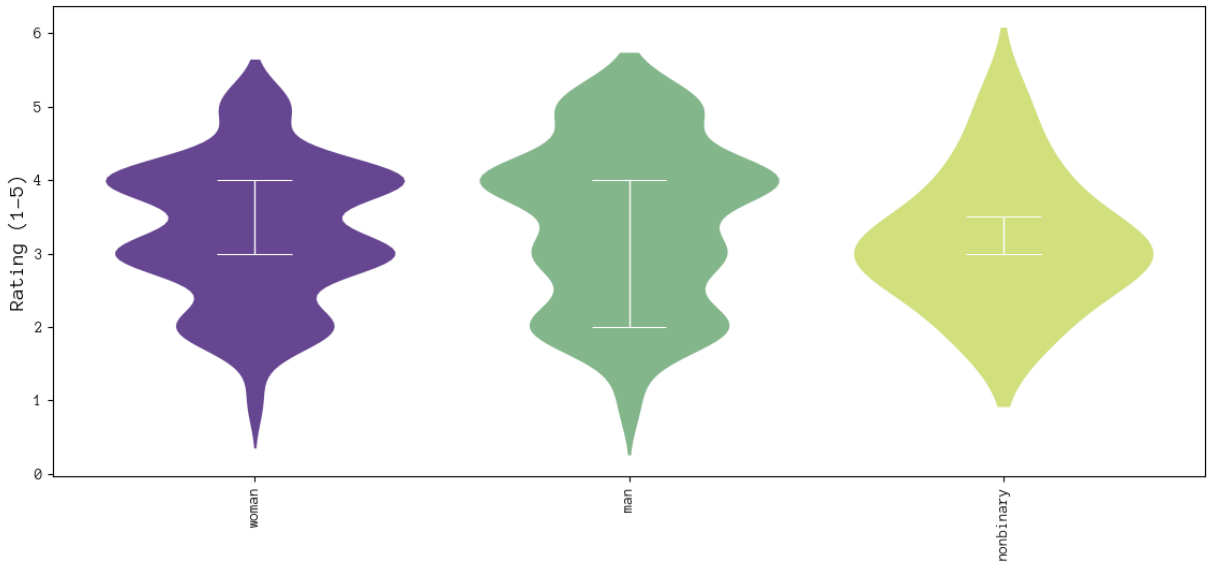


Figure 5.28: The spread of all ratings given on the Erasmus University Rotterdam campus map, divided by gender (N=40)

In addition, all scores are displayed in a violin plot, Figure 5.28, divided by gender.

The majority of women's ratings cluster around the mid-range values of 3 and 4, indicating a more moderate assessment of the map's qualities. In contrast, men's ratings are spread more widely, with peaks around 4, but also notable instances of ratings at 5, 3, and 2. This wider distribution suggests that men had stronger and more varied opinions about the map, both positive and negative. The non-binary respondent's ratings align more closely with the women's, particularly in terms of the scores being more concentrated around the 3 (see Figure 5.28) [7].

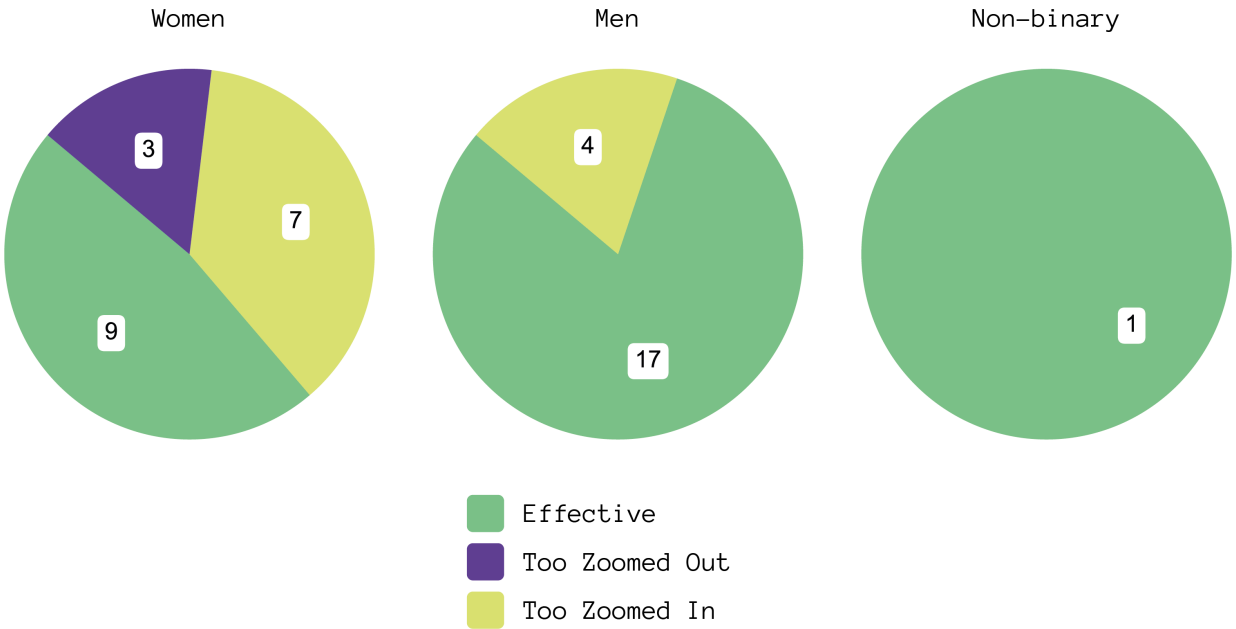


Figure 5.29: The absolute The absolute number of votes for the different appreciations of the scale of the Erasmus University Rotterdam campus map, divided by gender (N=41)

The division of the appreciation for the scale of the campus map of Rotterdam can be seen in Figure 5.29 (larger sized figures in Appendix E). Here, a difference can be seen between the appreciation for the scale of

[7] Because the sample includes only one non-binary respondent, the violin plot reflects that individual's responses rather than an average. As a result, the plot may display more 'extreme' scores, but these should not be interpreted as representative of broader preferences.

the Erasmus University Rotterdam campus map. More women were critical of the scale. Moreover, men didn't rate the map to be too zoomed out, and 3 women did. The non-binary respondent's appreciation of the scale as effective, aligns more with men's appreciation of scale than women's.

Regarding the layout, men were generally more critical, with four men leaving negative comments and none offering positive feedback. They described the layout as chaotic, too playful, and over the top. Women raised similar concerns, with three of them commenting that it was messy, packed, or unclear, although their feedback was less extreme than the men's. Interestingly, three women were pleased with the layout, describing it as fun to watch, gorgeous, or simply stating, "I like it."

When it came to the 3D aspect, two women were positive, saying they liked it and found it visually appealing. Men, however, left no positive comments on this element. Two men were concerned that the 3D design made roads on the map less visible, a concern that was echoed by one woman. Additionally, another woman found the extra details, such as people drawn on the map, distracting.

In terms of the information provided, one woman was satisfied with the way building names were displayed, noting that she had struggled with identifying them on campus before. However, two other women did not appreciate this feature. One man mentioned the absence of bathroom information, and both a woman and a man noted the lack of biking lanes. One man was particularly negative, saying that the playful style of the map made it resemble an amusement park.

As for the legend, both men and women were dissatisfied with it. Two women and three men stated that there wasn't much included in the legend. Additionally, two women and one man found the explanation of the building names confusing. No women left positive comments about the legend's clarity. One woman called the legend "very poor," while another said the map took the easy way out. One man suggested that a legend might not even be necessary because everything was already visible on the map, while another man mentioned that he didn't understand the significance of the letters, making it unclear whether they added any clarity.

Regarding the relevance of the text, one man was confused by the building explanations, and another felt there was too much text to read. Two men commented on the inconsistency of the text, with one not understanding why the map indicated whether a building was open. Three women also mentioned that some of the information was irrelevant, while one woman appreciated the fact that the ground floor's accessibility was highlighted. Men seemed more confused by the inconsistency and lack of clarity in the text, whereas women mainly found the text unnecessary.

In terms of text visualization, two women and two men appreciated the use of white behind the text. One man left a slightly negative comment, saying the text could be clearer, while three women provided negative feedback about the text's visualization.

The feedback on color revealed a noticeable difference in appreciation between genders. Only one man commented positively, saying that the colors "look nice." In contrast, five women left positive comments, describing the colors as pleasant, fun, clear, and even stunning. Interestingly, one woman liked that the map resembled an amusement park, while one man found that same feature to be a negative aspect. Another man found the colors overwhelming, and one man mentioned that he didn't like the colors personally.

There was a contradiction between the genders regarding the aesthetic appeal of the colors versus their appropriateness. While men did not find the colors particularly beautiful, three men appreciated them for being realistic. Despite women offering no negative feedback about the aesthetic appeal of the colors, they were more critical of their appropriateness, due to an overload of detail and brightness.

In terms of symbols, both a man and a woman mentioned confusion regarding the building names and letters. One man noted the lack of parking symbols, and another man, along with one woman, remarked that there were barely any symbols used. One man appreciated the categorization of symbols, while one woman mentioned considering the "little drawings" to be symbols as well, and expressed appreciation. There were no comments specifically addressing the clarity of the symbols[8].

Women tended to appreciate the map's visual appeal, including the colors and text readability, more than men did. Men were more critical of the map's chaotic layout, especially the 3D visualization, which they felt obstructed important information. Despite these differences, both genders identified similar issues with the

[8]Due to technical complications during the yielding of the survey responses, the additional comments are missing.

map, such as a lack of clarity in the legend and missing information (e.g., bike lanes, bathrooms). The scale was generally more appreciated by men, than women.

Interestingly, there is a lot of confusion about the letters and building names, which aren't well explained in the legend. Only a woman (respondent 4) who had previously struggled with this concept appreciated and understood it. Since the map is intended for new students, they might also face difficulties in understanding it.

Identified Strengths and Weaknesses According to Students, Based on the Survey

Some students mentioned their appreciation for the visually appealing use of colors. An element that got a lot of praise was the readability of the text due to font choice and contrast with the background. Some students thought the map was fun and even gorgeous (see Figure 5.5).

The map, both because of the 3D visualization, and the layout, was seen as chaotic and overly playful. It obstructs certain elements such as the roads. There was found to be lack of clarity in the legend, especially regarding building names and letters. Moreover, some information seemed to be missing (e.g., bathrooms, bike lanes, roads). The page also contains unnecessary text, according to the respondents (see Figure 5.5).

5.5.1 Follow-Up Interviews Erasmus University Rotterdam

Recurring Themes

	A	B	C	D	E	F
					Comments	
		Frequency			Women	Men
1	Recurring Themes	T	W	M		
2	Visual Appeal	5	2	3	Rotterdam is aesthetically pleasing, but too many extra elements are distracting. Well-designed	Feels like a comic. Style is like a zoo map. "The map is visually appealing, with 3D buildings and clear names and landmarks, which help you get a good sense of the campus layout and where things are."
3	3D	6	1	5	nice 3D layout	3D element is chaotic and includes too much irrelevant information. 3D design is confusing because the buildings don't use realistic colors. 3D design looks nice. Seems to focus more on aesthetics than functionality
4	Legend	3	1	2	too focused on food and drinks, and some random facts.	lacks a proper legend.
5	Color use	2	0	2		Not using realistic colors is confusing
6	Information	2	1	1	too many extra elements are distracting	includes too much irrelevant information.

Figure 5.30: Recurring themes in the responses of interviewees

Two women mentioned that they found the visual appeal of the map well-designed and aesthetically pleasing. One man agreed and added that it helps in getting an idea of the campus layout. However, another man remarked that it feels like a comic.

An interesting quote in addition to the table is from interviewee 10 (man), who admitted that seeing the map opened his eyes to this way of mapping: *"Rotterdam does a nice job of showing pleasant areas like cafes and gathering spots, which adds to the 'atmosphere' of the campus. I hadn't thought about a map displaying 'atmosphere' before."*

One woman (interviewee 1) mentioned that she liked the map, but felt it was not serious enough and added too many irrelevant elements, such as the drawn humans. One man (interviewee 3) had similar reasons for ranking it the lowest, stating that it would not help with navigation. Additionally, interviewee 8 (man) said that you can look around for fun things without needing humans on a map to show what to do. Two men (interviewees 4 and 10) agreed that the map was not serious enough. Similarly, another man (interviewee 5) said that the map focused too much on aesthetics and lacked functionality. On the contrary, interviewee 7 (woman) said that the aesthetics actually enhanced functionality, as they helped her place herself in the location. Similarly, interviewee 11 (man) ranked the map highest because it gave a good, complete view of the campus and its landmarks, which helped him discover new places.

Comparison Of Interview Answers Between Genders

Both men and women mentioned the visual appeal of the map, but two men found it to be resembling an unserious map like a comic or a zoo map (Figure 5.30). Moreover, men were more likely to find the layout and 3D aspect chaotic or non functional, while women mentioned that it was "well-designed". The opinion about the fact that there was too much irrelevant information in the map, was shared among genders.

Discussion Erasmus University Rotterdam Campus Map Evaluation

The diverging strong opinions on the map's playful style are interesting as they indicate that when maps don't look like what a "typical" map looks like [van Houtum, 2024], this can cause either very positive or very negative

response. Some people thought it was gorgeous, while others could not take it seriously. There seemed to be a slight gravitation towards women appreciating the playful style of the map, which could indicate that non-traditional mapping practices could appeal to women. These gendered responses may reflect broader feminist critiques of cartography, which argue that traditional mapping practices have been shaped by male perspectives [Fileborn, 2023] However, most women still found that the map took it too far with some elements such as the people drawn in the map. The quote by interviewee 10 (Section 5.30) indicates that being exposed to different types of maps can open up the viewer to diverse ways of mapping [van Houtum, 2024]. Most respondents, regardless of gender, still preferred clearer and more practical design choices, indicating that while innovative approaches to mapping can be successful, they should not compromise clarity and functionality [Krygier and Wood, 2011]. The critiques of the Rotterdam campus map, particularly regarding its layout and use of playful 3D visualization, suggest that non-traditional design elements in mapping can be polarizing. Many respondents found the map aesthetically pleasing but functionally inadequate. This also aligns with the following interview quote:

"I wouldn't know what else to use a map for than for navigation." - Interviewee 5 (man).

In contrast, one interviewee acknowledges the visual appeal in the map as a positive impact on the image of a university:

"The Rotterdam map is clearly well thought of. I't about the appearance of the campus itself, like a business card." - Interviewee 7 (woman)

This comment highlights an important point about the role of maps in conveying institutional image. This reflects van Houtum [2024]'s discussion on maps as not just navigational tools but as visual representations of identity. Aesthetic choices in campus maps may therefore serve a dual function: they help users navigate but also project a certain image of the campus.

5.6 Wageningen University and Research

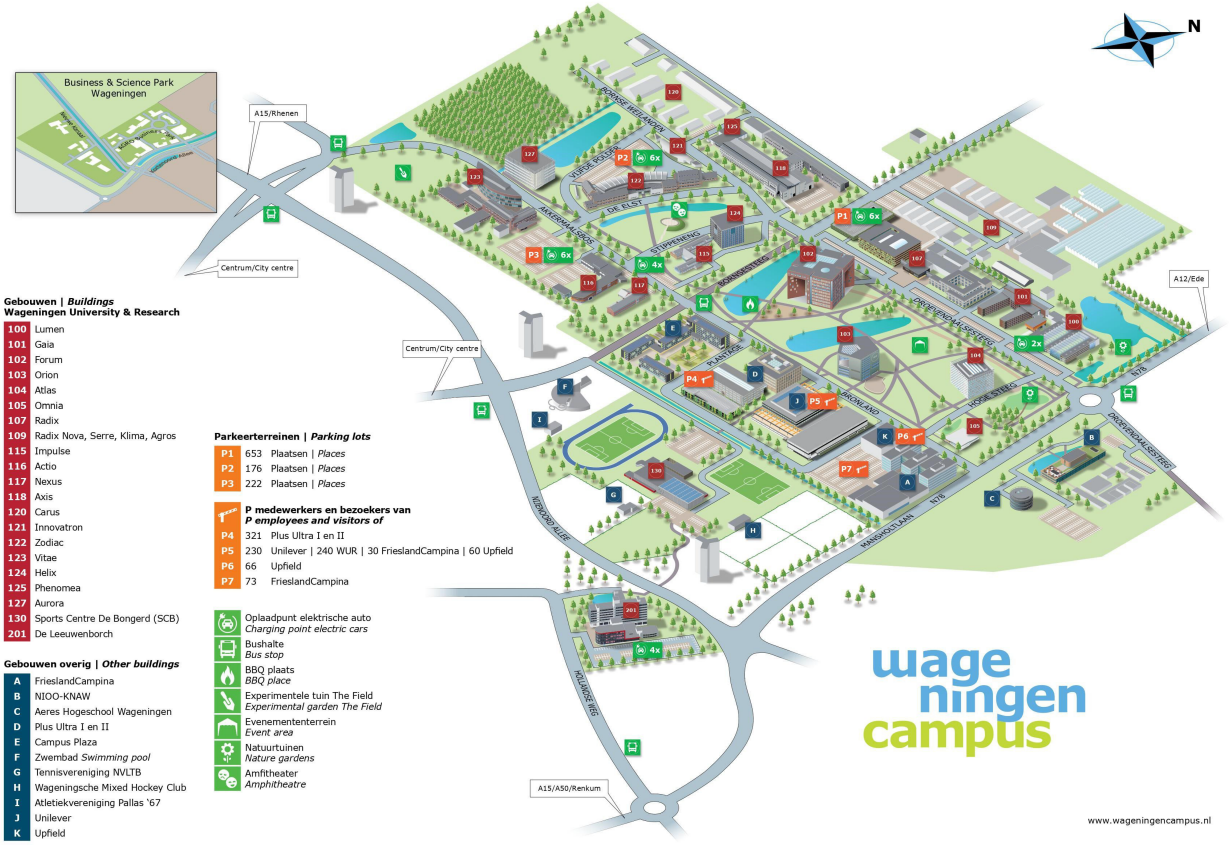


Figure 5.31: The map of the Wageningen University and Research campus that was evaluated by the assumed users

	A	B	C	D	E	F	G	H	I
			Average Score			Feedback			
1	Element	Aspect	All	W	M	Women		Men	
2						Positive	Negative	Positive	Negative
3	Layout		3.8	3.85	3.76	"Looks good" "Clear due to white background" "There is a nice division map/legend" "Looks clear and nice"	"The perspective is a bit confusing"	"Looks cool!!"	"Not really organised in an aesthetically pleasing way"
4	3D		3.8	3.85	3.76	"Its nice that you can see the shape of buildings and paths. The isometric view is nice" "Works really well actually, did not expect" "3D shows the buildings more clear, which makes it more recognizable if you know the campus"	"Not necessary in my opinion, too much going on" "The buidlings are too detailed" "I like the flat one more. Here distances are more difficult to estimate"	"Amazing, gotta say it looks much much better than 2D" "Makes it easier to recognize the buildings" "it helps navigate the map and see it in real world perspective" "It's nice that the reader gets an idea about the size/architecture of the building she/he is looking for."	"Doesn't make it more clear to me" "in order to make it effective they had to make the top of the map not oriented to the north (due to building orientation) , which loses clarity "
5	Information		3.88	3.75	4	x	x	x	x
6	Legend	Completeness	3.83	4	3.67	"Nothing seems missing" "Clear due to different color blocks." "Everything i would use the map for is there"	"It is missing the roads" "I have no idea in which building you can find each study, but if you are looking for a certain building and not study, it seems complete"	"Looks complete with the different categories" "Everything is there :)"	"Could contain different faculties"
7		Clarity	3.63	3.65	3.62	"Clear due different categories with each their own color"	"Shapes look the came, can be confusing/harder to find things"	"Neatly organised" "Good that they show number of parking places, and names of buildings." "The color division based on the use is really clear even to someone who's using a map for the first time." "Nice that they organized it in colours"	"Servicable, not too special"
8	Text	Relevance	3.93	4.05	3.81	"Only necessary" "Only necessary text if used which makes it clear'"It's fine" "All the text is useful"	x	"Seems to use less text in the map itself" "Relevant" "All text is useful"	x
9		Visualization	3.56	3.7	3.43	"Uppercase is nice, easier to read" "Black is nice and clear" "There is more coherence in the placement of the numbers on the image"	"Texts for building number are too small" "I don't like the text clouds for 'city center' and then there is text in the road, it's not very consistent" "Billboards on streets would have worked better instead of slanted labels which make them less easily readable, also a different font type and size in the legend would have made it more readable" "Maybe text a bit small" "Texts for building number are too small"	"All clear"	"Font too small, hard to read" "Could be bigger and have serif for readability"
10	Color	Visualization	3.71	3.65	3.76	"Pretty map" "There seems to be a good color palette, the buildings look realistic" "Clear" "It's clear"	"Not really a color scheme" "Too many colors because it's too detailed" "Colors of buildings are less clear due to their facade colors, the other colors are clear!" "Boring"	"Looks awesome!!! Maybe visuals do matter a bit...." "Highlights the map instead of everything around it " "The map looks nice"	"Not necessarily easy to read" "Colors a bit overwhelming sometimes, not always very functional"
11		Appropriateness	4.07	4.1	4.05	"feels very logical" "The realism is kind of nice" "Colors represent reality really well"	"All neutral/earthy colors, less easy to distinguish between"	"Very realistic! Makes buildings recognisable and all" "Matches up with what you expect" "The map is appealing to look at" "I dont know if the campus is actually that green, I have not been there"	"The lower contrast with lots of colours does not necessarily make it easy to read"
12	Symbols	Appropriateness	3.63	3.45	3.81	x	"All the same, not clear" "Colors are quite dark" "A bit ugly drawn" "BBQ place is a confusing choice of a symbol. At a first glimpse would have thoughts it is a fire brigade" "All have the same shape, can be more diverse" "Making the parking spots blue would make a bit more sense" "Bbq place seems like a weird thing to add as symbol when I can only find 1. I think I'm missing where is a canteen on this one and other maps"	"Nicer to see icons than numbers" "Clear" "The illustrated buildings make it very nice"	x
13		Clarity	3.46	3.35	3.57	x	x	x	x

Survey Results

The answers of the survey are presented in table 5.6. Here the total average score per map element is provided, and the average scores by men and women. The score cells are colored along a gradient, according to their value (blue = 1, red = 5). The comments that were added about each element are then classified as "negative" and "positive", divided by men and women [9]. These results are explained and compared in the following sections.

Comparison Of Survey Responses Between Genders

In Figure 5.32, the (average) scores for each element are shown, divided by gender (separate charts, and the non-binary response can be found in Appendix E). Women rated completeness of the legend higher than men, as well as the layout. Men were more appreciative of the overall quality of the symbols and the completeness of the information in the Wageningen University and Research campus map. The non-binary respondent's answers were higher than the averages of both men's and women's responses, except for information and layout, which were significantly lower than average (see Figure 5.32)

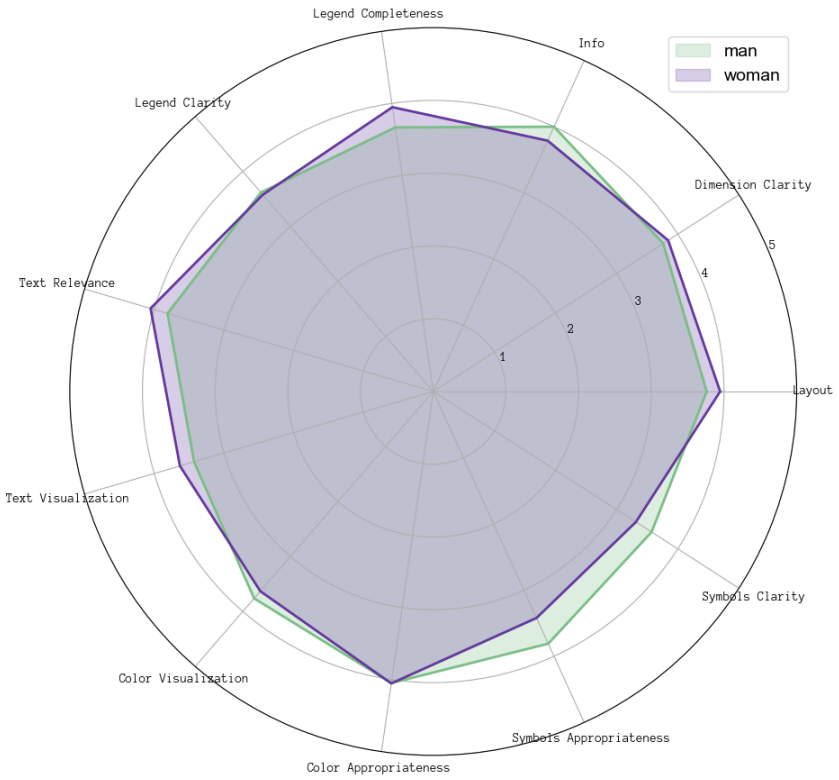


Figure 5.32: The average scores given to each element of the Wageningen University and Research campus map, by women and men (N=40)

[9] Since the non-binary respondent provided no additional comments, their scores will be compared to the overall averages of men's and women's responses, but they are not considered in the table with additional comments.

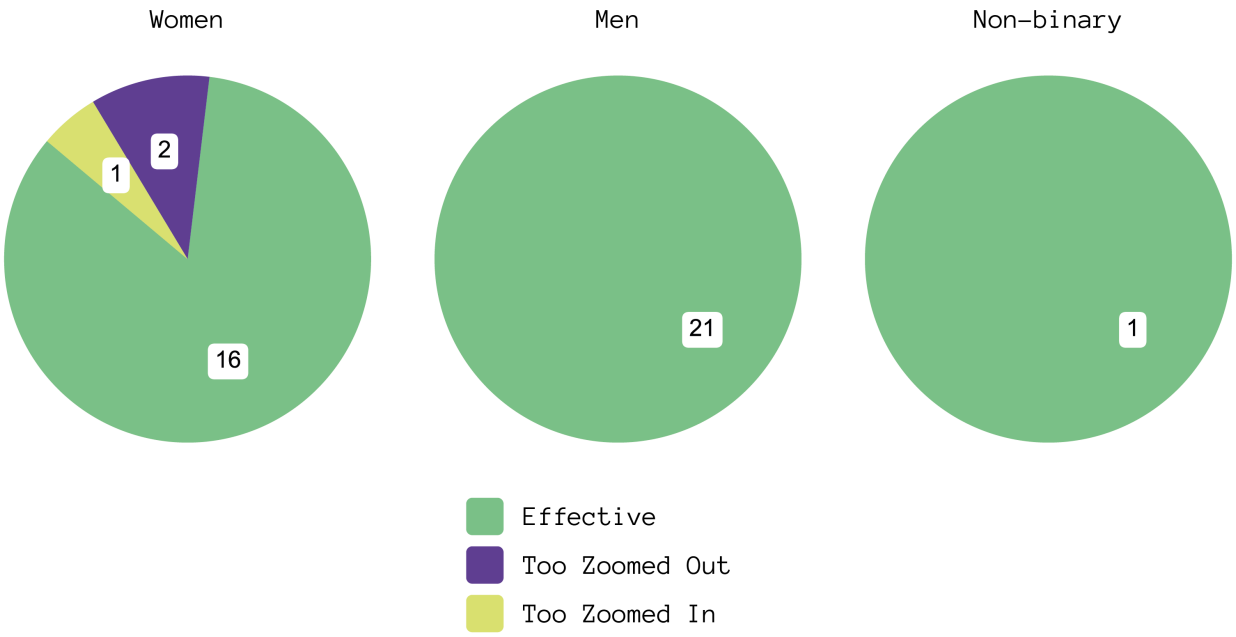


Figure 5.34: The absolute The absolute number of votes for the different appreciations of the scale of the Wageningen University and Research campus map, divided by gender (N=41)

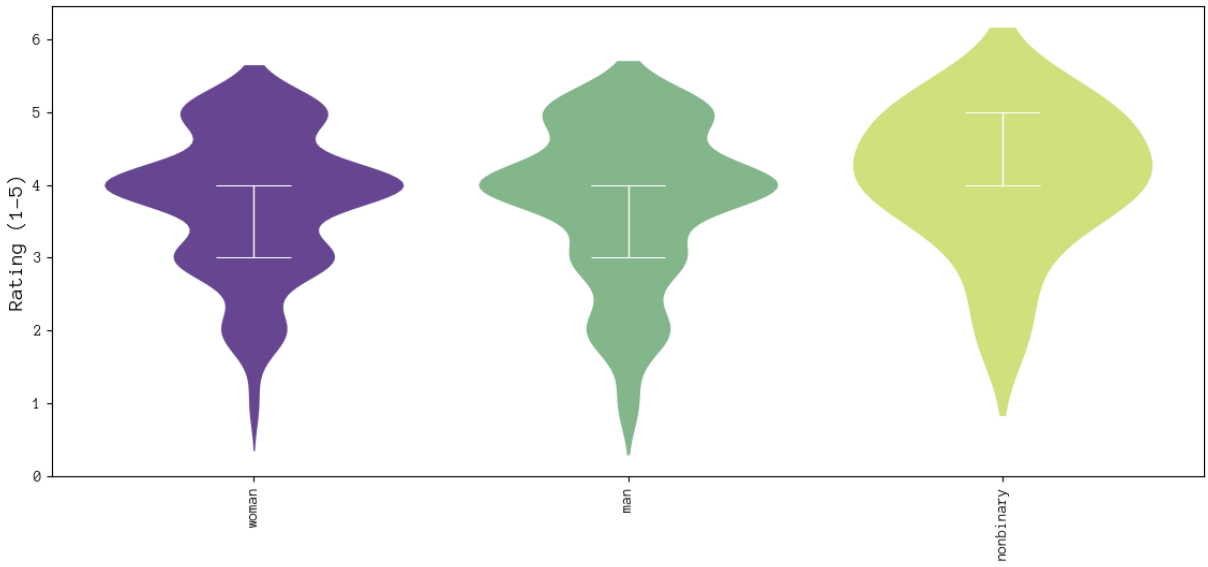


Figure 5.33: The spread of all ratings given on the Wageningen University and Research campus map, divided by gender

Moreover, all scores are displayed in a violin plot, Figure 5.33, divided by gender. The violin plot further supports the observation that men and women rated the Wageningen map similarly - and the non-binary respondent slightly higher - with only minimal variation. However, there is a slightly broader spread in the women's scores compared to men's, where men's ratings are more concentrated around 4 and 5.

The division of the appreciation for the scale of the campus map of Wageningen can be seen in Figures 5.34 (larger sized figures in Appendix E). Here, a difference between the scale appreciation can be noted. Men unanimously rated the scale as effective, whereas among the women, there were 3 diverging opinions. The non-binary respondent rated the scale as effective, which aligns with the majority of both men and women's votes.

Regarding the layout, one man found it not aesthetically pleasing, while four women appreciated its good looks and clarity. One woman, however, found the perspective confusing, and one man commented that the layout "looks cool."

For the 3D aspect, one man mentioned the loss of clarity due to the forced rotation of the map, where north no longer points upwards. Additionally, one woman said the 3D layout made it more difficult to estimate distances. In contrast, both a woman and a man expressed surprise at how well the 3D aspect worked. Moreover, two women and three men commented that it was nice to get a sense of the building shapes.

There were no comments about the information[10].

In terms of the legend, both one woman and one man appreciated the categories. One man and two women found the legend complete. However, one man and one woman emphasized the lack of differentiation between faculties, and one woman mentioned the absence of roads. In terms of clarity, men gave more positive feedback, with four positive comments, three of which praised the use of different colors for organization. In contrast, only one woman made a similar comment. One man had a negative remark, saying the legend "wasn't too special." Another woman gave more specific feedback, pointing out that the square shapes of the icons made it harder to find things.

Regarding the text, neither men nor women provided negative comments about its relevance. Both genders commented positively, with three women and three men stating that all the text was relevant. However, there was more critique about the text visualization. Two men found the text too small, while women provided more detailed feedback. Two women commented on the visualization style, mentioning the use of speech bubbles and slanted/italic text. Additionally, three women noted that the text was too small.

In terms of color visualization, some respondents raised concerns about readability. Two men and one woman said that the color use hindered functionality. One man found the colors overwhelming, and one woman similarly felt there were too many colors. Another woman mentioned that the map lacked a clear color scheme. On the positive side, two men praised the aesthetic appeal of the colors, and one woman found them pretty. Three women liked that the colors were clear and realistic.

Regarding the appropriateness of the colors, one man and one woman commented on the lack of contrast. Two men liked the colors because they matched their expectations, and one man found the colors appealing, though he noted they did not necessarily make the map easier to read. Three women praised the realism and logical use of colors.

In terms of symbols, no men left negative comments, and no women left positive reactions. Three men left positive comments, saying they preferred icons over numbers and found the symbols clear. However, seven women left negative comments. Two women found the BBQ symbol confusing, as it was unassociative and there was only one BBQ spot. Two other women disliked that all the symbols were square and looked the same.

There were no comments regarding the clarity of the symbols[11].

The quantative survey data reveals only slight differences between men's and women's ratings of the Wageningen University and Research campus map, indicating a generally similar level of appreciation across genders. However, there are a few differences in the reasoning behind the ratings: Men unanimously rated the scale as effective, while women had more diverse opinions, with one finding it too zoomed in, and two too zoomed out. Women tended to be more critical of the 3D aspect, with some finding it unnecessary or overly detailed, wheras among men, there was only one negative comment on the 3D aspect. Women were more likely to comment on text size and readability issues, with six women leaving extra comments, and only three men. Similarly, women provided more specific feedback on symbol design and clarity, often suggesting improvements. Seven women left detailed comments and critiques, while three men left short appreciative comments.
While both genders appreciated the map, women tended to provide more detailed and critical feedback, especially regarding readability, symbols, and the 3D element.

Identified Strengths and Weaknesses According to Students, Based on the Survey

The 3D visualization was frequently mentioned as a positive feature of the Wageningen University and Research campus map, particularly for helping users recognize buildings and providing visual appeal. Many respondents

[10]Due to technical complications during the yielding of the survey responses, the additional comments are missing.
[11]Due to technical complications during the yielding of the survey responses, the additional comments are missing.

appreciated the map's realistic style, which made the campus layout easier to understand. Additionally, the color coding system in the legend was highlighted as a strength (see Figure 5.6).

Interestingly, the 3D visualization was mentioned as a weakness as well, as it can complicate distance estimation and the north arrow cannot be pointing upwards, because of the perspective of the map. Moreover, the realistic style of the map also caused a lack of contrast between the colors, hindering the readability. The font size was often found too small and the visualization too inconsistent.

5.6.1 Follow-Up Interviews Wageningen University and Research

Recurring Themes

	A	B	C	D	E	F
		Frequency			Comments	
					Women	Men
1	Recurring Themes	T	W	M		
2	3D representation	5	2	3	"The 3D representation adds to the realism and context of a building, helping with navigation." 3D shows buildings more clearly.	Helps people understand the campus better, helps finding building entrances. More recognizable and easier to find your way. Visually appealing and help recognize the campus.
3	Green Spaces	3	1	2	includes green spaces, which makes the campus feel more complete	showing parks and green spaces gives a better understanding of what is happening on the campus. Green areas feel overemphasized, ahard to distinguish between parks and sports fields.
4	Color Use	3	2	1	Realistic colors help with orientation, doesn't abstract too far from reality. The green colors of the icons don't stand out enough.	Realistic color use keeps things clear

Figure 5.35: Recurring themes in the responses of interviewees

Overall, the 3D aspect was appreciated by both men and women. It adds to the realism of the display of the campus, aiding navigation and recognizing the campus (interviewees 1 and 9 (women) and 3, 4 and 10 (men)). Interviewee 4 (man) even mentioned it helped with calculating distances, contrasting to interviewee 5 (man), who said the rotation of the map was confusing since north was not pointing upwards. The extensive display of green spaces was appreciated by some, but criticized by others: Interviewee 4 (man) explains that it helps give an indication of what is going on on campus while another interviewee (8, man) finds the green areas to be overemphasized (Figure 5.35).

Comparison Of Interview Answers Between Genders

Both men and women valued the 3D aspect of the campus map for enhancing realism and aiding in navigation and campus recognition. However, opinions diverged on certain features. While one male interviewee appreciated the 3D aspect for helping to calculate distances, another found the map's rotation disorienting due to north not pointing upwards. Similarly, the depiction of green spaces received mixed feedback: one male interviewee found it informative for understanding campus activity, while another felt the green areas were overly emphasized. This highlights differing perspectives on map design, within the same gender.

5.6.2 Discussion Wageningen University and Research Campus Map Evaluation

The subtle differences in the feedback provided in the survey by men and women suggest a different way of appreciating the map. Women were more likely to comment on text size and readability issues, and their feedback was more detailed compared to men. Furthermore, there were differences in the scale appropriateness ratings, where men unanimously rated the scale as effective and women had varied opinions. This variability in how users experience scale further supports the notion that map design should account for diverse perspectives to ensure broad usability, as discussed by van Houtum [2024], but also how their is no one solution that will satisfy all users [Lobben et al., 2015]; even though this map's scale is highly appreciated overall, the critiques still diverge between "Too zoomed in" and "Too zoomed out" which doesn't indicate in what way the map could improve its scale.

The 3D aspect was praised for its ability to help users recognize buildings and aid navigation, aligning with Presagis [2023], who advocate for the intuitiveness of 3D maps. However, the criticism that the 3D design made it difficult to estimate distances and caused disorientation (due to the north arrow not pointing upwards) ties into the findings of Niedomysl et al. [2013], who argue that while 3D maps can be intuitive, they may also hinder information recall compared to simpler 2D designs. This suggests that while 3D maps can enhance realism, they may not always improve functional clarity, especially in terms of spatial orientation.

The critique regarding the overemphasis of green spaces reflects how a map has put a frame on a space, in this case the frame of a very green area, which can either align or misalign with the viewer's frame of this space [Carton, 2007]. The critique about text size and readability, predominantly raised by women, connects

to Tyner [2010]; Krygier and Wood [2011], who argue that text should only be included on maps if necessary, as too much text or improperly sized or visualized text can clutter the map and reduce its readability. While men only commented on the size of the text, women also commented on other visual choices.

5.7 Eindhoven University of Technology

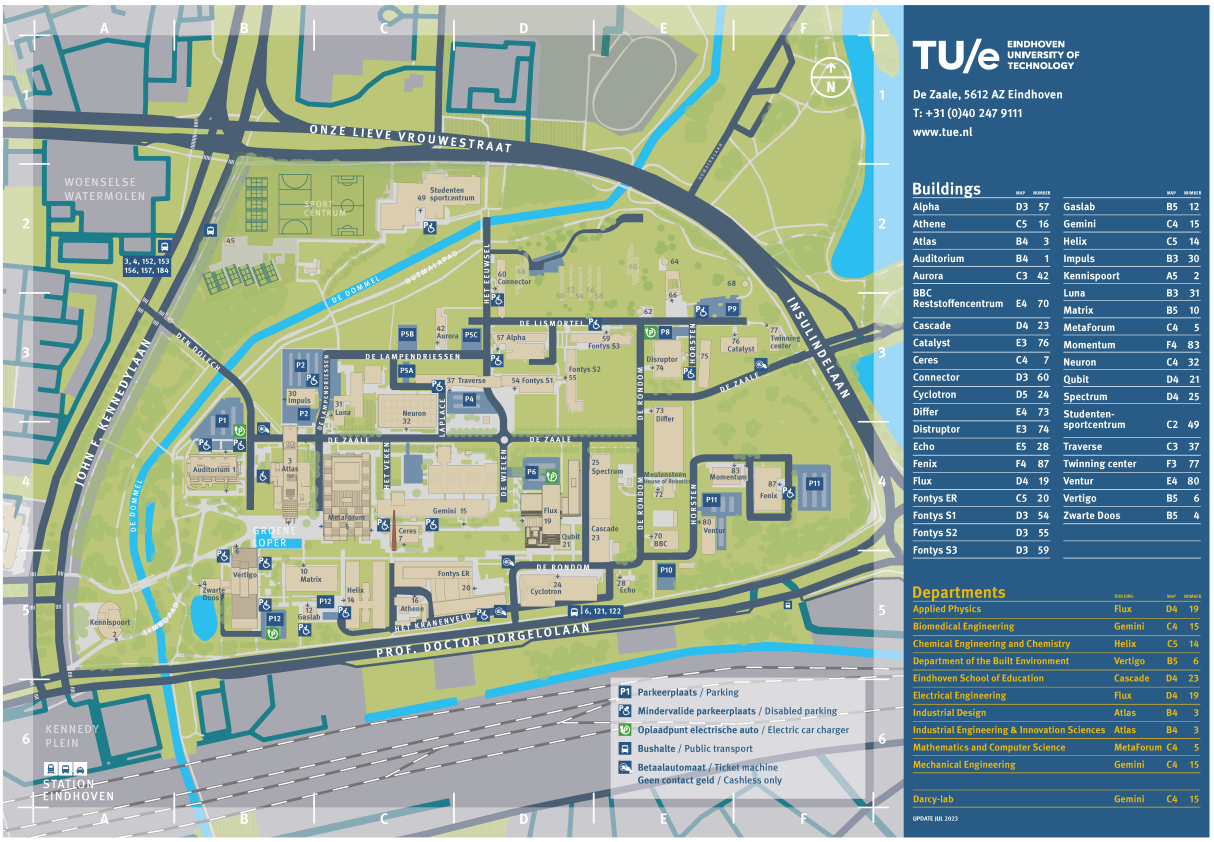


Figure 5.36: The map of the TU Eindhoven campus that was evaluated by the assumed users

	A	B	C	D	E	F	G	H	I
			Average Score			Feedback			
1	Element	Aspect	All	W	M	Women		Men	
2						Positive	Negative	Positive	Negative
3	Layout		3.56	3.55	3.57	"Clear difference between legend and map" "Looks good" "Nice and seems clear"	"There are too many colors. It feels bush and crowded and overwhelming"	"Looks neatly organized" "Very clear distinctions" "Good layout"	"Very messy at first glance" "Quite overwhelming"
4	2D		3.51	3.35	3.67	"Nothing seems missing" "I like it" "Makes it clear"	"A lot of concentrated info about the buildings. 3D would make sense in this case" "I think it could be made more clear with 3D"	"Provides a clear overview" "Tightly packed, so 3D is less valuable" "Makes sense because it's packed again"	x
5	Information		3.61	3.2	4	"It looks like it explains a lot"	"Departments not visible on the map" "Don't know, don't know the campus" "Lacking locations for toilets, charging points and coffee places" "It feels like there is too much innecessary information" "Not adequate for navigation purposes" "Focus on buildings, less on activities"	"Seems to provide a clear picture" "Contains everything you need to navigate the campus" "Everything is there"	"Focus on faculty buildings. There are probably other facilities that are not shown. Where are cafes, restaurants etc.?"
6	Legend	Completeness	3.56	3.55	3.57	"Nothing seems missing" "Good" "Legend contains everything you need" "Even the place on the map is added"	"Icons could be nice" "Some colors are not explained" "Should have the entrances as well on the legend"	"Nice that they added departments" "Good in relation to the amount of elements in the map"	"No description of cafes" "Too little information on the map"
7		Clarity	3.1	3.05	3.14	"Nothing seems missing" "I think it's clear" "Highly detailed"	"Feels a bit overwhelming with the amount of text and lack of symbols" "A lot of numbers" " the grids of the map such as 'D3' is comfusing and took quite a while to find and understand the corresponding information (may be since the visualization method is not very common?)" "Why are the numbers not in order but is it aphfabetical. That is only nice when you know the name of the building but especially in the beginning that is not the case or for outsiders It feels wrong" "too complicated especially the buildings section"	"Good and readable" "Easy to find the buildings with map references"	"No clear logical numbering" "What are the map'codes'?" "Feels a bit full/busy" "Would have preferred numbers ranking instead of alphabetically"
8	Text	Relevance	3.59	3.45	3.71	"Text is fine" "It's all relevant for the map"	"No need to mention the building names if they are already numbered" "Some texts like "woenselse watermolen" could be removed"	"Everything is useful information"	"For me, the street names don't need to be so clear"
9		Visualization	2.98	3.1	2.86	"Consistent which is nice" "The white on blue is nice" "Text is clear, better than the other 4"	"Sometimes placed crooked" "Too small in the buildings, harder to read because of the colors" "Not clear. Text too small and colors make it unclear" "The colors are blunt" "The yellow not so much. Is less readable than black letters on white or vice versa" "Usually too small text"	"Fine, good color choice with blue background"	"Very unclear font, practically unredable" "Very small "Not as great as in the legend"
10	Color	Visualization	3.05	3.3	2.81	"Very pretty map" "Good in terms of communication with the user" "I like these colors"	"Not enough contrast" "There are too many colors that are too closely together. It makes the map quite unclear" "Not very vibrant. Also color pallette's combination of subtle and vibrant parts is unfortunate" "The buildings surrounding the campus should be less visible" "No special or bright colors, seems to be a very serious map"	"Looks very clean" "Quite nice"	"Few colors, looks very unattractive"
11		Appropriateness	3.2	3.5	2.9	"Think its nice that the buildings are a bit lighter and the green not so bright" "It's true to reality" "They represent the buildings and reality" "It's true to reality"	"The buildings have a bit of an unnoticable color" "Not enough contrast" "Hate the colors" "Some things are not immediately clear to understand what they represent"	"Clear color use" "Matches up" "Realistic map!"	"Little differentiation between colors, that makes it unclear" "I'd expect the buildings to stand out more" "Trees slightly hard to see"
12	Symbols	Appropriateness	3	2.8	3.19	"Symbols are fine"	"No symbols for distinguishing between building or departments, building symbol is needed to find it easily." "I don't see a lot of symbols" "There is barely any symbols"	"Provides a clear overview" "Good use in symbols! I like that they also put the names in the buildings, as well as the legend"	x
13		Clarity	3	3	3	x	x	x	x

Survey Results

The answers of the survey are presented in table 5.7. Here the total average score per map element is provided, and the average scores by men and women. The score cells are colored along a gradient, according to their value (blue = 1, red = 5). The comments that were added about each element are then classified as "negative" and "positive", divided by men and women [12]. These results are explained and compared in the following sections.

Comparison Of Survey Responses Between Genders

In Figure 5.37 the (average) scores for each element are shown, divided by gender (separate charts, and the non-binary response can be found in Appendix E).

The radar chart reveals some gender-based differences in how the map was evaluated. Men gave higher ratings for aspects such as information completeness quality of text and the 2D aspect, while women rated color use more favorably. The non-binary respondent rated most aspects significantly higher than both men and women, particularly in areas like information, dimensions, and text relevance, although their scores for layout and symbols were lower.

Figure 5.37: The average scores given to each element of the Eindhoven University of Technology campus map, by women and men (N=40)

[12] Since the non-binary respondent provided no additional comments, their scores will be compared to the overall averages of men's and women's responses, but they are not considered in the table with additional comments.

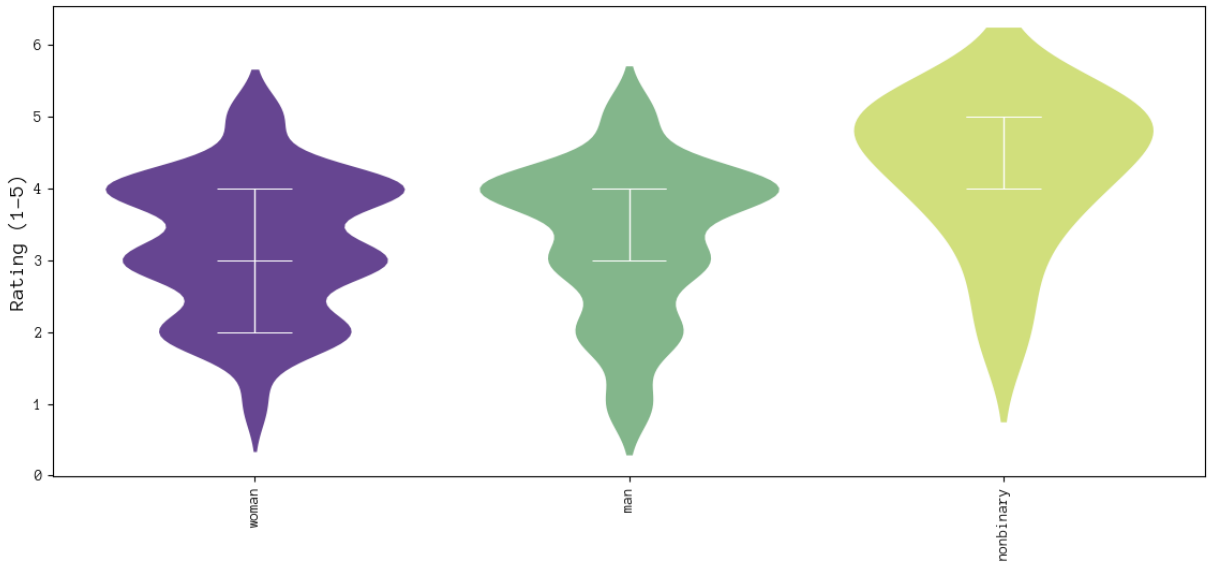


Figure 5.38: The spread of all ratings given on the Eindhoven University of Technology campus map, divided by gender (N=41)

Additionally, the violin plot in Figure 5.38 provides a visual comparison of the spread of ratings by gender. This plot shows that men's ratings are more concentrated around a score of 4, while women's ratings are more evenly distributed across 2, 3, and 4, and the non-binary respondent's ratings more concentrated around 5. This suggests an overall higher appreciation of the map among men, and the non-binary respondent, compared to women [13].

[13] Because the sample includes only one non-binary respondent, the violin plot reflects that individual's responses rather than an average. As a result, the plot may display more 'extreme' scores, but these should not be interpreted as representative of broader preferences.

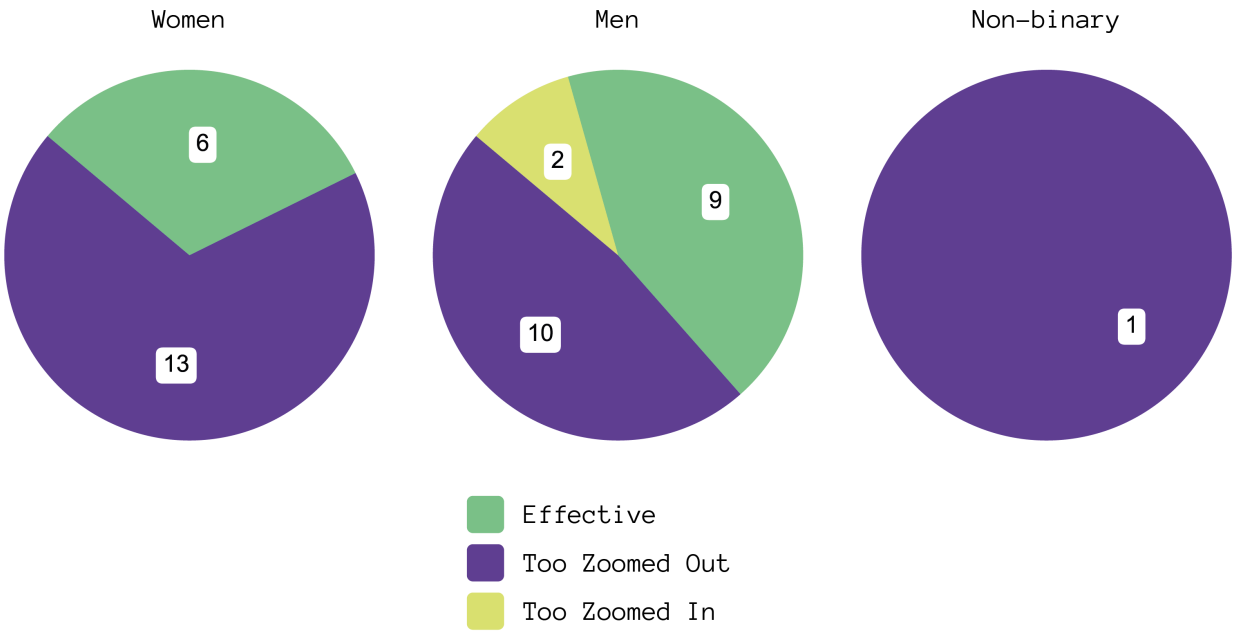


Figure 5.39: The absolute The absolute number of votes for the different appreciations of the scale of the Eindhoven University of Technology campus map, divided by gender (N=41)

The division of the appreciation for the scale of the campus map of Eindhoven can be seen in Figures 5.39. Here it becomes evident that the majority of both men and women find the map to be too zoomed out. However, among men, there are more respondents who are satisfied, and two respondents who found the map to be too zoomed in. The non-binary respondent's appreciation aligns with the majority of both men's and women's responses.

Two men and one woman found the layout overwhelming or messy, while three men and three women found it to be very clear and organized. One woman specifically attributed this to the clear distinction between the legend and the map.

In terms of the 2D aspect, no negative comments were made by men. Two men recognized that 3D would not have worked due to the campus layout being packed. On the other hand, two women felt that 3D would have been a better choice. Three women who were satisfied with the 2D option mentioned that it was clear and complete.

When it came to the information presented, one man mentioned the absence of cafes, while one woman noted the same and added that toilets and charging points were also missing. Additionally, both one man and one woman commented that the map focused too much on faculties, leaving out other important information.

Regarding the legend, one man pointed out that cafes were not displayed, while one woman suggested that icons could enhance the map. One man was positive about the balance between the information in the legend and the elements on the map. In contrast, four women left positive comments about the legend's completeness, with one woman specifically praising the map coordinates. However, three men were either negative or confused about the ordering based on the map coordinates, while one man appreciated those coordinates. On the women's side, five women found the amount of information overwhelming, particularly citing the difficulty with too many numbers. One of them noted that the buildings were not arranged in a clear order, making it hard for outsiders, while another questioned whether the map coordinates might be confusing due to their unfamiliarity.

For the text, both men and women found some elements unnecessary. One man thought that street names didn't need to be so prominent, while one woman felt that building names were unnecessary on the map. Another woman suggested that details like "Woenselse Watermolen" could be removed. In terms of visualization, both a man and a woman specifically liked the white text on a blue background. However, three men commented that the text was too small and hard to read, while four women left negative comments about the color of the text, and three criticized its size.

When discussing color visualization, one man left a negative comment, stating that there were too few colors. On the other hand, five women left negative comments about the colors. Despite this, the average rating from women was 0.5 higher than that of men. Four women criticized the lack of contrast, and one remarked that the

map looked very serious. In terms of appropriateness, three men commented on the lack of contrast, with one saying the buildings should stand out more and another focusing on the trees. The three positive comments from men were about the clarity and realism of the colors. Two women also mentioned the lack of contrast, and one said that not everything was easy to understand. One woman even expressed that she hated the colors. On the positive side, three women praised the colors for being true to reality, and one woman liked that the buildings were lighter, which contrasted with the feedback from one man and one woman about the light color of the buildings.

Regarding symbols, no negative comments were left by men. Two positive comments came from men, appreciating that the map provided a clear overview and that the building names were included in both the legend and the map. On the other hand, two women mentioned the lack of symbols, while one woman was content, saying the symbols were fine. No comments about the clarity of symbols were recorded[14].

The quantative scores for the Eindhoven University of Technology map display slight gender-based differences. In general, men tend to rate the map higher, especially in terms of information completeness, scale and 3D clarity. Women, on the other hand, show a higher appreciation for color use, although they also note dissatisfaction with the overall color palette's aesthetic appeal.

Identified Strengths and Weaknesses According to Students, Based on the Survey

The realistic color use in the map was generally appreciated, as well as the clear distinction between the legend and the map. The faculty names were included, as well as their map coordinates. The map was often described as "clear", "fine" and "complete". (see Figure 5.7).
However, the color palette, tough realistic, was not often appreciated for its visual appeal, nor was the contrast seen as sufficient. The overall layout was found to be overwhelming. Moreover, many respondents found the map coordinates to be confusing, as they didn't understand what they meant. The text was found to be too small, or not readable. The focus of the map is mostly on faculties and departments, and not on other facilities of the campus, such as cafés. Lastly, the scale seems to be an issue for the majority of students.

[14]Due to technical complications during the yielding of the survey responses, the additional comments are missing.

5.7.1 Follow-Up Interviews Eindhoven University of Technology

Recurring Themes

	A	B	C	D	E	F
					Comments	
		Frequency			Women	Men
1	Recurring Themes	T	W	M		
2	Color Use	4	1	3	The blue color of all icons is to generic.	The colors are dull but clear. The colors are simple and not vibrant but practical. Colors are balanced
3	Functionality	3	1	2	Focuses on buildings, functional, but not fun.	It's a serious map. Clean and straightforward, but nothing stands out too much.
4	Legend	3	1	2	Legend is unclear	Bad legend because you need to read everything. Legend is unclear.
5	Level of Detail	3	1	2	Doesn't tell you much about the campus atmosphere or how to get around.	Too zoomed out to help navigate between buildings. Too zoomed out to find specific details.
6	Layout	4	0	4		Balanced, similar to Google Maps. Clean layout, easy to navigate. clear but unremarkable
7	Transport	2	1	1	No information on bus stops	No public transport information or routes

Figure 5.40: Recurring themes in the responses of interviewees

Overall, the color use is seen as functional and clear, but boring, mostly discussed by men (3 men, 2F, Figure 5.40). However, one interviewee (9, woman) had similar views on the color use:
"The colors are what you'd expect from a technical university map. They don't stand out, but that's fine because when you need the map, you'll use it anyway." - Interviewee 9 (woman)

The legend is found unclear, mostly due to the lack of explanation about the grid codes:
"Eindhoven is a bit strange because the grid on the map is not very clearly explained." - Interviewee 2 (man).
Four men commented on the functionality of the layout, finding it balanced and clear (6F, Figure 5.40). The missing information about public transport was mentioned twice, once by a man and once by a woman.
One male interviewee (2) also noted that he ranked the Eindhoven map highly because its appearance resembled Google Maps, which was seen as a positive feature.

Comparison Of Interview Answers Between Genders

Women seem to place slightly more emphasis on practical details such as symbols. They tended to find the Eindhoven map serious but lacking in usability for newcomers. Men tend to appreciate the layout and color use more for its clarity, while women had less to say about the layout, and found the color use serious and "what you expect". Both men and women mentioned the lack op public transport information once (Figure 5.40).

5.7.2 Discussion Eindhoven University of Technology Campus Map Evaluation

The notion that the color use was seen as unsurprising but functional, and what you expect, in combination with the comparison to Google Maps, might imply that many students consider Google Maps and maps that look similar as the default map visualization. This reflects the discourse described by [Carton, 2007], who discusses that many cartographic conventions are replicated without being aware of it, just by exposure. Replicating these conventions without awareness or reflection could potentially push away other unconventional mapping practices [Monk and Hanson, 1982]. Another interesting notion is that the map grid coordinates were generally not appreciated due to confusion, even though that is a map element that is traditionally used in maps, such as atlases, and aims to improve the functionality of the map, potentially indicating that for many map users, this is an outdated map element. This might also be linked back to Google Maps use; a digital map like that doesn't need grid coordinates. This further underscores the idea that commercial digital maps such as Google Maps might be changing what users consider a conventional map.

Moreover, the map was described as "serious" and fitting for a technical university, which suggests that the way the map is styled and visualized, even when this is considered conventional, carries out some type of image for the university, which was in this case to some extent acknowledged by some of the respondent.

The variation in scale appreciation, where the majority found the map too zoomed out while some felt it was too zoomed in, emphasizes the challenge of satisfying diverse user needs with one scale. As noted by Lobben et al. [2015], there is no singular solution that can accommodate all users.

5.8 Comparison Between all Campus Maps

It has become evident that on each map, women seem to be more critical of the scale being appropriate. A smaller section of women votes for "Effective" than men do, for each map. Moreover, women are slightly more likely to vote for "Too Zoomed Out" than men are, except for the case of the Vrije Universiteit Amsterdam campus map (see Figures 5.17, 5.24, 5.29, 5.34, 5.39).

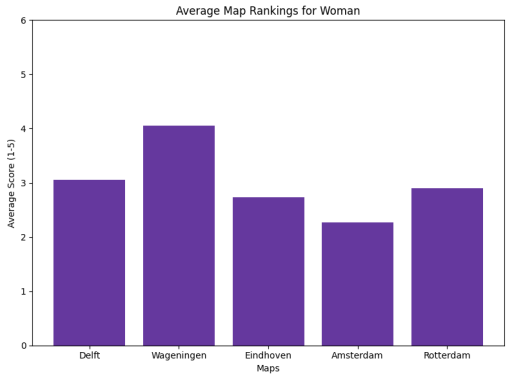


Figure 5.41: The distribution of the rankings of the maps (a score of 5 indicating the highest ranking, and a score of 1 indicating the lowest ranking), given by women (N=19).

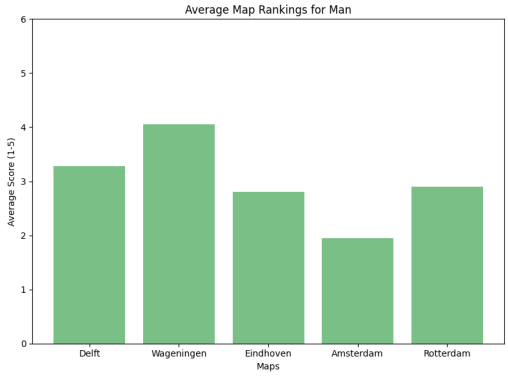


Figure 5.42: The distribution of the rankings of the maps (a score of 5 indicating the highest ranking, and a score of 1 indicating the lowest ranking), given by men (N=21).

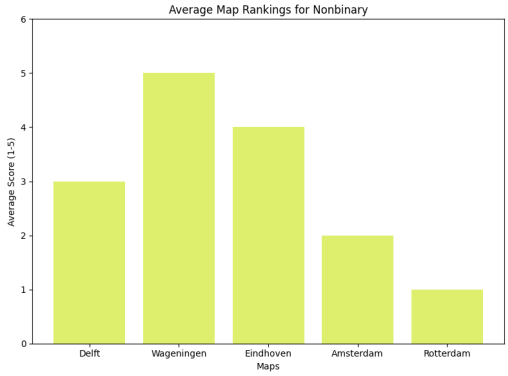


Figure 5.43: The distribution of the rankings of the maps (a score of 5 indicating the highest ranking, and a score of 1 indicating the lowest ranking), given by the non-binary respondent (N=1).

The map rankings are very similar compared between men and women. Interestingly, even though the distribution of the ratings for each map had some notable differences, as can be seen in the violin plots 5.15, 5.23, 5.28, 5.33, 5.38, which would suggest that there are differences in appreciation for each map between genders, as well as the differences in commentary on the maps, the rankings do not suggest that this results in a notable difference between the preferences of one map over another. This suggests that both men and women valued similar aspects in a campus map but might have weighed certain elements differently. The non-binary

respondent's ranking order diverges slightly from the average, as they have rated Rotterdam the lowest, when on average, Amsterdam scores lowest.

An important notion is that some respondents mentioned their opinions changed after seeing multiple maps, but they didn't go back to change their ratings. The map ranking was the final step of the survey, after seeing all the maps. This might mean that not all ratings align with the ranking, and maps that were initially rated highly were ranked lower, or vice versa, compared to other maps. The order in which the maps were presented to the respondents was:

1. Delft University of Technology
2. Wageningen University & Research
3. Vrije Universiteit Amsterdam
4. Eindhoven University of Technology
5. Erasmus University Rotterdam

Overall Strengths and Weaknesses of All Maps

There were certain map elements and characteristics that were generally either appreciated or disliked.

Appreciated Elements and Characteristics

Contrast and Color Use:
Several participants highlighted the importance of clear and realistic color contrasts in maps, particularly for distinguishing between various features such as buildings and green spaces. For example, one participant noted that "realistic color use helps with orientation" as it mirrors the actual surroundings (5.35). Moreover, color could help distinguish between different types of green spaces (5.20). The colors should be balanced (Figure 5.25) and have enough contrast (Figure 5.35).

Faculty Names and Building Identification:
Many interviewees expressed that the inclusion of faculty names directly on the map, rather than relying on a separate list, is greatly appreciated. This addition was suggested to make the map more intuitive for those unfamiliar with the campus, helping to faster identify the relevant locations. As one participant noted, "the map would be more practical if the faculty names were displayed directly on the map" (see Figure 5.19).

Clarity in Pathways and Navigation:
The clear display of the pathways and campus roads was frequently mentioned as an important feature. The use of clear symbols and the separation of pedestrian areas from vehicle routes was considered beneficial (Figures 5.30 5.25 5.40)

A Clear Layout:
It was appreciated on the Delft map and the Eindhoven map that there was a clear distinction between the legend and the map, for example through a vertical division of the page (see Figures 5.44 and 5.45).

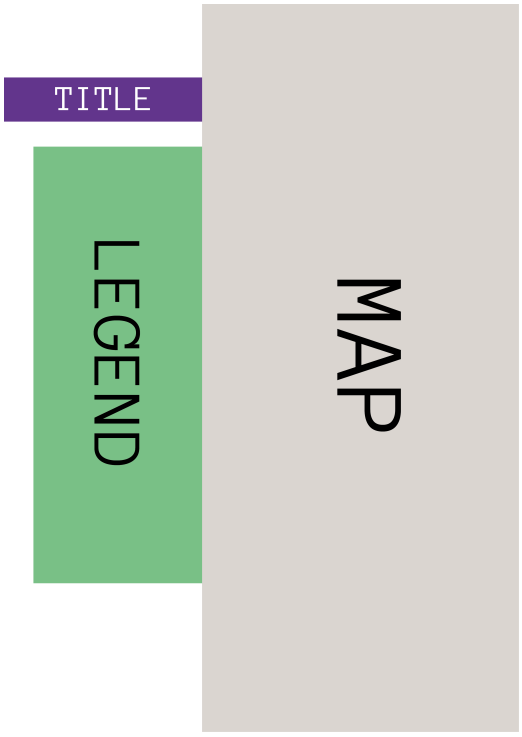


Figure 5.44: Layout of the Delft map

Figure 5.45: Layout of the Eindhoven map

Figure 5.46: Comparison of map layouts between Delft and Eindhoven

3D Realism:
Maps featuring 3D elements were often praised for improving spatial understanding and orientation. The 3D design helped users "recognize buildings more easily," which was particularly useful for first-time visitors or those less familiar with the campus. Realistic 3D representation also contributed to a sense of familiarity (Figures 5.35 5.30).

Use of Symbols:
Clearly labeled symbols for faculties, cafes, parking spots, and green areas were often highlighted as essential. Participants appreciated maps that differentiated between functional spaces, such as sports areas and leisure parks, using clear and consistent icons. Icons should be clearly distinguishable from each other and from the background and should be intuitive. Moreover, in the case of Delft, symbols were also mentioned as a way to emphasize a campus feature more than for example color use (Figures 5.25 5.35 5.3).

The following items were rated the highest by each gender for each city:

City	Women		Men	
	Element	Score	Element	Score
Delft	Color Visualization	3.75	Legend Clarity	3.9
Amsterdam	Information	3.25	2D Clarity	3.29
Rotterdam	Color Visualization	4	Color Visualization	3.95
Wageningen	Color appropriateness	4.1	Color appropriateness	4.05
Eindhoven	Color appropriateness	3.5	Information	4

Figure 5.47: The most appreciated elements per map, and their average rating, per gender

These findings suggest that both men and women tend to rate color-related aspects (such as color appropriateness and visuals) highly, but there are some differences in other categories like clarity and info across cities.

Disliked Elements Across All Maps

Unattractive or Confusing Color Schemes:
Participants frequently mentioned that confusing or unattractive color schemes were a major weakness across several maps. For example, the Amsterdam map was particularly criticized for having colors that were not well explained, leading to confusion about its features. One participant commented that "the colors and shadows make the map feel chaotic" (Figure 5.25). Moreover, when colors were not standing out enough, such as in the Wageningen map, this was seen as unclear and obstructing the readability of the map 5.35.

Overly Detailed or Unnecessary Information:
Some maps included too much irrelevant information, leading to clutter. The Rotterdam map, for instance, was noted to have "too many extra elements that distracted from the main function" of the map, such as the drawn figures in the Rotterdam campus map (Figures 5.30, 5.25).

Lack of Clarity About Faculty Names:
In Delft there were complaints about the missing faculty names, Eindhoven was criticized for its confusing legend, and Rotterdam had unclear explanations about the Faculty letters (Figures 5.40, 5.30, 5.19).

Low Path Clarity:
Some maps were criticized for not having clearly indicated paths. In the Rotterdam map for example, the 3D view obstructed many paths (Figure 5.30). Amsterdam was criticized for the lack of clarity about what was going on between the buildings (Figure 5.25). In Eindhoven, the level of detail was so low, that different types of paths could not be indicated (Figure 5.40).

A Messy Layout:
Both 3D maps, Wageningen and Rotterdam were criticized for its layout, with respondents stating that it is either confusing or not aesthetically pleasing. These layouts diverge from the more appreciated rectangular layouts, partly due to their angled perspective (see Figures 5.48 and 5.49).

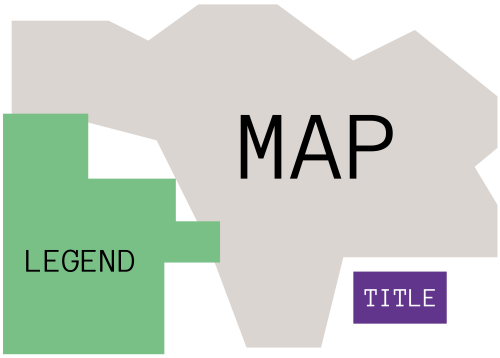


Figure 5.48: Layout of the Wageningen map

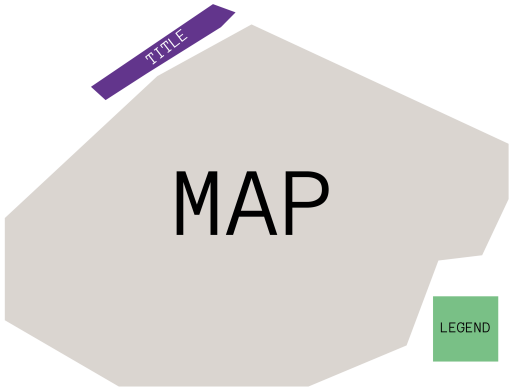


Figure 5.49: Layout of the Rotterdam map

Figure 5.50: Comparison of map layouts between Wageningen and Rotterdam

Unnecessary Text:
There were multiple complaints about superfluous text that information that was not serving the map, or even confusing, such as the explanation about the building letters in the Erasmus University Rotterdam campus map, or causing clutter such as the building letters being added on top of the buildings.

North Arrow Not Pointing Upwards:
However appreciated, the 3D representations forced the maps to be viewed from an angle which caused the north arrows to not be pointing upwards in the Wageningen and Rotterdam map. This was frequently mentioned as something that was confusing for using the map to orient oneself.

The following items were rated the lowest by each gender for each city:

City	Women		Men	
	Element	Score	Element	Score
Delft	Information	3.1	Information	3.33
Amsterdam	Color Visualization	2.55	Legend Clarity	2.69
Rotterdam	Information	2.9	Legend Clarity	3.19
Wageningen	Legend Clarity	3.65	Legend Clarity	3.62
Eindhoven	Legend Clarity	3.05	Color Appropriateness	2.9

Figure 5.51: The least appreciated elements per map, and their average rating, per gender

These findings highlight that information completeness legend clarity, and proper color use are recurring issues across multiple maps.

Other Observations Across All Maps

Both genders frequently mentioned Google Maps as an alternative, with men being more likely to say they didn't see the need for a campus-specific map because Google Maps fulfilled their needs.However, some mentioned issues with Google Maps not having certain campus-specific features (e.g., building numbers and classrooms).

"A detailed map is crucial for navigation. Google Maps is not detailed enough for campus navigation, making it the campus's responsibility to provide a detailed map." - Interviewee 6 (woman)

Several respondents indicated that for them personally, the quality of a campus map did not matter that much. The fact that they didn't depend on the map for navigation often caused this lack of care. However, as Interviewee 7 notes, a good campus map does add to or detract from the image of a university:
"For me personally, a campus map is not that important. If you are unfamiliar with the campus, it might be very useful. The Vrije Universiteit Amsterdam campus map is very scandalous. With that map you say "We don't care". The Rotterdam map, it is very clear time went into it. It's also about the appearance of the campus itself. The Rotterdam map, you could hang on a wall, it's almost like a business card." - Interviewee 7 (woman)

Moreover, the following quote reflects both the the lack of care for a campus map, and the increased use of Google Maps, and even presents this as a cause for not needing a proper campus map:

"Map north should be pointed upwards. Also used to that because of Google Maps. I don't know about the importance of a proper campus map, because I use mostly Google Maps, but maybe for people trying to choose which university they want to attend. And then, if you have never seen the campus the nicer looking map could influence the choice because of the impression of the campus." Interviewee 8 (man)

Similarly, the following quote describes the notion of the audience of a campus map not necessarily being the students of the campus, as well as Google Maps use, and the image of the campus being reflected in the map:

"Personally, I don't find it very important because I rely on Google Maps. I think it's hard to imagine what exactly a campus map adds. However, for visitors and new students, a clear map is essential. It could be useful for older people, but they are not often on campus. It also reflects on the university, so a well-designed map is important for its image. If you get a fun map during the introduction week, you might use it to discover new places. It should really offer something on top of Google Maps to be useful." - Interviewee 10 (man)

Both in the survey and in there were instances where participants changed opinions or had realizations during the process of answering the questions and looking at the maps. These instances are reflected in the following quotes:

"Wageningen also shows different public spaces, but Rotterdam does a nice job of showing pleasant areas like cafes and gathering spots, which adds to the "atmosphere" of the campus. I hadn't thought about a map displaying "atmosphere" before." - Interviewee 5 (man)

"I first saw the Delft map and thought it was fine. But then, after seeing the other maps, you look back and think "that was actually quite bad". I never thought about an axo view as a map before, but it's actually quite nice. It's not flat and boring." - Interviewee 7 (woman)

"It's a map, the visuals don't really matter in a map I think" about Delft, followed by *"Looks awesome!!! Maybe visuals do matter a bit...."* about Wageningen - Survey respondent 41 (man)

Characteristics of peoples behaviours on campus, such as showing appreciation for the Mekelpark (see Appendix D) or frequently using a bike (see Figure 5.11) seems to be reflected in issues that were raised in the survey and follow-up interviews. For example, multiple students mentioned that the different types of greenery on campus should be clearly indicated, and clearly visible bicycle paths and bicycle parking indication were mentioned several times as an appreciated map element, and it was criticized when they were not depicted properly. However, there was not a clear correlation between the specific respondents that mentioned the appreciation for parks and greenery on campus, and then were concerned about the display of greenery in the maps; People who didn't mention greenery on campus did comment on the greenery in the maps. Moreover, among the respondents, the vast majority uses a bicycle, therefore indicated bicycle paths on the map seem to be more of a general concern, than directly linked to specific respondents and their preferences.

Gender Based Differences Between the Appreciation of the Maps

The quantitative survey results shows only slight differences between the responses of different genders. However, the qualitative comments the respondents, as well as the follow-up interviews provided a more in-depth insight into the differences behind the reasoning of the respondent, and revealed more nuanced gender-based differences:

Women were generally more critical of the scale of each map and were more likely to find them too zoomed out compared to men. Additionally, women tended to be more particular about text visualization, often calling for greater consistency, sufficient contrast, and paying close attention to font type and coloring.

In terms of map style, men expressed a stronger dislike for the playful style and 3D effect of the Rotterdam map, while women were more appreciative of the visual appeal, as long as it didn't hinder clarity. Women also tended to dislike when realistic color use resulted in an overly complex palette with too many colors, while men were more focused on the lack of contrast or commented on associative use of colors. Even when they didn't find the colors aesthetically pleasing, men still appreciated the realistic aspect of the colors.

When it came to 3D maps, women were more likely to believe that a 2D option would have been better, and vice versa. Men, on the other hand, found the choice for dimension logical in relation to the campus layout, as they believed it was recognizable enough. Women often reconsidered their preference after seeing the 3D map, adding new critiques regarding its usefulness for navigation. Overall, on the Delft and Eindhoven maps, most women would have preferred a 3D version over 2D, while men were generally satisfied with the 2D format.

Women were also more critical of symbol visualization, emphasizing the need for distinguishable symbols that stood out from the background and could potentially replace some of the text. Their feedback on color use was typically more extensive, with both positive and negative comments.

On the other hand, men were more critical of unnecessary text that they felt lacked purpose and made the map appear cluttered or chaotic. Interestingly, women were the ones to praise the indication of wheelchair accessibility, a feature that men did not mention at all. Several respondents, including one woman for safety reasons, called for clearer visualization of the different green areas.

Regarding the non-binary respondent, their ratings showed some alignment with male responses in certain areas and with female responses in others, depending on the map and the specific element being rated. For example, on the Delft University of Technology campus map, their ratings were closer to those of the men in aspects like layout and color use, while on the Rotterdam map, their ratings aligned more with those of the female respondents. However, since there was only one non-binary respondent, these observations cannot be generalized.

5.8.1 Discussion on All Campus Map Evaluations

Emphasizing the importance of combining qualitative and quantitative feedback, the qualitative responses in the survey and follow-up interviews added valuable insights on top of the quantitative survey data [Ramon and Monk, 2007; Yin, 1994a].

A notable insight that came forward from the map evaluations was that most participants don't rely on the campus map for navigation. Therefore, the idea that campus maps might have an impact on the way that for example students or campus employees navigate or experience the campus [Dittus and Graham, 2022; van Houtum, 2024] might not be applicable. Many participants more so mentioned using Google Maps for navigation, or finding their way across campus through familiarizing themselves with the campus layout.

Google Maps became a recurring theme in the comments and answers of the participants, mostly in the follow-up interviews. The Eindhoven map, for example, was praised for looking like Google Maps, which sparked familarity. Its functional design was also described as "what you expect". This appreciation for familiar map designs, which in this case meant a visual resemblance to Google Maps reflects the discourse discussed by scholars like Carton [2007], where people adopt "cartographic conventions" by being exposed to them. However, in Carton [2007]'s work, she mentions maps on the walls of classrooms as an example of this exposure, not a profit-driven mapping platform such as Google Maps.

The appreciation for familiarity can also be seen as convenience. The Eindhoven map, for example, however appreciated, at best received comments such as *"it's fine"* or *"not a beauty, but does the job"*, which mostly reflects the appreciation for the functionality of the map. In contrast, maps that diverge more from this standard, such as Rotterdam's map, received more polarized opinions, where the illustrated style was either seen as *"gorgeous"* or **"very chaotic"**, and received also more personal commentary, like *"I'm not sure if I like it personally"*. This might indicate that maps that comply with the "mapping standard" and look familiar might more easily be perceived as an acceptable map, and therefore might more easily reproduce the conventional ways of mapping without careful consideration [van Houtum, 2024], where a map that pushes the boundaries of what people expect may also stimulate subjective discussion [Marchi and Diantini, 2022], as a contrast to the more neutrally received maps [Dittus and Graham, 2022].

Moreover, most critiques from the literature are suggesting traditional cartographic conventions are determining the standard and should be disrupted from within the discipline of cartography and geography [Kwan, 2002a; van Houtum, 2024; Schuurman and Pratt, 2002], however it appears that a commercial instance such as Google maps is setting the standard. To disrupt their methods of mapping might be a bigger challenge, and call for a different approach than what is discussed in the literature.

Additionally, the idea that a map can be used as a tool for discussion [Marchi and Diantini, 2022], might expose spatial issues that otherwise remain invisible [Falahatkar, 2024] and could challenge ways people think about and perceive space [Crampton and Krygier, 2010; Mahmoudi and Shelton, 2022; van Houtum, 2024], might only be relevant, when the map is used, and being taken seriously. Since students are hardly relying on a campus map, and maps such as the one from Rotterdam and Amsterdam were not taken seriously by some participants. Additionally, even though the maps didn't need to fulfill the navigational needs of the respondents, due to Google Maps use, they still criticized elements that obstructed navigation purposes, with most students expressing that they would intend to use a map for navigation, and not for other purposes. This might further complicate the idea of using a map intentionally as a tool for discussion [Marchi and Diantini, 2022], when people intend to use them more for practical purposes.

During the interviews and in the survey, there were several instances of participants' opinions changing, or their perception of a map shifting, after being exposed to multiple maps. For example, appreciating the 3D aspects - even though they obstructed navigational purposes - and recognizing the idea that a map could represent "atmosphere". These shifts underscore the importance of broadening the kinds of maps people are exposed to, as this can challenge assumptions about what a map "should" look like [Carton, 2007; van Houtum, 2024; Crampton and Krygier, 2010; Mahmoudi and Shelton, 2022; Fileborn, 2023].

Moreover, the dominance of Google Maps raises questions about the purpose of campus-specific maps. As students noted, Google Maps often fulfills their navigation needs. Students did express the need for a more detailed and specific mapping of campus elements such as faculties and different green/leisure areas. This could indicate that a current "standard" such as Google Maps doesn't fulfill user needs in terms of representation of the spatial needs of students, namely, visiting the faculties for studying, and partaking in activities such as sports and leisure on campus [Kwan, 2002a; Fileborn, 2023]. As Budhathoki et al. [2008] states, more detailed and rich information about a space can come from individuals that are closest observers to the phenomenon, which in this case could mean that the university and students could provide most detailed information about the campus. In this sense, campus maps may need to go beyond navigation to provide information that Google Maps cannot to stay relevant.

However, the Rotterdam map's attempted this by adding illustrations that showed campus elements that were derived from being personally familiar with the campus, such as the geese. The reactions to this were polarizing, with some students appreciating the creativity, while most found it distracting, or "too much". Moreover, the fact that these illustrations added a layer of positionality to the map and with this disrupts the disembodied perspective [van Houtum, 2024; D'Ignazio and Klein, 2016], which is suggested as a way to combat gender-blindness in mapping, was actually generally not appreciated, suggesting that this way of adding personal, campus specific information might not be appropriate. This could be a result of not actually consulting students during the mapping process, but deciding on these campus specific elements through intuition and experience with the campus [van Houtum, 2024; Till, 2005; Arnstein, 1969], or from not being aware of and intentional with adding this layer of positionality, as suggested by Carton [2007], van Houtum [2024] and D'Ignazio and Klein [2016]. Additionally, a more clearly "personal" or "humanized" element in a map seems to evoke comparison of this element to the viewer's personal experience; The "walking stick man" on the Delft map, was commented on by a respondent saying that the walking speed indicated, might not match his personal walking speed. Similarly, a respondent noted that he didn't need to see illustrated on a map people partaking in activities to decide what activities he would partake in.

A surprising finding is the contrast between the Wageningen and Rotterdam maps. While the Wageningen map, with its indications of leisure spaces like gardens, was not criticized, the similar representations of leisure in the Rotterdam map (e.g., people picnicking) were not well received. This may indicate that students appreciate information about non-study-related facilities, but prefer these to be depicted in a more conventional manner, such as through icons rather than drawings.

However, adding these personal elements in the way the Rotterdam map does might still be useful to disrupt the perception of a map as neutral and objective by the map-user, such as historical maps that were seen as a creative artefact based on travellers' stories [van Houtum, 2024] and were accompanied with more imaginative objects [Dittus and Graham, 2022]. There was an implicit awareness of the maps not being neutral [Monmonier, 1996; Dittus and Graham, 2022; Carton, 2007], such as the fact that multiple students found it important that the university put some level of effort into their campus map, even though the students themselves would not necessarily use the map. This effort should result in the map looking like the university "cares" or can be taken seriously, according to students. This indicates a relationship between the quality of the map design and the communication values of the university (e.g. the Vrije Universiteit Amsterdam campus map being "scandalously ugly" and the Rotterdam map being like a business card, or a zoo map) which made the students implicitly judge the university. This aligns with the theory by Ramon and Monk [2007], Martini [2021] and Dittus and Graham [2022] which suggests maps can instantiate subjective views.

A more implicit observation from the interviews was that many comments were accompanied with remarks like "I don't know, I don't know much about maps" or "I'm not sure if that's right". This aligns with the notion that there is a gap between the cartographic expertise, and its users [Budhathoki et al., 2008], and that not all users are aware that a map is a subjective product [Monmonier, 1996; Dittus and Graham, 2022; Carton, 2007].

The frequent mentions of confusion over map symbols, faculty names, and the legibility of text resonate with Tyner [2010]; Krygier and Wood [2011], who emphasize the importance of selecting and designing map elements carefully to ensure clarity and usability. The feedback suggests that while many campus maps succeeded in conveying key information, there was often room for improvement in terms of readability and usability. However, the opinions varied on what exactly was clear, readable and intuitive. In some cases for example in the Wageningen map, consistency of symbol shapes was appreciated, while someone else suggested differentiation in shapes. Moreover, the purple color of the Delft map was found intuitive by some, and counterintuitive by others. This aligns with the concerns of Lobben et al. [2015], who says there can be no rigid design guidelines that result in a design that satisfies everybody, also when user perspectives are considered.

In the evaluation of the campus maps, there were some slight differences between men and women, especially found in the qualitative comments and follow-up interviews. The differences were mostly in the motivation behind their opinions, and nuanced, further emphasizing the importance of gathering qualitative insights to expose opinions that otherwise might not be heard or understood [Ramon and Monk, 2007].

Examples of these differences are the appreciation for 3D versus 2D, the scale and the use of realistic colors or a color palette. This indicates that, even though there are guidelines such as the ones introduced by Tyner [2010], Krygier and Wood [2011] and Bell [2023] that should improve maps' usability, there might be gendered differences into what usable means to the user, such as a needed level of detail to accommodate to certain campus-specific information, and therefore being dissatisfied with the scale.

Women were the only ones that mentioned wheelchair which could indicate that they appreciate this display of marginalized features, as it might indicate mindfulness about inclusivity on campus [Self and Hudson, 2015], however, this was not reflected in features such as the rainbow crossing on the Rotterdam campus map, as no one at all commented on it. Additionally a woman mentioned the indication of different types of greenery for safety purposes, which aligns with the idea that women might experience spaces differently in terms of safety, and that a map could accommodate to this [Falahatkar, 2024; Cui et al., 2023].

5.9 Connecting the Mapping Process to the Map Evaluation

The discussions with map makers from Delft, Amsterdam, and Rotterdam revealed varied intentions behind map designs, of which the implications, in the case of Amsterdam and Rotterdam, could be seen in the map evaluation. For instance, the promotional intent behind the Rotterdam map was recognized by some, appreciating the aesthetic appeal and considering it a *"business card"*. Moreover, the simple and abstract layout of the Amsterdam map was rated negatively by most respondents.

One assumption at the start of this research was that students would be the primary users and target group for campus maps. However, this assumption was disproven by both the map-makers and the students themselves. The map-makers explained that their motives often did not prioritize how students navigate the campus, and students, in turn, reported that they largely relied on Google Maps or their own familiarity with the campus for navigation, rather than campus maps.

The map-making processes at Delft and Rotterdam showed a clear intention to use the maps as promotional tools—Delft's map was designed to attract investors by promoting the campus as a hub of innovation, and Rotterdam's map was intended to promote Erasmus Magazine to new students. The idea that the audience of the maps lies outside of people familiar with the campus might have implications for design decisions. As noted by several students, a 3D visualization might be more useful for people who have never visited the campus, helping them familiarize themselves with the layout in ways that 2D maps cannot.

While the map-makers mentioned having students "in the back of their minds," they were not the main focus during the design process. If campus maps were meant to be more student-oriented, it would be beneficial to actively consult students on what they want to see represented on the maps. Currently, many maps are perceived as lacking campus-specific information that would make them more relevant to students' everyday experiences, and provide additional value on top of Google Maps.

Additionally, even if the primary audience remains external, engaging students in the design process could still provide valuable, local and unique insights into how the campus is used and what features should be highlighted [Budhathoki et al., 2008]. Moreover, as students are a large component of the campus community and environment, they should be considered as a group that has influence on how their university campus is promoted towards the outside world.

Incorporating student input in a participatory, engaging way [Till, 2005; van Houtum, 2024] could also foster student interest in the maps themselves. Currently, these campus maps are produced isolated from most of the student community. However, if maps were approached as community artefacts that reflect the needs and interests of campus users, they could serve as tools for sparking discussions about the campus environment [Marchi and Diantini, 2022].

Since these maps are not constrained by strict navigational requirements — given that Google Maps largely fulfills this role — there seems to be more creative freedom in how campus maps can represent the space. This opens up possibilities for experimenting with alternative forms of mapping [van Houtum, 2024], which may better capture the diversity of campus life and the interests of students.

5.10 Limitations

This research, while comprehensive in its approach, is subject to several limitations that impact the generalizability and depth of the findings. One primary limitation is the scope of sources of evidence utilized. According to Yin [1994b], there are six major types of evidence that can be drawn upon in a case study. However, only two types — interviews and physical artefacts — were used. This limited the ability to triangulate findings across multiple forms of evidence, potentially affecting the robustness of the results.

Moreover, the follow-up interviews with students, while valuable for qualitative insights, were conducted as a replacement for the originally planned user participation session. This change in method may have altered the depth and range of participant engagement, thus limiting the comprehensiveness of the user feedback.

5.10.1 Interviews With Map Makers

One key limitation of the map maker interviews is that only three of the five map makers were available for participation. This limited the scope of insights, as not all perspectives on all the map-making processes could be captured. Additionally, the map maker interviewed from Delft was responsible for the interactive version of the campus map, while the static version of the map was the one evaluated by students. The static map was chosen for evaluation because it was more easily comparable to the other maps. Therefore, direct connection between the making process and the map evaluation cannot be fully established.

Moreover, the interviews were not confirmed or validated by the interviewees afterward, meaning there is a possibility that some interpretations or details may not fully align with their intentions. These factors combined suggest that the findings from these interviews provide a partial picture of the map-making processes at the

three universities. The specific focus of each map and the institutional goals behind their creation limit the applicability of these insights to other contexts or campus maps.

Lastly, the context in which the interviews were conducted varied: the interview with the TU Delft map maker was more exploratory and took place earlier in the thesis process, while the interviews with the map makers of the Amsterdam and Rotterdam campus maps occurred later, after more of the theoretical foundation had been established.

5.10.2 Survey Sample

The total number of respondents (41) limits the generalizability of the findings. A larger sample would have provided more robust and representative results. The majority of respondents (29 out of 41) are master's students and primarily live in Delft. This may skew the findings towards perspectives that are highly specific to this group, possibly underrepresenting other demographic groups such as bachelor students, employees and people who live further away from campus. These people might visit the campus more or less frequently, and partake in different activities, possibly influencing their needs in a campus map. While the gender distribution is fairly balanced between men and women, the small number of non-binary respondents (only one) limits the possibility to draw meaningful conclusions for this demographic. Finally, the method of survey distribution (online, through posters, and personal contacts) might lead to a non-response bias [Denscombe, 2017], meaning that more engaged or interested individuals could have been more likely to participate, potentially influencing the results towards certain opinions.

5.10.3 Follow-Up Interviews Sample

The interview sample includes only 11 participants, which, while useful for gathering qualitative insights, limits the representativeness and generalizability of the findings across the broader campus population. There is an unequal representation of genders; 7 men and 4 women, which might overrepresent men's perspectives. Since one of the objectives of this thesis is to investigate in marginalized perspectives, this is an important notion. Moreover, no individuals of a non-binary gender identity participated in the follow-up interviews. The sample predominantly consists of Dutch and Greek participants. This representation may limit insights into how campus maps are perceived by individuals from other cultural backgrounds. All interviewees are master's students, which introduces a potential bias in the data. Most participants live either on-campus or close to campus, which might skew the results towards those familiar with the campus, and visiting more frequently. This may underrepresent the perspectives of those who visit less frequently or live farther away. The sample allows for qualitative insights into the opinions of a diverse group of campus users.

6 Conclusion

The final chapter answers the main research question and the sub-questions, and provides recommendations for the mapping-process, as well as recommendations for further research.

6.1 Answers to Research Questions

Main Research Question

To what extent is gender-blindness present in the mapping process of campus maps in the Netherlands?

The results of this research indicate that there are indeed some levels of gender-blindness in the campus maps examined. The map-making processes across the campuses are highly divergent, but none of them structurally involved students in their design, nor did they actively acknowledge gender-related issues.

According to the literature, gender-blindness often stems from the assumption of a "default" male user. However, in the case of the investigated campus mapping processes, there is not a case of assuming a "default" user, but more so, a specific user, that is not a part of the campus community, such as investors and visitors. Therefore, accommodating to the map needs of members of the campus community, such as marginalized student groups, is not a priority in the mapping process.

Moreover, the current campus community, such as students, is not dependent on these campus maps, as they tend to rely on Google Maps for navigation. Therefore, there might currently be limited direct impact of the campus maps, and the way they are catering to or neglecting certain user needs, on the experiences and behaviour of the campus community. However, there seemed to be slight differences in the ways different gendered participants appreciated the maps, indicating there might be differences in what diverse groups need in campus maps, if they were more inclined to use them. Thus, if campus maps eventually would aim to cater to students and other members of the campus community, actively involving them to gather insight into their needs would be a necessary step towards creating a map that addresses the diverse needs of different groups.

In terms of transparency regarding the positionality of the map and the mapping process, the maps from Delft and Rotterdam seem to acknowledge their subjective nature and the power of their maps. However, this acknowledgment is not explicitly communicated towards the map-users.

Finally, no map maker explicitly mentioned considering gendered experiences in their design process, which is a strong indicator of gender-blindness. The absence of attention to how gender influences map use and map needs, such as safety concerns or accessibility, underscores the lack of inclusivity in these processes.

Thus, while campus maps are not currently central to students' navigation of campus, gender-blindness is evident in the design processes across the universities studied. The exclusion of marginalized groups and the lack of attention to gendered experiences reflect a failure to acknowledge the need for inclusive, representative maps. While the immediate implications for students are uncertain, the broader impact of these gender-blind practices — particularly in how the university is represented to external audiences — suggests that addressing gender-blindness in campus maps remains an important goal. By actively engaging campus users and incorporating their diverse needs, universities could transform campus maps into tools that promote inclusivity and better represent the diversity of the campus community.

Sub-Questions

1. **What does the discipline of mapping currently look like in theory?**
   The rise of Geographic Information Systems (GIS) and digital platforms has significantly changed the mapping process, making it more digital and accessible to a wider audience [Budhathoki et al., 2008; Dittus and Graham, 2022; Ramondetti, 2023]. In the past, mapping was controlled by a small group of individuals with specialized skills and access to tools, but today, mapping tools are widely available to the public Dittus and Graham [2022]. The digitization of maps began in the 20th century, moving cartography away from a creative and subjective process to a more structured, organized, and data-driven approach van Houtum [2024]. This shift has allowed maps to be produced faster and with greater precision, yet there is a concern that the digitization process also encourages the view that maps are unbiased, objective representations of the world [van Houtum, 2024; McLafferty, 2002; Dittus and Graham, 2022].
   With the advent of digital tools, mapping has potentially become more democratized [Budhathoki et al., 2008]. User participation is now often a critical element in map production. For example, digital mapping platforms like Google Maps rely on user-generated content, such as location reviews, to enrich the map with local knowledge Dittus and Graham [2022]. Moreover, initiatives like Geo-Information Infrastructures (GII) promote the sharing and exchange of spatial data Van Loenen and Zevenbergen [2010]. Users have transitioned from being passive consumers of spatial data to active participants who contribute data Budhathoki et al. [2008]. This shift suggests that handling spatial data, and therefore mapping could become a more participatory practice.
   The development of digital mapping tools such as GIS has enabled the processing of vast amounts of geographic data, and it allows for the integration of both qualitative and quantitative data, enabling richer and more nuanced maps Kwan [2002a]. The incorporation of qualitative information like photos, videos, and audio clips into digital maps shows a move towards maps that reflect not just physical space but also human experiences McLafferty [2002].
   The way maps are made and received has undergone a significant change in recent decades. With the rise of digital tools and broader access to spatial data, mapping has potentially become more participatory and inclusive. However, the shift towards digitization also raises concerns about the objectivity of maps and the potential for bias. While more people now have access to the tools to create maps or contribute spatial data, this does not necessarily result in a more equal distribution of participation. This potentially still results in the creation of representations that reproduce conventional ways of viewing the world.

2. **What does gender-blindness mean in the context of mapping and cartography?**
   In the context of mapping and cartography, gender-blindness refers several issues. First, it involves the assumption of a ”default” or ”universal” map user, where all individuals are expected to have the same needs and preferences when using a map. There is a risk of this default user being implicitly male, which neglects the diversity of user experiences, of anyone that falls outside of the definition of the ”default” [Lobben et al., 2015; Henriques et al., 2023; MacAya et al., 2021]. This assumption ignores that different groups may have varying needs or priorities when interacting with maps
   Second, beyond the default user, maps also need to account for gender-specific spatial experiences. Individuals of different genders often experience space differently due to factors like safety concerns, accessibility, or societal roles and responsibilities [Falahatkar, 2024; MacAya et al., 2021; Libertun de Duren et al., 2023]. Gender-blind mapping fails to recognize that these spatial needs can shape how individuals navigate and experience their environments, and maps that do not reflect these differences risk excluding marginalized perspectives from spatial discourse.
   Moreover, gender-blindness is tied to the positionality of the map-making process. Maps are often presented as objective and unbiased representations of space, but they reflect the priorities and biases of their creators, including gendered perspectives [Monk and Hanson, 1982; Harley, 1989; Mahmoudi and Shelton, 2022]. The failure to acknowledge these influences results in maps that may unintentionally perpetuate inequalities or fail to meet the needs of all users. This unacknowledged positionality is a key aspect of gender-blindness in mapping [MacAya et al., 2021; Henriques et al., 2023; Carton, 2007].
   In summary, gender-blindness in mapping arises both from the assumption that all users share the same needs (the idea of a default user) and from neglecting the gendered experiences that influence how different groups interact with space. Addressing this requires recognizing both the diversity of users and the positionality of the map-maker.

3. **What can be harmful implications of a gender-blind approach in mapping and cartography**?
As maps have become an integral part of our daily lives, particularly through mobile phone use [Dittus and Graham, 2022], they increasingly shape how we interact with the world around us. For example, Dittus and Graham [2022] points out that applications like Google Maps influence decisions on which places to visit based on reviews or how information is presented. In this way, maps have the power to shape spatial behaviors without users necessarily realizing the biases embedded within them. van Houtum [2024] warns that users often aren't aware of the prejudices that maps may project and remain unaware of their ability to challenge the narrative these maps create, partially due to the seemingly objective and neutral presentation of modern day maps [Dittus and Graham, 2022; Bian and Qiao, 2024].
The discipline of cartography has been critiqued for reproducing masculinist representations, and a lack of acknowledgement for gendered perspectives [Harley, 1989; Monk and Hanson, 1982]. This can lead to a lack of consideration for the way women currently use space, and their needs in terms of transport, safety or access to toilets [Falahatkar, 2024; Boys, 1996; MacAya et al., 2021; Libertun de Duren et al., 2023]. Which then might influence the way they navigate certain spaces, and how accessible these spaces become to them. In relation to university campuses, Coulter and Rankin [2020] stress that actively making an effort to create an inclusive campus, and address sexual assault and safety concerns for sexual and gender minorities, correlates with a lower likelihood of sexual assault, indicating that failing to address safety issues might perpetuate these issues.
A narrow approach like this might silence the voices of those who are already often silenced [Fileborn, 2023], and exclude these perspectives from certain conventional views of the world [Mahmoudi and Shelton, 2022]. Moreover, failing to properly visualize spaces that matter to the marginalized map user might lead them to not recognize these spaces as such on a map, such as safe zones [van Houtum, 2024; Lobben et al., 2015].
In summary, a gender-blind approach in mapping might reinforce existing spatial inequalities by failing to account for gendered experiences and needs in maps, and unknowingly reproducing biased representations of space. This oversight not only excludes marginalized perspectives from conventional representations of space, but can actively contribute to the creation of unsafe or inaccessible environments for marginalized groups.

4. **What does the current mapping process of different campuses in the Netherlands look like?**
The mapping processes across campuses in the Netherlands are diverse, shaped by a variety of goals, technical limitations, and financial constraints. These processes are not grounded in traditional cartographic principles, since the responsible person was in none of the cases a person with a professional background in cartography.
At Delft University of Technology, the mapping process is driven by the goal of promoting business and innovation, primarily targeting investors and entrepreneurs. While there is no explicit focus on student perspectives or inclusivity, including gender, there is a possibility that students may be involved in future updates. The process relies on external mapping companies and software, which imposes certain constraints on visualization choices. Map updates are managed by the university in collaboration with campus stakeholders.
At Vrije Universiteit Amsterdam, the campus map is primarily focused on practical navigation, such as signaling temporary routes. The map is designed to accommodate frequent construction changes on campus and safety requirements, using Adobe Illustrator for flexibility and easy updates. Although there was input from the inclusivity committee to add wheelchair accessibility symbols, there is no structural student involvement or broader focus on inclusivity. Plans for the future include developing a 360-degree map.
At Erasmus University Rotterdam, the map-making process involves collaboration with illustrators to create visually appealing maps, particularly aimed at promoting the university magazine to new students. Students are present during some iteration sessions, though there is no structural involvement throughout the process. The decision-making is largely intuitive, with the responsible person communicating design choices to the illustration company. There is no explicit focus on inclusivity, although current elements like the rainbow crossing and protesters have been incorporated into the map., with the intention to keep the map engaging
Given the unconventional and ad hoc nature of these processes, they differ significantly from traditional cartographic practices that are mainly being critiqued in the literature. Importantly, students are not always the primary audience for these maps, as external audiences such as investors or new students are often the main focus. There is no explicit focus on gender-related issues, student involvement tends to be incidental rather than systematic, which suggests a lack of attention for the diverse spatial needs of members of the campus community, such as students.
Furthermore, each university faces specific technical limitations in their mapping approach: Delft's reliance

on OpenStreetMap-based software restricts the customization of visual elements; Amsterdam's maps need to be easily updated due to frequent changes, hence the use of Adobe Illustrator; and in Rotterdam, the need to update maps annually without completely redrawing them limits the extent of changes, often reducing updates to minor details and color adjustments.

Each university's mapping approach reflects its unique needs and goals, but all face certain limitations. Reliance on external software, illustrators, or the need to remain adaptable to frequent campus changes has constrained the possibilities for visualization. The map designs are largely shaped by the map makers' personal ideas — who lack formal cartographic expertise —, or institutional goals, and are further influenced by practical factors such as software capabilities or ongoing campus construction. There is little consistency in the mapping approaches across universities, and no structured involvement of users in the design process, nor any explicit focus on gender-based issues.

5. **To what extent do the campus maps of different campuses in the Netherlands satisfy user's needs?**

   Although students are not always the primary target audience for campus maps, they may still represent a significant user group, and there are opportunities to make campus maps more useful to them. However, the findings suggest that students currently use campus maps infrequently, relying more on Google Maps for day-to-day navigation. This indicates that campus maps may not provide enough additional value compared to widely used navigation tools unless they offer information that Google Maps cannot, such as classroom numbers, faculty-specific details, or information on green spaces.

   The level of satisfaction with campus maps varies significantly between universities. Criticisms often revolve around the lack of detailed campus-specific information, scale issues, and visual elements such as color use and legibility. These findings suggest that there are both issues with the content of the campus maps and the way it is visualized and presented.

   Another interesting insight is that students tend to associate the quality of the campus map with the university's overall communication efforts. Several respondents noted that "well-designed" maps could improve the university's image, suggesting that even though the maps are not primarily being used for navigation by students, a visually appealing, functional map can become a reflection of the institution's professionalism and attention to detail, and a way to communicate the universities priorities and values. However, what well-designed or visually appealing means, cannot be pinned down exactly. Since even the most preferred map was critiqued on some aspects. Moreover, aspects that were liked by some, were disliked by others, and vise versa.

   Among the maps evaluated, the Wageningen map appears to satisfy user needs the most, regardless of gender. Its clearly categorized legend, realistic 3D display, and comprehensive coverage of campus elements—including faculty buildings, greenery, and other features—received positive feedback. This suggests that a structured, detailed map that offers a complete overview of the campus is valued by students. However, even in this map, the elements that were appreciated by *most*, were not appreciated by *everybody*, meaning that even when a map scores highly on most aspects of a map element, this does not mean it doesn't overlook more specific needs or preferences.

   While students infrequently rely on campus maps, they are also currently not completely meeting students' needs in terms of providing specific, detailed information and the quality of their visual design. Enhancing campus maps to include more campus-specific data, alongside efforts to make them more visually engaging, could increase their relevance to the campus community, and overall user satisfaction.

6. **To what extent is there a correlation between levels of gender-blindness in the making of the campus map and the satisfaction of different user needs?**

   The mapping processes examined did not demonstrate any explicit focus on gender inclusivity or systematic incorporation of input from marginalized groups, indicating a generally gender-blind approach to campus map-making.

   However, in some cases, the mapping processes — whether intentional or incidental — aligned to some extent with feminist critiques aimed at addressing gender-blindness. For example the Amsterdam map that included the input of the diversity committee, showing a receptive attitude towards external input, and the alternative mapping approach of Rotterdam, collaborating with an artist, adding personal elements to the map that challenge the idea of an objective neutral map,and should help new students familiarize with the campus.

   These instances showed some correlation with user satisfaction, though the response was not always positive. For example, the inclusion of wheelchair accessibility logos on the Amsterdam campus map was appreciated by respondents, demonstrating that representing marginalized groups' needs can evoke a positive response.

   On the other hand, the small illustrations of people on the Rotterdam map were mostly seen as distracting

by respondents. Despite the intention to cater to student preferences, this design element did not resonate well with users and detracted from the map's functionality.

The 3D design of the Rotterdam map was created with new students in mind, to help them recognize campus buildings and avoid getting lost. While some respondents appreciated the enhanced recognizability of the buildings, others criticized the style, indicating mixed responses to the design choices.

Additionally, the Rotterdam campus map, which diverged most from masculinist, supposedly objective cartographic conventions, yielded different comments from men and women, where women were more appreciative of the playful, drawn style. However, despite this initial appreciation, women did not rank the Rotterdam map significantly higher than men in their overall ratings, indicating that the map still did not fully meet their needs.

In summary, while there were positive responses to certain inclusivity efforts, like accessibility features, approaches that aligned with feminist critiques—such as acknowledging the positionality of maps and using unconventional mapping styles—did not necessarily yield positive responses but rather more polarized opinions. This suggests that when inclusivity efforts are incidental or intuitive rather than intentional and gender-aware, they might be less likely to align with user preferences.

Overall, because only two maps were evaluated in terms of process and student satisfaction, no clear correlation could be established between levels of gender-blindness in the mapping processes and overall user satisfaction.

7. **To what extent is there a correlation between the level of satisfaction of these users, and factors such as gender?**

   While the quantitative survey results showed only slight differences between men's and women's overall ratings, the qualitative comments and follow-up interviews revealed more nuanced gender-based preferences.

   Women tended to be more critical of map scale and text visualization, often calling for better clarity and consistency. In contrast, men focused more on eliminating unnecessary text that made the maps feel cluttered.

   When it came to map style, men were generally less appreciative of the playful design of the Rotterdam map, while women were more appreciative of it as long as it did not compromise clarity. Women also provided more detailed feedback on color use and were more likely to critique symbol visualization, emphasizing the importance of clear and distinguishable symbols.

   A notable gender difference emerged regarding specific features: women praised the inclusion of wheelchair accessibility, a feature that went unmentioned by men. Similarly, a safety concern related to the visualization of green areas was raised by a woman, suggesting that there might be issues that are more likely to be noticed by either men or women.

   While the overall map ratings and rankings did not differ significantly by gender, the qualitative feedback highlights subtle, context-based differences in how men and women engage with maps.

6.2 Recommendations

6.2.1 Recommendations for the Mapping Process

Campus maps could become valuable tools within campus environments to address spatial issues and cater to the needs of marginalized users. However, to make campus maps more relevant to the campus community, they should provide additional campus-specific information beyond what Google Maps offers, such as classroom locations or the function of green spaces.

This information would make campus maps more useful, particularly for new students or those with specific needs. To determine what kind of information should be included, the campus community should be actively involved in the mapping process, such as through co-creation sessions. An initial goal of this research was to organize a co-creation session to experiment with ways of incorporating users' perspectives, with the aim of highlighting or exposing issues that are not yet represented on the campus map. This method could still be useful in future mapping processes — not only to better meet students' needs but also to foster a participatory environment that encourages conversation and discussion about campus-related issues. The fact that the interest of participants seemed to be sparked after their engagement with multiple campus maps, and their opinions changed during the survey and interviews, suggests that there might be room to increase the students' interest in the campus map.

It is important to recognize that there is no one-size-fits-all approach to campus mapping. No map can satisfy all users — whether women, men, or non-binary individuals — because within each group, there are diverse experiences and opinions. This was reflected for example in the polarized opinions about color use, and the variety of suggestions done for improving the Delft campus map. Finding improvements or changes that satisfy everybody is likely to be a big challenge. Additionally, the needs, priorities, and possibilities for the campus maps differ from campus to campus. As a result, a campus-specific, context-sensitive approach is essential, one that accurately represents the unique identity of each university.

Universities should make use of the knowledge and expertise within their own institutions. For example, Delft University of Technology could benefit from its internal cartographic, design, and technical expertise to co-create a map. In similar ways, each university can benefit from its unique internal knowledge, expertise and values and make these visible in a map.

Doing this, universities can experiment with either digital or manual mapping methods, considering the context-specific requirements of each campus. This research demonstrated that both methods have their benefits and limitations. Therefore, mapping approaches should be chosen with regard to user preferences, the intended purpose of the map, and the physical characteristics and priorities of the campus. However, many student evaluations suggest that interactive maps could provide the detailed information they need, such as classroom locations.

Mapmakers should aim to create visually engaging maps that draw users in and encourage interaction. As the study revealed, users became more enthusiastic after being exposed to creative and engaging map designs, such as 3D visualizations.

Finally, the person responsible for the mapping process should be carefully considered. It is essential that mapmakers understand the power of maps and their potential impact, therefore maps should be approached with care. Universities should critically consider who they place in charge of their campus maps, ensuring those individuals are aware of the broader implications of their work.

6.2.2 Recommendations for Further Research

A lot of focus in the reviewed literature for this thesis was aimed at redefining the map-user. However, this thesis highlights the importance of examining the role and responsibilities of map-makers, which future research should explore further.

Furthermore, future research could focus on how non-binary individuals and other marginalized groups (such as people with disabilities or diverse cultural backgrounds) engage with and perceive campus maps. This study primarily focused on binary gender distinctions and lacked sufficient data from non-binary, or other identifying, participants. Moreover, future studies should aim to include larger and more diverse participant groups. The current research was limited to 41 respondents, primarily master's students. Expanding the sample to include bachelor students, employees, alumni, and people who live further from campus could offer a more comprehensive understanding of user needs.

Additionally, investigating the perspectives of new students and visitors, whom some of the maps are aimed to target, could provide deeper insights into how campus maps are used and perceived. Further research could also focus on quantitatively evaluating specific map elements that evoked more polarizing opinions — such as color palettes, 2D versus 3D representations, and symbol use — to determine how these features specifically affect user satisfaction. This approach could provide more generalizable insights into user preferences across different demographic groups.

Additionally, more specific investigation into the extent to which adding the wheelchair accessibility symbols resulted in increased satisfaction among wheelchair users, and in what different ways they would like to see this kind of information, could provide insight into whether this way of including external input in the map might be effective.

A more participatory approach, such as using focus groups, could provide valuable insights into how campus maps can be improved. Originally intended for this study, focus groups could allow users to fully express what they want to see in campus maps, potentially reshaping the maps to meet a wider range of needs. Following principles of counter-mapping, such as those proposed by feminist scholars, could foster discussions on campus safety and accessibility.

Moreover, since this study focused on Dutch universities, it would be interesting to compare these findings with other international cases. Investigating how universities worldwide approach campus mapping could reveal whether these trends and challenges are common or unique to specific regions, offering broader insights into global practices in campus mapping.

Further research could also explore alternative mapping techniques that might better incorporate diverse user perspectives. Experimenting with new methods of visualization, such as interactive maps, could reveal more suitable ways to represent diverse campus environments.

Appendices

A Self-Reflection

In this section, I reflect on the research process of my thesis, explaining the decisions I made and what I would have done differently in hindsight.

Given the topic's emphasis on positionality and the perspective from which something, also research, is produced, I want to reflect on the way my decisions were influenced by my personal stance towards the subject. For example, I initially hesitated to approach the topic of gender directly, and I was also reluctant to be direct in engaging people in discussions about it. Along the way, I discovered papers that tackled this topic with both caution and directness, clearly addressing potential gendered issues. For a long time, I thought a "careful" approach meant keeping everything open, such as the chance that there would be no gender-related issues at all in this context, but this lead me to find it hard to also address *potential* issues. For example; I was hesitant to address subjects that were often named in literature such as safety or sexual assault, in the interviews, in fear of steering the participant. However, I also realize that this could have provided valuable insight more directly, when approach with care. I do realize that it was exploratory so the approach of leaving everything open also had a lot of value, since I discovered much more broad issues.

I spent a lot of time caught up in literature research, searching for a methodology and theory that perfectly matched my research. Given the exploratory nature of my research, I realize now that this "perfect fit" didn't really exist. This hesitation to move forward meant I delayed the practical part of my research because I felt like I hadn't fully figured out the theory. In retrospect, even during the exploratory phase of the research, the interviews I conducted were very valuable. I've learned that even when the theory isn't fully settled — which it hardly ever can be — taking practical steps can be the best way to move forward, even when you are not completely sure. Of course, there should be sufficient theoretical foundation, but my perception of what this means has shifted during this research. I stayed stuck in a limbo, waiting for the perfect theoretical solution, which led to time constraints later and forced me to make rushed decisions. Though these decisions turned out to be useful, in the future, I would try to take action sooner while continuing to build the theoretical foundation along the way. Another key learning was how to combine literature from multiple disciplines and perspectives. Instead of searching for one paper that said exactly what I wanted, I took valuable insights from different sources. This is an important aspect of critical academic thinking, but it was something I hadn't applied in this way before.

A large part of the research was spent exploring what gender-blindness even meant in this context, while I was also trying to plan practical steps like focus groups. I think structuring the order of these exploration phases more clearly would have helped. For example, all map-maker interviews could have been part of the exploratory phase, alongside literature research, allowing both to steer the direction of the research more effectively. Instead, I rushed into defining later stages without fully setting the stage, which led to tunnel vision on the user participation session. I eventually realized that there also were interesting notions to explore in the map-making process itself.

Time constraints played a significant role. If I had taken earlier steps a bit quicker, I might have been able to organize the focus group (plan A), which would have provided valuable insights. However, I'm happy I had a plan B (follow-up interviews), which also offered useful insights. One regret is that I hesitated to develop a Plan B because I was convinced I could still execute Plan A. Now, I realize the importance of having a backup plan from the start, even when you're set on your original approach.

I also made assumptions about the map users, thinking they would primarily be students, which turned out not to be the case. If I had done more exploratory research early on, I might have realized this sooner and could have adjusted my focus to investigate who the actual users were or looked at other types of maps where the assumed and actual users align better. However, I do think that investigating the relation of students to the campus environment and the campus maps was an effective way to expose this fact, and begin exploring in what was a campus map could start to provide value to students within the campus environment.

On a more personal note, during my research I was hesitant to ask questions about things I thought I should already know. Looking back, I realize that any question is a good question, and I should have taken the opportunity to ask more people for advice. There are many knowledgeable people within the faculty who could have offered valuable insights, on such a topic that can be approached from so many angles.

Moreover, I have a tendency to stay in a state of "I don't know enough about this to say anything useful about it", however, this research has made me realize that there are many different ways to contribute to discourse without having to "know" everything. If anything, this research has taught me that there is no absolute truth that you can gather, and that all knowledge is partial.

Lastly, I was initially reluctant to focus specifically on gender due to the complexity of the topic and concerns

about my own bias. However, I've come to understand that many feminist scholars approach their work with personal passion, while being transparent about their own positions.

Therefore, I want to do the same; I am a woman, I consider myself a feminist, and this research has opened my eyes to new areas where feminist perspectives are active and new ways in which they are advocating for change.

To provide transparency and acknowledge my own bias, I have included my survey responses compared to the average responses of men, women, and the non-binary participant. This demonstrates that I was opinionated about these maps, which meant that I had some expectations or biases that might have had implicit impact during the interviews.

My personal ranking of the maps was:

1. Wageningen University & Research
2. Erasmus University Rotterdam
3. Eindhoven University of Technology
4. Delft University of Technology
5. Vrije Universiteit Amsterdam

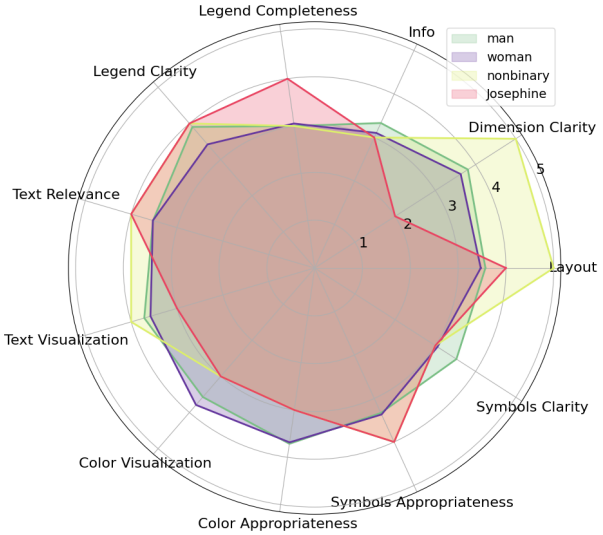


Figure A.1: My ratings of the Delft map in comparison to the averages of the respondents based on gender

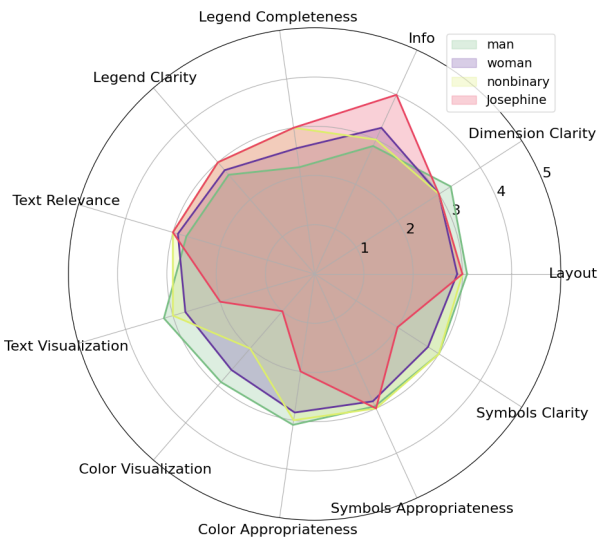


Figure A.2: My ratings of the Amsterdam map in comparison to the averages of the respondents based on gender

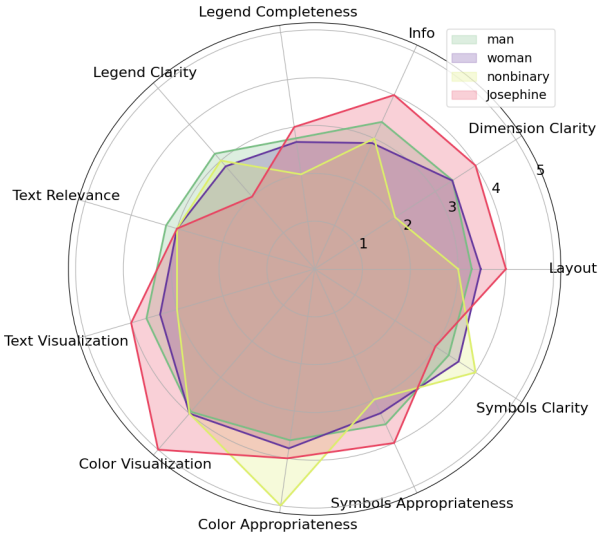


Figure A.3: My ratings of the Rotterdam map in comparison to the averages of the respondents based on gender

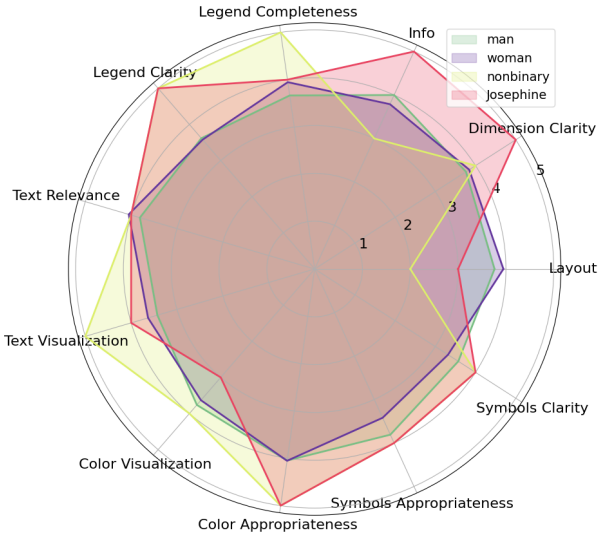


Figure A.4: My ratings of the Wageningen map in comparison to the averages of the respondents based on gender

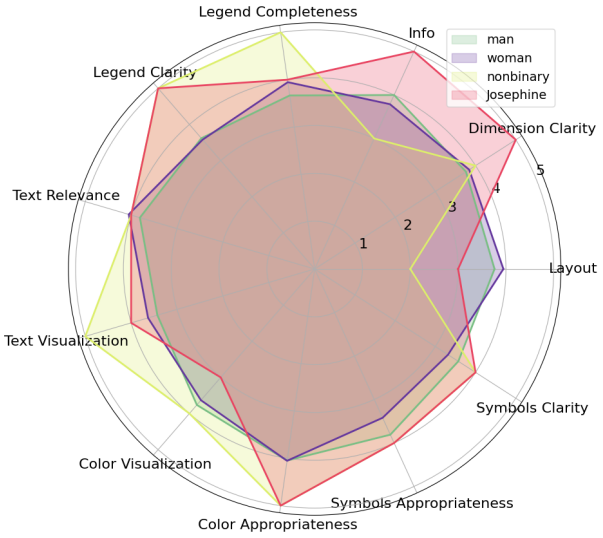


Figure A.5: My ratings of the Eindhoven map in comparison to the averages of the respondents based on gender

B Full Sized Campus Maps

Campus Map
Campusplattegrond

LEGEND / LEGENDA

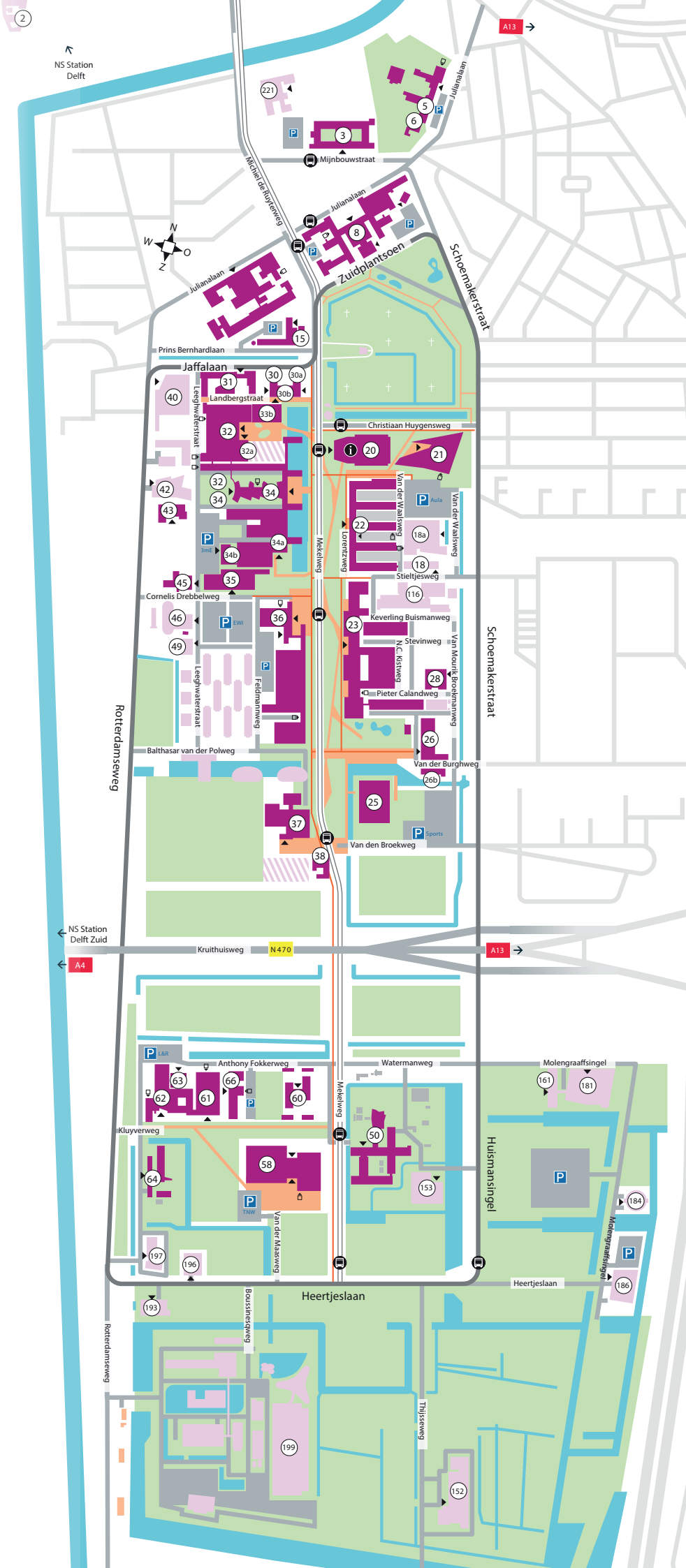
- TU buildings — TU gebouwen
- Other buildings — Overige gebouwen
- 20 — Building number — Gebouwnummer
- (Main) entrance building — (Hoofd)ingang gebouw
- Delivery entrance — Goedereningang
- TU roundway — TU ring
- Road — Autoweg
- Bus track — Busbaan
- Cycle path — Fietspad
- Pedestrian area — Voetgangersgebied
- Bus stop — Bushalte
- Parking — Parkeerplaats
- Park / sport field / grass surface — Park / sportveld / gras
- Water
- Area under construction — Gebied in ontwikkeling
- Information Desk TU Delft — Tel: +31 (0)15 27 88022

See page 2 for building list and addresses
Zie pagina 2 voor gebouwenlijst en adressen

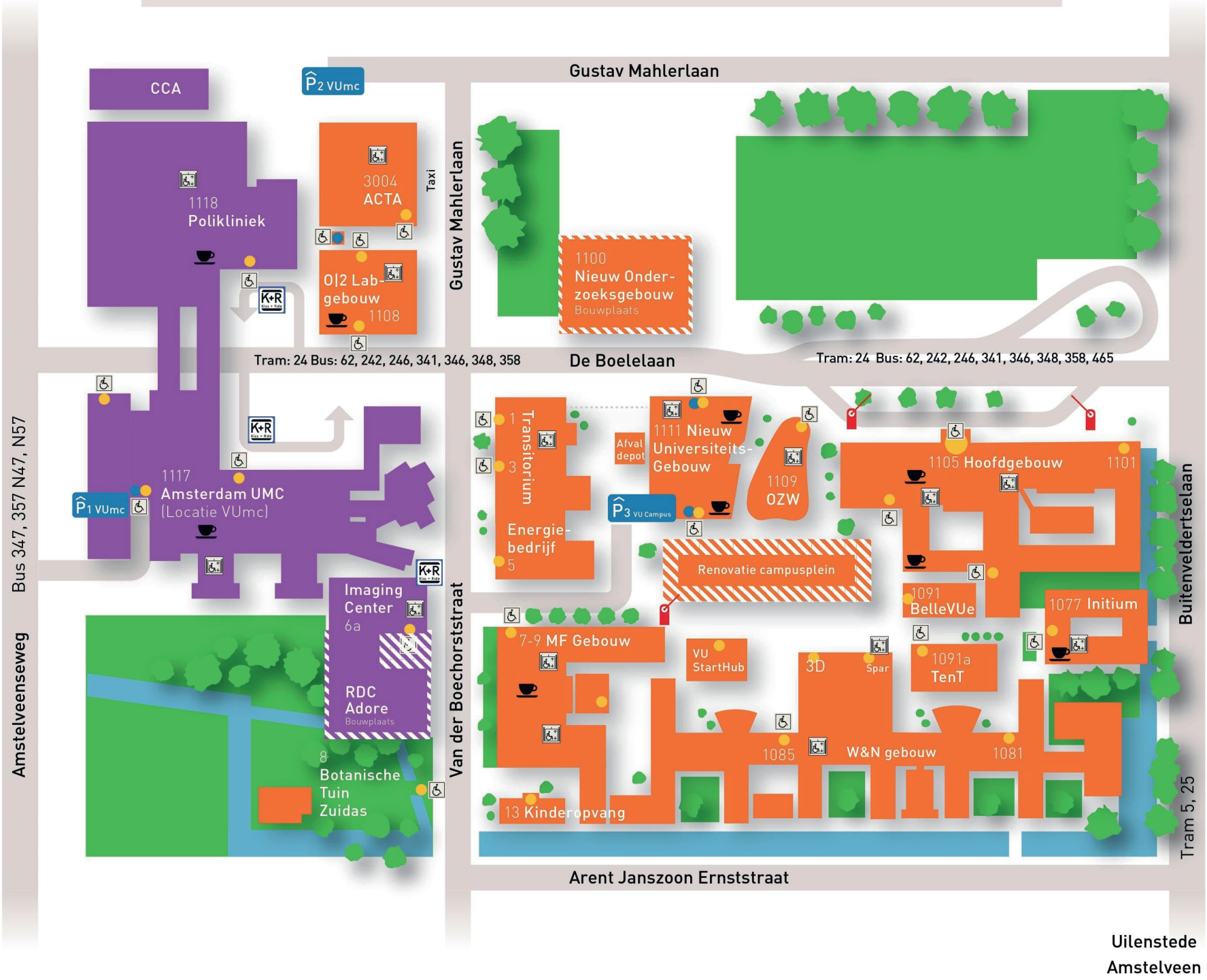
Februari 2018

3 min

TU Delft



PLATTEGROND VU CAMPUS EN AMSTERDAM UMC



Legenda

- Ingang/uitgang
- Parkeergarage ingang/uitgang
- Rolstoel toegankelijke ingang
- Rolstoel toegankelijke lift *
- Horeca

* Voor bepaalde liften is een toegangspas nodig. Die is te verkrijgen bij de gastdame/heer in de Centrale Hal van de gebouwen.

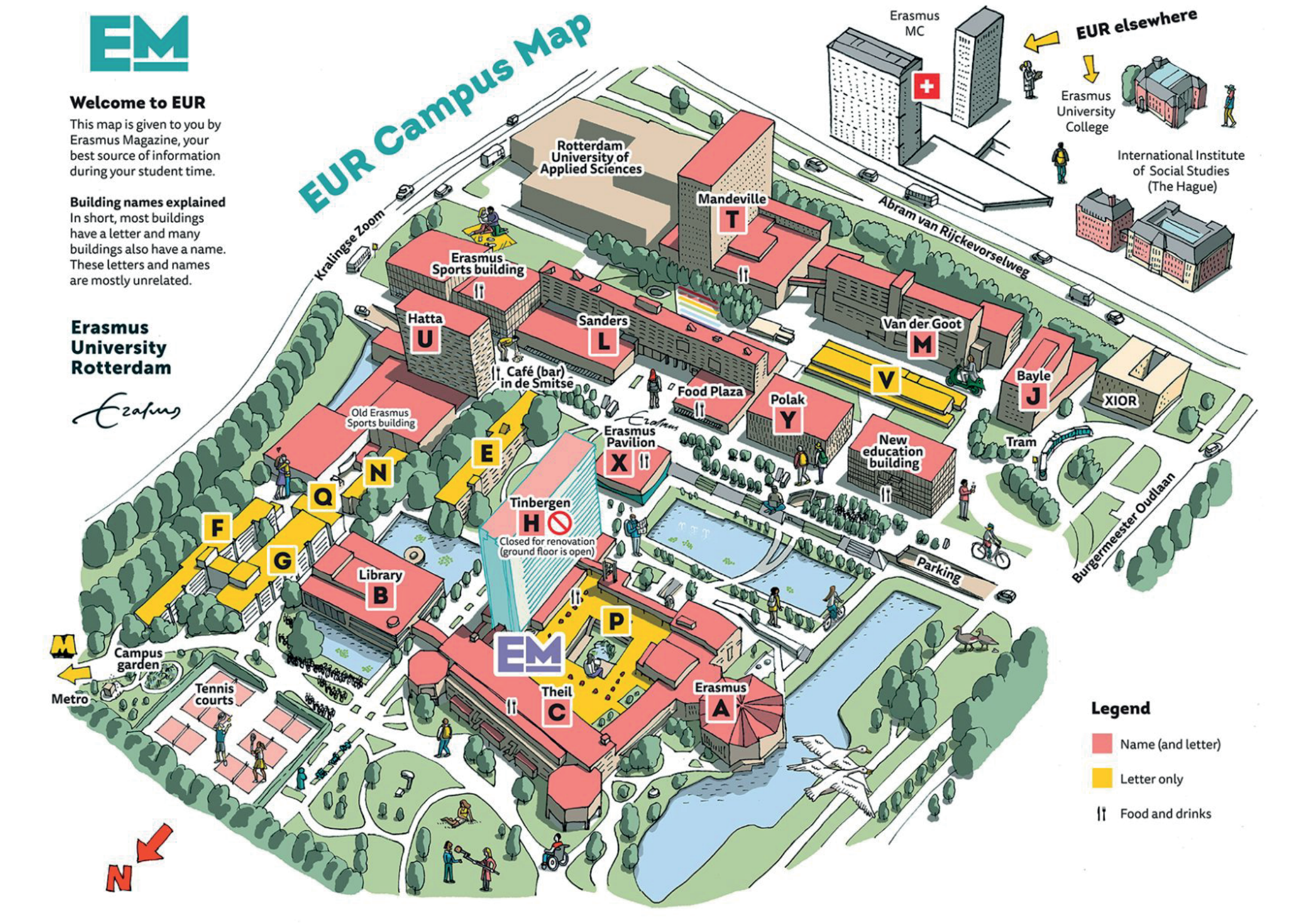
In ieder gebouw is een gastdame/heer aanwezig. Je kunt bij hen terecht met al je vragen. Mensen met een beperking die een probleem ondervinden en niet in de buurt van een Centrale Hal zijn, kunnen bellen naar: 020 59 85854.

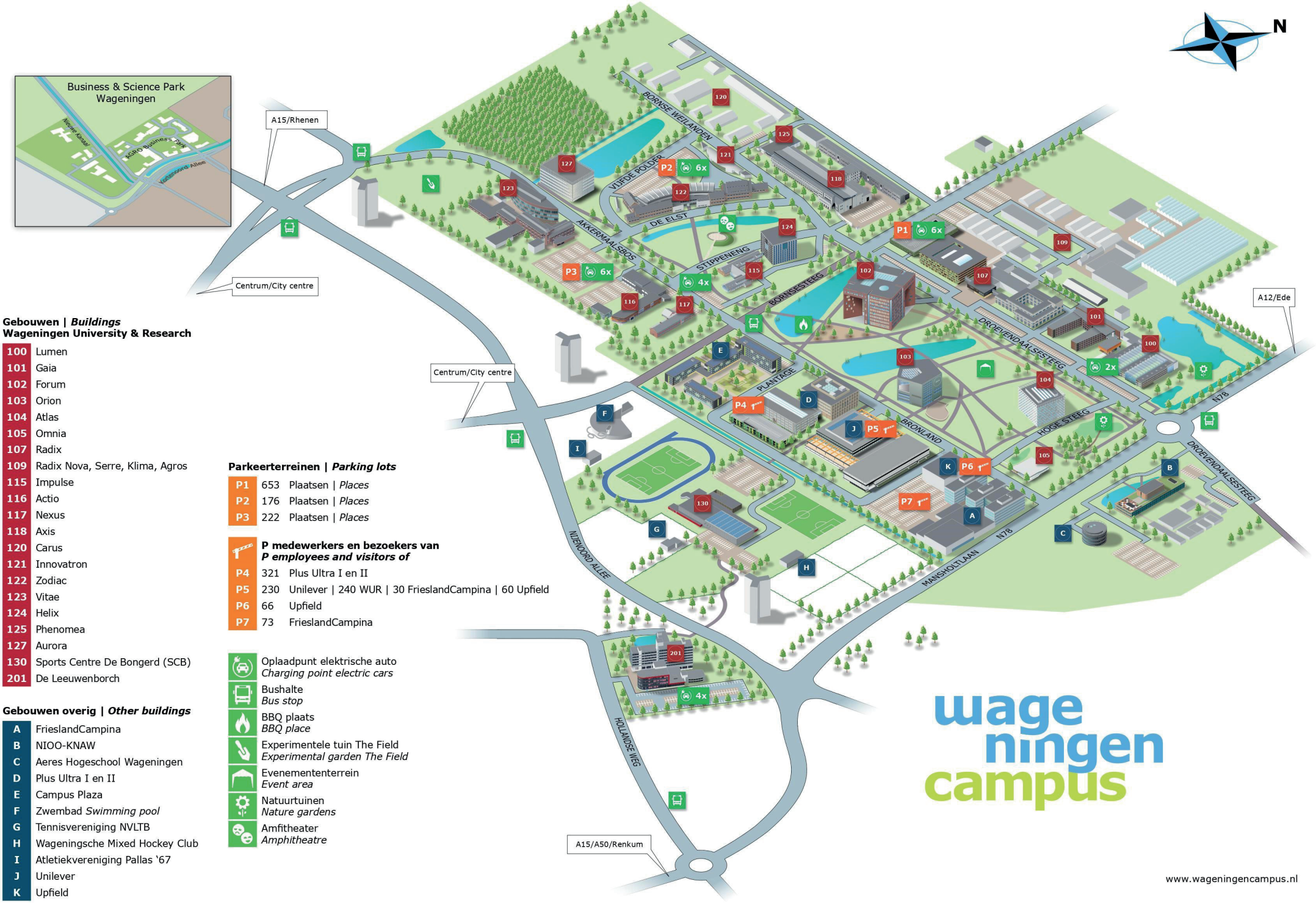
Locaties rolstoelvriendelijke wc's

Info voor mensen met beperking

Info over parkeren op VU campus

EUR Campus Map





Gebouwen | *Buildings*
Wageningen University & Research

100	Lumen
101	Gaia
102	Forum
103	Orion
104	Atlas
105	Omnia
107	Radix
109	Radix Nova, Serre, Klima, Agros
115	Impulse
116	Actio
117	Nexus
118	Axis
120	Carus
121	Innovatron
122	Zodiac
123	Vitae
124	Helix
125	Phenomea
127	Aurora
130	Sports Centre De Bongerd (SCB)
201	De Leeuwenborch

Gebouwen overig | *Other buildings*

A	FrieslandCampina
B	NIOO-KNAW
C	Aeres Hogeschool Wageningen
D	Plus Ultra I en II
E	Campus Plaza
F	Zwembad *Swimming pool*
G	Tennisvereniging NVLTB
H	Wageningsche Mixed Hockey Club
I	Atletiekvereniging Pallas '67
J	Unilever
K	Upfield

Parkeerterreinen | *Parking lots*

P1	653	Plaatsen | *Places*
P2	176	Plaatsen | *Places*
P3	222	Plaatsen | *Places*

P medewerkers en bezoekers van
P employees and visitors of

P4	321	Plus Ultra I en II
P5	230	Unilever | 240 WUR | 30 FrieslandCampina | 60 Upfield
P6	66	Upfield
P7	73	FrieslandCampina

Oplaadpunt elektrische auto
Charging point electric cars

Bushalte
Bus stop

BBQ plaats
BBQ place

Experimentele tuin The Field
Experimental garden The Field

Evenemententerrein
Event area

Natuurtuinen
Nature gardens

Amfitheater
Amphitheatre

www.wageningencampus.nl

TU/e EINDHOVEN UNIVERSITY OF TECHNOLOGY

De Zaale, 5612 AZ Eindhoven
T: +31 (0)40 247 9111
www.tue.nl

Buildings

	MAP	NUMBER
Alpha	D3	57
Athene	C5	16
Atlas	B4	3
Auditorium	B4	1
Aurora	C3	42
BBC Reststoffencentrum	E4	70
Cascade	D4	23
Catalyst	E3	76
Ceres	C4	7
Connector	D3	60
Cyclotron	D5	24
Differ	E4	73
Distruptor	E3	74
Echo	E5	28
Fenix	F4	87
Flux	D4	19
Fontys ER	C5	20
Fontys S1	D3	54
Fontys S2	D3	55
Fontys S3	D3	59

	MAP	NUMBER
Gaslab	B5	12
Gemini	C4	15
Helix	C5	14
Impuls	B3	30
Kennispoort	A5	2
Luna	B3	31
Matrix	B5	10
MetaForum	C4	5
Momentum	F4	83
Neuron	C4	32
Qubit	D4	21
Spectrum	D4	25
Studenten-sportcentrum	C2	49
Traverse	C3	37
Twinning center	F3	77
Ventur	E4	80
Vertigo	B5	6
Zwarte Doos	B5	4

Departments

	BUILDING	MAP	NUMBER
Applied Physics	Flux	D4	19
Biomedical Engineering	Gemini	C4	15
Chemical Engineering and Chemistry	Helix	C5	14
Department of the Built Environment	Vertigo	B5	6
Eindhoven School of Education	Cascade	D4	23
Electrical Engineering	Flux	D4	19
Industrial Design	Atlas	B4	3
Industrial Engineering & Innovation Sciences	Atlas	B4	3
Mathematics and Computer Science	MetaForum	C4	5
Mechanical Engineering	Gemini	C4	15
Darcy-lab	Gemini	C4	15

UPDATE JUL 2023

C Interviews with Map Makers

C.1 Interview questions

Interview questions

1. Can you describe your role in the development of the campus map of [University]?
2. Who else was involved in making the map? (stakeholders etc.)
3. When was the map made?
4. What were the intentions/guiding principles of creating the map?
5. Was there a campus map before, and how was this map going to be different/new?
6. What did the design process look like? (decision making, responsibilities, iterations, timespan)
7. How were decisions made in terms of
    a) Content: what information to put into the map, what extra text should be written on the page, what should be put in the legend, what elements should be indicated with colors/symbols
    b) Design: layout, color scheme, 3D/2D, choice of symbols, text formatting, scale
8. Is the map "done" or are there still changes being made?
    a) If so, what are these changes based on?
9. Were users involved in any part of this process?
    a) If so, how?

C.2 Interview Notes

C.2.1 Interview with campus map maker Delft University of Technology

This interview was conducted on January 17th 2024 in Delft. The answers as described below are constructed from interview notes taken during the interview.

1. **Can you describe your role in the development of the campus map of the TU Delft?**
   Interviewee is the primary person responsible for the development of the TU Delft campus map, working with a student assistant. The actual development of the map is done externally by developers in Rotterdam. Interviewee is mainly responsible for the addition of new features, but the external developers implement them.
2. **Who else was involved in making the map (stakeholders, etc.)?**
   Interviewee and their student assistant are mainly responsible for the development of the map. The developers in Rotterdam have to add new features. The Campus Real Estate and Facility Management (CREFM) team is responsible for maintaining the campus, and they regularly update specific domains on the map, such as sewage systems are replaced. There are about 7 people in that team who are responsible for updating those domains. The marketing and communications team of the TU Delft is responsible for promoting the campus.
3. **When was the map made?**
   The project began in 2019 but was paused for a period. The first version was completed in early 2021, and by early 2022, it was shared with a broader audience. The map went live in early 2023 and has been in use for about a year now, as of January 2024.
4. **What were the intentions/guiding principles of creating the map?**
   The map is made under the label *TU Delft Campus*. The question was to put themes that the TU Delft focuses on in the map. TU Delft wanted to highlight the part of the campus where a lot of businesses are. The aim for the map is to work data driven. The map should promote the TU Delft Campus as an attractive place, this is priority. It should satisfy groups such as starters and entrepreneurs, and visitors of the field labs.

5. **Was there a campus map before, and how was this map going to be different/new?**
   There was an old map. This map was maintained by an external company, which led to unclear ownership. Therefore, CREFM only updated this map every once in a while. This map was also not focused on the integration of the campus into the society. The map also wasn't well-known. So, there was a need to improve. TU Delft had ambitions of highlighting the themes they focus on in the map. There was also a 3D map, but the technical and financial limitations of that map, especially in terms of data input, were a hindrance. The benefits of that 3D map were that iconic buildings on campus were recognizable. With the new map, the goal was to put the themes on the map that the TU Delft wanted to highlight. The map is primarily for the streams Education and Research, so that base should be sufficient. However, the original map was excluding a group of people because of that focus: starters and entrepreneurs. These are more in focus in the new map. The goal of this new map is also to ensure better ownership over the map, reduce technical limitations, and therefore better management.
6. **What did the design process look like? (decision making, responsibilities, iterations, timespan)**
   a) **How were decisions made in terms of:**
      i. **Content: what information to put into the map, what extra text should be written on the page, what should be put in the legend, what elements should be indicated with colors/symbols?**
      Responsibility of this is with the interviewee, and the wishes of TU Delft are incorporated, such as mapping the businesses on campus. Since the alterations are done by the external company in Rotterdam, some additions are expensive, which also influences their decision to add more elements.
      ii. **Design: layout, color scheme, 3D/2D, choice of symbols, text formatting, scale?**
      It was decided to do the map in 2D on after the 3D version because of the financial limitations of the 3D version. This version uses MapBox which is based on OpenStreetMap (OSM). When you choose a system such as MapBox, many visual choices are fixed. MApBox makes it easier to add layers than Google Maps, and there needed to be a lot more information in the map than is available on Google Maps, therefore the choice was made to use MapBox. Moreover, OSM, on which MapBox is based, is more open to collaboration with third parties, which makes it suitable to work with. Things like faculty numbers had high priority in terms of hierarchy in the map, so these are clickable.

7. **Is the map "done" or are there still changes being made? If so, what are these changes based on?**
   It's still a work in progress. There is a plan to add parking spaces, that are connected to a counter that can indicate how many parking spaces are free. The question "how do we get the faculties to promote this map?" is asked. The goal shifted towards accommodating to more groups such as starters and entrepreneurs, but there might still be groups that are excluded, but there is not a good insight to that information.
8. **Were users involved in any part of this process? If so, how?**
   There was an internal user testing session with about 25 office employees, primarily focused on testing specific functionalities like the search feature. There will be another testing session with 40 employees, to see how people use the map. However, broader user involvement has been limited. The current map, being in its early stages, hasn't yet been widely promoted to students, but that's a future step. The interest lies also in finding out about how many people use the map, where they come from, how long they spend looking at something, how they scroll and what they pass by. There is a button in the map that says improve this map" but that is a fixed function of MapBox, and not much is done with it now.

C.2.2 Interview with campus map maker Vrije Universiteit Amsterdam

This interview was conducted with the campus map maker of Vrije Universiteit Amsterdam. The interview was conducted on June 5th 2024. The answers as described below are constructed from interview notes taken during the interview.

1. **Can you describe your role in the development of the campus map of the VU Amsterdam?**
   I was involved from the beginning. Initially, there was a 3D map. Then, due to a lot of new construction on campus, a new map was needed, because you could not see all the buildings in the 3D version. The first version of the new map was very simple, showing only the buildings and some entrances.
2. **Who else was involved in making the map (stakeholders, etc.)?**
   The FCO (Facilitaire Campus Organisatie) wanted to do signage on campus and give up-to-date information on construction and routes. I made the map on my own, manage it, and update it. Ruimteplanning and Ruimtebeheer keep track of floor plans of individual buildings.
3. **When was the map made?**
   A few years ago, and since then there have been almost yearly updates to include newly constructed buildings.
4. **What were the intentions/guiding principles of creating the map?**
   This map is mostly for the website to help visitors find their way. It is also used on location to indicate temporary routes due to construction. The map was designed in Illustrator, allowing for multiple layers that can be turned on and off easily, making it simple to update and create different versions. It is also used for safety purposes, such as emergency routes. The map was kept simple due to the constant changes on campus, making updates easier.
5. **Was there a campus map before, and how was this map going to be different/new?**
   There used to be a 3D map, but due to the construction of new buildings, other buildings became invisible from that perspective. Another map made by the communications department existed before, but I was dissatisfied with its level of detail and precision. Therefore, I created a new map starting from Google Maps, which I traced in Illustrator.
6. **What did the design process look like? (decision-making, responsibilities, iterations, timespan)**
   a) **How were decisions made in terms of:**
      i. **Content: what information to put into the map, what extra text should be written on the page, what should be put in the legend, what elements should be indicated with colors/symbols?**
      I made the map based on the existing one, adding more details such as building entrances because the campus is complex. During the last update, the diversity committee was involved, and they requested the inclusion of wheelchair accessibility, so I added that and QR codes. During COVID, alternative walking routes were added.
      ii. **Design: layout, color scheme, 3D/2D, choice of symbols, text formatting, scale?**
      I manage that the map remains readable and what it looks like. The diversity committee wanted the wheelchair logos to be very large, but I decided against it. Everybody wants "their thing" to be big on the map. MOreover, toilets did not fit on the map, so I left them out. The color scheme was chosen to clearly distinguish between the VU and VUMC. The two colors, green and purple, were previously part of the VU's style but have since changed.
7. **Is the map "done" or are there still changes being made? If so, what are these changes based on?**
   There are plans to add startups to the map, and more construction is being done around the square, so the map is not yet finished. There is also ongoing discussion about the map. Currently, many students are looking for a digital system to navigate inside the buildings, such as 360° images. Another discussion point is that a different map is used on the information signs on campus, which uses a completely different system and still needs updating.
8. **Were users involved in any part of this process? If so, how?**
   I do most of the work myself, but the diversity committee was involved in one update because they reached out to me.

C.2.3 Interview with campus map maker Erasmus University Rotterdam

This interview was conducted with the campus map maker of Erasmus University Rotterdam. The interview was conducted on June 4th 2024. The answers as described below are constructed from interview notes taken during the interview.

1. **Can you describe your role in the development of the campus map of Rotterdam?**
   I'm an assistant editor for the Erasmus Magazine, which is an independent news platform. I used to be an illustrator, but then I joined the editing team. I work here now for 5 years in image editing. I started out with making images for the magazine that could be used instead of stock photos. Images that could accompany cool stories in the magazine. Then, during the Introduction week, a colleague came with the idea to make a map. Because we were trying to stand out with our information stand to students, we thought handing out a map could work. We saw a lot of new students were lost and had a hard time finding buildings because of the names. My colleague wrote an article about it and then we decided to make a map.
2. **Who else was involved in making the map? (stakeholders etc.)**
   The illustration company "IkRotterdam" was consulted to draw the map. They drew many signature elements that are typical for the campus. One of the illustrators, also a friend of mine, really has a fascination for maps, therefore I asked him to draw this map. The first version had sponsors, but from the second version on, not anymore.
3. **When was the map made?**
   The first version came out in 2022.
4. **What were the intentions/guiding principles of creating the map?**
   It was really the focus to help new students find the way. Buildings that are not a part of the Erasmus University are drawn in a way that they stand out less. Because the first version was sponsored by Erasmus Pavilion, they are quite prominent in the map, but in the end, it turns out that it is also a good recognizable meeting point, so it still works. The goal is really to show recognizable elements in the map that help students get to know the campus.
5. **Was there a campus map before, and how was this map going to be different/new?**
   There is also a 2D map on the campus. Our 3D map was made to grab the students' attention in the Introduction Week and made with them in mind to help them find their way.
6. **What did the design process look like? (decision making, responsibilities, iterations, timespan)**
   a) **How were decisions made in terms of:**
      i. **Content: what information to put into the map, what extra text should be written on the page, what should be put in the legend, what elements should be indicated with colors/symbols?**
      A lot of decisions are made by me. The building names are quite confusing, some have only a letter, and some also a name, therefore they are in the legend. We started with extra information about other buildings off campus and changed that around a bit so it was less confusing. The sponsored elements were made quite prominent because they were sponsored but left in because they are also recognizable and meeting points.
      ii. **Design: layout, color scheme, 3D/2D, choice of symbols, text formatting, scale?**
      The design is made by the illustration team, a lot based on intuition. For example, the orientation just felt right. Only recently, we got a question about it: Why is the north pointing down? I didn't realize it, because it just looked right. Maybe because you often arrive at the campus from this side, so it feels logical. A lot was decided by the illustration team of "IkRotterdam" and then afterward we (the Magazine editors) looked at it and decided if it felt right. Changes are also made by the illustrators, commissioned by us (the editors). We know the campus very well. All decisions were made with students in mind.
7. **Is the map "done" or are there still changes being made?**
   a) **If so, what are these changes based on?**
   Every year, a new map is made. We come together and sit around the table and see what needs to be updated. The base of the map stays the same, but small changes are being made, so not a whole new drawing needs to be made. Sometimes we also change the colors around to give it a different look and feel. We add new little people in the map that do different things. There is always some geese somewhere, because that's really recognizable on the campus—the geese and geese poo. We also try to add something current, like the protestors. We really try to tell a story and we're quite proud of it.

8. **Were users involved in any part of this process?**
   a) **If so, how?**
   In the editorial team of the Erasmus Magazine, a lot of interns are students. They often join in the meeting where we look at the map and also give their opinion. Because we have a lot of students here walking around in the office, we are quite up to date with their opinions.

Additional Notes

Students often come back to get a map and say they really like it. People know the magazine because of the map.

D Survey

D.1 Gathering of Respondents


REAL TALK: EXPERT TALK
& PANEL
DESIGN A MAP TOGETHER
JOIN THE CO CREATION SESSION WITH FREE LUNCH!
Are you a student at the TU Delft, and are you interested in giving your opinion about the design of campus maps? Please join one of the co-creation sessions. You will be designing a map together with fellow students. FREE LUNCH provided!
Sign up for co-creation session:
DID YOU KNOW?
Maps are subjective and dynamic representations of the world around us. Therefore it's important to consider what we map, and how we map it.
YOUR INPUT IS GREATLY APPRECIATED
I'm Josephine, a Geomatics Master student. I'm currently writing my thesis on user participation in the mapping process. To create maps that fit the users' needs, it is crucial to involve them during the map design process.
I'm investigating different ways of doing this. By joining a session or filling in the survey you are helping me immensly in completing my thesis. And you're contributing to research in the field of inclusivity in the built environment! :)
FILL OUT THIS SHORT SURVEY!
Do you want to give your opinion but you don't have time to come to a session? Please fill out this survey. It will only take around 15 minutes!
Fill out the survey:
15
ECTS
STARTS
The Berlage.
The Berlage.

D.2 Screenshots of the Survey

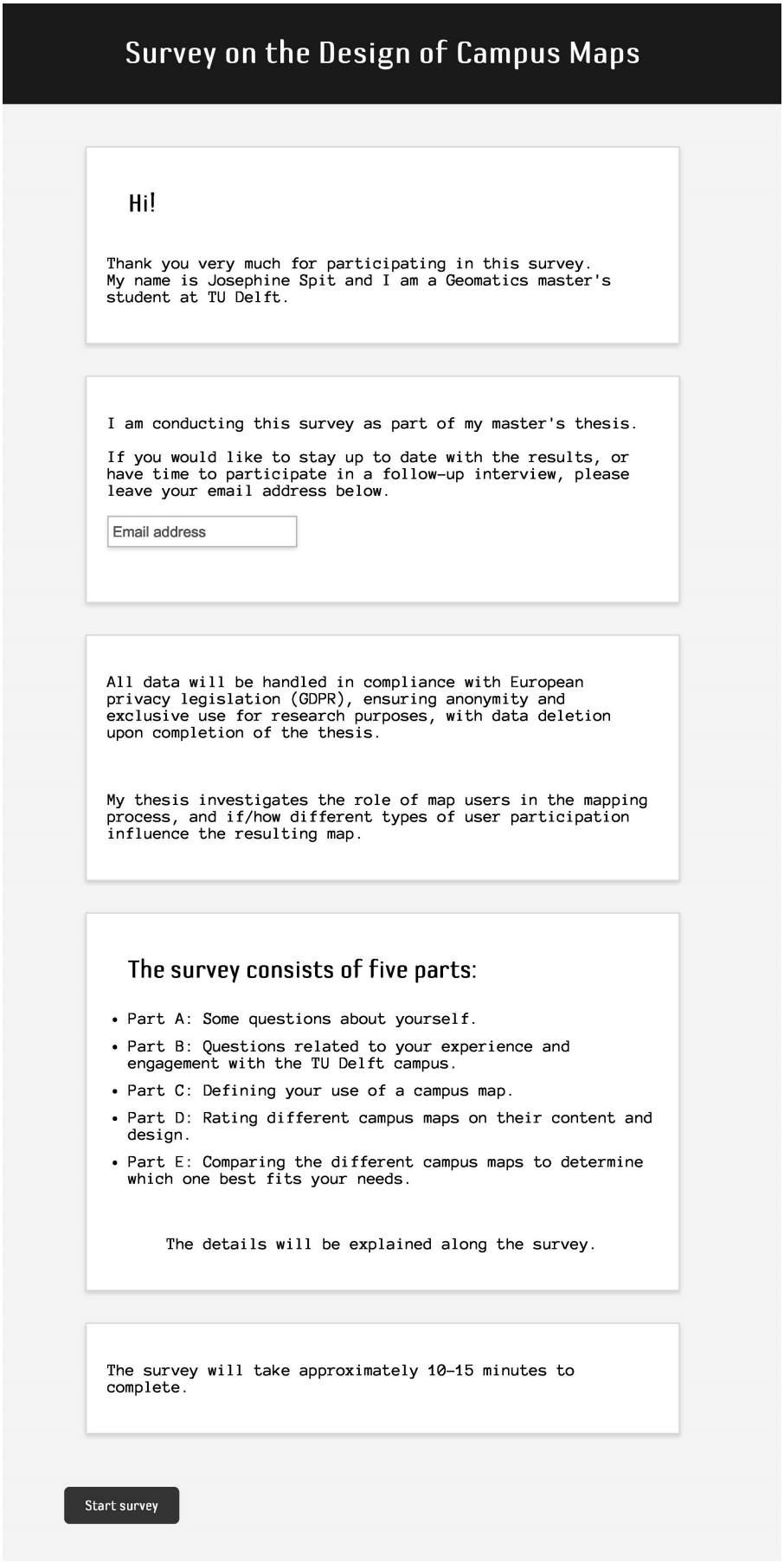


Figure D.1: The first page of the survey website

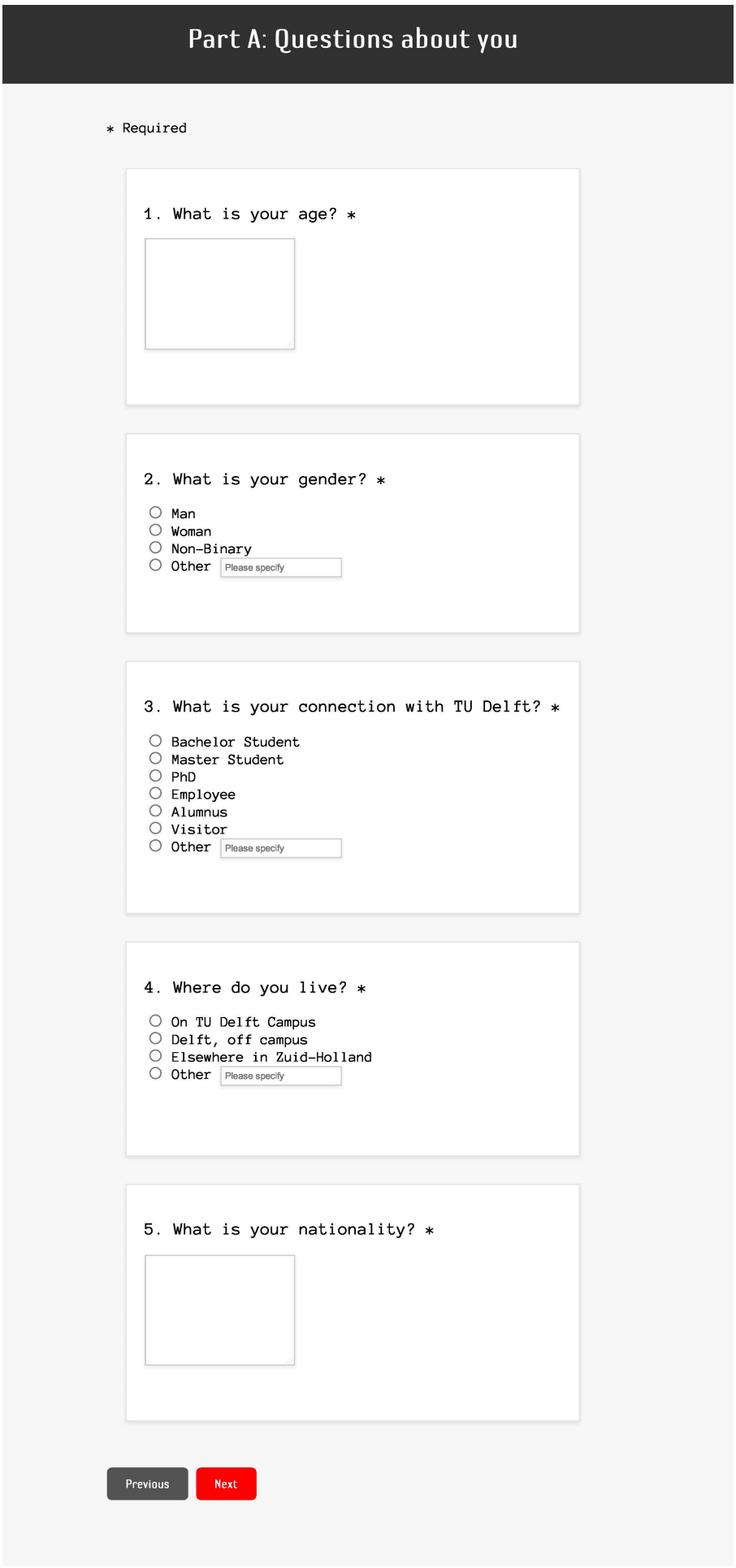


Figure D.2: Questions about the respondent

Figure D.3: The mobile version of the website, with sliders to rate the map per element

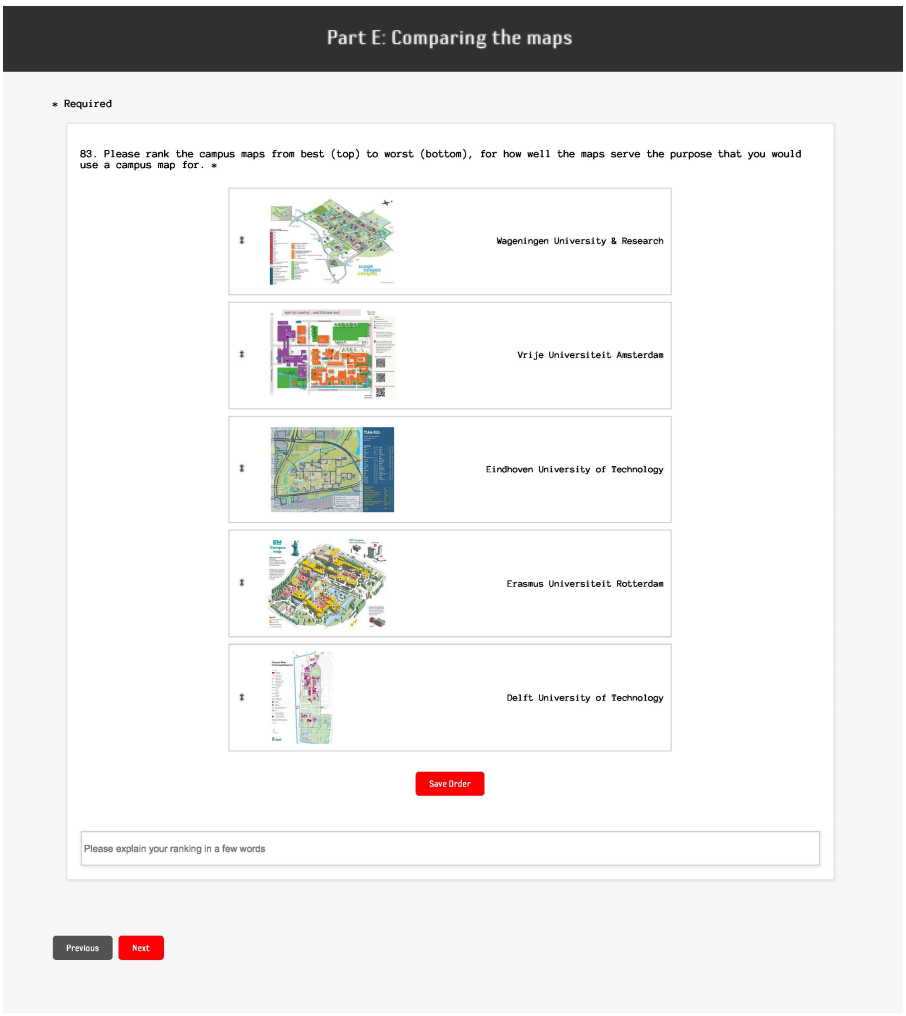


Figure D.4: The ranking page of the survey, where respondents could rank the 5 maps from best to worst.

D.3 Survey Code

D.3.1 A section of the HTML code for survey website

Complete code can be found on https://github.com/josephinespit/josephinespit.github.io

```
    <title>Survey</title>
</head>

<body>
    <div class="container">
        <div id="introPage" class="page">
            <div class="header">
                <h2>Survey on the Design of Campus Maps</h2>
            </div>

            <div class="bodycontainer">
            <div class="questioncontainer">

           <p> Hi!</p>
            <p>
                Thank you very much for participating in this survey.<br> My name is Josephine Spit and I am a Geomatics master's student at TU Delft.  <br> <br> </p></div>
              <div class="intromailcontainer"> <p>I am conducting this survey as part of my master's thesis.<br> <br>
                If you would like to stay up to date with the results, or have time to participate in a follow-up interview, please leave your email address below.  <br><br>
                    <input type="text" id="emailInput" type="text" placeholder="Email address"><br><br><br> </p> </div>
                <div class="questioncontainer"><p>All data will be handled in compliance with European privacy legislation (GDPR), ensuring anonymity and exclusive use for research purposes, with data deletion upon completion of the thesis. <br><br><br>
                </p>
               <p>My thesis investigates the role of map users in the mapping process, and if/how different types of user participation influence the resulting map.  <br><br> </p> </div>


             <div class="intromailcontainer">
                <div class="survey-summary">
                    <p3>The survey consists of five parts:</p3>
                    <ul>
                        <li><strong>Part A</strong>: Some questions about yourself.</li>
                        <li><strong>Part B</strong>: Questions related to your experience and engagement with the TU Delft campus.</li>
                        <li><strong>Part C</strong>: Defining your use of a campus map.</li>
                        <li><strong>Part D</strong>: Rating different campus maps on their content and design.</li>
                        <li><strong>Part E</strong>: Comparing the different campus maps to determine which one best fits your needs.</li>
                    </ul></div>
                    <p>The details will be explained along the survey. <br> <br>
                        </p>


            </div>

            <div class="questioncontainer">
                <p> The survey will take approximately 10-15 minutes to complete. <br> <br> </p>
                </div>
            </div>
                <button id="nextButtonIntro" onclick="showPage('personalPage')"> Start survey</button>
        </div>

        <div id="personalPage" class="page" style="display: none">
            <div class="header">
            <h2>Part A: Questions about you</h2> </div>

            <div class="bodycontainer">
            <p>* Required <br><br></p>

            <div class="questioncontainer">
                <div class="openquestion">
                    <h3>1. What is your age? *</h3>
                    <textarea rows="4" cols="50" id="ageInput" required></textarea>
                </div>
            </div>
```

```
61
62          <div class="questioncontainer">
63              <div class="mcquestion">
64                  <h3>2. What is your gender? *</h3>
65                  <input type="radio" name="gender" value="man" id="genderMan" required> Man<br>
66                  <input type="radio" name="gender" value="woman" id="genderWoman"> Woman<br>
67                  <input type="radio" name="gender" value="nonbinary" id="genderNonBinary"> Non-
    Binary<br>
68                  <input type="radio" name="gender" value="other" id="genderOther"> Other
69                  <input type="text" name="otherGender" id="otherGenderInput" placeholder="Please
    specify"> <br>
70
71
72              </div>
73          </div>
74
```

D.3.2 A section of the JavaScript code for survey website

Complete code can be found on `https://github.com/josephinespit/josephinespit.github.io`

```
1
2       // JavaScript functions
3       function showPage(pageId) {
4           const pages = document.querySelectorAll('.page');
5           pages.forEach(page => page.style.display = 'none');
6           document.getElementById(pageId).style.display = 'block';
7           window.scrollTo(0, 0);
8       }
9
10
11      // funcion to handle the slider
12      function updateLabel(labelId, value) {
13          document.getElementById(labelId).innerText = value;
14      }
15
16      document.addEventListener("DOMContentLoaded", function() {
17          const sliders = document.querySelectorAll(".slider");
18
19          sliders.forEach(function(slider) {
20              const labels = slider.nextElementSibling.querySelectorAll(".slider-label");
21
22              function updateLabels(value) {
23                  labels.forEach(function(label) {
24                      if (parseInt(label.getAttribute("data-value")) === value) {
25                          label.classList.add("active");
26                      } else {
27                          label.classList.remove("active");
28                      }
29                  });
30              }
31
32              function updateSliderColor(slider, value) {
33                  const percentage = ((value - slider.min) / (slider.max - slider.min)) * 100;
34                  slider.style.background = `linear-gradient(to bottom, #ddd ${100 - percentage}%,
    #2d6d97c4 ${100 - percentage}%)`;
35
36              }
37
38              slider.addEventListener("input", function() {
39                  const value = parseInt(this.value);
40                  updateLabels(value);
41                  updateSliderColor(this, value);
42              });
43
44              function handleTouchMove(e) {
45                  e.preventDefault(); // Prevent scrolling
46                  const touch = e.touches[0];
47                  const rect = slider.getBoundingClientRect();
48                  const offsetY = touch.clientY - rect.top;
49                  const percentage = offsetY / rect.height;
50                  const value = slider.max - Math.round((percentage) * (slider.max - slider.min));
    // Update calculation to flip direction
51                  slider.value = Math.max(slider.min, Math.min(slider.max, value));
52                  const sliderValue = parseInt(slider.value);
53                  updateLabels(sliderValue);
```

```
                    updateSliderColor(slider, sliderValue);

                    const inputEvent = new Event('input', { bubbles: true });
                    slider.dispatchEvent(inputEvent);
                }

                slider.addEventListener("touchmove", handleTouchMove);
                slider.addEventListener("touchstart", handleTouchMove);

                labels.forEach(label => {
                    label.addEventListener("touchmove", handleTouchMove);
                    label.addEventListener("touchstart", handleTouchMove);
                });

                // Initialize the correct label on load
                const initialValue = parseInt(slider.value);
                updateLabels(initialValue);
                updateSliderColor(slider, initialValue);
            });
        });

        document.addEventListener('DOMContentLoaded', function() {
            $("#sortable").sortable();
            $("#sortable").disableSelection();

            $('#saveButton').on('click', function() {
                const sortedIDs = $("#sortable").sortable("toArray");
                console.log('Sorted IDs:', sortedIDs); // For debugging purposes

            });
        });
```

D.3.3 A section of the code for processing survey results

Complete code can be found on https://github.com/josephinespit/josephinespit.github.io

```
# Load the JSON data
with open(os.path.join(output_directory, "responses.json")) as file:
    data = json.load(file)

# Prepare CSV data
column_headers = []
rows = []

for response in data:
    for key in response.keys():
        if key not in column_headers:
            column_headers.append(key)

for response in data:
    row = []
    for header in column_headers:
        row.append(response.get(header, ""))
    rows.append(row)

# Function to calculate averages for slider columns
def calculate_averages(filtered_data):
    slider_sums = defaultdict(int)
    slider_counts = defaultdict(int)

    for response in filtered_data:
        for key, value in response.items():
            if key.startswith("slider_"):
                slider_sums[key] += int(value)
                slider_counts[key] += 1

    slider_averages = {key: slider_sums[key] / slider_counts[key] if slider_counts[key] != 0 else 0
    for key in slider_sums}
    return slider_averages

# Calculate averages for all responses
all_averages = calculate_averages(data)

# Calculate averages for responses with gender="man"
man_averages = calculate_averages([r for r in data if r.get("gender") == "man"])

```

```
# Calculate averages for responses with gender="woman"
woman_averages = calculate_averages([r for r in data if r.get("gender") == "woman"])

# Write CSV file
csv_file_path = os.path.join(output_directory, "responses.csv")
with open(csv_file_path, "w", newline='') as file:
    writer = csv.writer(file)
    writer.writerow(column_headers)
    writer.writerows(rows)

# Create CSV with only slider columns and averages
slider_headers = [header for header in column_headers if header.startswith("slider_")]
slider_headers.insert(0, "Average Type")

slider_csv_file_path = os.path.join(output_directory, "slider_responses.csv")
with open(slider_csv_file_path, "w", newline='') as file:
    writer = csv.writer(file)
    writer.writerow(slider_headers)

    # Write the average rows for slider columns
    def write_average_row(average_type, averages):
        average_row = [""] * len(slider_headers)
        average_row[0] = average_type
        for key, avg in averages.items():
            if key in slider_headers:
                average_row[slider_headers.index(key)] = avg
        writer.writerow(average_row)

    write_average_row("Average (all)", all_averages)
    write_average_row("Average (man)", man_averages)
    write_average_row("Average (woman)", woman_averages)
```

D.4 Raw Survey Data

ID	age	gender	connection	location	nationality
1	26	woman	alumni	zuidholland	Romanian
2	25	man	master	delft	Dutch
3	25	man	alumni	delft	Dutch
4	25	woman	master	campus	Dutch
5	24	man	master	delft	Nederlands
6	25	man	master	Amsterdam	Dutch
7	24	woman	master	Rotterdam	Dutch
8	26	nonbinary	master	delft	Dutch
9	28	woman	master	delft	Greek
10	26	woman	master	zuidholland	NL
11	25	woman	master	delft	Dutch
12	25	man	master	campus	Dutch
13	20	man	bachelor	delft	Dutch
14	26	woman	master	delft	Dutch
15	22	woman	bachelor	delft	Dutch and New Zealand
16	34	woman	phd	zuidholland	Turkey
17	25	man	alumni	zuidholland	Dutch
18	19	woman	bachelor	Noord Holland	Dutch
19	24	woman	master	campus	Dutch
20	26	man	alumni	zuidholland	Dutch
21	25	woman	alumni	zuidholland	Dutch
22	29	woman	master	delft	Chinese
23	27	man	master	delft	Greek
24	24	woman	master	delft	Indian
25	24	woman	master	delft	Chinese
26	25	woman	master	zuidholland	Dutch
27	25	man	master	campus	Dutch
28	23	woman	alumni	delft	Dutch
29	23	woman	master	delft	Dutch
30	29	man	alumni	campus	Dutch
31	26	man	master	delft	Greek
32	24	man	master	delft	Dutch
33	24	man	master	zuidholland	Dutch
34	27	man	master	delft	Greek
35	28	man	alumni	Utrecht	Dutch
36	26	man	master	delft	Greek
37	27	man	master	zuidholland	Nederlandse
38	25	woman	master	campus	Dutch
39	24	man	master	delft	Dutch
40	24	man	master	delft	Chinese
41	21	man	master	delft	Dutch

ID	gender	campusVis	activities	faculty	transport
1	woman	14times	['study', 'hobbies', 'cafes', 'student_association', 'recreation']	abe	bike
2	man	14times	['study', 'cafes', 'recreation']	abe	bike
3	man	lessonce	['work', 'recreation']	tpm	bike
4	woman	more5	['study', 'hobbies', 'cafes', 'student_association', 'recreation']	as	bike
5	man	14times	['study', 'hobbies', 'cafes', 'student_association']	abe	bike
6	man	14times	['study', 'recreation']	abe	public_transport
7	woman	more5	['study']	abe	public_transport
8	nonbinary	14times	['study', 'hobbies']	abe	bike
9	woman	14times	['study', 'cafes', 'recreation']	abe	bike
10	woman	14times	['study', 'hobbies']	abe	walking
11	woman	more5	['study', 'hobbies', 'cafes', 'recreation']	abe	bike
12	man	more5	['study', 'work']	ide	walking
13	man	14times	['study', 'student_association']	eemc	bike
14	woman	14times	['study', 'cafes']	abe	bike
15	woman	14times	['study', 'hobbies', 'student_association', 'recreation']	abe	bike
16	woman	lessonce	['work', 'recreation']	abe	walking
17	man	lessonce	['cafes', 'recreation']	abe	public_transport
18	woman	14times	['study', 'recreation']	ide	bike
19	woman	more5	['study', 'work', 'hobbies', 'cafes', 'recreation']	abe	bike
20	man	more5	['work']	QuantWare	bike
21	woman	lessonce	['hobbies', 'recreation']	eemc	public_transport
22	woman	14times	['study', 'work', 'hobbies', 'student_association', 'recreation']	abe	bike
23	man	more5	['study', 'hobbies', 'cafes']	abe	bike
24	woman	14times	['study', 'work', 'hobbies', 'cafes', 'student_association', 'recreation']	ceg	bike
25	woman	14times	['study']	abe	bike
26	woman	more5	['study', 'cafes', 'student_association', 'recreation']	me	bike
27	man	more5	['study', 'work', 'hobbies', 'recreation', 'other', 'I live on campus']	me	bike
28	woman	more5	['study', 'hobbies', 'cafes', 'recreation']	me	bike
29	woman	more5	['study', 'hobbies', 'cafes', 'recreation']	eemc	bike
30	man	14times	['work', 'cafes', 'recreation']	abe	bike
31	man	14times	['study', 'hobbies']	abe	bike
32	man	Normally	['study', 'student_association']	abe	bike
33	man	14times	['study', 'work', 'hobbies', 'cafes', 'recreation']	abe	bike
34	man	lessonce	['study', 'cafes']	abe	bike
35	man	never	['study', 'hobbies', 'cafes']	me	bike
36	man	14times	['study', 'hobbies']	abe	bike
37	man	more5	['study', 'work', 'student_association']	abe	car
38	woman	more5	['study', 'hobbies', 'recreation']	me	walking
39	man	14times	['study', 'hobbies', 'cafes', 'student_association']	abe	bike
40	man	more5	['study', 'hobbies']	abe	bike
41	man	lessonce	['work', 'hobbies', 'cafes', 'recreation']	me	bike

ID	gender	campusExperience	purpose
1	woman	Maybe the biking Lane could be better signalised	navigation
2	man	Een betere campus kaart! Betere automaten! Cut the ties!	discovering
3	man		places
4	woman		places
5	man	Ik kom heel vaak op bk maar nooit op de campus want heb daar weinig te zoeken en voel me daar vreemde eend want bk	places
6	man	Very good accessibility via public transport	places
7	woman	The good study facilities, that are almost always open	places
8	nonbinary		places
9	woman	more flexible opening hours of the faculties and the library, morereasonable prices for food and drinks	navigation
10	woman	Dont often see the campus, because bk is closest to the city. But things I noticed are the beautiful trees in summer and the never ending work on the team track and no nice supermarket on campus	places
11	woman		places
12	man	Cycling is often very chaotic	places
13	man	-	places
14	woman		places
15	woman	more bins in the oranje zaal at architecture	places
16	woman		places
17	man	The tram	places
18	woman	Lots of parking spaces, I was surprised by limitation on study places on some facultyâ€™s, like io and Bouwko (or maybe I just donâ€™t know where to find them), there is also lots of food options, but they are only open for limited time, these times would be better if longer on the day.	places
19	woman	It is a shame that the busses will stop driving on the campus as soon as the tram will start. There will be no public transpott during the night or weekends!	discovering
20	man	A tram from Delft or Delft Campus would be nice	places
21	woman		places
22	woman		navigation
23	man	Some traffic signs regarding the campus buildings close to the bike lanes	places
24	woman	Way finding signages and accessibility to all the PwDs	discovering
25	woman	It'll be nice if there are more coffee shops, snacks bar inside the campus (the good ones)	navigation
26	woman		places
27	man	The Mekelpark is something very nice, especially in summer. The new tram line should finally be finished next year, but I am really skeptical about its benefits. From what I heard the campus will be less reachable because the trams will be less frequent than the busses used to go	purposeOther
28	woman		places
29	woman	I love the park in the middle of mekelpark, I think it adds a lot of admosphere. Eehm for improvements I think sometimes it is unclear in busy study weeks which buildings are open and which have spots free. There are a lot of food places but maybe not very cheap ones, although the cafetarias are not too bad.	places
30	man		places
31	man		discovering
32	man		places
33	man		places
34	man		discovering
35	man	Great cyclepaths	places
36	man		discovering
37	man	I like the number of buildings that are open during the weekend especially around the exam period	places
38	woman		places
39	man		places
40	man	Dining needes to be improved for both quality and price.	navigation
41	man	Affordable food	places

ID	gender	slider_familiarity_Delft	slider_layout_Delft	layout_Delft
1	woman	4	4	
2	man	4	4	
3	man	3	4	Clear use of colour to indicate what buildings are part of TU Delft. Nice use of arrows to indicate entrances.
4	woman	2	3	
5	man	4	4	
6	man	3	4	Good legibility
7	woman	2	3	
8	nonbinary	4	5	
9	woman	3	4	clear structure
10	woman	4	3	Colorful, seems clear
11	woman	4	3	I'm missing the list of buildings so the text could be more compact to not need another page
12	man	3	2	It's a very busy map to look at
13	man	4	4	
14	woman	1	1	Its clear. Nice use of different colors so the different aspects are visibly quite well.
15	woman	1	4	
16	woman	4	3	
17	man	4	4	
18	woman	4	4	Everything is clear
19	woman	5	4	
20	man	4	2	Building numbers arenâ€™t as familiar as facult y names
21	woman	4	4	
22	woman	5	5	
23	man	4	3	It would be nice if a "building landmark" such as Aula, was more visible (for example it was written) so the reader can directly "orient" himself in the map.
24	woman	3	3	
25	woman	4	4	
26	woman	1	4	
27	man	5	3	
28	woman	4	3	
29	woman	4	4	Good. But some parts you need to read are a bit small.
30	man	4	3	
31	man	2	4	
32	man	2	4	Clear distinction between legend/map on the page with the vertical split
33	man	4	3	
34	man	2	4	
35	man	2	3	
36	man	2	4	
37	man	5	4	
38	woman	2	3	
39	man	4	3	North arrow could be bigger.
40	man	2	5	
41	man	1	4	Good: legend and a map. All you need

ID	gender	slider_dimension_clarity_Delft	threeD_clarity_Delft	slider_info_Delft	info_Delft
1	woman	4		3	
2	man	2		3	
3	man	4		4	
4	woman	2		2	Id expect the campus buildings to be most important, so it feels incomplete that theres no names for the faculties on there. What does "Other buildings" mean? Very unclear. I do like the walking stick man
5	man	3		4	
6	man	4	The spatial layout of the campus is quite simple, you don't need to see the buildings' heights to understand where you are	4	
7	woman	4		2	It shows very little information, nothing about the use of the campus
8	nonbinary	5		3	
9	woman	3	makes sense since floors are not included	2	No classroom numbers, no bike parking sign, no accessibility entrances for handicapped people, no north arrow, no crosswalks, no traffic lights
10	woman	4	Think 2d is good enough to show how the campus funstions	2	Can be better, mainly buildings are visible. No other functions. Also it looks like there are many parcs, dont think thats true, maybe show trees or kind of parc
11	woman	4	The map looks clear to me, but I already know what it looks like in 3d. If you don't know it could be handy to recognize the ub by its sloped roof for example.	4	
12	man	5	Gives a clear overview	2	Does not describe facilities such as cafes or restaurants on Campus, also does not show bicycle parking
13	man	5		4	
14	woman	4	Its shows the best way to figure out the route. A 3D map would be nice to help identify the buildings. A 2D map only shows the global shape and not the facades	4	Everything that you need except for restaurants/ places to eat are shown
15	woman	4		3	
16	woman	3		2	
17	man	4		4	
18	woman	3	It looks a bit full, some buildings are shows too literally	3	Itâ€™s not clear what each building is
19	woman	3	Landmarks, like EWI, UB, BK are less visible in 2D	4	
20	man	3	Could it be 3d?	3	Faculty names would help
21	woman	4		4	
22	woman	5		5	
23	man	4		4	
24	woman	3		3	
25	woman	4		3	
26	woman	4		3	
27	man	4		2	It does not tell which faculty is where. Only which building number.
28	woman	4		2	
29	woman	3	I think the use of color is smart. as well as the different icons. Maybe it can be divided a bit more in the high level, I feel like its only very detailed but maybe a larger level indicator of "architecture" and "Maths" and then where it is on the map would be nice if you look for something? But then again the division is probably not that seperate for some studies.	4	It seems pretty clear where to go and where you can park if you look for a certain building.
30	man	2		4	
31	man	4		3	
32	man	4	3d would not have added much here I believe, the footprints of the buildings are distinguished enough	3	Could have had the names of the buildings,
33	man	3		4	
34	man	5		4	
35	man	4		3	
36	man	4		3	
37	man	4		2	
38	woman	4		4	
39	man	4	3d does not seem needed	2	The names of the faculties are not there (except on parking lots)
40	man	4		3	
41	man	4	Easy to read	5	Everything is there

ID	gender	scaleDelft	slider_legend_completeness_Delft	legend_completeness_Delft	slider_legend_clarity_Delft	legend_clarity_Delft
1	woman	scale_effective	3		3	
2	man	scale_effective	3		3	
3	man	too_zoomed_out	4		5	
4	woman	scale_effective	2	Id expect the campus buildings to be most important, so it feels incomplete that theres no names for the faculties on there. What does "Other buildings" mean? Very	2	see above
5	man	scale_effective	3		4	
6	man	scale_effective	4		4	
7	woman	too_zoomed_out	1		2	
8	nonbinary	too_zoomed_out	3		4	
9	woman	too_zoomed_out	3		3	green areas, not sufficiently explained
10	woman	too_zoomed_out	2	Shows the minimal, not the faculty etc	3	Colors and hatches make it clear
11	woman	scale_effective	2	Missing the buildings	4	Colours are clear
12	man	too_zoomed_out	2	facilities such as cafes or restaurants on Campus, also does not show bicycle parking	4	Clear and simple layout
13	man	scale_effective	4		4	
14	woman	scale_effective	5	It shows everything that you need	5	Clear due to white background and spacing
15	woman	scale_effective	3		4	
16	woman	scale_effective	3		2	
17	man	scale_effective	4		3	
18	woman	scale_effective	2	Not every building is numbered, leaves out things	4	Makes sense
19	woman	scale_effective	4		4	
20	man	scale_effective	2		4	
21	woman	scale_effective	5		5	
22	woman	scale_effective	5		5	
23	man	too_zoomed_out	4		4	
24	woman	too_zoomed_out	3		3	
25	woman	too_zoomed_out	2	I need the food station info, coffee shops info	2	
26	woman	too_zoomed_out	3		4	
27	man	scale_effective	2		3	
28	woman	scale_effective	3		2	
29	woman	too_zoomed_out	4	Good, the numbers are on a different page so thats fine	4	Clear and nice that its big
30	man	scale_effective	4		4	
31	man	too_zoomed_out	2		4	
32	man	scale_effective	2	Missing building names / faculties	4	
33	man	scale_effective	2		4	
34	man	scale_effective	5		5	
35	man	too_zoomed_out	3		4	
36	man	too_zoomed_out	2		4	
37	man	scale_effective	3		3	
38	woman	scale_effective	3		4	Only missing the corresponding faculty names with the numbers
39	man	scale_effective	2	It's okay, but they are very generous with areas they call 'park'. And sports fields should not be the same category.	4	
40	man	scale_effective	4		4	
41	man	too_zoomed_out	2	The stuff that's supposed to be on the back is kind of annoying	4	All clear, i just wouldve done it differently, as described above

ID	gender	slider_text_relevance_Delft	text_relevance_Delft	slider_text_visualization_Delft	text_visualization_Delft
1	woman	3		4	
2	man	4		4	
3	man	3		3	
4	woman	2	I do appreciate the street names very much.	2	Very small, although this might be better irl? The parking places seem to be harder to read
5	man	4		3	
6	man	4		3	
7	woman	1		2	The information at the buildings is unclear, there is no depth
8	nonbinary	4		4	
9	woman	4		4	
10	woman	4	English, Dutch, no information that should not be there	3	
11	woman	5		4	
12	man	2	Street names? Why?	2	Makes the map look busy
13	man	3		4	
14	woman	5	Only necessary text is shown which is nice	5	nice fontsizs , color is clear. (on my phone where I can zoom in)
15	woman	2		3	
16	woman	2		3	
17	man	5		2	
18	woman	5	No more than needed, only relevant information	4	Zooming in is needed for reading, but not impossible or annoying
19	woman	4		3	
20	man	4		4	
21	woman	5		5	
22	woman	5		5	
23	man	4		4	
24	woman	3		3	
25	woman	4		4	
26	woman	2		5	
27	man	3		3	A bit small
28	woman	3		2	
29	woman	4	It's short which is nice	4	good. The icons are a bit different styles but the difference in colors makes it clear
30	man	4		2	
31	man	2		5	
32	man	3		3	
33	man	3		4	
34	man	4		4	
35	man	4		5	
36	man	2		5	
37	man	4		4	
38	woman	4		3	I find it a bit confusing that the buildings are purple
39	man	4	Nice that they point to other things in the city off map.	4	
40	man	4		5	
41	man	4	All text contains good information	5	All clear, only thing thats important i think

ID	gender	slider_color_visualization_Delft	color_visualization_Delft	slider_color_appropriateness_Delft	color_appropriateness_Delft
1	woman	4		2	
2	man	3		4	
3	man	5		4	
4	woman	3		3	
5	man	2		2	
6	man	4		5	
7	woman	2	There is too much or too little contract between some of the color combinations	3	
8	nonbinary	3		3	
9	woman	3		4	
10	woman	4		4	Works well to associate
11	woman	5		4	
12	man	4	The use of purple and green makes the map easy to read	4	Colour use is clear
13	man	4		5	
14	woman	5	The different colors are not too close together so the different aspects are pretty clear	4	Wouldnâ€™t necessarily use pink/purple for buildings but it works in this map. It stands out
15	woman	4		3	
16	woman	3		3	
17	man	3		3	
18	woman	4	Nice color pallet	4	Realistic/recognizable
19	woman	4		3	
20	man	3		3	
21	woman	5		5	
22	woman	5		5	
23	man	4		4	
24	woman	3		3	
25	woman	2		3	
26	woman	5		5	
27	man	3		4	
28	woman	3		4	
29	woman	5	I like the color scheme	5	It's consistent and makes sense; green is pieces of grass, grey is road..
30	man	2		4	
31	man	4		3	
32	man	3		3	
33	man	2		2	
34	man	4		5	
35	man	5		4	
36	man	4		3	
37	man	2		3	
38	woman	3		3	See above
39	man	4		3	There is a lot more green on the map than in real life.
40	man	5		5	
41	man	5	It`s a map, the visuals dont really matter in a map i think	5	colors match with the real TU building signs. Good choice

ID	gender	slider_symbols_appropriateness_Delft	symbols_appropriateness_Delft	slider_symbols_clarity_Delft
1	woman	3		3
2	man	4		4
3	man	4		4
4	woman	2	I am missing symbols for faculties, as they are only colour coded. Bus symbols etc makes sense	3
5	man	2		2
6	man	4		3
7	woman	3	The pattern for construction area is too big, and the colour does not fit	1
8	nonbinary	4		3
9	woman	4		4
10	woman	3	Not so many symbols	3
11	woman	4		4
12	man	2	Numbers for the buildings also create a very busy map	5
13	man	3		4
14	woman	4		4
15	woman	3		2
16	woman	2		2
17	man	4		4
18	woman	4	Different types of entrance is confusing	3
19	woman	2		3
20	man	3		3
21	woman	5		4
22	woman	5		5
23	man	3		3
24	woman	2		2
25	woman	3		3
26	woman	4		3
27	man	3		3
28	woman	3		2
29	woman	4	Its clear	3
30	man	4		4
31	man	2		3
32	man	3		3
33	man	3		3
34	man	4		4
35	man	4		4
36	man	2		3
37	man	3		3
38	woman	4		4
39	man	4		4
40	man	4		4
41	man	5	Everything you need is there	4

ID	gender	slider_layout_Wageningen	layout_Wageningen	slider_dimension_clarity_Wageningen	threeD_clarity_Wageningen
1	woman	4		4	
2	man	5		5	
3	man	4		3	
4	woman	4		4	
5	man	4		5	
6	man	5		5	
7	woman	2		5	
8	nonbinary	2		4	
9	woman	4		5	
10	woman	4	Looks clear and nice	1	works really well actually, did not expect
11	woman	5		5	
12	man	2	Not really organised in a aesthetically pleasing way	3	Looks cool, does not make it more clear to me
13	man	4		2	
14	woman	4	Clear due to white background	4	Its nice that you can see the shape of buildings and paths. The isometric view is nice
15	woman	5		4	
16	woman	2		4	
17	man	2		3	
18	woman	5	Looks good	3	Not necessary in my opinion, too much going on
19	woman	2		3	The Buildings are to detailed
20	man	4		2	
21	woman	5		5	
22	woman	5		3	
23	man	4		5	It's nice that the reader gets an idea about the size/architecture of the building she/he is looking for.
24	woman	3		3	
25	woman	4		5	
26	woman	4		5	
27	man	5		5	
28	woman	5		4	
29	woman	4	The perspective is a bit confusing, but there is a nice division map / legend	2	I like the flat one more. Here distances are more difficult to estimate
30	man	4		4	
31	man	1		4	
32	man	4		3	On one hand it helps navigate the map and see it in real world perspective, but in order to make it effective they had to make the top of the map not oriented to the north (due to building orientation) , which loses clarity
33	man	4		5	
34	man	5		4	
35	man	4		3	
36	man	1		4	
37	man	3		2	
38	woman	4		4	3D shows the buildings more clear, which makes it more recognizable if you know the campus
39	man	4		4	buildings
40	man	5		3	
41	man	5	Looks cool!!	5	Amazing, gotta say it looks much much better than 2D

ID	gender	slider_info_Wageningen	scaleWageningen
1	woman	4	scale_effective
2	man	4	scale_effective
3	man	3	scale_effective
4	woman	3	scale_effective
5	man	3	scale_effective
6	man	5	scale_effective
7	woman	4	scale_effective
8	nonbinary	3	scale_effective
9	woman	3	scale_effective
10	woman	4	scale_effective
11	woman	4	scale_effective
12	man	4	scale_effective
13	man	5	scale_effective
14	woman	5	scale_effective
15	woman	4	scale_effective
16	woman	3	scale_effective
17	man	3	scale_effective
18	woman	4	scale_effective
19	woman	4	too_zoomed_in
20	man	4	scale_effective
21	woman	5	scale_effective
22	woman	3	scale_effective
23	man	4	scale_effective
24	woman	3	too_zoomed_out
25	woman	4	scale_effective
26	woman	4	too_zoomed_out
27	man	5	scale_effective
28	woman	4	scale_effective
29	woman	3	scale_effective
30	man	4	scale_effective
31	man	2	scale_effective
32	man	4	scale_effective
33	man	4	scale_effective
34	man	4	scale_effective
35	man	5	scale_effective
36	man	2	scale_effective
37	man	4	scale_effective
38	woman	4	scale_effective
39	man	5	scale_effective
40	man	5	scale_effective
41	man	5	scale_effective

ID	gender	slider_legend_completeness_Wageningen	legend_completeness_Wageningen	slider_legend_clarity_Wageningen	legend_clarity_Wageningen
1	woman	3		2	
2	man	4		4	
3	man	4		4	Good that they show number of parking places, and names of buildings.
4	woman	4		5	
5	man	4		3	
6	man	5		5	
7	woman	4		5	The colour code is effective
8	nonbinary	5		5	
9	woman	3		3	the symbols especially for the parking lots is quite poor, colours and patterns used in the map are not explained in the legend
10	woman	4	Everything I would use the map for is there	4	
11	woman	4		3	
12	man	4	Looks complete with the different categories	4	Neatly organised
13	man	4		5	
14	woman	4	Clear due to different color blocks. But it is missing the roads	4	Clear due different categories with each their own color
15	woman	4		4	
16	woman	3		3	
17	man	4		1	
18	woman	4	Nothing seems missing	3	Shapes look the came, can be confusing/harder to find things
19	woman	5		4	
20	man	4		4	
21	woman	5		5	
22	woman	5		5	
23	man	5		5	The color division based on the use is really clear even to someone who'is using a map for the first time.
24	woman	3		1	
25	woman	4		4	
26	woman	3		2	
27	man	5		5	
28	woman	5		4	
29	woman	4	I like the color coding and the consistency of the squares	3	The building names are a bit confusing since if you want the math building you don't know what it is if you have never been
30	man	2		2	
31	man	1		2	
32	man	4	Could contain different faculties	4	Serviceable, not too special
33	man	2		2	
34	man	5		4	
35	man	4		5	
36	man	1		2	
37	man	2		2	
38	woman	4	I have no idea in which building you can find each study, but if you are looking for a certain building and not study, it seems complete	4	
39	man	4		4	
40	man	4		4	
41	man	5	Everything is there:)	5	Nice that they organized it in colours

ID	gender	slider_text_relevance_Wageningen	text_relevance_Wageningen	slider_text_visualization_Wageningen	text_visualization_Wageningen
1	woman	4		4	
2	man	4		4	
3	man	4		2	Font too small, hard to read
4	woman	5	Except that i dont understand the car symbol and then 6x etc	4	
5	man	4		2	
6	man	5		5	
7	woman	3		4	There is more coherence in the placement of the numbers on the image
8	nonbinary	4		5	
9	woman	3		3	billboards on streets would have worked better instead of slanted labels which make them less easily readable, also a different font type and size in the
10	woman	5	All the text is usefull	3	Maybe text a bit small
11	woman	5		4	
12	man	4	Seems to use less text in the map itself	2	
13	man	4		5	
14	woman	5	Only necessary text is used which makes it clear	4	Black is nice and clear
15	woman	4		4	
16	woman	2		2	
17	man	2		3	
18	woman	5	Only necessary	5	Uppercase is nice, easier to read
19	woman	4		4	
20	man	4		4	
21	woman	5		5	
22	woman	5		3	texts for building number are too small
23	man	4		4	
24	woman	1		2	
25	woman	4		3	
26	woman	4		4	
27	man	4		4	
28	woman	5		4	
29	woman	4	Its fine	3	I don;t like the text clouds for 'city center' and then there is text in the road, it's not very consistent
30	man	3		4	
31	man	3		2	
32	man	4	Relevant	2	Could be bigger and have serif for readability.
33	man	3		3	
34	man	4		4	
35	man	4		3	
36	man	3		2	
37	man	3		4	
38	woman	4		4	
39	man	4		4	
40	man	5		4	
41	man	5	All text is useful	5	All clear

ID	gender	slider_color_visualization_Wageningen	color_visualization_Wageningen	slider_color_appropriateness_Wageningen	color_appropriateness_Wageningen
1	woman	4		4	
2	man	4		5	
3	man	2	Colors a bit overwhelming sometimes, not always very functional	3	
4	woman	5	pretty map	5	feels very logical
5	man	4		4	
6	man	5		4	
7	woman	4	There seems to be a good color palette, the buildings look realistic	4	
8	nonbinary	4		5	
9	woman	4		4	
10	woman	4	Clear	4	
11	woman	4		4	
12	man	4	The map looks nice, but not necessarily easy to read.	3	The map is appealing to look at but the Lower contrast with lots of colours does
13	man	4		5	
14	woman	3	Colors of buildings are lless clear due to their facade colors, the other colors are clear!	5	Colors represent reality really well
15	woman	5		4	
16	woman	3		3	
17	man	3		2	
18	woman	2	Boring,	2	All neutral/earthy colors, less easy to distinguish between
19	woman	3	To many colors because it is too detailed	2	
20	man	4		4	
21	woman	3		5	
22	woman	5		5	
23	man	5		5	
24	woman	3		4	
25	woman	4		4	
26	woman	4		5	
27	man	4		5	
28	woman	2		4	
29	woman	3	its clear but not really a color scheme	4	The realism is kind of nice
30	man	3		4	
31	man	3		4	
32	man	4	Highlights the map instead of everything around it	5	Matches up with what you expect
33	man	4		4	
34	man	4		4	
35	man	3		4	
36	man	3		4	
37	man	4		4	
38	woman	4		5	
39	man	4		4	that green, I have not been there
40	man	3		3	
41	man	5	Looks awesome!!! Maybe visuals do matter a bit....	5	very realistic! Makes buildings recognisable and all

ID	gender	slider_symbols_appropriateness_Wageningen	symbols_appropriateness_Wageningen	slider_symbols_clarity_Wageningen
1	woman	3		4
2	man	5		4
3	man	4		4
4	woman	4		4
5	man	3		3
6	man	5		5
7	woman	4		4
8	nonbinary	4		4
9	woman	3	bbq place is a confusing choice of a symbol. at a first glimpse would have thoughts it is a fire brigade	2
10	woman	3	All have the same shape, can be more diverse	3
11	woman	4	Bbq plaats seems like a weird thing to add as symbol when I can only find 1. I think I'm missing where is a canteen on this one and other maps	2
12	man	3	Nicer to see icons than numbersm	4
13	man	5		5
14	woman	2	Colors are quite dark	3
15	woman	4		4
16	woman	4		3
17	man	2		3
18	woman	2	All the same, not clear	2
19	woman	3		3
20	man	4		2
21	woman	5		5
22	woman	5		5
23	man	4		5
24	woman	3		2
25	woman	4		4
26	woman	3		2
27	man	5		5
28	woman	3		4
29	woman	3	They are clear but a bit ugly drawn	3
30	man	4		4
31	man	3		1
32	man	4	Clear	4
33	man	4		3
34	man	4		3
35	man	2		4
36	man	3		1
37	man	5		3
38	woman	3	Making the parking spots blue would make a bit more sence	4
39	man	4		4
40	man	2		3
41	man	5	The illustrated buildings make.it very nice	5

ID	gender	slider_layout_Amsterdam	layout_Amsterdam	slider_dimension_clarity_Amsterdam	threeD_clarity_Amsterdam
1	woman	3		3	
2	man	3		2	
3	man	5	Very to the point	5	Makes it quite clear
4	woman	3		4	
5	man	1		2	
6	man	4		3	
7	woman	4		4	
8	nonbinary	3		3	
9	woman	2	no clear separation of legend and map content	4	poor info overall for a 3d map to have a meaning
10	woman	2	Seems bit chaotic	2	Would have worked better this map in 3d i think
11	woman	4	Compact	3	It's compact so 3d might have been less clear
12	man	2	Very ugly and full	4	Provides a clear overview
13	man	3		4	
14	woman	3	Its is a bit messy and crowded. More white and bigger background would be better	3	2D map shows a clear overview but does not show look of buildings. The depth effect is not encedsary
15	woman	2		2	
16	woman	4		4	
17	man	1		2	
18	woman	4	Roads missing between buildings	5	Clear
19	woman	2		3	
20	man	3		4	
21	woman	5		3	
22	woman	3		3	
23	man	3		4	
24	woman	3		3	
25	woman	1		1	
26	woman	2		3	
27	man	2		3	
28	woman	4		2	
29	woman	2	Confusing, don't know whereto look	2	There are shadows which is a bit
30	man	2		2	
31	man	5		2	
32	man	4	Simple to understand at one glanxe	5	3d for such a small location wouldn't have worked well
33	man	2		3	
34	man	3		4	
35	man	2		4	
36	man	5		2	
37	man	2		3	
38	woman	2	It is a bit chaotic with the text and the symbols in the buildings and it makes it hard to find a certain building	3	
39	man	4		4	
40	man	4		3	
41	man	5	Not much to say	4	Fine choice, because everything is very packed here unlike wageningen

ID	gender	slider_info_Amsterdam	info_Amsterdam	scaleAmsterdam
1	woman	2		scale_effective
2	man	3		too_zoomed_out
3	man	3	Seems a bit simple	scale_effective
4	woman	3	dont know, id ont know the campus	scale_effective
5	man	2		too_zoomed_out
6	man	2	There is no legend. What am I looking at?	scale_effective
7	woman	4		scale_effective
8	nonbinary	3		scale_effective
9	woman	3	the only one which includes elevators and handicapped access points, number of trams and buses included is a pro. Still feels the most empty compared to the rest.	too_zoomed_in
10	woman	4	A lot of information, more then tu and Wageningen	too_zoomed_in
11	woman	4		scale_effective
12	man	3	Does not seem to say much but I am not sure	scale_effective
13	man	2		scale_effective
14	woman	4	It is nice that wheelchair related places are shown. And a public transport lines. It feels like something is missing such as bike lanes and stand places	too_zoomed_in
15	woman	3		too_zoomed_in
16	woman	3		scale_effective
17	man	1		scale_effective
18	woman	4	Missing context around campus	too_zoomed_in
19	woman	2		too_zoomed_in
20	man	4		scale_effective
21	woman	5	locations for disabled people is very nice	scale_effective
22	woman	3		too_zoomed_out
23	man	2		too_zoomed_out
24	woman	2		scale_effective
25	woman	2		too_zoomed_out
26	woman	4		scale_effective
27	man	3		scale_effective
28	woman	4		scale_effective
29	woman	4	I like that they added the bus numbers, and I like that the names of the buildings are actually on the buildings.	too_zoomed_in
30	man	2		too_zoomed_in
31	man	4		scale_effective
32	man	4		scale_effective
33	man	2		scale_effective
34	man	4		scale_effective
35	man	2		too_zoomed_out
36	man	4		scale_effective
37	man	2		too_zoomed_in
38	woman	2	Why are different colors used and why do some buildings have a striped pattern around them?	scale_effective
39	man	4		scale_effective
40	man	2		too_zoomed_out
41	man	5	Everything has a name	scale_effective

ID	gender	slider_legend_completeness_Amsterdam	legend_completeness_Amsterdam	slider_legend_clarity_Amsterdam	legend_clarity_Amsterdam
1	woman	2		3	
2	man	2		3	
3	man	2	Very small legend, doesn't cover use of colours	2	
4	woman	2	it seems a bit small	2	very much dislike the qr code use
5	man	2		2	
6	man	1		1	
7	woman	4	The display helps in not needing a very extensive legenda	2	
8	nonbinary	3		3	
9	woman	1	nearly nothing explained in the legend	3	what it includes is pretty clear
10	woman	4		3	A lot of information on the map itself, not that much inlegenda
11	woman	3		2	It's missing where are the different buildings
12	man	1	Does not really say much.	2	The few things are clear but a lot of extra text
13	man	2		3	
14	woman	4	Feels like the meaning of the colors of the building should be added	4	It feels crowded
15	woman	3		3	
16	woman	3		3	
17	man	1		2	
18	woman	1	Colors of buildings not mentioned	2	Too much text, too little items
19	woman	1		2	
20	man	2		3	
21	woman	5		5	
22	woman	2	quite poor, missing the information of what different color means in the map, and which one is the building symbol?	3	still poor
23	man	2		2	
24	woman	3		3	
25	woman	2		3	
26	woman	3		1	
27	man	2		3	
28	woman	2		2	
29	woman	1	There is not much in the legend	4	What is there is clear
30	man	4		4	
31	man	1		3	
32	man	4	Most of the info is in the map itself, so the legend is fine. Do dislike the color choice though	3	
33	man	2		2	
34	man	2		3	
35	man	3		2	
36	man	1		3	
37	man	3		2	
38	woman	3	Apart from the purple and orange colors, I think everything is explained in the legend	3	
39	man	2	orange buildings?	3	
40	man	3		3	
41	man	4	They chose to not put uni buildings in the legend, so that makes it smaller. Doesn't make it better per se	5	All things are easy 2 find

ID	gender	slider_text_relevance_Amsterdam	text_relevance_Amsterdam	slider_text_visualization_Amsterdam	text_visualization_Amsterdam
1	woman	3		3	
2	man	3		3	
3	man	1	A lot of text on the map itself, seems focused on public transport a lot	2	Makes the map chaotic
4	woman	3	not sure what everything is, a symbol would help (f.e. 3D)	3	
5	man	3		3	
6	man	2		3	
7	woman	4		4	
8	nonbinary	3		3	
9	woman	2	it is not clear who the map aims to address. wheelchair users and people looking for a coffee corner seem to be the main target groups	2	the title is not clearly distinguishable, some labels on the buildings are extremely small to be readable
10	woman	3	Bit much on the right	3	Think its fine, white works, size is okay
11	woman	2	The info has too much text in proportion	4	
12	man	2		3	High contrast with the image
13	man	2		3	
14	woman	3	There is top much text or more white space should be added	4	Color and size is nice
15	woman	2		3	
16	woman	3		3	
17	man	3		2	
18	woman	2	Too much going on	2	Looks messy, badly placed, to squished or stretched
19	woman	2		3	
20	man	4		3	
21	woman	4		3	
22	woman	3		3	
23	man	2		3	
24	woman	3		3	
25	woman	2		1	
26	woman	4		1	
27	man	3		2	a lot of text in the map does not help
28	woman	4		2	
29	woman	3	Its fine but it could be shaped better	2	It is pretty ugly, the colors are intense and do not make a
30	man	2		2	
31	man	1		4	
32	man	3	The host/hostess thing is not very relevant I think to the map	4	Readable for the amount of text there is
33	man	2		3	
34	man	4		4	
35	man	3		3	
36	man	1		4	
37	man	4		4	
38	woman	3		3	
39	man	4		4	
40	man	3		3	
41	man	5	Some nice extra info on the side	5	Clear, so good!

ID	gender	slider_color_visualization_Amsterdam	color_visualization_Amsterdam	slider_color_appropriateness_Amsterdam	color_appropriateness_Amsterdam
1	woman	2		3	
2	man	2		3	
3	man	4		5	
4	woman	3		3	
5	man	1		1	
6	man	4		5	
7	woman	2	The colors could be a bit less bright	3	
8	nonbinary	2		3	
9	woman	4	simple, clear, makes sense(colours follow real-world patterns)	3	buildings could have been different
10	woman	2	Color is much, dont know where to look	3	It works, but orange for the building was maybe not needed
11	woman	4	Clear colors	4	
12	man	1	Very ugly to look at. harsh colours	2	The detail does not add more clarity
13	man	2		4	
14	woman	2	The colors are hideous. Too bright and therefore overwhelming and it feels crowded	3	It represents it but the colors arent nice
15	woman	2		2	
16	woman	3		3	
17	man	2		3	
18	woman	3	Very contrasting, not necessarily pleasant to look at	3	Buildings are coolers very different, too much variety
19	woman	2		2	
20	man	2		3	
21	woman	4		4	
22	woman	3		3	poor, hard to distinguish the buildings/squares, etc
23	man	3		3	
24	woman	2		3	
25	woman	1		1	
26	woman	2		4	
27	man	2		3	
28	woman	3		2	
29	woman	2	Colors not explained, and intense, and no color scheme used?	3	I guess grass is green and water is blue but they are just as intense as the purple and orange which makes it look like a building
30	man	2		3	
31	man	5		3	
32	man	3	Looks clear. I dislike the yellow entrances on the orange building.	3	Green overlaps trees and buildings
33	man	1		2	
34	man	4		4	
35	man	4		2	
36	man	5		3	
37	man	3		3	
38	woman	3		2	I don't get why purple and orange for buildings
39	man	4		4	
40	man	3		3	
41	man	4	Not a beaty, but does its job	3	I guess they tryna split 2 groups of buildings? Dont know why, but the greenery is fine and clear

ID	gender	slider_symbols_appropriateness_Amsterdam	symbols_appropriateness_Amsterdam	slider_symbols_clarity_Amsterdam	symbols_clarity_Amsterdam
1	woman	2		2	
2	man	3		2	
3	man	3	Entrances are yellow dots? Why?	2	Yellow dots are entrances, green dots are random trees, makes it a bit vague
4	woman	2		2	
5	man	2		2	
6	man	3		3	
7	woman	3		4	
8	nonbinary	3		3	
9	woman	3		2	
10	woman	3		2	But small, hard to see
11	woman	4	I like that the coffee is indicated	3	A dot as entrance symbol is less clear than arrow imo
12	man	3	Easy to see where the coffee corner is	2	The map looks like a random collection of colours, names and icons
13	man	2		4	
14	woman	4	Symbols are clear	4	
15	woman	2		2	
16	woman	3		3	
17	man	4		4	
18	woman	2	Dots in not great colors, yellow is badly visible on orange	2	Seems randomly placed, not clear
19	woman	3		3	
20	man	2		4	
21	woman	5		4	
22	woman	3		3	
23	man	3		3	
24	woman	2		2	
25	woman	3		3	
26	woman	2		2	
27	man	2		2	
28	woman	3		4	
29	woman	2	All over the place	3	Still not really clear where the elements are.
30	man	3		2	
31	man	5		4	
32	man	3	Not a lot of symbols, fine I guess?	3	Symbols don't impact clarity much since there aren't a lot, but map is less detailed than others.
33	man	3		3	
34	man	2		3	
35	man	2		2	
36	man	5		4	
37	man	3		3	
38	woman	3		2	It is all a bit full and therefore chaotic, I think the combination of the text and the symbols in the map make it this way.
39	man	2	natural	3	
40	man	3		3	
41	man	4	Fine, maybe entrance/exit some other symbol?	5	Good idea of adding entrances to the buildings tho

ID	gender	slider_layout_Eindhoven	layout_Eindhoven	slider_dimension_clarity_Eindhoven	threeD_clarity_Eindhoven
1	woman	4		4	
2	man	4		4	
3	man	2	Op t eerste gezicht heel rommelig	4	
4	woman	3		3	
5	man	4		3	
6	man	5		4	
7	woman	4		1	
8	nonbinary	3		5	
9	woman	4		2	a lot of concentrated info about the buildings. 3d would make sense in this case
10	woman	4	Nice and seems clear	4	
11	woman	3		2	But maybe because the other design choices are not that good.
12	man	4	Looks neatly organised	4	Provides a clear overview
13	man	2		4	
14	woman	2	There is tooo much colors. It feels bush and crowded and overwhelming	4	Makes it clear
15	woman	3		4	
16	woman	4		3	
17	man	4		4	
18	woman	5	Clear difference between legend and map	5	Nothing seems missing
19	woman	5		4	
20	man	4		4	
21	woman	2		2	
22	woman	5		5	
23	man	3		3	
24	woman	2		2	
25	woman	3		3	
26	woman	3		3	
27	man	3		3	
28	woman	4		4	
29	woman	4	Looks good	4	I like it
30	man	4		4	
31	man	1		2	
32	man	5	Very clear distinctions	3	Tight packed, so 3d less valuable
33	man	4		4	
34	man	4		4	
35	man	4		5	
36	man	1		2	
37	man	4		4	
38	woman	4		3	I think it could be made more clear with 3D
39	man	4		4	
40	man	5		4	
41	man	4	Good layout, quite overwhelming tho	4	Makes sense because its packed again

ID	gender	slider_info_Eindhoven	info_Eindhoven	scaleEindhoven
1	woman	4		too_zoomed_out
2	man	4		scale_effective
3	man	3	Focus op faculteitsgebouwen, zijn vast nog andere voorzieningen en die zijn niet te zien. Waar cafeetjes, restaurants, etc.?	too_zoomed_out
4	woman	3	dont know, dont know the campus	too_zoomed_out
5	man	4		scale_effective
6	man	4		scale_effective
7	woman	4		scale_effective
8	nonbinary	5		too_zoomed_out
9	woman	2	not adequate for navigation purposes	too_zoomed_out
10	woman	3	Focus on buildings, less on activities	scale_effective
11	woman	3		too_zoomed_out
12	man	4	Seems to provide a clear picture	scale_effective
13	man	3		too_zoomed_out
14	woman	3	It feels like there is too much unnecessary information	too_zoomed_out
15	woman	2		scale_effective
16	woman	3		scale_effective
17	man	5		scale_effective
18	woman	3	Departments not visible on map	too_zoomed_out
19	woman	4		too_zoomed_out
20	man	4		too_zoomed_out
21	woman	2	lacking locations for toilets, charging points and coffee places	too_zoomed_out
22	woman	5		scale_effective
23	man	3		too_zoomed_out
24	woman	3		too_zoomed_out
25	woman	2		too_zoomed_out
26	woman	3		too_zoomed_out
27	man	4		too_zoomed_out
28	woman	3		too_zoomed_out
29	woman	4	It looks like it explains a lot	too_zoomed_out
30	man	4		scale_effective
31	man	4		too_zoomed_in
32	man	4	Contains everything you need to navigate the campus	too_zoomed_out
33	man	4		too_zoomed_out
34	man	5		scale_effective
35	man	4		scale_effective
36	man	4		too_zoomed_in
37	man	4		too_zoomed_out
38	woman	3		scale_effective
39	man	4		too_zoomed_out
40	man	4		scale_effective
41	man	5	Everything is there	too_zoomed_out

ID	gender	slider_legend_completeness_Eindhoven	legend_completeness_Eindhoven	slider_legend_clarity_Eindhoven	legend_clarity_Eindhoven
1	woman	4		2	
2	man	3		4	
3	man	4	Goed relatief tov aantal elementen dat op kaart staat, maar wat mij betreft te weinig info op de kaart	4	
4	woman	3		2	the amount of text and lack of
5	man	4		3	
6	man	5		4	
7	woman	4		5	
8	nonbinary	5		5	
9	woman	3	some colours are not explained	2	too complicated especially the buildings section
10	woman	4		4	Thinks its clear
11	woman	3		2	A lot of numbers
12	man	2	No description of cafes	2	Feels a bit full/ busy
13	man	3		3	
14	woman	4	Legend contains everything you need	2	Why are the numbers not in order but is it alfabetical. That is only nice when you know the name of the building but especially in the beginning that is not the casw or for outsiders It feels wrong
15	woman	2	should have the entrances as well on the legend	3	
16	woman	4		4	
17	man	3		2	
18	woman	5	Nothing seems missing	4	Nothing seems missing
19	woman	2		2	
20	man	4		4	
21	woman	3		3	
22	woman	5		3	highly detailed, but the grids of the map such as 'D3' is comfusing and took quite a while to find and understand the corresponding information (may be since the visualization method is not very common?)
23	man	3		3	
24	woman	3		2	
25	woman	4		2	
26	woman	2		2	
27	man	4		2	no clear logical numbering
28	woman	4		4	
29	woman	3	Good but icons could be nice	4	
30	man	4		4	
31	man	3		1	
32	man	4		4	Good and readable, would have preferred numbers ranking instead of alphabetically
33	man	5		4	
34	man	3		3	
35	man	4		5	
36	man	3		1	
37	man	2		4	
38	woman	4	Even the place on the map is added	4	
39	man	3		1	What are the 'map'codes?
40	man	4		3	
41	man	5	Nice that they added departments	5	Easy to find buildings with the map references

ID	gender	slider_text_	text_relevance_Eindhoven	slider_text_visualizatio	text_visualization_Eindhoven
1	woman	3		2	
2	man	4		4	
3	man	4		1	Heel onduidelijk lettertype, praktisch onleesbaar
4	woman	3	lots of text tho. doesnt give much information except the names (Which is necessary)	2	too small in the buildings, harder to read because of the colours
5	man	4		4	
6	man	4		3	
7	woman	4		5	
8	nonbinary	5		4	
9	woman	4		2	usually too small text
10	woman	3	Its all relevant dor the map	4	Text is clear, better then the other 4
11	woman	3		1	Not clear. Text too small and colours make it unclear
12	man	3	For me the street names do not need to be so clear	1	Creates clear contrast, not as great in the legend
13	man	3		2	
14	woman	3	Text is fine	3	The white on blue is nice. The yellow not so much. Is less readable than black letters on white or vice versa
15	woman	2		4	
16	woman	4		4	
17	man	3		2	
18	woman	2	No need to mention the building names if they are already numbered	3	Sometimes placed crooked
19	woman	4		4	
20	man	4		4	
21	woman	3		2	the colours are blunt
22	woman	5		3	
23	man	3		2	
24	woman	2		2	
25	woman	3		3	
26	woman	4		4	
27	man	3		2	very small
28	woman	4		2	
29	woman	4	Fine. Some texts like "woenselse watermolen" could be removed	4	Consistent which is nice
30	man	2		2	
31	man	5		2	
32	man	4		4	
33	man	4		3	
34	man	4		4	
35	man	4		4	
36	man	5		2	
37	man	4		4	
38	woman	4		4	
39	man	3		3	
40	man	3		3	
41	man	5	Everything is useful.info	4	Fine, good color choice with blue background

ID	gender	r_visualization_Eindhoven	color_visualization_Eindhoven	slider_color_appropriateness_Eindhoven	color_appropriateness_Eindhoven
1	woman	2		2	
2	man	2		2	
3	man	1	Weinig kleur, ziet er erg onaantrekkelijk uit.	2	Weinig differentiatie in kleur, daardoor onduidelijk
4	woman	5	very pretty map tho	4	
5	man	4		3	
6	man	2		4	
7	woman	3		3	
8	nonbinary	5		4	
9	woman	3	not very vibrant but good in terms of communication with the user. also colour palettes combination of settle and vibrant parts is unfortunate	3	some things are not immediately clear to undersatnd what they represent
10	woman	4	I like these colors	4	Think its nice that the buildings are a bit lighter and the green not so bright
11	woman	1	Not enough contrast	2	Not enough contrast
12	man	3		4	Clear colour use
13	man	1		2	
14	woman	2	There is top much colors that are top closely together. It makes the map quite unclear	4	Hate the colors but they represent the buildings and reality
15	woman	3	the buildings surrounding eindhoven should be less visible	3	
16	woman	4		4	
17	man	1		4	
18	woman	4	Nice color palette, too little use of contrasting colors	5	It is true to reality
19	woman	4		4	
20	man	4		3	
21	woman	2		4	
22	woman	3		3	
23	man	2		2	
24	woman	4		2	
25	woman	4		4	
26	woman	4		5	
27	man	3		3	
28	woman	2		3	
29	woman	4		3	The buildings have a bit of a unnoticable color
30	man	4		4	
31	man	3		1	
32	man	4	Looks very clean	4	hard to see
33	man	4		4	
34	man	4		2	out more
35	man	1		2	
36	man	3		1	
37	man	4		2	
38	woman	3	seems to be a very serious map	4	
39	man	2		4	
40	man	3		3	
41	man	4	Quite nice	5	Realistic map!

ID	gender	slider_symbols_appropriateness_Eindhoven	symbols_appropriateness_Eindhoven	slider_symbols_clarity_Eindhoven
1	woman	3		3
2	man	4		4
3	man	2		3
4	woman	2	there is barely any symbols	2
5	man	3		3
6	man	3		4
7	woman	1		1
8	nonbinary	2		4
9	woman	4		3
10	woman	4		2
11	woman	3		3
12	man	4	Provides a clear overview	3
13	man	2		2
14	woman	3	Symbols are fine	4
15	woman	4		3
16	woman	4		4
17	man	4		4
18	woman	1	No symbols for distinguishing between building or department, building symbol is needed to find easily	3
19	woman	2		2
20	man	3		3
21	woman	3		3
22	woman	3		3
23	man	2		1
24	woman	2		2
25	woman	4		4
26	woman	3		3
27	man	4		4
28	woman	2		4
29	woman	2	I dont see a lot of symbols	3
30	man	4		4
31	man	3		1
32	man	4		4
33	man	2		2
34	man	2		2
35	man	2		3
36	man	3		1
37	man	4		3
38	woman	4		4
39	man	4		4
40	man	3		3
41	man	5	Good use in symbols! I like that they also put the names in the buildings,.as well as the legend	5

ID	gender	slider_layout_Rotterdam	layout_Rotterdam	slider_dimension_clarity_Rotterdam	threeD_clarity_Rotterdam
1	woman	2		3	
2	man	4		5	
3	man	1	Te speels, over the top	2	Daardoor zie je veel wegen niet die achter de gebouwen lopen
4	woman	5	gorgeous, love how they incoporated off campus stuff	4	i dislike the "extra" cute stuff like the people kissing , the birds, etc. seems like a wheres waldo picture, which imo impacts its clarity. while it is a gorgeous map it is quite full and this makes it chaotic
5	man	3		3	
6	man	4		5	
7	woman	3		5	
8	nonbinary	3		2	
9	woman	2		4	
10	woman	4	Fun to watch	4	I actually like the 3d maps :)
11	woman	4	Compact	3	
12	man	3	A bit chaotic though	2	Unclear
13	man	4		2	
14	woman	4	Nice use of white	3	Not al paths are visible
15	woman	4		4	
16	woman	3		3	
17	man	4		3	
18	woman	3	Seems a bit packed, all over the place	2	Not necessary
19	woman	4		4	(just so you know, sorry i don't know where else to put it, but this is not the official map they use on the campus to navigate. I study at the EUR and have never seen this map before.)
20	man	4		4	
21	woman	4		4	
22	woman	3	a lil bit messy	3	
23	man	4		5	
24	woman	4		4	
25	woman	4		4	
26	woman	4		2	
27	man	2		1	
28	woman	2		2	
29	woman	3	I like it but it;s a bit unclear	3	Not really clear but pretty
30	man	3		4	
31	man	3		5	
32	man	2	Very chaotic	2	I think you should always be able to see at least some part of the road, should have had less tilt
33	man	4		5	
34	man	3		3	
35	man	2		2	
36	man	3		5	
37	man	4		2	
38	woman	4		4	
39	man	4		4	
40	man	5		5	
41	man	3	I wouldve put all extra info to one side	3	Not as good as wageningen, maybe 2d was better here

ID	gender	slider_info_	info_Rotterdam	scaleRotterdam
1	woman	2		too_zoomed_in
2	man	4		scale_effective
3	man	3		too_zoomed_in
4	woman	3	seems pretty accurate. glad it includes both the titles of the buildings and the letters (ive struggled with those before)	scale_effective
5	man	2	Wegen/bereikbaarheid niet leesbaar	scale_effective
6	man	3		scale_effective
7	woman	2		too_zoomed_in
8	nonbinary	3		scale_effective
9	woman	2		scale_effective
10	woman	3		scale_effective
11	woman	3		scale_effective
12	man	2	Feels like an amusementpark map	too_zoomed_in
13	man	4		scale_effective
14	woman	3	Not everything is there things like bike lanes are	scale_effective
15	woman	2		scale_effective
16	woman	3		too_zoomed_in
17	man	4		scale_effective
18	woman	2	No explanations of how a map works should be necessary	too_zoomed_in
19	woman	3		too_zoomed_in
20	man	4		scale_effective
21	woman	3	instead of letters, the names of the buildings are better	too_zoomed_in
22	woman	3		too_zoomed_out
23	man	4		scale_effective
24	woman	4		scale_effective
25	woman	3		too_zoomed_out
26	woman	3		too_zoomed_out
27	man	2		too_zoomed_in
28	woman	3		scale_effective
29	woman	4		scale_effective
30	man	3		scale_effective
31	man	4		scale_effective
32	man	3	Has mostly what you need, no extra info like bathrooms or the like	scale_effective
33	man	3		scale_effective
34	man	4		scale_effective
35	man	2		too_zoomed_in
36	man	4		scale_effective
37	man	2		scale_effective
38	woman	4		too_zoomed_in
39	man	4		scale_effective
40	man	5		scale_effective
41	man	5	Everything is there	scale_effective

ID	gender	slider_legend_completeness_Rotterdam	legend_completeness_Rotterdam	slider_legend_clarity_Rotterdam	legend_clarity_Rotterdam
1	woman	2		2	
2	man	4		4	
3	man	3		1	Name and letter, and letter only. Very vague concepts
4	woman	3		3	
5	man	2		2	
6	man	2	Why should I care wether a building has just a letter or both a letter and a name - especially when they are unrelated? Why can't they be the same colour?	2	
7	woman	2		3	
8	nonbinary	2		3	
9	woman	1		2	
10	woman	3		2	Bit simple and short
11	woman	3	Legend is confusing why specify how many letters you put in instead of what the colour means	3	
12	man	2	Not much described	4	Easy to understand
13	man	2		2	
14	woman	2		4	
15	woman	2		2	
16	woman	3		3	
17	man	1		3	
18	woman	2	No, a lot seems missing	2	Donâ€™t take the easy way in making a map
19	woman	2		2	
20	man	4		4	
21	woman	3		4	
22	woman	3		1	very poor. not relevant to the elements on the map
23	man	5		2	but everything is well visualized so maybe there is no need for a more detailed legend
24	woman	4		4	
25	woman	3		4	
26	woman	4		4	
27	man	2		2	
28	woman	4		3	
29	woman	2	Not really a lot of legend, only color with a statement which you can see yourself (the letter vs full name)	2	
30	man	2		2	
31	man	2		5	
32	man	3	Explains everything, but there is little to explain	3	Not sure, don't know the significance of letter
33	man	2		2	
34	man	3		4	
35	man	2		4	
36	man	2		5	
37	man	4		2	
38	woman	3		4	
39	man	4		4	
40	man	5		5	
41	man	2	Small legend, i wouldve put all buildings in the legend i think	5	Not much to say

ID	gender	slider_text_relevance_Rotterdam	text_relevance_Rotterdam	slider_text_visualization_Rotterdam	text_visualization_Rotterdam
1	woman	3		3	
2	man	5		4	
3	man	2	Waarom ISS opeens hele uitleg en rest niet? Sommoge straten wel naam, andere niet.	3	Kan duidelijker lettertype
4	woman	4	i like that they mention that the closed building has an accessible lower floor	4	like the white background stuff
5	man	3		2	
6	man	2	As above	3	
7	woman	3		2	The titles are not very clear
8	nonbinary	3		3	
9	woman	2		4	
10	woman	2	Not all text relevant for using map	4	
11	woman	3		3	Idk what the colours of buildings mean
12	man	3	Not really prepared to read it, too much	4	Clean font, clear contrast
13	man	4		4	
14	woman	3	Not all text is necesaary	5	Clear
15	woman	4		3	
16	woman	3		3	
17	man	3		2	
18	woman	2	Too much extra information, unnecessary	4	Nice white lining around letters
19	woman	3		3	
20	man	4		4	
21	woman	4		3	
22	woman	2	poor	2	poor, hard to find the useful information
23	man	4		5	
24	woman	4		3	
25	woman	3		3	
26	woman	3		5	
27	man	1	"the buildings and their letters have no correlation" what kind of "explenation" is that?	4	white around the letters makes it easily readable
28	woman	2		1	
29	woman	3		5	
30	man	4		2	
31	man	4		5	
32	man	2	It is irrelevant for the map to show whether a building is open?	3	Text is readable mostly except tin bergen subtext
33	man	2		3	
34	man	4		4	
35	man	2		4	
36	man	4		5	
37	man	2		2	
38	woman	4		4	
39	man	4		4	
40	man	5		5	
41	man	4	Everything is somewhat important to know	5	Very reasable

ID	gender	slider_color_visualization_Rotterdam	color_visualization_Rotterdam	slider_color_appropriateness_Rotterdam	color_appropriateness_Rotterdam
1	woman	4		3	
2	man	5		4	
3	man	4		4	
4	woman	5	absolutely stunning. i like maps that are a bit more "drawn" (altho like i said before this is too much wheres waldo vibes)	5	
5	man	2		3	
6	man	3		1	
7	woman	5		5	
8	nonbinary	4		5	
9	woman	5		4	
10	woman	3		3	Works well, maybe buildings bit to bright
11	woman	4	Nice colours	3	
12	man	3	Looks like an amusement park map	3	Is clear
13	man	4		5	
14	woman	5	Its looks fun and is clear	5	
15	woman	4		3	
16	woman	3		3	
17	man	5		5	
18	woman	4	Pleasant, Efteling like	4	Clear
19	woman	4		4	
20	man	5		4	
21	woman	4		4	
22	woman	3		2	poor
23	man	5		5	
24	woman	3		4	
25	woman	4		4	
26	woman	5		5	
27	man	5		5	
28	woman	2		3	
29	woman	5	Nice use of color	4	A bit too much detail and not enough actual information
30	man	2		2	
31	man	5		3	
32	man	4	Map looks nice	4	Works
33	man	4		3	
34	man	4		4	
35	man	2		4	
36	man	5		3	
37	man	4		2	
38	woman	4		4	
39	man	3	its a bit much	3	
40	man	5		4	
41	man	4	They did their best on it. Not sure if i like it personally	5	Realistic in some way

ID	gender	slider_symbols_appropriateness_Rotterdam	symbols_appropriateness_Rotterdam	slider_symbols_clarity_Rotterdam
1	woman	3		2
2	man	4		4
3	man	3	Gebruik nummers en letters beetje vaag, kan duidelijker	2
4	woman	4	although im not sure you can eat at the smidse lol.	4
5	man	2		2
6	man	4		4
7	woman	4		4
8	nonbinary	3		4
9	woman	4		4
10	woman	4	I see the little drawings as symbols as well, thats nice	4
11	woman	3		3
12	man	5	Great categorization and names	4
13	man	4		4
14	woman	4	Symbols for letters for buildings could be differenr color	5
15	woman	4		4
16	woman	3		3
17	man	3		3
18	woman	2	Barely any symbols used	2
19	woman	1		2
20	man	4		4
21	woman	4		4
22	woman	2	poor	3
23	man	5		4
24	woman	4		4
25	woman	2		3
26	woman	5		5
27	man	5		2
28	woman	3		4
29	woman	3		4
30	man	4		4
31	man	4		3
32	man	3	Not many symbols	3
33	man	3		3
34	man	3		3
35	man	4		3
36	man	4		3
37	man	2		4
38	woman	4		4
39	man	3		3
40	man	4		4
41	man	2	I miss stuff like parking, not listed very clearly i think.	4

ID	gender	sortedIDs	ranking
1	woman	['Wagranking', 'Delftranking', 'Rotterdamranking', 'Eindhovenranking', 'VUranking']	{}
2	man	['Rotterdamranking', 'Wagranking', 'Delftranking', 'Eindhovenranking', 'VUranking']	{}
3	man	['VUranking', 'Wagranking', 'Delftranking', 'Rotterdamranking', 'Eindhovenranking']	{}
4	woman	['Wagranking', 'Eindhovenranking', 'Rotterdamranking', 'Delftranking', 'VUranking']	{}
5	man	['Wagranking', 'Delftranking', 'Eindhovenranking', 'Rotterdamranking', 'VUranking']	{}
6	man	['Wagranking', 'Delftranking', 'Eindhovenranking', 'VUranking', 'Rotterdamranking']	{}
7	woman	['Wagranking', 'VUranking', 'Rotterdamranking', 'Eindhovenranking', 'Delftranking']	{}
8	nonbinary	['Wagranking', 'Eindhovenranking', 'Delftranking', 'VUranking', 'Rotterdamranking']	{}
9	woman	['Wagranking', 'Rotterdamranking', 'Eindhovenranking', 'VUranking', 'Delftranking']	{}
10	woman	['Wagranking', 'Rotterdamranking', 'Eindhovenranking', 'Delftranking', 'VUranking']	{}
11	woman	['Wagranking', 'VUranking', 'Rotterdamranking', 'Delftranking', 'Eindhovenranking']	{}
12	man	['Wagranking', 'Delftranking', 'Rotterdamranking', 'Eindhovenranking', 'VUranking']	{}
13	man	['Delftranking', 'Rotterdamranking', 'VUranking', 'Wagranking', 'Eindhovenranking']	{}
14	woman	['Delftranking', 'Rotterdamranking', 'Wagranking', 'VUranking', 'Eindhovenranking']	{}
15	woman	['Wagranking', 'Rotterdamranking', 'Delftranking', 'Eindhovenranking', 'VUranking']	{}
16	woman	['Eindhovenranking', 'Delftranking', 'VUranking', 'Wagranking', 'Rotterdamranking']	{}
17	man	['Delftranking', 'Eindhovenranking', 'Rotterdamranking', 'Wagranking', 'VUranking']	{}
18	woman	['Delftranking', 'Eindhovenranking', 'Rotterdamranking', 'Wagranking', 'VUranking']	{}
19	woman	['VUranking', 'Eindhovenranking', 'Rotterdamranking', 'Delftranking', 'Wagranking']	{}
20	man	['Delftranking', 'Rotterdamranking', 'Wagranking', 'Eindhovenranking', 'VUranking']	{}
21	woman	['Wagranking', 'VUranking', 'Delftranking', 'Eindhovenranking', 'Rotterdamranking']	{}
22	woman	['Delftranking', 'Wagranking', 'Eindhovenranking', 'VUranking', 'Rotterdamranking']	{}
23	man	['Wagranking', 'Rotterdamranking', 'Delftranking', 'Eindhovenranking', 'VUranking']	{}
24	woman	['Rotterdamranking', 'VUranking', 'Wagranking', 'Delftranking', 'Eindhovenranking']	{}
25	woman	['Wagranking', 'Rotterdamranking', 'Delftranking', 'Eindhovenranking', 'VUranking']	{}
26	woman	['Wagranking', 'Delftranking', 'Eindhovenranking', 'Rotterdamranking', 'VUranking']	{}
27	man	['Wagranking', 'Delftranking', 'Eindhovenranking', 'VUranking', 'Rotterdamranking']	{}
28	woman	['Wagranking', 'VUranking', 'Delftranking', 'Eindhovenranking', 'Rotterdamranking']	{}
29	woman	['Delftranking', 'Eindhovenranking', 'Rotterdamranking', 'Wagranking', 'VUranking']	{}
30	man	['Wagranking', 'Rotterdamranking', 'Eindhovenranking', 'Delftranking', 'VUranking']	{}
31	man	['Rotterdamranking', 'Wagranking', 'VUranking', 'Delftranking', 'Eindhovenranking']	{}
32	man	['Eindhovenranking', 'Wagranking', 'Delftranking', 'VUranking', 'Rotterdamranking']	{}
33	man	['Eindhovenranking', 'Wagranking', 'Rotterdamranking', 'Delftranking', 'VUranking']	{}
34	man	['Wagranking', 'Eindhovenranking', 'Delftranking', 'Rotterdamranking', 'VUranking']	{}
35	man	['Wagranking', 'Delftranking', 'VUranking', 'Eindhovenranking', 'Rotterdamranking']	{}
36	man	['Rotterdamranking', 'Wagranking', 'VUranking', 'Delftranking', 'Eindhovenranking']	{}
37	man	['Eindhovenranking', 'Delftranking', 'VUranking', 'Wagranking', 'Rotterdamranking']	{}
38	woman	['Wagranking', 'Eindhovenranking', 'Rotterdamranking', 'Delftranking', 'VUranking']	{}
39	man	['Wagranking', 'VUranking', 'Rotterdamranking', 'Eindhovenranking', 'Delftranking']	{}
40	man	['Rotterdamranking', 'Eindhovenranking', 'Delftranking', 'Wagranking', 'VUranking']	{}
41	man	['Wagranking', 'Eindhovenranking', 'Delftranking', 'Rotterdamranking', 'VUranking']	{}

E Additional Survey Plots

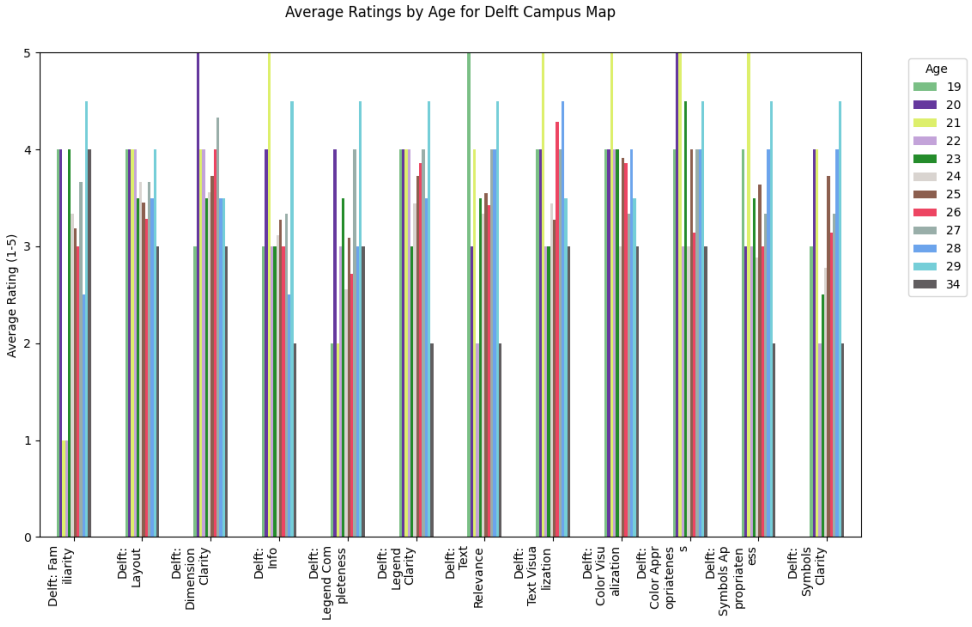


Figure E.1: The average ratings of different map elements divided by age

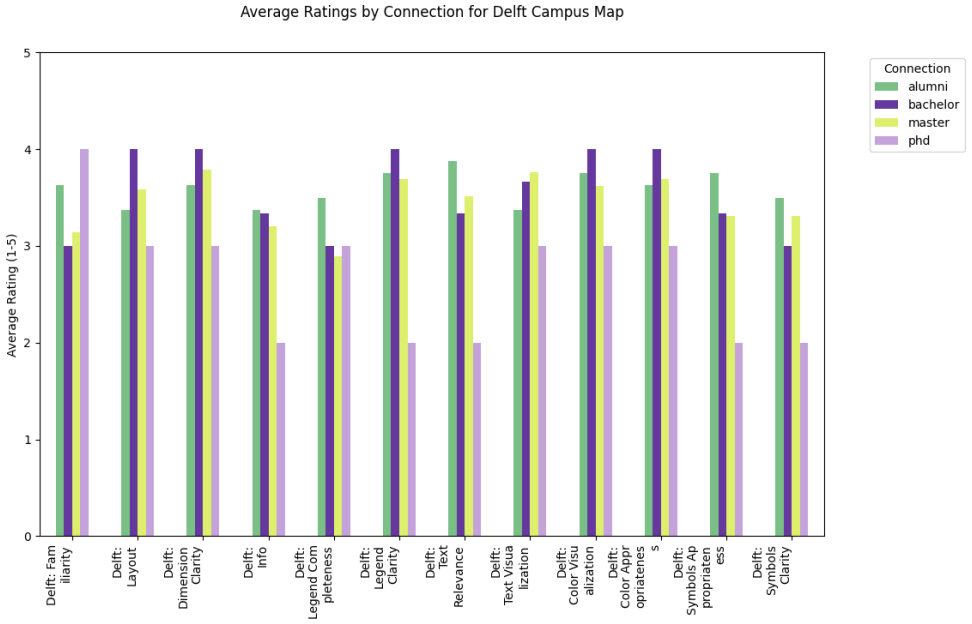


Figure E.2: The average ratings of different map elements divided by connection with the TU Delft

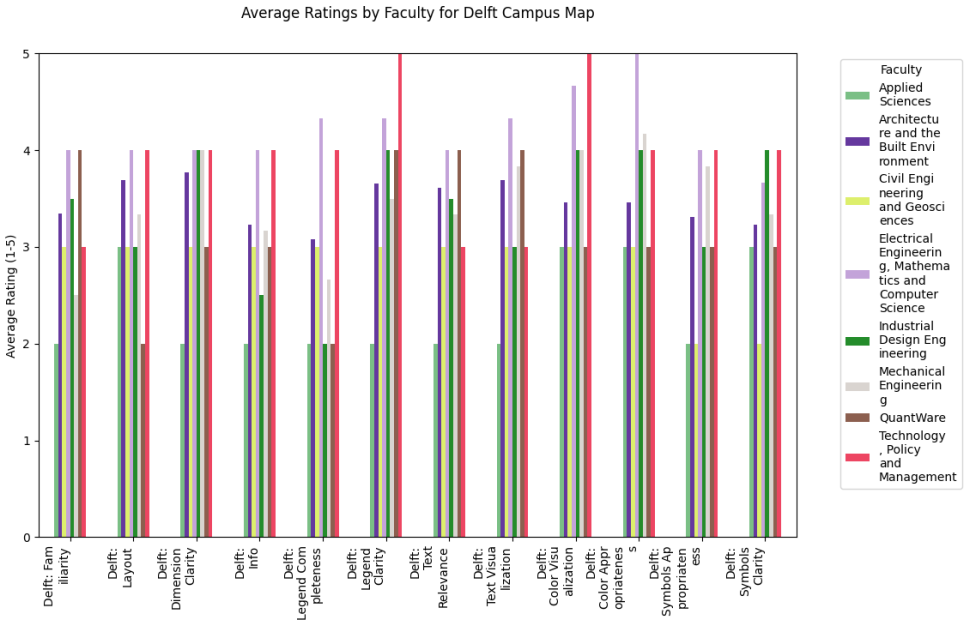


Figure E.3: The average ratings of different map elements divided by faculty

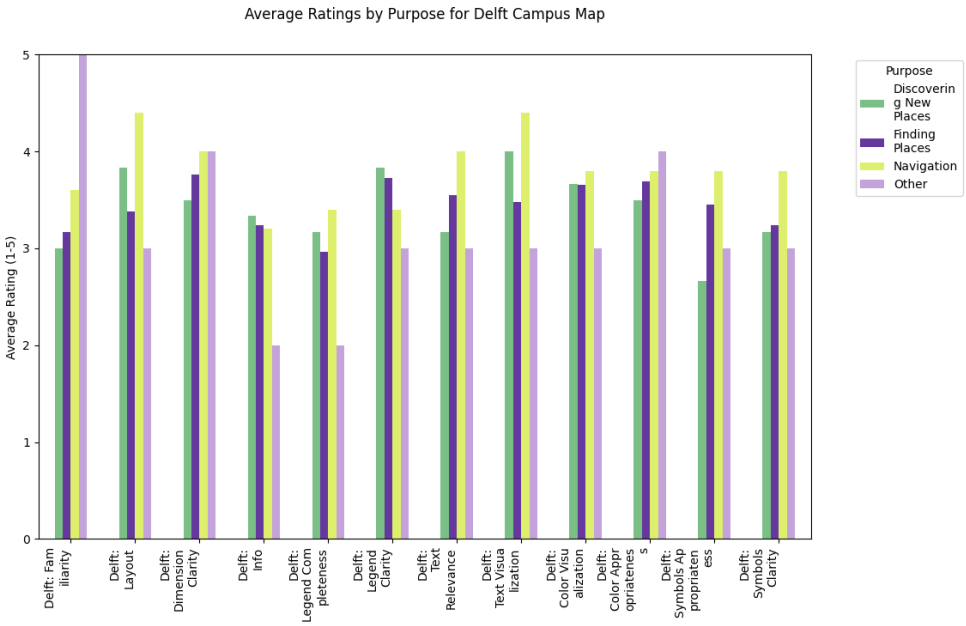


Figure E.4: The average ratings of different map elements divided by the purpose respondents assign to the map

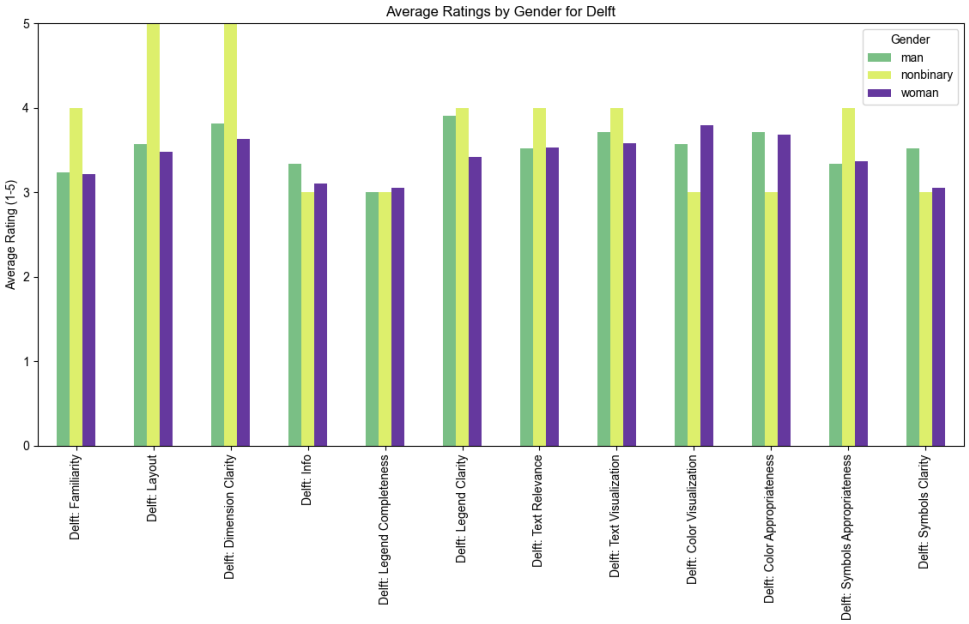


Figure E.5: Average rating per elements per gender, Delft

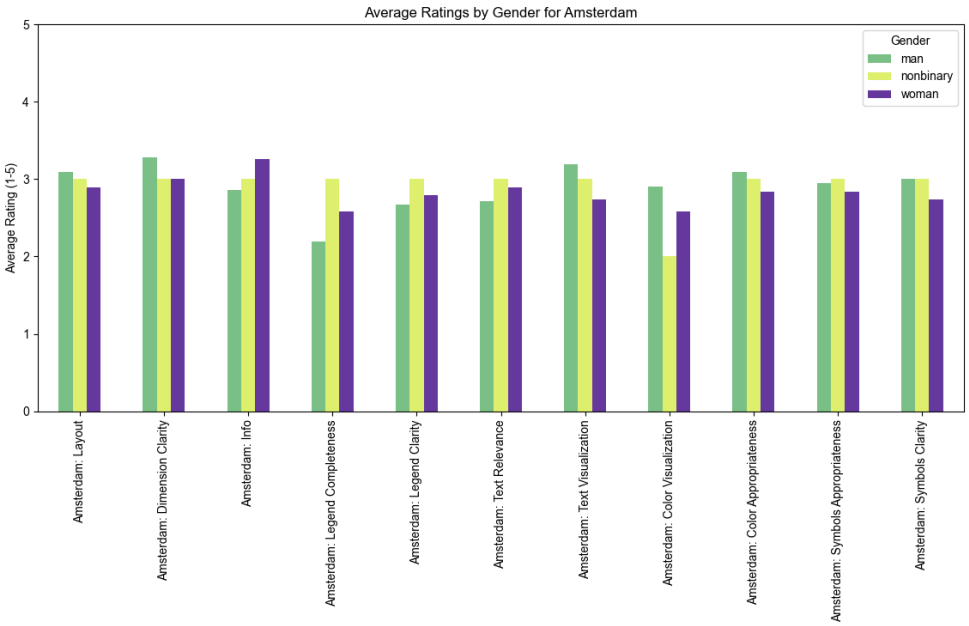


Figure E.6: Average rating per elements per gender, Amsterdam

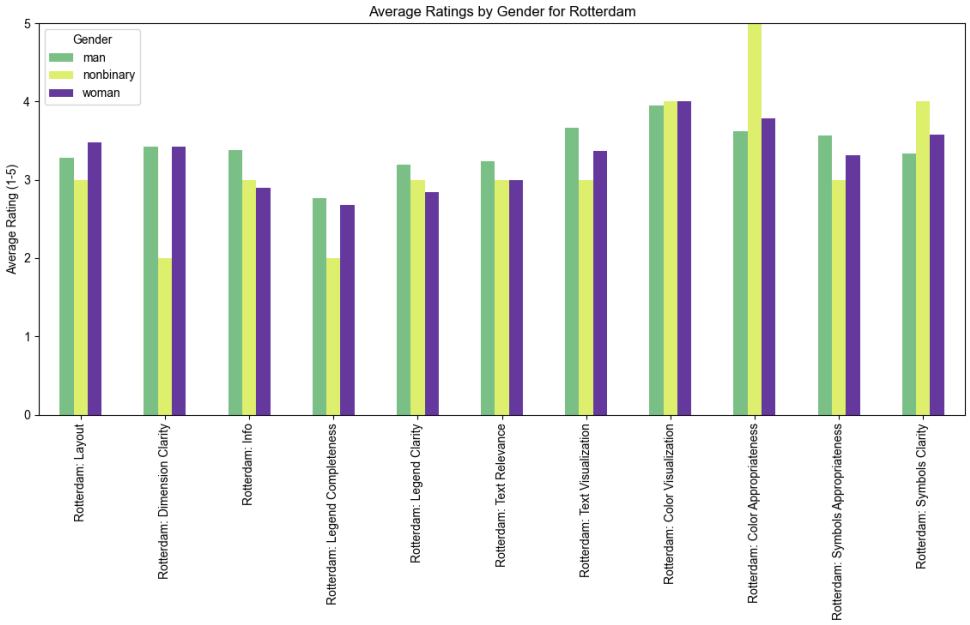


Figure E.7: Average rating per elements per gender, Rotterdam

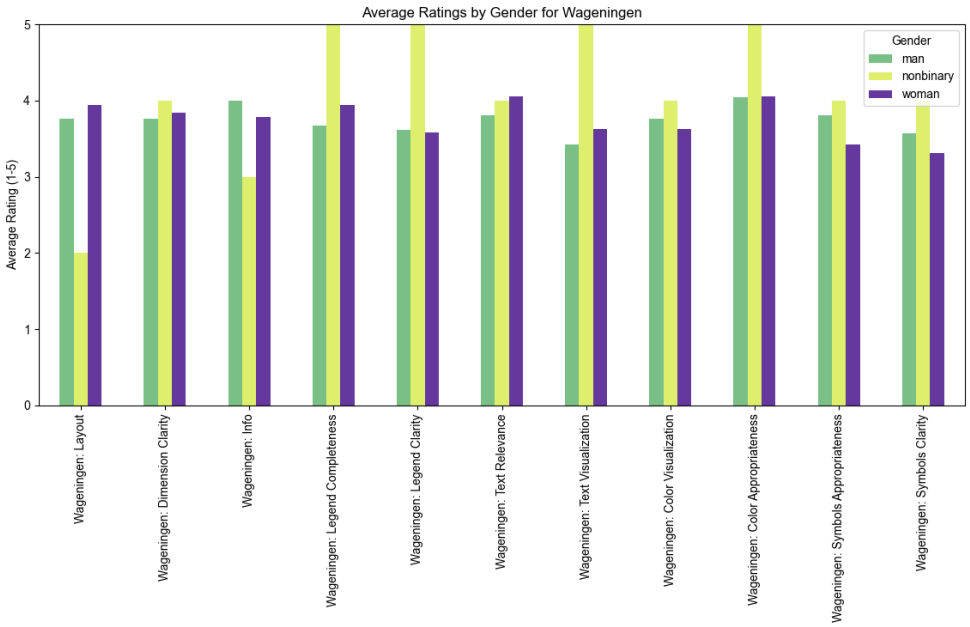


Figure E.8: Average rating per elements per gender, Wageningen

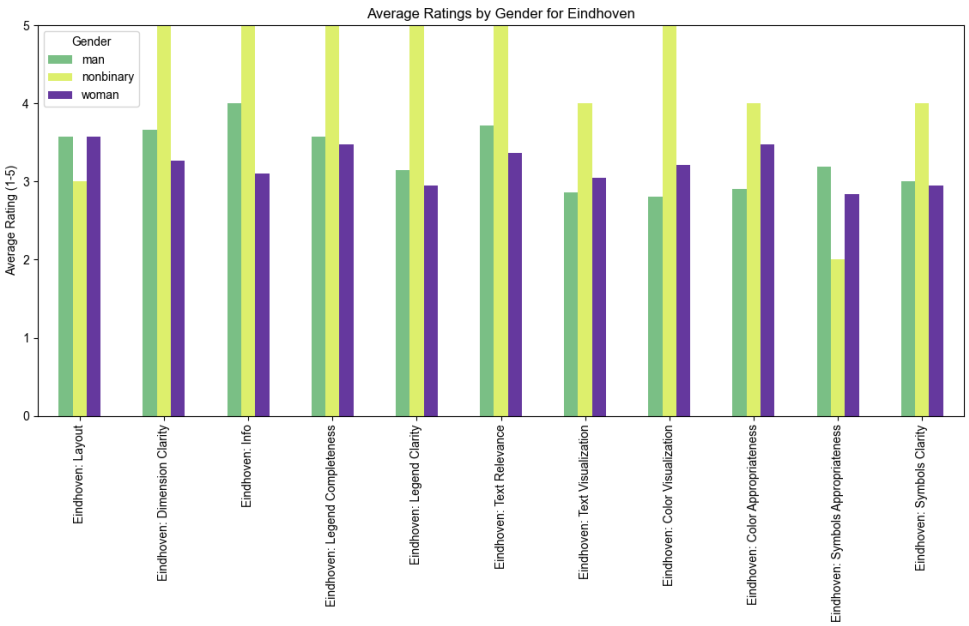


Figure E.9: Average rating per elements per gender, Eindhoven

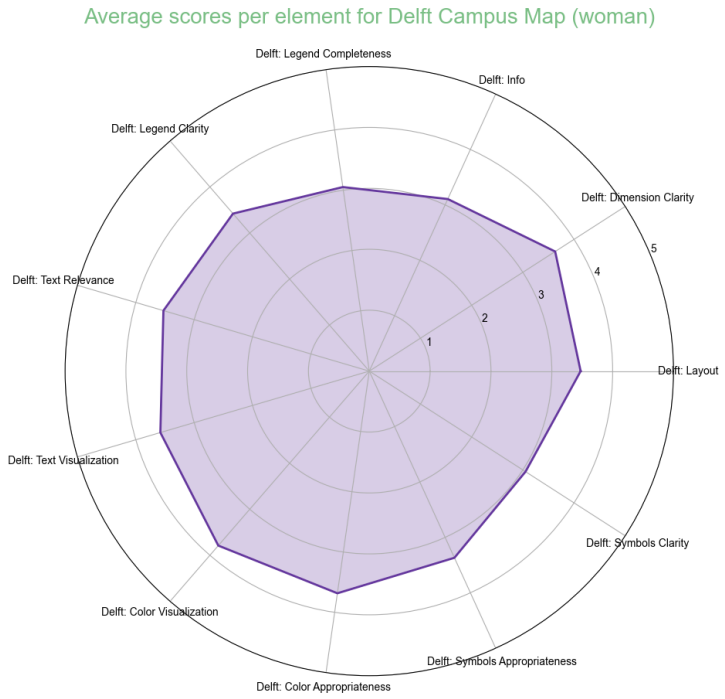


Figure E.10: Larger sized version of the spider chart for TU Delft campus map, by women.

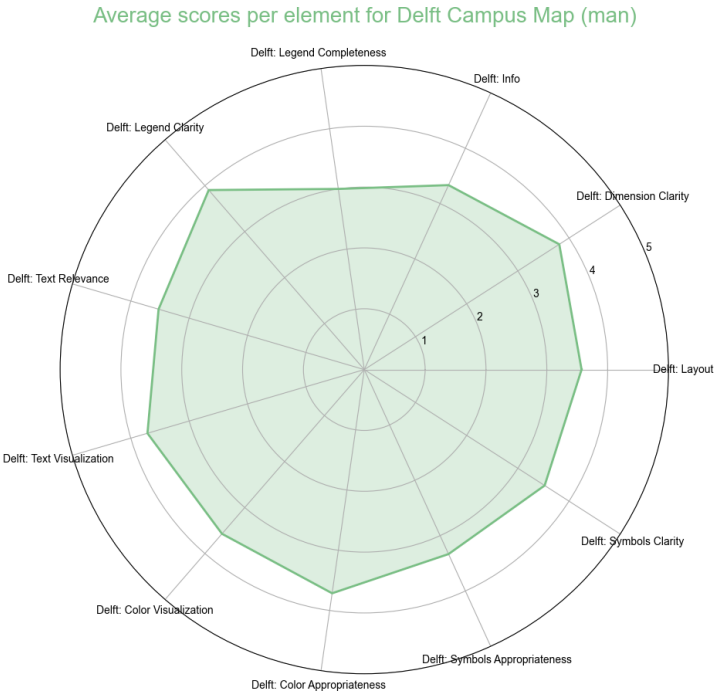


Figure E.11: Larger sized version of the spider chart for TU Delft campus map, by men.

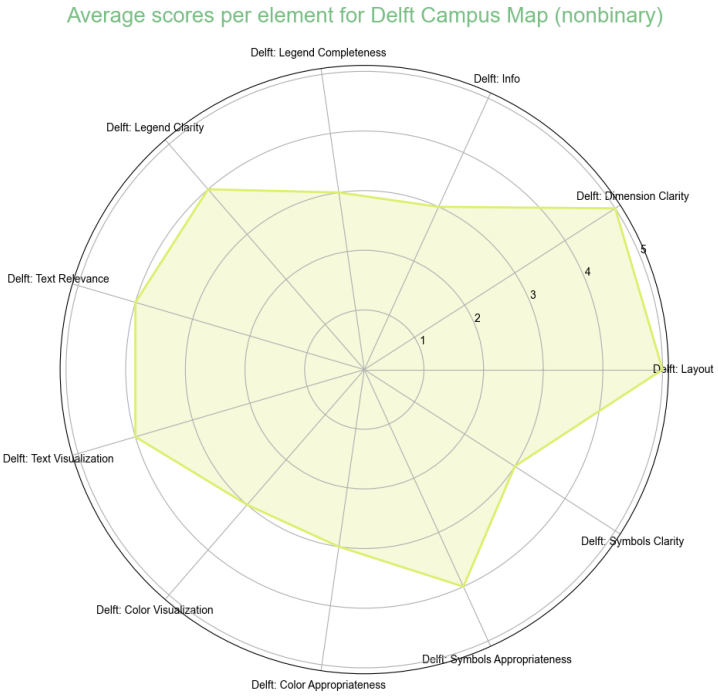


Figure E.12: Larger sized version of the spider chart for TU Delft campus map, by nonbinary respondent.

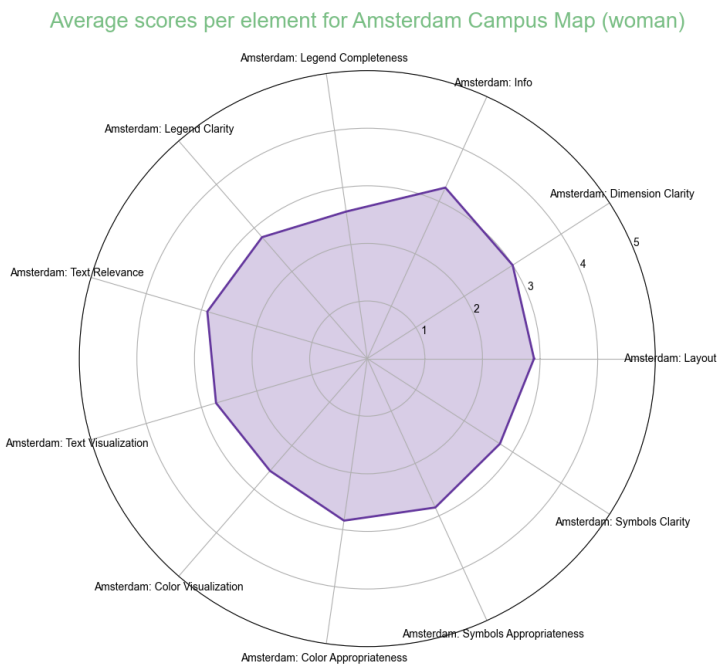


Figure E.13: Larger sized version of the spider chart for VU Amsterdam campus map, by women.

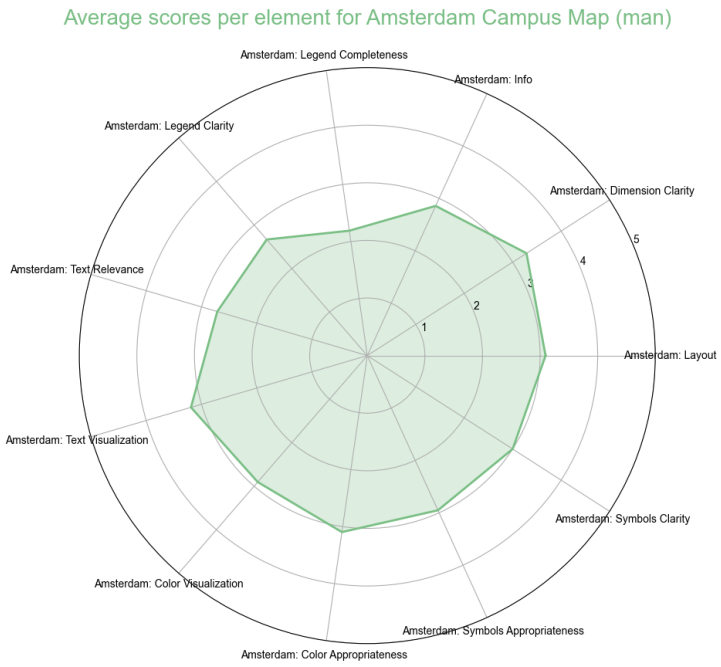


Figure E.14: Larger sized version of the spider chart for VU Amsterdam campus map, by men.

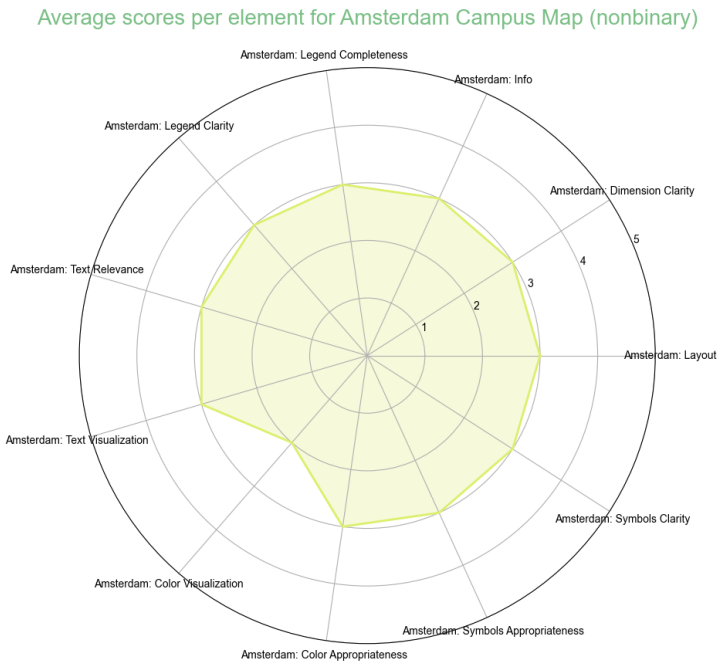


Figure E.15: Larger sized version of the spider chart for VU Amsterdam campus map, by nonbinary respondent.

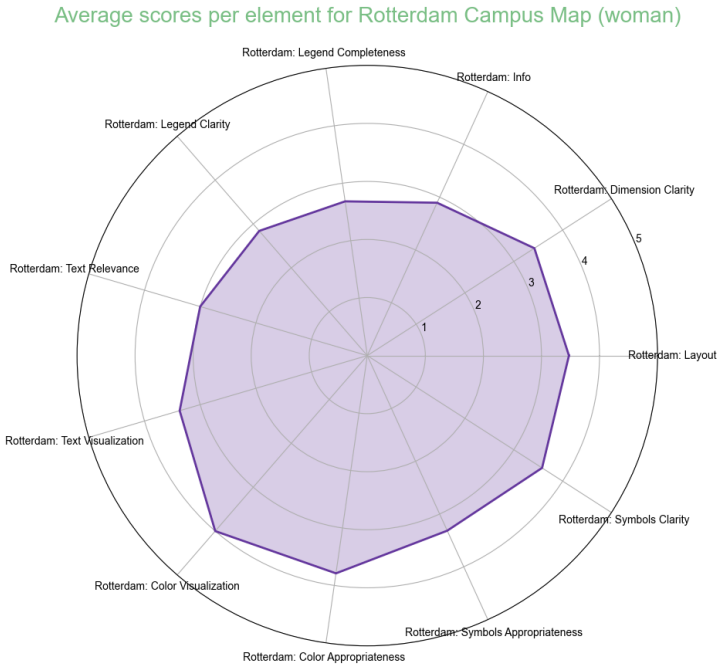


Figure E.16: Larger sized version of the spider chart for Erasmus University Rotterdam campus map, by women.

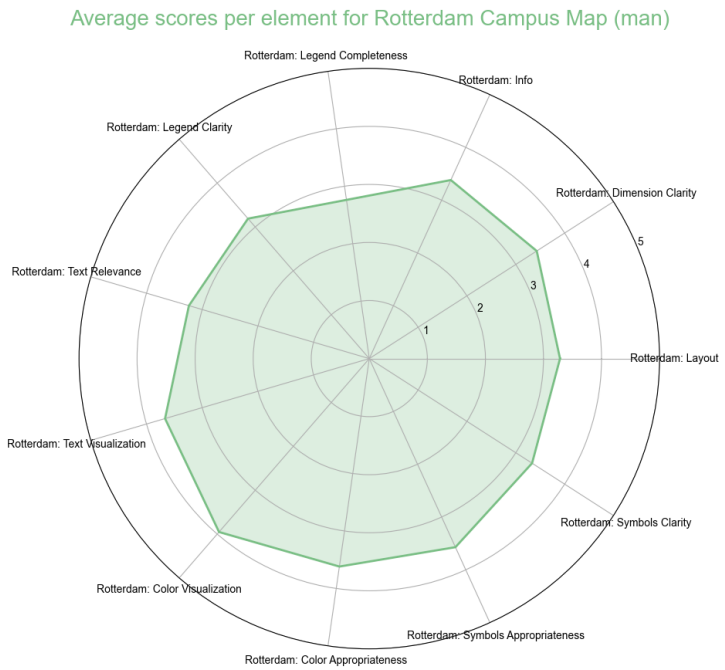


Figure E.17: Larger sized version of the spider chart for Erasmus University Rotterdam campus map, by men.

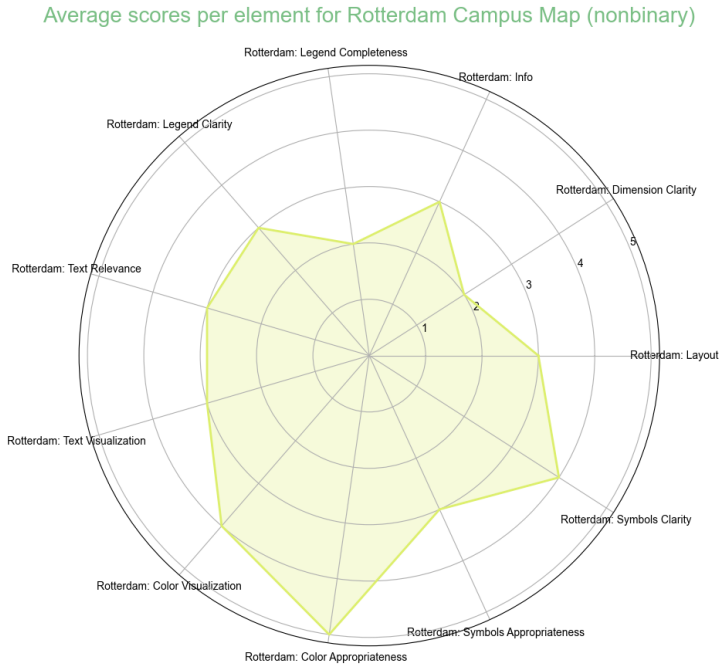


Figure E.18: Larger sized version of the spider chart for Erasmus University Rotterdam campus map, by non-binary respondent.

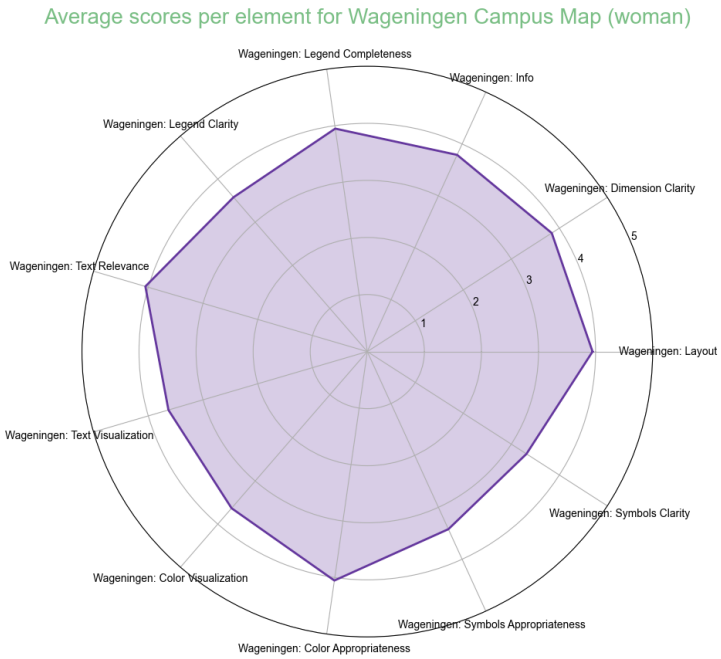


Figure E.19: Larger sized version of the spider chart for Wageningen University and Research campus map, by women.

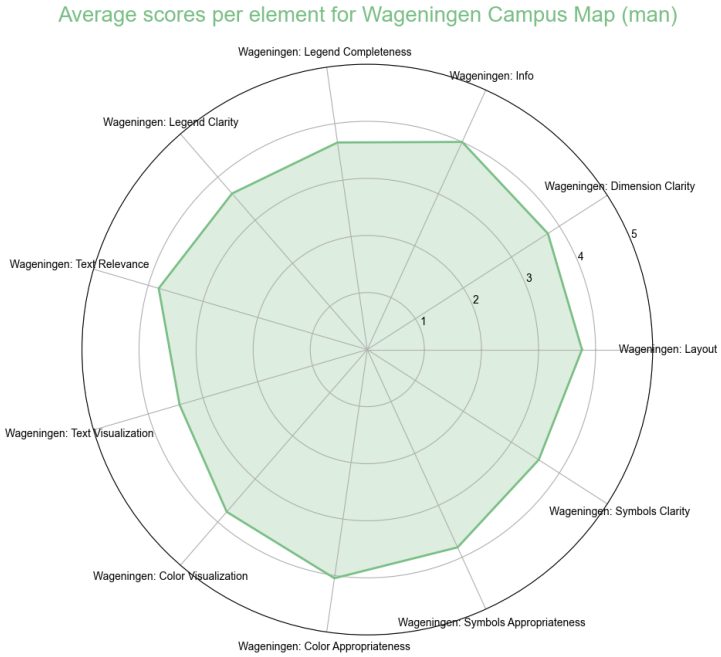


Figure E.20: Larger sized version of the spider chart for Wageningen University and Research campus map, by men.

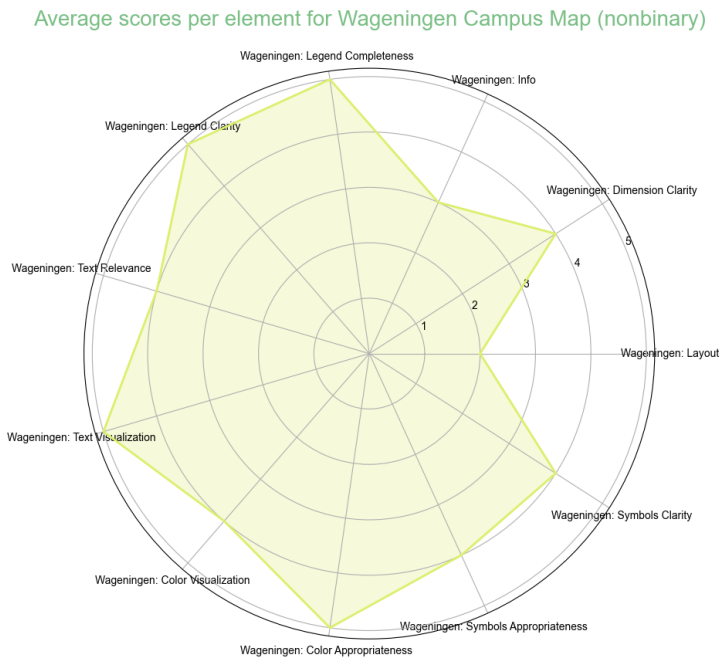


Figure E.21: Larger sized version of the spider chart for Wageningen University and Research campus map, by nonbinary respondent.

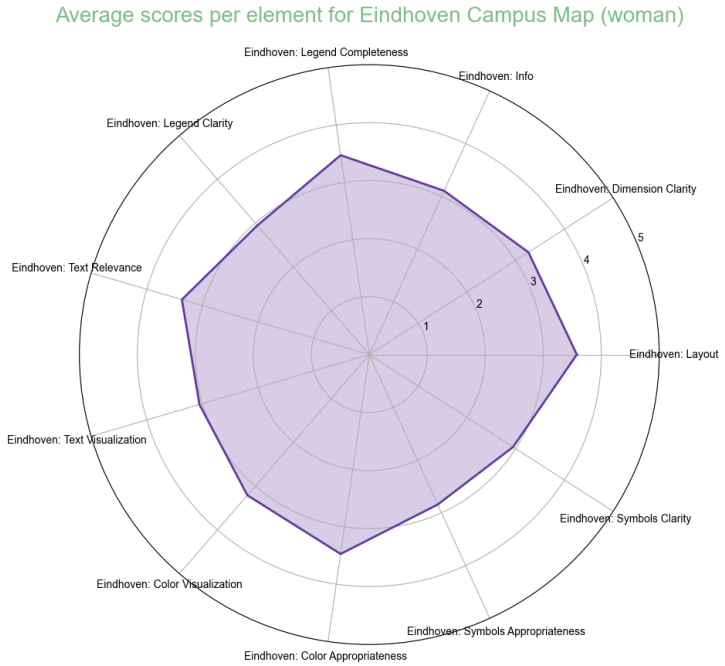


Figure E.22: Larger sized version of the spider chart for Eindhoven University of Technology campus map, by women.

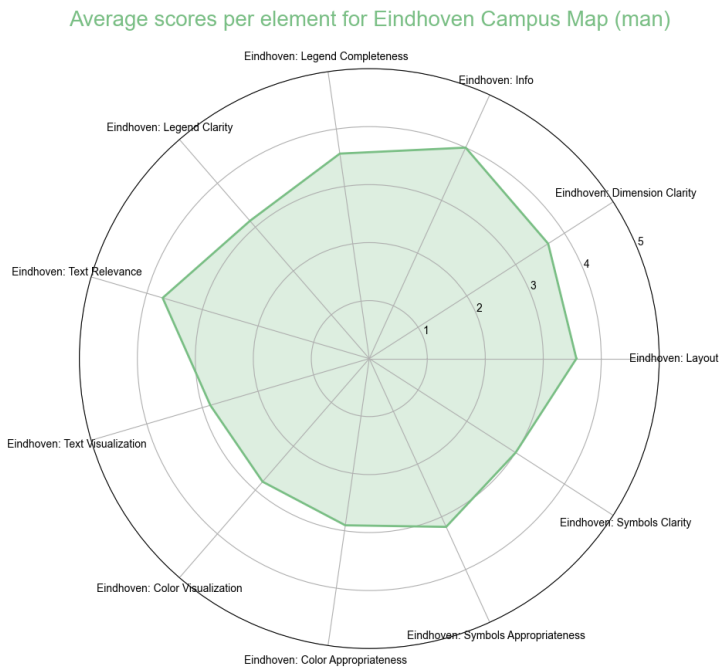


Figure E.23: Larger sized version of the spider chart for Eindhoven University of Technology campus map, by men.

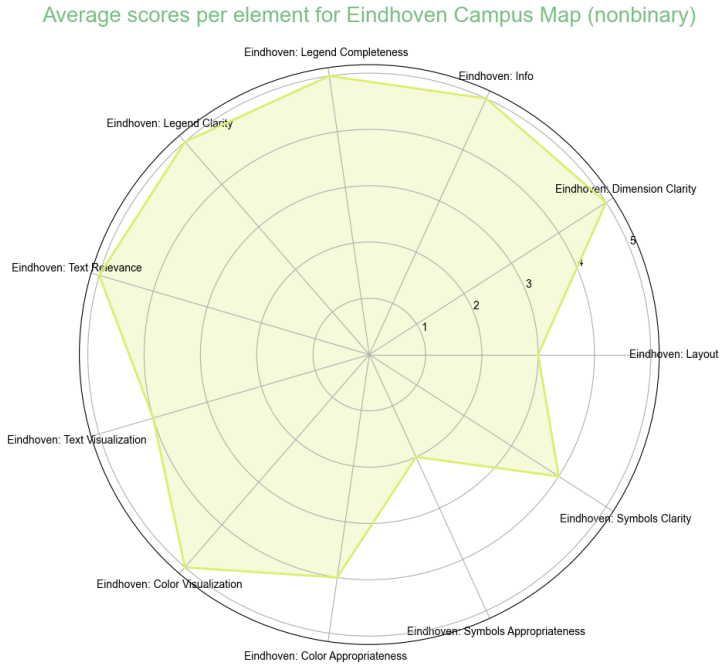


Figure E.24: Larger sized version of the spider chart for Eindhoven University of Technology campus map, by nonbinary respondent.

F Follow-up Interviews

Interviewee	Age	Gender	Connection	Location	Nationality	Campus Visits	Activities	Faculty	Transport Mode	Purpose of Map
1	25	woman	Master	Campus	Dutch	>5 times a week	Study, hobbies, cafes, student association, recreation	Applied Sciences	Bike	Finding places
2	27	man	Master	Delft	Greek	less than once a week	Study, cafes	Architecture and the Built Environment	Bike	Discovering new places
3	25	man	Master	Campus	Dutch	>5 times a week	Study, work, hobbies, recreation, I live on Campus'	Mechanical Engineering	Bike	Other
4	27	man	Master	Delft	Greek	>5 times a week	Study, hobbies, cafes	Architecture and the Built Environment	Bike	Finding places
5	24	man	Master	Delft	Dutch	Normally 1-4 times, currently almost never	Study, student association	Architecture and the Built Environment	Bike	Finding places
6	28	woman	Master	Delft	Greek	1-4 times a week	Study, cafes, recreation	Architecture and the Built Environment	Bike	Finding the shortest route
7	26	woman	Master	zuidholland	Dutch	1-4 times a week	Study, hobbies	Architecture and the Built Environment	Walking	Finding places
8	24	man	Master	Delft	Dutch	1-4 times a week	Study, hobbies, cafes, student association	Architecture and the Built Environment	Bike	Finding places
9	25	woman	Master	Campus	Dutch	>5 times a week	Study, hobbies, recreation	Mechanical Engineering	Walking	Finding places
10	21	man	Master	Delft	Dutch	less than once a week	Work, hobbies, cafes, recreation	Mechanical Engineering	Bike	Finding places
11	25	man	Master	Delft	Dutch	1-4 times a week	Study, cafes, recreation	Architecture and the Built Environment	Bike	Discovering new places

F.1 Interviewee 1, woman, Applied Sciences

Familiarity

- Can you elaborate on your familiarity with the TU Delft campus map?
  I've seen it but never studied it extensively. I've never really needed it because I know the campus well. I became intrigued after you showed it to me.
- Why are you very familiar or not at all familiar with it?
  I found it hard to locate the maps, and there isn't one clear version that seems to be the definitive map. A physical location where the map is displayed would be helpful. Building numbers are not always logical, but in some cases, they are useful to avoid confusion between different buildings.
- What has influenced the frequency of your use of the map?
  I don't really need to consult the map because I know the campus well.

Appropriate for Use

- To what extent does the TU Delft campus map fit your needs and why?
  The map shows where buildings are, but it doesn't indicate important things like the faculty. The pathways on the campus aren't very clear on the map, making it harder to navigate.
- What do you think could be improved to fit your needs better?
  Adding clearer symbols for faculties and improving the differentiation of pathways on the map would make it more useful. The list and contrast on the Delft map make it hard to distinguish all the paths clearly.

Ranking

- Can you elaborate on your ranking of the maps?
  - Wageningen is very clear, and the north is indicated on the map.
  - Eindhoven is neat with nice colors and little clutter. It's easy to find the university buildings, but faculties are more essential than finding cafes.
  - Rotterdam is aesthetically pleasing, but too many extra elements are distracting.
  - Delft misses contrast and details, making navigation harder. It's not clear that it is a car-free campus.
  - Amsterdam was confusing with poor visual clarity.

Personalized Questions

- You mentioned that the Delft map doesn't emphasize the campus buildings, can you elaborate?
  The campus buildings are the most important features, but the map doesn't reflect that. It would be better if the map made these buildings more prominent.
- You mentioned missing the symbols for the faculties in the Delft map, can you elaborate?
  Having clear symbols for the faculties would help people navigate the campus more easily.
- You said you like the walking stick man on the Delft map, why is that?
  It helps in estimating walking distances and gives the map a human scale, which adds a sense of relatability to an otherwise flat, cold map. This feature helps to decide whether you should take the bus, bike, or walk.
- You said the color use in Wageningen feels logical, can you elaborate?
  The colors are realistic and help with orientation. It doesn't abstract too far from reality, and the 3D representation adds to the realism and adds context to a building, helping with navigation.
- Why do you dislike the use of QR codes in the Amsterrdam map?
  When you're standing in front of a map, you don't want to have to use your phone. It's an extra step, and people with disabilities might have difficulty scanning QR codes. All information should be available in one place. Now it feels like an "extra". I do like the telephone number, that's efficient for reaching someone to ask for help. Disabled toilets shouldn't only be marked via QR codes; they should be visible on the map, as not everyone can access QR codes easily.
- Why do you like the drawn style of the Rotterdam map?
  It's very fun, but maybe too informal. All extras are distracting. The human aspect is fun, but this is too much. The Rotterdam map feels too playful, similar to an amusement park map, like the Efteling map, and less suitable for an official university map.

F.2 Interviewee 2, man, Architecture and the Built Environment

Familiarity

- Can you elaborate on your familiarity with the TU Delft campus map?
  I've used the digital version, mainly in the first week to check facilities or find cool places. After that, Google Maps was easier and sufficient.
- Why are you very familiar or not at all familiar with it?
  I haven't used this exact map before, mainly because I don't need it often. Google Maps fulfills most of my navigation needs.
- What has influenced the frequency of your use of the map?
  I am not on campus more than once a week. I mostly rely on Google Maps for navigation, and only needed the map during the first few weeks to familiarize myself with the facilities.

Appropriate for Use

- To what extent does the TU Delft campus map fit your needs and why?
  The TU Delft map is quite general and I expect it to work for most people. I'm curious to see what it would look like if the green was less present. The dark purple of the buildings really stands out, and is confusing. Most of the time the buildings are grey. Why would you point out pedestrian areas? You can walk everywhere anyway.
- What do you think could be improved to fit your needs better?
  It would help if the colors of the buildings were more balanced and less overwhelming. The dark purple, for instance, is confusing.

Ranking

- Can you elaborate on your ranking of the maps?
  - Wageningen provides the right amount of information, clear and easy to understand.
  - Eindhoven is balanced, but nothing stands out too much, similar to Google Maps.
  - TU Delft is useful for most people and quite general. Aesthetically less pleasing than the other maps.
  - Rotterdam is aesthetically pleasing, but less relevant buildings should stand out less. The north arrow is confusing.
  - Amsterdam's map is poorly explained, the colors and text combination are not clear, and shadows seem unnecessary.

Personalized Questions

- You mentioned that the green areas could be less prominent on the Delft map. Could you explain?
  I'm curious how it would look if the green was less prominent and the buildings stood out more. Most of the time, the buildings are grey in real life, and I expect the map to reflect that.
- Why do you think the dark purple on the Delft map is confusing?
  The dark purple used for pedestrian areas is confusing. You can walk everywhere on campus anyway, so it doesn't make sense to highlight that area in such a prominent color.
- You said Eindhoven's map looks familiar, can you explain why?
  The map looks similar to Google Maps, which makes it feel familiar. The colors are nicely balanced, and nothing stands out too much.
- What are your thoughts on the aesthetic of the Rotterdam map?
  The Rotterdam map is aesthetically pleasing, but the north arrow also adds some confusion when trying to orient yourself.
- You mentioned Google Maps as your preferred tool. How do you think the campus map compares?
  Google Maps does most of what I need. If the schedule was integrated into the Delft map, showing what room I need to be in, it would be more useful, but only for the first few weeks of the semester.

F.3 Interviewee 3, man, Mechanical Engineering

Familiarity

- Can you elaborate on your familiarity with the TU Delft campus map?
  I don't use it much because I already know the campus well. I only use it occasionally to show new people how to navigate the campus.
- Why are you very familiar or not at all familiar with it?
  I don't need the map very often because I've learned my way around the campus. I found my way around the campus by going with people.
- What has influenced the frequency of your use of the map?
  I don't visit many different places on campus, so I know the campus quite well. I haven't needed to use the map for most of my time here. At a certain point, you know all the places you need.

Appropriate for Use

- To what extent does the TU Delft campus map fit your needs and why?
  The map is useful when explaining routes to new students, but since I know the campus, I haven't found a need to use it myself.
- What do you think could be improved to fit your needs better?
  It would be helpful if the faculty names were included on the map for people who have never visited the campus. Having maps placed in visible locations could also help instead of handing them out, which is unnecessary.

Ranking

- Can you elaborate on your ranking of the maps?
  - Wageningen is clear, complete, has useful information and a clear layout. The 3D element is neat and clear, and helps recognizing buildings. Realistic color use works well for orientation.
  - Delft is well-structured, but the faculty names need to be added.
  - Eindhoven is a bit strange because the grid on the map is not very clearly explained.
  - Amsterdam has unnecessary shadows and an unclear layout.
  - Rotterdam is chaotic and includes too much irrelevant information this map won't help you find your way. The 3D element is chaotic

Personalized Questions

- You said that a lot of text in the Rotterdam map doesn't help. Could you explain what you mean?
  Maps like the one from Rotterdam have too much text, which can distract from the main information. It could be clearer with less text.
- You said the faculty names should be added to the Delft map. Could you elaborate?
  It's important for visitors or new students to know the faculty buildings by name. Including those on the map would make it more practical.
- How do you feel about the use of drawn people on the Rotterdam campus map?
  The poppets are a bit too much. You can imagine what you would do in those places, you don't need a drawing of a person there. They reduce practicality.
- You mentioned the green areas and parks on campus are not reflected well in the Delft map. How could the map reflect these better?
  The Mekelpark area could be made clearer on the Delft map, showing that it's a nice area. It could be maybe shown with a different shade of green or tree symbols, similar to how Wageningen does it. It's nice when a map reflects the amount of green, or footbal fields.
- How would you suggest showing the walking distances on the maps?
  The walking stick man in the Delft map is funny, but everyone walks at different speeds, so the time indication is not correct for everybody. A distance indication would work better

F.4 Interviewee 4, man, Architecture and the Built Environment

Familiarity

- Can you elaborate on your familiarity with the TU Delft campus map?
  I don't use it much because I orient myself by moving around the campus. I mainly use it to find out which building my exam is in.
- Why are you very familiar or not at all familiar with it?
  I don't use the map often because I know the campus well and can navigate it by myself. Most of the time, I can just find my way by walking around the campus.
- What has influenced the frequency of your use of the map?
  The only time I use the map is to find a specific building number for exams. The room number/location starts with the building number, then floor and then room. I took me a while to understand that. Otherwise, I know my way around the campus and don't need to use the map.

Appropriate for Use

- To what extent does the TU Delft campus map fit your needs and why?
  It helps me find building numbers, but understanding the shape of the buildings and the entrances is difficult without more detailed geometry or 3D representations. For someone new to the campus, it might not be that easy to use.
- What do you think could be improved to fit your needs better?
  It would be helpful if landmarks like the Aula were labeled more clearly so people could use them as reference points. A more detailed plan or 3D view of the buildings would also help people understand the structure and entrances. Moreover, it could be more zoomed in, so you can see the difference between road and bicycle path.

Ranking

- Can you elaborate on your ranking of the maps?

  – Wageningen is great because it gives the reader a clear idea of the building sizes and architecture. The color division is easy to understand, even for someone using a map for the first time. Because all the roads are clear, you can estimate distance in the map.
  – Rotterdam's map feels more like a comic, which might be fun but doesn't suit an official campus map. The legend is lacking, you still need to look it up in the map.
  – Delft is okay, but you cannot understand the nature of the building entrances or how to approach them.
  – Eindhoven has a bad legend because you need to read everything. It could be improved by using categories like Wageningen does.
  – Amsterdam colors are not explained and the legend is not very detailed. The QR codes are a good thing.

Personalized Questions

- You mentioned that the TU Delft map mainly shows buildings. How could it be improved?
  The TU Delft map could be improved by showing new things you don't know about better. For example, parks or green spaces are not highlighted well, as well as the nice green village. Showing these features would make the map more useful for people living on campus.
- How do you feel about the use of QR codes on the Amsterdam campus map?
  QR codes could be useful for specific things like parking spots. However, for public transport, I think symbols would work better.
- What features would you prioritize in a campus map?
  Parking spaces and faculty buildings should be prioritized.
- You said that people use the Wageningen map to understand what's happening on campus. Can you explain?
  The Wageningen map shows not only buildings but also areas of interest, parks, and green spaces. It gives a better understanding of what is happening on the campus, which makes it more useful for people living or working there. The quality of the area is reflected well.
- How does the 3D representation of the Wageningen map work for you?
  A 3D view of the buildings would help people understand the campus better, especially when it comes to finding building entrances or specific areas. It works well to promote the quality of the area.

F.5 Interviewee 5, man, Architecure and the Built Environment

Familiarity

- Can you elaborate on your familiarity with the TU Delft campus map?
  I haven't seen this specific map before because online there are many different maps available. If I need to find a building, I use Roomfinder instead.
- Why are you very familiar or not at all familiar with it?
  I haven't used it often because I couldn't find it easily. I rely on other methods to find my way around.
- What has influenced the frequency of your use of the map?
  The map is not easy to find online, so I don't use it often. I only use it when I specifically need to navigate to a building.

Appropriate for Use

- To what extent does the TU Delft campus map fit your needs and why?
  The map is quite complete but could be improved. One annoying aspect is that you need to flip to page 2 to find faculty numbers. It would be more helpful if building colors were linked to faculties.
- What do you think could be improved to fit your needs better?
  Building colors that match faculties would be a useful addition. The map is already quite detailed.

Ranking

- Can you elaborate on your ranking of the maps?

  – Eindhoven is ranked highest because of its clean layout and good color use. It is easy to navigate, and the building names are shown clearly. I wouldn't know what else to use a map for than for navigation.
  – Wageningen is useful, but the buildings are shown at an angle, which makes navigation harder since north isn't pointing upwards. This might be a nerd opinion, but north should be pointing upwards. However, the realistic color use keeps things clear, which is important.
  – Delft is functional, but the faculty numbers are harder to access.
  – Amsterdam is easy to understand, but the color choices are not ideal. The overlap between trees and grass makes them hard to distinguish, especially for colorblind users.
  – Rotterdam ranks lowest because the 3D design seems to focus more on aesthetics than functionality. The chaotic composition makes it hard to figure out where to look. It does look better in real life than on the phone. It also contains irrelevant information.

Personalized Questions

- How does color usage affect your experience with the maps?
  Realistic color use is important to keep things clear. On some maps, like the Amsterdam map, color choices could be improved, especially for distinguishing between trees and grass. Important features should stand out. A color blind person could probably not use the Amsterdam map.
- How important is a proper campus map in general?
  It depends on the university. It's especially important for people who weren't able to attend introductory days. The map becomes more useful when you need to go to many different buildings.
- You mentioned that the Rotterdam map shows public spaces. How does this compare with the Wageningen map?
  Wageningen also shows different public spaces, but Rotterdam does a nice job of showing pleasant areas like cafes and gathering spots, which adds to the "atmosphere" of the campus. I hadn't thought about a map displaying "atmosphere" before.

F.6 Interviewee 6, woman, Architecture and the Built Environment

Familiarity

- Can you elaborate on your familiarity with the TU Delft campus map?
  I've encountered it mainly when looking for exam buildings or classrooms. I only use it for finding exam locations.
- Why are you very familiar or not at all familiar with it?
  I haven't used it much because it's not detailed enough for finding classrooms. There are no numbers for classrooms or floors.
- What has influenced the frequency of your use of the map?
  I only use it when I need to navigate to specific exam buildings. For other purposes, I'd look for another map or ask for directions once I reach the building. Especially because the Architecture faculty has a complicated layout, for those types of buildings it's a bigger problem that they are not depicted in a lot of detail.

Appropriate for Use

- To what extent does the TU Delft campus map fit your needs and why?
  The map isn't detailed enough for complex buildings. There are no room numbers or floor indicators, which makes it less useful for finding classrooms.
- What do you think could be improved to fit your needs better?
  Adding information like room numbers, floors, accessibility entrances for handicapped people, and bike parking would make the map more helpful. It also needs a north arrow and details like traffic lights and crosswalks.

Ranking

- Can you elaborate on your ranking of the maps?
  - Wageningen is the clearest. The trees are nice, and the colors and 3D are pretty However, the symbols don't always feel representative for what they mean.
  - Rotterdam is well-designed, with a nice 3D layout, but the legend is too focused on food and drinks, and some random facts. Legend feels superfluous. The overall design is nice and has potential. And the map feels communicative.
  - Eindhoven is complicated, and the legend is difficult to read. It's hard to navigate, but the north arrow and grid are helpful. It's a serious map.
  - Amsterdam provides basic information like coffee, parking, and wheelchair access, but it's not the basic information for students.
  - TU Delft does the minimum; it's functional but lacks the necessary details for navigation. I also feels like a serious map.

Personalized Questions

- You mentioned the lack of classroom numbers, bike parking, and accessibility information on the Delft map. How does this affect the map's usability?
  Without these details, the map isn't very useful for planning your route, especially if you need to decide on a mode of transport. If you don't know where the bike parking is, you don't know if you can cycle there. If there are a lot of traffic lights, you might have to leave earlier. If you're less familiar with the campus, more information is appreciated in the map.
- Are there specific groups of people who might find the Delft map less helpful as a result?
  People with disabilities or those unfamiliar with the campus might struggle. Without information on bike parking, accessibility entrances, or traffic lights, they'd have a harder time planning their routes.
- You said the green areas on the Delft map aren't sufficiently explained. How would you want them explained?
  It would be helpful if the map showed different types of green spaces, like grassland or forests. This could also be useful for safety concerns, as some areas, like forests, might feel unsafe to women. You could also plan your route according to what is nice to see.
- You noted that the Amsterdam map includes elevators and access points but still feels empty. Can you elaborate on this?
  The Amsterdam map shows some accessibility features, but it's missing more detailed information like indoor navigation, rooms, or studying areas for students. Why would you add the shadows? It doesn't add

anything.

- You said the Amsterdam map lacks clarity about who it addresses. Could you explain?
  It's unclear if the Amsterdam map is meant for students or visitors. It should include more details for students, like room locations and entrances, to make it more useful for a wider audience. Studying points should be easier to find on the map for new students.
- You said the Eindhoven map is not adequate for navigation purposes. Could you elaborate?
  The map's scale is too small for indoor navigation, and it's hard to find entrances. The overall layout of the campus is not well-structured, making it difficult to navigate.
- How does the color use in the Eindhoven map compare to other maps?
  The color use in Eindhoven is not very vibrant, but it works for communication. The green parts are easily visible, and the water is blue, which makes sense. However, Rotterdam uses more varied colors, making it more engaging.
- Hoe important is it to have a proper campus map? *Very important to have a proper map. When you're navigating the city, you use google maps. But those maps don't care about a detailed representation of the campus. So it is the campus's responsibility to make a very detailed map.*

F.7 Interviewee 7, woman, Architecture and the Built Environment

Familiarity

- Can you elaborate on your familiarity with the TU Delft campus map?
  I became familiar with the map during my first year, as I had to visit many different buildings. It was also laid out in front of you in the first week. For exams, I often used it to find the building.
- Why are you very familiar or not at all familiar with it?
  I'm familiar with it mostly from those early years, but now I don't need it as much since I know the campus. When you're given a building number, you use the map, but only when necessary.
- What has influenced the frequency of your use of the map?
  I don't use the map often anymore because I know where everything is, especially the two ends of the campus where I spend most of my time, like X and the Faculty of Architecture. I don't often need to be anywhere else than Architecture.

Appropriate for Use

- To what extent does the TU Delft campus map fit your needs and why?
  It shows where buildings are located, but it doesn't indicate their function or faculty. For example, you wouldn't know that X is a sports facility unless you already knew. Maps like Wageningen show the function of buildings better.
- How does the representation of the campus on the map align with the way you use the campus?
  It doesn't at all. Especially compared to the 3D maps. Those show how you move through the campus, and you recognize buildings and parks. The only thing I recognize in Delft is the long axis going through the middle. I wouldn't look at this map for fun, but only to find something.
- What specific improvements (additions, changes, or removals) would make the map better suited to your needs?
  More focus on recognizable landmarks would help, such as the EWI building to use as a reference point. Along with functions of buildings and outdoor spaces. It would be useful if there were clearer distinctions for parks and green areas. You have to create the recognizability using the outdoor spaces, because with the buildings that might be harder.

Ranking

- Can you elaborate on your ranking of the maps?

  - Wageningen uses 3D representation well and includes green spaces, which makes the campus feel more complete. However, the green of the icons does not stand out enough, and the square shape makes them look similar.
  - Rotterdam's aesthetic design makes it functional, because you can place yourself in it, even though it's more focused on looks. It also includes the faculty names, unlike Delft.
  - Eindhoven uses icons well but they are all blue which is too generic. It's hard to distinguish different areas.
  - TU Delft is too functional. The long road is the only thing you recognize, and there's no clear distinction between buildings and green spaces.
  - Amsterdam's map uses icons effectively but it's a very ugly map. There could have been a little more information on the map.

Personalized Questions

- You said the Delft map mainly shows buildings and lacks other functions. What other functions would you like to see?
  I'd like to see more focus on green areas, parks, picnic spots, and different kinds of spaces. The map should show how the green spaces and water features can be used. For instance, Delft has many leisure spaces that aren't represented on the map.
- You mentioned that the color use works well to associate certain features in the Deft map. Can you elaborate on this compared to other maps?
  The green and blue colors on the Delft map are logical, and the purple buildings stand out. In contrast, the color use in Eindhoven doesn't pop as much, and in Wageningen, the grey buildings blend into the background. Realistic colors work well, but some things need to pop out.
- You described the Amsterdam map as chaotic with a lot of information. Can you explain the tension between quantity and quality?

The Amsterdam map is overwhelming because the colors and QR codes are confusing. There's too much going on, and it's not clear what the most important information is, or where to look.

- You said the Eindhoven map focuses on buildings rather than activities. How does this affect campus use? *The Eindhoven map only shows buildings and departments, which limits its usefulness. It doesn't provide information on public transport routes, which is something I'd expect to see.*
- How important is a proper campus map to you? *To me personally, a proper map is not that important. I don't need a map anymore. If you're unfamiliar to a campus it is very useful. The Amsterdam map is scandalous, with that you say "We don't care". The Rotterdam map is clearly well thought of. I't about the appearance of the campus itself, like a business card.*
- Any other comments?
  I first saw the Delft map and thought it was fine. But then, after seeing the other maps, you look back and think "that was actually quite bad". I never thought about an axo view as a map before, but it's actually quite nice. It's not flat and boring.

F.8 Interviewee 8, man, Architecture and the Built Environment

Familiarity

- Can you elaborate on your familiarity with the TU Delft campus map?
  I've seen the map before and recognized it, but I've never used it. When I need to find something on campus, I just use Google Maps, and by now, I know the campus well.
- Why are you very familiar or not at all familiar with it?
  I don't need to use it often because I already know where everything is. Google Maps is easier to use, and the campus map doesn't clearly indicate faculty names.
- What has influenced the frequency of your use of the map?
  Since Google Maps works well for navigation, and I already know the campus, I haven't found a need to use the campus map.

Appropriate for Use

- To what extent does the TU Delft campus map fit your needs and why?
  It's missing key information like faculty names, sports, and culture facilities, which are important for people unfamiliar with the campus. Writing the faculty names on the map would make it more useful.
- What do you think could be improved to fit your needs better?
  Adding the faculty names and clearer indications for sports and cultural facilities would be a great improvement. People who aren't familiar with the campus would benefit from having this information.

Ranking

- Can you elaborate on your ranking of the maps?

  – Wageningen's green areas feel exaggerated. There isn't enough distinction between parks and sports fields, which use the same color.
  – Amsterdam's map has unclear entrances; the dots don't feel like proper entrance markers. They could be improved with arrows or lines. It doesn't really matter if a map is ugly. Now I look at the maps again, maybe the Amsterdam map scores lower. It's not that clear after all.
  – Rotterdam's 3D design is confusing because the buildings don't use realistic colors, even though it is in 3D. The extra elements don't add anything. You look around you to find fun spots, not on the map.
  – Eindhoven is too zoomed out, and the legend is unclear. There's too much information about the surrounding area, and elements like "D3" are confusing.
  – Delft looks neat, but it lacks faculty names, making it harder to navigate. The green areas are exaggerated.

Personalized Questions

- You mentioned that Delft and Wageningen use exaggerated green spaces. Could you explain this?
  Both maps make the green areas feel overemphasized, and it's hard to distinguish between parks and sports fields. For example, in Wageningen, the parks and sports fields are the same color, making it unclear what kind of space it is.
- You said the 3D elements on the Rotterdam map are not realistic. Can you elaborate?
  The 3D design is meant to help you recognize buildings, but since the colors aren't realistic, it actually makes the map harder to use. If the buildings had more realistic colors, it would be easier to navigate.
- How does the orientation of the Rotterdam map affect its usability?
  We're used to maps being oriented north, thanks to Google Maps. When the map is rotated, like on the Delft campus map, it can be confusing, but a slight rotation isn't a big deal.
- You said the Amsterdam map's entrances aren't clear. How would you improve that?
  The entrances are marked by dots, but they don't really feel like entrance points. It would be better to use arrows or lines to make the entrances clearer.
- How important is having a proper campus map?
  It's hard to say, since most people just use Google Maps. However, for people choosing a university or visiting for the first time, a well-designed campus map might be more attractive and useful.

F.9 Interviewee 9, woman, Mechanical Engineering

Familiarity

- Can you elaborate on your familiarity with the TU Delft campus map?
  I haven't used it throughout my time as a student. I usually look up building names rather than numbers, and for that, I use Google Maps. I've only used the campus map when a building only had a number.
- Why are you very familiar or not at all familiar with it?
  I didn't need to use it much. Google Maps shows the route directly, which is enough to find the building.
- What has influenced the frequency of your use of the map?
  I didn't really need it because Google Maps provides routes to the buildings. However, I have used other building floor plans more often.

Appropriate for Use

- To what extent does the TU Delft campus map fit your needs and why?
  It doesn't fit my needs well because I don't use it for navigation or finding routes within buildings.
- What specific improvements (additions, changes, or removals) would make the Delft map better suited to your needs?
  A list correlating building numbers with faculties would be helpful, but even then, it might not be better than Google Maps. The building entrances and service points are useful additions, though.

Ranking

- Can you elaborate on your ranking of the maps?

  – Wageningen is very nice, with recognizable buildings in 3D, making it easy to recognize the campus if you've been there before. It gives a nice overview and is complete.
  – Eindhoven is boring but clear, with colors and layout that match expectations.
  – Rotterdam is a bit too intense, especially with its use of text and colors. Too much is going on, the people drawn in hinder clarity.
  – Delft is fine, but the buildings aren't easily recognizable from the 2D perspective.
  – Amsterdam is the hardest to understand, with only two colors and little detail. The large buildings and lack of roads make it unclear.

Personalized Questions

- You said you find it confusing that the buildings are purple in the Delft map. What makes that confusing, and how would you like the buildings to be displayed?
  I don't associate purple with a building, the use of color is inconsistent and confusing. The grey parts are also confusing, as some buildings are light purple. It would be easier to recognize buildings if the colors were more realistic. I get that they used purple because it stands out more.
- You said "3D shows the buildings more clearly, which makes them more recognizable if you know the campus" about the Wageningen map. Why does it make it more recognizable when you know the campus? What does it mean for people who don't know the campus?
  Even if you haven't been there, 3D gives a sense of the building's shape. It's similar to using Google Maps' street view to place yourself in the environment. Just seeing the building from above can be confusing because that is not what you see when you're walking around the campus.
- You said the Amsterdam map is chaotic with too much information. What would you suggest to improve it?
  Adding a more detailed legend would help. The color use isn't explained well, and the map feels like it's lacking information. A 3D map might make it easier to find buildings. I don't understand anything about the colors.
- You commented on the legend of the Eindhoven map and said "even the place on the map is added." How do you feel about this way of indicating locations compared to the other maps?
  It's helpful because you don't need to scan the whole map to find something. It keeps the map organized, and you can focus on specific parts of the map.
- You said the color use of the Eindhoven map makes it feel like a serious map. Can you explain how the colors contribute to this? Do you feel this seriousness is positive or negative?
  The colors are what you'd expect from a technical university map. They don't stand out, but that's fine because when you need the map, you'll use it anyway. It feels appropriate for the university, making it feel organized and serious.

- You mentioned your main mode of transport on campus is walking. How does this influence the way you navigate? Would it affect the way you use a campus map?
  I don't think it makes much difference between walking and biking. I used to bike more, but I don't see the campus much differently now. However, if you were driving, it would be more important to see parking spots and know where you can drive. The map doesn't clearly distinguish between roads for cars and other paths.
- How important is a campus map?
  For me, it's not that important. I never use it since I know the campus, and once you've had a tour, you don't need it. But for visitors, a clear campus map is important, especially for finding building numbers. It's also important for the university's image—having a well-designed map reflects well on the university.

F.10 Interviewee 10, man, Mechanical Engineering

Familiarity

- Can you elaborate on your familiarity with the TU Delft campus map?
  I've never seen the map before, or it has not stuck in my memory.
- Why are you very familiar or not at all familiar with it?
  I've never encountered it, so I didn't use it.
- What has influenced the frequency of your use of the map?
  I haven't seen it.

Appropriate for Use

- To what extent does the TU Delft campus map fit your needs and why?
  The map works fine for finding everything. All the numbers are included, but the faculties are listed separately, which is a bit annoying.
- How does the representation of the campus on the map align with your needs and the way you use the campus?
  It aligns well. There's one main road with most of the buildings around it, which makes navigation easier. It's like Google Maps, but with a bit more detail, so it's nice.
- What specific improvements (additions, changes, or removals) would make the map better suited to your needs?
  The surrounding area isn't very relevant. In Wageningen, the buildings are very recognizable in 3D, which works well. At first I thought 2D was fine, but after seeing the other maps, it changed my opinion about 3D. It does increase recognizability, so you easily know where you are and where you should go.

Ranking

- Can you elaborate on your ranking of the maps?
  - Wageningen: The 3D buildings make it much more recognizable and easier to find your way.
  - Eindhoven: It's clearer and more intuitive, but it's zoomed out too far, and the legend is a bit unclear.
  - Delft: The legend is good, but it's annoying that the faculties are listed on the back of the map.
  - Rotterdam: The map is fine, but the style is a bit like a zoo map, which doesn't appeal to me. Everything is in the map, there could be more in the legend. It doesn't change my opinion about the campus.
  - Amsterdam: It looks like it was made in Paint, and the lack of a clear list of names makes it harder to use. it's not clear what happens in between the buildings. It could be 3D, the style could be changed. I looks very packed.

Personalized Questions

- You mentioned that Delft's map has a good legend, but you find it annoying that some information is on the back. Could you explain?
  The map works well, but it's inconvenient that the information is split between the front and back. It would be better if everything were on one side for easier reference.
- You said the color use on the Delft map works well. How does it help with navigation?
  The purple color used for the buildings makes them stand out, and it's easy to associate with the real TU signs on campus. It's intuitive and helps with recognition. Eindhoven deos the same, parking is blue, walking areas are grey.
- You said "3D shows the buildings more clearly and makes it easier to find what you're looking for" about the Wageningen map Can you elaborate?
  The 3D map makes it easier to recognize where you are, and once you know the campus, it's easier to navigate. It also helps if you haven't been there before because it gives a better sense of the buildings.
- You mentioned that the Rotterdam map is confusing because of the 3D elements. Could you elaborate?
  The 3D design looks nice, but since the buildings don't use their real colors, it's harder to recognize them. The extra information could be placed on one side instead of scattered across the map.
- How important is it that a map is visually appealing?
  Initially, I didn't think it mattered, but after seeing the different maps, I now appreciate a well-designed map. While aesthetics are nice, functionality is still the priority.
- Does a map influence your expectations of a place?

A good map, like the 3D ones, can give a better sense of the campus and make it more appealing. If I didn't know any of the campuses, I'd probably be more impressed by the Wageningen or Rotterdam maps.

- You said 3D maps could help with orientation. How do you think 3D compares to 2D for navigation?
  3D gives you a better idea of the layout and makes buildings more recognizable. It's easier to place yourself on the map, which isn't always the case with 2D maps.
- About Eindhoven you said that the layout was overwhelming, can you elaborate? *Too much area around is shown. For that area you can use Google Maps. It should only show the campus itself.*
- How important is a campus map?
  Personally, I don't find it very important because I rely on Google Maps. I think it's hard to imagine what exactly a campus map adds. However, for visitors and new students, a clear map is essential. It could be useful for older people, but they are not often on campus. It also reflects on the university, so a well-designed map is important for its image. If you get a fun map during the introduction week, you might use it to discover new places. It should really offer something on top of Google Maps to be useful.

F.11 Interviewee 11, man, Architecture and the Built Environment

Familiarity

- Can you elaborate on your familiarity with the TU Delft campus map?
  I've seen it hanging by the traffic lights, so I look at it from a distance and think the colors are ugly. I've never used it to get anywhere. I can just use Google Maps instead, which has the building numbers as well.
- Why are you very familiar or not at all familiar with it?
  I haven't used it because Google Maps shows the same information. The campus map doesn't provide any extra useful information beyond what Google Maps offers.
- What has influenced the frequency of your use of the map?
  I've never needed it, as Google Maps shows me what I need. The campus map doesn't feel necessary since Google Maps includes building numbers.

Appropriate for Use

- To what extent does the TU Delft campus map fit your needs and why?
  It would be nice if new students had a map like Wageningen's or Rotterdam's that helps them feel connected and welcomed to the campus. The TU map is very factual, but it doesn't help you build a connection to the campus. In your first year, you only know a few buildings, so it would be nice to discover the other buildings through a map.
- What specific improvements (additions, changes, or removals) would make the map better suited to your needs?
  Including the faculty names directly on the map instead of on a separate list would help. 3D would help making the buildings more recognizable. Nobody is going to remember building numbers, so the names should be there as well.

Ranking

- Can you elaborate on your ranking of the maps?
  - Rotterdam: The 3D buildings and clear names and landmarks help you get a good sense of the campus layout and where things are.
  - Wageningen: The 3D buildings make it visually appealing and help recognize the campus if you've been there before. But it could feel a bit boring with the realistic colors.
  - Delft: It has small icons and details, but you only find them if you already know what to look for. It lacks differentiation between different types of areas.
  - Eindhoven: The layout is clear but unremarkable. The map is a bit overwhelming with too much information about around the campus.
  - Amsterdam: It's very abstract and hard to understand. The colors and lack of detail make it feel chaotic. The colors are also very ugly.

Personalized Questions

- You mentioned that the faculty names being separate from the buildings makes the Delft map difficult to read. Could you explain?
  It's confusing to have the faculty names in a separate list instead of being marked on the buildings. It would make it easier to navigate if the faculty names were on the map itself.
- You said "3D buildings and clear landmarks make it easier to discover new places" about the Rotterdam map. Could you elaborate?
  The Rotterdam map shows the building shapes clearly and makes it easier to understand where you are and what's next to each other. It's drawn in a way that helps you see what is what, which makes discovering new places easier.
- You mentioned the Delft map doesn't differentiate between types of spaces. How would you like that to be improved?
  The map could show more than just buildings. It would be better if it distinguished between different kinds of spaces like parks, sports fields, and green areas. Right now, it only differentiates between buildings and non-buildings.
- You said the Amsterdam map is chaotic and abstract. Can you elaborate?
  It's not just the colors, but also the level of abstraction that make it appear different.
- How important is having a proper campus map?

It's not always essential because you can rely on maps and signs on campus. However, it's important to create a sense of connection to the campus, especially for new students. A well-designed map could make people feel more at home. And it's good to have a coherent overview

- Does the map influence how you experience the campus?
  For new students or visitors, a good map can help them feel more connected to the campus. It's not just about navigation but about creating a welcoming feeling, like Rotterdam's map with the little figures. In contrast, the TU Delft map feels cold and impersonal.

Bibliography

A. Akinwunmi, H. Aworinde, and M. Adewale. Development of a mobile location-aware campus map application. *British Journal of Mathematics and Computer Science*, 15:1–9, 1 2016. doi: 10.9734/bjmcs/2016/24640.

S. R. Arnstein. A ladder of citizen participation. *Journal of the American Institute of Planners*, 35(4):216–224, 1969. doi: 10.1080/01944366908977225. URL https://doi.org/10.1080/01944366908977225.

A. Aurigi. No need to fix: strategic inclusivity in developing and managing the smart city, 2016.

S. Bell. *Introduction to Geomatics*. University of Saskatchewan, 2023.

F. Bian and S. Qiao. Challenging the gender neutrality of on-demand mobility platforms. *Annals of the American Association of Geographers*, 2024. ISSN 24694460. doi: 10.1080/24694452.2024.2322478.

A. Boudrie, Z. Caine, B. Callahan, H. Deremo, I. Dzulkifli, and M. Lonnerstater. Interactive campus sustainability map final report, 2011.

J. Boys. Beyond maps and metaphors? re-thinking the relationships between architecture and gender. In R. Ainley, editor, *New Frontiers of Space, Bodies, and Gender*, chapter Architecture and Gender. Routledge, London and New York, 1996.

N. R. Budhathoki, B. Bruce, and Z. Nedovic-Budic. Reconceptualizing the role of the user of spatial data infrastructure, 8 2008. ISSN 03432521.

L. Carton. Map making and map use in a multi-actor context spatial visualizations and frame conflicts in regional policymaking in the netherlands, 2007.

L. J. Carton and W. A. H. Thissen. Emerging conflict in collaborative mapping: Towards a deeper understanding?, 2007.

R. W. Coulter and S. R. Rankin. College sexual assault and campus climate for sexual- and gender-minority undergraduate students. *Journal of Interpersonal Violence*, 35:1351–1366, 3 2020. ISSN 15526518. doi: 10.1177/0886260517696870.

J. W. Crampton and J. Krygier. An introduction to critical cartography. *ACME: An International E-Journal for Critical Geographies*, 4(1):11–33, July 2010. URL https://www.researchgate.net/publication/241435510_An_Introduction_to_Critical_Cartography. All content following this page was uploaded by Jeremy W. Crampton on 01 February 2014.

C. Criado-Perez. *Invisible Women: Data Bias in a World Designed for Men*. 2019.

Q. Cui, Y. Zhang, G. Yang, Y. Huang, and Y. Chen. Analysing gender differences in the perceived safety from street view imagery, 11 2023. ISSN 1872826X.

W. C. V. den Hoonaard. *Map Worlds: A History of Women in Cartogrpahy*. Wilfrid Laurier University Press, 2013.

M. Denscombe. *The Good Research Guid for Small-Scale Social Research Projects*, volume 1. Open University Press, 6 edition, 2017.

M. Dittus and M. Graham. Geographies of digital exclusion, 2022.

P. L. Doan. The tyranny of gendered spaces – reflections from beyond the gender dichotomy. *Gender, Place and Culture*, 17:635–654, 10 2010. ISSN 0966-369X. doi: 10.1080/0966369x.2010.503121.

M. Domosh. Feminism and urban imagery. *Urban Geography*, 16(7):643–648, 1995. doi: 10.2747/0272-3638.16.7.643. URL http://dx.doi.org/10.2747/0272-3638.16.7.643. Published online: 15 May 2013.

C. D'Ignazio and L. F. Klein. Feminist data visualization. 2016. URL https://api.semanticscholar.org/CorpusID:202601544.

Eindhoven University of Technology. TU/e Campus Map. https://www.tue.nl/en/our-university/tue-campus, 2023. Accessed: november 2023.

Erasmus University Rotterdam. Campus Map of Erasmus University Rotterdam. https://www.erasmusmagazine.nl/2022/07/28/vind-je-weg-en-win-een-prijs-met-deze-plattegrond-van-de-campus/, 2022. Accessed: november 2023.

H. Falahatkar. A feminist gis approach for identifying, mapping and evaluating gender inclusive features in urban public spaces, 2024.

S. L. Faulkner, W. K. Watson, M. A. Pollino, and J. R. Shetterly. "treat me like a person, rather than another number": university student perceptions of inclusive classroom practices. *Communication Education*, 70: 92–111, 1 2021. ISSN 0363-4523. doi: 10.1080/03634523.2020.1812680.

B. Fileborn. Digital mapping as feminist method: critical reflections. *Qualitative Research*, 23:343–361, 4 2023. ISSN 17413109. doi: 10.1177/14687941211028797.

M. F. Goodchild. Giscience ten years after ground truth. *Transactions in GIS*, 10(5):687–692, 2006. doi: 10.1111/j.1467-9671.2006.00282.x.

U. Habitat. Mixed reality for public participation in urban and public space design, 2019. URL www.unhabitat.org.

J. B. Harley. Deconstructing the map. *CARTOGRAPHICA*, 26:1–20, 4 1989.

A. O. Henriques, S. Rafael, V. M. Almeida, and J. G. Pinto. The problem with gender-blind design and how we might begin to address it: A model for intersectional feminist ethical deliberation. In *Conference on Human Factors in Computing Systems - Proceedings*. Association for Computing Machinery, 4 2023. ISBN 9781450394222. doi: 10.1145/3544549.3582750.

N. H. Huffman. Charting the other maps: Cartography and visual methods in feminist research. In J. P. J. III, H. Nast, and S. M. Roberts, editors, *Thresholds in Feminist Geography: Difference, Methodology, Representation*, chapter 13, pages 255–273. Rowman & Littlefield Publishers, Lanham, MD, 1997. ISBN 9780847685315. URL https://books.google.nl/books?hl=en&lr=&id=TGdd8mY3heQC&oi=fnd&pg=PA255&dq=feminist+cartography.

Inclusive Cartography Working Group. Objectives – inclusive cartography, 2024. URL https://inclusive-cartography.icaci.org/objectives/. Accessed: 2024-10-15.

T. Klausch, J. J. Hox, and B. Schouten. Measurement effects of survey mode on the equivalence of attitudinal rating scale questions. *Sociological Methods & Research*, 42(3):227–263, 2013. doi: 10.1177/0049124113500480.

J. Krygier and D. Wood. *Making Maps, A Visual Guide to Map Design for GIS*. 2011.

M. P. Kwan. Feminist visualization: Re-envisioning gis as a method in feminist geographic research, 2002a. ISSN 14678306.

M.-P. Kwan. Is gis for women? reflections on the critical discourse in the 1990s. *Gender, Place & Culture*, 9: 271–279, 9 2002b. ISSN 0966-369X. doi: 10.1080/0966369022000003888.

M. Lapaine, T. Midtbø, G. Gartner, T. Bandrova, T. Wang, and J. Shen. Definition of the map. *Advances in Cartography and GIScience of the International Cartographic Association*, 3:9, 2021. doi: 10.5194/ica-adv-3-9-2021. URL https://doi.org/10.5194/ica-adv-3-9-2021. 30th International Cartographic Conference (ICC 2021), 14–18 December 2021, Florence, Italy. This contribution underwent double-blind peer review based on the full paper.

N. Libertun de Duren, D. E. Davis, and M. L. Morelli. Discursive understandings of the city and the persistence of gender inequality. In F. C. Mena and P. C. Pico, editors, *Urbicide*, The Urban Book Series, pages 531–550. Springer Nature Switzerland AG, 2023. doi: 10.1007/978-3-031-25304-1_31. URL https://doi.org/10.1007/978-3-031-25304-1_31.

A. Lobben, M. E. Brittell, and N. A. Perdue. *Inclusive Cartographic Design: Overcoming Ocular-Centric Cartographies*. 2015.

J. F. M. MacAya, S. B. Dhaou, and M. A. Cunha. Gendering the smart cities: Addressing gender inequalities in urban spaces. pages 398–405. Association for Computing Machinery, 10 2021. ISBN 9781450390118. doi: 10.1145/3494193.3494308.

A. MacEachren and F. Taylor. *Visualization in Modern Cartography*, volume 2. 1 edition, 1994.

A. M. MacEachren. *How maps work : representation, visualization, and design*. Guilford Press, 2008. ISBN 9781572300408.

D. Mahmoudi and T. Shelton. Doing critical gis, 2022. URL https://doingcriticalgis.umbc.edu/.

D. Mahmoudi, A. M. Levenda, and J. G. Stehlin. *Political ecologies of platform urbanism*, pages 40–52. Routledge, 10 2020. doi: 10.4324/9780429319754-4.

M. A. A. Maidin, F. Ahmad, N. I. Abidin, J. Suhaili, M. Awang, M. A. A. Rahman, M. K. Musa, N. Hamidon, F. M. Yusop, M. M. S. Syazwan, H. Harun, N. H. A. Hamid, and N. A. Kamil. *Design Campus Map Using OpenStreetMap Digital Software*, pages 113–129. 2021. doi: 10.1007/978-981-16-0742-4_8.

M. D. Marchi and A. Diantini. *Participatory Geographic Information Science: Disclosing the Power of Geographical Tools and Knowledge in Agroecological Transition*, pages 25–44. CRC Press, 1 2022. ISBN 9780429629211. doi: 10.1201/9780429052842-3.

N. Martini. Street homelessness, visibility and recognition: Navigating the dilemmas of mapping homeless spatialities, 11 2021. URL https://www.researchgate.net/publication/356682885.

S. Mclafferty. Women and gis: Geospatial technologies and feminist geographies. *Cartograhpica*, 40:37–46, 11 2005.

S. L. McLafferty. Mapping women's worlds: Knowledge, power and the bounds of gis. *Gender, Place & Culture*, 9:263–269, 9 2002. ISSN 0966-369X. doi: 10.1080/0966369022000003879.

J. Monk and S. Hanson. On not excluding half of the human in human geography. *Professional Geographer*, 34:11–23, 1982. ISSN 14679272. doi: 10.1111/j.0033-0124.1982.00011.x.

M. Monmonier. *How to Lie with Maps*. 1996.

T. Niedomysl, E. Elldér, A. Larsson, M. Thelin, and B. Jansund. Learning benefits of using 2d versus 3d maps: Evidence from a randomized controlled experiment. *Journal of Geography*, 112:87–96, 5 2013. ISSN 0022-1341. doi: 10.1080/00221341.2012.709876.

N. Pirani, B. A. Ricker, and M. J. Kraak. Feminist cartography and the united nations sustainable development goal on gender equality: Emotional responses to three thematic maps. *Canadian Geographer*, 64:184–198, 2020. ISSN 15410064. doi: 10.1111/cag.12575.

Presagis. Maps: 2d vs. 3d, 2023.

M. D. G. Ramon and J. Monk. Gender and geography: World views and practices. *Belgeo*, 3:Introduction, 2007. Available online at belgeo.revues.org.

L. Ramondetti. Untangling infrastructure networks through critical cartographies: Mapping the port of trieste, italy. *Annals of the American Association of Geographers*, 2023. ISSN 24694460. doi: 10.1080/24694452.2023.2289985.

N. Schuurman and G. Pratt. Care of the subject: Feminism and critiques of gis. *Gender, Place & Culture*, 9:291–299, 9 2002. ISSN 0966-369X. doi: 10.1080/0966369022000003905.

J. M. Self and K. D. Hudson. Dangerous waters and brave space: A critical feminist inquiry of campus lgbtq centers. *Journal of Gay and Lesbian Social Services*, 27:216–245, 4 2015. ISSN 15404056. doi: 10.1080/10538720.2015.1021985.

Sheridan and Jacobi. Critical feminist practice and campus-community partnerships: A review essay. *Feminist Teacher*, 24:138, 2014. ISSN 08824843. doi: 10.5406/femteacher.24.1-2.0138.

J. Thatcher, L. Bergmann, B. Ricker, R. Rose-Redwood, D. O'Sullivan, T. J. Barnes, L. R. Barnesmoore, L. B. Imaoka, R. Burns, J. Cinnamon, C. M. Dalton, C. Davis, S. Dunn, F. Harvey, J. K. Jung, E. Kersten, L. D. Knigge, N. Lally, W. Lin, D. Mahmoudi, M. Martin, W. Payne, A. Sheikh, T. Shelton, E. Sheppard, C. W. Strother, A. Tarr, M. W. Wilson, and J. C. Young. Revisiting critical gis. *Environment and Planning A*, 48:815–824, 2015. ISSN 14723409. doi: 10.1177/0308518X15622208.

J. Till. The negotiation of hope, 2005.

TU Delft. Tu delft campus map. https://www.tudelft.nl/en/, 2018. Accessed: november 2023.

TU Delft Campus. Screenshot of tu delft campus map. Screenshot from https://map.tudelftcampus.nl/, 2024a. Accessed: 2024-09-05.

TU Delft Campus. About tu delft campus. https://www.tudelftcampus.nl/about/, 2024b. Accessed: 2024-10-19.

J. Tyner. *Principles of Map Design*. 2010.

H. van Houtum. *Free the Map*. nai010Publishers, 2024.

B. van Loenen. Developing geographic information infrastructures, 2006. URL http://www.library.tudelft.nl/dup/.

B. Van Loenen and J. Zevenbergen. Assessing geographic information enhancement *. *International Journal of Spatial Data Infrastructures Research*, 5:244–266, 2010. doi: 10.2902/1725-0463.2010.05.art10.

M. Van Selm and N. W. Jankowski. Conducting online surveys. *Quality & Quantity*, 40(3):435–456, 2006. doi: 10.1007/s11135-005-8081-8.

D. E. Varanka. The manly map: the english construction of gender in early modern cartography. *Gender and Landscape*, pages 223–239, 3 2005. doi: 10.4324/9780203449196-23.

Vrije Universiteit Amsterdam. VU Campus Map. https://vu.nl/nl/over-de-vu/meer-over/plattegrond-vu-campus, 2023. Accessed: november 2023.

Wageningen University and Research. Campus Map of Wageningen University & Research. https://www.wur.nl/nl/show/campus-plattegrond-20220726.htm, 2022. Accessed: november 2023.

D. Wood, J. Fels, and J. Krygier. *Rethinking the Power of Maps*. 2010.

F. Wu, D. Clarke, J. Jiang, A. Baba, and S. Buford. The digital age of campus maps on mobile devices. *Journal of Computer and Communications*, 04:22–30, 2016. ISSN 2327-5219. doi: 10.4236/jcc.2016.47004.

R. K. Yin. Discovering the future of the case study method in evaluation research. *Evaluation Practice*, 15 (3):283–290, 1994a. ISSN 0886-1633. doi: https://doi.org/10.1016/0886-1633(94)90023-X. URL https://www.sciencedirect.com/science/article/pii/088616339490023X.

R. K. Yin. *Case Study Research, Design and Methods*. Sage Publications, 2nd edition, 1994b.

Colophon

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