Large-scale mixed-use buildings:
Aspects of urban and building design shaping social interactions
between insiders and outsiders

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Colophon

"First we shape the cities – then they shape us."
- Jan Gehl

Abstract

Establishing large-scale mixed-use buildings is an upcoming trend in the Netherlands as these buildings contribute to the creation of sustainable cities. Research on the social aspects of these buildings is still lacking. Therefore, this research investigates how large-scale mixed-use buildings can be socially integrated into their surrounding environment. The research does so by developing a set of aspects of urban design and building design that contribute to the emergence of social interaction between people living or working in the building on the one hand and people from the surrounding neighbourhood on the other hand. Social interaction between these groups can lead to social capital, from which individuals and society can benefit. The research uses a grounded theory approach with observations and informal conversations as data collection methods. Unlike more traditional grounded theory, this research uses existing theories from the literature as a starting point. Results and conclusions imply that social interaction between the groups is more likely to happen if the buildings are located in vibrant neighbourhoods and along continuous walking paths. Furthermore, the groups must have common entrances, hallways and spaces within the building. A broad range of facilities is essential to attract people from the surrounding neighbourhood to enter the building in the first place. Furthermore, the façade should not look too exclusive, and entrances should be well visible. As the research is qualitative, the results must be tested in further, more quantitative and detailed research.

Key words: Large-scale mixed-use buildings, urban design, building design, social interaction, social capital.

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1. Introduction

1.1 Background

The Dutch population continues to grow and is expected to reach 18.9 million inhabitants by 2025 (PBL/CBS, 2022). Bowley & Evins (2022) state that population growth results in the inevitable necessity for human settlements to either expand or increase density. According to CBS/PBL (2022), the Netherlands, especially the large and medium-sized municipalities, will continue to expand due to population growth in the coming years. Ewing & Cervero (2010) reviewed existing academic literature related to sprawl. They conclude that academics consistently agree on the negative impact of sprawl. Positive relationships have been found between urban sprawl and levels of vehicle travel, resource utilization, energy consumption and emission of greenhouse gases. Sprawl does not solely negatively impact our climate. According to Sööt & Dodge-Hayakawa (2013), sprawl has several other negative impacts, such as increased travel time and infrastructure costs.

Generalova et al. (2018) noticed that experts in several fields, such as architecture, urban planning, economics, sociology and ecology, are deeply concerned about urban sprawl due to its negative societal impacts. As a result, experts are actively searching for innovative and more efficient urban planning strategies to address the challenges of sprawl. One of the ways to reduce territorial expansion is the implementation of large-scale mixed-use buildings in urban environments (Generalova & Generalov, 2020). Generalova & Generalov (2020) state that by integrating different functions into a single building, compact and multifunctional urban environments can be created. The concept of a large-scale mixed-use building goes beyond the widespread shop-house mixed-use building, where residential spaces are located above shops (Kahn et al., 2022). Rather, these structures provide a live-work-play environment by fusing residential, office, retail, and social functions (McDonald, 2008). Several authors (Gosh, 2014; Morrato, 2022; Webb & White, 2022) refer to large-scale mixed-use buildings as "vertical neighbourhoods" as they contain almost everything usually found in traditional neighbourhoods. Baggerman (2022) even refers to large-scale mixed-use buildings as "cities within cities".

Large-scale mixed-use buildings are common in mainly South and Southeast Asian cities (Kahn et al., 2022). In the Netherlands, large-scale mixed-use buildings are a relatively new phenomenon. Nozeman & Fokkema (2008) observed an advance of mixed-use buildings in the Netherlands in 2008. However, an implementation on a significant scale has been observed for a few years, as most mixed-use buildings date from the late 2010s and 2020s (Baggerman, 2022). The increased implementation of mixed-use buildings in Dutch cities is consistent with the ambitions of the Dutch government to limit sprawl by increasing density within the existing urban areas (PBL, 2012). Furthermore, these buildings contribute to ambitions from the National Strategy on Spatial Planning and the Environment to opt for multiple

land uses whenever possible to reduce travel time (BZK, 2020). However, according to Baggerman (2022), questions arise about how architects and planners can ensure these 'cities within cities' contribute to the broader urban dynamics.

Goldberg's Marina City in Chicago, built in 1964, was the first single structure in the world that could be characterized as a large-scale mixed-use building (Ilgin, 2021). This project has made planners aware that while large-scale mixed-use buildings offer spatial advantages, there is an inherent potential danger embedded in the concept of such structures. This danger is illustrated by the critique Marina City received. This critique is mentioned in the paper of Ilgin (2021); Marina City was heavily criticized as the building did not contribute to urban dynamics because of its closed and inward-looking character and its lack of spaces which enable social interaction.

Marina City illustrates how the physical environment can impact social dynamics. According to Samuel & Hatleskog (2020), there is a widespread consensus that the physical world influences the social world. Delving into social interaction specifically, Gehl (2011) emphasizes that social interaction is shaped by the design of urban environments. Tuan (1977) also highlights the essential role of space in our daily interactions with others.

When a large-scale mixed-use building is inward-looking and lacks spaces that facilitate social interaction, like Marina City, it may lead to a spatial division between 'insiders' and 'outsiders,' resulting in limited social interaction between the two groups. In a mixed-use building, the 'insiders' primarily comprise residents and (office)employees, 'outsiders' comprise residents and employees from the surrounding neighbourhood. Judging by the prices of apartments and office spaces in large-scale mixed-use buildings (Funda, 2023), the 'insiders' are assumed to be relatively affluent individuals. Encouraging social interaction between these 'insiders' and the surrounding community holds the potential to foster the emergence of social capital, as depicted by Putnam (2000). Social capital is valuable and crucial for the functioning of communities and societies. According to Kaur (2015), social capital is associated with increased trust, reciprocity, information sharing and group action. This results in increased happiness and economic benefits. When social capital is highly present, it can save time, boost people's careers, make things simpler, stimulate the generation of new ideas and prevent the making of mistakes (Berner et al., 2020).

1.2 Research objective

In order to foster social interaction between 'insiders' and 'outsiders' of large-scale mixed-use buildings that will be established in the Netherlands in the future, it is crucial to explore the factors that drive the emergence of such interactions. An extensive range of aspects could play a role. Therefore, the focus of

this research is limited to aspects of urban design and building design. Thus, this research explores which aspects of urban design and building design stimulate social interaction between 'insiders' and 'outsiders' of large-scale mixed-use buildings. Based on this research aim, the following primary research question and sub-questions have been formulated:

Primary research question

How do aspects of urban and building design influence the emergence of social interaction between 'insiders' and 'outsiders' of large-scale mixed-use buildings in the Netherlands?

Sub-questions

- How can the concepts of large-scale mixed-use buildings and social interaction be defined?
- How does social interaction develop in the built environment, and how is it valuable to society?
- Which aspects of urban and building design facilitate or restrict the emergence of social interaction between people in the built environment in general?
- Which aspects of urban and building design can be observed to stimulate social interaction between 'insiders' and 'outsiders' of large-scale mixed-use buildings in the Netherlands?

1.3 Relevance

Around the world, mixed-used buildings are increasingly implemented in the built environment (Generalova & Generalov, 2020). Baggerman (2022) observes that this trend is visible in the Netherlands as well. In the past there have been trends in architecture and planning that were considered as holy, but have led to less desired places nowadays. For example, the early post-war neighbourhoods in the Netherlands. At the time of construction, based on design principles of that era, they were considered beautiful and well-working neighbourhoods. Nowadays, these neighbourhoods are often considered troubled neighbourhoods (Argiolu et al., 2008). In order to prevent situations like these, thorough research to the implementation of large-scale mixed-use buildings in the Dutch context is necessary.

Fortunately, academia in the field of real estate and urban planning have shown a great deal of interests in in mixed-use real estate since the mid 2000s. The increased attention from academia to large-scale mixed-use buildings is driven by their inherent potential to address contemporary societal challenges (DeLisle & Grissom, 2013). Seemingly, the largest part of academia, consider the increased implementation of mixed-use buildings as a positive development, contributing to good urban form. Especially, in light of urban sprawl, mixed-use buildings are considered a remedy (Grant, 2002). However, Barrie et al. (2023) found little proof supporting the widely believed idea, supported by for example Frank (1994) and Coupland (1997), that mixed-use buildings are in general liveable, appealing,

sustainable and safe spaces to live, work and recreate. Therefore, Barrie et al. (2023) state that more empirical evidence is needed to support this widely believed notion.

DeLisle & Grissom also emphasize several research gaps, despite the attention given to the topic. They notice that extended evidence for the social benefits of mixed-use buildings is lacking. They emphasize that not much empirical study has been done to pinpoint the key ingredients for well-functioning mixed-use buildings. Therefore, they call for more empirical research to inform on decisions about location, design, occupancy and operational methods that will increase the likelihood of reaching goals and objectives. To address the gaps mentioned by DeLisle & Grissom (2020), the research lying in front of you is an empirical study which aims to pinpoint ingredients for mixed-use buildings which are outward looking and socially integrated into their surrounding environment.

Additionally, Generalova & Generalov (2020) notice that research is necessary for a number of aspects of mixed-use buildings including the ways to integrate the buildings into the urban environment. The aim of this research is to find possible conditions under which mixed-use buildings are well integrated in their surrounding environment and therefore hopes to helps filling the research gap mentioned by Generalova & Generalov (2020).

Investigating the social dynamics of large-scale mixed-use buildings holds significant importance for contemporary society. According to Gehl (2011), the way a place is designed has a significant impact on how we live and experience life, which in turn affects our behavior, subjective wellbeing and identity. When conditions for outward-looking and socially integrated large-scale mixed-use buildings are formulated, future mixed-use buildings could contribute to bridging groups within society. This could result in the emergence of social capital; bridging social capital in particular. Access to new knowledge, assets, and prospects can be provided by bridging social capital (Smith & Giraud-Carrier, 2010). Bringing different groups within society is especially a necessity in current days of polarization. According to Kolthoff & Janssen (2022), society seems to be undergoing a division that no longer occurs solely along the traditional lines of rich and poor. Polarization in politics or in debates on for example racism or gender equality are common place. Therefore, it is of high importance that future urban environments foster social interaction between different groups within our society.

1.4 Reading Guide

The introduction to the research has been covered in this first chapter. The next chapter, Chapter 2, provides the theoretical framework that serves as the basis for the empirical study. Chapter 3 discusses the methodology. The results of the empirical study are presented in Chapter 4, followed by a discussion of these results and a conclusion in Chapter 5. The concluding chapter, Chapter 6, contains a reflection and recommendations.

2. Theoretical framework

The theoretical framework starts with a short sketch of the history of the mixed-use concept to provide an understanding of what preceded the emergence of large-scale mixed-use buildings and to show to which planning tradition the buildings belong. Secondly, the theoretical framework provides an overview of what has already been written about large-scale mixed-use buildings. The overview shows that extended literature on the social aspects of large-scale mixed-use buildings is missing. Thirdly, a definition for a large-scale mixed-use building, fitting to this research, is developed. Consequently, the theoretical framework elaborates upon social interaction and its societal value through the concept of social capital. Hereafter, the framework investigates how aspects of urban and building design influence social interaction and can contribute to creating welcoming environments for visitors. This exploration forms the basis for empirical research, where identified aspects are applied to large-scale mixed-use buildings and their surroundings.

2.1 Towards mix-use within one building

Large-scale mixed-use buildings did not materialize spontaneously. The buildings are one of the modern-day results of a long planning history. Discussing the relevant planning history will create a better understanding of how and why large-scale mixed-use buildings emerge in modern-day urban environments. The historical context sketched in 2.1.1 will focus on traditions in either separating or mixing functions. Through discussing the relevant planning history, large-scale mixed-use buildings can be placed into a planning tradition. In 2.1.2, it is shown that the history of separating and mixing functions is nothing more than a change of scale at which functions are perceived to be mixed.

2.1.1 Planning history of functional mixing

Functional mixing was standard in the Netherlands until the end of the 19th century. Until then, the small-scale artisan way of working coexisted well with the residential function (PBL, 2009). As a result of the Industrial Revolution, large-scale factory complexes emerged, which changed the relationship between working and living. The environmental and health effects of industrial activities made the spatial combination of living and working no longer possible. Around the end of the 19th century, the first workers' villages were built, usually still close to the factories (PBL, 2009).

Grant (2014) discusses the City Garden movement, which significantly impacted urban and suburban development globally in the twentieth century. Supporters of the City Garden movement, which included town planners, designers, and developers, sought to turn industrial city neighbourhoods crowded with people into open, green spaces that would the standards of living of the working class. The Garden City idea promoted less congested and more expansive urban landscapes by fusing the attractive elements of urban and rural environments. The Garden City ideas, however, came to be

associated with problems like urban expansion, exorbitant development, and unsustainable land use practices with the introduction of the vehicle (Grant, 2014). In the Netherlands, the concept of the Garden City was translated into 'Garden Neighbourhoods'. These were new neighbourhoods at the edges of existing cities, far from polluting industries. This distance between living and working was enabled by the fast growth of public transit in the early 20th century and later by the automobile. However, the garden cities continued to have a traditional layout and a suitable mix of functions (PBL, 2009).

According to Van Rossum (1997), Cornelis Van Eesteren was among the first to depart from classical urban planning. Between 1923 and 1927, van Eesteren develops his vision of the functional city. The "functional city" idea takes shape through four main functions, which are all separated in space: housing, working, recreation, and transportation. According to Van Eesteren, optimizing each individual function naturally leads to their physical separation. Functionalism was not exclusive to the Netherlands. The functional city was a subject of discussion at the first CIAM (International Congress of Modern Architecture) in 1928. The CIAM has formed a dynamic movement of innovation for over thirty years, with the participation of hundreds of architects and urban planners. Among them are Le Corbusier, Siegfried Giedion, and Walter Gropius (Gold, 1998). After World War II, many neighbourhoods in the Netherlands were built based on the principles of the functional city. Functional separation became the guiding principle at all levels of spatial planning. PBL (2009) shows how zoning was institutionalized through zoning plans and environmental impact categories. Moreover, Ebels (1997) discusses how urban renewal efforts in the 1970s led to the disappearance of most original employment in pre-war neighbourhoods, which led to further functional separation.

In the 1960s, the first counter-movement emerged, in which Jane Jacobs was one of the leaders (PBL, 2009). According to Jacobs (1961), functional separation leads to a decline in quality of life and sustainability in residential and industrial neighbourhoods. Jacobs (1961) formulates principles for creating a "vibrant urbanity" in which mixed land uses play a crucial role. These principles directly challenged the approach of planners and policymakers in the 1960s (PBL, 2009). Jacobs received widespread recognition decades after her publication (PBL, 2009). Nowadays, most planning theorists acknowledge mixed-use's functional, social and ecological benefits (Hirt, 2009).

Functional mixing is often associated with the concept of a compact city. The term compact city is often used when discussing the planning of sustainable cities. Besides mixed-use, principles such as high density and walkability belong to the concept of a compact city (Lin & Gámez, 2018). The idea of a compact city is part of the New Urbanism movement. According to the last-mentioned authors, the potential embedded in the compact city concept is not yet fully used in urban planning. Lin & Gámez (2018) state that the idea of a compact city can lead to innovative and cutting-edge urban designs, the application of advanced technology and the solution of environmental issues. An example of rethinking

the concept of compact cities is the Vertical Urbanism approach, to which large-scale mixed-use buildings belong. According to Lin & Gámez (2018), the Vertical Urbanism approach considers the city as a city as a multidimensional, multilayered organism. It imagines a city where infrastructure, space and nature are connected three-dimensionally. This experimental approach tries to design cities in a new, integrated and comprehensive manner. Sim & Gehl (2019) propose layering instead of stacking functions within buildings to create vibrant and dynamic cities. This proposal could be considered part of the vertical urbanism approach.

The emergence of the vertical urbanism approach has been fueled by advancements in technology like social media, mobile devices and e-commerce. According to Pinder et al. (2017), technological advancements have caused our personal and organizational systems to keep changing over time. This has required the built environment to adapt to changing expectations and lifestyles, leading designers to develop flexible and multi-functional spatial typologies. As a result, the world has seen an increase in the development of large-scale mixed-use buildings (Ravindranath & Menon, 2018). Khan et al. (2022) observed that this type of urbanism is already common in the global south, mainly in South and South-East Asian countries. From Irvine (2018), it can be concluded that the high prevalence of mixed-use buildings in Asian cities is a result of their high population density. Their popularity in Asia could also be the result of the hot climate; mixed-use buildings allow people to enjoy several functions under one roof, which reduces the necessity to go outside.

Baggerman (2022) observes an acceleration in implementing large-scale mixed-use buildings in the Netherlands. However, examples are not numerous yet. The buildings could be considered the opposite of the functional city promoted by, among others, Van Eesteren and the CIAM. Ironically, while mixed-use buildings promote internal integration, they may contribute to external divisions within the neighbourhood. Functional cities created divisions between people as they forced people into their cars. Mixed-use buildings may create divisions as they may keep certain people within the building and others out (Baggerman, 2022).

2.1.2 Change of scale

The evolution of perspectives on functional mixing in urban planning can be seen as a shift in the scale at which functional mixing should take place. In times of functionalism, functions were separated at the neighbourhood level but mixed at the city level; cities still housed different functions. Later on, Jane Jacobs referred to mixed-use at the neighbourhood level (Hoppenbrouwer & Louw, 2005). Coupland (1997) referred to mixed-use at the building level, which is subject to this research.

Hoppenbrouwer & Louw (2005) outlined four dimensions of mixed-use. First is the horizontal dimension, which is the mixing of functions between buildings at a flat service. Secondly, he describes the shared premises dimension. This refers to many uses at one location, such as rooms in a house or building that one family uses. As more individuals work from home, housing and employment are being combined in a more private and informal manner. Mixed-use at the building level is referred to as the vertical dimension of mixed-use. Finally, there is the dimension of time. A restaurant can, for example, be used as a place for business meetings during the day and as a place to eat out during the night. Therefore, the concept of time relates to the fulfilment of functions within a given time frame, such as an hour, 24 hours, a week, or a year. The figure below, conducted by Hoppenbrouwer & Louw (2005), illustrates which dimensions of mixed-use relate to which geographical scale.

Figure 1: Components of mixed land use: dimension versus scale

	Building	Block	District	City
Shared premises dimension	√			
Horizontal dimension		√	√	√
Vertical dimension	√	√		
Time dimension	√	√		

Source: Hoppenbrouwer & Louw (2005)

The figure above shows that mixed-use at a building level relates to the shared premises, vertical, and time dimensions. Mixed-use at a building level does not relate to the horizontal dimension. However, this dimension is relevant to this research as it hopes to examine social interaction between the a large-scale mixed-use building, and the horizontal city around it.

2.2 Existing literature on large-scale mixed-use buildings

DeLisle & Grissom (2013) conducted a thorough literature analysis to ascertain the key themes addressed in the literature on mixed-use buildings. They sought to understand which themes there is substantial knowledge of and for which themes the literature still needs to be expanded.

The aforementioned authors found around 200 papers on the topic of mixed-use buildings. These papers were reduced to 78 after assessing their relevance and prospective contributions to the field. In the literature, 11 factors and 33 concepts were found, but social interaction was not among them. However, this might be because social interaction is often treated as a dependent variable, and the variables on the list consist of factors, which are independent variables. This would mean that the factors mentioned can lead to social interaction under certain conditions. This thought is supported by the claim of DeLisle & Grissom (2013) that mixed-use projects can provide several secondary social and environmental impacts. Social interaction could be one of these social impacts. Figure 2, on the following page,

illustrates the frequency of each factor and concept occurring in the literature found by DeLisle & Grissom (2013). The figure demonstrates that most attention has been given to the factors' Urban Form', 'Land Uses', 'Market' and 'Scale'.

Figure 2: Filtered Literature Summary

Factor	33 Concepts in 78 Articles	Concepts		Factors	
		Number	Share	Number	Share
Growth Mgmt.	Density/Sprawl	23	4.7%		
	Urbanism/Suburb	17	3.5%	40	8.1%
Urban Form	Quaint Space	22	4.5%		
	Urban Form/Land Use	25	5.1%		
	Street Pattern	16	3.3%	63	12.8%
Land Uses	Number of Uses	33	6.7%		
	Association of Uses	37	7.5%		
	Situs/Land Uses	25	5.1%	95	19.3%
Accessibility	Public Transit	11	2.2%		
	Pedestrian Access	13	2.6%		
	Parking	3	0.6%	27	5.5%
Sustain	Green Building	3	0.6%		
	Sustainable Energy	7	1.4%	10	2.0%
Econ Dev.	Grey/Brown/Greenfield	2	0.4%		
	Redevelopment/Renewal	5	1.0%		
	Economic External Factors	13	2.6%		
	Job Generation	12	2.4%	32	6.5%
Policy	Political/Policy/Social	19	3.9%		
	Affordability	2	0.4%		
	Crime/Legal Conflict	4	0.8%	25	5.1%
Market	Tenant/Quality	5	1.0%		
	Lifestyle	27	5.5%		
	Behavior Response	25	5.1%	57	11.6%
Scale	Land Value/Site Assemblage	28	5.7%		
	Scale	15	3.1%		
	Retail Mass	6	1.2%		
	Amenities	5	1.0%		
	Multi vs. Single Use	15	3.1%	69	14.1%
Operations	Flexibility of Use	5	1.0%		
	Facilities Systems	4	0.8%		
	Management Complexity	16	3.3%	25	5.1%
Finance	Returns/Finance	29	5.9%		
	Option/Portfolio/Market	19	3.9%	48	9.8%
Total/Share		491	100.0%	491	100.0%

Source: DeLisle & Grissom (2013)

Figure 3 shows the frequency of each factor occurring in literature throughout history. The figure demonstrates that the attention given to each factor differs per historical period. The table demonstrates that when analyzing mixed-use developments, the mix of 'Land Use' has consistently been of great concern. Moreover, 'Growth Management' is a common topic of discussion, although the number of papers referencing this theme has decreased in the past ten years. Interest in aspects relating to 'Finance' has always been significant, but this has gradually decreased over time. This decline in interest might result from cyclical patterns (Lim, 2010). 'Accessibility' has not received much attention, but the attention given to the topic has increased over time. This increase may be a result of higher energy and transportation expenses. Papers on 'Economic Development' and 'Scale' have slightly increased in more recent papers.

Figure 3: Market Share per Period

Factors	Pre-1990s	1990s	2000–2006	Post-2006	Total
Growth Management	7%	8%	10%	7%	8%
Urban Form	5%	13%	12%	17%	13%
Land Uses	17%	18%	20%	20%	19%
Access	5%	6%	5%	7%	5%
Sustain	0%	1%	4%	1%	2%
Econ Development	7%	4%	6%	10%	7%
Policy	0%	4%	6%	6%	5%
Market	10%	10%	14%	11%	12%
Scale	22%	19%	12%	11%	14%
Operations	12%	4%	5%	4%	5%
Finance	15%	12%	10%	6%	10%
Total	100%	100%	100%	100%	100%

Source: DeLisle & Grissom (2013)

The literature discussed by DeLisle & Grissom (2013) provides an overview of literature related to mixed-use buildings until 2013. However, due to the increased popularity of mixed-use buildings in the last couple of years (UCEM, 2023), it is assumed that a large part of the literature on the topic was written after the literature by DeLisle & Grissom (2013) was written. This assumption is in line with observations made by the author while reviewing the literature. Furthermore, the proportion of contributions per field of interest most likely differs from the period before 2013. It goes beyond the scope of research to investigate the exact differences. However, one clear shift becomes visible based on the literature research. Research related to sustainability and mixed-use projects is more frequently executed nowadays than in 2013. These articles revolve around, for example, energy efficiency, adaptability to climate change and air quality (e.g., Caluba et al., 2020; Jin et al., 2023; Sholanke et al., 2023).

In one of their concluding paragraphs, DeLisle & Grissom (2013) write that not much empirical study has been done to pinpoint the key ingredients for mixed-use buildings. This aligns with the statements of several authors, such as Rabianski et al. (2009), who state that empirical research on mixed-use buildings is minimal. The same observations were made by the author during the literature study.

The author noticed that many research papers assume mixed-use buildings naturally encourage social interaction. However, earlier studies lack specific details regarding their impact on social interaction, leaving questions unanswered about the extent of social interaction, the groups involved, and the factors influencing it. Moreover, most research focuses on mixed-use developments in North-America or Asia. This research is influenced by location-specific factors of these continents, for example cultural

background. Cultural backgrounds greatly influence whether social interaction occurs or not (Salami et al., 2021). Therefore, research on these buildings outside of North America or Asia is important.

2.3 Developing a fitting definition

Before delving into the relevant theories on social interaction and design aspects that could positively influence its emergence, it is crucial to develop a fitting definition for the buildings discussed in this research. At first glance, defining buildings that have several functions might seem a straightforward task. However, two problems arise. Firstly, different names are given to buildings which inhabit several functions; 'Mixed-use buildings', 'mixed-use tall buildings', 'vertical hybrids', 'monolith hybrids', 'mixed-use high-rise buildings', 'mixed-use projects'... are all names that have been given to large buildings which include several functions. Secondly, these buildings have diverse features, functions, land uses, tenant combinations, regulations, etcetera. Before developing a fitting definition for this research, definitions used in other research or by official institutions will be explored.

The Council on Tall Buildings and Urban Habitat (2019) uses the definition 'mixed-use tall buildings', which they define relatively broadly. They define mixed-use tall buildings as buildings typically housing two or more functions, each occupying a sizeable portion of the tower's overall space, according to their definition, 15 per cent or more of the total floor area. Supporting functions such as parking lots do not count as one of the two (CTBUH, 2019).

The literature review by DeLisle & Grissom (2013), which was discussed at the beginning of the theoretical framework, also follows a rather simple definition. They use the term 'mixed-use project' and define it as a construction project that combines two or more different functions, such as office, retail, residential, and hotel, within a single structure. DeLisle & Grissom (2013) emphasize that mixed-use projects often have commercial services on the first floor and residential or office spaces on the floors above. They notice that mixed-use projects are frequently confused with multiple-use projects that contain multiple structures with separate functions which are somehow connected horizontally. They emphasize that individual projects need to be carefully inspected or studied in order to be correctly classified. Goodchild (1998) contrast DeLisle & Grissom (2013) as they state that most of the industry would not categorize retail space with offices or apartments on top as mixed-use development.

Per et al. (2014) go a step further and distinguish between what they call 'mixed-use buildings' and 'vertical hybrids'. They use 'mixed-use buildings' as an overarching term for buildings with several functions. They mention that a vertical hybrid is a type of mixed-use building. Thus, all vertical hybrids are mixed-use buildings, but not all mixed-use buildings are vertical hybrids.

Vertical hybrids are distinguished from mixed-use buildings by their elevated level of programmatic complexity; in vertical hybrids, functional connectivity is optimal. Unlike mixed-use buildings, which simply incorporate diverse functions within their physical structure, vertical hybrids acknowledge the interdependence of these functions. Vertical hybrids demonstrate an awareness of the social dimension of users and are often successfully integrated into the wider urban environment. In vertical hybrids, the different functions are integrated and are mutually synergistic. Figure 4, constructed by Ravindranath & Menon (2018), illustrates the difference between mixed-use buildings and vertical hybrids formulated by Per et al. (2014). Per et al. (2014) illustrate how, in hybrid buildings, private life and public life take place within one building and produce constant activity and how, as a result, the building works full-time. Per et al. (2014) refer to vertical hybrids as tall structures that are space-efficient and have the mixed-use gene incorporated into their genetic code. They help to regenerate urban environments and save space.

Sim & Gehl (2019) talk about layering functions versus stacking functions. Stacking functions is simply putting the same functions on each other; this is the case in traditional, monofunctional buildings. In their definition of layering functions, the ideal of implementing them in such a way that people and the facilities themselves benefit maximally from the presence of several functions incorporated. In this, the idea of a hybrid is embedded. The functions should be connected in a certain way, and the location of the function within the building should be carefully assigned.

Figure 4: Difference between mixed-use buildings and hybrid buildings
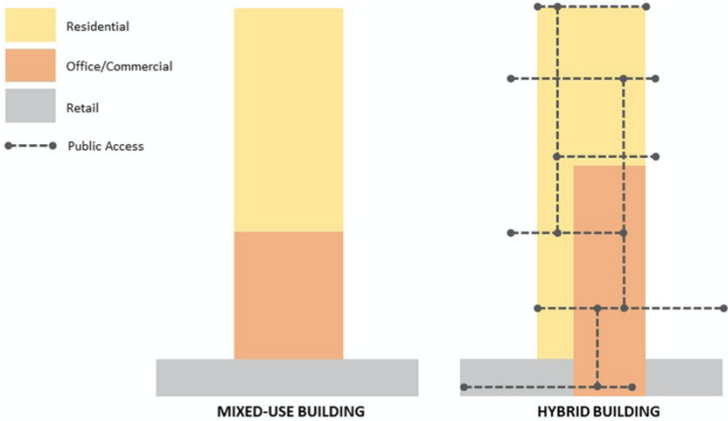
Source: Ravindranath & Menon (2018)

The external appearance of tall buildings for mixed use was initially divided into three categories by Fenton (1985): fabric hybrids, graft hybrids, and monolith hybrids. Fabric hybrids often blend in with their environment; their exteriors only express their varied program to a small extent. The graft hybrid is a fusion of multiple building types inside an urban block that articulates numerous purposes. The

monolith hybrid is described as a towering structure that unifies several functions behind a common skin. Monolith hybrids differ from fabric hybrids primarily in terms of scale. The change in scale and quantity of functions turns into qualitative changes. Monolith hybrids are monumental cities inside cities that refer more to themselves than to the city surrounding them. Some of the design variants of such hybrid developments include complex shapes, architectural layouts, hybrid interfaces for indoor and outdoor spaces, and public places that are subterranean, multi-level, or elevated.

Niemira (2007) formulated an industry-wide definition through a cross-organizational survey in which the American International Council of Shopping Centers (ICSC), the American National Association of Industrial and Office Properties (NAIOP), the American Building Owners and Managers Association (BOMA) and the National Multi Housing Council (NMHC) participated. Niemira (2007, p. 3) came up with the following definitions for 'mixed-use developments': "A mixed-use development is a real estate project with planned integration of some combination of retail, office, residential, hotel, recreation or other functions. It is pedestrian-oriented and contains elements of a live-work-play environment. It maximizes space usage, has amenities and architectural expression and tends to mitigate traffic and sprawl."

It is worth mentioning that this paper revolves around large-scale mixed-use buildings with a private character. All research papers found revolved around buildings with a private character. However, in the Netherlands, there are buildings with several public facilities like schools, subsidized sports facilities, healthcare, etcetera. This kind of public is not targeted in this study. It is chosen not to target these buildings as they are assumed to function utterly differently because of all the public facilities embedded in them. Also, unlike mixed-use buildings with private characters, these public buildings usually do not contain housing or offices. Therefore, putting buildings with mainly public functions and buildings with mainly private functions under one umbrella is impossible.

It has been decided that the name 'large-scale mixed-use buildings' is best suited for the buildings targeted in this research. Per et al. (2014) clarified that the term 'mixed-use building' is a general term for buildings with several functions. This name covers buildings that simply incorporate several functions and buildings that have hybrid characteristics. This research only targets large buildings. This choice has been made as many small buildings in the Netherlands might exist, including a few houses, a shop, and an office. These buildings cannot be compared with large mixed-use buildings. CTBUH (2019) referred to the buildings as 'Mixed-use tall buildings'. However, some mixed-use buildings in the Netherlands are not extremely tall but cover a large floor area. Therefore, 'tall' has been replaced with 'large-scale'. This brings us to the name 'large-scale mixed-use building'.

To provide this name with a definition, The industry-wide definition, as ensembled by Niemira (2007), will be combined with elements from the other definitions discussed and will be adjusted to the Dutch context. To show which elements are borrowed from which definition, table 1 has been created.

Table 1: Overview definitions

Author	Definition	Characteristics
CTBUH (2019)	Mixed-use tall buildings	2 or more functions, each function covers > 15 % of floor area, supporting functions excluded
Per et al. (2014)	Mixed-use buildings	Simply incorporate diverse functions, general term
Goodchild (1998)	Mixed-use development	**Retail space with offices or apartments on top is not a mixed-use development**
Per et al. (2014)	Vertical hybrids	Elevated programmatic complexity, acknowledge interdependency of functions, effectively integrated within wider urban environment, **private and public life dwell within the building**
Holl (2018)	Vertical hybrids	Space-efficient, have mixed-use gene incorporated into their genetic code, help regenerate urban environment
Fenton (1985)	Fabric hybrids (1)	Blend in with environment, exteriors do only express their varied program to a small extent
Fenton (1985)	Graft hybrids (2)	Fusion of multiple building types inside an urban bock that articulates numerous purposes
Fenton (1985)	Monolith hybrids (3)	Larger scale and higher quantity of functions then fabric hybrid, el. Cities inside cities, refer more to themselves then to city surrounding them, **contain public spaces.**
Niemira (2007)	Mixed-use development	**Real estate project with planned integration of some combination residential, retail, office, hotel, recreation or other functions. They contain a live-work-play environment and are pedestrian-oriented. Tend to mitigate traffic and sprawl.**
DeLisle & Grissom (2013)	Mixed-use project	Construction project that combines two or more different functions within a single structure
Baggerman (2022)	Mixed-use gebouw	Building complexes in which **living, working, shopping and recreation is combined.**

Source: Author (2024)

Combining the industry-wide definition ensembled by Niemira (2007), with aspects from other definitions (see table) and adjusting the definition to the Dutch context in which verticality is not present to a large extent and many mixed-use buildings have a public character, we come to the following definition for the buildings targeted in this research which we call 'large-scale mixed-use buildings':

"A large-scale mixed-use building is a large building which houses at least the following functions: residential, office, recreation. It contains a live-work-play environment. The building has a private character but contains public spaces. The building maximizes space usage and tends to mitigate traffic and sprawl."

2.4 Social interaction, the built environment and social capital

In this subchapter, the focus will switch from the physical world to the social world by discussing the concept of social interaction and how the concept relates to the built environment. Furthermore, the value of social interaction is illustrated through the concept of social capital.

2.4.1 Social interaction

A process of reciprocal interactivity and stimulation between at least two people is what Hari and Kujala (2009) define as social interaction. Sociological theories often distinguish between active and passive social interaction (Gehl, 2011; Goffman, 1983; Wolske et al., 2020). Active social interaction is the communication between two or more subjects, for example, brief interactions, unplanned contacts, group gatherings and primary contacts (Moulay et al., 2017; Wolske et al., 2020). Passive social interaction is when people simply observe others, for example public solitude and watching people (Moulay et al., 2017). Gehl (2011) illustrated the various degrees of contact intensity presented in Figure 5.

Figure 5: Varying degrees of contact intensity
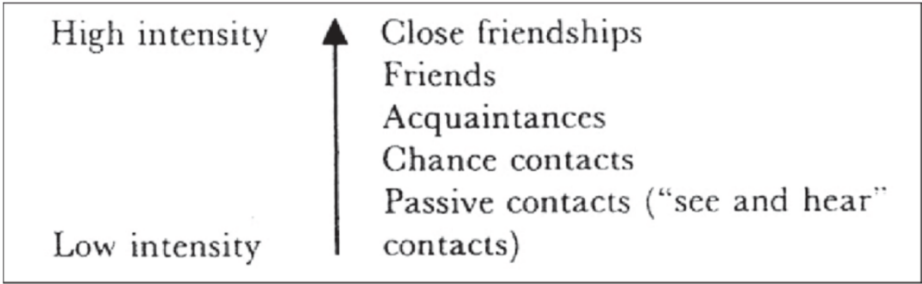
Source: Gehl (2011)

The majority of interactions in city streets and centres entail passive social interactions (Gehl, 2011). They seem rather useless at first glance. However, passive interactions can be very valuable. People can

utilize passive interactions to compare and draw conclusions about other people's behaviours in order to create subjective assessments of particular behaviours (Wolske et al., 2020). Additionally, Gehl (2011) describes the importance of passive social interactions by illustrating a situation in which they were absent. If there would be no activity on the streets, the low-intensity contact forms would disappear. This would result in sharper boundaries between being alone and being with others. As a result, people would find themselves in either complete isolation or engaged in highly demanding social situations. The value of passive contact applies to the person who watches people and the person who is watched. People being watched tend to show more desirable behaviour (Yu et al., 2015).

Part of the value of passive contacts lies in their potential to progress to more extended forms of social contact (Gehl, 2011). Through these contacts, social capital can be created and accumulated. Further elaboration on the concept of social capital follows in 2.4.3. A prerequisite for passive contacts to progress into more extended contact forms is that people are in the same physical space. In a physical space, a passive contact can evolve into a chance contact, for example. Examples of chance contacts are picking up a phone when someone drops it or asking someone for the time. The following subchapter will clarify that the design of physical environments can influence the likelihood of passive and active social interactions.

2.4.2 The built environment and social interaction

Numerous influential social theorists have researched how space and buildings influence social reproduction. Anthony Giddens, in particular, has made a significant impact, according to Fisher (2009). Giddens (1984) took an agent-centred approach to discuss the reciprocal relationship between architecture, actors and social structures. According to Giddens (1984), people are knowledgeable agents who make conscious choices and shape their actions through understanding. This contrasts the habitus theory of Bourdieu (1973), which emphasizes that individuals are primarily shaped by their social environments and frequently behave unconsciously, following deeply rooted behaviours. In his structuration theory, Giddens (1984) highlights the recursive nature of social systems. He formulates this recursive relationship as a "duality of structure" in which the structural characteristics of social systems serve as both the vehicle and the product of the social behaviours they regulate.

Giddens's work centers around the idea that space is essential to social interaction. He presents the concept of locale, which is the mobilization of various components in contact rather than just a spatial characteristic or physical environment (Giddens, 1984). Giddens's work shows the overall approach taken by the authors named in this paragraph and many others, whereby architecture acts as the context for the social interactions and activities of informed agents and plays a crucial part in social reproduction by drawing social and physical boundaries.

According to Gehl (2011), the design of the physical environment cannot influence the quality and intensity of contacts, but it can influence the possibilities for seeing and hearing each other. For more meaningful contacts to be created, people need a common dominator. In other words, low-intensity contact is the only form of contact the built environment can influence. The quality of the built environment influences the kind of outdoor activities taking place and the endurance of these activities. The more time people spend on the streets, the more passive contact emerges, and the more likely it is that more extended forms of contact will grow from these passive contacts (Gehl, 2011).

2.4.3 Social capital

Social interactions can be pleasurable on their own Gehl (2011). However, much of their importance is embedded in their potential to create social capital. According to Bourdieu (1986) and Putnam (2000), resources made available by social networks, reciprocity, norms, mutual trust, and social interactions are referred to as social capital. Interactionist and structuralist perspectives exist on social capital. Interactionists agree that social capital results from interaction between people (Rutten et al., 2010). Structuralists claim that social capital equals an individual's connections to others (Rutten et al., 2010). However, from an interactionalist and a structuralist perspective, social capital cannot emerge without social interaction. The following paragraphs will delve deeper into social capital's importance to society.

Putnam (2000) claims that social capital is of high value to society. He states that "social capital has many features that help people translate aspirations into realities" (p. 288). Social capital makes solving problems between parties easier. Therefore, social capital within neighbourhoods results in better functioning and safer neighbourhoods. Secondly, social capital increases trust, which leads to more accessible and quicker business transactions, which enhances the national, regional, and local economies. Additionally, it aids in accelerating the flow of information, which increases knowledge and also boosts economies. Moreover, social capital broadens our understanding of our interconnectedness, which might raise the standard of our democratic and civic institutions. Lastly, social capital enhances our health and pleasure through physiological and psychological processes that depend on human interaction.

Putnam (2000) claims that the concept of social capital contains many different aspects. The difference between bonding (exclusive) and bridging (inclusive) social capital, he claims, is the most important one. Close relationships between family and friends are the only places where bonding social capital may be found. It aids people in managing their everyday lives and helping them "get by" (Putnam, 2000). It provides emotional support and a sense of belonging (Smith & Giraud-Carrier, 2010). It tends to be homogenous and inward-looking (Putnam, 2000); as a result, it can lead to closure and exclusion of

outsiders (Patulny & Svendsen, 2007). Bridging social capital is inclusive and connects individuals across diverse social groups (Putnam, 2000). It provides access to new information, resources and opportunities (Smith & Giruad-Carrier, 2010). It helps individuals to "get ahead" and achieve their goals (Putnam, 2000). It tends to be heterogenous and outward-looking. It can lead to greater social integration and group cooperation (Patulny & Svendsen, 2007). When discussing social interaction between 'insiders' and 'outsiders' of large-scale mixed-use buildings and the potential emergence of social capital, bridging social capital is primarily relevant because it involves connections between different groups in society.

Putnam (2000) emphasizes the power of the built environment to shape social interaction, leading to social capital. According to Putnam (2000), social capital has declined in the past few decades. This results from television, generational differences, and pressures on time and money. However, according to Putnam (2000), the deadliest aspect causing social capital and community involvement relates to the built environment: sprawl. Sprawl has partly caused the aforementioned pressure on time as people spend much time in their cars.

Large-scale mixed-use builds tend to mitigate traffic and sprawl, according to Niemira (2007). Therefore, large-scale mixed-use buildings contribute to the emergence of social capital as they minimize traffic and sprawl. Putnam (2000) proposes encouraging New Urbanist efforts to increase social capital. As stated, large-scale mixed-use buildings have several New Urbanist features: high density, a mix of functions and walkability (Lin & Gámez, 2018). However, some new urbanistic features, such as the human scale, are not seen back in large-scale mixed-use buildings.

2.5 Aspects of urban and building design

The previous subchapter made clear that there is a relationship between the design of the built environment and the emergence of social interaction between individuals. The crucial question of how the built environment influences social interaction between individuals remains. Therefore, this chapter delves into design aspects that increase the likeliness of social interaction to emerge in neighbourhoods and buildings. The review will revolve around neighbourhoods and buildings in general, as the author has not found literature on social interaction in and around mixed-use buildings specifically.

This research distinguishes between aspects of building design and aspects of building design. The aspects of building design will be applied to large-scale mixed-use buildings later in this research. The aspects of urban design will be applied to urban environments surrounding mixed-use buildings. Urban design focuses on planning cities, towns, neighbourhoods, and public areas. It is the art of constructing and reshaping towns and cities, giving them shape and personality through the layout of infrastructure,

utilities, public areas, and transportation. Building design is the practice and art of creating buildings. It includes the design of the interior and outside spaces. Thus, building design is concerned with the planning and construction of individual structures, while urban design is more concerned with a city's overall layout and operation (UDL, 2022).

A precondition for different groups to interact is that both are present in the same physical space (Gehl, 2011). It is, therefore, crucial that outsiders enter the large-scale mixed-use building or insiders exit it. The researcher considers the formulation of aspects that ensure outsiders enter the building more relevant to this research than those that ensure insiders go inside the neighbourhood. Therefore, the following subchapter explores urban and building design aspects that could encourage outsiders to enter buildings. Later in this research, the principles will be applied to large-scale mixed-use buildings.

Thus, in short, in the following subchapter, the focus will be on:
1.   Urban design aspects shaping social interaction in neighbourhoods
2.   Building design aspects shaping social interaction in buildings
3.   Urban and building design aspects stimulating outsiders to enter buildings

2.5.1 Urban design aspects shaping social interaction in neighbourhoods

The 4D model, developed by Mazumdar et al. (2017), is used in this research to structure the discussion of urban design aspects that possibly impact the occurrence of social interaction in neighbourhoods. This 4D model is an extension of the traditional 3D framework proposed by Cervero & Kockelman (1997). The original 3Ds consist of Density, Diversity and Design. The fourth D, added by Mazumdar et al. (2017) is Destination. The 4D's discuss how the design of neighbourhoods impacts the emergence of social capital and social interaction.

Destination

The Destination domain assesses the proximity to a wide range of destinations, such as retail, recreation, health, and sports (Mazumdar et al., 2017). As the Destination domain assesses the proximity to a wide range of destinations, it is closely related to the concept of walkability. A walkable neighbourhood is "a safe, well-serviced neighbourhood, imbued with qualities that make walking a positive experience" (Talen & Koschinsky, 2013, p. 43). Better destination access has been frequently linked to increased social capital, according to several researchers (Mazumdar et al. 2017). Most articles reviewed by Mazumdar et al. (2017) found a positive relationship between destination access and social interaction. Only 15% of the significant relationships showed a negative association between the concepts.

Good destination access and walkability can increase social interaction in a neighbourhood because it encourages pedestrian movement. Pedestrian movement increases the chance that residents encounter

each other on the streets, and social interaction emerges, according to Lund (2003). The same author also suggests that the destinations serve as places for contact between neighbours. Furthermore, this author found that strolling trips result in more unplanned interactions than destination-oriented trips. This makes sense given the nature of the walks themselves: strollers are more likely to have time to pause and converse, whereas destination walkers are probably walking out of need or time restrictions. He also found that strolling trips happen more in neighbourhoods with no facilities or only parks than in neighbourhoods with only retail facilities.

Density

Mazumdar et al. (2017) examined a large body of literature on the relationship between the density of neighbourhoods and the emergence of social capital and social interaction within these neighbourhoods. Most of the literature reviewed by the authors mentioned above showed a negative relationship between density and social interaction. However, these relationships were not strong or consistent. It is interesting to mention that negative relationships were shown regardless of the measure for density used: dwelling density, population density, or degree of urbanization. The negative relationship between density, social capital, and social interaction is counterintuitive; density and walkability are related, and walkability increases social interaction and social capital as it increases pedestrian movement and the chance that residents encounter each other on the streets (Cervero & Kockelman, 1997). According to Wood et al. (2008), there may be a density threshold over which the social capital gained from better access to destinations is outweighed by the social capital loss from having a large population of people with few local ties. The assumption of Wood (2008) is confirmed by Shibu (2005), who found that this density threshold lies somewhere between 70 to 80 households per hectare. Social capital was lower in areas with fewer or more households per hectare. When household density is lower than these thresholds, neighbourhoods might not be walkable, decreasing street pedestrian encounters. When household density exceeds this threshold, social capital is decreased due to the following two mechanisms. Firstly, some densely populated neighbourhoods could attract a temporary population with few links to the area. These temporary residents come to the neighbourhood for particular needs and convenient access to various facilities and leave after their needs change (Mazumdar et al., 2017). Additionally, high-density areas may attract many people from elsewhere, like tourists, discouraging inhabitants from spending time on the streets or in front yards if many people from elsewhere are present (Wood et al., 2010). Similarly, Hawley (2012) found a negative relationship between density and social interaction with neighbours. However, a positive relationship was found between the density of social interaction with friends.

Diversity

In the 4D model, diversity means diversity in land use. Diversity in land use can be defined as the extent to which residential, commercial and recreational purposes are present in a shared and nonsegregated way (Mazumdar et al., 2017). Around 60% of the articles on diversity that Mazumdar et al. (2017) assessed showed a positive relationship between diversity and social capital. In the 1960s, Jacobs (1961) saw the necessity for a functional mix on small scales. Jacobs posited that diversity in land use enhances social interaction by creating environments where people of diverse schedules and purposes coexist. Similarly, Alexander (1965) points out that a functional mix offers a great deal of possibilities for fostering social interaction among neighbors. It increases local mobilit, which raises the usage of sidewalks and other public areas and, consequently, opportunities for social interaction. Fuentes et al. (2022) found that diversity in land use reduces daytime segregation and causes more interactions during the day between people from different socio-economic backgrounds. They state that more diverse places attract a more heterogeneous population. It must be admitted that the majority of significant relationships listed by Mazumdar et al. (2017) relate to the availability of green spaces and social capital; they included green spaces in their diversity domain. Lund (2003) discovered that having access to parks improved neighbourhood ties and promoted spontaneous interactions. A broad range of other studies (e.g. Jennings & Bamkole, 2019; Cohen et al., 2008; Aram et al., 2019) found a positive relationship between accessibility to green spaces and an increased number of social interactions emerging in the neighbourhood.

Design

All 4D's revolve around the design of a neighbourhood in a certain way. The design domain revolves more around the design of the streets, such as street widths, speed limits, network patterns, and the shapes of the streets (Mazumdar et al., 2017). According to Kim & Kaplan (2004) and Podobnik (2011), inhabitants of neighbourhoods with gridded street networks have more sense of community. Jacobs (1961) talked about the network patterns in streets, which belong to the design domain according to Mazumdar et al. (2017). She states that small building blocks are necessary. Long streets, with no options to turn them off, cause monotonous and boring streets and discourage contact formation. A street layout with small blocks enables pedestrians to take different routes, making the neighbourhood more vibrant and increasing the chances of spontaneous encounters. Additionally, speed limits are crucial for social interaction to emerge in neighbourhoods because they help create a safe and inviting environment for people to gather and interact (Langston, 2015).

2.5.2 Building design aspects shaping social interaction in buildings

A paper by Barrie et al. (2023) discusses the value of public spaces in mixed-use buildings. This paper is the only paper found by the author that elaborates deeply on the social aspects of mixed-use buildings.

According to Barrie et al. (2023), building design influences how we use the space, feel, and interact in the building. Good building design, combined with active placemaking strategies, can foster better, healthier and more encouraging interactions.

According to Barrie et al. (2023), shared, communal spaces are crucial to creating a sense of community between users. Logically, this would mean that shared, communal spaces stimulate the emergence of social interaction. The lobby or atrium is especially vital in creating user interactions (Bouma, 2013). Atria offer a spatial and comfortable gathering place where people can congregate and socialize (Hung & Chow, 2001). Additionally, they strengthen people's sense of co-presence, especially when they are visible and accessible from several floors (Saxon, 1983; Kazemzadeh, 2014).

The lobby or atrium is where people pass through, but it can also enable many other uses; it is both a circulation space and a space where people can stay. Open seating arrangements in lobbies are essential as they provide space for people to observe or meet others (Barrie et al., 2023). Besides the free-public spaces, paid public spaces within mixed-use buildings such as cafés are considered spaces where interactions are likely to be formed (Barrie et al., 2023). Barrie et al. (2023) state that users highly value these paid facilities and are places where residents and visitors interact. Bouma et al. (2009) elaborate on the importance of common hallways for passive interactions. Furthermore, they elaborate on the importance of common rooms in facilitating both passive and active social interaction. In line with Barrie et al. (2023) and Bouma et al. (2009), Poelman et al. (2015) emphasize the importance of atriums, open staircases, seating areas and spaces with extended views in the emergence of interaction.

Sim & Gehl (2019) claim that functions should be layered so that people and facilities benefit maximally from the presence of all the different functions. This is the case in vertical hybrids. Vertical hybrids are distinguished from mixed-use buildings by their elevated level of programmatic complexity. Per et al. (2014) state that vertical hybrids, buildings with highly integrated functions, demonstrate an awareness of the "social dimension of users". Unfortunately, Per et al. (2014) do not elaborately explain their statement. However, from their statement, one could carefully conclude that more interactions might occur in hybrid buildings than in mixed-use buildings not characterized as hybrid ones.

2.5.3 Urban design aspects stimulating outsiders to enter buildings

Whether outsiders, someone who is not necessitated to enter the building for living or work, will enter the building depends on whether the building feels welcoming (De Omgevingspsycholoog, 2014). Whether a building feels welcoming depends on several factors. The simplicity with which a guest can locate the building from various points of departure is the first step towards making them feel welcome (Weisman, 1981). The ease of wayfinding has been found to be influenced by four main elements

(Weisman, 1981): differentiation, visual access, layout complexity, and signage. Differentiation is the degree to which elements of the built environment are different. Environments may be differentiated through size, form, colour or architectural style. Because the distinctive elements are more recognizable and remembered, settings with more significant differentiation typically facilitate navigation. Visual access is the degree to which different parts of an environment, in this case, the building, can be seen from various viewpoints (Weisman, 1981). Layout complexity refers to the complexity of the street patterns. For example, environments with oblique turns might be more disorienting than environments with orthogonal turns (Weisman, 1981). Orientation during wayfinding is essential (Montello & Sas, 2006). Signage, the fourth component, plays a crucial role. The design and placement of signage significantly influence orientation (Arthur & Passini, 1992). Effective signage should strike a balance, being sufficiently informative yet simple in design, ensuring readability from a distance. The information must be strategically placed, particularly at decision points.
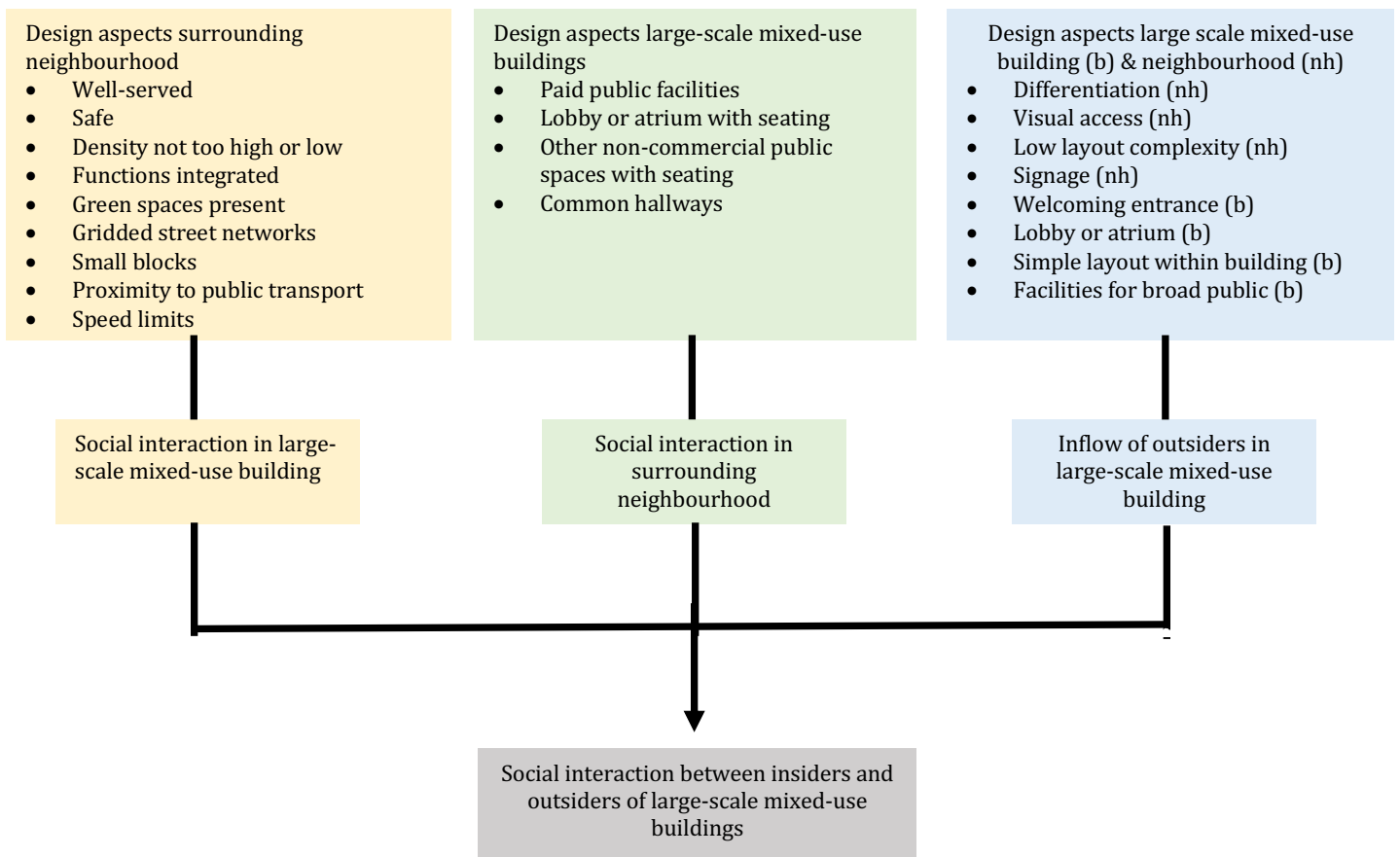
Once intentionally or unintentionally arrived at the building, one will arrive at the entrance, which will either be inviting or not. Metaphorically speaking, the entrance links the microcosm within the structure and the outside world (Wolf, 2007). A narrow definition of an entrance would be a "void or space without any designed elements" (Wolf, 2007, p. 6). A broader definition would be "the entire architectural composition surrounding the empty space that is the literal entrance. So, an entrance can be a doorcase, a portico, or even an entire façade or elevation" (Wolf, 2007, p. 6). Some entrances permit access for inhabitants or staff members but deny access to others. Other entrances are open to everyone. The entrance design usually reflects who can go in and who cannot. Visible entrances are essential for visitors to feel welcome. Welcoming entrances are easy to find as they are distinguished from the rest of the building through, for example, the use of materials different from those of the rest of the façade. Features like a door recess or canopy can draw attention to the location of an entrance. Artificial lighting can draw attention to a building's entryway and increase everyone's awareness at night. Moreover, audio cues such as fountains or rustling plants can be used to emphasize the entrance (CEUD, 2020).

Once one enters the building, one must comprehend its inner structure in order to stay there for a longer time. Atria with an open layout are highly important in achieving this goal; they allow for visibility and help individuals comprehend spatial accessibility (Saxon, 1983; Hung & Chow, 2001). An increasing amount of research indicates that factors such as the complexity of the layout of a building and the characteristics of corridors play a crucial role in people's wayfinding process in addition to factors intrinsic to people (Jamshidi et al., 2020). Lastly, according to Barrie et al. (2023), users must pass through the lobby regularly to make outsiders feel welcome. Furthermore, they consider it crucial that as many amenities as possible are open to the public and not reserved for inhabitants.

2.6 Conceptual model

The theoretical framework explored the concept of large-scale mixed-use buildings. Hereafter, it explored urban design aspects shaping social interaction in neighbourhoods, building design aspects shaping social interaction in buildings and urban, and building design aspects stimulating outsiders to enter buildings. These design aspects revolved around neighbourhoods and buildings in general. However, they potentially influence the emergence of social interaction between 'insiders' and 'outsiders' of large-scale mixed-use buildings specifically. Based on this potential relationship, the conceptual model below (Figure 6) has been established. The researcher has left room for other influential aspects to emerge during the research. This will be further explained in Chapter 3.

Figure 6: Conceptual model

Design aspects surrounding neighbourhood	Design aspects large-scale mixed-use buildings	Design aspects large scale mixed-use building (b) & neighbourhood (nh)
• Well-served • Safe • Density not too high or low • Functions integrated • Green spaces present • Gridded street networks • Small blocks • Proximity to public transport • Speed limits	• Paid public facilities • Lobby or atrium with seating • Other non-commercial public spaces with seating • Common hallways	• Differentiation (nh) • Visual access (nh) • Low layout complexity (nh) • Signage (nh) • Welcoming entrance (b) • Lobby or atrium (b) • Simple layout within building (b) • Facilities for broad public (b)
Social interaction in large-scale mixed-use building	Social interaction in surrounding neighbourhood	Inflow of outsiders in large-scale mixed-use building

Social interaction between insiders and outsiders of large-scale mixed-use buildings

3. Methodology

3.1 Grounded theory approach

The theoretical framework provided insights into large-scale mixed-use buildings and the relationship between the built environment and social interaction. Apart from one article on public places within mixed-use buildings written by Barrie et al. (2023), literature discussing the conditions under which social interaction in and around mixed-use buildings is maximal has not been found by the author. The lack of literature found on the topic is in line with DeLisle & Grissom (2020), who state that there has not been much empirical study done to pinpoint the key ingredients for well-functioning mixed-use buildings.

Because of the lack of literature on the topic, a grounded theory approach has been used to answer the main research question. Glaser & Strauss (1967) originally founded the grounded theory approach. Grounded theory is a qualitative research methodology with the purpose of generating or developing an explanatory theory based on empirical data (Glaser & Strauss, 1967; Birks & Mills, 2015; Bryant & Charmaz, 2007). A grounded theory approach is a good fit when little is known about a phenomenon; through a grounded theory approach, one can discover the theory hidden in the data (Dick, 2005). Grounded theory has an emergent nature; it does not test a hypothesis (Dick, 2005).

Research based on the grounded theory approach follows constant cycles of data collection, data analysis and reflection. After the first data collection phase, the researcher analyses and reflects on the data (Bravant & Charmaz, 2007). Throughout the data collection, analysis and reflection cycles, a theory grounded in the data emerges. According to traditional grounded theory, theories should be developed from data without consulting prior research (Glaser, 1992). Other forms of grounded theory (Charmaz, 2014; Clarke, 2005; Corbin & Strauss, 2015; Oliver, 2012) permit interaction with pre-existing theories at any point in the data collection process, including interaction with pre-existing theories before the data collection process. This research is not an example of classical grounded theory as it engaged with existing scientific literature before and during the data collection process.

Possible influential aspects of urban and building design have been derived from the theoretical framework. However, most of these aspects came from studies on neighbourhoods and buildings in general, not from studies that studied mixed-use buildings and their surrounding environment specifically. Throughout the data collection process, it has been attempted to determine whether each aspect plays a role. However, these aspects have only been used as a starting point for the data collection process. The researcher remained open to new influential aspects of urban and building design to

emerge. These aspects were grounded in the data and have been identified using the grounded theory approach.

In this research, one data collection cycle equals the data collection at one building. Data analysis and reflection took place after the data collection at each building. Existing theories have supported the reflection. When using a grounded theory approach, subsequent samples will be selected based on previous cycles of data collection; this process is called theoretical sampling (Glaser & Strauss, 1967). In this research, the cases were selected beforehand, but the focus of subsequent research was determined by previous data collection cycles. The observations' focus shifted when theoretical saturation was reached, which means that no new issues or insights emerged from the data (Hennink et al., 2017). While following the process described in this paragraph, a theory slowly emerged during the research process.

3.2 Case Selection

The research was executed by studying three cases: three existing large-scale mixed-use buildings in the Netherlands. The number of large-scale mixed-use buildings in the Netherlands that fit the definitions formulated for this research is limited. There are several mixed-use buildings in the Netherlands, but most do not contain residences, offices, and facilities or are small-scale. Only a few buildings remained after applying the filter that emerged by formulating the definition. Some of these buildings, for example, het Zandkasteel and West Beat in Amsterdam, were only delivered recently (Baggerman, 2022). These buildings have not been selected purposely, as people from the surrounding areas still need to familiarize themselves with these buildings. The existing large-scale mixed-use buildings are primarily located in the four cities with the largest number of inhabitants of the Netherlands (Baggerman, 2022): Amsterdam, Rotterdam, The Hague and Utrecht. The researcher aimed to select cases in the same city or all in different cities. None of the cities contained enough large-scale mixed-use buildings. Therefore, it has been decided to select buildings from different cities. Following the abovementioned criteria, the researcher came to three cases: Valley in Amsterdam, Calypso in Rotterdam, New Babylon in The Hague. Below, a short description of the buildings will follow.
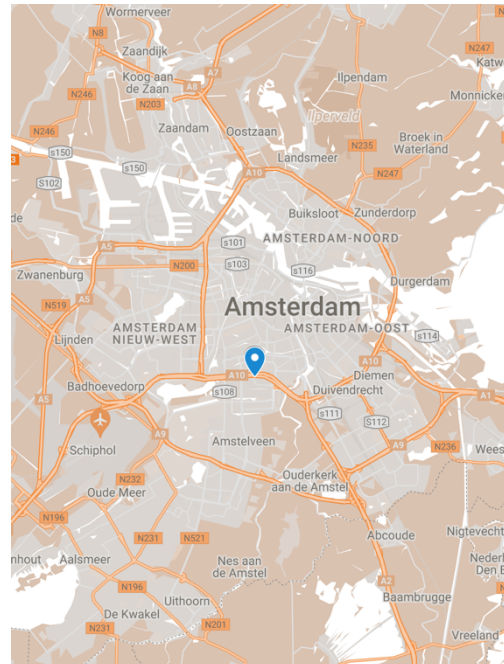
Valley, Amsterdam

Key features
- Architect(s): MVRDV
- Building year: 2022
- Gross floor area: 75 000 m²
- Functions: residences, offices, restaurants, a shop, a spa and gym exclusively accessible to residents.

Source: MVRDV (2024)

Figure 7: Valley

Source: MVRDV (2024)   Source: Google My Maps (2024)

Context

Valley is located in the capital city of the Netherlands, Amsterdam. The building is located in the Ravel neighbourhood. The Ravel neighbourhood is located in a business district called South Axis. This business district is slowly transitioning from purely a business district to a place where individuals and households can live pleasantly. Valley is part of this effort (Zuidas, 2024). Valley is situated 300 meters from the Amsterdam South railway station (Google Maps, 2024a). On the west side of the building, several soccer fields belonging to the Amsterdamsche Football Club are located. The other sides of the building are adjacent to other large, primarily office buildings.

Calypso, Rotterdam

Key features
- Architect(s): Van der Laan Bouma Architekten
- Building year: 2013
- Gross floor area: 72 041 m²
- Functions: residences, offices, shops, restaurants, a gym exclusively accessible to residents.

Source: Van der Laan Bouma Architekten (2024)

Figure 8: Calypso

Source: KYK Architecten (2024)

Source: Google My Maps (2024)

Context

Calypso is located in Rotterdam, the city with the second-largest number of inhabitants in the Netherlands (CBS, 2023). The building is located in the neighbourhood of Rotterdam Centrum, 400 meters from Rotterdam Central Station (Google Maps, 2024b). The front side, situated towards the west, borders a large park and Chinatown. On the east side, a large square is situated. When one passes the square, one will enter a large shopping area. On the north side, many other large buildings are adjacent to Calypso.

New Babylon, The Hague

Key features
- Architect(s): MVSA Architects
- Building year: Built in the 1970s, transformed to mixed-use building in 2012
- Gross floor area: 143 000 m²
- Functions: residences, offices, shops, gym, restaurants, educational facility, conference center.

Source: MVSA Architects (2024)

Figure 9: New Babylon

Source: Wicona (2024)   Source: Google My Maps (2024)

Context

New Babylon is located in The Hague, the third largest city in the Netherlands (CBS, 2023). The Hague is not the capital city; however, the Dutch national government is located in the Hague. New Babylon is located directly next to The Hague central station. A large parc named "Haagsche Bos" is situated at the northeast side of the building.

3.3 Methods of data collection and analysis

In this research, the data is derived from three primary sources; existing scientific literature, field observations and informal conversations. However, it is worth mentioning that in grounded theory, "all is data"; meaning that whatever the researcher comes across when researching the subject is data (Conlon et al., 2020).

3.3.1 Existing scientific literature

At the start of this methodology chapter, the role of theory in this research has already been briefly discussed. However, it is beneficial to delve further into the role of existing scientific literature in this research. The theoretical framework in Chapter 2 discusses the reviewed literature. Firstly, more general literature on the nature of mixed-use buildings is discussed. Hereafter, the concept of social interaction has been dissected. Consequently, the theoretical framework elaborates on the value of social interaction in the built environment to society through social capital. Lastly, the focus shifted towards the relationship between physical and social environments. The following aspects of urban and building design received attention:

1. Urban design aspects shaping social interaction in neighbourhoods
2. Building design aspects shaping social interaction in buildings
3. Urban and building design aspects stimulating outsiders to enter buildings

From the design aspects found, a list has been created. The list formed a starting point for the data collection; it has been extended using a grounded theory approach.

3.3.2 Observations

Research that uses a grounded theory approach ends with a hypothesis Drew (2023). This study aims to formulate a set of urban and building design aspects that are hypothesized to influence social interaction between insiders and outsiders of large-scale mixed-use buildings. Field observations are a proper research method for formulating a hypothesis, as they help to create a better understanding of a subject (Tan, 2022). Several kinds of observations exist. The observations done in favour of this research are naturalistic observations. Naturalistic observations aim to observe subjects in their natural setting without intervention. Researchers note what they observe during the observations (Mestre, 2012).

Field observations are the core method of data collection in this research. The field observations are conducted to fulfil the following purposes:

Assessing aspects of urban and building design:

1. Urban design aspects shaping social interaction in neighbourhoods
2. Building design aspects shaping social interaction in buildings
3. Urban design aspects stimulating outsiders to enter buildings

Assessing levels of social interaction between insiders and outsiders

1. Social interaction with the large-scale mixed-use buildings
2. Social interaction around the large-scale mixed-use buildings

For assessing the aspects of urban and building design, Table 2 has been established with existing literature. The table is used is a starting point for the data collection.

Table 2: Aspects of urban and building design

Design aspect	Valley	Calypso	New Babylon
Urban design aspects relating to SI (4D's)			
Well-served (			
Safe			
Density not too high or low			
Functions integrated			
Green spaces present			
Gridded street networks			
Small blocks			
Proximity to public transport			
Speed limits			
Building design aspects relating to SI			
Paid public facilities			
Lobby or atrium with seating			
Other non-commercial public spaces with seating			
Common hallways			
Urban design/building aspects influencing inflow outsiders			
Differentiation			
Visual access			
Low layout complexity			
Signage			
Welcoming entrance			
Lobby or atrium			
Simple layout within building			
Facilities for broad public			

Whether and to what extent an urban or building design aspect was present will be indicated in the following way: ++ = highly present, + = present, - = not really present, -- = completely not present

Throughout the research, new design aspects will emerge from the data. Later in the research, Table 2 will be filled in and will indicate the newly emerged design aspects in the following way:

* *Aspect emerged at Valley*

** *Aspect emerged at Calypso*

*** *Aspect emerged at New Babylon*

Source: Author (2024)

For assessing levels of social interaction in and around the cases, the Social Interaction Scale developed by Chen et al. (2023) is used, displayed in Table 3. Their Social Interaction Scale has been conducted to assess social interaction in parks. This research aims to assess social interaction in and around mixed-use buildings. Therefore, the examples are adapted to large-scale mixed-use buildings and their surrounding environment. The SIS developed by Chen et al. (2023) has been a starting point. Beforehand, the researcher realised that patterns that are not part of the SIS might be encountered. It appeared that this was the truth. The adapted version of the SIS is shown in the results section. Furthermore, observations have been made that were not all implementable in the SIS. Therefore, the SIS has not been applied rigidly and has been let go when observations did not fit.

Table 3: Instrument for measuring social interaction

SIS	Descriptions	Examples	Valley	Calypso	New Babylon
Solitary	Individual, uninterested in others	Reading on a bench, not noticing anyone			
Solitary onlooker	Individual, interested in others	Individual on a bench watching others			
Onlookers	Group, not communicating but observing others	In silence drinking coffee, while watching others			
Parallel	Group, more interested in activity than in each other	Shopping together but not interacting			
Associative	Group, interacting with each other unorganized matter	Shopping together and interacting			
Cooperative	Group, interacting in organized activity	Working on something together			

The presence of the types of interaction occurring at each building is indicated in the following way: ++ = highly present, + = present, - = not really present, -- = completely not present

Source: Conducted by author, based on Chen et al. (2023)

In order to compare the observations at the different buildings, observations were made at fixed times and on fixed days of the week. According to research by Kantar Public (2023), Tuesdays and Thursdays are the busiest days of the week in terms of the number of commuters. This phenomenon is called the 'DIDO-economie', which stands for Tuesday and Thursday economy. It can be assumed that people's lifestyle patterns are relatively similar during these two days. Therefore, the field research days have been restricted to Tuesdays and Thursdays. According to Rijkswaterstaat (2021), rush hour peaks occur at 8:30 AM and 5:30 PM. Therefore, it is decided to observe people at the entrances between 8:30 AM

and 9:00 AM and between 5:00 PM and 5:30 PM. These times have also been chosen as doing observations at these times would reveal information on who lives and works where. Observations at the entrance were also done between 12 AM and 12:30 PM, revealing information on people entering or leaving the building during lunch. The rest of the observations have not been done at fixed times as all buildings are different. Therefore, observing social interaction and physical aspects will cost a different amount of time at each building.

3.3.3 Informal conversations

The main aim of the informal conversations has been to obtain information that complements the observations made on social interaction. People who have spent much time in and around the building, such as inhabitants, employees, and frequent visitors, provided information on social interaction the researcher has not observed. Despite the long tradition of informal conversations, the method has been underutilized and often overlooked (Swain & King, 2022). However, informal conversations have advantages over more general qualitative approaches and methodologies. Informal conversations produce more naturalistic data as they enable the researcher to come closer to people's experiences, values, and perceptions (Swain & King, 2022). Other advantages are that they have the benefit of being able to happen almost anywhere. For example, while someone is strolling through a hallway or while a barista is making coffee, As they take a much smaller amount of time, it is not necessary to plan ahead of time, which is convenient for the person being talked to and the researcher.

3.4 Ethical considerations

Ethical issues and challenges arise inevitably while doing fieldwork in natural environments (Clark, 2012). First of all, ethical issues relating to the informal conversations have been considered. It was chosen not to record the informal conversations and not to let the people with whom was talked sign a consent form beforehand. This choice has been made as this might be obstructive and result in less rich and authentic data (Swain & King, 2020). After the conversations, participants were verbally asked for consent to include the insights they provided in the research.

Shifting to the observations, asking all observed people for consent was impossible. However, no personal or sensitive information is included in this research, so asking for consent would not be considered necessary. During the observations, the researcher became part of the people observed, for example, while drinking a coffee in one of the buildings or strolling around the buildings. The researcher respected all the people encountered and did not enter private areas. The researcher took pictures of the physical aspects observed and did not take pictures of people in and around the large-scale mixed-use buildings.

4. Results

The following chapter presents the results of the field research. The results are presented individually for each of the three buildings. For every building, the observed design aspects are discussed first. With this, the order in which the aspects are presented in the theoretical framework is followed. The urban and building design aspects derived from the theoretical framework are underlined. After presenting the observed design aspects, the observations related to social interaction are discussed. The indications derived from the Social Interaction Scale are also underlined. At the end of the presentation of the results of each building, the aspects that emerged in a grounded way during the data collection processes are presented. Sometimes, literature is used to validate these aspects found aspects. The aspects that emerged at the first building are integrated into the results of the next building. If aspects emerged at the last two buildings, Calypso or New Babylon, a small section at the end of the presentation of the results of these buildings is implemented to show whether these aspects are present at the previously discussed buildings. The aspects that emerged grounded during data collection are underlined and italicized.

4.1 Results Valley

The first large-scale mixed-use building studied in favour of this research is Valley. The field research was executed on Tuesday, the 22nd of November, 2023. During the day, it was mostly cloudy. Rain was forecast between 2 PM and 3 PM; however, it remained dry the entire day. The maximum temperature was 8 degrees Celsius.

Urban design aspects relating to social interaction (4D's)

The destination domain discusses, among other aspects, whether a neighbourhood is well-served. Valley is located in the Ravel neighbourhood, which is part of a business district. In the neighbourhood, fewer facilities are present than in, for example, Dutch inner cities. The facilities mainly entail coffee shops or places where people can enjoy a quick meal. The facilities are relatively expensive and target the affluent people working in the area (Figure 10). Regarding safety, the researcher did not experience any feelings of unsafety while investigating the neighbourhood.

Figure 10: High-end facilities
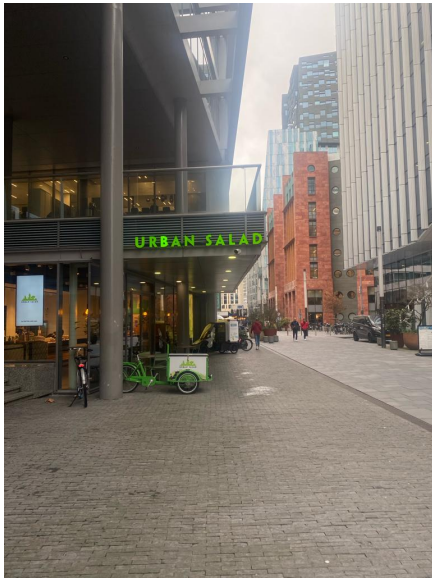
Source: Author 2023

Continuing with the density domain, the researcher experienced the neighbourhood in which Valley is as a neighbourhood with a high building <u>density</u>. However, it stood out to the researcher that the number of people present on the streets was lower than one would expect in an environment with such a high building density. Especially during the night, the streets were quiet.

The first aspect of the diversity domain is whether different <u>functions</u> are <u>integrated.</u> Observations reveal some integration, mainly for commercial and recreational purposes. However, this integration could still be improved massively. The neighbourhood contains only a small number of residences, which automatically means residential purposes are not well integrated with other purposes. Only very few and small <u>green spaces</u> were observed in the area surrounding the Valley.

Delving into the design domain, the researcher observed <u>gridded street networks</u>. However, the researcher did not observe <u>small blocks</u> in comparison to other urban areas in the Netherlands. Options to turn off usually occur every 150 meters. The <u>proximity to public transport</u> is high. There is a train station in the area surrounding Valley, and there are several bus stops. <u>Speed limits</u> are present and are set at 30 kilometers per hour.

Building design aspects relating to social interaction

Valley contains several <u>paid public facilities.</u> Most facilities are housed on the plinth, and one of the public facilities is located within the atrium. The building contains a gym, swimming pool, and sauna, which are only accessible to residents. The following facilities can be found on the plinth, starting from the far left:

- Molteni & C – Expensive interior design shop
- De Pizza Bakkers – affordable pizza restaurant
- Private parking
- Exhibition Sapiens – Exhibition which is never realized
- Yuan's Hot Pot – Asian Restaurant
- Jerilli's – Expensive Italian Restaurant

Inside the building the following facilities are housed:

- Cora – Coffee bar, only accessible to residents
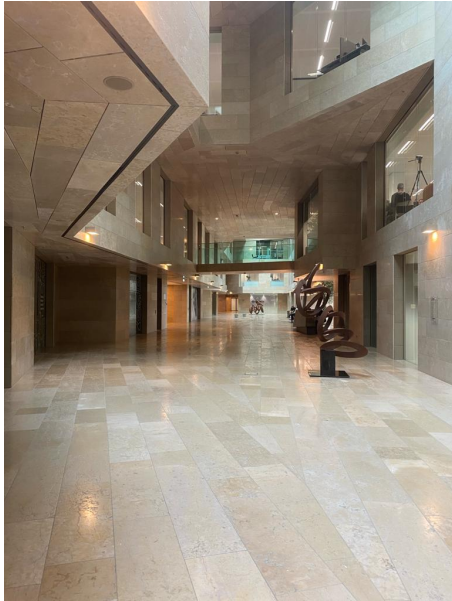- A gym, swimming pool and sauna – only accessible to residents

The facilities are and look mostly rather expensive (Figure 11). However, according to the researcher's perception, they are places in which social interaction is stimulated. The designs create a pleasing ambience, and the tables are arranged so that people can get in contact with one another. Valley has a large <u>atrium</u>, displayed in Figure 12. However, the researcher assumes that the design of the atrium does not stimulate social interaction to emerge. The atrium is very 'clean', and lacks seating possibilities. Furthermore, the smell in the atrium is very luxurious. Besides the atrium, there is one other <u>non-commercial public space with seating.</u> Valley has a unique feature: a walking path located across the building. The walking path contains a lot of green; diverse plant species are planted in large planters. Furthermore, a few benches are present on the path. The Valley-walk is displayed in the Figure 13.

Figure 11: Expensive restaurant

Source: Author (2023)

Figure 12: The atrium   *Figure 13 : Walk across Valley*

Source: Author (2023)   *Source: Author (2023)*

The last building design aspect relating to social interaction is the presence of <u>common</u> <u>hallways.</u> Residents have separate entrances and separate hallways. It is only possible to enter these hallways with an access card, which means only residents can enter them. The atrium and coffee shop within the building must be entered by the same entrances and hallways as the office workers use.

Urban and building design aspects influencing inflow of outsiders

Firstly, whether the facilities are attractive to a <u>broad public</u> is discussed. The facilities on the plinth can be attractive to several visitors. However, the interior design shop is rather exclusive and has a specific target audience. Also, while observing the Valley from the outside, someone entered the shop only once or twice. The Pizza Bakkers are not cheap or expensive and could be interesting for a broader set of people; the same applies to Yuan's Hotpot. Jerilli's, the luxurious Italian restaurant, is relatively expensive and therefore less interesting for many people. Furthermore, walking across the building can be enjoyable for anyone mobile enough to walk it.

The Valley stands out because of its striking architecture; the unique shape and the vegetation on the building make it different from the other buildings in the area. Therefore, it can be said that Valley is very well <u>differentiated</u> from its surrounding environment. Furthermore, there is significant visual access to the building from a large number of places around 200 meters from the building. Several points which provide visual access to Valley are displayed in Figure 14.

Figure 14: Visual accessibility from the surrounding neighbourhoods

Source: author (2023)

Source: author (2023)

The streets leading towards Valley have a low <u>layout complexity</u> as most turns are orthogonal. There is no <u>signage</u> directing to The Valley. The Valley has two public <u>entrances</u>, which have not been experienced as welcoming by the researcher, as they are made of very dark, almost black glass. One of the entrances is displayed in Figure 15. The researcher does not consider the <u>atrium</u> to be <u>welcoming</u>. The atrium is large and beautiful; however, it looks uncozy and lacks seating possibilities. Also, the smell in the atrium is very luxurious. The <u>layout</u> of the building is relatively simple, and there is signage in the building. Therefore, it could be considered comprehensible.

Figure 15: Entrance

Source: Author (2023)

Although the building meets several criteria, possibly stimulating outsiders to visit the building, the researcher felt unwelcome. The same applied to a young woman with whom was informally spoken. The young woman explained that she did not feel welcome because of the luxurious-looking exterior and interior. The unwelcomeness is also confirmed by the postman, who had no idea how to enter the building. Moreover, the man with whom was talked while observing the walk across the Valley

mentioned that he only knew he could go up because he observed the researcher doing so. It might be the case that the building was designed unwelcoming on purpose. The receptionists explained to the researcher that it is a 'grey area' whether or not visitors are allowed inside the building. Later, the receptionist used different words and stated that outsiders were not really supposed to enter the building. However, the receptionist said that tourists, mainly Asian tourists, enter the building to enjoy the architecture. Furthermore, the receptionist said that people often visit the walk across Valley.

Observed social interaction

Levels of social interaction were assessed with the aid of the Social Interaction Scale. Social interaction at the entrances was observed at fixed moments during the day. By observing social interaction at the entrances, the researcher also gained information on who enters and leaves the building. The researcher observed the entrances from 8:30 AM to 9:00 AM, from 12:00 PM to 1:00 PM and from 5:00 PM to 5:30 PM.

During the observations between 08:30 AM and 09:00 AM, around fifty people entered the building, and around ten people left the building. The people entering the building were mainly office employees. Most office employees approached and entered the building by themselves and were not interested in their environment. They could be considered solitary. The office employees who approached the building together were mostly talking and could, therefore, be considered associative. Most office employees came from the side of the train station, which might mean that those people do not live in the neighbourhood.

It became evident that many more people entered the building than left it during the morning. Which means that during the day, more workers from elsewhere enter the building than that inhabitants leave the building to work elsewhere. The receptionists told in an informal conversation that the people who live in the Valley do not work there. The people who left the building between 08:30 AM and 09:00 AM were most likely inhabitants. They mostly exit the building with their car. As a consequence, zero interaction, neither passive nor active, emerged between residents and people from the surroundings when a resident left the building by car. A few inhabitants left the building by bicycle or walking, which means at least passive social interaction emerges. However, the residents leaving by car, foot, or bike did not seem interested in their surroundings and could, therefore, be considered solitary.

During the afternoon observations, it mainly were office employees who entered or left the building. The office employees mostly entered or left the building in duos and were mostly talking; these people could be considered associative. Many of the office employees entering the building were carrying a lunch they most likely bought during their lunch break. The fact that office employees leave the building for lunch means that social interaction emerges between the office employees and the neighbourhood as

they get their lunch in the neighbourhood. Furthermore, during the lunchtime observations, some employees came out to smoke. However, they were primarily interested in their phones. These people could be considered solitary.

During the observations between 5:00 PM to 5:30 PM, many office employees were exiting the building, mostly in groups. They were mostly talking and could be called associative. For the residents, the same applies in the evening as in the morning. Hardly any people entered via the residence entrance. Only a few cars entered the building.

During the three observation moments, it stood out that only a few people from the neighbourhood walked along the building. This is likely a result of the fact that there is no continuous walking path situated along Valley. This means that only people who need to enter the building will enter the space in front of the building.

During the remaining moments, the interior of the Valley and the walk across it were observed. The atrium was observed from 13:00 to 13:30 and was relatively quiet. The people who were present in the atrium walked through it but did not stay there for a longer time. The only people walking around were office employees. Most office employees walked through it alone and were uninterested in the people around them; they could be considered solitary. The receptionist informed the researcher that sometimes tourists enter the building, often in large groups of more than fifteen people. The receptionist informed the researcher that she had never observed active social interaction between tourists and office employees. However, the fact that tourists are present means that passive social interaction occurs between them and the office employees. The receptionist shared that she thinks it is good that outsiders are not really meant to be in the atrium or visit the café, as it would be obstructing for office employees. Another exciting thing to mention is that there are no people who both live and work in Valley, according to the receptionist.

Observations in the small café in the atrium were made between 13:30 and 14:00. The café was full of people. According to the barista, only people who live or work in Valley visit the café. However, it is open to the public. The people sitting in the café were chatting and not working; therefore, they could be called associative.

The researcher observed the walk across Valley between 3:00 PM and 3:15 PM. One man was observed, with whom an informal conversation was held. The man was alone but interested in his environment and could, therefore, be considered a solitary onlooker.

Around 4:00 PM to 4:30 PM, the researcher sat inside the cheaper pizza restaurant on the plinth. The pizza restaurant was empty, which might have to do with the time of the day. During an informal conversation with the waitress, she mentioned that many of the guests consist of residents who often casually declare, "I live upstairs", accompanied by a pointing upward gesture. The pizza place also enjoys a significant customer base from various businesses within the building and the surrounding neighbourhood.

4.1.2 Urban and building design aspects grounded in data Valley

On the official website of Valley, the following vision of the architect is presented: "Valley is a place where people will truly live, work and enjoy city life. It is an exciting mix of prime offices, a cultural exposition space, retail units, parking facilities and residential apartments at the core of Amsterdam's South Axis" (Valley, 2024). However, the researcher did not experience this feeling, mainly due to

its exclusive appearance. Especially the façade looks highly exclusive (Figure 16). According to Green (2021), the façade is the aspect that often defines the appearance of the building. The researcher assumes a façade with luxurious and exclusive details scares people away from the building. Informal conversation with two other visitors confirmed the researcher's view. Furthermore, on the official website of Valley (2024), it is stated that Valley is, in line with the researchers' observations, a high-end building. At the subsequent buildings, it will be tested whether an exclusive appearance can discourage outsiders from visiting the building. Therefore, the aspect _non-exclusive façade design_ will be included in the category 'urban and building design aspects stimulating the inflow of outsiders'.

Figure 16: Façade
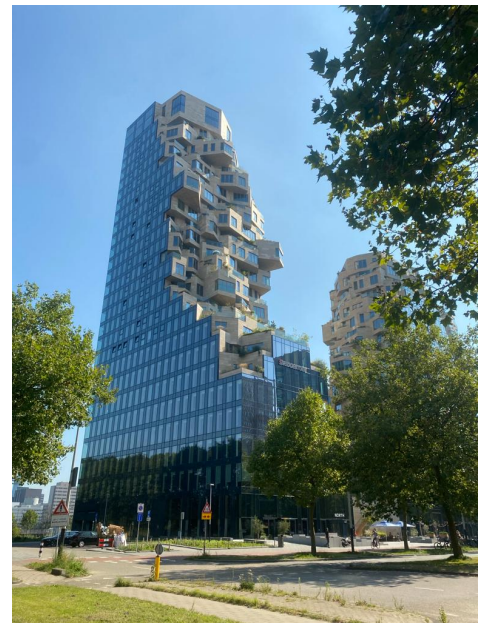
Source: Author (2023)

Moreover, unwelcoming signage has been observed at Valley which is assumed to scare people away. Examples of unwelcoming signage are displayed in Figure 17. The signage is considered unwelcoming because there is a camera surveillance sign present. The researcher and visitors did not feel welcome but were legally welcome. Madanipour (2015) points out that subtle and not-so-subtle cues and signs may indicate that members of a specific group are not welcome, even when individuals are legally allowed to visit certain parts of the city. The aspect no unwelcoming signage will be included in the category 'urban and building design aspects stimulating the inflow of outsiders.

Figure 17: Unwelcoming signage

Source: Author (2023)

At Valley, the researcher observed that the walking path along the building is not continuous. The path in front of Valley does not connect to any other buildings or places. People need to cross the road to visit Valley. Cars drive relatively fast on this road, and pedestrians do not have priority. According to Gehl (2011), difficult street crossings reduce pedestrian traffic. The absence of a continuous walking path along Valley means that people will never walk along Valley if they do not plan on entering the building. However, to allow spontaneous social interaction between people from the neighbourhood and people working or living in Valley to emerge, it is considered crucial that many people from the surrounding area pass by the building. A new aspect emerged: whether there is a *continuous walking path* running along the building. This aspect relates to the design of a neighbourhood and influences the number of people present and, therefore, social interaction. Therefore, this aspect is included in the 'urban design aspects that influence the emergence of social interaction' category.

After observing social interaction in and around Valley, the researcher concluded that it would be more beneficial to adapt the assessment table in a way that distinguishes between people on the go and people standing still or sitting. This is because people on the go interact differently with the people around them than those who are standing still or sitting. Adapting the table allows interactive behaviour to be displayed for both groups separately.

At the end of this chapter, the observed urban and building design aspects and the observed social interaction will be displayed systematically. It is considered helpful to display whether it was quiet or many people were present. It was observed that whether people are present highly differs per day.

However, these patterns were the same in and around every building. It is chosen to display whether there were many people present relative to the other buildings. Lastly, as this research revolves around the emergence of social interaction between insiders and outsiders, it is chosen to display the frequency of observing spontaneous encounters. Implementing all of this leads to the below, Table 4. This adjusted observation template has been used in the next rounds of data collection.

Table 4: Adapted and supplemented version SIS

	SIS	**Valley**	**Calypso**	**New Babylon**
Seated or standing	Solitary			
	Solitary onlooker			
	Onlookers			
	Parallel			
	Associative			
	Cooperative			
Flowing in and out	Solitary			
	Solitary onlookers			
	Onlookers			
	Associative			
	Cooperative			
Volume in- and outflow				
Frequency observed spontaneous encounters				

++ = highly present, + = present, - = not really present, -- = completely not present

Source: Conducted by author, partly based on Chen et al. (2023)

4.2 Results Calypso

The second large-scale mixed-use building studies is Calypso in Rotterdam. The field research was executed on Tuesday the 12th of December. During the day, it was raining from 13:00 PM onwards and the maximum temperature was around 10 degrees Celsius.

Urban design aspects relating to social interaction (4D's)

The presentation of the results will start again with the destination domain. The neighbourhood in which Calypso is located, Rotterdam Centrum, is well served. The front side of the building borders China Town, where many Asian shops and restaurants are located (Figure 18). The backside of the building borders a large shopping area. Both Chinatown and the shopping area were experienced as safe by the researcher. A large square is located between the shopping area and the building. The researcher felt unsafe at the square and the space between the building and the square. Many homeless people were hanging around in the space between the square and the backside of the building. Furthermore, in the space between the building and the square and at the square itself, much trash was observed, which is displayed in Figure 19. The presence of trash decreased the researchers' feeling of safety.

Picture 18: Chinatown

Source: Author (2023)

Picture 19: Trash around Calypso

Source: Author (2023)

The neighbourhood where Calypso is located, Rotterdam Centrum, was experienced as a high-density neighbourhood by the researcher. However, the large square situated at the backside of Calypso and the large park situated between the front side of the building and China created a spacious feeling.

The diversity domain discusses whether residential, commercial and recreational purposes are integrated. The researcher observed high levels of integration between these three purposes

in the neighbourhood. In Chinatown and the shopping area, houses were mainly located above the shops. In Rotterdam Centrum, some office towers are also located where the integration of functions is lower. The diversity domain also elaborates on the importance of the <u>presence of</u> <u>green spaces</u> in the neighbourhood. There is one large park located between the building and China own. However, not many people made use of the park.

Continuing to the design domain, the neighbourhood has mostly <u>gridded street networks</u> and <u>small blocks;</u> options to turn off occurred at least each hundred meters. The shopping area bordering the backside of the building is car-free. Cars were in other parts of the neighbourhood, but <u>speed limits </u>ensured people did not drive fast.

At Valley, whether a *<u>continuous walking path </u>*runs along the building emerged from the data. At Calypso, there is a continuous walking path present. The path is busy, as it leads to many destinations.

Building design aspects influencing social interaction

There is a large set of <u>paid facilities</u> present in Calypso. The facilities are all located in the plinth and are not accessible from the inside of the building except for a gym which is only accessible to residents.

When standing in front of the main entrance and going clockwise one will find:

- Bagels and Beans – sandwich shop
- Albert Heijn – supermarket
- Kilo kilo – vintage clothing store
- Cutea Bubble Tea and More – Bubble tea bar
- Studiootje Schouwburgplein – Beauty saloon
- Dionysos – A large Greek restaurant
- Alice Thai Street food – Thai street food restaurant
- Paulus Kerk – A church
- Ah-un Japanese BBQ – A Japanese BBQ restaurant
- Private Parking
- Madame Thai – Thai restaurant

Inside the building one will find:
- A gym – only accessible to residents

There is an <u>atrium</u> within the building. The atrium is much smaller and cosier than the atrium of Valley. Not many seats were present in the atrium. The atrium has some decorative features, among which is a Christmas tree. Besides the atrium, no <u>other non-commercial places</u> with seating were present within Calypso. The offices and residences have their hallways. There are no facilities for visitors present within the building. Therefore, there are no hallways within the building where visitors come. Thus, there is an absence of <u>common hallways</u>.

Urban and building design aspects influencing inflow outsiders

The facilities located in Calypso are attractive for visitors with middle-incomes and low-incomes. This means the facilities are attractive for a relatively <u>broad public.</u> The church located within the building also might attract people with low incomes. The Albert Heijn might also attract people with high incomes. The restaurants are not luxurious and, therefore, accessible to a broad public. Furthermore, several fast-food facilities were very cheap. This cheapness is reflected by the exterior of the facilities (Figure 20).

Figure 20: Cheap facilities in Calypso

Source: Author (2023)

Due to the orange and red colours used in the design of the exterior of Calypso, the building is very well <u>differentiated</u> from the surrounding buildings. Several places in the surrounding neighbourhood provide <u>visual access</u> to the building. The building is visible from the square in front of the central station, the neighbouring park, the shopping centre, the large square at the backside, and from several paths leading towards the building. Pictures taken from the park and shopping center are displayed in Figure 22.

Figure 22: Park and shopping center

Source: Author (2023)   *Source: Author (2023)*

The environment surrounding Calypso has a low layout complexity. The researcher found it easy to navigate towards and from the building despite the absence of signage pointing towards the building. The entrance has transparent glass and is well-differentiated from the rest of the building. Therefore, the entrance was easy to find and felt welcoming. The atrium is also welcoming; however, visitors have no purpose to enter it. Discussing the layout of the building is not relevant as visitors have no purpose to enter it. The facilities are all located on the plinth. However, when standing in front or at the sides of the building, it does not immediately become apparent that there are also facilities at the backside. This is because an extensive loading and unloading place from the Albert Heijn divides the two sides.

At Valley, the aspects *of non-exclusive façade design* and *no unwelcoming signage* emerged. From the researcher's point of view, the façade of Calypso has a much less exclusive appearance than Valley. This is why the researcher also felt much more welcome than at Valley. However, the researcher assumes that large buildings might always be slightly intimidating. In contrast to Valley, no unwelcoming signage was observed at Calypso.

Observed social interaction

The main entrance was observed during the morning observations from 8:30 AM to 9:00 AM. The number of people entering and leaving the building was approximately the same. This is in contrast to Valley, where the number of people leaving the building was much lower than the number of people entering the building. The main entrance is a joined entrance for residents and office employees. It can be assumed that the people leaving the building between 8:30 AM and 9:000 AM are residents, and the people entering are the office employees. The receptionist informed the researcher that there are no people who both live and work in Calypso. Most people entering or leaving the building were alone and

uninterested in their environment; they could be considered solitary. At 9:00, the researcher left the entrance and walked around the building. Around ten homeless people were observed sleeping, sitting, or standing around the building.

During the lunchtime observations from 12:00 AM to 12:30 PM, there was not much inflow or outflow of people. This contrasts Valley, where many office employees left the building during the afternoon to buy lunch somewhere in the neighbourhood. However, many pedestrians were passing by the entrance, enabling passive and active social interaction between the people passing by and the residents and office employees that did leave or enter the building during lunchtime. When the researcher was standing next to the entrance, the researcher was asked two questions by people who could not find their way.

During the observations from 5:00 PM to 5:30 PM, the same phenomenon was seen in the morning. Namely, the number of people leaving and entering the building was approximately the same. At this observation moment, it could be assumed that the people entering the building are residents and those leaving the building are office employees. In contrast to the observations made in the morning, people left or entered the building mostly in pairs or groups during the late afternoon. Around half of those people were interacting with each other and could, therefore, be considered associative. The other half of the people were not interacting with each other and were observing their environment; these people could be considered onlookers.

In between the systematic observations at the entrances, the facilities were observed. From 09:15 AM to 09:30 AM, the researcher was present at Albert Heijn, the supermarket on the plinth of Calypso. Most people were doing groceries on their own and could be called solitary. An employee behind the service desk was asked which customers visit the Albert Heijn within Calypso. The employee answered that the customers are people from the neighbourhood, including people living and working in Calypso, people working in the neighbourhood and tourists. Thus, residents of Calypso visit the Albert Heijn. However, at the vintage clothing store, the Bagels & Beans, the Greek restaurant and the Asian restaurant employees were asked whether people living or working in Calypso visit these facilities. Every employee gave the same answer; they never heard that someone lived or worked in Calypso. However, employees of the vintage clothing store, the Asian restaurant and the Greek restaurant said that they often hear from people that they live in the surrounding neighbourhood or come from far away. This is a significant contrast to Valley, where the customer base of the facilities within the building consisted of a large part of residents and office employees from Valley. In the facilities within Calypso themselves, much social interaction happened.

The researcher also observed a few spontaneous encounters between people, such as at the toilet of an Asian restaurant and an interaction between people sitting at different tables in Bagels & Beans. These

people could be called <u>associative.</u> However, it is not likely that these were interactions between insiders and outsiders, as employees of facilities never received people who told them they lived or worked in Calypso.

4.2.1 Urban and building design aspects grounded in data Calypso

At Calypso, some residences at the front of the building have balconies entirely surrounded by glass walls. The researcher observed a woman sitting on her balcony waving to someone who was passing by on the street. The balconies are displayed in Figure 23. The observation raised the question of whether passing people's windows could be valuable to the emergence of social interaction. Gehl (2011) states that windows can stimulate contact through experience between the public and the private. He says that this contact is not suitable in every situation. However, in general neighbourhoods, there is contact between people on the street and people inside through windows. According to Gehl (2011), eye contact is a passive interaction that can be the start of more intense interactions. Therefore, it is decided to include *visual access between private and public as a newly emerged aspect in this* research. Besides the balconies, there is another place in Calypso with visual access between the public and private. From the Bagels & Beans, visitors have visual access to the atrium, where office employees and residents usually come. This visual access is displayed in Figure 24.

Figure 23: Balconies

Picture 24: View atrium from Bagels & Beans

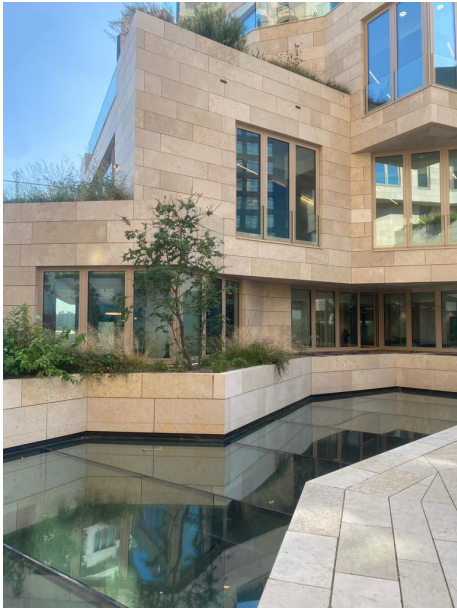*Source: Author (2023)*   *Source: Author (2023)*

Whether there is *visual access between the public and private* is a building design aspect potentially influencing the emergence of social interaction. Therefore, the aspects will be included in 'Building design aspects relating to social interaction'.

Applying aspects emerged at Calypso to Valley

One new potential influential building design aspect emerged at Calypso. The researcher returned to Valley to check whether the newly emerged aspect was present at Valley. The researcher observed that the only place with *visual access between the public and the private* is the walk across the Valley. The walk leads along the offices (Figure 25). This enables passive social interaction between office employees and visitors who walk across Valley. Some offices even have an outside terrace, enabling active interactions between office employees and visitors of the Valley Walk. Unfortunately, there are no points at the Valley Walk where it is possible to walk along the residences.

Figure 25: Visual access through glass Valley Walk

Source: Author (2023)
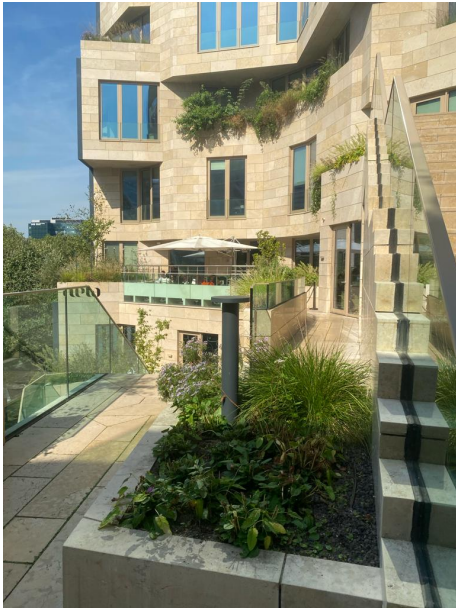
4.3 Results New Babylon

The last investigated large-scale mixed-use building is New Babylon in the Hague. The research was executed on Thursday the 14th of December. During the day there was some minor rainfall and the maximum temperature was around 8 degrees.

Urban design aspects relating to social interaction (4D's)

Starting with the destination domain, the researcher concluded that the neighbourhood surrounding New Babylon is relatively <u>well-served</u>. The central station houses many facilities and is next to the building. However, the building borders a few office buildings without facilities. The large park located next to New Babylon is a facility itself. However, because of the presence of the park, this is the only facility on this side of the building. The researcher concludes that the neighbourhood surrounding New Babylon has more facilities than the neighbourhood surrounding Valley but less than the neighbourhood surrounding Calypso. The researcher experienced the neighbourhood surrounding New Babylon as <u>safe</u>. Many people were present, and there was no trash on the street.

Continuing to the density domain, the density of buildings and people was experienced as high. However, the large park next to the building decreases density to some extent.

About the diversity domain can be said that <u>residential, commercial and recreational purposes are integrated.</u> A large park is present next to New Babylon, which means there is a presence of <u>green spaces</u>.

Delving into the design domain, it became visible that the street <u>networks are gridded</u>. Options to turn off occur about every 50 to 100 meters, which means there are <u>small blocks</u>. The train station is next to New Babylon, and several bus- and tram stops are nearby. Therefore, the researcher concludes that the <u>accessibility to public</u> transport is good. <u>Speed limits</u> are also present. However, on one side of the building, there is an important and busy road located. However, the other side of the building is a car-free square with seating and greenery.

At Valley, whether a <u>continuous walking</u> <u>path</u> is running along the building emerged from the data as a new aspect. At New Babylon, there is a continuous continuous walking paths present (Figure 26). People walk by also if they are not aiming to enter New Babylon. The paths along New Babylon connect many locations, for example the train station and several offices.

Building design aspects relating to social interaction

There is a wide range of <u>paid public facilities</u> present in New Babylon. The facilities target a diverse public. The facilities located in New Babylon consist of everyday facilities and facilities that people with an average income use regularly. Some other facilities are facilities people do not visit regularly, such as the car rental, which might attract people from further away. Part of the facilities is only accessible from the outside of the building; part of the facilities is only accessible from the atrium, and part of the facilities is accessible from both the outside and the atrium. Furthermore, there is a conference centre located on the first floor of the building.

Facilities accessible through the plinth:
- Babylon Hotel – hotel
- Q-park – public parking
- Private parking
- The Livingroom- restaurant
- Cosy Food Corner – food corner
- Sixt Rent a Car – car rental

Facilities accessible through the atrium:
- DE Café – coffee shop
- Holland & Barret – drugstore
- Coffee shop atrium – coffee shop
- Albert Heijn – supermarket

- ProDemos – provides excursions for high schools

Facilities accessible through both the plinth and atrium:
- Coolblue – electronic store
- SportCity – gym

Facilities further within the building:
- Conference Center – Conference Center

New Babylon has an L-shape <u>atrium</u>. However, it is doubted whether an 'atrium' is the most fitting description. The public ground floor came across to the researcher as a real indoor street. Several facilities are located within the atrium. In the centre of the atrium, a large open coffee shop with many seating opportunities is located. Figure 27 provides an impression of the atrium.

Figure 27: Atrium
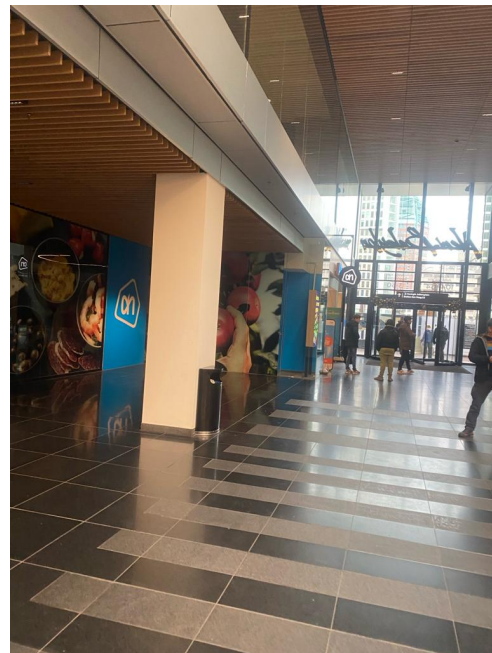
Source: Author (2023)

Within the building, there are other publicly accessible non-commercial places with seating. However, these spaces are located on the higher floors where the offices are located. Therefore, only some outsiders will enter these public spaces, especially those visiting the conference centre. Hallways in New Babylon are partly common. Residents have their entrances and hallways. However, office employees enter their offices through the atrium. Here, office employees and visitors will cross paths.

At Calypso, the building design aspect of *visual access between public and private* emerged. At New Babylon, visitors and residents have no visual access to each other. However, there is visual access between visitors and office employees. Above the atrium are balconies present where the offices are located. This provides the building with an open feeling (Figure 28).

Figure 28: Balconies

Source: Author (2023)

Urban design aspects influencing inflow outsiders

The facilities present in New Babylon are attractive to a broad public. The facilities in New Babylon consist of everyday facilities that people with an average income use regularly.

The building is not well differentiated from the buildings in the surrounding environment. The building is a tall building, a skyscraper. A large part of the buildings in the surrounding environment could also be considered a skyscraper. However, the architecture of the building itself is different from that of some of the other buildings as it has details in the colour blue and knows some diagonal shapes. The building is of great height. Therefore, there is visual accessibility to the building from several points in the surrounding neighbourhood. Most paths around the building have an orthogonal shape. However, most buildings around the building are pretty large. The researcher can imagine it could be difficult for visitors to comprehend how to navigate through these buildings to New Babylon. Therefore, the layout complexity could be labelled as relatively complex. There is no signage present in the surrounding environment pointing towards New Babylon. However, on the exterior of the building, signage was present to inform visitors of the facilities within the building (Figure 30).

Figure 30: Signage towards facilities

Source: Author (2023)

The entrances have dark glass, which lowers the extent to which they were experienced as welcoming by the researcher. However, at Valley, it was not immediately clear what the entrances were to the researcher. At New Babylon, the location of entrances was immediately apparent to the researcher. This was the case because the letters 'New Babylon' were displayed in an informal style above the entrance. Furthermore, the entrances were in a small cut-out, making their location clearer. The <u>atrium</u> is very welcoming to visitors, as discussed above. The <u>layout</u> within the building was experienced as <u>simple</u> by the researcher. The researcher immediately understood the layout of the atrium with facilities. Also, it was immediately understood that offices are located on the upper floors because of the open design.

At Valley, the aspects *of non-exclusive façade design* and *no unwelcoming signage* emerged. From the researcher's point of view, the façade of New Babylon looks less exclusive than Valley, but still rather exclusive, mainly due to its enormous size and the use of dark glass. However, at the façade of New Babylon, it is indicated that common facilities like Albert Heijn and Douwe Egberts Café are present. This made the building come across as less exclusive in the eyes of the researcher. No unwelcoming signage was observed at New Babylon.

Observed social interaction

During the observations between 8:30 AM and 9:00 AM, many people entered the atrium and accessed either the facilities or the offices. Few people left the building. The people entering the atrium were mainly office employees, given that they were dressed in business casual outfits and often wore bags in which they most likely took their laptops and given the fact that they were alone. Only a few people left via the entrance leading to the apartments. Zero people entered through the entrance leading to the apartments. The people approaching and leaving New Babylon between 8:00 AM and 9:00 AM were primarily <u>solitary;</u> alone and uninterested in their environment.

The observations during lunchtime, between 12 PM and 12:30 PM, revealed an interesting phenomenon: the same observation as at Calypso. Namely there was much less traffic than at Valley. At Valley, many office employees exit the building, mostly in groups, and enter the building later, often with lunch. At New Babylon, not many office employees left or entered the building. However, during lunchtime, a large group of teenagers left the building with their teachers after visiting ProDemos. The teenagers were chatting with each other; they could be labelled <u>associative</u>.

During the observations from 5:00 PM to 5:30 PM, many office workers left the building, mostly in groups; they could be considered <u>associative</u>. Visitors were also observed. The number of visitors leaving was about the same as the number of visitors entering. Again, residents were observed only in small numbers. More residents were observed leaving the building than entering it.

During the remaining moments, social interaction in the interior spaces was observed. During the morning, the building was still relatively quiet, except for the DE Café. The researcher observed the DE Café from 10 AM to 10:30 AM. Many people were present. About half of the people were working <u>solitary</u> behind a laptop, and the other half were having a talk, <u>associative</u>. The people working behind a laptop were primarily people above 25; however, some students were present in the DE Café to study. Some people in the coffee shop for leisure were tourists preparing themselves for a day in The Hague. Others were most likely locals. An informal conversation with the baristas revealed that besides many tourists and people from the surrounding environment, many residents of New Babylon visit the coffee shop. One of the baristas said that some residents do not even have a coffee machine and go to the coffee shop every morning to drink coffee. Furthermore, the barista said that often spontaneous encounters happen in the coffee shop, mainly between people who go there alone to work. Furthermore, an employee of Albert Heijn said that part of their clients consists of inhabitants of New Babylon. Also, people from the neighbourhood visit the Albert Heijn. Employees of Holland & Barret told me that they also regularly hear from people who live in the building. Sport City employees said they do not know whether some of their customers live in New Babylon.

The paths within the atrium were quiet during the morning. The rest of the day, they were pretty full of people. It stood out that the behaviour of the people strolling through the paths was more similar to those on the streets than in Valley and Calypso. This might have to do with the fact that people feel more welcome because of all the public facilities present. The groups of high school students that visit ProDemos present in the atrium also create a more laid-back atmosphere. People strolling to the atrium consisted of solitary people. However, even more people seemed to be interested in their environment and could be labelled solitary onlookers. Furthermore, some group onlookers and associative people were observed. People with the label parallel or cooperative were hardly spotted in any of the large-scale mixed-use buildings.

4.3.1 Urban and building design aspects grounded in data New Babylon

After researching New Babylon, it became clear that the lifestyle patterns of New Babylon and Valley residents are different than at Calypso. Lifestyle patterns indirectly influence the chance of residents being involved in social interactions with people from the neighbourhood, as they determine when and where residents are present. At Calypso, many more residents entered and left the building during rush hours than at Valley and New Babylon. However, this might also have to do with the fact that Calypso contains more apartments than Valley and New Babylon. Valley contains 200 apartments (Valley, 2023), Calypso contains 407 apartments (KYK Architecten, 2023), and New Babylon contains 335 apartments (MVSA Architects, 2024). However, also relative to the number of residents, much fewer residents have been observed flowing in and out at rush hours at Valley and New Babylon than at Calypso. Besides, it stood out that no employees of the facilities in Calypso ever heard that people visiting their facility reside in Calypso. For Valley and New Babylon, this was the case. The researcher hypothesizes that this difference in lifestyle patterns has to do with the income level of residents. Bill et al. (2022) confirm that income influences lifestyle. The income level of residents is not an urban design aspect. However, the income levels of people influence what residences they can afford. Therefore, the *housing segment* is a building design aspect that can potentially influence the chances for social interaction to emerge. Therefore, it will be assigned to 'Building design aspects relating to social interaction'. New Babylon contains both rental apartments and apartments owned by the residents. The rent prices vary from 1800 to 4500 euros, excluding service costs (Trovit, 2024). The owner-occupied apartments have square meter prices ranging from 5000 to 9500 euros (Funda, 2023). The apartment prices of the other two buildings will be discussed below.

New Babylon houses a total of seven facilities, which are part of a chain. These facilities were all busy and well-visited, unlike those not part of a chain. This raised the question of whether social interaction within buildings can be enforced by including facilities which belong to a chain. Therefore, whether the

building contains *facilities part of a chain* is included and investigated. The observation that facilities belonging to a chain were better visited than facilities that do not belong to a chain can be explained through the research of Winet & O'Brien (2023), who state that people prefer familiarity over novelty. People would rather visit places or do activities they already know than ones they do not know. Furthermore, a study by Janiszewski et al. (2013) found that consumers are more likely to purchase a product or service if they have previously seen it, indicating that familiarity can influence consumer decisions. Whether the facilities are part of a large chain is a building design aspect that might influence the inflow of outsiders. Therefore, this aspect will be assigned to 'Urban design/building design aspects influencing the inflow of outsiders.

Applying aspects emerged at New Babylon to Valley and Calypso

The *housing segment* of Valley consists of rental apartments from the highest segment. The exact prices are not displayed anywhere online. However, a few news articles, e.g. Telegraaf (2021), mention that prices start at 1350 euros for a very small apartment, excluding service costs. Furthermore, the following statement is found on the website of Valley, from which we can conclude that renting the apartments is highly expensive: "Valley is an exclusive and luxurious residential complex, located in the prestigious Zuidas area of Amsterdam". Calypso contains both rental apartments and apartments which the residents own. The prices per square meter of apartments in Calypso vary from around 4000 to 6000 euros (Funda, 2024). The rental apartments vary from 1700 to 3000 euros, excluding service costs.

Continuing to the other emerging building design aspect at New Babylon, we will examine whether the facilities are part of a *large chain*. Valley has three facilities which are part of a chain. However, two out of these three facilities have less than five establishments. Calypso houses two chains, however these two chains both have a large number of establishments.

4.4 Systematic representation results

Table 5: Observed aspects of urban and building design

Urban/Building design aspect	Valley	Calypso	New Babylon
Urban design aspects relating to SI (4D's)			
Well-served	-	++	+
Safe	++	-	++
Density	++	++	++
Residential, commercial and recreation integrated	-	++	+
Green spaces present	-	+	+
Gridded street networks	++	++	++
Small blocks	--	+	+
Proximity to public transport	++	++	++
Speed limits	+	+	+
Continuous walking path *	--	++	++
Building design aspects relating to SI			
Paid public facilities	+	++	++
Lobby or atrium with seating	-	-	++
Other non-commercial public spaces with seating	+	--	--
Common hallways	--	--	+
Accessible housing segment***	--	-	--
Visual accessibility through glass **	+	++	+
Urban design/building aspects influencing inflow outsiders			
Facilities for broad public	-	++	++
Differentiation	+	+	+
Visual access	++	++	++
Low layout complexity	++	++	-
Signage	--	--	--
Welcoming entrance	--	+	+
Lobby or atrium	++	++	++
Simple layout within building	++	++	++
Non-exclusive façade design *	--	+	-
No unwelcoming signage*	--	++	++
Facilities part of a chain **	-	+	++

++ = highly present, + = present, - = not really present, -- = completely not present

*   Aspect emerged at Valley
** Aspect emerged at Calypso
*** Aspect emerged at New Babylon

Source: Assembled by author (2023)

Table 6: Adapted and completed version SIS

	SIS	**Valley**	**Calypso**	**New Babylon**
Seated or standing	Solitary	**++**	**+**	**+**
	Solitary onlooker	**--**	**-**	**-**
	Onlookers	**--**	**--**	**--**
	Parallel	**--**	**--**	**--**
	Associative	**-**	**++**	**++**
	Cooperative	**--**	**-**	**+**
Flowing in and out	Solitary	**++**	**++**	**++**
	Solitary onlookers	**--**	**-**	**-**
	Onlookers	**--**	**--**	**--**
	Associative	**+**	**+**	**+**
	Cooperative	**--**	**--**	**-**
Volume in- and outflow		**-**	**+**	**++**
Frequency observed sponteneous encounters		**--**	**-**	**-**

++ = highly present, + = present, - = not really present, -- = completely not present

Source: Conducted by author, partly based on Chen et al. (2023)

5. Discussion and conclusions

In this chapter, the results will be interpreted, whereafter conclusions will be drawn. However, it is essential to notice how one should consider the discussion of the results and the conclusion of this research. This research has been using a grounded theory approach. A grounded theory approach aims to generate testable knowledge from data (Birks & Mills, 2022). Therefore, the statements made in the discussion and conclusion are only assumptions. The value of these assumptions is that they can form the start of more robust knowledge about the topic. Others could investigate the assumptions in a more detailed and quantitative manner. Furthermore, the researcher always kept in mind to be as objective and open-minded as possible and to listen to listen to the data. However, it is still likely that the findings have been influenced by the researchers preexisting notions (Corbin & Strauss, 2014).

Furthermore, it is exciting and essential to note not for everything that is observed, an explanation is found. A couple of times, either a condition was present, but the expected behaviour was not, or the condition was not present, but the expected behaviour was observed. This likely means that a factor was at play that was not noticed by the researcher. Moreover, the researcher might have observed interactions or patterns of in- and outflow that have been coincidental. This again shows why the discussion and conclusion consist of assumptions that should be tested in further research.

5.1 Discussion

Social interaction emerges when people are together in the same physical space (Gehl, 2011). Most contacts on city streets entail passive social interactions (Gehl, 2011). Passive and active social interactions between insiders and outsiders are likely to happen right outside the buildings. Here, people from the neighbourhood pass by, and insiders find themselves in the space in front of the building when entering or leaving it. It stood out that much fewer people were passing by the building at Valley than at Calypso and New Babylon. This seems to partly result from the absence of a continuous walking path along Valley. The absence of a continuous walking path results in outsiders only being present at the space in front of the building when they plan on entering it. Calypso and New Babylon are located along continuous walking paths, meaning that many of the people in the area automatically walk along these large-scale mixed-use buildings.

Furthermore, Calypso and New Babylon are located in well-served city centres, while Valley is in a business district. The observation that more people are present around Calypso and New Babylon as they are located in better-served neighbourhoods and that this results in more social interaction aligns with Mazumdar et al. (2018). Besides the presence of facilities, the integration of facilities is also higher in the neighbourhoods around Calypso and New Babylon. However, this is simply a result of the

relatively small number of housing and facilities in the neighbourhood around Valley. When there are few houses and facilities present in comparison to office spaces, it also means that the three are automatically less integrated. As a result of this lower integration of functions, at some moments of the day, the neighbourhood around Valley was really quiet, for example, during the evening when the office employees were at home. At these moments not much passive and active observations were observed around Valley. This observation aligns with Jacobs (1961), who states that neighbourhoods with high integration of functions are lively almost every moment.

It was observed that between 8:30 AM and 9:00 AM and between 5 PM and 5:30 PM, more people from the surrounding neighbourhoods pass by the building than at other times of the day. This observation is in line with Rijkswaterstaat (2021), who states that rush hours take place around these times. Therefore, to increase the chances of social interaction between insiders and outsiders, it is crucial that insiders also enter and leave the building during these rush hours. Office employees entered and left the building during rush hours at all three large-scale mixed-use buildings. At Calypso, residents also left and entered the building during rush hours. However, much fewer residents entering or leaving the building were observed during rush hours at Valley and New Babylon. The researcher found a possible explanation for this observation: the housing segment. Apartments in Valley and New Babylon are slightly more expensive than apartments in Calypso, which might mean people in Valley and New Babylon have a slightly higher income, have different lifestyles, and may not have a regular nine-to-five job.

Furthermore, it stood out that at Valley, many office employees entered the building during lunchtime with a lunch they just bought. This means that they enter the neighbourhood during lunchtime, and social interaction between them and people from the neighbourhood emerges. At Calypso and New Babylon, this was not observed. New Babylon contains several facilities where office employees can buy lunch. This explains why no office employees were observed entering the building after getting lunch in the neighbourhood. It was unclear why office employees entering with lunch were not observed at Calypso. Calypso has a supermarket; however, office employees need to leave and re-enter the building to get there. Here, there might be a factor at play that the researcher has not identified. One could think about the corporate culture of the businesses in Calypso; it could be that the employees bring a sandwich from home every day or that a free lunch is provided in the offices.

The number of outsiders passing by the building correlated with the number of outsiders visiting the facilities within the large-scale mixed-use buildings. Also, visiting facilities seems to be the primary motive for outsiders to enter the building. At Valley, outsiders also entered the building to enjoy the architecture. Besides these two motives, no other motives for outsiders to visit the building were identified. At the front of Calypso and the entire area surrounding New Babylon, many people passed by and were present within its facilities. Not many people were in the facilities at Valley and the backside

of Calypso, where not many people passed by. The researcher felt safe around each building, except for the backside of Calypso. Here, only a few people were present, and the people passing by walked very quickly. This aligns with the statement that low safety levels reduce the likelihood of interactions to emerge by Mazumdar et al. (2017). Moreover, likely as a result, the facilities at the backside of Calypso were poorly visited. Another interesting observation was that facilities that are part of a well-known chain, for example, Coolblue and DE Café, were better visited than other facilities; this is in line with Winet & O'Brien (2023), who state that people prefer familiarity over novelty.

A prerequisite for interactions between insiders and outsiders to emerge within the facilities is that insiders also visit the facilities. At Valley, this was the case. However, at Valley, most outsiders who visit the facilities are business people from the surrounding business district. At Valley, the facilities are relatively high-end. This can declare why residents often visit the facilities; the facilities meet their tastes and standards. Besides, only a few alternative options are present in the surrounding neighbourhood. At New Babylon, many residents visit the facilities in their building. At New Babylon, the facilities are also decent, which might be why, also here, many insiders visit the facilities in their building. At Calypso, the residents do not visit the facilities, as far as the employees of several facilities know. There are three possible explanations for this. One is that most facilities are cheap and of low quality and, therefore, do not match the standards of the residents of Calypso. Another potential explanation could be that the surrounding environment is very well served, which means many alternative options are available. The third possible explanation is the income of residents of Calypso, which is slightly lower. They might go out for lunch or dinner less often and might prefer a place outside their residence when they do go out.

Many active social interactions were observed within the facilities at each large-scale mixed-use building. This aligns with Barrie et al. (2023), who state that paid public facilities within buildings are spaces where social interactions are likely to be formed. A few active social interactions have been observed to be formed between people who do not know each other yet. This was mainly the case within coffee bars and other food-related facilities. However, whether these interactions were between insiders and outsiders has not been possible to observe.

The observations revealed, in line with the literature, that atria can be an important place for the emergence of social interaction, which is in line with Barrie et al. (2023). A few spontaneous interactions have been observed in the atrium of New Babylon, also, between people who were clearly strangers. However, these interactions were merely functional. For example, they were asking someone for the route. Interactions were observed at the atria of Valley and Calypso, too. However, these seemed to be merely interactions between people who knew each other beforehand. This is logical, as outsiders have no reason to visit the atrium at all at Calypso, as there are no facilities in the atrium or further within the

building. At Valley, there is a facility in the atrium, and outsiders sometimes enter the atrium to enjoy the architecture. However, the receptionist has never observed interactions between outsiders and insiders within the atrium. The researcher assumes this is the case because the atrium is very large, luxurious, formal, and lacks seating possibilities. Barrie et al. (2023) state that seating is crucial in public places to stimulate social interaction.

As stated, more spontaneous and non-spontaneous interactions emerged in the atrium of New Babylon than in the atria of the other two buildings. The atrium of New Babylon almost feels like a street because of its shape and the large number of facilities present. The researcher observed that people, likely due to the design of the atrium, feel at ease in the atrium. People were observed talking loudly, enjoying a snack while walking, or making a phone call; all behaviours that have not been observed in the other two atria. The researcher assumes that as a result of people feeling at ease and showing behaviour as if they were out on the streets, more interactions emerged.

The atrium of New Babylon offers access to its offices and contains facilities. Therefore, in New Babylon's atrium, office employees and visitors were present and interacted. This integration of office space with leisure space is a feature of a "hybrid building". In hybrid buildings, the different functions are well integrated, which results in more interactions, according to Per et al. (2014). The researcher does not consider all three buildings fully hybrid; however, New Babylon would come closest. Within New Babylon, most social interactions have also been observed. This observation is in line with Per et al. (2014), who state that in hybrid buildings, more interactions happen.

As discussed, interactions between insiders and outsiders could emerge in the spaces surrounding the building, atrium, or facilities. However, some of the buildings were designed in a way that mostly passive interactions were also enabled between people who were not present in the same space, through glass or via balconies. The researcher observed one active interaction through glass: someone waving to one another. However, many passive interactions through glass were observed. According to Gehl (2011), these interactions can be valuable.

Of several urban and building design aspects, it was hard to make assumptions on whether they influence the presence of people and the emergence of social interaction. A few aspects were present to the same extent at each building; these entail density, gridded street networks, speed limits and proximity to public transport, the extent to which a building is differentiated from the surrounding environment, and whether the building has a comprehensible layout. Green spaces were not present around any of the buildings. Large parks were observed very close to Calypso and New Babylon. However, the parks were empty and did not seem to influence the presence of people around the large-scale mixed-use buildings. This might also have been a result of the cold weather during the observation days.

Whether outsiders enter the building seemed to depend primarily on whether they accidentally pass by and whether there are facilities present. However, some architectural features were observed that may also play a role. At Valley, only a few people were present. The fact that Valley is not located in a busy neighbourhood, at a continuous walking path and does not have facilities that appeal to everyone plays a role. However, the researcher assumes that the exclusive appearance of Valley also plays a role. The researcher and a few people with whom an informal conversation was held felt unwelcome because of the exclusive design of the façade and the fact that it was extendedly emphasized with signage on the exterior of the building that the building is under camera protection. That these signs could potentially scare outsiders away is in line with Madanipour (2015). Madanipour points out that subtle and not-so-subtle cues and signs may indicate that members of a specific group are not welcome, even when individuals are legally allowed to visit certain parts of the city. Besides the signage and exclusive appearance, the Valley's entrances are not remarkable. The researcher also experienced difficulties with identifying which entrance leads to the atrium. At New Babylon, the researcher immediately understood which entrance to enter because of signage; this made the researcher feel much more welcome.

It became clear that the extent to which people are present depends on several design aspects. Also, which people are present depends on several urban and building design aspects. The extent to which social interactions emerged when people were present was more challenging to observe. The researcher observed several emerging interactions; however, it was not possible to know whether they were between insiders and outsiders. However, it also becomes clear through informal conversations that there are no people who both live and work within a mixed-use building. This means that all residents leave the building for work, and all office employees leave the building at night to go home. As a result, these people interact with the world outside the building, and the world outside the building interacts with them. Therefore, no mixed-use building is on its own a complete system, as the words "vertical neighbourhood" or "a vertical city" (Gosh, 2014; Morrato, 2022; Webb & White, 2022) imply.

5.1.2 Systematic representation discussion

Table 7 below brings the physical world and the social world together. It shows simply and systematically which aspects of urban and building design are assumed to influence the emergence of social interaction in and around large-scale mixed-use buildings between insiders and outsiders. Only the urban and building design aspects assumed to be influential are included in the table. The assumed influence of the aspects on the emergence of social interaction is indicated with the indications 'high', 'medium' or 'low'.

Table 7: Influential aspects of urban and building design

Urban/Building design aspect	Assumed influence on SI
Urban design aspects relating to SI (4D's)	
Well-served	High
Safe	Medium
Functions integrated	Medium
Continuous walking path *	High
Building design aspects relating to SI	
Paid public facilities	High
Lobby or atrium with seating	High
Other non-commercial public spaces with seating	High
Common hallways	High
Accessible housing segment***	Low
Visual accessibility through glass **	Low
Urban design/building aspects influencing inflow outsiders	
Facilities for broad public	High
Welcoming entrance	Low
Lobby or atrium	High
Non-exclusive façade design *	Medium
No unwelcoming signage*	Low
Facilities part of a chain **	Medium

5.2 Conclusions

This research explored urban and building design aspects shaping social interactions between insiders and outsiders of large-scale mixed-use buildings. It became clear that none of the large-scale mixed-used buildings were closed cities within cities. People do not choose to both live and work in one large-scale mixed-use building. However, the extent to which insiders and outsiders were present and interactions emerged in and around the large-scale mixed-use building differs per building. This is likely a result of the difference in how the buildings and their surrounding environments are designed.

When large-scale mixed-use buildings are situated in environments where housing, offices, and leisure facilities are well-integrated, there tends to be a higher presence of people and more social interaction. Moreover, a continuous walking path must run along the building as this ensures the presence of outsiders around the building. When entrances for office employees and residents border the walking path, the chance of encounters between insiders and outsiders is high. During rush hours, the highest number of outsiders was observed around the building. Therefore, for social interaction to emerge

between insiders and outsiders, insiders must enter or leave the large-scale mixed-use building during this time. Office employees mostly entered or left during rush hours. Whether inhabitants enter and leave during rush hours depends on their lifestyles and, therefore, on the housing segment of the residences included.

The presence of facilities attractive to a broad public is crucial in attracting outsiders to the building. Facilities are also places where much social interaction takes place. It became clear that facilities that belong to a well-known chain are better visited. Thus, including diverse facilities within a building, of which some are part of a chain, is essential. Whether residents visit the facilities seems to depend on whether the facilities fit their mostly higher standards and on the number of alternative options in the surrounding neighbourhood. Thus, the building should include facilities that meet residents' standards so they can meet outsiders within these facilities. However, the range of facilities meeting residents' standards should not be too high to stimulate them to recreate in the surrounding neighbourhood and meet outsiders.

Furthermore, it is of high importance that insiders and outsiders have common entrances and spaces. In order to create shared spaces which also allow the emergence of social interactions, it is essential that there is seating present and that the design of these spaces does not have a formal and prominent appearance. Outsiders can be scared away by unwelcoming signage and exclusive façade design. Also, it is of high importance that entrances can be easily identified; this can be achieved through signage, a cut-out or the use of differentiated materials. Also, to attract visitors to a building, spaces around the building must be clean and safe.

6. Reflection and recommendations

6.1 Reflection

Overall, the researcher experienced the research process as challenging. The researcher encountered several challenges related to epistemological, ontological and axiological questions during the research process.

Epistemology delves into what we assume to be the 'proper ways' to study social phenomena. In other words, it revolves around questions on how to gather data. The researcher considered collecting data through surveys. However, the question of to what extent people know what explains their behaviour arose. Subsequently, the researcher delved into the possibilities of making observations from which it was hoped to be able to explain people's behaviour. Observations were finally chosen as the research method. However, before making this decision, ontological and axiological questions arose.

Ontology entails questions related to what is reality and what is not and to the researchers' relation to reality. Initially, the researcher was worried about ensuring to stay as objective as possible. Later on, the researcher took a more subjectivist stance as the researcher noticed during the first observations that many phenomena are impossible to perceive only using the five senses. The researcher believes that subjective interpretative processes can produce more precise explanations, as objectively representing subjective experiences is hard, if not impossible.

Axiology revolves around values, including the impact of the researcher's values and beliefs on the research outcomes. The researcher's norms, values, ideas, etcetera, likely influenced the research results. However, to make this impact as small as possible, the researcher tried to start the research process with zero expectations and tried to see the world through the glasses of others. The researcher believes that knowledge of social phenomena cannot be created solely objectively or subjectively. The researcher believes in the validity of intersubjective knowledge. Intersubjectivity is when scientists agree on how they interpret several phenomena. In connection with this belief, a recommendation for further research is made in the following subchapter.

Drawing conclusions from the results gained was also a challenge. Cities are highly complex systems. Within cities, many interdependencies exist between many aspects and phenomena. Therefore, it was challenging to conclude whether an observed phenomenon resulted from another observed phenomenon. An observed phenomenon could also be the result of several other observed phenomena. Moreover, even more interesting, an observed phenomenon could result from one that has not yet been identified.

Despite, but also due to the challenges, the researcher enjoyed the research process. All the challenges encouraged the researcher to think creatively, which was a pleasant experience. Furthermore, the field workdays were very joyful. It was lovely to be out in the largest cities of the Netherlands for a couple of days and to be among the people there. Lastly, because of the challenges, the researcher feels to have improved their research skills.

6.2 Limitations and recommendations for further research

This study used a grounded theory approach. A grounded theory approach ends with assumptions or hypotheses. In order to verify these assumptions or hypotheses, further, more extended or quantitative research should be conducted.

A significant limitation is the limited quantity of buildings observed and the limited number of observation days per building. The limited quantity of observations negatively influenced the depth and validity of the findings. Further research in which more buildings are observed and observations are done during more days at each building could provide more profound, extended, and valid insights. Especially observations during weekend days could provide interesting insights.

Furthermore, the most significant part of the informal conversations was held with employees of the facilities within the buildings. Future studies could more extendedly include the visions of residents from the surrounding neighbourhood or people who live or work in a large-scale mixed-use building. Research by design could be an exciting research method to create insights into how a large-scale mixed-use building should be designed to be welcoming to outsiders.

In the reflection, the researcher expresses their belief that knowledge can neither be ensembled completely subjectively nor objectively; the researcher believes in the creation of knowledge in an intersubjective way. Therefore, the researcher recommends that in further research, several researchers make observations and think about the possible relationships between the observed phenomena. This way, researchers can develop a joint, more robust understanding of the topic.

6.3 Policy recommendations

This research was conducted through a grounded theory approach. Therefore, the research outcomes are assumptions; the research lists several urban and building design aspects that are assumed to stimulate the emergence of social interaction between insiders and outsiders of large-scale mixed-use buildings. Therefore, the policy recommendations listed are only valid if further, more detailed and quantitative research confirms the assumptions listed.

Earlier research emphasized that large-scale mixed-use buildings contribute to creating compact cities. As a result, these buildings reduce travel times and positively affect the environment. Therefore, it would be advisable for municipalities to encourage the implementation of large-scale mixed-use buildings, however only under certain conditions. If these conditions are not met, the building will become a closed city within a city. When a mixed-use building becomes a city within a city, insiders and outsiders will not interact. This results in the absence of social capital between the insiders and outsiders. Without social capital between these groups, certain social and economic benefits are not harvested, but they could have been harvested if the built environment had looked different. The presence of social capital between the two groups could, for example, save time and money, boost people's careers, prevent certain mistakes from being made and increase happiness.

It is advisable only to implement large-scale mixed-use buildings in highly urban environments where many residents, offices, and especially leisure facilities are present in the surrounding area. If this condition is not met, it would be an appealing option for residents to work and recreate within the building, as fewer alternative options are nearby. This results in low levels of interaction with them and the people who live in the surrounding environment.

If a large-scale mixed-use building is implemented in the built environment, the facilities must serve a broad public. This results in many people from the surrounding neighbourhood visiting the building, where they have the opportunity to meet the insiders. It is also advisable to include apartments of different segments within the building. This increases the chance that part of the inhabitants has a regular nine-to-five job and leave the building during rush when most people from the surrounding neighbourhood pass by the building.

Lastly, architects need to ensure that large-scale mixed-use buildings do not have a highly expensive and exclusive appearance or contain exclusive signage. This can scare visitors, including neighbouring residents, away. Furthermore, entrances should be easily findable, and signage should be present on the facade of the building to inform visitors about what they can find within it.

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