
The Application of Building and City Information Modeling for City and Real Estate Marketing

Master's Thesis

International Master of Science in Construction and Real Estate Management

Joint Study Programme of Metropolia UAS Helsinki and HTW Berlin

from

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Date:

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[Copy of proposed conceptual formulation]



**International Master of Science in Construction and Real Estate Management
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Conceptual Formulation

Master Thesis for Mr./Ms. _____ DOWOLE OLUWASEYI SAMUEL

Student number _____ s0581318

Topic:

The Application of Building and City Information Modelling for City Marketing

Introduction

City Information Modelling (CIM) represents a superior level of infrastructure networking, administration, and human activity than the merging of BIM models. With this model, it is possible to visualize, analyze and monitor the urban environment from a local to a regional perspective to support project planning. As a result, CIM is characterized by a multidisciplinary integration of all spatial data models (Dantas, 2019).

Building Information Modelling (BIM), a close relative of CIM, is a system of systems that stores virtual information for the built environment to help manage, document, design and construct buildings and Infrastructure. BIM goes beyond traditional CAD drawings by providing architecture with details about individual building components (e.g., windows, walls, chillers) and information about the building as a whole (e.g., system flows, building loads) (Boukara & Naamane, 2015).

BIM and CIM have shown their importance over recent years in their use in the construction and facility management industry, yet new uses are still being developed and improved. This can be shown in the constant development of their applications and software plugins.

City marketing exists in order to continue to manage and develop the city. City Marketing aims to turn the city into a brand that attracts consumers. There is no question that companies benefit significantly from their brand presence: trademarks and brands are worth more than anything else in the company's arsenal (Moilanen, 2009). The proper marketing of a city gives rise to a different form of development opportunities and exposure; this could be in form of influx in tourism activities, investment from foreign companies etc. The marketing of a city could target diverse group of people. Different cities around the world have been marketed and branded differently, for example, Dubai is being marketed as the smartest city in the world with its futuristic style advancement in technology and its paperless government in order to appeal as an ideal tourist destination, another example of branding can be found in Silicon Valley which is located in Northern California, it is known to a city with High innovation and technological start-ups, famous for having the global head quarters of tech companies such as Adobe, Yahoo, Apple Inc, eBay, Twitter and a host of other large global companies.



BIM research in City Marketing is on the low side when compared to its potential. The most researched BIM topics are Sustainability, Knowledge management, Implementation, and Cost and Scheduling (Qing-Jie Wen, 2021).

The visual aspects of CIM could add the marketing aspect to the BIM execution plan, from the conceptualisation and design of the product to the BIM being ready for construction and further adopted for management purposes. City managers and planners may find that virtual models appeal to prospective investors and aid in publicity due to their efficiency and accessibility.

BIM as a system produces a series of models, this could be Architectural, Structural, HVAC, and Electrical. These models come with information that aid the construction and management of the project, the merging of multiple BIM models usually creates the basis for CIM system. After BIM projects has been constructed and it has entered the management phase, these models can be further utilised in the marketing aspect of the city management.

According to Edmund (1960), there are four Ps of Real Estate marketing, and this include Place, Product, Price, and Promotion. Promotion in this sense involves communicating with the product to the client, in this sense will be the how CIM can be used to communicate the product of the project to the client and foster interaction between the client and the project. This research will focus on the promotion aspect of Real Estate Marketing and its relationship with BIM.

Research Objective

- To explore CIM uses in City marketing
- To identify CIM and BIM-related software with the potential to enhance City Marketing
- To define and assess current City marketing tools most used in the EU
- To compare CIM application with City Marketing tools in the EU

Methodology

This research study aims to investigate CIM systems in City Marketing. This study will adopt a survey research design. This study will use primary (questionnaire, audio recordings, and interviews) and secondary data. The questionnaires and interviews' target respondents are Practicing Professionals in the City planning Industry in an EU country. Due to the nature of the research and the targeted sample frame, the snowballing sampling technique will be adopted to obtain data from professionals in the City Planning Industry. The data gotten would be analysed through the help of SPSS (Statistical Packages for Social Scientists) and a thematic content analysis for the interview data. This data collection method was chosen to obtain detailed information not covered in the questionnaire, as the professional's experience in the field is crucial for this thesis research.

	2022							2023						
	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
PHASE 1: INTRODUCTION														
Preliminary Study														
Problem Identification														
Research Question and Topic														
Formulation of Aim and Obj.														
Scope of Study														
PHASE 2: LITERATURE														
Literature Review														
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PHASE 4: FINDINGS AND CONCLUSION														
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Resources

The resources needed to complete this thesis are access to the School Library and another premium academic Internet resource, access to premium LinkedIn to form networks with relevant professionals.



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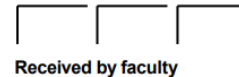
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Silvia delicalascondos

Signature of the 2nd Supervisor

[Copy of change of Thesis title Request form]

For the
Chairperson of the Examination Board



of the **Programme** Construction and Real Estate Management
at the Hochschule für Technik und Wirtschaft Berlin

REQUEST TO CHANGE THE TITLE OF THE FINAL THESIS

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I wish to request for the following change to the title of my thesis.

Previous title:

The Application of Building and City Information Modelling for City Marketing

New title to be confirmed:

The Application of Building and City Information Modeling for City and Real Estate Marketing

Please note that changing the title of the final thesis does not constitute a rejection of the topic as defined by § 21, no. 2 of HTW's Examination Framework Regulations!

Agreement of the 1st examiner:

Zsuzsa Besenyoi

Agreement of the 2nd examiner:

Silvia de Lima Vasconcelos

Agreement of the examination board:



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 Frank Stoll
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Berlin, _____

[Signature]

Signature of the candidate

Abstract

This Thesis investigated the application of Building and City Information Modelling in Real Estate and City Marketing. The Thesis aimed to create a framework for applying the Integrated BIM and CIM for Real Estate and City Marketing.

A case study research design was used in the thesis; this was chosen due to the availability of data, practical applicability of the framework, contextual comprehension, and for validation of the framework. The chosen case study was the Babbel GmbH building at Andreasstraße 72, 10243 Berlin, and it was chosen based on specific criteria, which are marketing objectives of the selected urban space, relevance to BIM and CIM, the feasibility and accessibility of the space and the availability of data to the space.

The Framework created shows the workflow of the model creation from the perspective of a process owner, which can either be a property owner or the City administration depending on the scale of the marketed property. The framework follows from identifying the target groups, which later determines the required information. The required information now determines the software applications and the file format the integrated model will take.

The created Framework was then validated through the use of the Case study, and it was concluded that the Framework achieved the marketing objectives of Babbel GmbH.

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List of Abbreviations

ArcGIS	Aeronautical Reconnaissance Coverage Geography Information System
BIM	Building Information Modelling
CAD	Computer Aided Design
CIM	City Information Model
CityGML	City Geography Markup Language
COBie	Construction Operation Building Information Exchange
DSM	Digital Surface Model
DTM	Digital Terrain Model
ESRI	Environmental Systems Research Institute
FME	Feature Manipulation Engine
GDR	German Democratic Republic
GIS	Geographic Information Systems
GmbH	Gesellschaft mit beschränkter Haftung
GovTech	Government Technology Agency
HVAC	Generalised Markup Language
IFC	International foundation class
IoT	Internet of Things
KML	Key Markup Language
KMZ	Keyhole Markup Language Zipped
LoD	Level of Detail
LOD	level of detail
NDA	Non-Disclosure Agreement
nDSM	Normalised Digital Surface Model
NRF	National Research Foundation
QGIS	Quantum Geographic Information System

URA Urban Redevelopment Authority's

VR Virtual Reality

XML Extensible Markup Language

1. Introduction

As a result of the evolution in technology, there has been continual advancement in the computer-aided architectural, construction, and engineering software with the evolution of 2D to 3D up until 7D with some claiming up until 9D, and this led to a system of computer-aided documentation of plans of buildings creating a virtual representation as close as much as possible to the original which can be referred to as Building Information Modelling (BIM). BIM can be further built on to create a City Information Model (CIM). This should not be mistaken for simply putting the BIM models together to a CIM mode but by creating a larger model, usually not as detailed in the polygon similarity to real life, but having specific information on the different buildings and city structure that would help in real-time city planning and management.

Building and City Information models are ever-evolving technologies, with new use cases still being explored since their inception. Their interoperability and application are a gold mine for new use cases.

One of these use cases is its application in City and Real Estate Marketing, and Marketing can be seen as the final step taken in producing any product. The same can be said in the Real Estate and City Industry if both are considered products. For a city to become smart and sustainable, more environmentally sound, economically prosperous and socially just, it must integrate big data and information in its planning and daily maintenance (Sarkar, 2015). This information and data are the basis for Building and City Information modelling. Integrating BIM and CIM also forms the backbone of smart city planning and management (Munirah & Ezdihar, 2022).

Hence the importance of putting BIM and CIM in the Marketing of Real Estate. BIM and CIM are essential tools for sustainable building development within smart cities and play a significant role in their marketing (Chen et al., 2022).

This technology has already shown promise as it was used to explore the changes in Real Estate Prices in Taitung City (Wang et al., 2019).

This Thesis seeks to create a Framework for the opportunity that arises from the combination of CIM and BIM and how they can be applied in the use case for Cities and Real Estate.

1.1 Statement of Problem

The Application of BIM and CIM has shown promise in City and Real Estate Marketing. Although there still exist some significant gaps and challenges to be filled until we can effectively utilise these systems to their full potential.

Firstly, City Information Modelling is still a relatively new terminology in big data in the real estate and construction industry. Hence it still has ways to go in its potential being fulfilled. It should be noted that city marketing predominantly focuses on tools such as city events, celebrity branding, city sales, and promotion (Daszkiewicz & Pukas, 2016). There is a gap to be filled for city information modelling with the amount of information that can be processed and represented visually. Marketing a city and real estate is not simple, as it contains a complex series of interwoven systems. Studies have shown that one of the significant problems of city marketing is the ability to communicate information and data as efficiently as possible. CIM could provide an excellent solution to this problem with its visual features.

Secondly, Applications such as ArcGIS, QGIS, AutoDesk Revit, and Solibri are widely used in BIM collaboration. Since CIM is an extension of BIM, these same applications can also integrate CIM and BIM. This thesis needs to identify how these application pipelines can enhance City and Real Estate Marketing.

Another justification for this is that although marketing is only listed once as a use case under visualization in buildingSMART BIM Use Case List, it can be used for marketing beyond just visualization. The information gathered in BIM can also be utilized for marketing purposes. This thesis argues that although marketing is only listed once as a use case for visualization in smart objective beam, it can be used for marketing beyond just visualization.

Lastly, The existing City and Real Estate marketing tools vary broadly as stated earlier, for the development of a City and Real Estate, the most suitable marketing tool and strategy is usually selected based on the city's needs. For example, if a city needs employment for its labour, its strategy would be geared towards advertising its cheap labour or its pristine environment for foreign investment to attract foreign investment to generate employment (Dril et al., 2016). This now begs the question of how these tools would fair if aided by the CIM and BIM.

The importance of having a City or Real Estate that attracts foreign investment in startups, tourism, and a company opening a branch in the city cannot be overstated. The benefits of cities are significant, resulting in an unprecedented increase in productivity and competitiveness.

This results in the research questions that this thesis sought to answer. The questions seek to explore the depth and breadth of the Thesis title in hopes of creating a comprehensive understanding of the Application of BIM and CIM in City and Real Estate Marketing.

1.2 Research Questions and Objectives

The research question for this thesis are;

- Which CIM and BIM-related software have the potential to enhance City and Real Estate Marketing?
- How effective are the current City and Real Estate Marketing Tools?
- What processes and strategies are currently applied in City and Real Estate Marketing?
- How can a framework be developed for Real Estate and City Marketing?

Aim and Objectives

This research aims to assess and develop a CIM framework for City Marketing, and this would be achieved through the following objectives

- To Identify CIM and BIM-related software with the potential to enhance City Marketing and Real Estate Marketing
- To define and assess current Real Estate and City Marketing tools most
- To Identify processes and strategies in Real Estate and City Marketing
- To develop a framework for Real estate and city Marketing

1.3 Research Methodology

The Thesis was structured in a way that follows a theme to enable the reader understand the thought process of the author in concluding The First chapter Introduces the thesis by identifying the need for the use of BIM and CIM in marketing as well as

highlighting the Justification of the study. The Second chapter discusses the various components of city and real estate marketing and its actors. The third chapter explores the practical application of City Information Modeling and Building Information Modeling. It discusses the data storages, file formats and explains the concept of level of detail. The Fourth chapter involves the development of the framework. In the fifth chapter, the case studies would be introduced, which are the Babel building and Friedrischain district. The sixth chapter assesses the framework's applicability and possible way forward.

The research methodology followed in this research is as follows:

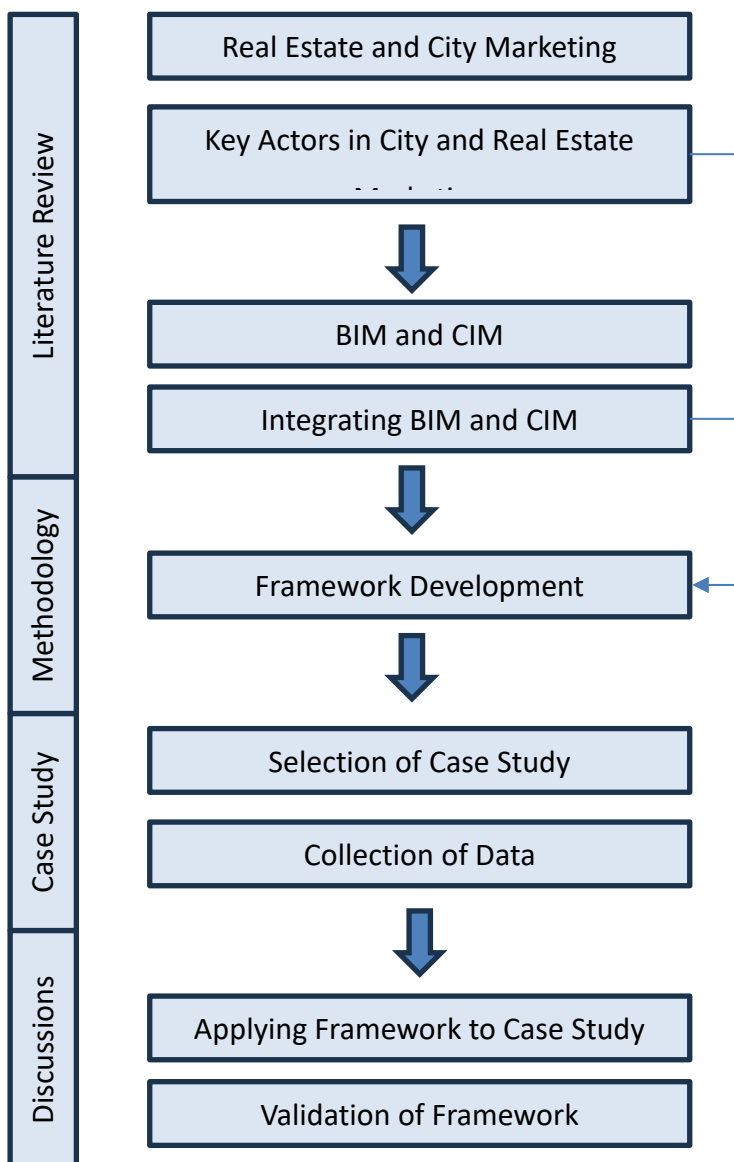


Figure 1: Thesis Research Methodology (Source: The Author)

The literature review was conducted utilizing a variety of Journals, Journal articles, books, and other academic online sources. The thesis involves a literature review on real estate and city marketing, key actors, and the integration of BIM and CIM. A framework is then developed based on this review. A case study is selected based on specific criteria that align with the thesis objectives. Data is collected for the case study, which is then used to apply the framework developed earlier. The Case study was used to validate the Framework to ensure its effectiveness and practicability in a real-world context.

1.3.1 Research Design

For this thesis, Case Study research was chosen, this was because it best fits the aims and objectives of the study. The Case Study selected for this research is the Babbel Building at Andreasstrase 72, 10243, which was selected based on specific criteria (see Chapter 5.1.1). This thesis will also make use of both Primary and Secondary data. The Primary data was collected through a structured interview with the representative of Babbel GmbH, answering relevant questions that would aid in formulating and validating the Framework to be developed by the author. The secondary data were sourced from relevant literature, academic journals, relevant government statistics and resources, and relevant institution statistics.

The Framework was validated using the case study; for this, there was the need for an Information model of both the Babbel Building and the district of Friedrichshain.

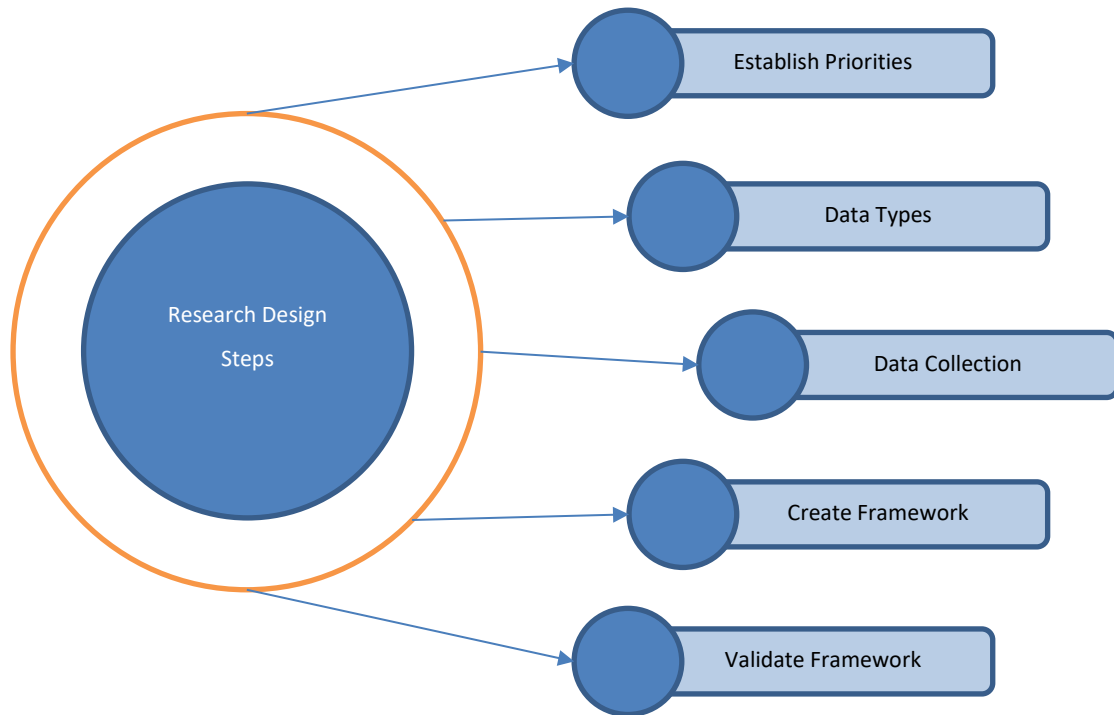


Figure 2: Thesis Research Design (Source: The Author)

The research design steps taken to ensure a successful thesis can be seen in fig 2. The author first established priorities, and information most important for the thesis, then categorised them into data types. Which were later sourced out either through primary or secondary data collection means. The collected data was now used in creating the framework which the case study.

2. Real Estate and City Marketing

This chapter explores the intersection of real estate and city marketing, delving into the various components considered in city marketing, such as design and attractions. It further discusses the traditional real estate and city marketing process, highlighting the tools used, including 3D visualization, television and radio adverts, social media adverts, outdoor advertising, and customer relation management tools. Critical actors in marketing, specifically in the city for city marketing, are also examined, focusing on residents, companies, visitors, and investors.

In real estate marketing, activities are undertaken in response to real estate demand by researching, planning, applying, controlling, and evaluating the efforts of natural persons and entities in real estate and real estate investment (Likos et al., 2019). Real Estate Marketing often involves unique occurrences. The buying and selling of Real Estate is usually based on singular negotiations for each unique transaction (Kang & Gardner, 1989). Real Estate, in the context of this thesis, refers to Assets and Space within the context of a district. Real Estate Marketing is the Marketing of Assets and Space on a smaller scale than City Marketing.

City Marketing is an endeavor carried out to change, create or maintain a public's opinion towards a city (Dril et al., 2016). City marketing can be observed worldwide as it has become a subject of urban management due to the increase in the entrepreneurial attitude of city leaders (Boisen, 2007). The term city marketing is often used interchangeably with City Branding, as it involves the management of the brand image of the city.

City marketing is a branch of city management, and it can be said to be about transforming a city from a location to a destination, attracting positive effects to enhance and grow the city. Cities grow and receive investments at different rates. When seeking out the reason for this, it is discovered that the cities were marketed differently. Promoting cities' interests involves selling cities as a product, building their brand and reputation, and making them attractive in the "urban market" to investors, partners, and residents (Yezhova, 2020).

It is becoming more and more common to have more urban players establish a department or agency geared towards city marketing and long-term development plans, all this will require readily accessible information and platforms for communicating and

managing the plans, and these can be achieved through building and city information modeling.

The importance of the image of a city cannot be overstated, as global opinions of cities affect their economy. The globalized economy is very competitive as cities wish to attract investors, tourists, businesses, residents, investors, and influence. City marketing is an integral part of planning and developing cities that wish to be competitive globally in today's conditions (Deffner & Liouris, 2005).

2.1 City Components considered Marketing in City Marketing.

City components can be what makes up the city's image, which affects the public perception of the city. This perception is formed through an individual's visual and interactive experience with the city. The most dominant parts of this perception are the design, infrastructure, essential services, and attractions that the city presents.

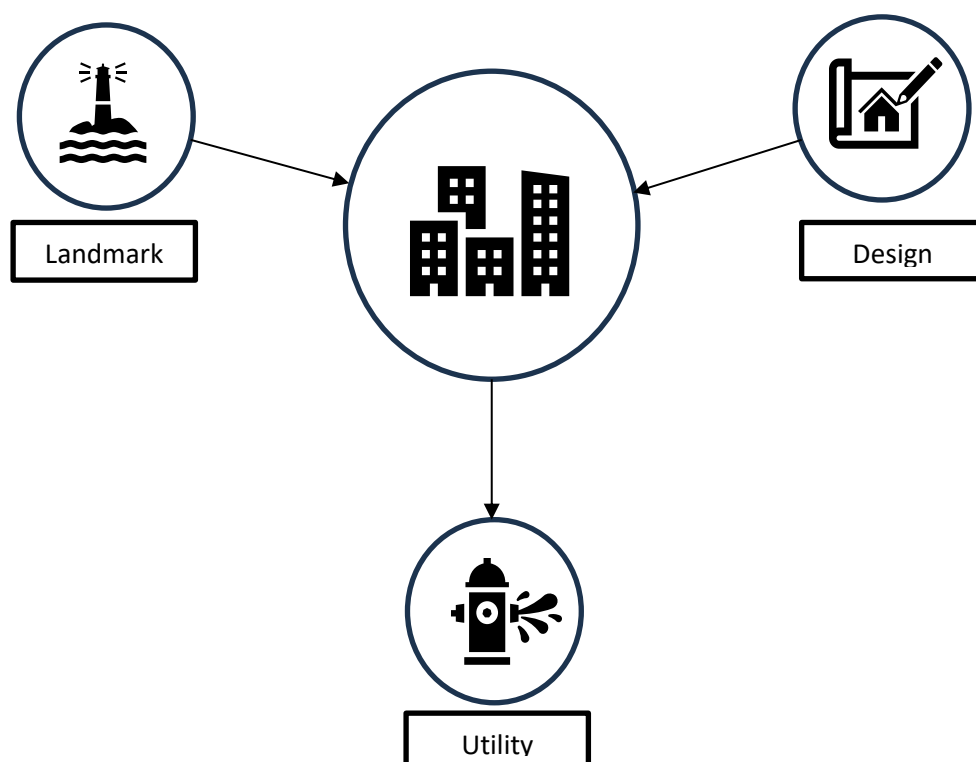


Figure 3: Component of A City (Source: The Author)

2.1.1 Design

City design involves organizing urban space in a functional, efficient, and visually pleasing way for residents and visitors to work, live, move around, and enjoy recreational activities. This process encompasses various fields, such as transportation, engineering, traditional architecture, history, and building regulations. The interplay of these factors shapes the resulting visual image of a city. City design aims to incorporate concepts of environmental protection, social equity, and economic viability to create a unique and appealing urban environment (Raven et al., 2018)

Design is often said to be a form of communication. Hence the design of a city can be used to communicate different expressions and feelings. The overall shapes and colors of the buildings, paths of the transport network, public spaces, and landmarks can all be used to communicate feelings and emotions. A person's sense of comfort is an expression of his or her wellbeing in a particular environment. In order to analyze space, the human perception system uses filters. Opinions are then formed on the place in question, whether it is a place of beauty or repulsion (Pompe, 2020). As a result, it is essential to determine which design is more relevant and should be focused on when trying to improve the image of a city.

A city's transport network and design layout can have an impression on individuals based on how difficult or how easy it is to navigate, the sights en route to prominent destinations, and the accessibility of public infrastructure all affect a person's image of a city, confusing transport network can make someone traversing it frustrated and confused. In contrast, an organized layout with sights and vistas would seem exciting and organized. Monuments and landmarks also help shape the perception of people of a city. If the landmark is more old then it gives the city a form of historical feel, and if it is more modern, like skyscrapers, it gives a different feel, same as if it were to be a religious building it would also give the city a religious feel. The design of the public spaces also has a significant effect of the perception of the city; well-designed public spaces would encourage people to spend more time outdoors, giving the impression of a lively city, and poorly designed places can feel uninviting.

The content of a city's design in terms of its physical form can be classified into five elements: landmarks, paths, edges, districts, and nodes (Lynch, 1989). The paths are the channels which are usually the transport networks either the roads, train tracks or

rivers. Edges refer to the boundaries of the city, the district are medium to large-scale sections of the city that have an identifiable character. Nodes are strategic points in the city, they may be primary junctions or paths along a transport channel, while landmarks are places that can be used as points of reference and can determine the overall perception of its immediate surroundings.

A city's overall aesthetics, including its architecture and landscaping, can significantly affect an individual's perception of its livability and beauty. Its design can create a positive impression and a sense of connection.

2.1.2 Infrastructure

Infrastructure is the agglomeration of materials, institutions, and personnel needed to operate a company, society, or enterprise. Infrastructure includes transportation, medical, communication networks, sewage, water, and school systems. Each of these infrastructures can further be Material Infrastructure, complementary personal infrastructure, and institutional infrastructure (Adl-Zarrabi, 2017).

A City's infrastructure is its backbone and determines how well it runs. The accessibility of individuals to a city's infrastructure affects how a person views the city. The accessibility to medical facilities, the presence, and efficiency of security facilities all affect how a person feels safe in a city and how livable it is. The availability of reliable utilities such as water supply, heating, electricity, and gas are essential in determining a city's livability. Infrastructure provision has links to improving the environment, reducing poverty, and making a place more secure and comfortable (United Nations, 1994).

A city's infrastructure plays a crucial role in its image as it impacts its residents, businesses, and visitors' quality of life. By improving connectivity, transportation, accessibility, and public services, an infrastructure system can enhance a city's image.

2.1.3 Attractions

Attraction in the context of this study refers to landmarks, amusement parks, and places of architectural, religious and historical significance. These places in a city attract people from close or far due to their nature. Attractions are usually tourist destinations. Tourism is an economic activity that generates trade and business and is considered

one of the most productive sectors of the global economy. Compared with socio-cultural and environmental impacts, tourism's economic impacts are the most visible and quantifiable (Castela, 2018). They create jobs and boost the local economy, which helps to improve the city's image as a hub for tourism hence attracting more visitors and improving its image.

The type of tourist attraction affects the image of the city. The activities performed there blurs the image of the city in the minds of the tourist. For example, if a city has more tourist attractions, that has to do with relaxation. It will be viewed as a city for relaxation, if it has more religious attractions, then it will be viewed as a sacred city, if it has more fun and exciting attractions, then it would be viewed as a fun and fascinating city. For example, Mecca in Saudi Arabia is seen as the holiest city in Islam due to its historical and religious landmarks.

Attractions, to a large extent, also help promote the culture and history of the city. A city with a unique and exciting history or culture can help attract people interested in learning about that local history and culture. This could help improve the city's image as a cultural and historical centre, an example of this is the pyramids in Egypt as they are linked to the country's rich history and culture.

It can be concluded that tourist attractions can significantly impact a city's image. Their impact can be felt in many ways, such as promoting the economy, promoting the culture and history of a city, and improving the city's infrastructure. As a result, cities need to develop and maintain attractive and unique tourist attractions to enhance their image as tourist destinations.

Summary of Chapter 2.1

This Subchapter introduces the components considered in City Marketing: Infrastructure, Attractions, and its Design. The design section discusses how the unique arrangement of a city contributes to its efficiency, functionality, and its aesthetics (see chapter 2.1.1). The subchapter also emphasizes the importance of Infrastructures as a backbone of the city (see Chapter 2.1.2). Furthermore, it highlights the crucial role of Attractions in bolstering the city's local economy and showcasing its rich culture and history (see Chapter 2.1.3).

2.2 Traditional Process of Real Estate and City Marketing

Marketing entails a range of activities and strategies to promote and sell products or services. Key marketing elements are Market research, Product development, Pricing, promotion, distribution, sales, and customer service. Real Estate and City Marketing, being concerned with the built industry, broadly follow similar processes and methodologies of thinking.

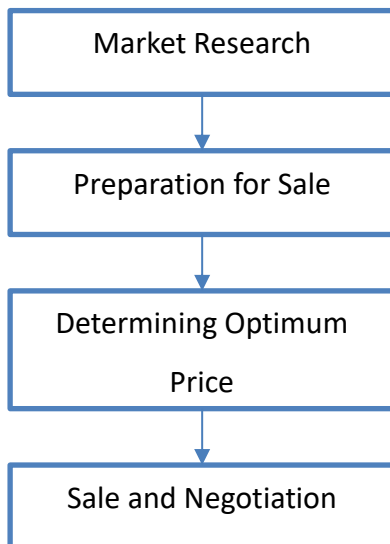


Figure 4: Traditional Process of Real Estate Marketing (Source: The Author)

To create a strategic real estate marketing plan, a series of linear steps must be followed, it starts with a well-conceived project that meets the needs of the market rather than the other way around (a project that is looking for a market). A dynamic marketing program can facilitate the success of a property in a poor market, but developers should avoid assuming that such an outcome is likely (Hasan, 2002). Some Key Aspects of the process include Market Research which involves researching the local real estate market to understand the market's demand and supply dynamics as well as the preference of potential buyers or renters, the property can now be prepared for sale, this could include cleaning, repairs, upgrade and making any necessary changes. After this, the optimal price of the property can be determined through the information gathered from the market dynamics, location, and other factors. The property is then listed on various platforms ranging from posters to online web advertisements, after which comes sale and negotiation and offering customer service where necessary. The real estate marketing process may differ based on the specific property, target market, and marketing goals. It is, however, possible for real estate agents and property owners to

successfully market and advertise their properties to potential buyers and renters by following these general steps.

For city marketing to succeed, certain stages or processes must be done, and strategies must be applied. City marketing as a city planning task involves many activities, which are listed below.

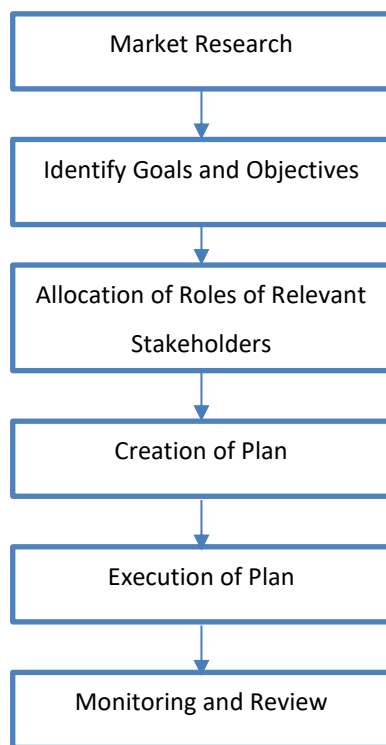


Figure 5: Traditional Process of City Marketing (Source: The Author)

The first action to be taken in City Marketing is Extensive Research, the latent strength and weakness as well as the opportunities, audience and threats should be first of all identified, The knowledge acquired from this would be used in identifying the goals and later the objectives of the city marketing operation, this stage involves the inputs of all the stakeholders involved and this could range from the city's citizens to large corporations in the city, the government and other relevant bodies. Decision on this stage is usually informed by the culture and history of the city and the may sometimes try to adapt the current global trend if the city aims to globalize. After the vision and objectives have been defined, what comes next is the allocation of roles to the relevant bodies, city marketing is primarily a government undertaken endeavor as thus it mainly involves the allocation of roles by the government to its various agencies and subsidiaries, for the plan to work well, all the body need to be well informed of the role they

have to play in making the city appear more appealing. Naturally, the implementation stage comes next. After this, the plan is implemented, and activities toward the city's image are conducted. These activities must be monitored and reviewed at different stages of the City Marketing Plan.

There are some similarities between city marketing and real estate marketing since both involve promoting and attracting people to a particular location. City and real estate marketing target a specific audience with similar tactics and strategies. Although the specific objectives and methods may differ, both types of marketing ultimately aim to promote and sell a place or property.

2.2.1 Strategies of City Marketing

Strategies in City marketing entail focusing on the needs and priorities of the actors involved (Dril et al., 2016). These needs are prioritised based on the actors at the top of the target list of the city marketing project or plan. An analysis conducted of city marketing strategies worldwide has shown that four strategies are the most popular and efficient (Dril et al., 2016),

The first approach is aimed at improving the image of the City, and this involves doing activities that have to do with increasing the global and public perception of a territory. This can be done through celebrity endorsement and advertisement of its most prominent features. All Urban Marketing strategy aims to improve a place's public image (Avraham, 2004). Different factors affect the image of a city and how it is perceived on a global scale. A few of them include the city's population, socio-economic status, security and crime rate, international media coverage, and famous individuals and institutions from the city, amongst other factors. In order to successfully change the narrative of a city's image, A process must be followed and done in stages. The first stage involves pinpointing the issues, priorities, goals, and objectives, then developing a strategic vision, and lastly, laying out the steps to accomplish each objective.

The Second strategy involves making the city more attractive through various means, such as increasing the economic attractiveness of the city to bring in investors, having tourist attractions to bring in tourists and creating infrastructure that can support foreign companies and firms wanting to have a base of operations in the city (Dril et al., 2016).

Another approach is infrastructure-based marketing. In this city marketing strategy, the presence of infrastructure is seen as the focal point of the strategy. The importance of infrastructure to a city cannot be overstated, a city with a good infrastructure generally means one with high public safety, good quality of life, sustainable infrastructure, and having equal access to the infrastructure. Overall, infrastructure is the backbone of any city, and investing in it is critical for ensuring that cities are safe, vibrant, and sustainable places to live and work. Investors, companies, residents, and visitors generally seek after these basics.

Lastly, the strategy for city marketing can be based on the needs of the population, a city can decide to market itself based on its needs. For example, a city with a low employment rate can market itself to companies as a place with abundant labor, or a city in need of housing development can market itself to investors as a place with a high number of customers for the housing market.

2.2.2 Real Estate and City Marketing Tools

Many different marketing tools are used in City marketing, and these tools are essential for marketing properties either to create a form of attraction, for sale, for rent, or for showcasing the property's unique features or the city. "Real Estate Marketing" is the process of offering, exchanging, creating, and exchanging land, and creating, offering, and exchanging buildings directly or indirectly to gain what they need and want (Rostowicz, 2001). The use of marketing tools and their application to a complex system such as a city is made possible from broadening the marketing concept (Zafra & Hultén, 2012). Marketing in the built Industry is highly competitive as many real estate developers and regions wish to attract people to their products, which can be city or real estate properties. These marketing tools can affect the city or real estate property is attractiveness. An effective marketing tool would lead to effective marketing.



Figure 6: Real Estate and City Marketing Tools (Source: The Author)

3D Visualisation

The human brain processes visuals about 60,000 times faster than texts, and about 90 percent of the information transmitted to the brain is visual, which brings the quote, „A picture is worth 1000 words “ into perspective. 3D visualisation visualization refers to creating a three-dimensional model of a property or city for showcasing to prospective buyers or investors.

Cities are complex systems having unique landmarks, terrains, and infrastructure etc., 3D visualisation can be used to showcase these elements to potential residents, investors, and companies to give a realistic and immersive experience of the city.

The Singapore Urban Redevelopment Authority's (URA) "Virtual Singapore" project is one example of 3D visualization used as a marketing tool. Users can explore and visualize the city-state's buildings, infrastructure, and urban planning using Virtual Singapore, a 3D digital model of the city-state. It is used for urban planning, disaster management, and public engagement. Additionally, URA uses the model to showcase the city's potential and opportunities to potential investors. According to the Singapore National Research Foundation (2022), the Project is being pushed by the National Research Foundation (NRF) of Singapore, the Prime ministers office, the Singapore Land Authority, and the Singapore Government Technology Agency (GovTech).

This immersive experience from 3D visualisation helps create an image in mind before visiting or experiencing the city.

Television and Radio Adverts

Recently, Television and Radio Adverts have been seen as the more traditional mode of advertising. Television and radio have been an effective method of reaching a broad audience for decades. Television advertising has been effective for many years because it can reach a broad audience. Television advertising in the real estate industry has increased significantly in recent years, with many real estate companies using television advertising to promote their properties. According to a study by Nielsen, the average American adult watches more than five hours of television per day, making it an effective way to reach potential customers (National Association of Realtors NAR, 2021)

It can be challenging to gauge the efficacy of radio and television advertisements in the real estate sector. Nevertheless, according to research by the National Association of Realtors, 14% of home purchasers discovered their dream home via television, while 7% did so via radio (National Association of Realtors, 2019).

While television and radio advertisements can help increase property interest, they have some drawbacks. For smaller real estate enterprises, the cost of producing and airing television and radio advertisements can be a barrier. Additionally, it can be challenging to gauge the efficiency of radio and television advertisements, making it challenging to calculate their return on investment.

Traditional means of advertising can be successful in promoting real estate. While they offer some benefits, such as the capacity to reach a large audience and target particular groups, they also have some drawbacks.

Social Media Adverts

Social Media Advert can play a large role in the publicising of a product because of its online nature it can reach a wider audience and cut across multiple socio-economic spectrums of people.

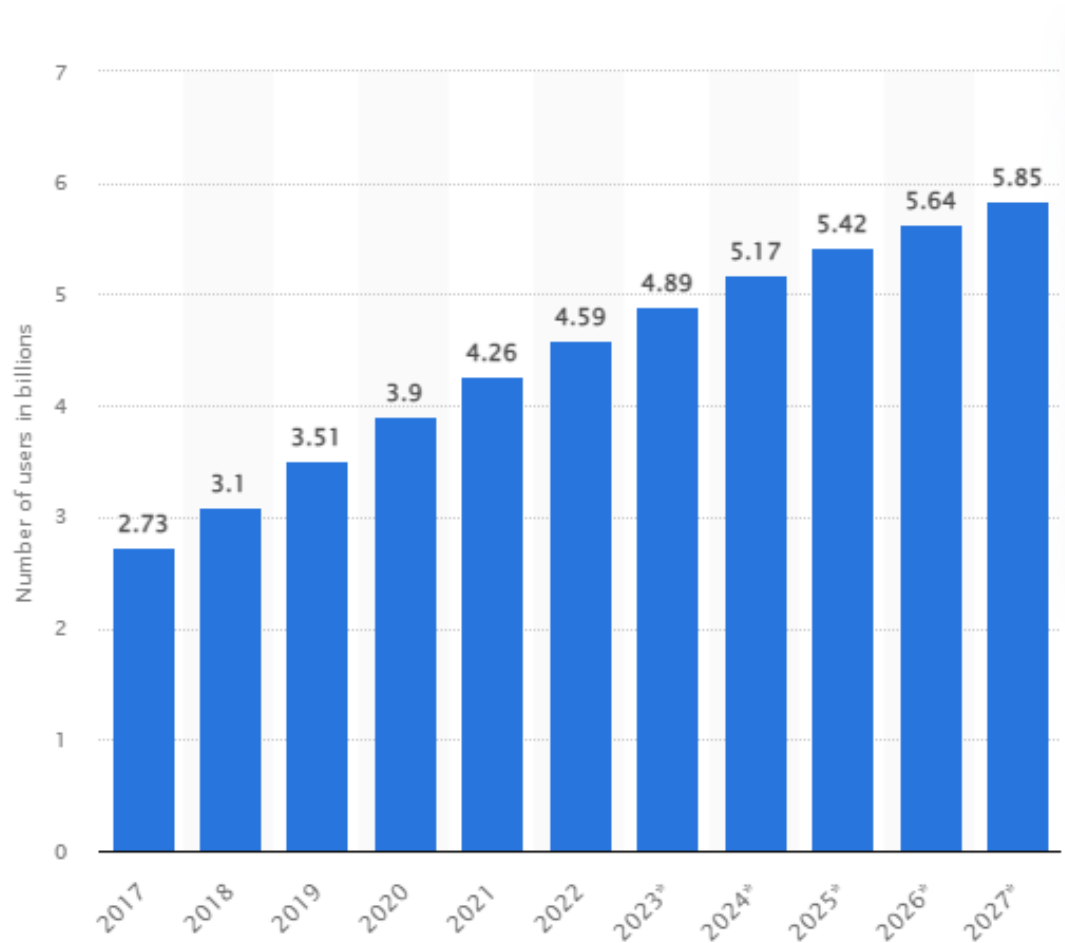


Figure 7: Bar Chart showing increase in the use of Social Media (Source: Statista 2022)

The amount of people using social media increases significantly by the year. It is at 2.73 billion as at 2017 and has grown to 4.59 billion in 2022 and is projected to be 5.85 billion in 2022.

Social Media Adverts increase online traffic toward a company's product (Sujata et al., 2019). More than half of the World uses social media (59%) and an average daily spend of 2hrs 31 mins (*Global Social Media Statistics Research Summary 2022 [June 2022]*, n.d.). Social Media Platforms such as Facebook, Instagram, and Twitter have millions of active daily users. Through social media, Real Estate and City Marketers can connect with customers more meaningfully and personalizedly in an interactive manner and gain valuable insights into their preferences and behaviors. As a result, the brand gains a positive image and is able to build stronger relationships with customers.

Social Media Platforms also enable marketers to target their goals more effectively; by analysing set data and insights, marketers can identify their target audience's

demographics, interests, and behaviours and tailor the marketing campaigns accordingly. As a result, marketing efforts can be more effective and return on investment higher.

A Marketing campaign's message can be amplified through positive experiences shared on social media as their friends and followers are also likely to notice and share the content. This is more relevant when a celebrity ambassador with millions of followers shares a positive experience on a place, the message has the potential of reaching millions of people also.

Another reason Social Media Marketing has been so popular in recent years is its cost-effectiveness compared to traditional marketing channels such as television and printed ads and it offers a higher return on investment.

Furthermore, it is crucial to know that social media marketing requires a strategic approach and consistent effort to yield results. In order to be successful in social media marketing, businesses must stay on top of the latest trends and best practices and create content that is engaging and relevant to their target audiences. Additionally, businesses must monitor their social media channels regularly to ensure that their brand image remains positive and they respond promptly to customer feedback.

Ultimately, social media has proven to be an effective marketing tool, offering businesses a number of advantages over traditional methods. Social media allows businesses to connect more meaningfully and personally with customers, create user-generated content, and effectively target their marketing efforts.

Outdoor Advertising

Out-of-home or outdoor advertising uses various mediums to promote consumer products and services, including billboards, transit ads, and street furniture. Among all mass communication mediums, outdoor is the oldest. It received much attention after World War II (Lichtenthal et al., 2006). Today, with fragmented media and advertising-avoidance technologies, Outdoor advertising allows advertisers to reach a broad audience Mobile and increasingly elusive consumers. Outdoor advertising is growing faster than traditional media (Zhang, 2010).

Real Estate Businesses spend billions of dollars yearly on outdoor advertising, including billboards, digital displays, transit ads, and other OOH advertising. It is simple: outdoor advertising reaches a large audience and creates brand awareness.

Outdoor Advertising is also cost-effective and about 80% cheaper than advertising on other media, such as television and radio. Billboards, for example, can reach thousands of people daily, making them an inexpensive way to promote a product or service. Additionally, digital displays and other forms of OOH advertising can be updated quickly and easily, allowing businesses to modify their messaging and promotions.

Although seen as a largely positive form of advertising, it is not without its drawbacks, and one of the main drawbacks is that it is seen as a form of visual pollution. It is often said that it distracts from the landscape's natural beauty, and some also argue that it can distract drivers.

Outdoor advertising can reach a broad audience and establish brand recognition for businesses. Despite concerns about the effects of outdoor advertising on the environment and society, many businesses still benefit from this type of marketing. Outdoor advertising will adapt and evolve as technology advances to meet the changing needs of consumers and businesses.

Summary of Chapter 2.2

This Subchapter 2.2 discusses the strategies, processes, and tools used in Real Estate and City Marketing. The process identified through the literature review for Real Estate marketing goes from Market research to the Sale of property (see figure 4). The process for City Marketing goes from Market Research to Monitoring and Review (see Figure 5).

The sub-chapter chapter emphasizes that although the specific objectives and methods may differ, Real Estate and City Marketing aim to promote and sell space or property using various marketing tools.

2.3 Key Actors in City and Real Estate Marketing

In understanding City Marketing as a production pipeline, the City Brand is the final product, the users are the final consumers, and the City Marketer is the producer. In this way the critical actors in a city Marketing pipeline are the City Marketers, the City, and its users. There are different possible users for a city, in trying to ensure successful city marketing, the users should be clearly defined. The users in a city marketing

perspective are the Residents, Companies, Investors, and Visitors (Zafra & Hultén, 2012). Each of these groups has their needs and wants, with each having different priorities, which leads to city Marketing being specific to target one or two groups or all the groups.

2.3.1 Key Actors in City Marketing

In City Marketing, the main actors identified are the Residents, visitors, companies, and investors. These actors must be understood before any marketing strategy can be seen as effective.



Figure 8: Key Actors in City Marketing (source:Zafra & Hultén, 2012)

Residents

The residents are one of the most critical actors in city marketing as they give the overall feel and atmosphere of the city. They are the group that intends to settle in the city for a long time. Hence their priority would be skewed towards infrastructure that has long-term benefits, this would be security, job opportunities, health care, peaceful environment, etc.

Residents in City Marketing can be seen from four perspectives, they can be seen from the perspective of being the Target of the City Marketing, as Citizens, as an integrated part of a place brand, and as ambassadors for the City's brand (Kavaratzis et al., 2010).

The First prominent role is the residents as a target group, so many countries suffer from population decline. Such countries include Bulgaria, Greece, Poland, Portugal, Japan, and Italy (United Nations, 2019). This shows the importance of a city to retain its residents and attract people willing to settle down in the City, as population plays a prominent role in the economy of a City. When Creating a city Brand focused on attracting residents, a simple question must be asked at the beginning of any plan, and that is 'what are residents looking for in a Place', the answer to this should be the foundation for any city marketing plan for attracting residents.

The next role of residents is that they serve as an integrated part of a place brand. This is about the attitude of the residents towards outside forces, which could be tourists, foreign companies and their products. This is a significant factor in City Branding. It is believed that the characteristics that make the local people of a place friendly are also the reasons why the place in question has a successful place brand (Freire, 2009).

Residents are also seen as Ambassadors of the place they belong to; it is a norm that everyone is allowed to represent the place they belong to; this comes as a sense of pride in the place where they live. Also, well-known and famous people bring about a positive image to the place they live (Wassler & Hung, 2017)

Another essential role of residents in City Branding is that of Citizens; it is an often neglected role. Although it is as important as all the other roles, this role has to do with residents as a community, and this focuses on what differentiates the citizens of one city or country from another (Kavaratzis et al., 2010)

Companies

When choosing a location, companies prioritize infrastructure that supports long-term growth and profitability. This includes access to cheap labor, physical, legal, and social structures, and a good customer base. The attractiveness of a business environment is determined by factors such as site and building quality, surrounding environment, employee and customer accessibility, and financial and business partnerships (VON WEIZSÄCKER et al., 1988).

Companies also impact a city's image, which can be either positive or negative. Positive influence comes from companies and foreign firms, indicating that the city is a conducive place for business, and they can contribute to the city's economy by providing jobs and resources. Companies can also support local initiatives, sponsor cultural or sporting events, and contribute to community projects to build a positive reputation for the city.

Furthermore, companies can promote a city's brand by featuring it in their advertising and marketing campaigns, using landmarks and cultural events as backdrops, and showcasing unique attributes. However, companies engaging in harmful practices or controversies or scandals can harm the city's brand. Therefore, it is crucial for companies to be aware of their impact on a city's brand and to act responsibly and sustainably to ensure that they contribute positively to the city's image and reputation. By doing so, they can help to strengthen the city's brand, attract investment, and promote economic growth and development.

Visitors

The visitors are those who would have a short time stay in the city, this would range from tourists, to expatriates etc. Their priority would be infrastructure that focuses on short time stay. Hospitality Infrastructure such as Hotels, Motels, and hostels would be a focus and tourist attractions would also be key in this. The attractiveness of a city to a visitor depends on the city's temporary accommodation and its direct environment, its accessibility to cultural facilities, entertainment facilities, shopping facilities, catering facilities and business opportunities (VON WEIZSÄCKER et al., 1988).

When it comes to City Branding or any other form of advertisement, word of mouth is significant, and one of the most reliable sources of information about a product is the city. The Visitors carry their experiences from the visited city to outside the city and share with others who haven't been there yet, helping them form an opinion about the place they are yet to visit. What is perceived from the city by the visitor is crucial in city marketing as they will gather and interpret the information about the environment and create their own opinion on it which can then be passed to others (VON WEIZSÄCKER et al., 1988). This is why visitors are an essential aspect in City Branding. Visitors also serve as a source of income for cities as they contribute to the city's local economy. They patronize local shops, restaurants, and hotels, which will lead to long-term and

short-term economic growth (Rasool et al., 2021). Just like in the case of residents, visitors can also act as ambassadors of the city, promoting it to their friends and family to create awareness of the city and increase its visibility on the global market.

All in all, Visitors are crucial in the City Marketing Industry. They are targets of City Marketing and also play a role in the City's Marketing as if a positive impression is left on the visitors by the city it will also lead to the attraction of more visitors to the city.

Investors

Like companies, investors prioritize mid to long-term infrastructure when deciding where to invest. They seek cities with stable economies, potential for growth, and good returns on investment. Investors are a crucial target for city marketing and play a major role in a city's economic growth. By investing in real estate and local businesses, they create new job opportunities and improve the city's overall image.

Attracting investors to a city is essential, as they bring opportunities for innovation, investment in public infrastructure, and the potential to attract even more investors. A city's investor attractiveness is a critical characteristic that boosts employment rates, increases income and encourages residents to invest in their well-being. To be considered investment-worthy, a city must offer accessible skilled and unskilled labor, a straightforward legal process for starting a business, competitive real estate and labor costs, and assistance with investment challenges. These factors are crucial to determining a city's attractiveness to investors.

2.3.2 Key Actors in Real Estate Marketing

Various actors are involved in the Real Estate Industry, each having varying degrees of influence on the real estate Market. The Actors directly influencing the real estate market are the developers, investors, lenders, and brokers (Poorvu, 1999). Therefore, real estate companies and construction companies with tacit market knowledge are the key players. The profits they earn are determined by the demand, income, and savings of the individual, as well as the mortgage-lending conditions, which are determined by the institutional framework of the individual property owners (Theurillat et al., 2015). The Actors in Real Estate are the Investors, which can be divided into the Supply and Demand side and include; Traditional and new owners, Service Providers,

Capital Intermediaries and Developers on the supply side and Residents, Visitors and Companies on the Demand side.

Investors

Property investors are individuals or companies buying properties to generate income or capital gains. The different types of Investors range from small individual investors to large institutional investors like pension funds and REITs (Poorvu, 1999). Investors as actors play several vital roles in real estate marketing, and this includes financing as they can provide the needed fund for developing or purchasing real estate. They are usually persons or companies and take responsibility for kick-starting real estate development.

An Investor also conducts market analysis through extensive research to determine the potential for the real estate market. Investors need to know the real estate type that is currently thriving whether it is a Residential, Industrial, or Commercial zone area. The real estate investor invests in already established properties after evaluating the real estate market in order to select the best properties that can generate income for him, An investor typically purchases a property in a condition that allows immediate investment. The property is then managed in way that allows it to generate income (Chiadika & Jessica, 2022). Investors play a critical role to the success of real estate marketing, as they help to ensure that the property is marketed correctly and attracting the right buyers and tenants.

Before Investing in a property, there are different information the investor must consider: location, physical characteristics, financial aspects, and the surrounding market climate.

Firstly, investors consider the location of the property. The location can significantly influence the property's value and its potential for appreciation over time. Factors such as the property's proximity to amenities, schools, and public transportation, as well as the overall safety and desirability of the neighborhood, are vital considerations (Ullah & Sepasgozar, 2020).

Secondly, the physical characteristics of the property are also important. This includes the size and layout of the property, its condition, and the quality of its construction. The potential for renovations or improvements that could increase the property's value is also a consideration (Bikhchandani et al., 1998).

Thirdly, investors also consider the financial aspects of the investment. This includes the cost of the property, the potential for rental income, the property's tax implications, and the potential for appreciation in value. The availability of financing and the interest rates on mortgage loans are also key financial considerations (Lusardi & Mitchell, 2006).

Lastly, investors consider the market conditions and the potential for future growth. This includes the overall health of the real estate market, the demand for properties in the area, and the potential for economic and demographic changes that could influence the property's value (Calvo et al., 1993)

In conclusion, investors considering investing in a property engage in a complex evaluation of various factors that impact the potential return on investment. This process involves careful consideration of the location and physical characteristics of the property, its financial implications, and the overall market conditions.

Service Providers/Lenders

The lenders provide financing for developers and investors to purchase and develop properties. Many types of financial institutions exist, including banks, private lenders, and others. Before providing financing, lenders assess borrowers' creditworthiness and the project's potential risk (Poorvu, 1999). The increase in the availability of lenders in a real estate market also increases the demand for real estate and further increase the prices (Hilbers et al., 2001). As the increase in the number of lenders means increase in the possibility for real estate options and plans for a different variety of people, increasing their access to real estate.

Lenders' major role is providing the capital for real estate to occur. They ensure that people are not restricted from going to real estate due to a lack of funds. They provide funds to investors and developers. Real estate markets cannot function without proper loan markets due to their high price, ubiquity, and economic relevance. In the worst case, it is possible for this relationship to result in the assignment of more loans to riskier borrowers who use real estate to secure their debt (Zurek, 2022).

Lenders also facilitate real estate transactions by providing services to real estate developers and investors. The services offered include ensuring smooth real estate transaction processes, making refinancing options available to borrowers who want to lower

their monthly payments, offering insurance to home buyers, and a host of other services.

Lenders play a vital role in the real estate market by providing capital for transactions, managing risks to ensure stability, and facilitating transactions. The real estate market would likely be less stable overall without lenders. Lenders will continue to play a critical role in the real estate ecosystem for years.

Brokers/Intermediaries

Real estate brokers serve as intermediaries between buyers and sellers, helping to realise real estate transactions. Their services can be provided to either the buyer or the seller, and they earn a commission. To be successful, brokers need a deep understanding of the real estate market and a vast network of contacts (Poorvu, 1999).

Brokers offer market expertise to clients looking to buy or sell real estate. Their knowledge of local real estate markets allows them to provide clients with insight into trends, pricing, and market conditions (Elickson, 2008). Brokers can also provide clients with data and analytics to help them make informed decisions about buying or selling property (Haywood, 1993). When clients are unfamiliar with the real estate market and need guidance on navigating it effectively, this expertise is precious.

Developers

Developers play a crucial role in the real estate industry, as they are the driving force behind bringing new projects to fruition. Their responsibilities encompass a wide range of tasks, from land acquisition to the design and construction of properties. Developers are actively involved throughout the development process, ensuring every step is executed efficiently and effectively.

One of the key skills that developers possess is the ability to comprehend market demand. They conduct thorough market research and analysis to identify potential buyers' or tenants' needs and preferences. By understanding market trends and demands, developers can tailor their projects to meet the specific requirements of the target audience, thereby maximizing the chances of success.

Moreover, developers must possess a firm grasp of financial feasibility. They evaluate the potential costs and revenues associated with a project, considering factors such as construction expenses, operational costs, and projected returns. This financial acumen is vital in determining the viability and profitability of a real estate venture.

Developers must accurately assess the financial risks and rewards to make informed decisions and secure project funding.

It is essential to recognize that the success of real estate projects relies heavily on the collaboration and cooperation of all the different actors involved. Investors, developers, architects, contractors, and other stakeholders must collaborate seamlessly to achieve the desired outcomes. By understanding the roles and motivations of each actor, investors, and developers can make more informed decisions, foster effective partnerships, and ultimately increase their chances of success in the dynamic and competitive real estate market.

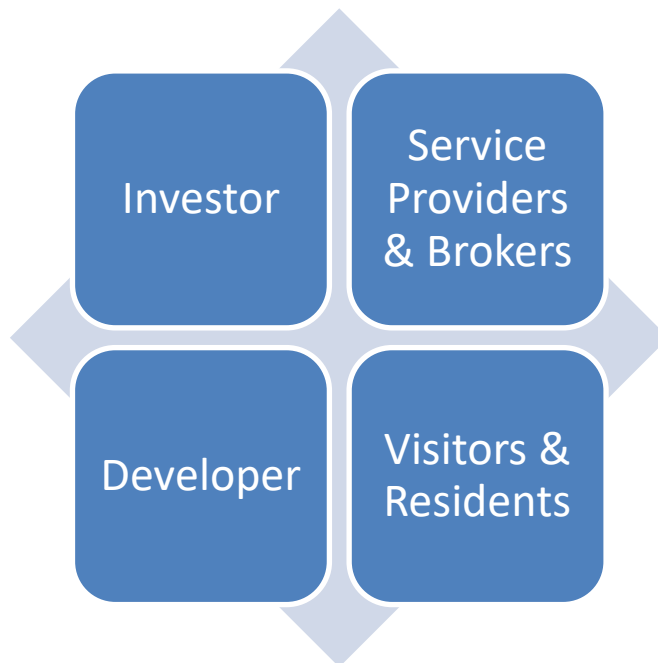


Figure 9: Key Actors in Real Estate Marketing (Source: The Author)

Residents

Residents are a significant actor in the real estate industry, as the value of Europe's residential real estate market reached 130 trillion dollars at the beginning of 2023 (Statista, 2023). Choosing a residence is very important for city, state, or country residents. Many factors go into this decision-making process, including personal design preference, financial ability, culture, and availability.

Hence the physical characteristics of the residence as well as its access to water, heating, electricity, its layout, internet access, distance from social facilities and such, are of great importance and play a crucial role when deciding for a place to live (Liu et al., 2007). The property's location also plays a crucial role, with factors such as proximity to workplaces, schools, healthcare facilities, and public transportation being key considerations (Wolch et al., 2014).

Secondly, an individual or family's financial ability primarily affects their decision in owning or leasing. The financial considerations taken are the rent, leasing period (either short or long-term), utility fees, and sometimes broker fees. The rent increase probability and lease agreement length are also significant financial considerations (Turner et al., 2007).

Another consideration that residents make regards the social environment of the property. The social environment encompasses the immediate physical surroundings, social relationships, and cultural milieus within which defined groups of people function and interact (Barnett, 2001). The family's makeup is another consideration, for example having children can influence the decision on buying or leasing a property (Wolch et al., 2014).

Lastly, legal considerations also play a role in the decision-making process. This includes understanding the terms of the lease agreement and being aware of any legal restrictions or obligations associated with the property (Turner et al., 2007). All these factors come together to affect the behaviour of residents as an actor in the real estate industry.

Visitors

Tourists or Visitors, basically individuals looking to stay in a place for a short period, also have a role to play in the real estate market. Also, for visitors, the choice of the property, whether a hotel or a hostel, largely affects their travel experience, so much thought is put into it also. One of the primary things that define a property is its location. Tourists typically prefer centrally located properties and have easy access to popular tourist attractions, restaurants, and shopping centres (Spalding et al., 2017). Another factor that is also considered the physical characteristics of the property. This includes the size and layout of the property, its condition, and the availability of necessary amenities such as Wi-Fi, air conditioning, and a fully equipped kitchen (Weber & Haklay,

2008). The property's aesthetic appeal and surroundings also play a crucial role in decision-making (Buckley, 2012).

Another primary consideration is the financial side of things. What is considered are the costs of the stay. Different accommodation ranges are now available online through websites such as Booking.com, Travelocity, and Expedia (Achievingintourism, 2023).

All these factors go into consideration when deciding on a property. Hence, the real estate industry suppliers must be aware of this and consider them when planning for the supply.

Companies

Commercial Real Estate is around 34 trillion dollars as of 2021 (Statista, 2023). Companies are very active in the Real Estate Industry as they always look to upscale or downsize. It could be a start-up looking to grow, hence needing a bigger space, or a company needing a new branch in a particular urban space. Through this process of companies looking for a better accommodation that fits their own current needs, there is a variety of information to make informed decisions,

In the process of leasing a building, companies require a variety of information to make informed decisions. This information can be categorized into the property's financial, legal, and physical aspects, market conditions, and potential impacts on the company's operations.

One of the most important considerations is the financial aspects. Companies need to know the cost of leasing or purchasing the property, the maintenance costs, and any other additional charges that come with acquiring the property (Chaney et al., 2022). They also need to understand the financial implications of the lease terms, such as the length of the lease and the potential for rent increases. The market condition is also a big determinant of leasing or buying a property. Companies must understand the supply and demand dynamics in the real estate market and the potential impacts of economic trends such as inflation, war, and pandemic (Holmstrom & Roberts, 2012).

The legal aspect is also considered when deciding on a property. Companies need to understand the legal responsibilities, requirements and restrictions related to owning or leasing a property (Mangialardo & Micelli, 2018).

Summary of Chapter 2.3

The purpose of chapter 2.3 is to describe the Key Players in City and Real Estate Marketing and their roles, both from a supply and demand perspective, as well as the information they need and what they require. The Investors, Service providers, Residents, Brokers, Developers and Residents all play a crucial role in the complex ecosystem that is the Real Estate and City Marketing Industry. The interactions and decisions of these actors shape the market, influence its dynamics and trends.

Major Findings and Implications

This present chapter explores the relationship between Real Estate and City Marketing. It identifies the key components of a city to be its and elucidates how these elements collectively shape the city's overall image, design elements, landmarks, and infrastructure. The chapter also discusses the traditional process involved in City and Real Estate marketing, also identifying the most prominent tool used to be 3D visualisations, Social Media marketing, outdoor marketing, and radio/tv.

The Key Actors involved in City and Real Estate Marketing (see Chapter 2.3) identified as Residents, Visitors, Service Providers, Companies, and Investors, made up the target groups in the development of the framework.

3 Introduction to City and Building Information Modelling

This chapter delves into the intricate world of City and Building Information Modelling (CIM and BIM, respectively). It begins with an introduction to CIM, exploring its relationship with Geographic Information Systems (GIS) and the various uses of GIS. The process of creating a City Information Model is discussed in detail, including considerations for data storage formats such as CityGML, Keyhole Markup Language Zipped (KMZ), and ESRI Geodatabase. The chapter also delves into the concept of 'Level of Detail' and the process of creating a CIM model using ESRI ArcGIS CityEngine.

Following this, the chapter transitions into the realm of Building Information Modelling (BIM), before examining the relationship between CIM and BIM.

3.1 City Information Marketing (CIM)

City Information Modeling, as mentioned in the earlier chapter, is related mainly to BIM as both systems seem to work on a similar concept of visual documentation to overcome challenges and enhance collaboration between different practitioners. CIM was presented in 2007 as a form of BIM that can be applied to cities (Xu et al., 2021). It is also widely argued that integrating BIM into a Geographical Information System creates the template for CIM. CIM is sometimes interchanged with Digital Twin and Urban Information Modelling in Literature (GIL, 2015).

BIM in the Architectural context stems from collaboration between professionals such as the Architect, Civil Engineer, Structural Engineer, HVAC Engineer, Electrical Engineer, Facility Manager, and other professionals needed to develop and maintain a building. The same can be said for CIM as it requires collaboration between professionals, including architects, Structural engineers, City Planners, hydrologists, geologists, Real Estate surveyors, and other different professions depending on the purpose of the CIM.

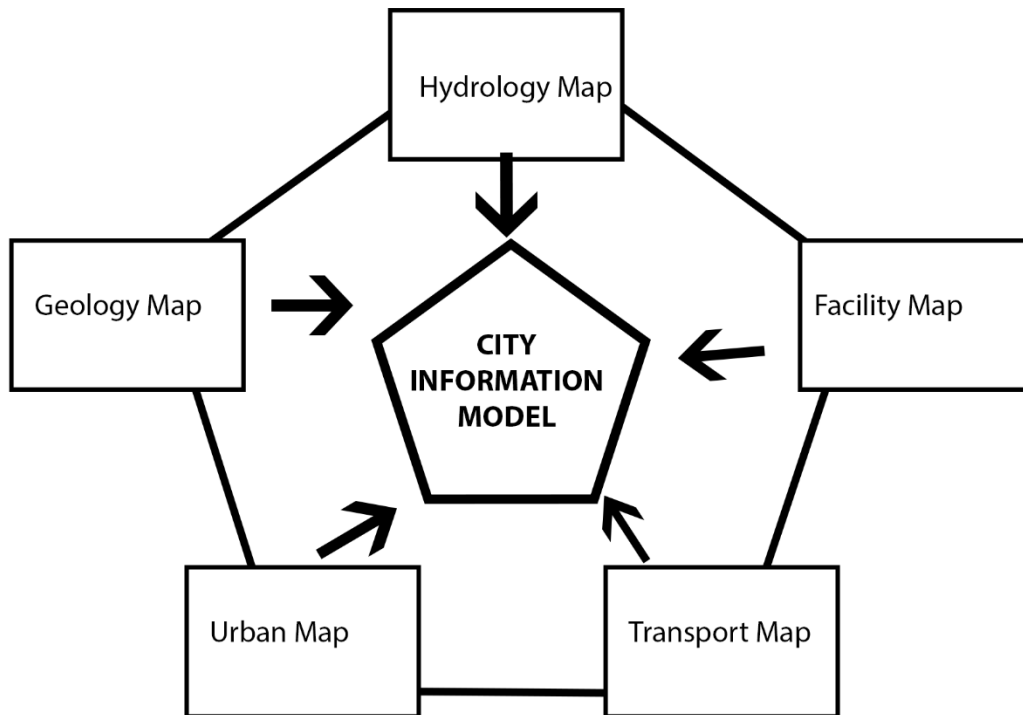


Figure 10: Representation of City Information Model (Source: The Author)

The different professionals in CIM, create a digital plan or map with detailed documentation and information in digital form, the various Maps and Plans can be super-imposed on one another in a GIS space and operated on. The use of CIM in City planning and decision-making ensures that errors can be detected early, and decision-making can be made with various information from the relevant field (Schaufler & Schwimmer, 2020).

3.1.1 CIM and GIS

Geographic Information System (GIS) is a tool with multiple uses: spatial analysis, management, and data collection. Processing and presentation all to ensure better decision-making. A Geographic Information System is a computer-based tool for mapping and analysing things that already exists on the earth's surface. GIS technology integrates common database integration with unique presentation and geographic analysis benefits offered by maps (Environmental Systems Research Institute- ESRI)

CIM models can be created by attempting to scale up BIM or three-dimensionalise GIS (Burry et al., 2015). GIS systems are used for large areas of hamlets, towns, cities, sub-regions, and regions as opposed to applications such as Autodesk Revit or

ArchiCAD, which usually specialise on a smaller scale. As CIM goes beyond Building Level it requires GIS which operates on a larger scale

3.1.2 GIS uses

GIS, a tool for spatial analysis and visual presentation of its results, has various uses. One of the main themes of GIS is the ability to overlay Maps or plans of different themes (Transportation, Building use, Building Age, Topography, Utility plan) to create inferential analysis. The overlay capability provides a comprehensive view of the spatial characteristics of an area by integrating diverse data types on a single platform (Setiawan et al., 2004).

The Overlay function can also be used for the creation of inferential analysis. Researchers can conclude and predict an area of study by examining the spatial relationships between different themes. GIS can be used to estimate the probability surfaces for geographical fatalities, demonstrating the potential of GIS for inferential spatial analysis (Brunsdon, 1995).

The overlay function can identify hazards and potential resource exploitation areas in urban planning and environmental management. For example, GIS was used to map out areas susceptible to landslides along the China-Pakistan Economic corridor (Ali et al., 2018). It also used geospatial techniques to evaluate ground water potential (Hussein et al., 2017).

In summary, GIS, with its capacity for spatial analysis and map overlay, offers a robust tool for inferential spatial analysis. This capability is instrumental in generating insights that inform decision-making in various disciplines. The ability to overlay and analyze thematic maps has proven invaluable in various fields, contributing to our understanding of complex spatial relationships and facilitating informed decision-making.

3.1.3 Creating a City Information Model

Creating a CIM would eventually boil down to its intended use or uses. It is common for BIM and GIS projects to have multiple uses and functions. The same can be said for CIM models. Different aspects must be considered to create a City Model, including

the data storage format, level of detail, visualisation and use, which are the essential aspects.

Data Storage Format

CityGML

The data storage format is critical and should be set from the initial stage of creating the CIM model. This is more important if the Model is made up of different parts from different professionals to ensure seamless integration of essential data. One of the most critical data storage formats to know is CityGML.

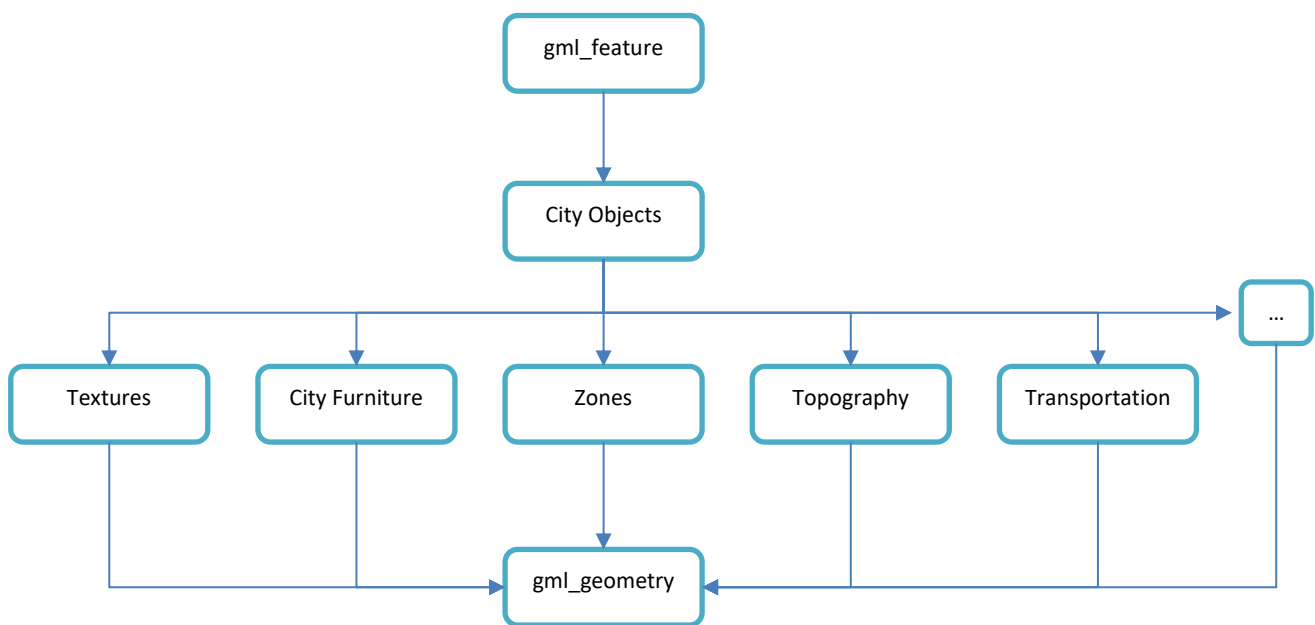


Figure 11: CityGML File format Makeup (Source: The Author)

CityGML is defined as a way to represent geometry and attributes of the standard features found in cities, it represents features such as roads, buildings, rivers, vegetation, and city furniture (Borrmann et al., 2018). In its raw form, CityGML contains a set of plain XML files and some image files to show the texture. CityGML stores the various components of a city into different modules, and these are:

Appearance: The textures controlling the appearance of the objects

Bridge: All bridge like structures

Building: the exterior and possibly the interior of the buildings with individual surfaces that represent doors, windows etc.

City Furniture: traffic lights, traffic signs, benches,

zones: Area of land depicting various land-uses which could be industrial, residential, commercial, and entertainment

Topography: This shows the relief of the terrain

Transportation: this includes walkways, roads, tram lines

Vegetation: this includes green areas

Water Body: this includes rivers, canals, streams and lakes (Borrmann et al., 2018)

Keyhole Markup Language Zipped (KMZ)

Another Data Format that needs to be discussed is KMZ. A KMZ file is a ZIP file consisting of KML files. A KML file is a file format used for displaying geographic information. The KML file can contain Vector and raster data features: points, polygons, Network links, Regions, and 3D models as vector data and satellite imageries as Raster Data.

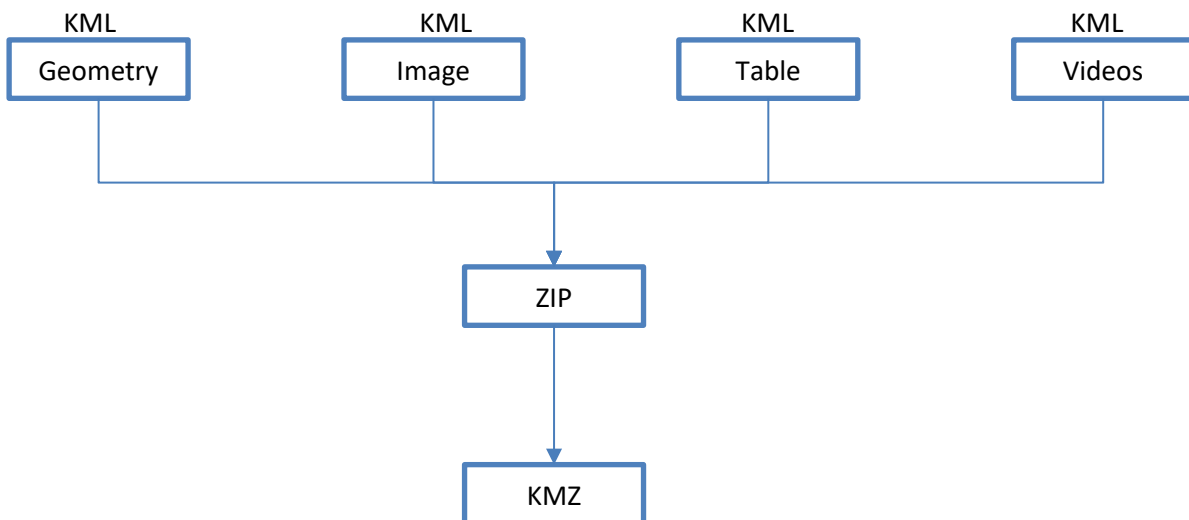


Figure 12: KMZ File format Makeup (Source: The Author)

The KMZ file usually contains multiple KML files, with each KML file specifying a set of geographical information. The structure of the KMZ ZIP consists of a main KML file, usually labelled as doc.kml and other associated files hosting the texture, video, and sound.

This KMZ file format is quite popular in the field of geography as it has a high interoperability with Google Earth and other large information model platforms.

ESRI Geodatabase

The ESRI file Geotabase is a collection of different files into a folder that can store, query and manage both spatial and non-spatial information. An ESRI Geodatabase is typically made up of system tables and user data. The user data can be stored in different kinds of datasets: Feature class, Feature dataset, Mosaic dataset, Raster dataset, Schematic dataset, Tables and toolboxes.

The ESRI Geodatabase is a comprehensive and versatile file system that is a repository for a diverse range of files organized within a folder. It offers the ability to store, query, and manage various data types, including both spatial and non-spatial information. The Geodatabase comprises two primary components: system tables and user data. Different datasets can be created and stored within the user data section, each serving a specific purpose. These datasets encompass various formats, such as feature classes, feature datasets, mosaic datasets, raster datasets, schematic datasets, tables, and toolboxes. This rich assortment of data storage options empowers users to efficiently organize, analyze, and manipulate information within the ESRI Geodatabase, facilitating comprehensive data management and spatial analysis capabilities.

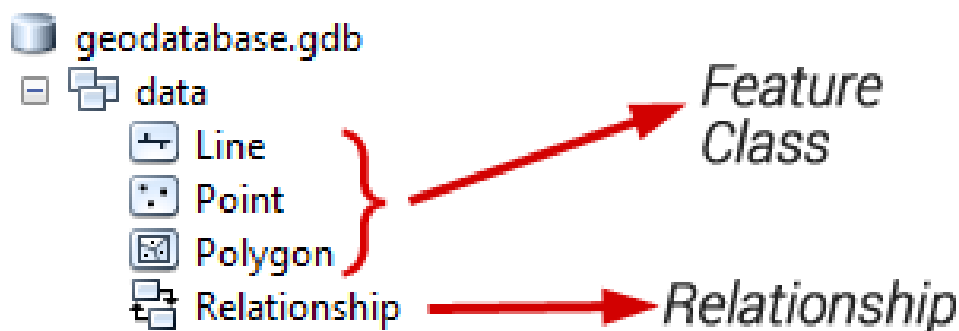


Figure 13: Geodatabase File Format Makeup (Source: <https://gisgeography.com/geodatabase>)

In the provided image, we can observe an illustrative representation of the files encompassed within a geodatabase. Specifically, we can identify the presence of feature classes, also commonly referred to as shape files within ArcGIS. These feature classes consist of three distinct types: lines, points, and polygons. Each of these feature

classes serves as a repository for vector data, facilitating the representation and analysis of geographic features.

Furthermore, we encounter the Relationship file within the geodatabase, which is pivotal in describing the intricate relationships between different datasets. This file provides valuable information on how various datasets within the geodatabase are inter-related, enabling users to establish and understand the connections and dependencies between different spatial data elements.

These files within the geodatabase structure empower users to store, manage, and explore their geospatial information efficiently. By leveraging the feature classes and the Relationship file, users can delve into the comprehensive spatial analysis, gain insights, and make informed decisions based on the interconnections and attributes of the datasets within the geodatabase.

The other important data format in City Information Modelling are .rvt, .nwd, .dwg, and other Architectural and proprietary file formats. The non-proprietary file formats include International foundation class (IFC) and Construction Operation Building Information Exchange (COBie).

Level of Detail

The next to be addressed is the level of detail, depending on the use of the City Information Modeling, the level of detail required will defer. The level of detail ranges from having the buildings on the model shown as boxes with approximate shapes and roads with approximate outlines to the buildings and roads being BIM models with detail components. The level of detail affects the size and work that goes into creating the model and the type of storage format used. CityGML has a concept of level of detail which indicates how closely the model should resemble the real world (Biljecki et al., 2014).

Lod levels on Buildings

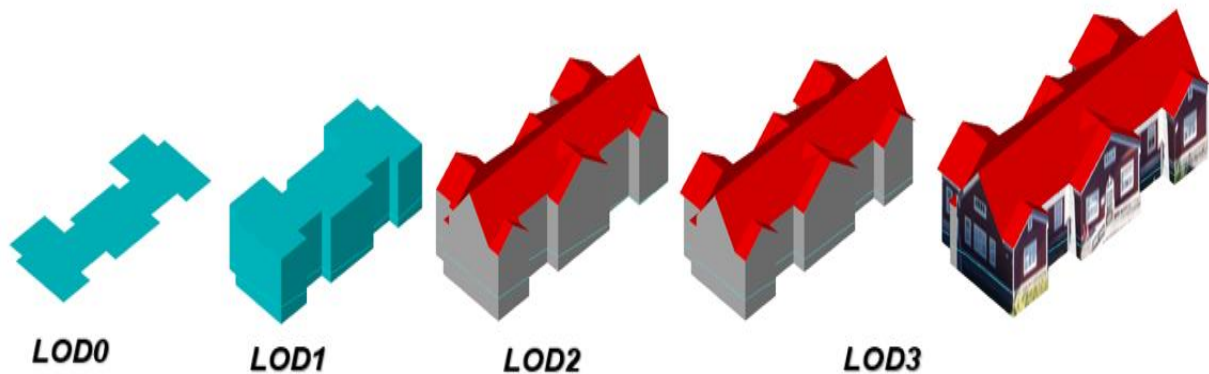


Figure 14: Showing Level of Detail (source: https://kartat.espool.fi/3d/citymodel_en.html)

The above figure shows the different levels of detail in a city information model. The level of detail in CityGML is divided into five, and these are LOD0, LOD1, LOD2, LOD3 and LOD4. As the number increases, the amount of detail put into it increases. The LOD0 is a 2d representation of city. This model presents the transformation from 2d to GIS models and do not contain a z axis (3rd vertical/volumetric dimension) (Borrmann et al., 2018). This model are generally used in mapping and topographical analysis. The LOD1 comes after LOD0, and this one contains volumetric features, it has characteristics of building features represented as massing as it is a block model that is usually gotten from extruding the footprint to a certain height (Arroyo Ohori et al., 2015). The LOD2 goes further in adding detail in that it gives a general roof shape to the extruded footprint structure, and this can be used for various calculations, such as rooftop solar potential estimations (Bremer et al., 2016). The LOD3 shows more than just the roof shape, it shows the positions of the windows on the building and its orientation and adds finer details o the building structure. LOD3 adds finer texture to the building showing its façade details. The LOD4 in short, can be described as an LOD3 which contains indoor features, this dataset is that which is closest to BIM models, this is the most detailed form of city information model and is only advised to be used when information of interior and exterior of multiple buildings is needed to make a form of analysis.



	Virtual 3D City model (CityGML)	BIM (Revit/IFC)
Graphical illustration		
Information details	<ul style="list-style-type: none"> ▪ Surfaces (wall, floor, roof) ▪ Installed objects (windows, doors) ▪ Edges and object demarcation lines ▪ Visible internal details (e.g. floor slabs) 	<ul style="list-style-type: none"> ▪ Surfaces (wall, floor, roof) ▪ Installed objects (window, doors) ▪ Edges and object demarcation lines ▪ Visible internal details (e.g. floor slabs) ▪ Detailed outline for edges of objects (e.g. frame around windows) ▪ Partition lines for surfaces of an object (e.g. double doorpanels, window panes) ▪ Can be used for construction purposes as dimensions are accurate

Figure 15: Difference between LOD4 and BIM Model (Source: (Tah et al., 2017))

3.1.4 Process of Creating a CIM Model

Due to the diverse amount of software applications in the built environment, there are different processes of creating CIM Models. The process generally involves a combination of data collection, modelling, analysis, and collaboration to create a comprehensive and dynamic representation of the City. For this study, we will focus on Creating CIM with ESRI ArcGIS CityEngine and integrating BIM and GIS to create CIM Model.

ESRI ArcGIS CityEngine

ESRI ArcGIS is a Geographic Information System Software developed by ESRI, a company specialising in GIS technology. ArcGIS allows users to create, analyse, and share geographic data map through different software components such as ArcMap, ArcCatalog, ArcScene, ArcGIS Online, and ArcGIS Pro. ArcGIS also supports a wide range of data formats and is integrated with other Esri Products and third -party tools.

Organisations in urban planning, environmental management, transportation, public safety, and natural resources management widely use it. Included in the ArcGIS Urban suite is the ArcGIS CityEngine. The CityEngine 3D modelling software creates interactive and immersive urban environments in less time than traditional modelling techniques. CityEngine can create cities and scenes based on real-world GIS data or depict a fictional city at any time in history (ESRI, 2023).

The process of creating a CIM Model in CityEngine involves first completing some basic steps in ArcGIS Desktop. These steps are: the preparation of the existing data, generation of elevation products which could either be the Digital Terrain Model (DTM), Digital Surface Model (DSM), Normalised Digital Surface Model (nDSM). Then the next step is create a 3D City (3DCIM) geodatabase, then loading of the relevant source data into the system then setting of the building heights with native tools in the system after which a CityEngine Project and scene can be created the data sets added and rules governing the project scene and the relationship between the datasets can be applied.

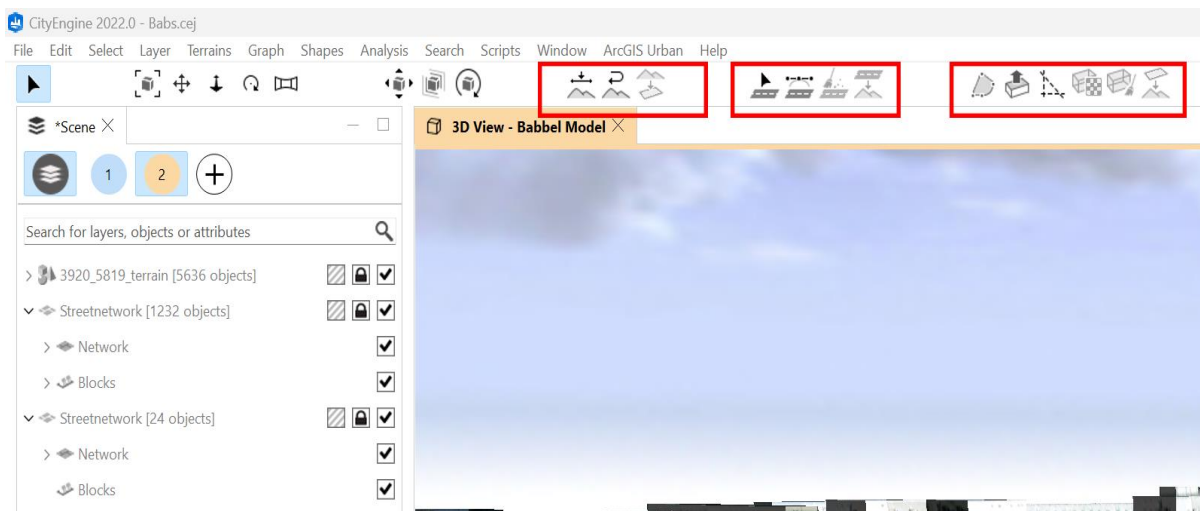


Figure 16: Native Tools of ArcGIS CityEngine (Source: The Author)

The above image shows the native tools included in the CityEngine system and these include: The street creation tool, which, as its name suggests, is used in creating a street model in the system. Depending on the rule assigned to the tool, complex road patterns and designs can be created. Another one of the tools is the Push Pull tool. This is a vital tool as it is used to add height to 2D geometry. This is especially important in the case of creating building models. Edit Terrain is another tool used in the system as it is used in making changes to the terrain and creating terrain information.

A minimum requirement of the elevation and raster data was set for the data to be usable. The minimum data required for a good CIM model with CityEngine is having ortho imagery and a Digital Elevation Model. The recommended is having an Orthoimagery and a DTM, DSM, and nDSM. The ESRI foundation also specified the vector data requirements, with the minimum data being Building footprint and Vegetation. In contrast, the recommended data is the Building footprint, Vegetation, Streets, Zoning/Land Use, Parcels, and Landcover.

integration of BIM and GIS to create the CIM Model

Integrating BIM and GIS to create a CIM model refers to integrating both data file formats (Xun Xu et al., 2014). BIM uses IFC as its universal data file format, while GML (Geographical Markup Language) is the more universal and transferrable way of storing geographical information. For the Integration of BIM into GIS to create a CIM Model, the BIM information would have to be transferable to GIS. Multiple software and approaches have been created to make this possible. These include but are not limited to the use of Feature Manipulation Engine (FME) by "safe software inc", which is software that specifies the transformation of BIM data. Another is the generation of buildings in GIS using IFC, a framework built by Isikdag and Zlatanova (2009) that converts IFC to CityGML automatically (Xun Xu et al., 2014).

Summary of Chapter 3.1

This subchapter discusses CIM as a concept and identifies its similarities to BIM. It also discusses its integration with GIS while identifying the uses of GIS and how it will help aid CIM. This subchapter also discusses the process of creating a CIM model and factors to consider, such as the data storage format, level of detail, visualisation, and its use. It also identifies possible processes, such as using City Engine or integrating the BIM model into a GIS space. This chapter also gives an insight into the various details in CIM, stating that they vary depending on the model's intended use.

3.2 BIM

Building Information Technology (BIM) is a virtual system that replicates real-world structures and promotes collaboration among professionals in the construction industry. BIM allows professionals to plan, design, and construct a building using a 3D

model. It encompasses all aspects of the built environment, including architecture, construction, real estate, and the entire life cycle of the building. BIM has evolved rapidly alongside Computer-Aided Design (CAD), with the term "Building Information Modeling" first coined in the early 1990s. BIM has progressed from 2D representations to more realistic 3D models, and 4D to 9D BIM has been introduced over time. Overall, BIM is a system that covers various disciplines and documentation and can be used at different stages of development in the construction industry. Building Information Technology (BIM) is a virtual system that replicates real-world structures and promotes collaboration among professionals in the construction industry. BIM allows professionals to plan, design, and construct a building using a 3D model. It encompasses all aspects of the built environment, including architecture, construction, real estate, and the entire life cycle of the building. BIM has evolved rapidly alongside Computer-Aided Design (CAD), with the term "Building Information Modeling" first coined in the early 1990s. BIM has progressed from 2D representations to more realistic 3D models, and 4D to 9D BIM has been introduced over time. Overall, BIM is a system that covers various disciplines and documentation and can be used at different stages of development in the construction industry..



Figure 17: Disciplines of BIM (Source : *BibLus*, n.d.)

BIM can be used in various aspects such as cost calculation, geometry, materials, life cycle analysis, energy analysis, demolition, safety, etc. This is because the "I" in BIM,

that is, the Information, gives the system its value, making it possible to share and integrate processes and encourage transparency between the disciplines (Kjartansdóttir et al., 2017). BIM can also be included in all facets of construction management, including but not limited to Quality Management, Resource Management, Risk Management, Project Management, Material Management and Information Management (Yalcinkaya & Arditi, 2013). The next step is to discuss the software applications that makes this phenomenon possible.

3.2.1 Technologies in BIM

There are various software systems and environment that exists within BIM each having an environment that fosters collaboration between the different disciplines. Companies such as Autodesk, Trimble, ArchiCAD each having their own environment and means to combine their different disciplines. Autodesk is a good example as it has applications such as AutodeskRevit for architects and structural engineers, AutodeskInventor for mechanical design, AutodeskCivil3D for civil engineering planning and construction documentation amongst others with Autodesk BIM Collaborate being the software to manage all the different models and information from different places in one system in which clashes and real time issues can be detected.

This software coming from different companies and storing different information leads to them having different file formats, but due to the nature of construction with projects usually making use of different software application. For example it is not uncommon for a project to use Autodesk Revit for its architecture design and Trimble Tekla structures for its structure design, due to this, there needed to be a common ground for smooth collaboration between this software hence the Industry Foundation Classes (IFC) file format.

Industry Foundation Classes (IFC)

Industry Foundation Classes is a standardized description of the assets of the built industry by "building Smart". This file format aims to promote vendor-neutral usability across a wide range of hardware and software platforms for multiple use cases (Building Smart, n.d.)

.ifc	The standard format is based on STEP (STEP: Standard for the Exchange of Product Model Data).
.ifcZIP	Compressed IFC files with much smaller file size; can be read by most software applications that support IFC. It can be unpacked to make the uncompressed IFC file visible.
.ifcXMK	XML-based representation of IFC data, required by certain calculation software.

Table 1: IFC file formats (Autodesk, 2022)

The different IFC have defined key definitions that define their uses. The standard IFC format is based on the exchange of Model data compressed ZIP file can be unpacked to make a compressed IFC file visible. ifcXMK is based on specific IFC data requiring calculation software (Autodesk, 2022).

3.2.2 Dimensions of BIM

BIM dimensions refer to the amount of information available in a project, ranging from 3D to 10D. Each dimension adds a deeper level of understanding to the project.



Figure 18: Dimensions of BIM (Source: Biblus, 2023)

The 3D Dimension adds geometry to computer-aided design, giving it a 3-dimensional (x,y,z) geographical structure. The 4D gives it a timeline, adding scheduling and duration dimensions, while 5D adds the cost estimation and budget analysis aspect. 6D BIM adds sustainability and energy efficiency, and 7D dimension adds the facility management aspect to BIM. 8D to 10D, which are relatively newer, add their different aspects, with 8D adding safety during construction, 9D lean construction, and 10D construction industrialisation (Biblus,2023). All these BIM dimensions are done to ensure as much input of information into the BIM system to increase the rationality of the decisions to be taken by the construction manager or whoever is in charge of the real-life project for the BIM model.

Summary of Chapter 3.2

Chapter 3.2 introduces the reader to the concepts of BIM as a system encompassing multiple disciplines (see fig 18), rather than any specific technology or model.

This subchapter also introduces the software applications used in the BIM environment and the IFC file (see Table 1), which serves as a vendor-neutral file format that ties everything together.

This chapter also introduced the ten dimensions of BIM, as each dimension seeks to add more information and utility to the BIM system.

3.3 Relationship Between CIM and BIM

The relationship between BIM and CIM is constantly evolving, as neither system has reached its conclusive state yet. BIM primarily focuses on digital information about building projects throughout their various stages. On the other hand, CIM is an advanced version of BIM that concentrates on cities and urban communities, including public services and facilities.

It is possible to incorporate BIM models into CIM. The more detailed the BIM models are, the more information can be accessible in the CIM. This enables greater rationality in decision-making processes.

CIM deals with BIM on a larger scale. Some CIM applications may require information from BIM models. For example, a BIM model can demonstrate the fire escape in a single building for fire incidents, but when dealing with a larger-scale incident, CIM is needed to plan an escape route. Information required for BIM can also be directly applied to CIM but on a larger scale. However, the practicality of the CIM model, such as the file size and the processor required to compute that much information, is a concern when each BIM model is detailed.

BIM and CIM are considered systems or processes that aid in collaboration, managing, and planning different phases of projects.

Differences between BIM and CIM		
	BIM	CIM
SIZE/LEVEL	Building	Hamlet, Town, City, Sub-Region, Region, Country and Potentially Gobal
Software Application	ArchiCAD, Autodesk Revit	QGIS, ESRI ArcGIS
File Format	.dwg, .ifc, .	CityGML,
Professionals	Engineers, Architects, HVAC Engineers	City Planners, Land Resource Managers, Topographers, Geologists
Design Orientation	Object Oriented	Spatial Oriented

Table 2: Difference between BIM and CIM (Source: The Author)

3.3.1 Case Studies of BIM/CIM Application in Real Estate/City Marketing

Helsinki 3D Model

In recent years, the application of Computer-Integrated Marketing (CIM) and Building Information Modeling (BIM) in marketing has gained significant attention. Marketing has emerged as a valuable use case for BIM, particularly in visualization. One notable example of CIM/BIM application in marketing is the Helsinki City Information Model, which serves as a comprehensive and digital representation of the city, encompassing various data sets such as demographics, environment, and infrastructure.

The Helsinki City Information Model development involved collaboration among multiple stakeholders, including government agencies, urban planners, and technology companies. A wide range of data sources was utilized to populate the model, including integrating data from Internet of Things (IoT) sensors, public surveys, and social media platforms. This approach ensured the model captured a holistic view of the city and its dynamics.

An essential aspect of the Helsinki City Information Model is its ability to facilitate diverse analyses. Users can leverage the model to conduct analyses on energy consumption, as well as the release of greenhouse gases. By integrating LoD2 (Level of Detail 2) and LoD1 structures, the CIM model offers detailed and textured representations of the city, allowing for a more immersive experience.



Figure 19: Helsinki 3D Model (source: hri.fi/data/en_GB)

The 3D model generated through the Helsinki City Information Model has been leveraged in various marketing campaigns. Interactive websites and mobile platforms have been developed to enable users to explore and experience the city, even from a remote location. These platforms enable individuals to navigate through the digital model of Helsinki, gaining insights into its architecture, urban design, and cultural landmarks.

The utilization of CIM/BIM in marketing, as exemplified by the Helsinki City Information Model, showcases the potential for integrating advanced digital models with marketing strategies. By offering a realistic and interactive experience, these models empower

marketers to engage with their target audience in novel ways, transcending traditional marketing approaches. Such applications enhance marketing campaigns and provide valuable insights for urban planning, sustainability initiatives, and decision-making processes related to city development (*3D Models of Helsinki - Helsinki Region Infoshare*, n.d.).

The Shard London

The Shard is a perfect example of using BIM in real estate marketing. The Shard is a skyscraper located in London. The skyscraper stands at a height of 310 metres, making it the tallest skyscraper in the United Kingdom and one of the Tallest in Europe and the World.

Sellar Property Group developed a highly detailed BIM model of The Shard in collaboration with architectural firms and BIM specialists. The model included components of the building's structure, MEP systems (mechanical, electrical, plumbing), and architectural elements.

The development team developed an interactive virtual tour by utilizing the BIM model as a foundation. It featured different levels and views from all angles, allowing users to explore the building's interior spaces in 3D.

The BIM Model was often used in multiple Stakeholder meetings as due to the proposed size of the building, simulations were run on it and CGI renderings of the BIM were made from every multiple angle. They were presented in stakeholder's meetings (Sellar, 2015). The digital version of the BIM Model was made available on the official website and shared across various digital platforms, including social media channels and property listing websites. Through the tour, potential buyers, tenants, and investors were able to get a first-hand impression of the building's design, amenities, and surrounding landscape.

Summary of Chapter 3.3

This sub chapter 3.3 discusses the relationships between BIM and CIM, and how they can both be interwoven to create a more complex model. The differences in both are also identified (see table 1). This subchapter also gives examples of using BIM and CIM in Real Estate and City Marketing.

Major Findings and Implications

This chapter comprehensively explores City and Building Information Modelling, highlighting the synergies and distinctions between the two. It underscores the importance of these modelling techniques in real estate and city marketing, as evidenced by case studies such as the Helsinki 3D Model and The Shard in London.

The major implication of this chapter is that firstly, the integration of CIM and BIM can enhance the efficacy and effectiveness of city planning and real estate development and marketing.

Another major implication is that the choice of data storage forms is critical in creating a CIM model, it ensures seamless integration of essential data from different professionals and determines the ease of use and interoperability of the model.

Lastly, the insights gleaned from this chapter are instrumental in understanding the potential of CIM and BIM in revolutionizing real estate and city marketing strategies. This chapter also gives the author and reader on the creation of the framework as it gives bases on the required level of detail depending on the use of the model.

4 Method and Methodology

The present chapter elucidates the evolution of the Framework for the current thesis. This chapter presents the author's cognitive steps and reasoning leading to the thesis's creation lucidly and succinctly.

The chapter under consideration identifies the data collection method employed in the thesis. Additionally, the interview protocol to be utilized has been identified. The author identified the limitations of case study design.

4.1 Framework Development

This sub-chapter centres on creating a comprehensive structure for applying Building Information Modeling (BIM) and City Information Modeling (CIM) in City and Real Estate Marketing. The framework functions as a tool for decision-making, providing guidance for identifying and prioritising factors to be considered. This research thesis conducted a comprehensive literature review (See chapter 2 to 3) to outline a systematic approach for implementing BIM and CIM in City and Real Estate Marketing.

The initial stage of the framework development process entails establishing well-defined objectives that align with the overarching aim of incorporating Building Information Modeling (BIM) and City Information Modeling (CIM). The stated objectives function as fundamental principles that offer direction for the subsequent phases of the framework's development.

Upon establishing the objectives, the subsequent phase involves identifying the primary stakeholders who will implement and utilise Building Information Modeling (BIM) and Construction Information Modeling (CIM). The stakeholders involved in planning, designing, constructing, and promoting real estate projects and urban environments may consist of professionals such as real estate developers, city planners, marketing agencies, government entities, architects, engineers, and others.

The identification of stakeholders is a critical aspect of developing a framework. Equally important is determining the specific target groups the framework intends to serve. The identified target groups comprise prospective investors, Residents, visitors/Tourists, Companies, and Service Providers who possess a keen interest in real estate and urban market as a user. Comprehending the necessities and anticipations

of the target mentioned above Target groups is imperative in customizing the framework to meet their prerequisites.

Additionally, it is crucial to evaluate the information requirements of the identified demographic segments. The process entails identifying pertinent and valuable information for the intended audience and determining the appropriate level of detail necessary to convey said information effectively. By comprehending the specific information requirements, a framework can be formulated to furnish the essential data and perspectives to facilitate the decision-making procedures.

Furthermore, properly selecting software is crucial in successfully implementing the framework. The initial phase of this research entails identifying software tools and platforms that are optimally tailored for integrating Building Information Modeling (BIM) and City Information Modeling (CIM) in the context of City and Real Estate Marketing. The software must support data exchange, visualization, collaboration, and analysis, empowering stakeholders to leverage BIM and CIM technologies efficiently.

The above thought process served as the basis for the development of the Framework. The proposed Framework offers a systematic methodology for relevant stakeholders to facilitate their decision-making process concerning the utilization of Building Information Modeling (BIM) and City Information Modeling (CIM) in the context of City Information Model.

The present thesis introduces a framework that integrates Building Information Modeling (BIM) and City Information Modeling (CIM) in the context of City and Real Estate Marketing. The framework is divided into two main sections, namely the City level and the Real Estate level. The present study reveals that a comprehensive analysis of the literature indicates a number of similarities between the marketing of real estate and the CIM model. The two domains exhibit a high degree of stakeholder overlap and require the utilization of congruent software applications and system environments. The main differentiation, however, is rooted in the particular goals pursued by the individual in charge of the process, resulting in differences in the necessary data for identical stakeholders. As a result, the framework has been bifurcated into two distinct components to cater to these disparate requirements, as delineated underneath. The primary distinguishing factor between the two processes lies in the marketed entity,

which may be the city, a particular building, or a specific floor or apartment within the building.

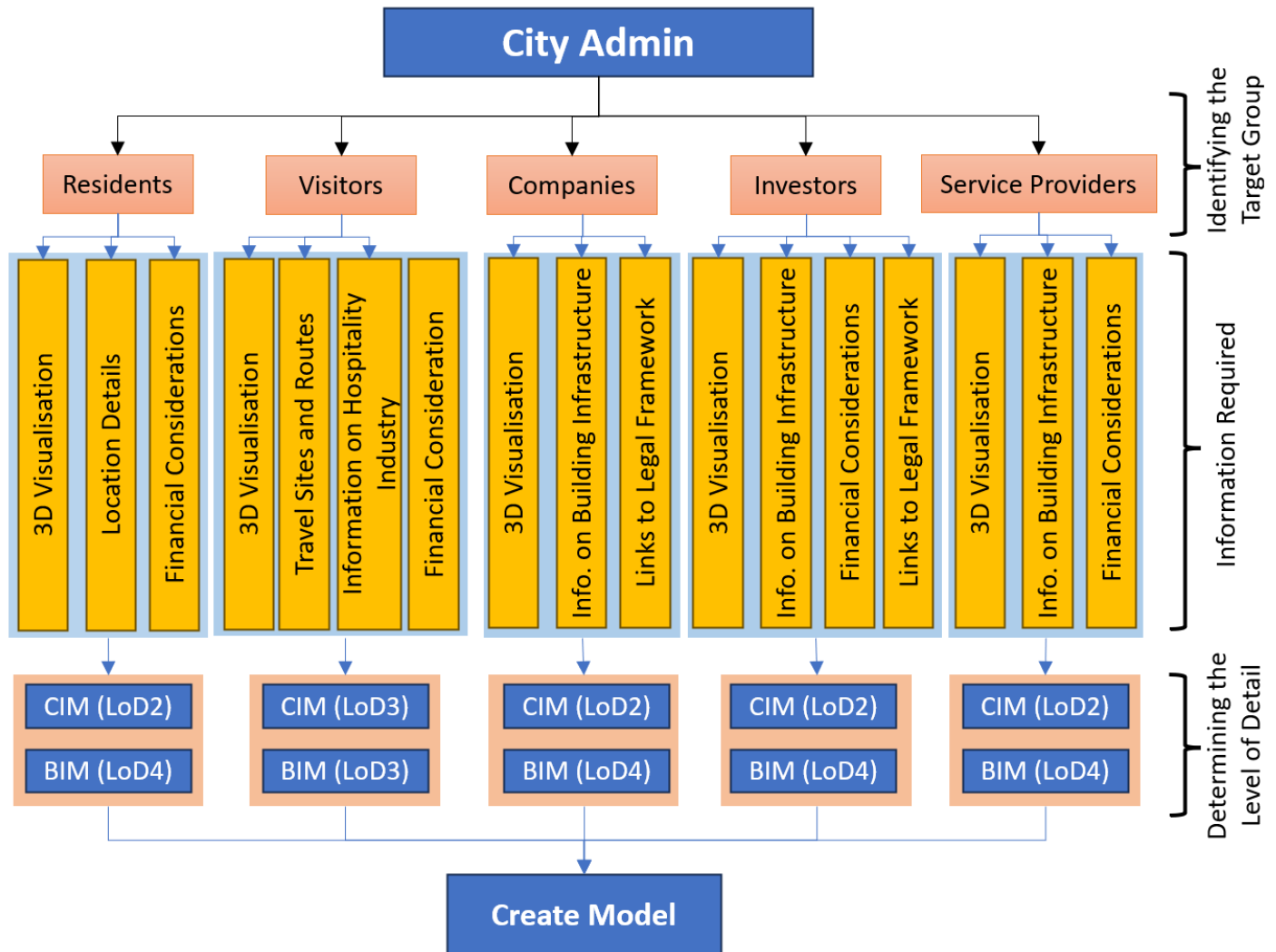


Figure 20: Framework from City Admins Perspective (Source: The Author)

The initial phase in the creation of the Framework involves the identification of the specific demographic groups that are being targeted. To optimize the utilization of BIM and CIM in City and Real Estate Marketing, it is crucial to identify the specific target groups that stand to gain the most from the information model. The present framework categorizes the target groups into five distinct categories: Residents, Visitors, Companies, Investors, and Service Providers. This classification has been derived from the literature review findings discussed in Chapter 2.3.1. Each Target group embodies a unique stakeholder category with distinct interests and requirements.

Upon identification of the target groups, the subsequent step involves identifying the necessary information for each group. Although the specific requirements may exhibit variability, certain shared characteristics exist among the cohorts of interest. The requirement for 3D visualization is a crucial component in Building Information Modeling (BIM) for its marketing applications. When contemplating a place to reside, individuals prioritize a range of factors. The factors that are considered in this study include safety and security, affordability, quality of life, education and employment opportunities, accessibility, cultural diversity, and community involvement.

As a target demographic, visitors exhibit a preference for short-term accommodations and are primarily interested in obtaining information about facilities such as hotels, hostels, attractions, and landmarks. The data presented should be customized to suit their short-term residency and encounters in the urban area.

The Target groups of companies, investors, and service providers require pertinent information to inform their business and investment decisions. The report comprehensively analyses various aspects that impact investment and service provision, such as commercial properties, infrastructure, transportation networks, market trends, and economic indicators.

After identifying the target groups and their individual information needs, the framework recommends determining the suitable level of detail (LOD) for both the Building Information Modeling (BIM) and City Information Modeling (CIM) models. The Level of Detail (LOD) indicates the level of refinement and comprehensiveness of data contained within the models. The inhabitants must have. The utilization of Level of Development (LOD) 3 is a common requirement for both Building Information Modeling (BIM) and City Information Modeling (CIM) models intended for residential purposes. The level of detail presented in this study adequately addresses the informational requirements of the city's inhabitants regarding its infrastructure, amenities, and urban surroundings.

The model integrating BIM and CIM for visitors adheres to a Level of Development (LOD) of 3. This level of development provides visitors with information on various attractions, landmarks, and short-term accommodations that can enhance their overall experience.

A recommended LOD of 4 is advised for the BIM model of the group of companies, investors, and service providers. A higher degree of specificity is provided in this data,

which presents a complete depiction of the characteristics, facilities, and additional pertinent data that are necessary for making well-informed choices. The LOD for the CIM model is 2.

Developing a framework for integrating Building Information Modeling (BIM) and City Information Modeling (CIM) in Real Estate and City Marketing was predicated on thoroughly comprehending the target audiences and their unique informational requirements. Through the identification of specific requirements and the establishment of an appropriate level of detail (LOD), the proposed framework has the potential to effectively direct the utilization of Building Information Modeling (BIM) and City Information Modeling (CIM) models. This, in turn, has the potential to improve decision-making processes and provide valuable insights to stakeholders within the City and Real Estate sectors.

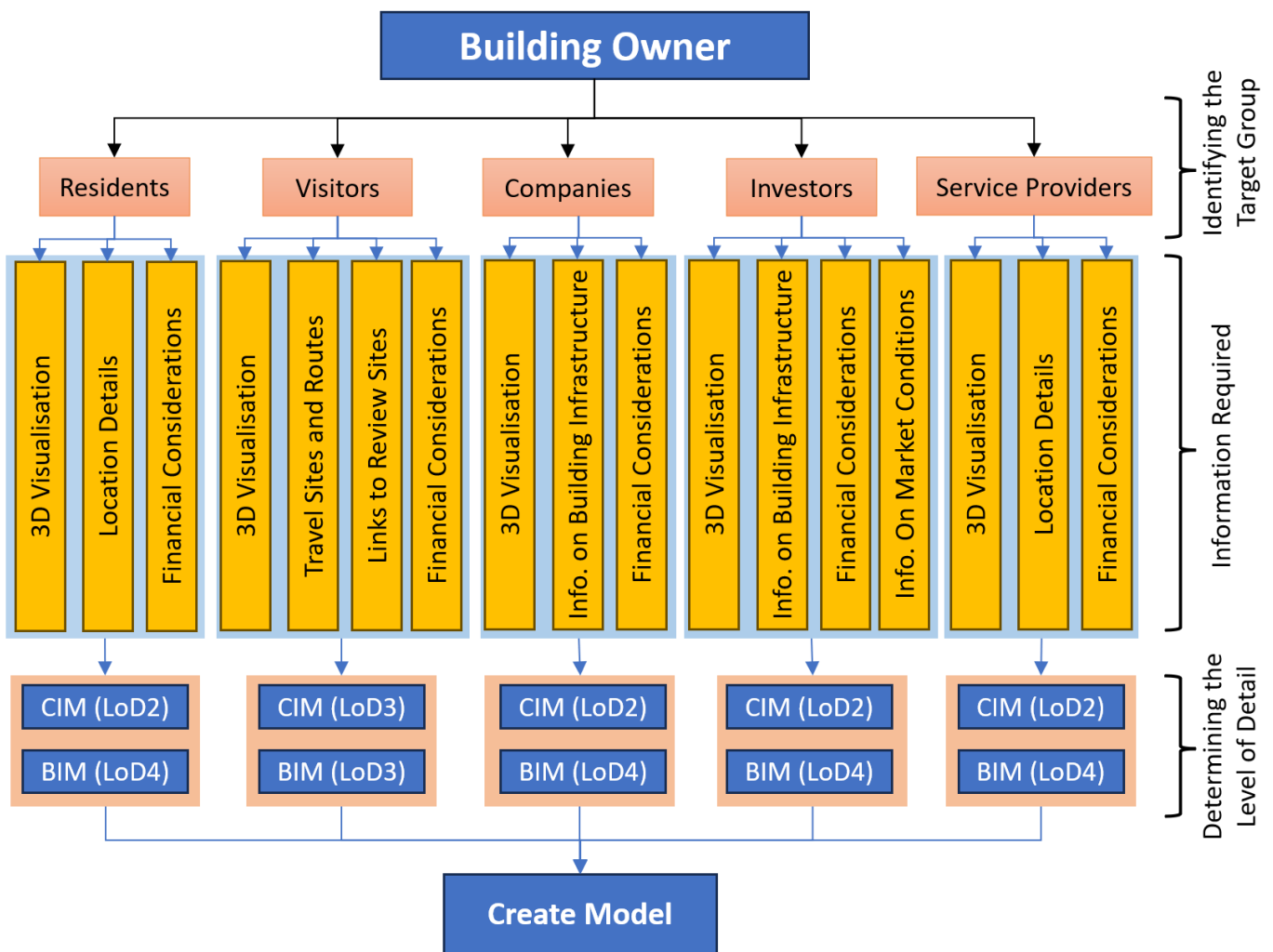


Figure 21: Framework from Building owner Perspective (Source: The Author)

The framework above delineates the process from the building owner's vantage point, encapsulating the thesis's micro-scale objectives. Likewise, on a macro scale, this process entails distinct Target groups, requisite Information, necessary models, desired level of detail, indispensable Software applications, and the designated data file format. The Target groups remain consistent across both frameworks; however, the diverging factor lies in the specific Information sought from them.

The required Information diverges based on the distinct Target groups, except for the shared need for immersive 3D visualization imagery, which simultaneously fortifies the marketing endeavours. Critical information pertains to transportation networks, local parks, and other essential infrastructural elements for residents. Additionally, pertinent information concerning the utilization of the building holds paramount significance. On

the other hand, visitors rely heavily on information about transportation routes and additional facilities. Companies, service providers, and investors all exhibit a demand for analogous information encompassing the building's infrastructure, spatial requirements, and size specifications.

In order to entice prospective residents, the creation of a comprehensive CIM (City Information Modeling) and BIM (Building Information Modeling) model, boasting a Level of Detail (LOD) of 3, is deemed necessary. A BIM model with LOD 4 and a CIM model with LOD 3 is indispensable for visitors. Similarly, companies, investors, and service providers necessitate a BIM model with LOD 4 and a CIM model with LOD 3, respectively, to fulfil their requirements.

To fulfil these modelling needs, industry-standard applications such as Revit and CityEngine emerge as suitable choices. These software solutions cater to creating all the models mentioned above, thereby ensuring efficiency and accuracy. Furthermore, the designated file formats for the models encompass IFC (Industry Foundation Classes), CityGML, and RVT (Revit) formats, ensuring compatibility and seamless integration within the established framework.

4.1.1 BIM and CIM Integrated Model

Drawing from the Literature review (see chapter 3.1.4) The author uses an approach in creating the BIM and CIM model for this thesis. This approach enables the creation of a BIM and CIM model that incorporates the framework developed by the author. The core objective of this is to establish a seamless introduction into the creation of the model process when all steps are followed carefully from the framework.

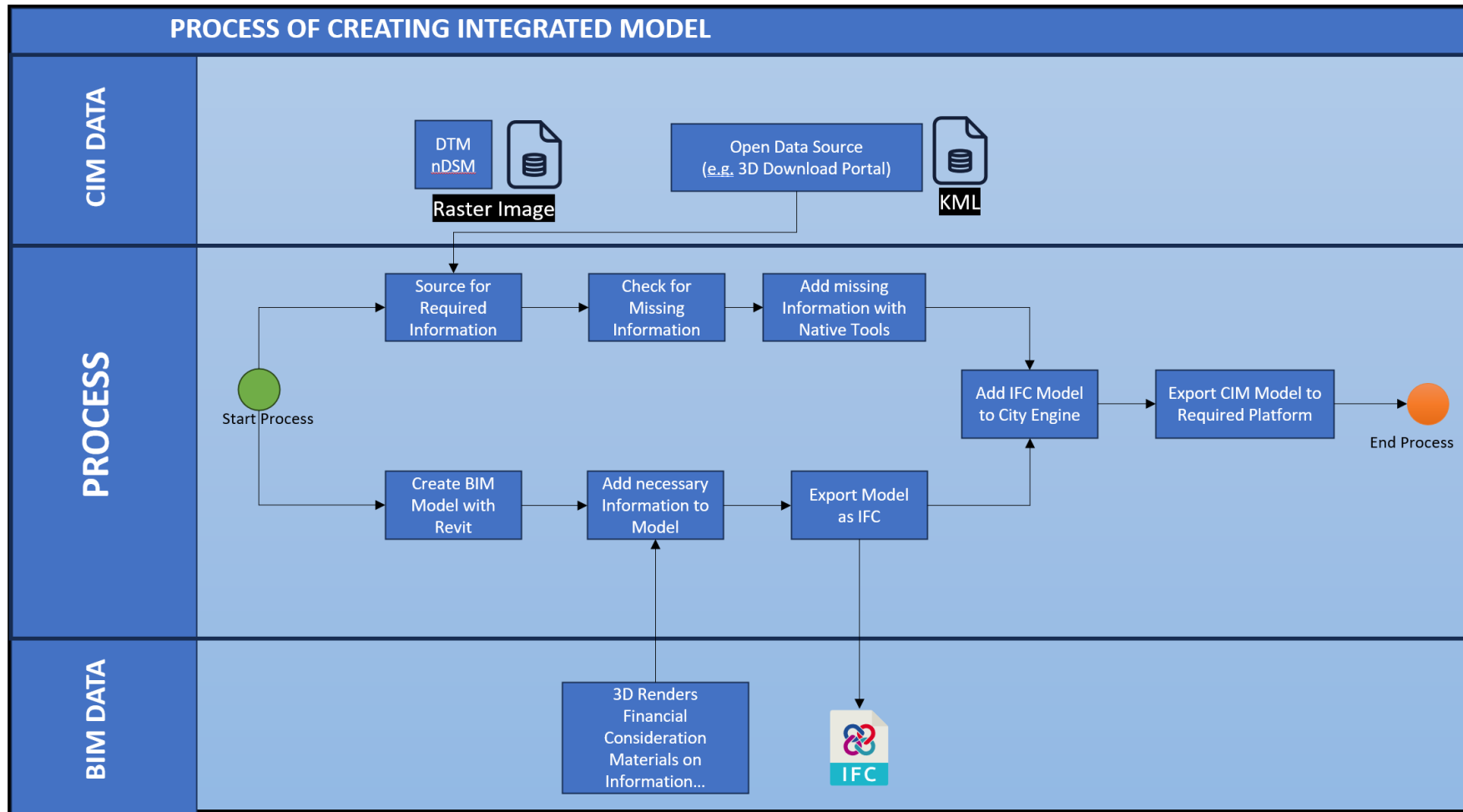


Figure 22: Process of Creating Integrated Model (source: The Author)

The model was created through the use of City Engine and Autodesk Revit. The BIM model was created in Revit, and subsequently, the International Foundation Classes (IFC) file format was exported from Revit and imported into CityEngine. The CIM model involved acquiring a pre-existing model from publicly available open sources and augmenting it with the native tools provided by CityEngine. Once the IFC file was incorporated into CityEngine, the resulting model could be exported to the desired platform, facilitating further analysis and utilization.

Summary of Chapter 4.1

This Subchapter develops the thesis framework for applying CIM and BIM in City and Real Estate Marketing. It identifies the steps and workflow to create a model for this purpose from the building owner and city administration perspective (see Fig 19 and 20). The framework identifies the workflow to identify the target groups. The information required for the target groups will determine the required model, its level of detail and the software application required.

4.2 Data Collection

The primary data utilised in this study was obtained through interviews and procuring building plans. This approach was employed to gather vast data to accomplish the research project's aim.

An interview was employed to ascertain the marketing objectives of Babbel's construction. The personal interaction between the author and the representative played a critical role in providing valuable insights into the attitudes and strategies of Babbel GmbH as an organisation.

The author utilised the collection of Building plans as the second source to generate the BIM model of the Babbel GmbH building.

4.2.1 Data Recording and Storage

The data collected and utilized during this research is protected by a Non-Disclosure Agreement (NDA). The author of this thesis and the representative of the Babbel Building, a key stakeholder in this research, formally signed this agreement. This agreement was intended to safeguard sensitive information about the Babbel Building, ensuring that such information would not accidentally become public knowledge.

The documents that fall under the purview of this agreement have been included in the appendix of this thesis. These documents primarily consist of the floor plans of the Babbel Building, a critical component of the research and analysis conducted in the thesis. The inclusion of these documents in the thesis, albeit under the protective umbrella of the NDA, was a strategic decision made to foster and maintain a relationship of trust between the author of the thesis and the owner of the Babbel Building. This trust is crucial, as it allows for a more open and collaborative research process while ensuring that all parties' interests are adequately protected.

Upon completing the thesis, the author adhered strictly to the terms of the Non-Disclosure Agreement. This action was taken to fulfil the obligations outlined in the NDA and further demonstrate the author's commitment to respecting the privacy and confidentiality of the data provided by the Babbel Building.

The NDA pertains to using CAD data and related documents of the Babbel Building for the author's Master's Thesis. The agreement stipulates that the unprocessed data provided by Babbel GmbH remains their property and cannot be published by the author without written permission. However, the author can use this unprocessed data and release or publish any processed data resulting from the case study. The agreement comes into effect upon signing by both parties.

4.2.2 Interview Protocol

In order to conduct a good interview, a protocol must be followed. The Interview was semi-structured; the questions were open-ended and left opportunities for the interviewee to express themselves.

The Interviewee chosen for this thesis was a dignified representative of Babbel GmbH. They defined the marketing objectives of Babbel GmbH for the Babbel building at

Andreasstrase 72, 10243 Berlin. They answered questions on the Background information of the Building, the current Marketing Strategies and future marketing Intentions. All this was essential in checking if the required model created through the framework fits into this.

The author recorded and transcribed the interview audio (see Appendix A). This was done to ensure that the author did not miss a detail of the intention of Babbel GmbH regarding their building.

Interview Structure

The structure of the interview is an essential aspect of the research process. It is crucial to establish a clear and concise plan.

The interview was conducted in a structured manner, consisting of three distinct phases. The initial phase focused on gathering background information regarding the relationship between Babbel and the building. This was done to gain a comprehensive understanding of the reasons behind the occupation of the building and the need for new tenants.

Subsequently, inquiries pertaining to the marketing goals and objectives of the subject under investigation would be posed to ascertain the requisite target demographics for the Framework.

Inquiries were made regarding the future marketing plans of Babbel GmbH in order to gain insight into any potential modifications to their existing marketing approach.

As a result, the following interview questions were formulated.

1. What is the duration of Babbel GmbH's occupancy of the building?
2. What was the rationale behind the decision to switch to Babbel GmbH?
3. What are the current marketing objectives of Babbel GmbH?
4. What is the target demographic of customers being sought by Babbel GmbH?
5. Is there a particular area that requires targeted marketing or emphasis?
6. What is the duration of the lease agreement for the space intended for rental?
7. Is there a possibility of a modification to the existing marketing approach in the future period?

4.2.3 Limitation in Case Study Design

For fairness in this thesis, it is essential to discuss the possible limitations of the study. One of the significant criticisms of case study involves issues of the validity of the research construct, which refers to the reliability and re-applicability of the various forms of the single case study analysis (Willis, 2014). Another major criticism of single case study analysis is the generalisability of the research results.

To combat all the limitations in the research, the author studied a wide range of literature and drew information from a large data pool. Also, a case study on Building and City level was studied and included in chapter three of this thesis.

Summary of Chapter 4.2

This subchapter discusses the data collection, recording of the data, and the interview protocol used in this thesis. The data was to be collected through a structured interview and building plans. The data to be collected was to be protected by an NDA to protect the interests of Babbel GmbH.

Major Findings and Implications

In this chapter, the framework was developed. The result of the framework is a workflow for creating an integrated BIM and CIM model that can be used to satisfy marketing objects from a building owner or city admin point of view.

The methods of collecting data for the case study were also highlighted. This method is through an interview with the Babbel Representative and a collection of plans. This was to aid in understanding the marketing goals and objectives of Babbel GmbH and creating the Model. The Interview was audio recorded and transcribed by the author. Finally, the chapter discusses the limitations of case study design and highlights the criticism of single case study analysis and how it must be counteracted.

5 Case Study

This chapter introduces the case study of this thesis, which is the Babel building, and it would be taken from the building owner's perspective. In this chapter, the justification for the study is highlighted, and the selection criteria and case study boundaries are also highlighted.

The Babel building and the district of Freidischain were also discussed extensively in this chapter to give an understanding of their significant elements. The interview results are also discussed in this chapter, the Babel building model was also built according to the framework, and the results were validated.

5.1 Justification for Case Study

The selection of a case study approach was deemed necessary to achieve the objectives of this thesis. This can be attributed to specific considerations that the author took into account. These key considerations are the ability to attain a comprehensive contextual comprehension of the subject matter, to ensure practicality and enable validation of the framework resulting from the author's literature review (refer to figures 20 and 21), and access to data pertaining to a singular case study is also imperative.

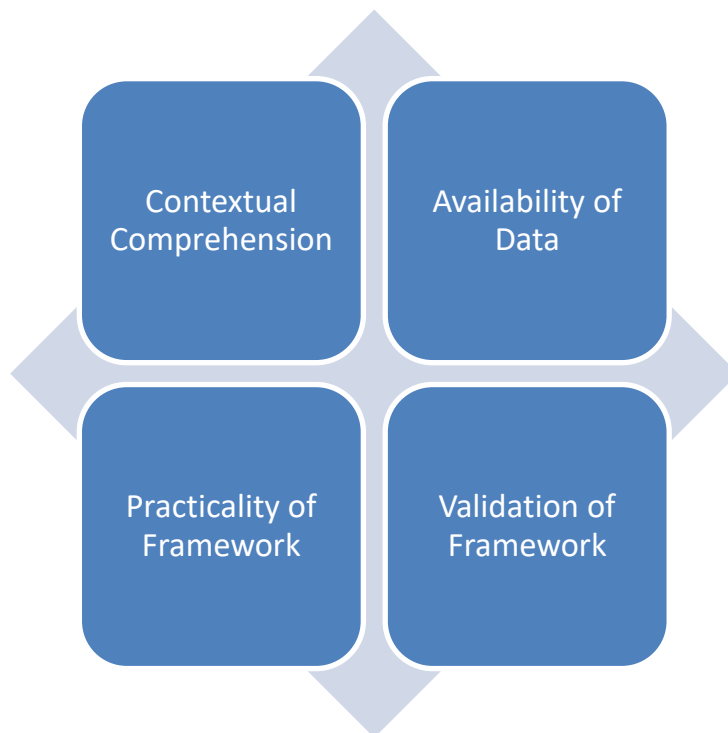


Figure 23: Justification of Study (Source: The Author)

Developing a thorough contextual comprehension is a crucial aspect of the case study methodology, as it enables a comprehensive grasp of the building's characteristics. Utilising a case study approach, this thesis aims to elucidate the stages at which the various technologies expounded upon in Chapter 3 are implemented. This will provide valuable insight for prospective readers regarding the practical applications of said technologies.

The practicality of the thesis is closely linked to the applicability of the Framework developed therein, which is designed to be utilised by professionals in the real estate and city marketing sectors.

This approach facilitates the acquisition of extensive information from a building during the implementation of the framework, as perceived by the author. As additional data is collected, the decision-making process for constructing the framework becomes more rational.

Finally, a case study will be employed to validate the framework proposed in this thesis. The framework's efficacy will be evaluated based on its successful implementation in attaining the predetermined objectives of the selected case study.

5.1.1 Selection Criteria

In order to do good research, The building selected for the case study has to meet specific criteria. The building was selected after considering several criteria by the author of the thesis. The criteria were to ensure that the building is representative, relevant, and can provide valuable insights into creating the framework. For this purpose, the following criteria were selected.

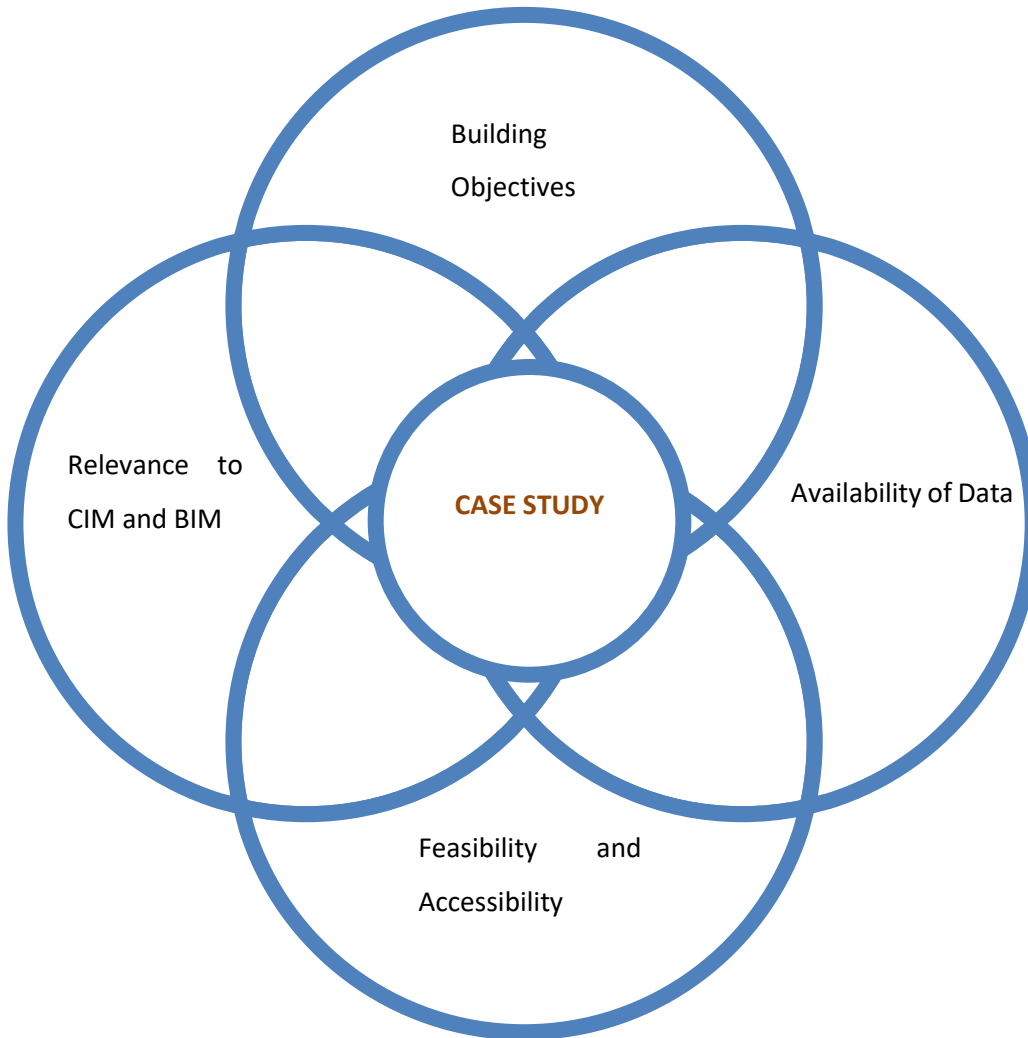


Figure 24: Case Study Selection Criteria (Source: The Author)

1. **Relevance to BIM and CIM:** the selected building that can demonstrate the full utilisation of BIM and CIM. This is to ensure that the case study aligns with the objectives of the Thesis.
2. **Building Objective:** The building selection process for the thesis project aims to identify a suitable property that aligns with the project's objectives. Specifically, the chosen building should have a current need to rent out a floor or a portion, if not the entire building. This criterion ensures that the selected building aligns with the thesis's core focus. The thesis project can address real-world challenges and provide practical solutions by selecting a building with available rental space in the real estate market context. This approach allows for a more hands-on and relevant investigation, enabling the exploration of market dynamics, leasing strategies, and the overall effectiveness of marketing efforts.

3. **Availability of Data:** The selected Building should be located with an available City Information Model to enable the ease of data collection on the CIM part of the thesis. The selected building should have relevant and accessible data sources, including marketing plans, brochures, digital assets, and documentation related to implementing BIM and CIM technologies. Adequate access to the building owner or relevant stakeholders for interviews and data collection is also essential.
4. **Feasibility and Accessibility:** The feasibility and accessibility of the building case study play a significant role in the research process. Practical considerations, such as proximity to the researcher, ease of data collection, and availability of resources, should be taken into account to ensure the successful execution of the case study.

5.1.2 Case Study Boundaries

When deciding on the boundaries of the case study, the author considered the scope of the research, the available resources, and the objectives stated in the introduction chapter of the thesis. The following were considered as the potential boundaries of the research.

1. **BIM and CIM Application:** The study focuses on the application of BIM and CIM tools for the specific of creating a model that could market the 4th floor of the building
2. **Time Frame:** The case study is limited to a time frame which is the lease period of the fourth floor.
3. **Stakeholder Involvement:** The stakeholder involved is confined to the one directly involved in leasing the 4th floor of the case study, which is the Babbel GmbH building.
4. **Data Availability:** The study could be limited by the availability of data. This could include data on the building itself (such as architectural drawings, BIM models, etc.), real estate market data, and city urban planning policies.

Summary of Chapter 5.1

This Subchapter 5.1 discusses the justification of the Case study approach taken in this thesis (See fig 22). The practicality, data availability, contextual comprehension, and framework validation were all reasons for justifying the framework.

Also, the selection criteria for a case study were its relevance to BIM, Feasibility and accessibility, availability of data, and marketing objectives.

5.2 Babel Building Case Study

After reviewing the criteria for a good case study for this thesis objectives (see chapter 5.1.1). The Case study for the Micro and Macro of this Thesis is the Babel Building GmbH located at Andreasstraße 72, Berlin.



Figure 25: Babel Building Exterior (Source: The Author)

The above Babel building is tall, with six floors and a basement. The basement has a cafeteria and a car parking space. The building has an exterior façade of red bricks facing the road (see fig 25) under heritage protection and a white-painted stone wall in the inner courtyard. The floor area of the building is a total of 2572 square meters.

5.2.1 Interview Result

The interview was conducted between two individuals, one representative (2) from the Babel building and the author of this Thesis. The conversation began with the representative asking about the duration of Babel's occupancy in the building. The individual responded that Babel had opened the building in April 2021. The move to the new building was necessitated by the growth of the company and the need for a larger office space.

When asked about marketing the current building, the individual explained that the goal was to attract learners and other customers. Babel is a purpose-driven company that aims to create mutual understanding through language. They aim to utilize all possible channels to achieve this, including their app and the physical space of the building itself.

The individual further elaborated on their plans for the building. They expressed an interest in inviting individuals, startups, and smaller companies working in areas similar to Babel to work close to them. The idea behind this is to foster a fruitful exchange of ideas about learning, languages, and cultural exchange. This would benefit Babel and the other parties involved, creating a vibrant and collaborative environment.

Regarding leasing, the individual mentioned that the lease period for these spaces is long-term. However, they also emphasized that they do not want to limit themselves when it comes to expanding again or changing the setup. Therefore, the lease can be renewed annually, providing flexibility for both Babel and the leasees.

The building itself has several features that they believe would attract people. There is a co-working space and an event space that could potentially be highlighted in their marketing efforts. The reception area is very open and welcoming, which they believe should attract people and create a positive first impression.

However, despite these plans and features, the individual admitted that there is currently no specific strategy for attracting people interested in learning about language and different cultures offline in the building. They also stated that it is hard to predict future developments or changes in strategy at this point as they don't have a specific strategy in place right now.

Towards the end of the interview, the representative acknowledged that this was only the first half of the conversation, suggesting that more insights and information might be gleaned from the rest of the interview.

This summary provides a comprehensive overview of the interview, highlighting Babbel's plans for the building, their approach to leasing, and their overall mission and goals. The full Transcribed interview is provided in the Appendix of this Thesis.

5.2.2 Babbel Building BIM Model

The BIM model for the Babbel Building was created using Revit 2024, which is a software in the BIM modelling software in the Autodesk environment. The plans which were gotten from Babbel GmbH were AutoCAD dwg files. These files were imported into Revit as a guideline for developing the model.

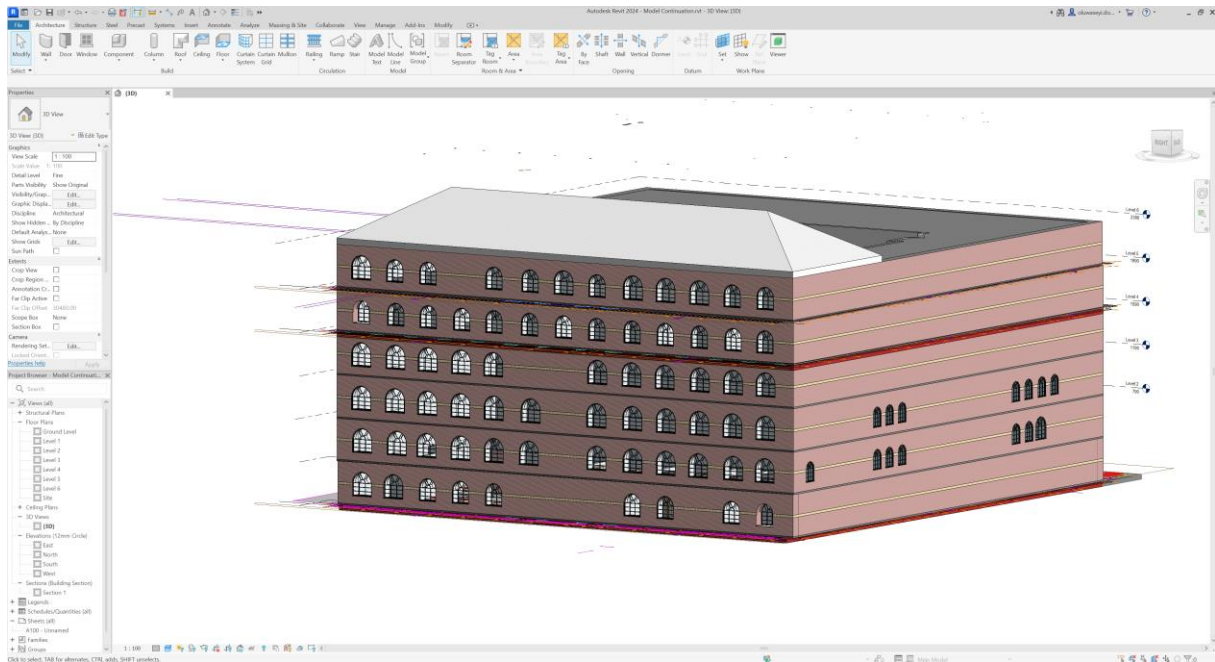


Figure 26: Babbel Building BIM Model (Source: The Author)

The BIM model was created at LoD of 4. Due to the function of Revit as a BIM authoring tool, it is possible to add the information needed for the marketing of the Building to fulfil the objectives of the framework.

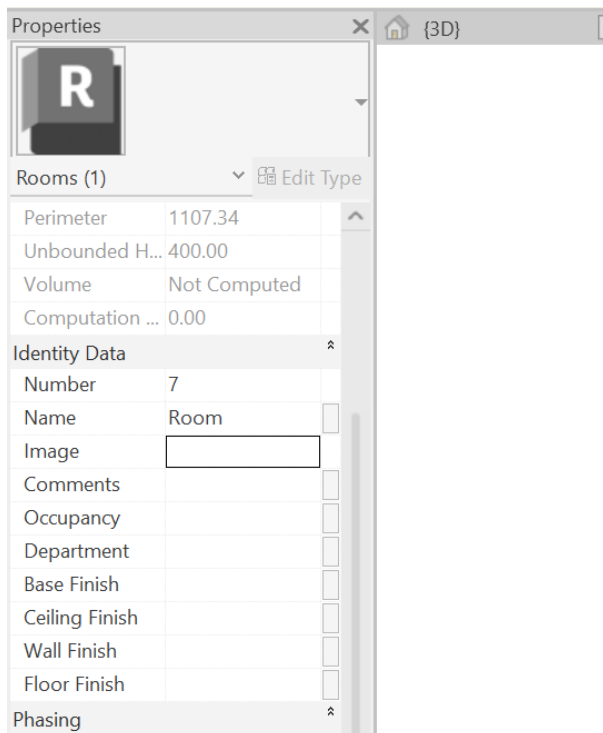


Figure 27: Information dialog box in Revit (Source: The Author)

The BIM model developed for this thesis necessitated a meticulous level of specificity, particularly with respect to the areas designated for rent on the fourth floor, the event

hall on the ground floor, and the research area on the first floor for attracting residents and visitors. In order to achieve the research objective, it was necessary to incorporate a substantial amount of spatial data into the BIM model.

The data provided comprises the names of each room, its dimensions, and the surface materials utilised for its walls, floors, and ceilings. Detailed information enables prospective tenants to make more informed decisions regarding selecting a space that is most appropriate for their requirements based on a comprehensive comprehension of the layout and characteristics of each room.

Lastly, Rendered images of each space, accompanied by fundamental room details, could be presented to clients through the BIM model to showcase potential design concepts. Images can potentially serve as a potent aid in facilitating clients' ability to envision the room's fully furnished and decorated state.

Summary of Chapter 5.2

This subchapter discussed the Babbel Case study in length, highlighting the interview results with the Babbel representative, which showed the marketing objectives of Babbel GmbH.

This subchapter also discusses the creation of the Babbel building BIM model following the framework defined in chapter 4 of this thesis.

5.3 Friedrichshain District

The Friedrichshain district, located east of Center Berlin, is an urban district with a land area of 9.78 square kilometres. Mitte, Prenzlauer Berg, Kreuzberg and Lichtenberg surround Friedrichshain. Friedrichshain was first developed as a wealthy working-class district when Greater Berlin was established. Friedrichshain was heavily damaged during the second world war (*Prenzlauer Berg and Friedrichshain Area Guide | CuddlyNest, n.d.*)

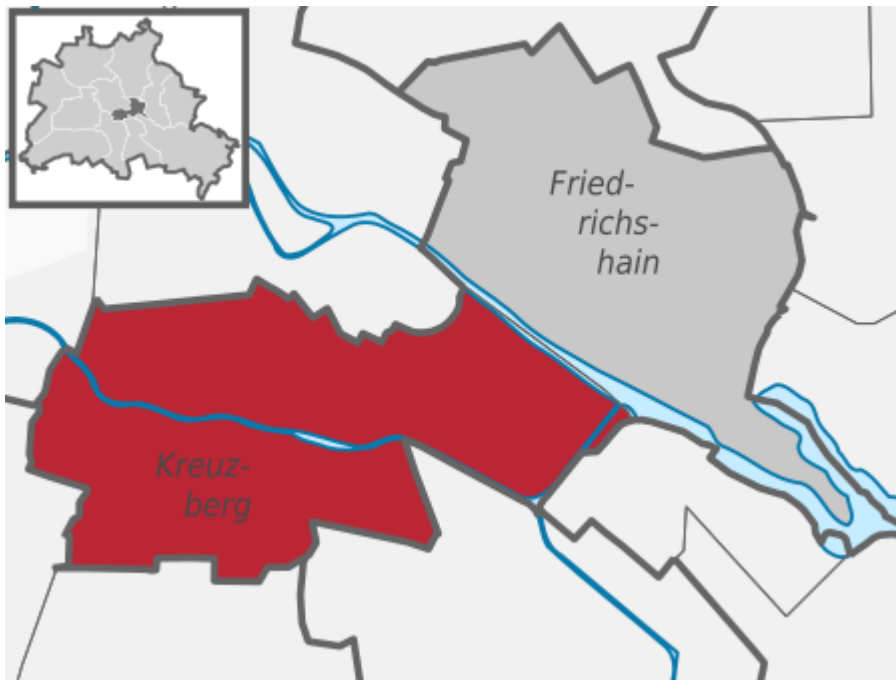


Figure 28: Friedrichshain District (Source: The Author)

The map above shows the location of Friedrichshain amongst other districts. It also shows how the river Spree bounds the district on the south, separating it from Kreuzberg. The Spree River is a significant waterway in Berlin and a popular tourist attraction. Recreational activities like boat tours, kayaking, and swimming can be enjoyed along the river. Economy

5.3.1 Socio/Economic Characteristics of Friedrichshain

Friedrichshain, located in a diverse city such as Berlin, also reflects its diversity. However, it is a more diverse district in an already diverse city. Friedrichshain is also Berlin's smallest and most densely populated district, with a population density of 13,389 inhabitants per square kilometre (Ewert & Evers, n.d.). Being close to the centre of Berlin, Friedrichshain shares characteristics with East and West Berlin. Friedrichshain as a district has a relatively high number of poor people, with 22 per cent of its inhabitants dependent on at least one form of social assistance.

Another critical factor is the age distribution in Friedrichshain, as the age demography of a place can also give a visual impression of the place. The district of Friedrichshain has a vibrant street life with a predominantly youthful population. This suggests a

reversal of demographic trends compared to the general aging of the German population (Ewert & Evers, n.d.).

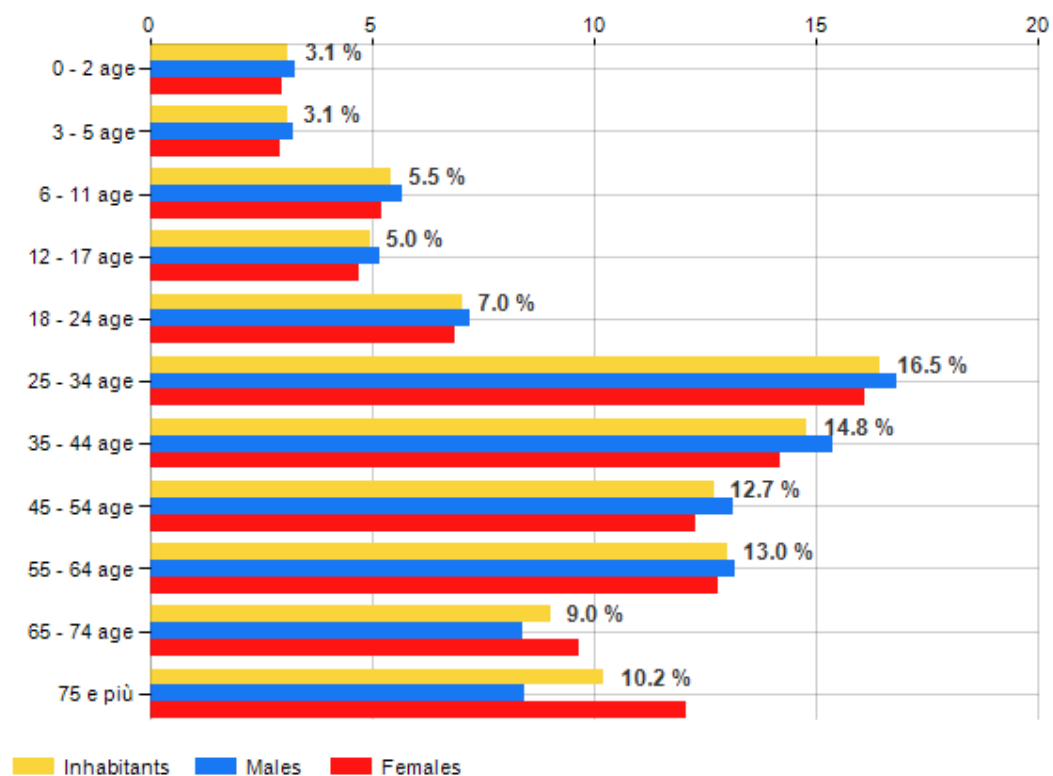


Figure 29: Age Classes by Gender Source (*Age Classes by GenderMunicipality of BERLIN-FRIEDRICHSHAIN-KREUZBERG, Old-Age Index and Average Age of Residents, n.d.*)

The above figure shows the population distribution with respect to age and gender. The histogram shows a high population of people within the range of 25 to 34. Friedrichshain is a vibrant district fitting as most of its population are in their youth. The district is renowned for its exuberant culture, and this palpable vibrancy can be attributed to the overwhelming presence of young individuals. Consequently, it is plausible to deduce that the population's demographic composition plays a pivotal role in determining the district's identity.

Another critical factor is the financial status of the residents of Friedrichshain, as it is primarily known that the level of economic standard in a place of living is linked mainly to the number of vices that can be found there,

Gesundheits- und Sozialstrukturatlas: Trend Gesundheits- und Sozialindex 2022 (GESix Trend)

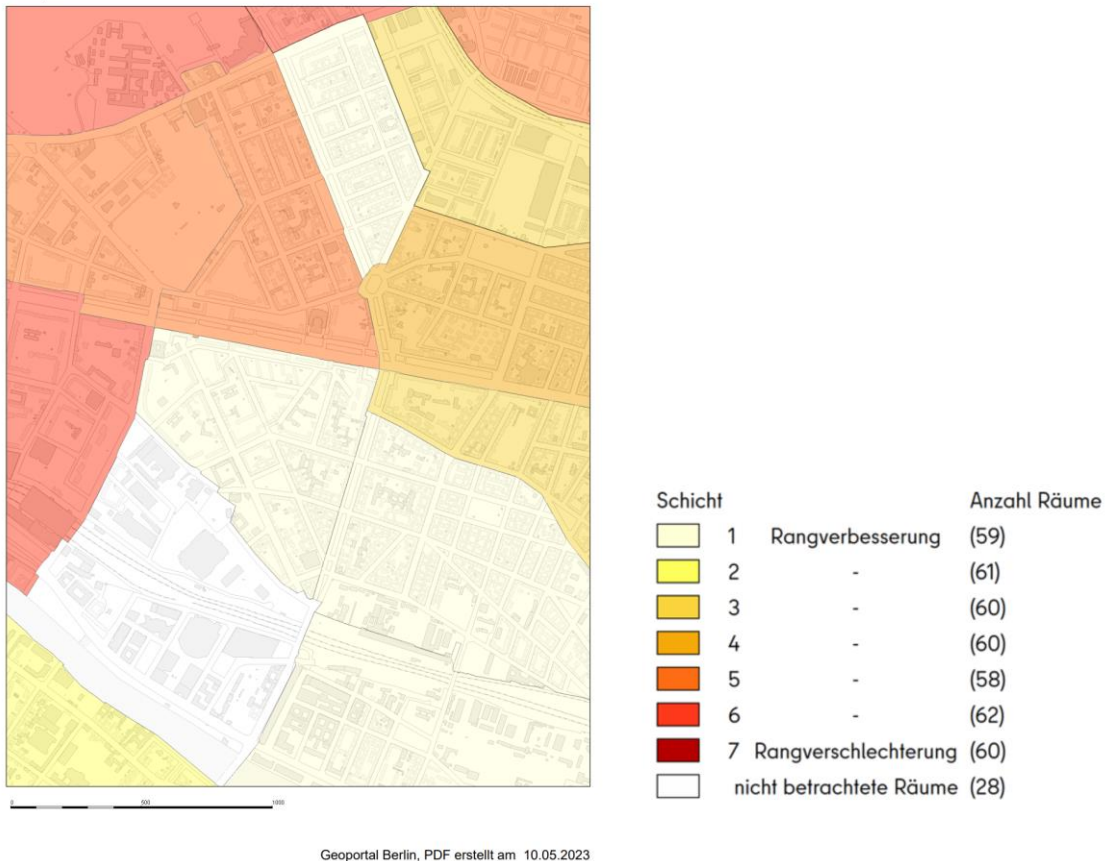


Figure 30: Health and Social Structure of Friedrichshain (source: FIS-Broker, 2023)

The image above shows the Health and Social Structure improvements which can be identified in the study area. With Rank one showing the area with the most improvement, this goes downwards to Rank Seven, showing the area with the slightest improvement.

5.3.2 Design

Due to the history of Berlin, there is a distinct difference in the architecture of East and West Berlin. Friedrichshain falls under East Berlin and has similar architecture. The Architecture of east Berlin is similar to Russian socialist architecture imposing high-rise buildings. Florian examines the architecture and urban design of East Berlin in his book, and he argues that East Berlin architecture combined a modernist, socialist agenda and historical norms (Urban, 2009). This style that combines these two

architectures is referred to as the neo-historical and can be seen in various buildings around Friedrichshain.

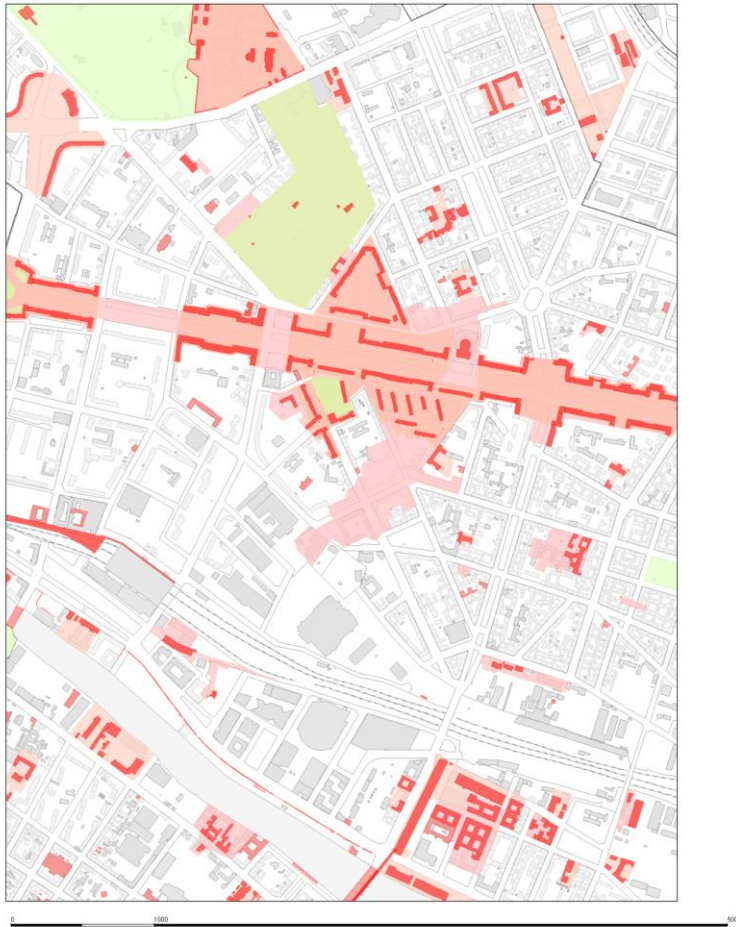
Overall, Friedrichshain architecture emerged as a result of political movements that occurred during the era of the German Democratic Republic (GDR), which its planners and Architects shaped at that time. Its design and planning were heavily influenced by socialist architecture, which hoped to create a built environment reflecting values of equality, community and progress. The Planners and architects for Friedrichshain were tasked with creating an urban landscape that reflected this aspiration.

The architects and planners largely incorporated communal spaces into buildings and public spaces, as equality and community were crucial in the socialist agenda. The large courtyards and open spaces were created to encourage social interaction among different people creating a form of community building.

5.2.3 Landmarks

The landmarks and attractions of Friedrichshain have a significant impact on its image, economy, and culture. They include landmarks, amusement parks, and places of architectural, religious, and historical significance. Tourism is one of the most productive sectors of the global economy, generating trade, business, and job opportunities. A city's attractions affect the type of tourism it attracts, and the activities performed in these places become part of the city's image. Therefore, cities need to develop and maintain unique and exciting tourist attractions to enhance their image and reputation as tourist destinations.

Biotoptypen: Gesetzlich geschützte Biotope (Umweltatlas)



Geportal Berlin, PDF erstellt am 10.05.2023

Figure 31: Protected areas in Friedrichshain (source: FIS-Broker, 2023)

The map depicted above, sourced from the Fachübergreifendes Informations System (FIS Broker) and the Berlin Denkmalkarte, illustrates the protected areas and sites of historical value in the Friedrichshain district. These sites include locations of significant cultural or historical importance, individual buildings designated as monuments, and garden monuments. The map highlights the abundance of landmarks in the Friedrichshain district, indicating its rich cultural and historical heritage.

The inclusion of protected areas and historical sites on the Berlin Denkmalkarte is a testament to the significance of Friedrichshain in the broader context of Berlin's history and cultural identity. The map demonstrates that the district is a thriving urban centre and a repository of significant cultural and historical artefacts contributing to Berlin's diverse cultural landscape. It also showcases the importance of preserving these sites for future generations to maintain the district's unique identity and history. A few of the

more prominent Landmarks in Friedrichshain are the East Side Gallery and the Wall Museum, the Mercedes Benz Arena and The Oberbaum Bridge.

The Mercedes Benz Arena is located on the south side of Friedrichshain. Its construction started on the 13th of September 2006, and it was opened in September 2008 with a total construction time of 728 days. It has a construction cost of 165 million euros, and it is believed to be one of the most modern multi-purpose halls in the world. The Area has hosted a list of outstanding musical talents, such as Kanye West, Kanye West and Beyonce. It also hosts sports events such as Basketball and Hockey matches. The Arena is a 17,000-seater with different event and entertainment suites. The Arena has a length, width, and height of 160 metres, 130 metres, and 35 metres, respectively. It has a total area of 60 000 square metres and an Ice hockey rink of 60 metres by 30 metres. It also has eight escalators and eight passenger lifts—the Mercedes Benz Arena on an average of 1.3 million visitors and 130 events annually. The structure is characterised by a LED Façade, half-round glass (105 degrees), 14440 square metres, one of the world's most significant LED instalments (*Facts | Mercedes-Benz Arena Berlin*, n.d.). Overall, the Mercedes Benz Arena is a remarkable achievement of modern architecture and engineering, and it continues to attract visitors and host events that leave a lasting impression on everyone who experiences them.

The most prominent site in Friedrichshain is the wall museum at the Eastside Gallery. The Wall Museum is located at Muhlenstr. 78-80, close to the River Spree, is an exciting and thrilling exhibition that covers the history of the Wall through the cold war and the victims of the Wall. The Exhibition covers the most dramatic period in Berlin's history, from the construction to the wall's fall. The Museum has 13 rooms in which the history of Berlin under the German Democratic Republic and the Cold War. Original exhibits and unique contributions by Mikhail Gorbachev or Leonardo DiCaprio make the exhibition come alive uniquely (*The Wall Museum - East Side Gallery - Berlin*, n.d.). The Museum is open 365 days of a year, and it attracts people from all over the country and Europe wanting to learn about the history of the berlin wall. Tourists come in as individuals, school groups or tourist groups. It has an affordable ticket price of 5 Euro as at the time of writing this thesis. In conclusion, the Wall Museum at the East-side Gallery in Friedrichshain is an exciting and educational exhibition covering the Berlin Wall's history and the Cold War era, making it an essential destination for those interested in learning about Berlin's history.

Another interesting Landmark is the Oberbaum Bridge, this bridge connects Freidrichshain and Kreuzberg districts, and it is considered by many to be the most beautiful bridge in Berlin and one of the most beautiful in Germany. The bridge is historically significant as it was home to the Oberbaum, where customs duties were collected (*Oberbaum Bridge – Berlin.De*, n.d.). This served as a representation of the distinction between East and West Germany during the Cold Ward. It was recorded that armed guards patrolled the area and was the cross-over checkpoint between East and West Berlin. The Oberbaum Bridge serves as a crossing for both pedestrians and vehicles, including Berlin's oldest subway line. The subway train tracks are supported by a decorated architectural structure that resembles a castle from the Mark Brandenburg region. This structure is adorned with medieval-looking ornaments, adding to the bridge's unique and visually striking appearance.

Additionally, pedestrians use the walkway beneath the roadway for safe passage (*Oberbaum Bridge – Berlin.De*, n.d.). The bridge's unique and visually striking appearance is attributed to the decorated architectural structure that supports Berlin's oldest subway line, which resembles a castle from the Mark Brandenburg region. Pedestrians can also use the walkway underneath the roadway for safe passage. The Oberbaum Bridge remains an important landmark that attracts both locals and tourists to marvel at its beauty and rich history.

5.3.4 City Information Model of Friedrichshain

As part of this master's thesis, a comprehensive CIM (City Information Modelling) model of Friedrichshain was needed. A meticulous selection process led to utilising the Berlin 3D-Downloadportal as the primary data source, given the numerous options available to obtain a representation of Friedrichshain. Notably, the 3D model in question was developed and refined from 2007 to 2018, culminating in the creation of a detailed LoD2 (Level of Detail 2) model for immersive three-dimensional presentations. Also, in 2019 a 3D Model mesh was created using a survey flight (*Berlin 3D - Downloadportal*, n.d.).

Researchers could download either a LoD2 model, which provided a solid foundation for analysis, or a mesh model, which was highly representative and similar to a sophisticated LoD3 (Level of Detail 3) model, by accessing the Berlin 3D-Downloadportal.

Using this 3D Model, researchers could examine Friedrichshain's urban landscape in greater depth and scrutinize the district's intricate spatial and architectural characteristics.

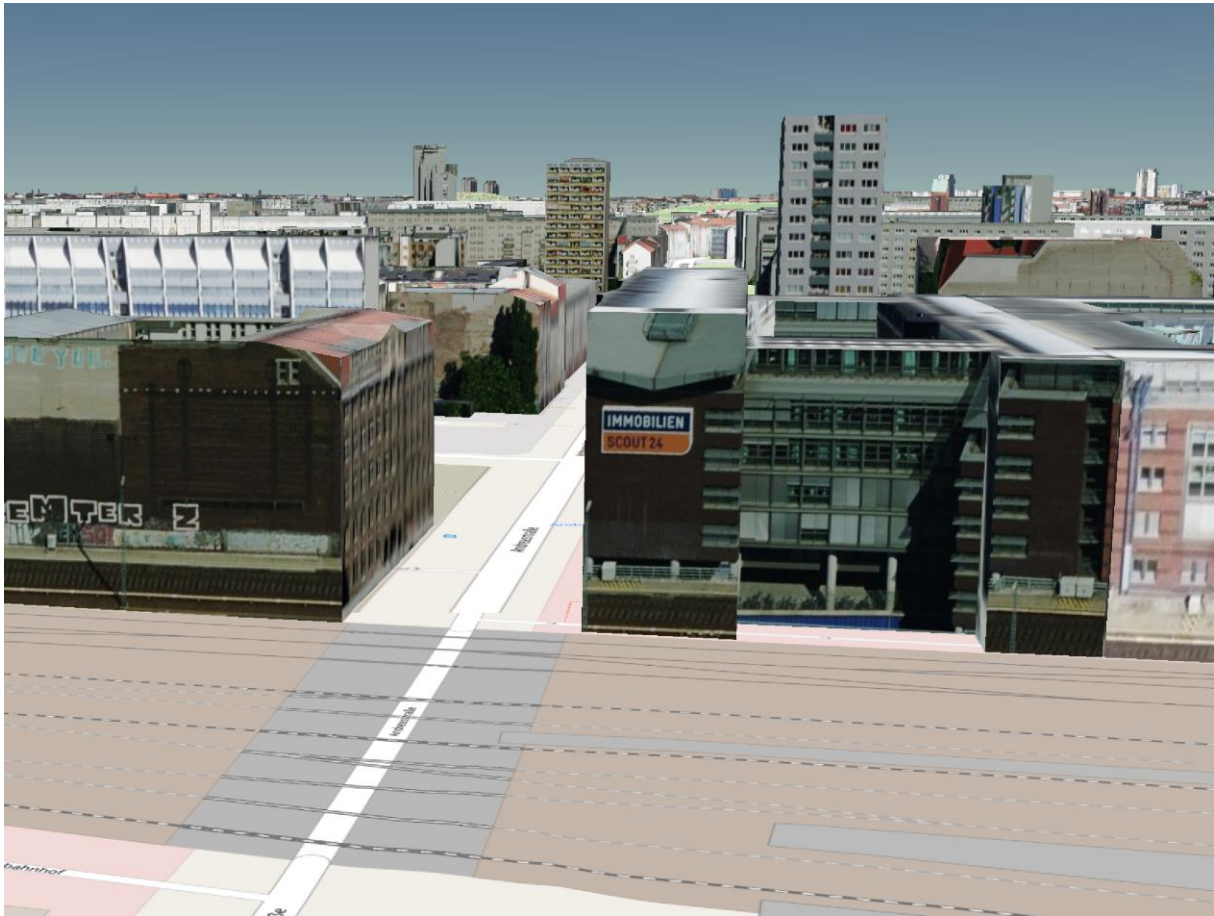


Figure 32: A view of Friedrichshain's CIM Model (Source: The Author)

The image above shows Berlin's 3D Download portal, LoD2. The buildings are represented in a simplified form with distinct roof structures, facades, and building form. The level of detail is shown in basic texture, representing the colours, materials, and architectural features such as windows, doors, and other openings. While not as detailed as higher-level models, it is sufficient to distinguish the buildings from each other. The Model also incorporated a building footprint which depicts the shape and area of the building.

For this thesis, the author downloaded the region of Friedrichshain after multiple trials and errors. Contrary to the initial perception from the start of writing the thesis, the most flexible download format for ArcGIS CityEngine was Keyhole Markup Language (KMZ).

The KMZ for the region of Friedrichshain was downloaded and imported directly into CityEngine. The BIM Model of the Babel building in its IFC format was imported and then used to replace the previous KMZ Babel building from the Berlin 3D portal.

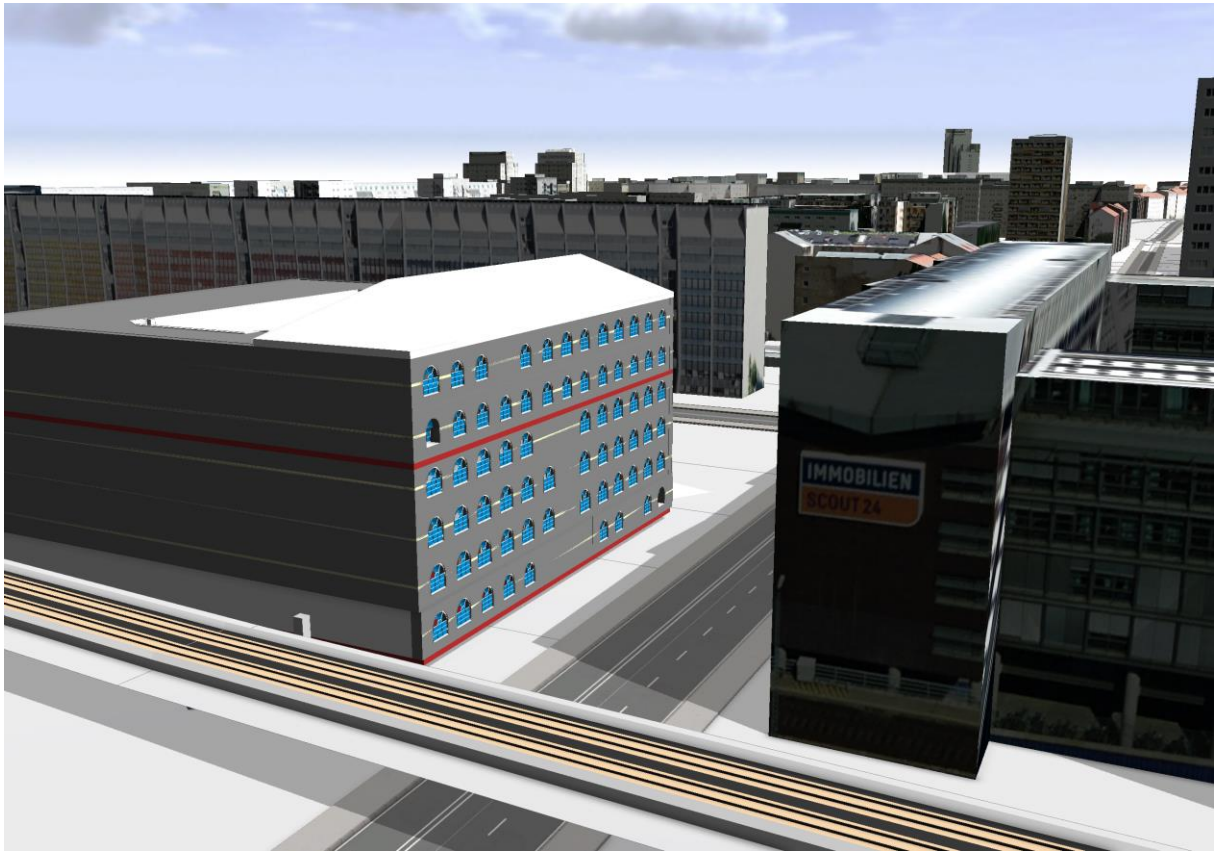


Figure 33: A view with Friedrichshain CIM Model with the Babel BIM building (Source: The Author)

This image shows how the imported Babel building has been seamlessly integrated into CityEngine. The Babel building has a Level of Detail (LoD) of 4, demonstrating intricate architectural details and accurate scale. While the surrounding environment has a LoD of 2, ensuring that both have a harmonious relationship. The roads were improved compared to what was initially gotten from the 3D Berlin Portal through the make road function of the CityEngine software.

Summary of Chapter 5.3

This chapter discusses the district of Friedrichshain, its socio-economic characteristics, design, landmarks, and the creation of the CIM model. The model was obtained from Berlin 3D download portal and put into CityEngine, after which it was edited to suit the purpose of the thesis.

5.4 Framework Validation

The Babel Building will be used as a case study for validating the framework proposed in this thesis. The validation process aims to determine whether the framework effectively achieves the goal of generating Building Information Models (BIM) and City Information Models (CIM) that meet Babel GmbH's specific requirements. The framework will be applied to develop Babel's BIM/CIM model, following its prescribed steps and methodologies. The validation process includes an evaluation of the framework's success in addressing Babel's goals and objectives. This assessment will involve analyzing various aspects, including the accuracy and completeness of the model, its ability to capture the intricacies of the Babel Building, and its compatibility with Babel's specific requirements.

In order to assess the practicality and efficacy of the proposed framework, the validation process is crucial. In addition, it provides a means of objectively evaluating the framework's strengths, limitations, and areas for improvement. Moreover, the findings from this validation exercise will provide valuable insights into future endeavors in BIM/CIM modelling for similar projects and contribute to the refinement of the framework. By examining the framework's output against predetermined criteria, an assessment will be made to determine the extent to which the goals of Babel GmbH are met.

By employing a rigorous and systematic approach to validate the framework, this thesis aims to provide a comprehensive assessment of its applicability and suitability for meeting the specific goals of Babel GmbH. The results of this validation process will inform critical decisions regarding the adoption and implementation of the framework, ensuring its alignment with Babel's objectives and enhancing the overall success of BIM/CIM modelling efforts.

The validation of the proposed framework will be conducted through a meticulous, stage-by-stage approach, ensuring that each framework component is thoroughly examined and assessed. This systematic process is crucial in maintaining the integrity of the validation process and ensuring that the results are reliable and meaningful.

The validation process will be carried out from the building owner's perspective, Babel GmbH. This perspective is essential as it aligns the validation process with the real-world context in which the framework is intended to be applied. By adopting the building owner's viewpoint, the validation process can better assess the framework's

practicality, relevance, and effectiveness in addressing the specific needs and objectives of Babbel GmbH.

Upon completion of the validation process, the results will be evaluated against the objectives of Babbel GmbH. This evaluation will assess whether the framework meets the building owner's needs and how well it aligns with their strategic goals and operational realities. This alignment is critical in ensuring the framework is theoretically sound, practically applicable, and beneficial to Babbel GmbH.

Moreover, the evaluation will also consider the potential impact of the framework on the broader context of real estate marketing and city marketing. By assessing the framework's potential contributions to these fields, the evaluation can provide insights into the broader implications and value of the research.

The validation and evaluation process will be a comprehensive, systematic, and contextually grounded examination of the proposed framework. This process will ensure the framework is validated in theory and evaluated in practice, providing a robust and meaningful assessment of its value and effectiveness.

Identifying Target Groups

The initial phase of the validation process involves identifying the target groups. These groups represent the potential lessees of the fourth floor of the Babbel building. Understanding the needs and preferences of these target groups is crucial as it informs the subsequent steps of the framework and ensures that the marketing strategy aligns with the interests of the potential lessees.

Identifying the target groups was achieved through an interview with the representative of Babbel GmbH. This interview provided valuable insights into the types of organizations that Babbel GmbH envisages as potential lessees for the fourth floor of their building. The representative indicated that smaller startups and firms seeking short-term leasing agreements, visitors, and Residents are the primary target groups of Babbel GmbH.

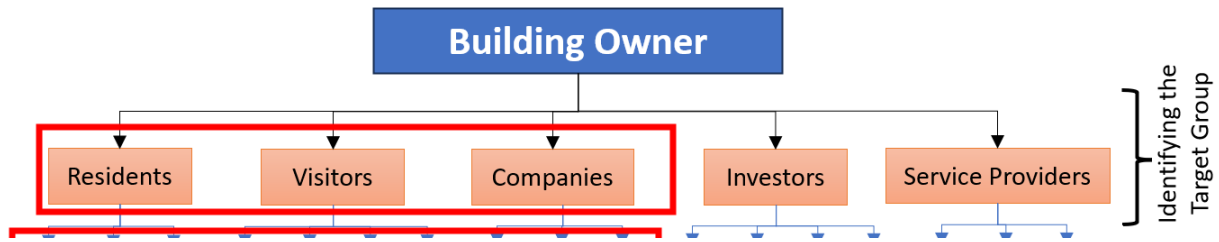


Figure 34: Framework Target Groups (Source: The Author)

The Targeted Groups highlighted by the Babbel Representative can directly be applied to the Framework. Upon applying the framework to this information, it was determined that the 'Residents,' 'Visitors,' and 'Companies' target groups best fit the profile described by the Babbel GmbH representative. This target group, as defined in the framework, encompasses organizations that are in the early stages of their development and are seeking flexible leasing arrangements, Tourists/Visitors who want to engage in the German culture as a means to attract more customers and Residents of Berlin wanting to learn different languages. This aligns well with the description provided by the Babbel GmbH representative, validating the framework's effectiveness in identifying appropriate target groups.

Identifying the Information Required

The Next step is the Identification of the information required. According to the framework, this stage is more built on the Literature review that the author carried out. With the Identified Target groups, it is possible, with the aid of the framework, to determine the required information.

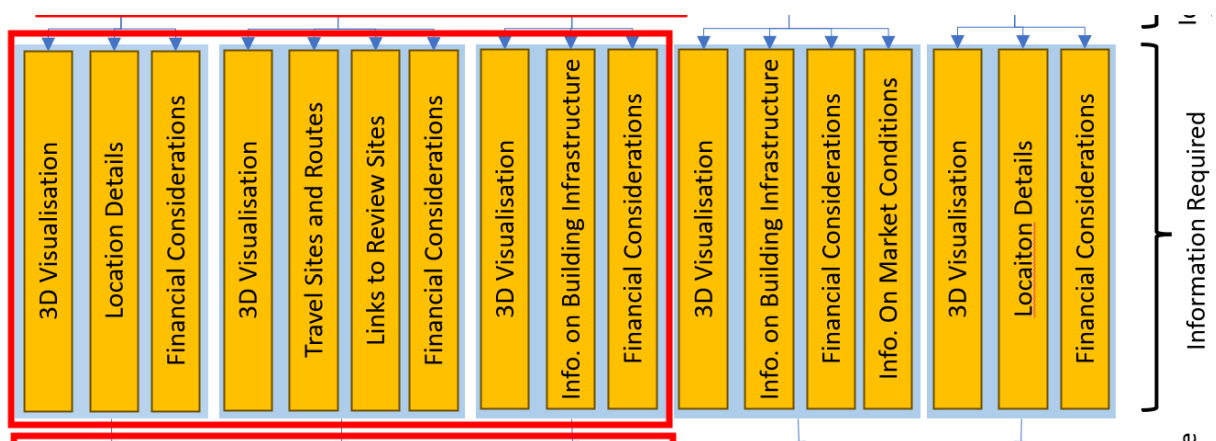


Figure 35: Framework Information Required (Source: The Author)

Seeing as the Target groups identified are Residents, Visitors, and Companies. The information required for the Babbel Model will be a combination of the Target groups,

Residents, Visitors, and Companies. Hence, the model included the following information; 3D visualisation of essential features to be highlighted in the Model, Information on location and routes to the Building from Prominent locations, Links to the Babel Website, Financial Considerations, and building plans and infrastructure. The required information regarding the Financial considerations, building Infrastructure, and website Links are included in the form of metadata in the BIM model, which will later be exported to the CityEngine application as IFC metadata. The information on locations and routes will be generated in CityEngine.

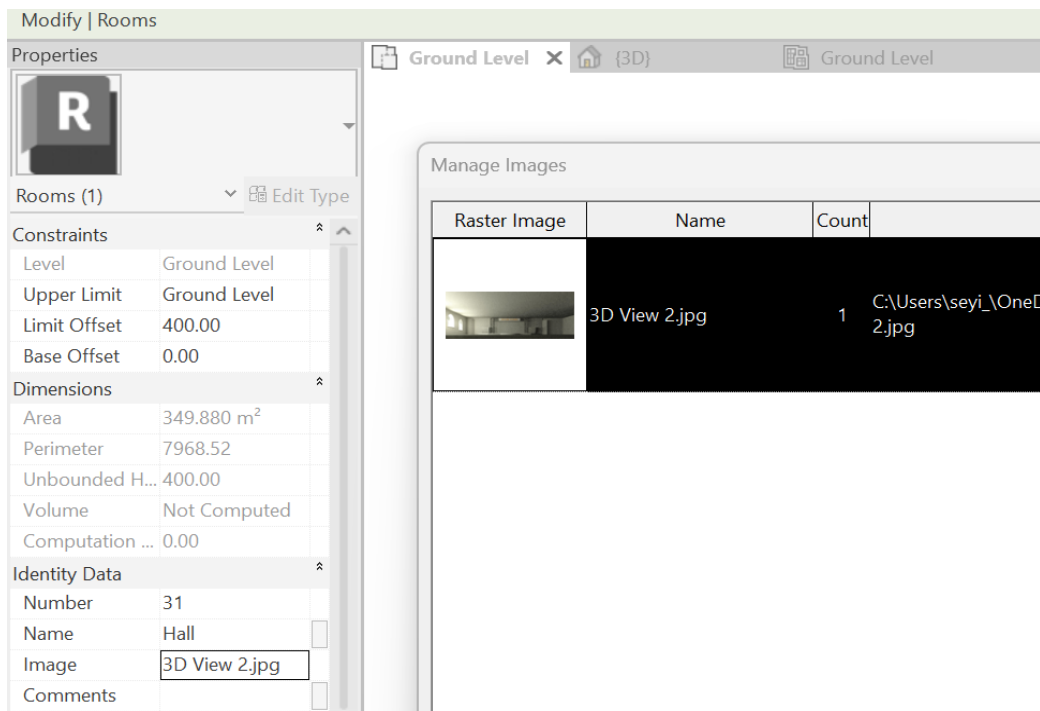


Figure 36: Render of the Event Hall Added to the Model (source: The Author)

The Image above shows a render of the Event Hall being added to the BIM Model as metadata. One of the significant areas to be highlighted and showcased as a selling point in the BIM model. This information will be transferred into CityEngine with the IFC file creating a CIM Model with the appropriate and necessary information.

Determining The Level of Detail

After the required model and information have been identified, the next step in the framework is to determine the required level of detail. The model must highlight the required information for residents, visitors, and companies. Since the Marketing objectives of Babel GmbH are cut across three different target groups, the chosen LoD would be from the minimum among the three for both the BIM and CIM model.

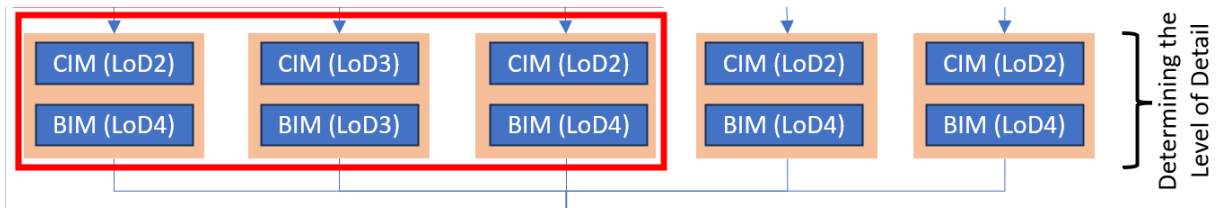


Figure 37: Framework's Level of Detail (Source: The Author)

Accordingly to the literature review and the details gathered, and after considering the market objectives of the Babbel building and who their target is the required level of detail is LOD 4 for the BIM model and LOD 3 for the CIM model. Focus to be put on the Building itself as it is the main highlight of the building, hence, the need for a high Level of Detail.

Major Findings and Implications

This chapter discussed the case study, the interview with the Babbel Representative, and the BIM and CIM Model created for the case study. The framework was created by reviewing the Literature review of this thesis. The objective of Babbel GmgH was obtained from the interview and the framework process was followed in creating the Model which will best achieve the wans of Babbel GmbH.

The Validation of the framework using the Babbel Case study provided critical insights to the frameworks effectiveness in generating an integrated BIM and CIM model for the purpose of marketing. The results of this validation process will inform decisions regarding the adoption and implementation of the framework, ensuring its alignment with Babbel's objectives and enhancing the overall success of BIM/CIM modelling efforts.

6 Findings and Discussions

This chapter will assess the Framework created and highlight the challenges faced, stating its limitations and applicability. This chapter will also give the implication of the findings, the possible way forward, and recommendations for future Findings.

6.1 Discussion

Following the framework created, it was possible to create a Model that suits the uses of Babbel GmbH. It fulfills the objectives of creating a model for attracting companies looking for short-term stays.

The question of how well the framework meets its purpose will have to be answered over time, but arguments can be made that it has fulfilled its objectives to a certain extent. The framework was created and then validated using the Case study. As a model was created while following the framework, it was possible to result in a model with the necessary Information for all the target groups of Babbel GmbH while being in a visual format that is the most attractive to their prospective customers.

The Framework utilises some aspects of traditional Marketing tools and follows the same principles of Marketing. The Marketing principles of Market research setting goals and objectives, preparing the property for sale, negotiating and closing the sale (Joseph, 2014) are not dissimilar to the framework proposed by the author.

Traditional Process	Framework
Market Research	Identifying Target Groups
	Identifying Information required
setting goals and objectives	Level of Detail Required
preparing the property for sale	Putting the Model on the Required Platform
negotiation and closing the sale	negotiation and closing the sale

Table 3: Comparing Traditional Process with Developed Framework (Source: The Author)

In the conventional realm of real estate marketing, the initial phase involves comprehensive market research. This stage is dedicated to the identification of potential clientele and the collection of pertinent information about them. It is a process akin to

investigative work, requiring the meticulous gathering of data and the construction of a detailed profile of the target demographic. This stage parallels the Identifying the Target groups and Information required as both procedures necessitate a thorough understanding of the market landscape and the systematic organization of the accumulated information.

After this, the establishment of goals and objectives takes place. This phase involves formulating a strategic direction for marketing efforts, predicated on insights from the initial market research. It can be likened to charting a course on a map. In the context of the Framework, this stage corresponds to Identifying the required model, the level of detail, and identifying the software and File formats.

The property is prepared for sale in the traditional marketing process upon setting these goals. This could encompass a range of activities, from staging the property to enhance its appeal to commissioning professional photographs or crafting compelling property descriptions. In the Framework context, this stage corresponds to making the model accessible on a variety of platforms, such as websites and mobile applications. In both instances, the product, whether a physical property or a digital model, is presented in the most attractive manner possible to attract potential buyers or users.

6.2 Limitation of Framework

While going through the framework process, some possible improvements were noticed.

Firstly, the framework relies on specific software applications, Revit and CityEngine, for creating the models. This could limit the applicability of the Framework if the software are unavailable or the intended user lacks the necessary skills. This is also a challenge as the Framework only explores the interoperability of the file formats between KMZ, IFC, and the native CityEngine and Revit file formats. If other systems or software applications are not compatible with this file format, it can also pose a challenge and limit the usability of the File format.

The Framework also requires specific information about the Target groups and the property. If this information is unavailable, it could pose a challenge and limit the framework's effectiveness.

Another challenge that could be faced is the complexity of the models. The author built on already available City Models with a specific level of detail. If the framework is to be applied in places without such models, it could be complex and time-consuming to create such models from scratch.

The framework also requires specialised skills in CityEngine and Revit, which could pose a barrier for individual professionals. Hence, the framework best applies to those with experience in Revit (BIM) and CityEngine (CIM).

Another challenge is the variability in the target groups. The framework may not fully capture the variability within the different target groups. For instance, the possibility of information required by specific target groups can vary based on socio-economic characteristics like income, culture, and lifestyle. The final challenge of the framework was that it was validated from the perspective of the building owner and was not done so from the larger context, such as the city-wide or regional estate marketing context.

These identified limitations present a valuable opportunity for conducting further research and development. Each challenge may pose constraints on the Framework but also route further development. For instance, the challenge of data variability could inspire a more segmented marketing strategy for the specific strategy or create an adaptive framework for different scenarios and objectives.

In conclusion, while the framework has limitations, they brighten the possible and exciting future and research opportunities. The limitations highlight possible areas for improvement and catalyze innovations and improvements, further enhancing the practicability and usability of the framework in different scenarios.

6.3 Recommendations for Future Research

In this subchapter, the author gives exciting recommendations for future research in The application of BIM and CIM in City and Real Estate marketing. They come in the form of Unreal Engine and Virtual Reality.

6.3.1 Virtual Reality (VR)

Virtual reality (VR) technology simulates a realistic environment through an advanced human-computer interface. Participants can move around in the virtual world. They

can view it from different angles, reach it, grab it, and reshape it. In order to make the computer perform a task, there is a little screen of symbols to manipulate nor commands to enter (Zheng et al., 1998). Artificially stimulating our senses causes our bodies to accept an alternative reality. A VR experience can transport us to a magical cartoon world or another part of the Earth or universe, like a dream (Machover & Tice, 2019). As virtual reality deals with the visual sense, which controls much human perception, it is an opportunity for further marketing. Possibilities exist for adopting virtual reality with the framework to create a more realistic fill. Although still young, it is already being adopted in marketing. Companies such as "Program Ace" provide services on virtual reality for real estate marketing creating a more immersive insight, international coverage, and a more rewarding result in the long-run.

6.3.2 Unreal Engine

Unreal Engine, a product of EPIC Games, also poses an opportunity to utilise the model created with the Framework. The Unreal Engine is a game engine popularly known for creating more photorealistic imagery and worlds. The CityEngine software has been compatible with Unreal Engine to create a more realistic-looking world. This would enhance the presentation of the model, making it a more realistic world and giving it a realistic feel as it Unreal Engine also has a function for creating a virtual reality world.

In conclusion, Virtual Reality and Unreal Engine offer a compelling opportunity for further research in the practicability and implementation of the framework, as they both can create a more immersive and realistic environment that the various target groups will find engaging. As these technologies continue to develop and improve, so will their integration with Framework create a more robust user experience, ultimately enhancing the value and impact of the created Model.

Conclusion

This Thesis aimed to develop a framework for integrating BIM and CIM in Real Estate and City Marketing. This aim brought about the Research questions of the thesis. The author sought to identify BIM and CIM software that has the potential to enhance City and Real Estate Marketing, the process and strategies currently applied in City and Real Estate Marketing, and how a framework can be developed to achieve the overarching aim of the thesis.

The author went about answering the research questions with a systematic approach. First came the analysis of the Components of Real Estate and City Marketing, their strategies, and process. This led to identifying key actors involved in this process: Residents, Visitors, Companies, Investors, and Service Providers.

After this, the specifics of BIM and CIM needed to be understood to create a framework properly. Their data formats and level of detail. Furthermore, the processes involved in integrating BIM and CIM had to be discussed.

After all the necessary information had been gathered, the next step was the creation of the Framework. The Framework created was based on the literature review conducted by the Author, highlighting themes throughout. The framework created was a workflow of the Integration of BIM and CIM for Real Estate and City Marketing which was from the identification of Target groups which were the actors identified in the literature review, these target groups have information that is required of them, and this information then determines the level of detail required, the BIM and CIM technology required and required file format.

The Framework was later validated through the use of a Case Study. The case study was selected based on specific criteria: its relevance to BIM, data availability, marketing objectives, and accessibility.

The Case Study chosen was Babbel GmbH, located at Andreasstraße 72, Berlin. The building met all the required criteria (see Chapter 5.1.1). The Framework was then applied in order to fulfil the marketing objectives of the Building Owner/Occupier. The case study demonstrated the applicability of the Framework and how it is possible to create a BIM and CIM integrated model for marketing. It also highlighted the limitations: the variability of target groups, the need for specialised skills to apply the framework,

and its reliance on specific software, which could all be a point for improvement in the future.

Lastly, the author recommended areas for future research, such as Unreal Engine and Virtual Reality, which are exciting new possibilities for research regarding the framework's applicability.

The research fulfilled its objectives in creating a framework for the application of BIM and CIM in Real Estate and City Marketing and, with that, has made a significant contribution to the fields of Real Estate and City Marketing and helping us better understand the potential for BIM and CIM and has opened avenues for future research and practice in these fields.

Declaration of Authorship

I hereby declare that the attached Master's thesis was completed independently and without the prohibited assistance of third parties, and that no sources or assistance were used other than those listed. All passages whose content or wording originates from another publication have been marked as such. Neither this thesis nor any variant of it has previously been submitted to an examining authority or published.

Berlin, 06 July 2023

Location, Date



Signature of the student

Appendix

Appendix A

INTERVIEW WITH BABEL REPRESENTATIVE

2= The Author
1= Babel Representative

• 2

00:00

Yeah, so this is the beginning of the Interview. So, I would like to know first of all, like, how long has Babu occupied the building?

• 1

00:12

And since April 2021 is when we opened it up. And we, yeah.

• 2

00:23

So, from there, were you any reason for the change?

• 1

00:28

To the new building? Yeah, we grew out of our old office. It got too small.

• 2

00:34

So, like, why did you want to, why was the reason you want to market the building currently?

• 1

00:45

The current building? To attract learners, to attract other customers. And we have a purpose. Yeah, we're a purpose-driven company. Our purpose is to create mutual understanding through language. And we want to make sure that we have all the possible channels in place

in order to do this. So, we have our app, but we also want to attract people that would like to learn something about language, about different cultures offline in our building. Do you have any current strategy for that? No.

• 2

01:31

Okay, so that's, you've already described that you are looking for customers,

• 2

01:35

offline customers, which was going to be the next question.

• 2

01:38

Yeah, and, um, well, I heard that, like, you also wanted, like, market the fourth-floor space for the office space for, like, um, your startup.

• 1

01:50

Exactly. So, we would like to invite individuals or start-ups, smaller companies who are working in maybe a similar area than Babel, the opportunity to work very close to us and have a fruitful exchange about learning, about languages, about culture exchange.

• 2

02:31

So, like the lease period, short or long time?

• 1

02:40

It's long time least, yeah.

• 2

02:42

I'm talking about the...

• 1

02:44

The co-working?

• 2

02:45

Yeah, co-working.

• 1

02:46

Nothing more than a year because we don't want to limit ourselves when it comes to expanding again or changing setup. Of course, with the option to renew every year.

• 2

03:02

have like any setting point you want to highlight for people to come in? So of course the new area that we're building, the co-working space and that

• 1

03:14

we also have an event space that potentially could be highlighted, and we have generally our reception area that's very open and welcoming, so that also is something that maybe should attract people or we would like to market more than the rest of the building. Do you see any changes concerning, for example,

• 2

03:49

would there be a need to maybe market another side of the building?
Are there any kind of developments you see in the future in terms of
like okay maybe you have a different strategy, or you feel that like the
current flow is what is going to be

- 1

04:11

in the future? That's really hard to tell right because we don't have a
strategy right now so I can't really tell you about the possible strategy
in the future. right now, so I can't really tell you about the possible
strategy in the future.

- 2

04:21

Okay.

.....

Appendix B

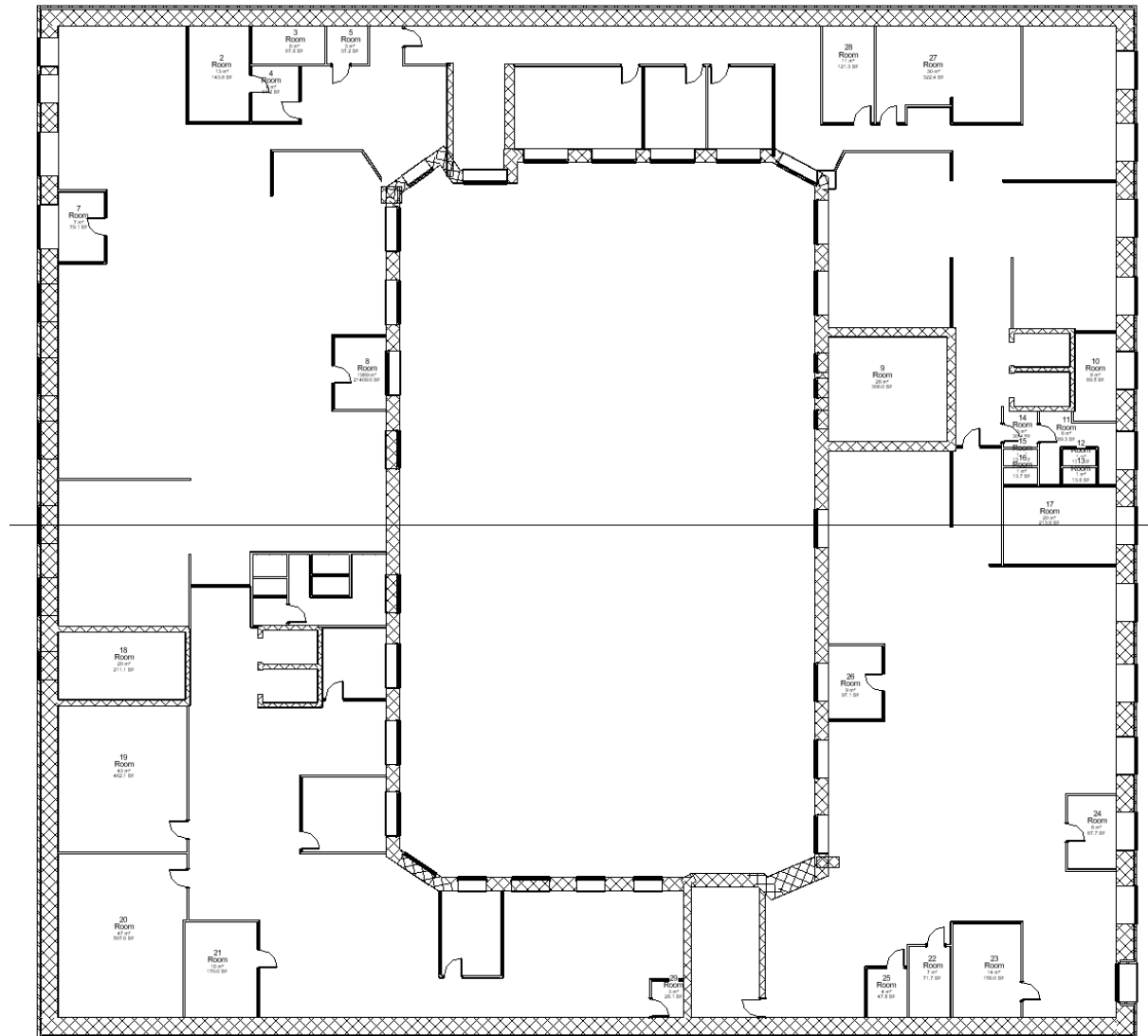


Figure 38: Fourth Floor Plan of Babel Building

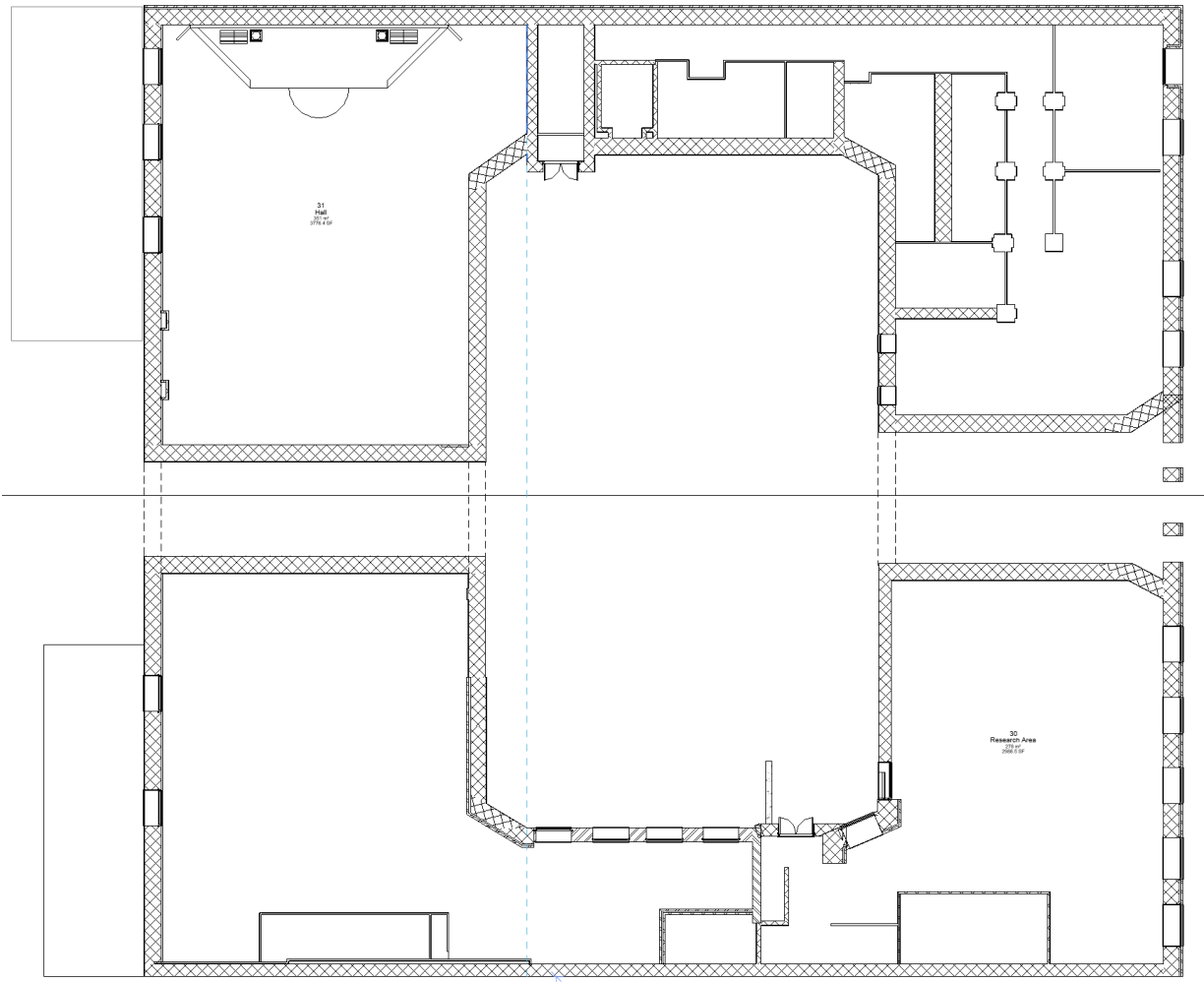


Figure 39: First floor Plan of Babel Building

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