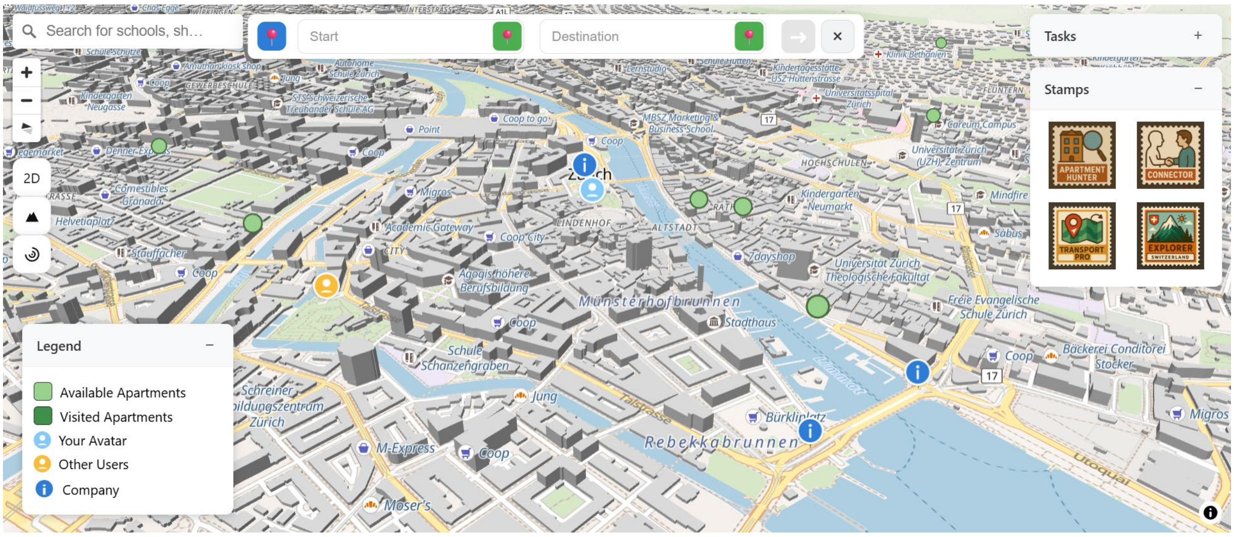
University of Applied Sciences and Arts Northwestern Switzerland
School of Computer Science

SwissPlatz
Reliable. Every Step.

Interactive 3D Map of Relocation Process

IP5-Report



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Abstract

Relocating to a new city can be frustrating and overwhelming, especially for foreigners who are unfamiliar with local structures, neighbourhoods, and services. Many existing relocation platforms focus primarily on information delivery and lack interactive or exploratory elements that support spatial understanding and engagement. This project explores how an interactive 3D map can support the early stages of relocation by improving spatial understanding, engagement, and user experience.

The project involved design, implementation, and evaluation of a web-based relocation platform that combines a 3D city map with avatars and light gamification elements. The platform allows users to explore neighbourhoods, search for available apartments, interact with companies, that are represented as non-player characters (NPCs), and complete simple tasks to encourage exploration while keeping them motivated. The design process was supported by user research, sketches, storyboards, user flows, and low-fidelity prototyping.

A functional prototype was implemented using modern web technologies and open-source mapping libraries. The platform was evaluated through usability testing, in which participants completed relocation-related tasks using Google search, a 2D map version and the 3D map version.

The results indicate that the 3D map supports spatial understanding and exploratory behaviour during early-stage relocation. The gamification elements increased engagement for some users without significantly distracting from important information. While traditional tools remain more efficient for precise routing, the 3D platform was perceived as more engaging and helpful for gaining an overview of a new city.

These findings suggest that an interactive 3D map combined with light gamification elements can enhance the relocation experience when usability and immersion are carefully balanced.

Keywords:

Interactive 3D map, relocation platform, gamification, spatial orientation, city exploration

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1 Introduction

The process of settling into a new city in Switzerland can be a tedious process, especially for foreigners who are unfamiliar with the country's administrative systems and cultural nuances. Relocating can be demanding and often overwhelming. Finding suitable housing, registering with local authorities, setting up health insurance, and understanding public transportation are only a few of the many tasks that newcomers must manage, often within a short timeframe. Although Switzerland is known for its organisation and efficiency, the relocation experience itself is rather impersonal and confusing to those who do not yet know how things work.

However, many existing relocation services focus on information delivery and overlook the emotional challenges that support major life transitions. This leaves foreigners feeling disconnected, stressed, and unsupported.

The relocation platform SwissPlatz aims to address these challenges by simplifying the process for newcomers to make settling into Switzerland more accessible and enjoyable. SwissPlatz also seeks to combine practical guidance with interactive elements.

This project focuses on the design and evaluation of a digital platform that enhances the relocation experience for newcomers moving to Switzerland. The main goal is to make the process of moving to a new city more intuitive, engaging, and less overwhelming by combining relocation information with playful, interactive elements. A central feature of the platform is a 3D interactive city map that allows users, represented by avatars, to explore neighbourhoods, discover housing options, and build spatial understanding of their unfamiliar environment.

To guide the conceptual design and evaluation of the platform, the following research questions were defined:

A. **3D Map Usability and Immersion:** How can a 3D interactive map visualisation for relocation services be designed and implemented to balance usability and immersion for different characteristics of the target group?
B. **Gamification Design:** How can we integrate gamification so that exploring housing and neighbourhood feels motivated and playful without distracting from its informational purpose?
C. **Comparison of 3D and 2D Map Visualisations:** What advantages does a 3D city map offer over a 2D map in terms of user task performance, user engagement, enjoyability, and usefulness for the relocation process?

These research questions are explored through the conceptual design, technical implementation, and evaluation of the platform. The project examines the technical implementation of a 3D relocation platform, as well as how users perceive and interact with it compared to traditional relocation tools.

This report is structured into: Chapter 2, which reviews related work and theoretical foundations; Chapter 3, which describes the applied methodology; Chapter 4, which presents the design process; Chapter 5, which shows the technical implementation; Chapter 6, which summarizes the evaluation results; Chapter 7, which includes the discussion part, and Chapters 8 and 9, which contain the conclusion and future work.

2 Background

This chapter provides the theoretical and technological background for this project. It reviews existing digital relocation services, explores 3D map and avatar technologies, and introduces gamification principles.

2.1 Relocation Platforms and Services

Digital relocation platforms support newcomers by helping them find housing, explore neighbourhoods, and access local information. While there are many such platforms, they vary in terms of interactivity, engagement, and the support they provide for relocation. Table 2.1 provides an overview of key relocation platforms in Switzerland. The table highlights their main functionalities and limitations in terms of engagement and exploration.

Platform	Description	Core features	Limitations
SwissPlatz [1]	SwissPlatz is a Swiss-based digital relocation service that supports foreigners' relocation to or within Switzerland.	Their service includes application file preparation, contract reviews, utilities setup, and move-in inspections. Premium options include proxy apartment viewings, rental guarantees, and post-move-in assistance.	There is limited spatial interaction and no immersive exploration of the city. The focus is on services rather than city exploration.
ImmoScout24 [2]	ImmoScout24 is a large online marketplace for real estate that connects tenants, landlords, and agencies.	Extensive property listings, filters, photos, price comparisons, 2D map views, and communication with advertisers. TenantPlus is a paid subscription that offers early access to new listings and exclusive properties.	There is a static presentation of information, limited neighbourhood context, and it lacks interactive or exploratory elements.

Table 2.1: Relocation Platforms and Services

In addition to SwissPlatz and ImmoScout24, other popular housing platforms in Switzerland include Homegate, Flatfox and Comparis. While these platforms often focus on property listings, filtering options, photos, and basic map views, they usually lack interactive features, gamification, or tools for exploring the city.

Beyond these housing platforms, Google Maps and Apple Maps play a significant role in relocation decisions. They offer features such as Google's 3D Street View and Apple's 3D city models [3], [4]. These tools allow users to virtually explore the neighbourhoods they potentially want to move to in the future. However, while these platforms offer a visual insight, they do not provide housing listings or relocation support.

2.2 3D Map and Digital Twin Technologies

3D mapping and digital twin technologies have become important tools in urban planning, navigation, and city-related simulations because of the growing importance of spatial data and real-time visualisation. These types of technologies make it possible to represent complex urban environments in a visual and interactive way.

A **digital twin** is a virtual representation of a physical environment that reflects real-world objects, buildings, or entire cities using digital models and data connections. They are commonly used in urban planning and infrastructure management to simulate scenarios, monitor systems, and improve understanding of spatial relationships [5].

In addition to practical mapping tools, virtual environments such as **The Sims** and **Second Life** show how 3D spaces can simulate the real world on a visual and practical level. Although these environments are designed for entertainment, they demonstrate similar principles to digital twins, including spatial representation, dynamic interaction, and user-driven exploration [6], [7]. This combination of 3D visualisation and interactive elements can create a more engaging and immersive experience for exploring cities.

2.3 Avatars and Virtual City Exploration

Avatars play an important role in virtual environments. They represent users and enable interactions within digital spaces. They also allow users to explore, communicate, and engage with environments in a more engaging and immersive way. Research shows that avatar-based interaction can reduce social anxiety and create a more comfortable way to enter digital experiences than interactions involving real people. This experience depends on how interactive the interface is and how vivid the presentation of avatars is [8].

Virtual environments with avatar navigation usually focus on identity creation, spatial exploration, and feedback loops between users and environments. Studies on virtual worlds have shown that users become more engaged when environments respond dynamically to their actions. This encourages exploration and ongoing interaction. The design of both the avatar system and the virtual environment influence how users perceive space, form emotional connections, and engage with opportunities [9].

A common element in such environments is the use of **non-playable characters** (NPCs). These are characters within a virtual system that are not controlled by users. They are also designed to guide, inform or improve the user experience [10]. NPCs can support onboarding, provide information, and create a sense of atmosphere.

Gamified platforms such as **Second Life** illustrate how avatars can be used to explore virtual spaces. They combine navigation, interaction, and identity creation within a digital world. Users can engage in spatial exploration and complete tasks within the environment, receiving feedback and benefiting from responsive systems and NPC guidance [7]. This example highlights the value of avatar-based systems for exploring cities in an immersive way.

2.4 Gamification and Motivation Design

2.4.1 Definition

The **gamification** concept was introduced by Nick Pelling in 2002. He described gamification as the application of game-like interface design to make electronic transactions faster and more enjoyable [11].

Nowadays gamification is more defined as the use of game design elements in non-game contexts with the aim of increasing user engagement and motivation. It is frequently applied in various domains, including education, business, and digital applications, where it is used to enhance user experience by fostering engagement, immersion, and sustainable interaction with a system [11].

2.4.2 Game Design Elements

Badges are frequently used in gamified systems as visual representation of user achievements. Badges can act as a transparent goal when there are openly known and thereby support goal-oriented behaviour. In addition, they can also provide users an overview of the system's available functionalities and the range of actions that can be performed within it [12].

As reward mechanisms, badges also function as feedback by acknowledging users' accomplishments. Receiving a badge can strengthen the feeling of mastery and competence, which are associated with increased motivation [12].

Furthermore, when badges are visible to others, they may foster a sense of group identification among users who share similar achievements.

Levels can function as progress indicators that provide feedback on a users' advancement within the system. Achieving a higher level or the highest level can be associated with feelings of competence and offers users a clear, goal-oriented milestone [12].

Progressing to a higher level is not only accumulating points but can also be achieved through the completion of specific tasks. Typically, users begin with relatively simple tasks, while tasks in higher levels increase in their difficulty and often require greater effort and skills. Successfully completing challenging yet achievable tasks aligned with an individual's skill level can foster feelings of mastery and competence. Additionally, when users can define and apply their own strategies to complete tasks, feelings of autonomy may emerge [12].

3 Methodology

This chapter describes the methodological approach used in this project. It outlines the project planning, the applied workflow and tools, the user research and data collecting, and the definition of the work packages.

This includes the project planning, brainstorming, the Agile development process, and the organisation of work packages, and usability testing. These activities influenced the design and development process of the project.

3.1 Project Planning and Setup

During the kick-off meeting, various ideas for the project direction were discussed, and one of them was to implement a 3D city model to make the relocation process for foreigners more engaging through a gamified experience. As a result of the discussion, the project focus shifted towards user experience and interface design rather than automation and personalisation, as the initial project description suggested.

After the kick-off meeting with the client, Byung Yun Cho from SwissPlatz, and the coaches, the project team initiated the planning and brainstorming phase. One of the first steps was the completion of the project agreement, which defined the initial project situation, the overall project vision, the three central research questions, and the proposed methodology of the team.

In parallel, research of existing relocation and housing platforms was conducted. This revealed that no comparable platforms were found that combine city exploration and apartment hunting in a 3D interactive map with gamification elements. These findings supported the chosen direction of the project.

Based on these discussions and findings, the scope and direction of the project were refined. A roadmap was created to guide the development process and ensure alignment between the planned features and the project goals. Figure 3.1 shows the last version of the roadmap.

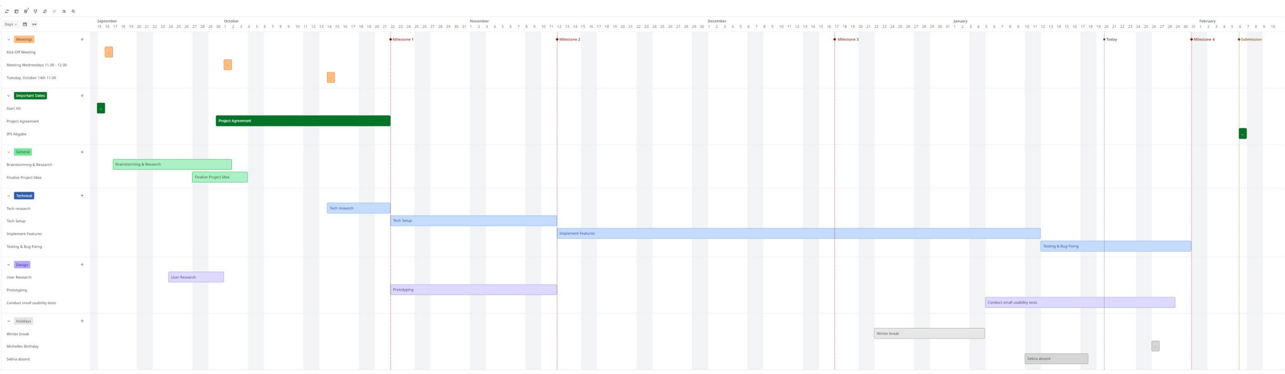

Figure 3.1: IP5 Roadmap

The research questions, introduced in Chapter 1, guided the planning and design decisions and are revisited and addressed in the discussion (Chapter 7).

3.2 Tools and Workflow

Once the project scope and roadmap were defined, the team established the workflow, tools, and collaborative practices, ensuring efficient development. The project followed an Agile workflow with iterative development and continuous refinement. The team worked in short development cycles that allowed features to be implemented and improved incrementally. This approach was well suited to the exploratory nature of the project and the evolving understanding of the user needs.

In the initial stages of the project, pair programming was frequently used. The team worked together on both conceptual and technical tasks, which helped establish a shared understanding of the codebase, design decisions, and overall system architecture. This collaborative approach also facilitated faster problem-solving and effective knowledge sharing. As the project progressed and responsibilities became more clearly defined, tasks were increasingly managed individually. Nevertheless, regular reviews and feedback sessions were conducted to maintain consistency and code quality.

A Kanban-based workflow was used to organise tasks and track progress. Work items were visualised on a Kanban board, providing an overview of the project status and supporting prioritisation, coordination, and the identification of bottlenecks. Git was used for version control, enabling parallel development through feature branches without affecting the main codebase. To improve the code's structure, readability, and maintainability, refactoring was used as an ongoing activity.

3.3 User Research and Data Collection

For user research and data collection, a general online search was conducted by browsing. This included browsing through blogs from expats and posts on community platforms like Reddit and the Swiss Forum and in-depth video content on YouTube. These sources included descriptions of the relocation process in and to Switzerland, personal insights, and advice for others considering moving to Switzerland.

During this process, the team took notes on key experiences and opinions mentioned by the foreigners. After completing the research, the team analysed and summarised the most common key points.

Section 3.3.1 provides more information on the created persona, as well as the identified user needs and pain points.

3.3.1 Persona Creation, User Needs, and Pain Points

The persona was created from the information gathered during the user research phase described in Section 3.3. The collected information was consolidated and analysed to identify recurring patterns in motivation, concerns, behaviours, and emotional responses were identified and clustered. Based on these patterns, a persona was created to help understand a typical target user of the platform.

Figure 3.2 shows the persona, representing a user who is planning to move to Switzerland.

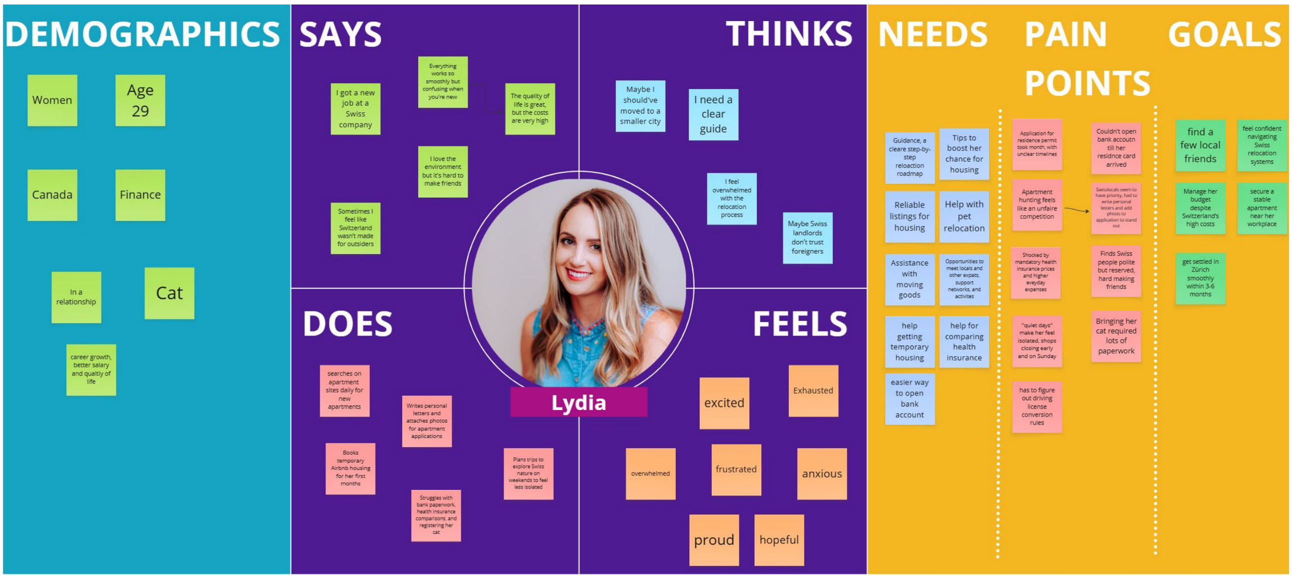

Figure 3.2: Persona

The persona includes demographic information, behavioural aspects, and emotional drivers of the user and was structured around the following elements:

- Demographics (age, nationality, profession, personal situation)
- Says, Thinks, Does, and Feels
- User Needs
- Pain Points
- Goals

This structure allows a global understanding of users, combining both practical and emotional aspects of the relocation process.

The **'Says'** section shows statements made by expats, identified during the research process. These statements mostly express optimism about career opportunities while also revealing uncertainty about daily life and integration in Switzerland.

The **'Thinks'** section highlights concerns that may not always be verbalised, such as fears of social isolation, the strong housing competition, or difficulties navigating unfamiliar administrative systems.

The **'Does'** section describes concrete actions users took during their relocation process, including apartment searching and gathering information about legal and administrative requirements.

The **'Feels'** section addresses the emotional state of the user throughout the process. The emotions range from excitement and hopefulness to anxiety, frustration, and exhaustion.

Based on the research and the created persona, various user needs were identified. These needs reflect what potential users expect from the website and what support is required to successfully navigate the relocation process. The needs can be grouped into various categories like informational, practical, emotional and social needs and were used to structure the content and functionality of the website.

The identified pain points represent obstacles that negatively affect foreigners during their relocation process. Such as high competition in the housing market, especially in bigger cities, or the lack of a transparent timeline for administrative processes. Understanding these pain points helped to prioritise features and design a solution that addresses the users' frustrations rather than assumed problems.

The goals describe what the user aims to achieve through the platform, like finding suitable housing, gaining orientation within a city, and feeling more confident during the relocation process.

The persona served as a reference point throughout the whole design process. It supported prioritisation of features and ensured consistency across user flows and storyboards. By continuously referring to the persona, the team aimed to design a solution grounded in real user needs and experiences rather than assumptions. Based on this persona, multiple user flows and storyboards were developed, as further described in Chapter 4.

3.4 Brainstorming

Brainstorming was used as an exploratory method to generate ideas without technical or structural constraints. The first few brainstorming sessions focused on identifying features, interaction concepts, and overall directions for the platform.

At the beginning, a wide range of ideas related to the platform's functionality and overall concept were gathered. These included ideas around exploring cities, finding apartments, interacting with buildings, and helpful elements such as information overlays, search options, and event-related data. The team also discussed whether the platform should concentrate on entire cities or smaller areas such as districts or quarters.

A Moodboard was created to further support these ideas and concepts. This Moodboard included inspirations for 3D city models, basic building representations, map-based navigation, and diverse levels of visual detail. The team focused on balancing visual clarity and performance by prioritising simplified models with highlighted elements rather than a more detailed environment. For highlighting buildings, streets, and points of interest, different approaches have been explored, as well as the use of pins and overlays to display additional information.

Figure 3.3 shows the created moodboard and information gathered during the brainstorming phase.

During the brainstorming sessions, the avatar system, NPCs, and interaction mechanics were explored. Several types of visual styles and levels of complexity were considered. This ranged from simple characters to more expressive and customisable avatars. Furthermore, the role of NPCs as guides, information providers, or interactive elements was discussed, as well as the possibility of integrating chat-based interactions.

In addition, gamification ideas were collected during this phase. These included reward systems, progress indicators, badges, and optional tasks meant to motivate exploration and engagement. Other ideas, such as onboarding tutorials and guided instructions were explored to support first-time users and improve overall suitability.

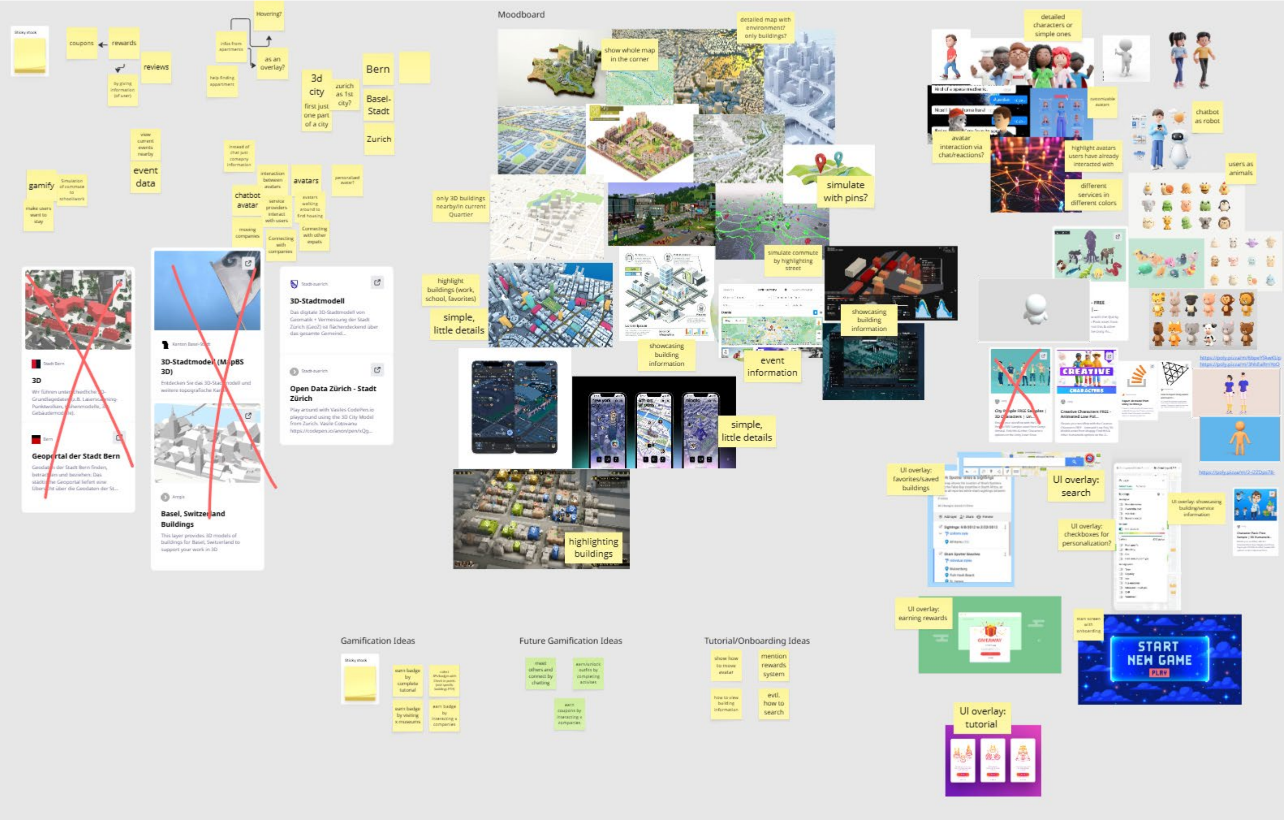

Figure 3.3 Brainstorming and Moodboard

3.5 Work Package Definition and Estimation

At the beginning of the planning, a set of work packages was defined, each corresponding to individual features, technical requirements, or design tasks. Defining these work packages early helped define the project scope and supported planning.

An overview of the defined work packages is shown in Figure 3.4. Each work package was estimated in terms of effort and complexity, allowing the team to prioritise tasks and plan development phases accordingly. Prioritisation was based on expected user values and relevance to the research questions.

Brainstorm & Research

Goals	Brainstorm and research ideas and project approach
Activities	• create moodboard • idea gathering • discuss initial concepts with coaches
Deliverables	final idea and project approach
Start	17.09.2025
End	01.10.2025
Effort	32h

Project Agreement

Goals	define project scope, goals, and direction
Activities	• finalize project plan • finalize project agreement document
Deliverables	• project agreement document
Start	01.10.2025
End	14.10.2025
Effort	20h

Concept & Prototyping (Lo-Fi)

Goals	define interaction concepts and first user experience flows
Activities	• sketch avatar system • create storyboards • early validation with users/superivsors
Deliverables	• Wireframes / storyboards / Sketches • Low-fidelity prototype
Start	15.10.2025
End	11.11.2025
Effort	36h

Technical Evaluation & Setup

Goals	select and set up tech stack including 3D map source and libraries
Activities	• research and choose 3D framework • evaluate libraries and map data sources • set up project structure and architecture
Deliverables	• technology evaluation documentation draft • working project setup
Start	23.10.2025
End	11.11.2025
Effort	36h

3D Map & Avatar Navigation

Goals	implement basic 3D map of city and basic avatar movement
Activities	• use 3D city map source • implement avatar creation and basic navigation • test performance & usability • Integrate city data
Deliverables	• working prototype: city navigation with avatar
Start	12.11.2025
End	17.12.2025
Effort	80h

Gamification

Goals	enhance engagement by making exploration fun and motivation
Activities	• define gamification mechanics • implement gamification elements • test user motivation & usability
Deliverables	• gamification features integrated into prototype
Start	03.12.2025
End	12.01.2026
Effort	60h

Testing, Review, Finalization

Goals	validate functionality, finalize documentation, prepare presentation
Activities	• conduct usability tests • fix bugs and optimize • write project documentation • prepare presentation
Deliverables	• final report • final demo version • presentation materials • user testing documentation
Start	13.01.2026
End	05.02.2026
Effort	48h

Figure 3.4: Work Packages

3.6 Usability Testing

For the usability testing, a structured set of tasks and questions was prepared and compiled in a spreadsheet. Before conducting the test, the questions were shared with one of our project coaches, Kevin Kim, for feedback and validation. A total of four participants took part in the usability testing.

At the beginning of each test, participants received a brief introduction to the project and the context of the test. They were then asked to complete several relocation-related scenarios using the platform. Participants were not guided through the tasks and were free to interact with the platform independently. This allowed for clear observation of the users' behaviour.

After completing the tasks, participants answered a set of questions about their experience with the platform. Observations and responses were collected and analysed after all testing sessions. Chapter 6 provides a detailed description of the testing procedure and results. The full set of tasks, questions, and answers is available in Section D in the Appendix.

4 Design

This chapter describes the design process and outcomes of the project. It explains how results from the user research were translated into sketches, storyboards, user flows, and prototypes, and how these helped develop the final concept.

4.1 Design Goals

The goal of the design was to make the relocation process to Switzerland for foreigners more engaging and intuitive. The platform wants to increase the motivation of users while they search for an apartment and explore a new city by integrating gamification elements such as tasks, rewards, and avatars. The use of a 3D map supports informational discovery and transforms apartment hunting into a more playful experience, encouraging exploratory behaviour while maintaining familiar map interactions.

To achieve this, the design focuses on:

- Increasing user motivation to search for apartments and explore new neighbourhoods
- Encouraging exploratory behaviour instead of purely linear navigation
- Integrating light gamification elements such as tasks, rewards, and avatars
- Supporting spatial understanding through a 3D map environment

4.2 Sketches and Flows

The design phase began with exploratory sketches and user flows. These were used to explore ideas and define how users would interact with the platform. These initial design concepts helped clarify the main functionalities and interaction methods, as well as the overall system structure, before more detailed design decisions were made.

Sketches and Storyboard

The first design concepts were explored through hand-drawn sketches and a storyboard. These sketches helped to quickly explore ideas and visualise how users might interact with the platform. The storyboard helped to describe the user interaction with the platform in a narrative way with a focus on their emotions, motivations, and context rather than detailed interface designs.

Figure 4.1 shows the storyboard developed during this phase, illustrating a typical user journey from initial uncertainty to increased confidence and engagement through exploration and gamified interactions.

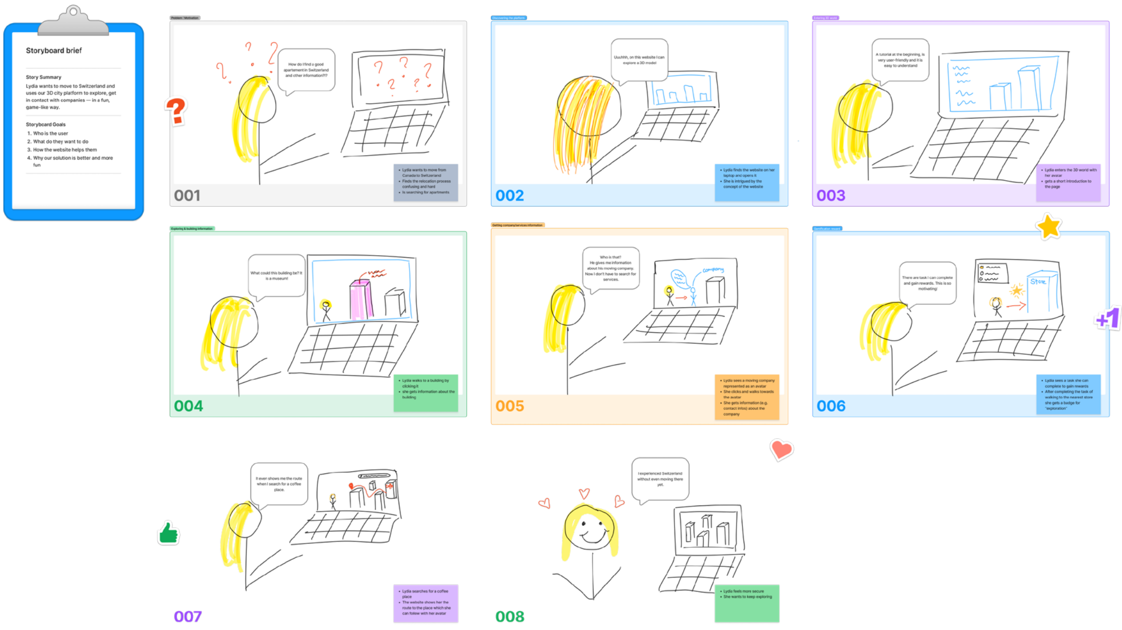

Figure 4.1: Storyboard

User Flow and Flowchart

User flows were created to understand the main tasks and interactions that a user has within the system. These flows helped to define an entry point, decision points, and user interaction, such as exploring the city, searching for a specific location, or interacting with NPCs. It also helped to identify alternative paths that a user may take, instead of just a single linear flow, and helped detect unnecessary complexity or potential dead ends. This ensured a logical progression between steps while still allowing flexible exploration.

Figure 4.2 presents the flowchart that summarises the overall structure of the platform. It shows how the main parts of the platform are connected and how core features are integrated into the user experience.

In addition to the abstract flowchart, a more detailed user flow sketch was created to visualise a concrete interaction sequence. The sketch focuses on a specific user action and transitions during exploration and navigation. Figure 4.3 shows the user flow sketch, highlighting how a user would interact with an NPC, receive rewards, and move through the map.

4 Design

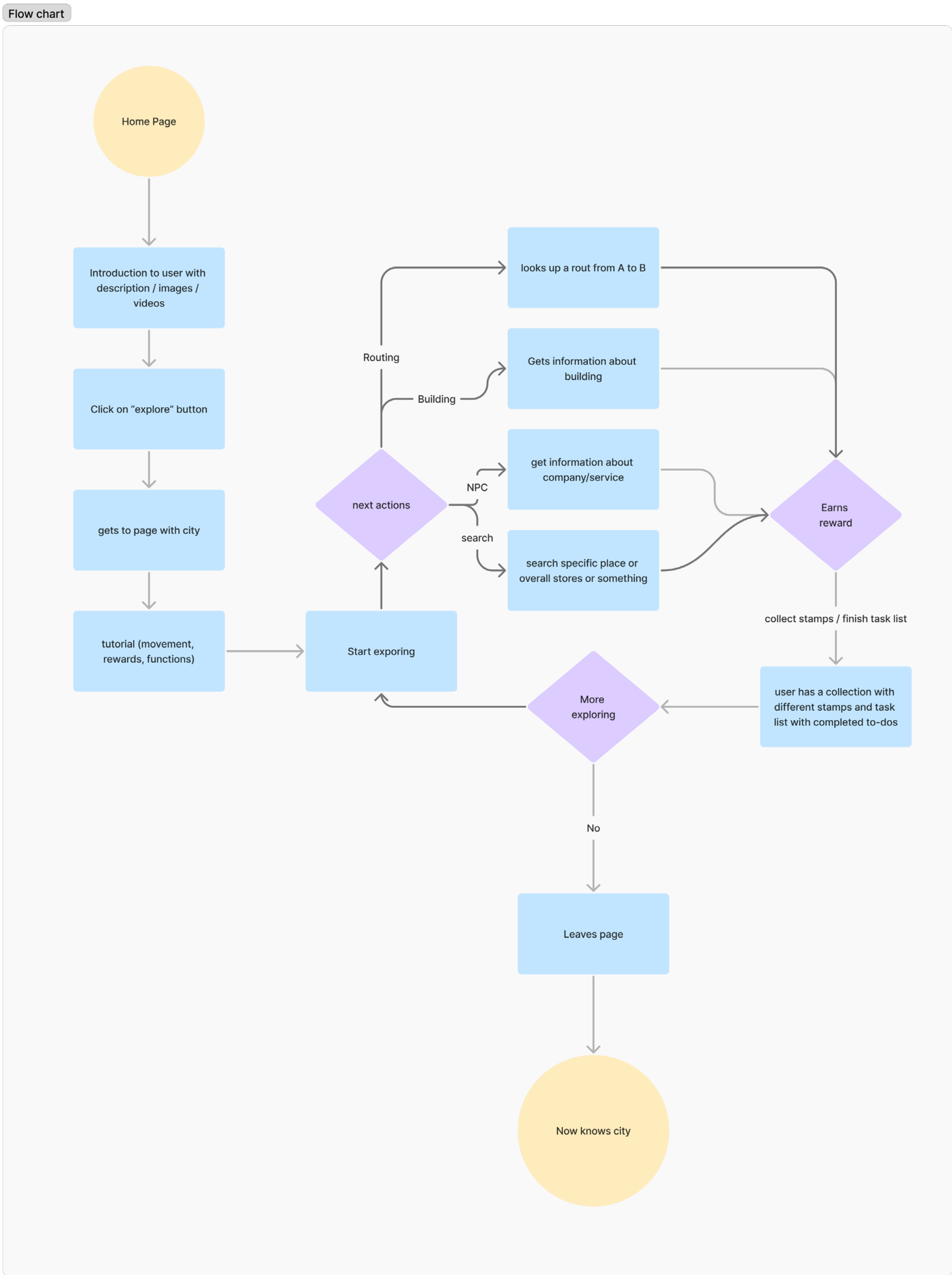

Figure 4.2: Flow Chart

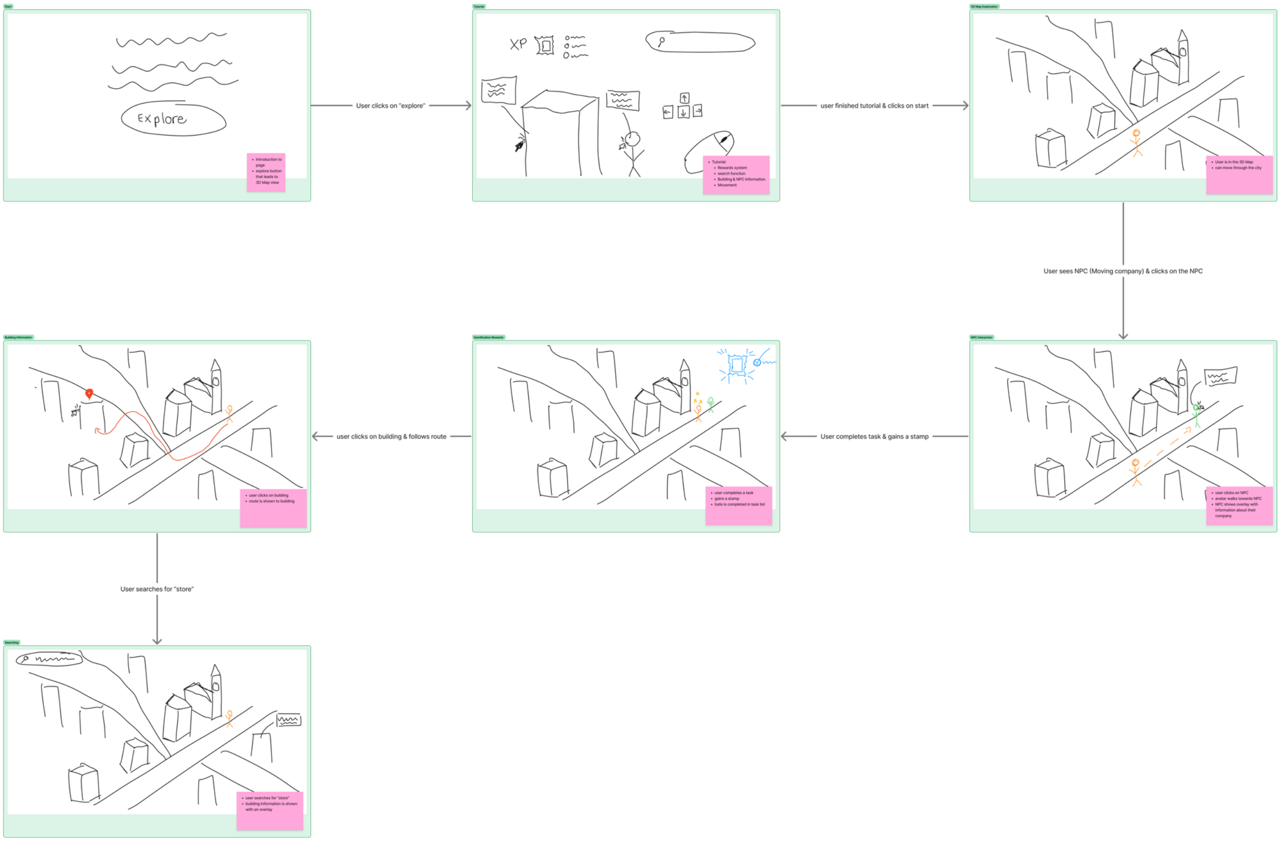

Figure 4.3 Sketch: User Flow

4.3 Prototyping

Based on the ideas gathered, that are shown in Figure 4.4 and the defined user flows, a low-fidelity prototype was created in Figma. The aim of this prototype was to explore how the webpage could look. The design focused primarily on layout, information hierarchy, and interaction flow. This approach allowed the prototype to be adapted quickly based on feedback from the client and supervisors.

The prototype included initial concepts for information overlays, simplified buildings, and NPC representation. It also covered essential user interface elements such as search functionality, dropdown menus, and zoom controls. In addition, early designs for gamification elements, including stamps and tasks, were integrated to support exploration and user engagement.

Figure 4.5 provides an overview of the prototype webpage, illustrating the general layout and map-centred interaction concept, as well as information overlays used to present contextual details for locations and services within the map.

Two different tutorial overlays were also prototyped to introduce users to core interactions. The concepts are shown in Figure 4.6 and Figure 4.7. However, it was not included in the final implementation.

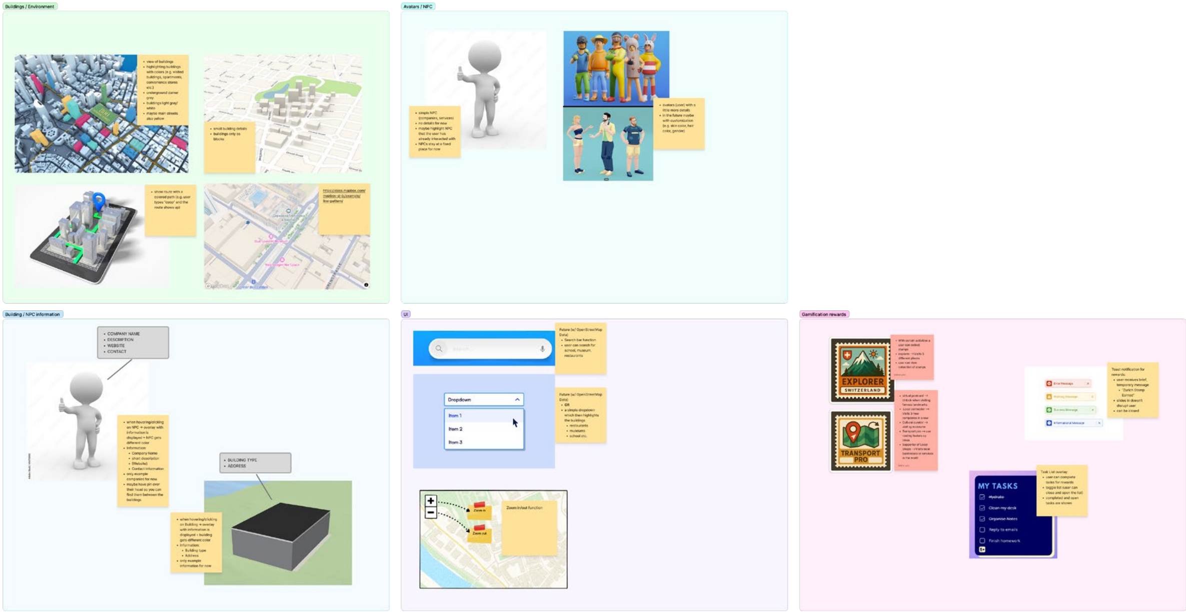

Figure 4.4: Detailed Ideas

Figure 4.5: Prototype Webpage Overall

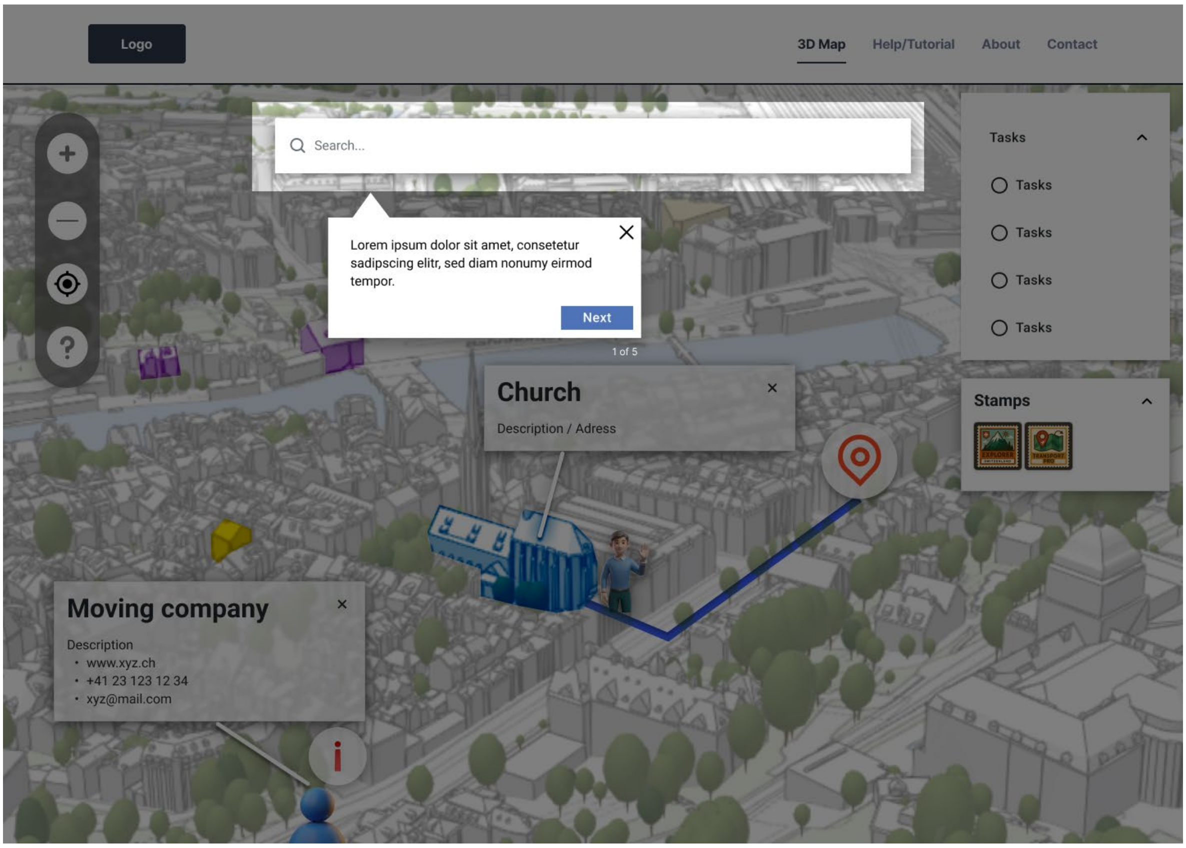

Figure 4.6: Prototype Tutorial Interactive

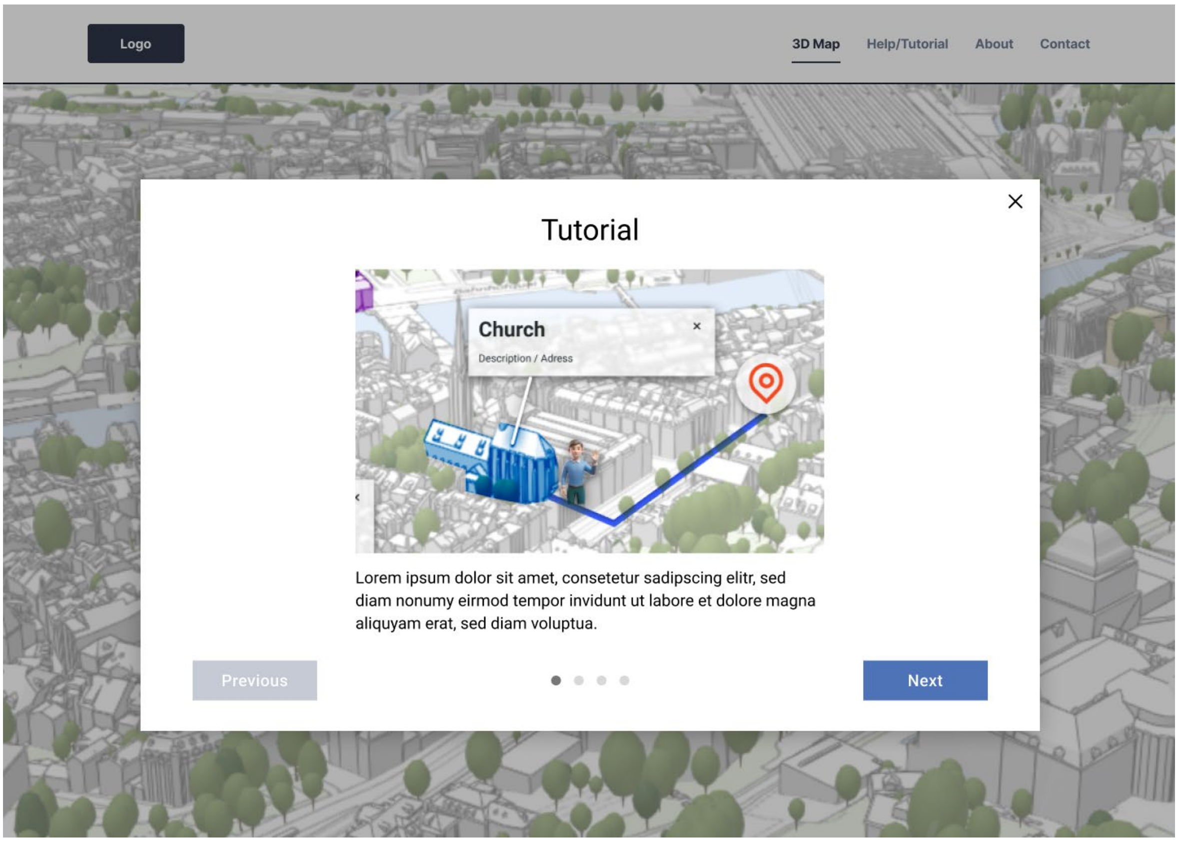

Figure 4.7: Prototype Tutorial Overlay Screen

5 Implementation

This chapter describes how the implementation of the relocation platform concept was realised. It explains the system architecture, core technologies, and interaction logic behind the 3D city map, avatar system, search and routing features, and gamification elements.

5.1 Technical Setup and Architecture

The platform was implemented as a web-based application using modern frontend technologies and map-rendering libraries. The architecture follows a modular design, separating map logic, interaction handling, and data management. This separation improves maintainability and scalability.

5.1.1 Core Technologies

HTML, CSS, and JavaScript were used as the foundation for the web application. These technologies manage the structure, visual styling, and interaction logic of the user interface.

Vite was used as the development environment and build tool. It supports fast loading times and an efficient way of handling modules, which supports iterative development.

5.1.2 Map Visualisation

MapLibre GL JS was used for rendering the interactive 2D and 3D city map. It manages camera movement, zoom levels, rotation, map styling, and the rendering of geographic data. MapLibre was selected due to its open-source nature, flexibility, support for vector tile rendering, and 3D map features.

Vector map tiles form the spatial foundation of the 3D city environment. They are loaded dynamically and enable smooth navigation and scalable rendering of large geographic areas while maintaining performance and allowing elements such as buildings and points of interest (POIs) to adapt while zooming.

5.1.3 3D Elements

Three.js renders 3D elements such as user avatars and NPCs. The 3D objects were integrated into the MapLibre rendering pipeline with a custom layer, which allows characters to appear spatially anchored to geographic coordinates.

This integration allows characters to appear as if they are anchored in the map environment, combining traditional map navigation with immersive 3D elements without requiring a full 3D game engine.

5.1.4 Data Formats

Different data formats were used depending on the type of information that was handled.

JSON files were used for application-related data such as NPC definitions, avatar information, tasks, and stamp logic. This format was chosen for its simplicity, flexibility, and readability.

GeoJSON was used for geographic and spatial data for the apartment locations. GeoJSON allows direct integration with MapLibre layers and spatial filtering.

5.2 City Map Development

This section covers the development of the 3D map, including the visualisation of buildings, markers, POIs, search and routing functionalities, and navigation controls that allow users to interact with the map.

5.2.1 3D Map

The 3D map was implemented using MapLibre GL JS, inspired by the official building extrusion example. Building footprints are extruded based on height attributes, creating a 3D city representation.

Figure 5.1 shows the implementation of the 3D buildings, showing their heights, block structures, and the spatial density of the urban environment.

To maintain performance, the building extrusions are only displayed at a specific zoom level. The 3D elements are progressively introduced as a user zooms in on the map. Users can freely pan, rotate, tilt, and zoom the map, which supports exploratory navigation and spatial orientation.

This 3D representation improves the spatial understanding by allowing users to perceive building heights, density, and neighbourhood structures. It supports a more intuitive overview of unfamiliar areas compared to flat 2D maps.

In addition to the 3D visualisation, the platform includes buttons to switch between 2D and 3D map views and to enable an optional terrain layer.

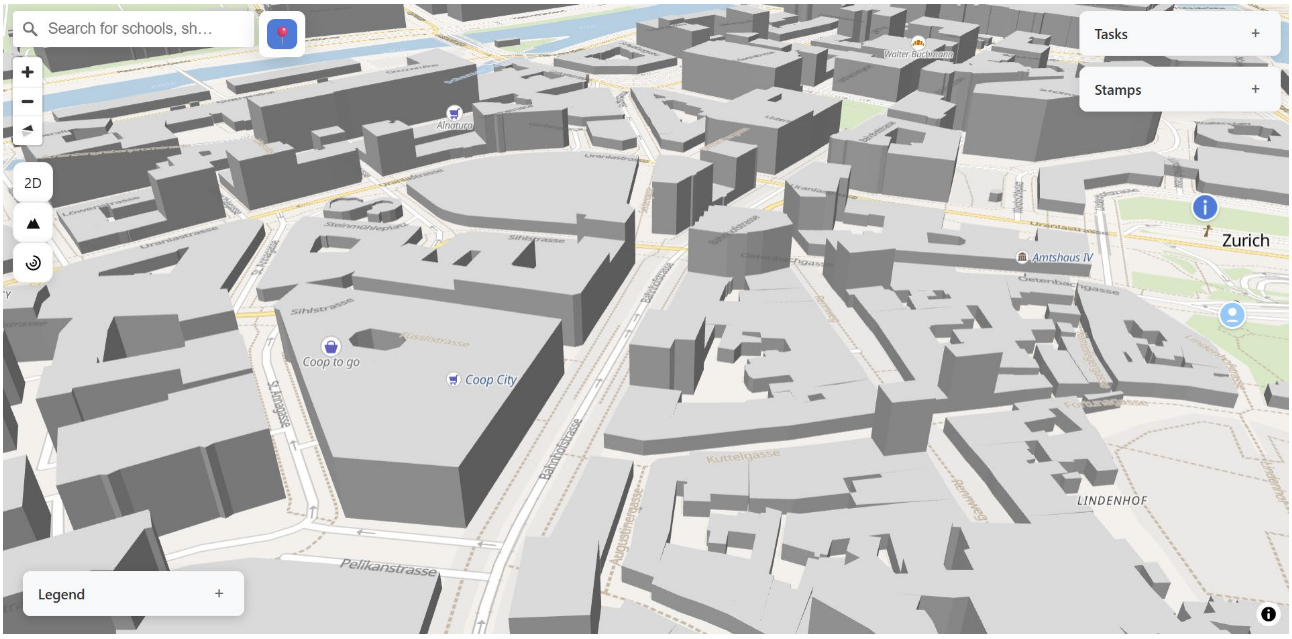

Figure 5.1: 3D Buildings

5.2.2 Markers and Information Overlays

Multiple marker types were implemented to represent different information categories. These markers provide access to detailed content while keeping the map itself visually uncluttered.

Apartment listings are loaded from a GeoJSON file that contains sample property data from ImmoScout24 listings. Each listing includes geographic coordinates, address information, price, number of rooms, floor space, floor, and a link to the original listing. When the user clicks on a listing marker, an information overlay opens directly within the map, presenting key details.

Figure 5.2 shows an example of an apartment listing marker with its associated information overlay.

Figure 5.2: Apartment Information Overlay

NPCs and avatars are also represented using markers. NPCs represent companies and have an information icon that opens a pop-up containing company details. These details include name, address, description, and contact information. Interaction with certain NPCs can also trigger the completion of a related task. This directly links exploration with gamification elements.

Figures 5.3 and 5.4 show an NPC marker and the corresponding information overlay.

Figure 5.3: NPC Marker

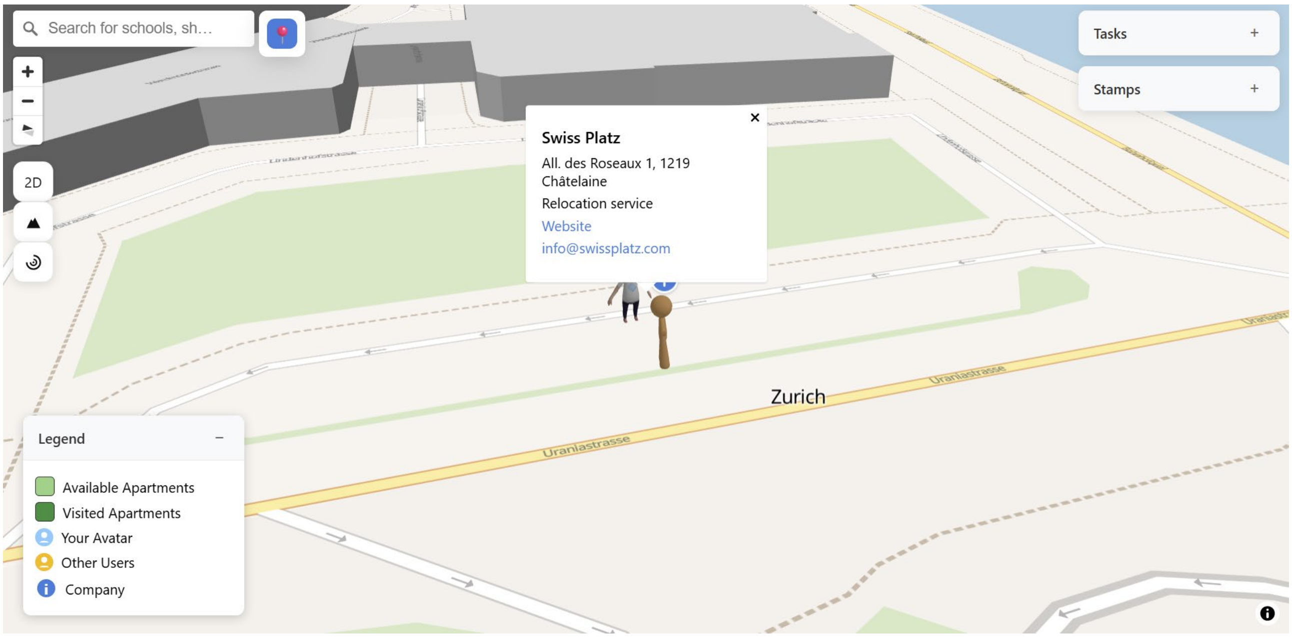

Figure 5.4: NPC Information Overlay

The marker of the user's avatar is only shown at specific zoom levels to avoid visual clutter and maintain orientation during large-scale navigation. Other users are represented with similar avatar markers but in different colours. Clicking on these markers opens a pop-up with basic profile information and their collected stamps.

Figures 5.5 and 5.6 show the marker representation of other users and their associated information overlays.

Figure 5.5: Marker Representing Other Users

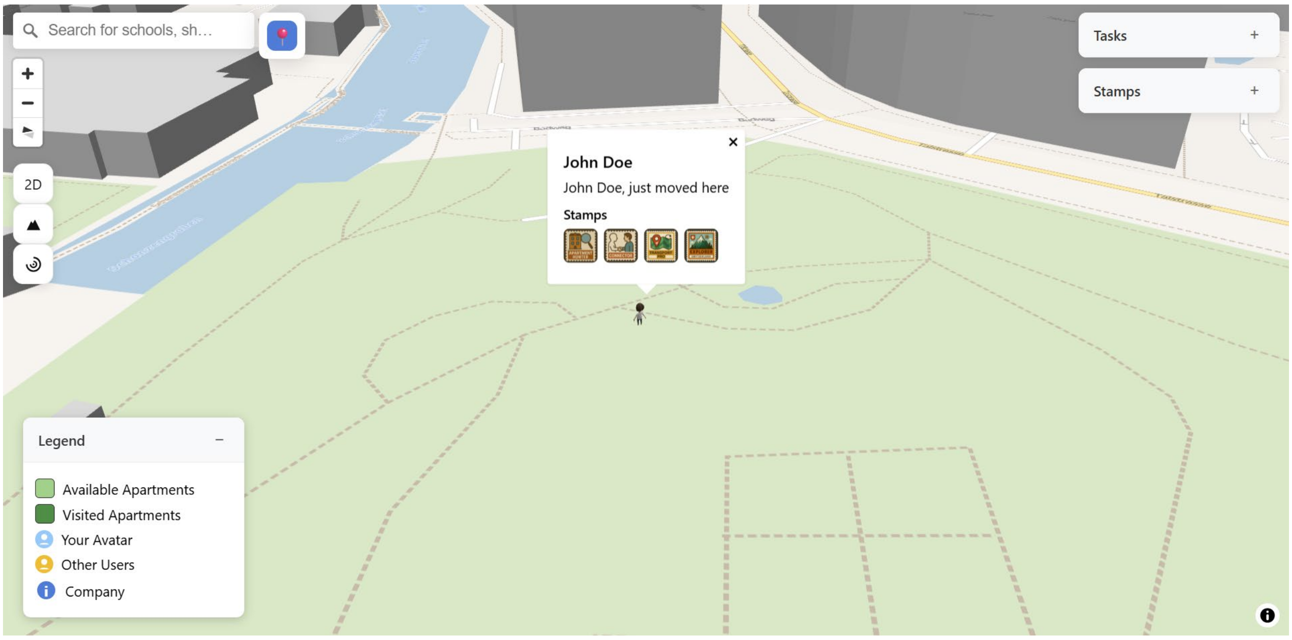

Figure 5.6: Other User Information Overlay

5.2.3 Search Functionality

The search functionality is implemented using OpenStreetMap's Nominatim API. All search-related logic and interactions are handled by GeocoderService.js, which manages user input, API requests, and result processing.

The user input is sent to the Nominatim API to retrieve matching addresses and POIs). Results are then displayed as a list, allowing users to select a location. Once a location is selected, the map pans and zooms to that destination and highlights it with a distinct indicator.

Figure 5.7 shows an example of a search result for schools, including the result list and the corresponding markers displayed on the map.

Search results are also shown as markers on the map. However, they are not directly clickable. Therefore, interaction is limited to the result list to avoid UI overload and maintain predictable user behaviour.

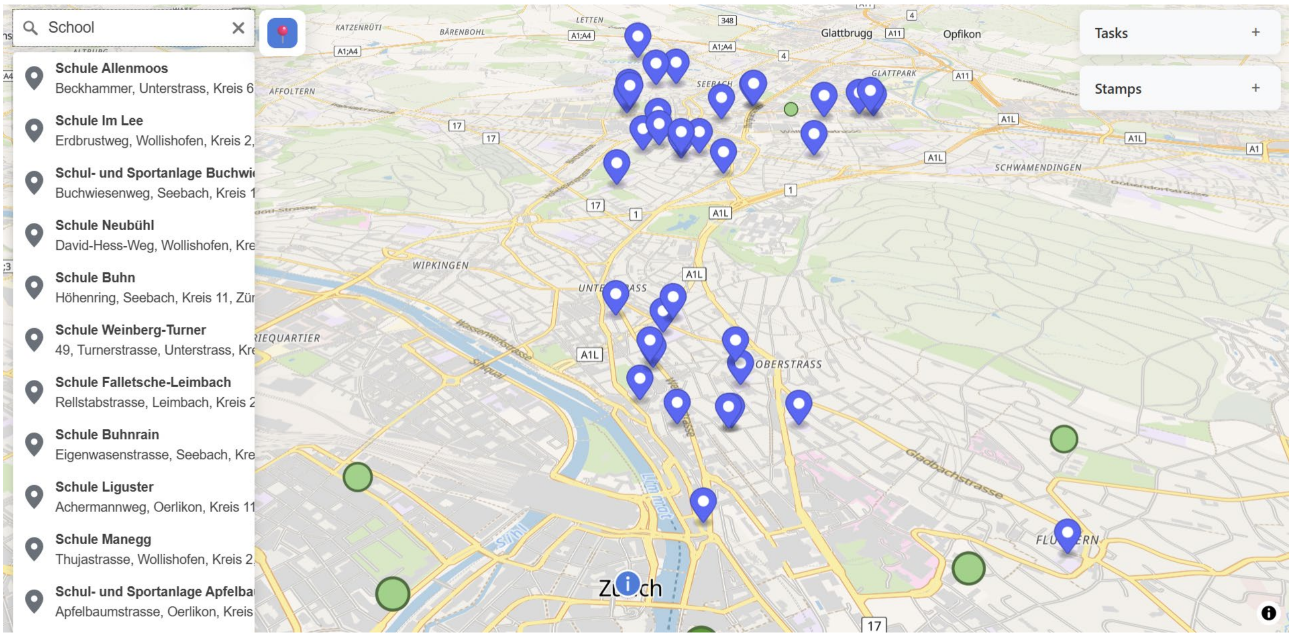

Figure 5.7: Search Results

5.2.4 Points of interest Tags and Filtering

Points of interest were filtered to only show relocation-relevant categories such as schools, hospitals, administrative buildings, grocery stores, bakeries, and butcher shops. This filtering reduces visual clutter and supports exploration based on typical relocation needs.

Figure 5.8 shows the POI tags that are used to highlight relevant facilities.

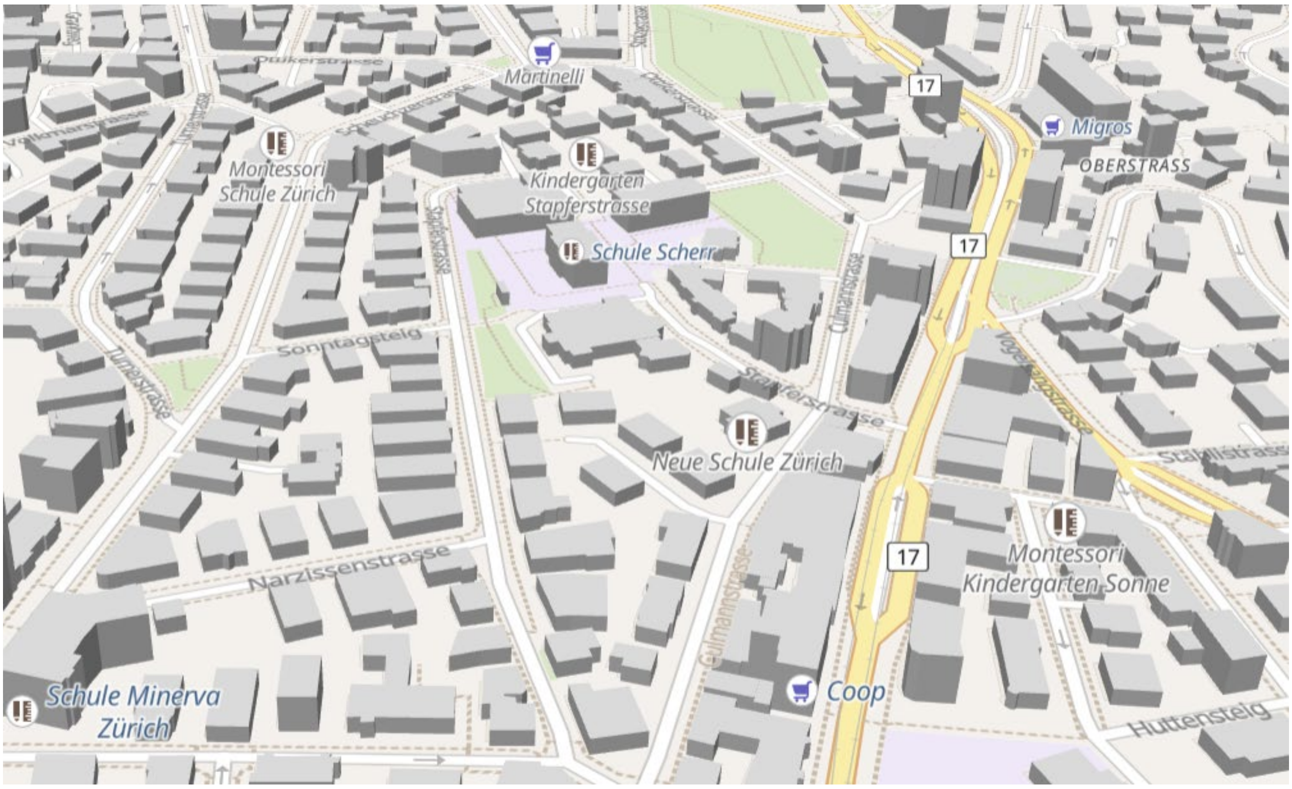

Figure 5.8: Markers of POIs

5.2.5 Routing System

The routing feature allows users to calculate routes between two locations. This routing is handled by RoutingService.js, which uses the Open Source Routing Machine (OSRM) instance.

Users can define start and end points by either searching for locations or clicking directly on the map. Once start and end points are defined, the system calculates a car-based route and displays it as a polyline on the map. Additionally, distance and estimated travel time are displayed in a compact overlay.

Figure 5.9 shows an example of a calculated route between two points, including the visualised route polyline and the associated distance information.

Car routing was chosen to keep the implementation simple and consistent. Different modes of transportation require distinct routing logic, datasets, and APIs, which were considered out of scope for this project.

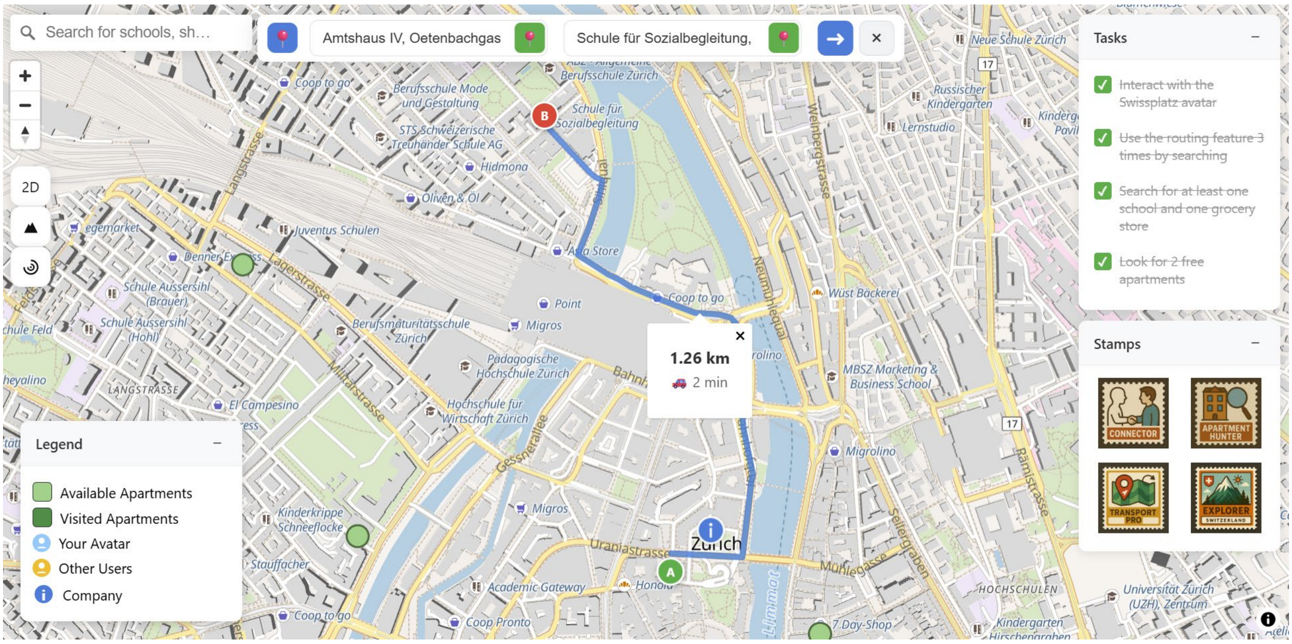

Figure 5.9: Routing

5.3 Avatar System and Interaction

This section explains how users and NPCs are represented and how movement and interaction are handled.

5.3.1 3D Avatar

The user is visually represented by a free humanoid 3D model from the Unity Asset Store.

When the user clicks on a location on the map, the avatar automatically moves along a route to that destination. Users are not required to follow the avatar continuously and can explore freely. There is a dedicated button that allows users to return the camera to the avatar's current location at any time.

At a lower zoom level, the avatar is represented by a simple marker to maintain orientation. This design supports both free exploration and spatial awareness by allowing the user to switch between overview navigation and avatar-centred interaction.

Figure 5.10 shows the humanoid 3D avatar used to represent the user within the platform.

Figure 5.10: 3D Avatar Representing User

5.3.2 NPC System

NPCs are used to represent services, companies, and other users within the platform. They are all positioned within a limited area rather than across the entire city. This helps maintain clarity, reduces visual clutter, and supports focused exploration.

NPC movement is simple and non-intrusive. NPCs move within a limited area using basic motion patterns. The idea of NPCs following the user was discussed but not implemented, as this would require further user testing to evaluate whether it would be helpful or overwhelming.

Figure 5.11 shows a 3D NPC representing a service provider, including an associated information marker.

Other user NPCs share the same base humanoid model as the user avatar but have a different marker colour and profile information. This representation allows users to perceive the presence of other users without introducing a complex social interaction mechanism.

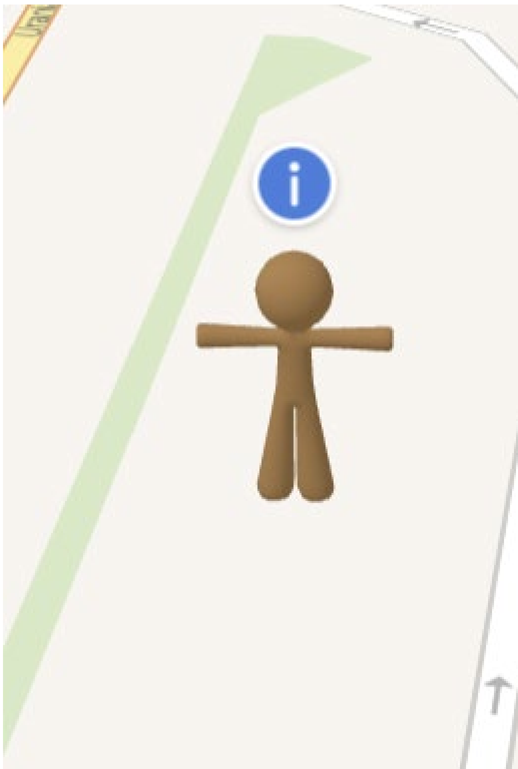

Figure 5.11: 3D Character Representing Companies

5.4 Gamification Design and Features

This section describes how gamification elements were implemented to increase user engagement and support exploratory interactions with the platform.

5.4.1 Gamification Design

For the gamification design, the team focused on increasing the user's motivation and encouraging city exploration. To achieve this, the platform includes tasks and stamps as the main gamification elements. Tasks provide users with clear and achievable goals, while stamps visualise progress and completed achievements.

The overall goal of the gamification design is to encourage exploratory behaviour, support spatial learning, and create a sense of achievement. Users can discover information by interacting with the environment through searching, navigation, and exploration rather than passive information consumption.

5.4.2 Tasks

The platform includes four guiding tasks that introduce users to the main features of the system. These tasks encourage active exploration of the city, such as apartment searching, interacting with service providers, exploring nearby locations like schools or grocery stores, and using the routing feature.

The tasks are displayed in the form of a to-do list that provides users with a clear overview of their progress. Once a task is completed, the user receives a confirmation message, and the task is marked as finished. The number of tasks was intentionally kept low to maintain simplicity and avoid overwhelming users, while still offering a playful and motivating experience.

Figure 5.12 shows the task list overlay, while Figure 5.13 illustrates the visual feedback given after completing a task.

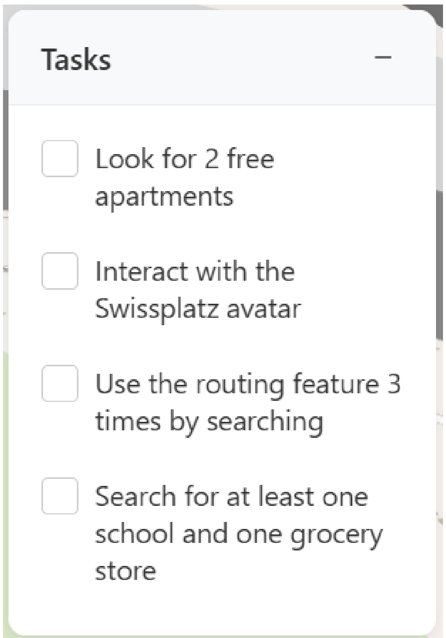

Figure 5.12: Task List

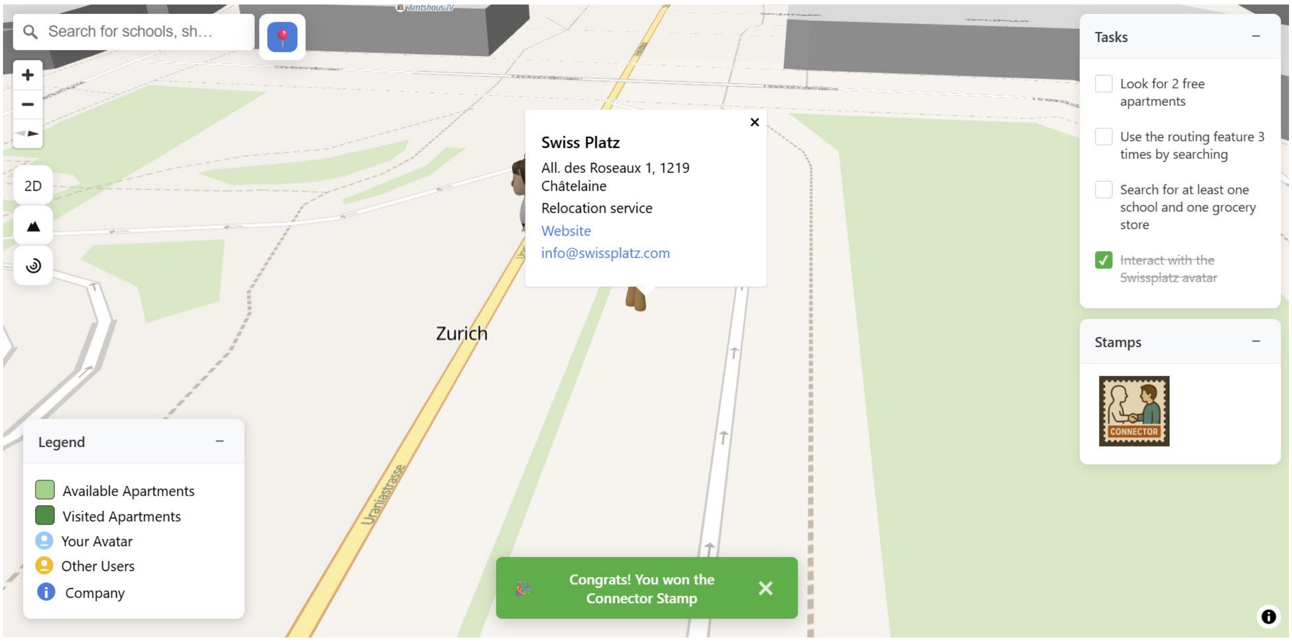

Figure 5.13: Completing Task

5.4.3 Stamps

Each task is linked to a corresponding stamp that acts as a visual reward. The stamps provide immediate feedback and motivate users to continue exploring the platform. By collecting stamps, users gain a clear sense of progress and achievement.

All stamp illustrations were generated using ChatGPT's AI Image Generator. The use of stamps also allows for future extensions, such as comparing achievements with other users or expanding the reward system.

Figure 5.14 shows the stamp collection overlay, displaying the stamps earned by the user through task completion.

Figure 5.14: Stamps

5.5 Scalability and Limitations

The current implementation focuses on a limited area defined by a bounding box around Zurich. This restriction was intentionally applied to reduce data load and ensure stable performance during development. As a result, the platform does not yet support exploration across multiple cities.

While this geographic limitation represents a constraint of the present implementation, the system architecture is designed to be scalable. The modular structure allows additional cities to be integrated by extending the existing boundaries. Geographic data, POIs, and NPC configurations could be adapted per region without requiring fundamental changes to the core system.

6 Evaluation

This chapter shows the evaluation of the interactive relocation platform through structured usability testing. The goal of the evaluation was to assess how users interact with the platform, how efficiently users can complete typical relocation-related tasks, and how the 3D map and gamified elements influence usability, understanding, and engagement.

6.1 User Background

The usability test involved four participants with different levels of experience in the apartment search and relocation process. All participants were already living in Switzerland and had at least some prior knowledge of housing searches or relocation-related tools. This approach made it possible for the evaluation to focus on general usability and interaction patterns of the platform rather than on its suitability for a specific real-life relocation case for foreigners.

Before starting with the tasks, the participants were asked about their occupation and if they had used a relocation platform before. This information provided additional context for interpreting their feedback and helped identify differences in familiarity with map-based or platform-driven apartment searches.

6.2 Usability Testing Setup

The usability testing was conducted at the end of the project to evaluate the interaction, usability, and perceived usefulness of the relocation platform. A total of four participants took part in the testing, all living in Switzerland and with prior experience in apartment searching, as described in Section 6.1.

Participants completed relocation-related tasks using three different methods: Google search, a 2D version of the platform, and the full 3D platform. This setup allowed a direct comparison of interaction, usability, and information accessibility between the methods.

6.2.1 Testing Approach

The usability testing followed a comparative, task-based approach. All participants were asked to complete the relocation-related tasks using three different methods.

- **Google search:** Participants could use any websites, queries, or tools to complete the tasks.
- **2D platform:** Participants performed the same tasks using a simplified 2D version of the platform.
- **3D platform:** Participants completed the tasks using the 3D version.

The participants were divided into two groups. One group completed the tasks in the 3D version before the 2D version, while the other group did the opposite. Both groups began with the Google-based tasks to observe how they typically would approach such relocation-related cases.

For all methods, participants were asked to complete a set of relocation-related tasks covering apartment search, local exploration, and city orientation. These tasks reflected typical actions that users perform during the early stages of relocation.

When it came to the Google-based method, participants were given a laptop with a suitable browser. They were able to use any websites, search queries, or tools they thought were appropriate to complete the tasks. This approach helped create a realistic way of doing relocation research.

In contrast, for the 2D and 3D versions of the platform, participants could only use the project website. This made sure that the tasks only relied on the platform's features, allowing for a direct comparison of interaction flow, usability, and information accessibility between the visuals.

6.2.2 Post-Test Questionnaire

After completing the tasks using all methods, participants were asked a few structured questions. The questions were designed to compare the three different approaches and to reflect on the usability of the 3D version of the website.

The questions focused on efficiency, simplicity, and the overall user experience each method offered while completing the tasks. Additionally, participants were asked to reflect on how well each method supported their spatial understanding of the city and neighbourhoods. A separate section of the questionnaire addressed the 3D version only. This section explored how confident the participants felt in understanding spatial relations and their experience with interactive and gamified elements. The questions also revolved around whether these gamified features supported or hindered the task completion. Finally, all participants had the chance to assess the overall usefulness of the platform and provide open-ended feedback and suggestions for improvement. Section D of the Appendix provides the tasks and questions from the usability test, along with the results and notes.

6.3 Results

This section presents the results of the user testing based on quantitative code mapping analysis.

6.3.1 Task Efficiency and Performance

Participants reported that the efficiency depended heavily on the type of task that was performed. The platform was mostly described as efficient for exploratory tasks, like searching for free apartments and getting an overview of the surroundings. In contrast, traditional tools like Google Maps and 2D maps were frequently perceived as more efficient for routing and navigation tasks. Several participants prefer Google Maps for route calculations and navigation due to familiarity and clarity. One participant mentioned that interacting with the 3D map could be confusing in certain situations, for example, when selecting specific buildings, which then reduced efficiency.

6.3.2 Spatial Understanding and Neighbourhood Comprehension

Most participants described that the platform supported their understanding of the city and its neighbourhoods. The 3D visualisation was considered as helpful for understanding spatial relationships, building heights, and the general structure of an area. Participants expressed that being able to see apartments, points of interest, and surrounding infrastructure within a single view granted a clearer representation of the city.

While most perceived an advantage over a typical Google search, one participant reported no clear difference between the platform and Google Maps, indicating that similar spatial understanding can sometimes be achieved using satellite or street views in existing tools.

6.3.3 Spatial Confidence After Using the 3D Map

After using the 3D version of the platform, most participants reported that they were confident in understanding the spatial relationship between apartments, schools, and grocery stores. Seeing multiple locations at once was described as helpful.

However, some limitations were identified. One participant mentioned that additional filtering for schools or grocery stores would improve the spatial understanding. Another participant mentioned limitations related to the routing functionality, especially for estimating travel times when using other transport methods than cars.

6.3.4 Gamification, Engagement, and Distraction

The gamification elements, like tasks, rewards, and avatars, were perceived differently among participants. Several reported that these elements increased enjoyment and engagement with the platform, and for some users, gamification also supported motivation to explore the map.

Other users reported little to no motivational effect, stating that the gamified elements were either unclear or not particularly relevant to their goals. Most participants did not get distracted from completing the tasks by the playful elements. One noted that distraction could occur depending on user focus and intent.

6.3.5 Adoption and Use Context

Participants generally described the platform as suitable for exploration and orientation purposes, particularly during early stages of a relocation process. While some indicated that they would use the platform in a real relocation scenario, others stated they would rely on traditional relocation platforms for final decision-making.

6.4 Analysis of Testing for Future Work

This section reflects on the results of the user testing and describes concrete implications for improving the platform in the future. The analysis focuses on issues and opportunities that emerged directly from user feedback and observed interaction patterns.

6.4.1 Information Availability and Filtering

The user testing showed that participants often relied on additional platforms when searching for detailed information. Several users expressed the need for basic filtering, such as price range or nearby infrastructure. The absence of preview images for apartments also limited the ability to quickly compare listings.

For future work, integrating essential filtering mechanisms and basic visual previews directly into the map interface could significantly improve efficiency while maintaining the exploratory characteristic of the platform.

6.4.2 Routing and Mobility Support

Even though the routing functionality was generally understood, participants identified some limitations in estimating travel times, particularly for biking and public transport. Since mobility is a key factor in relocation decisions, these limitations reduced spatial confidence for some users.

In future development, additional routing modes and clearer travel-time representations should be considered to better reflect real-world mobility scenarios.

6.4.3 Clarity and Visibility of Features

The testing showed that some features, such as search interactions, tasks, and gamification elements, were not immediately visible or fully understood by all users. This occasionally led to confusion or required external guidance during task completion.

For future work onboarding, visual hierarchy and feature visibility should be improved. This could help first-time users understand available functionalities more quickly and reduce the learning effort.

6.4.4 Gamification Balance

Although gamification components were generally perceived as enjoyable, their relevance varied based on user goals. While some participants appreciated the playful aspects, others focused primarily on efficiency and did not really engage with the gamified features.

This suggests that gamification should remain secondary to the core functionality or be optional. This allows users to prioritise either exploration or efficiency depending on their preferences.

6.4.5 Summary

To summarise, the user testing highlighted several opportunities for improvement. Particularly in terms of information density, routing functionality and feature clarity. Addressing these aspects could strengthen the platform's role as an exploration and orientation tool while improving its practicality for relocation-related decision-making.

7 Discussion

This chapter discusses the project-specific research questions by reflecting on the overall design and implementation of the platform, supported by insights gained from the user testing. The discussion interprets the evaluation results presented in Chapter 6 and relates them to the design goals and conceptual foundations described earlier in the report. It highlights the strengths and weaknesses of the relocation platform, reflects on its limitations, and suggests ways in which the platform could be improved in the future.

7.1 Answering Project-Specific Research Questions

This section revisits the project-specific research questions and discusses how they were addressed through the design and implementation of the platform. Each research question is addressed individually to assess how effectively the platform meets its intended goals.

7.1.1 3D Map Usability and Immersion (Question A)

How can a 3D interactive map visualisation for relocation services be designed and implemented to balance usability and immersion for different characteristics of the target group?

The design and implementation of the platform were intended as a direct response to this research question. To support both usability and immersion, the system combines familiar map-based interaction patterns with selectively applied 3D and animated elements. Rather than aiming for full realism, the platform focuses on early-stage relocation needs of users, such as spatial orientation, neighbourhood exploration, and general city understanding. As described in Chapter 4, this design approach prioritises low entry barriers through familiar interactions, while the use of 3D buildings, avatars, and NPCs improves spatial understanding and exploratory behaviour without overwhelming users.

The evaluation results from Section 6.3 show that usability and immersion can be balanced by combining common ways of interacting with selected 3D elements. Most participants were able to navigate the platform easily, even if they had no prior experience with 3D maps. This can be explained using interaction patterns that users are already familiar with when it comes to popular map applications. These interactions include panning, zooming, clicking on markers, and searching via the search bar. As explained in Section 5.2.1, these interactions were the basis of the map navigation and helped users learn quickly.

At the same time, immersive elements such as 3D building models, animated avatar movement, and NPCs were implemented. This supported users with their spatial understanding and orientation (see Sections 5.2.1 and 5.3). These elements were not designed to create full realism but rather to help users understand the height of the buildings, neighbourhoods, and spatial relationships. Based on the results of the evaluation (see Section 6.3.2), users valued this improved sense of space when exploring neighbourhoods and finding apartments and points of interest.

Furthermore, the platform was designed to support different exploration styles, which matches the design goals defined in Section 4.1. While some participants used the platform only to achieve the specific goals, like searching for housing or nearby services, others additionally explored the city to gain an overall impression of the environment. As discussed in Section 6.3.5, the platform was mainly perceived as suitable for early-stage exploration and orientation rather than for tasks that need a lot of efficiency, such as planning routes in detail. This behaviour is in line with the design intention described in Section 5.4, where gamification and interaction design were used to encourage discovery without forcing users to do things a certain way.

The 3D map successfully balances usability and immersion by combining common interaction patterns with selected 3D elements. Users could navigate the platform easily and understand their surroundings better, making it suitable for both goal-oriented tasks and just exploring.

7.1.2 Gamification Design and User Engagement (Question B)

How can we integrate gamification so that exploring housing and neighbourhoods feels motivated and playful without distracting from its informational purpose?

The gamification concept of the platform was designed to support and motivate users through the relocation process. Instead of including complex gamification mechanics, gamification was used to subtly motivate users to engage with core activities related to relocation.

To achieve this, simple and familiar gamification elements were implemented. Tasks were used to provide structure and guidance, while stamps served as simple visual rewards to show the user's progress. To increase liveliness and help create a stronger sense of place, the platform included avatars and NPCs. Section 5.4 explains how the gamification systems work, including the tasks and stamps. Sections 5.2.2 and 5.3 describe the avatar and NPC representation.

The tasks were designed to be goal-oriented but not linear, allowing users to choose how and when they want to complete them. They focus on essential relocation activities such as searching for apartments, exploring new neighbourhoods and services and using the route planner. This makes sure that completing tasks does not get in the way of other activities (see Section 5.4.2).

The results of the user testing (see Section 6.3.4) showed how well this approach worked. Most participants perceived the gamification aspect as enjoyable and supportive. None of them reported that any element was distracting them from finding important information. Several users stated that gamification made them more interested in the platform, especially during exploration. However, the test also revealed that some users did not notice or fully understand the stamp system right away. This was partly because the task and stamp lists were hidden by default, which made them difficult to see for first-time users. This issue is also mentioned in the evaluation (see Section 6.4.3).

In addition, the results showed that the impact of gamification depended on what the user intended to do and what kind of user they are. While participants who like to explore enjoyed the playful elements, others who like to be efficient focused on completing tasks quickly and did not pay much attention to the rewards.

Overall, the findings suggest that gamification in relocation platforms should support users in finding information they need. Keeping gamification simple, optional, and clearly visible allows the system to adapt to different user preferences. In this project, the chosen approach successfully enhanced engagement for some users while keeping things clear and easy to understand. This shows that simple and flexible gamification is more effective than complex game systems in this context.

7.1.3 Comparison of 3D and 2D Map Visualisation (Question C)

What advantages does a 3D city map offer over a 2D map in terms of user task performance, user engagement, enjoyability, and usefulness for the relocation process?

The results of the evaluation show that a 3D city map offers several advantages over a 2D map, especially when it comes to spatial understanding, engagement, and exploratory use during the early stages of relocation. As shown in Section 6.3.2, most participants reported that the 3D visualisations helped them understand the city better, including building heights, density, and neighbourhood structure. Seeing buildings as 3D objects made it easier to identify individual buildings and understand their spatial relationships compared to flat representations on 2D maps.

These advantages are particularly useful for users who are not familiar with the city, as a 3D overview helps them with orientation and understanding the city layout. This matches the goal to support early-stage relocation decisions in a new city or area (Section 4.1). In this stage, it is more important to get a general idea of the city and its neighbourhoods than to complete tasks as quickly as possible.

In addition to improving spatial understanding, the 3D environment made exploration more engaging and enjoyable. The combination of 3D building models, avatar movement, and interactive markers (Sections 5.2.1 and 5.3.1) made users feel like they were in the city. This encouraged them to explore different areas rather than only following a predefined path. These elements also helped users view apartments, points of interest, and neighbourhoods simultaneously, which supported them in having a clearer understanding of the city (see Section 6.3.2). This is especially valuable when users are deciding where to live and which nearby places are important to them.

While the 3D map improved spatial understanding and engagement, some participants noted that tasks that required precise routing or specific selections could be done faster on a 2D map or with familiar mapping tools (see Sections 6.3.1 and 6.3.5). This indicates that 3D visualisation is more useful for exploratory and orientation-focused activities rather than tasks that need efficiency.

In general, the 3D map offers clear advantages over the 2D map in terms of spatial understanding, engagement, and exploration at an early stage. While it may be less efficient for specific tasks like planning a route, it gives users a clearer idea of the city. This makes it easier for them to find their way around and helps them make informed decisions when they are moving.

7.2 Usability, System Design, and Validation

The results of the user testing (see Chapter 6) show that the platform is easy to use, and that the system design makes it simple to interact with a 3D map. Participants could use the platform without prior experience, which suggests that combining familiar map interactions with a simple interface design works well.

The map's design was kept simple so that users can focus on the map and its content. This is especially important in 3D, because if there are too many visual elements, it can be overwhelming for users and make orientation harder for them. The pop-ups and overlays can also be switched off easily by the user because they were designed to appear only when needed. This makes it possible for users to explore the map without any distractions.

Performance-related design decisions, such as limiting the visibility of 3D elements and only showing a certain area of the map, helped make the platform easy to use. It also prevented visual cluttering and performance issues during testing.

Overall, the testing results show that the chosen system and interface design work well for helping users move and explore new places.

7.3 Limitations and Future Work

The project shows the potential of a 3D interactive relocation platform. However, there are some limitations that must be considered.

The evaluation was conducted with a small number of participants. Although the number was sufficient to show important patterns and general interaction issues, it does not allow for generalised conclusions. A larger and more diverse participant group would help better understand different users, their expectations and what they might do.

In addition, the platform currently uses static and sample data. Apartment listings, points of interest, and NPC-related information are not connected to real-time data sources. That is why the website should be seen as a conceptual prototype rather than a service that is ready to be used.

Another limitation is the restricted geographic scope of the implementation. The platform is limited to a predefined area. This was done to ensure stable performance and manageable data complexity during development. However, this means that the website is not suitable for users who are moving to other cities or areas.

Future work could focus on addressing these limitations. This means using real-time location and housing data, expanding the platform to include multiple cities, and adding more routing options such as public transportation. Furthermore, more user studies could investigate long-term usage, cultural differences among users, and how gamification elements affect engagement over time. A more detailed discussion of potential future developments is explained in Chapter 9.

8 Conclusion

This project explored how an interactive 3D map can help with the relocation process by improving spatial understanding, engagement, and orientation in a new city. The main goal was to design, implement, and test a relocation platform that balances usability, immersion, and clear information access while still being easy to use, despite different user preferences.

The evaluation revealed several key findings. Participants found the 3D visualisation helpful for understanding how tall buildings were and their distances. They also noticed that it clarified how the area was structured. This made it easier for participants to understand the spatial layout. Interactive elements like the 3D characters helped with exploration and engagement. Tasks and stamps motivated users without distracting them from the main purpose of the platform, which is sharing information. Participants also said that these features made the platform enjoyable to use and encouraged them to explore more. This confirms that a careful balance between immersion and usability is possible in relocation applications.

In summary, the platform shows that 3D maps combined with simple gamification can improve users' relocation experience when designed carefully. The results show that finding the right balance between usability and immersion is crucial. They also indicate that interactive, exploratory tools can help users make more informed relocation decisions. The initial research questions (A-C) have been addressed, which provides a solid basis for further development in this area.

9 Future Work

The project shows how an interactive and gamified approach can help users with their relocation process. Several ideas were identified that could extend the platform's functionality. Due to time and scope limitations, these concepts could not be implemented, but they provide a clear direction for future development. The system design also supports future extensions at a code level.

An important next step would be to integrate external APIs to get real housing data. This would mean that the platform could move from a conceptual prototype to a real tool for actual relocation scenarios. Expanding the platform to support multiple cities would also increase its adaptability for a wider range of use cases.

The gamification system could also be extended by creating tasks as progressive levels. This essentially means that when a user completes one task, they will unlock the next one. Users could then compare their stamps with other users, which gives them a sense of competition. User accounts could help with this by letting users save their preferences, locations, and progress.

Another potential feature would be a guided onboarding experience for first-time users. A short tutorial or an NPC-based guide could help users understand the platform's features more quickly. This could be done by making the NPCs more advanced or by using an AI-based chatbot that answers user questions. Such chatbots could also provide recommendations or guide users during exploration. If the platform expands and includes more cities, NPCs could also be placed at the real locations of their services.

Finally, future work could focus on enhancing collaboration and social interaction by introducing a multi-user platform. This would let users explore and chat together, as well as use community features. These enhancements would create a strong foundation for future research and development projects.

Bibliography

[1] SwissPlatz, “Votre Meilleure Agence de Relocation | SwissPlatz | Genève”, 2025. [Online]. Available: https://www.swissplatz.com/. [Accessed: 20 12 2025]

[2] ImmoScout24, “ImmoScout24: Real estate in Switzerland to buy and to rent”, 2025. [Online]. Available: https://www.immoscout24.ch/en. [Accessed: 20 12 2025]

[3] Google Maps, “Google Maps”, 2025. [Online]. Available: https://www.google.com/maps. [Accessed: 21 12 2025]

[4] Apple, “Apple Maps: Directions, Guides & Traffic”, 2025. [Online]. Available: https://maps.apple.com/. [Accessed: 21 12 2025]

[5] N. Crespi, A.T. Drobot, R. Minerva, “The Digital Twin: What and Why?”, in *The Digital Twin*, Springer, Cham, Jun. 2023, pp. 3-20. [Online]. Available: https://link.springer.com/chapter/10.1007/978-3-031-21343-4_1

[6] Electronic Arts Inc., “The Sims Video Games - Official EA site,” 2026. [Online]. Available: https://www.ea.com/en-gb/games/the-sims. [Accessed: 07 01 2026]

[7] Second Life, “Official site | Second Life - Virtual Worlds, Virtual Reality, VR, Avatars, and Free 3D Chat”, 2026. [Online]. Available: https://secondlife.com/. [Accessed: 07 01 2026]

[8] C. Gu, X. Sun, W. Wei, J. Sun, Y. Zeng, and L. Zhang, “’Nice to Meet You in Masks’: How Virtual Avatars Enhance User Experience on Random Video Chat Platforms”, *Journal of Theoretical and Applied Electronic Commerce Research*, vol. 20, no. 1, Jan. 2025, pp. 14. [Online]. Available: https://www.mdpi.com/0718-1876/20/1/14

[9] J. Strobel, C. Hawkins, “Designing in Second Life: Identity Construction and Learning in a Virtual Informal Environment,” *Journal of Online Engineering Education*, vol.1, no. 1, Jun. 2022. [Online]. Available: https://onlineengineeringeducation.com/index.php/joee/article/view/3/3

[10] “NPC”, Cambridge Dictionary, 2025. [Online]. Available: https://dictionary.cambridge.org/dictionary/english/npc?q=NPc. [Accessed: 18 12 2025]

[11] O. Goethe, “Gamified Thinking”, in *Human–Computer Interaction Series*, Jun. 2019, pp. 13-24. [Online]. Available: https://link.springer.com/chapter/10.1007/978-3-030-11078-9_2

[12] A. Schmid, “Theoretical Background”, in *Gabler Theses*, Jul. 2022, pp. 9-50. [Online]. Available: https://link.springer.com/chapter/10.1007/978-3-658-38261-2_2

Bibliography

AI Tool	Where in paper	What kind of support
ChatGPT 5.2	6.3 Results	Support analysis of user testing evaluation
ChatGPT AI Image Generator	Mentioned in 5.4.3 Stamps	For generating images of stamps
DeepL Translate	Everywhere	To translate individual words from German to English

Declaration of Authenticity

I hereby declare that any individual/pair/team- work submitted for assessment is entirely the product of my own/my own & my partner's/my own & my team's effort

- that I/we have correctly cited all text passages that do not originate from me, in accordance with standard academic citation rules (e.g. APA or IEEE), and that I have clearly mentioned all sources used;
- that I/we have declared in footnotes or in an "Index of auxiliary tools" all aids used (AI assistance systems such as chatbots [e.g., ChatGPT], translation [e.g., DeepL] paraphrasing [e.g., Quillbot]) or programming applications [e.g., Github Copilot] and indicated their use at the corresponding text passages;
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Windisch, 06.02.2026

Name(s): Selina Lanz, Michelle Rickenmann

Signature(s): S. Lanz Michelle R.

Appendix

A Miro Documentation

Link to Miro documentation: https://miro.com/app/board/uXjVJJcqEXE=/?share_link_id=861445668080

B Figma Prototype

Link to design flows: https://www.figma.com/board/HUiLJubWLRD5jOqf7j1QZ6/Flows?node-id=37-470&t=gHd3pwYIn6iIYKGj-1

Link to prototype: https://www.figma.com/design/DgSGAlvdEkbFsgNXJRt2nZ/Prototype?node-id=0-1&t=XH4zWPchmbtpKY20-1

C Stamps

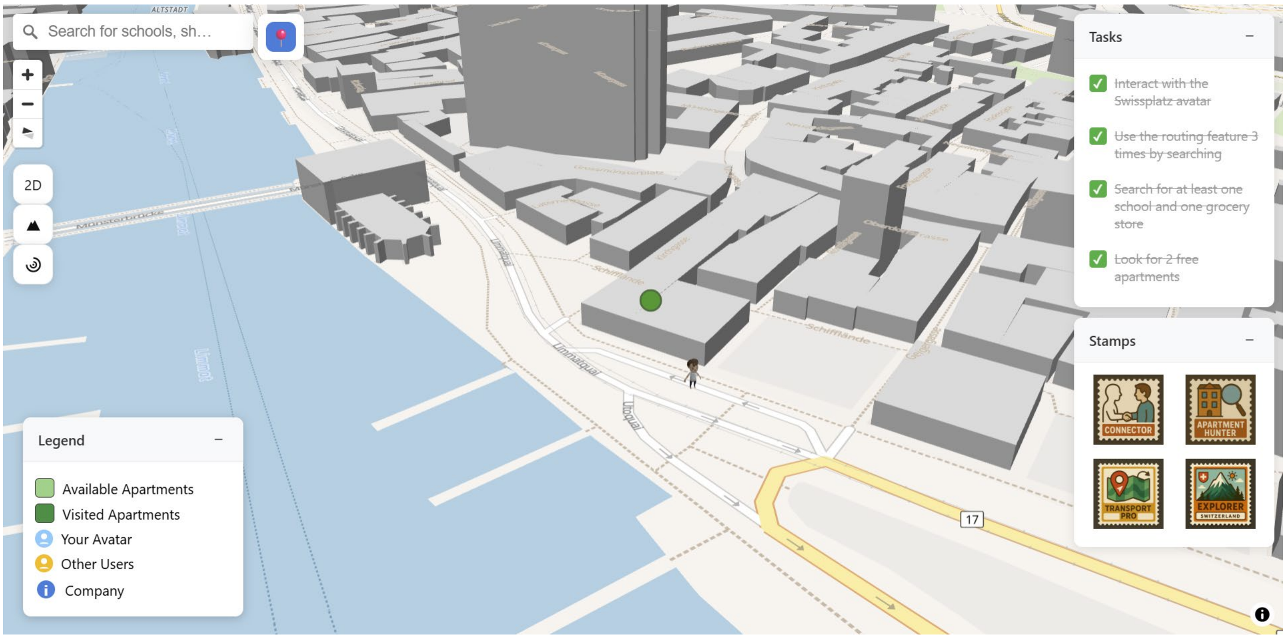
Prompt for Explorer stamp: «Erstelle mir eine briefmarke die als reward in einem spiel dienen soll sie soll iergndwie die schweiz repräsentieren und wäre als badge für explorer gedacht»

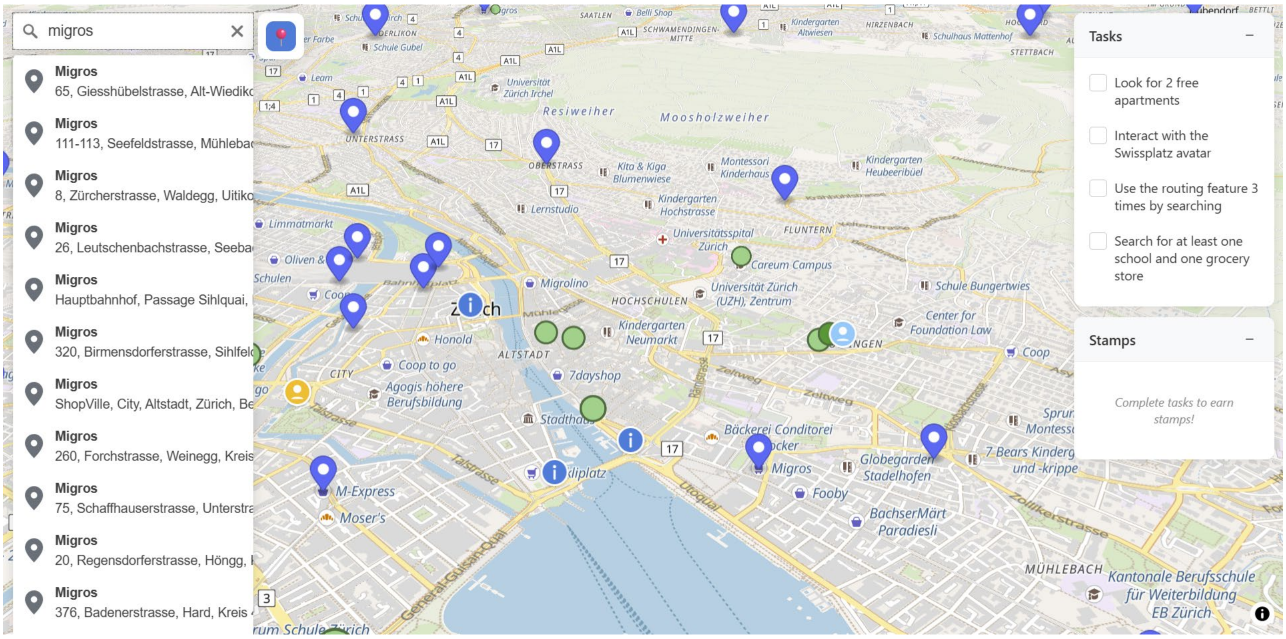
D Usability Testing Results and Questionnaire

Link to Excel file:

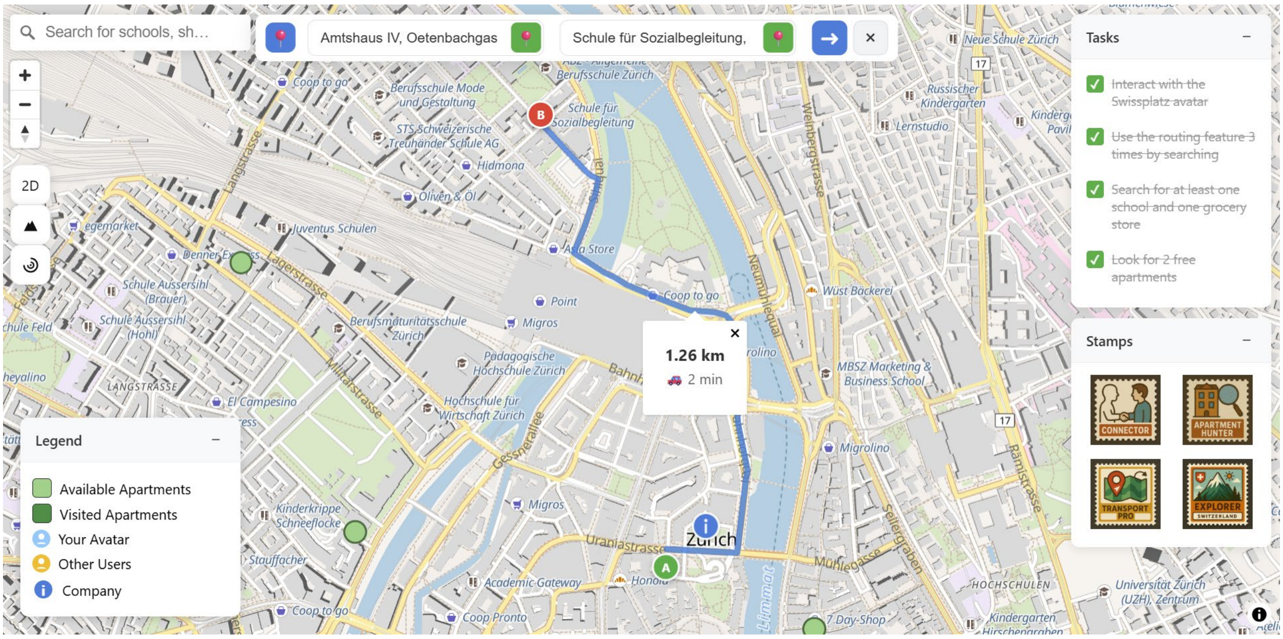
User Testing.xlsx

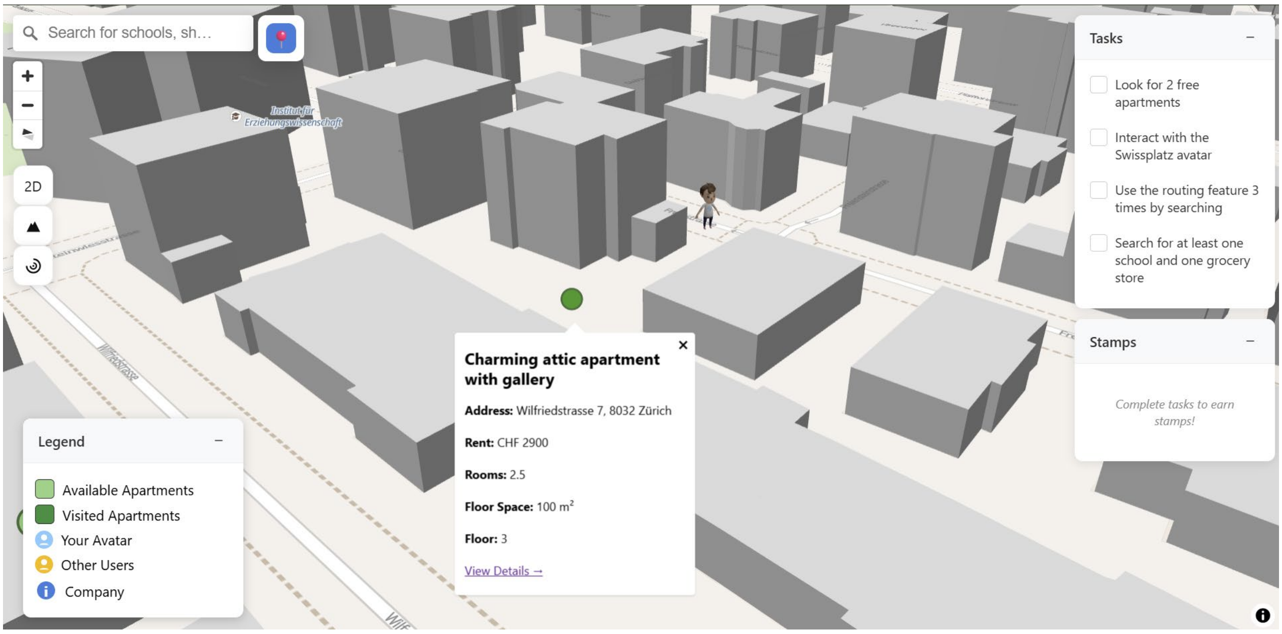
E Final Solution





E Final Solution





E Final Solution