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1. Problem Statement

This paper presents *Tinterim*, an innovative company that seeks to tackle the pervasive challenge of vacant non-residential buildings in urban areas, focusing firstly on Munich (Neuperlach), Germany. Our solution has been developed in response to a challenge initiated by institutions of TU-Munich, namely the Chair of Circular Economy (CE) in Straubing and The Institute of Energy Efficient and Sustainable Design and Building (ENPB) in Munich. The challenge was carried out in the context of the EuroTeQ Collider “Leave no Waste Behind” Course.

Cities, including Munich's district Neuperlach, are facing the pressing issue of large numbers of vacant non-residential buildings. In 2019, eight major cities, including Cologne, Düsseldorf, Essen, Hamburg, Berlin, Leipzig, Frankfurt, and Munich had a staggering amount of empty building space of 4,038,000 m². The city of Munich contributes 861,000 m² to this "waste of space" (BNP Paribas Real Estate, 2019).

The Covid crisis has further exacerbated the problem (Balemi, et al., 2021). Companies offer more home office and remote working options to their employees. As a result, large tenants leave these non-residential buildings leaving large office spaces empty which leads to a surplus of unoccupied large office buildings (BNP Paribas Real Estate, 2019). Our expert interviews with Franken and Karle (2023) showed that future long-term tenants often require prior renovations. Unfortunately, the process of planning and negotiating such renovation projects is time-consuming, typically spanning a duration of 1 to 6 years. But building owners are not incentivized to rent during this time since large-scale renters have become rare, especially for only interim rent. Therefore, the search for interim renters is often not worth the time and money investment. But there is a high interest in smaller interim renters. They also often don't require prior renovations. But until there is no incentive created for large building owners to fill their empty buildings before renovation or demolition this empty space will continue to be wasted (Franken & Karle, 2023).

To address this critical challenge, *Tinterim* aims to bridge the temporal gap between the conclusion of one occupancy and the start of renovation or demolition activities. Our approach is rooted in the concept of circularity, with a dedicated focus on the reuse phase within the sustainability pyramid (Lim, 2022). We deliberately focus on the reuse rather than recycling stage in the building sector. This strategic decision is based on two primary factors. Firstly,

recycling initiatives offer limited potential for substantial improvements, as extensive research has already been conducted, and numerous recycling strategies have already been implemented Nautiyal et al., (2015). Secondly, operating at the highest level possible of the circularity pyramid is essential to achieve true circularity. By prioritizing reuse, which occupies the second level of the pyramid, we can enhance circularity to a greater extent than focusing solely on recycling, which falls at the third level (Lim, 2022).

Our objective is to establish an integrated platform that seamlessly facilitates interim rentals, ensuring the efficient and optimal utilization of time and space between successive occupancies.

2. Solution Explanation

The efficient utilization of empty spaces is a pressing concern in various domains, ranging from real estate to community development. *Tinterim* presents an innovative platform that addresses this issue by seamlessly connecting building owners and tenants while facilitating collaboration among individuals with similar ideas.

Our webpage is a dual-sided platform specifically developed to facilitate the connection between owners of vacant spaces and potential tenants. Upon receiving information from space owners, our proficient team promptly engages in various activities. These include generating a digital blueprint of the area, evaluating, and ultimately identifying available spaces suitable for immediate occupancy with minimal or no renovation activities. The collaborative efforts of space owners and our dedicated team result in the efficient allocation and utilization of vacant spaces, unlocking their potential for temporary occupancy.

On the other side of our platform, we cater to tenants ranging from startups and organizations to individuals seeking suitable spaces. Through our user-friendly website, tenants can select spaces tailored to their requirements. In addition, we offer a unique feature that allows tenants to connect with like-minded individuals or communities who share similar ideas. Once a match is made, our team manages legal procedures, ensures compliance, and facilitates a hassle-free transition. By providing this comprehensive service, we aim to enhance the overall experience for tenants and owners alike, enabling them to focus on their core activities. At the same time, we take care of the necessary administrative processes.

We conducted a comprehensive analysis to evaluate the viability of our double-sided platform. In 2021, Munich had a total vacant space of 962,100 m². Despite this significant vacancy, the new built-up area was 73,200 m². Additionally, a large area of 1.4 million m² is currently under

construction, projected to be available by 2025 (Cushman and Wakefield). According to a report by BNP Paribas, the vacancy rate in Munich rose to 4.5% in 2021 (BNP Paribas Real Estate, 2019). To promote the circularity of vacant spaces, we have decided to concentrate on Munich's empty area as a first step. Identifying these empty spaces in Munich presented a significant challenge for us.

In our expert interviews, Mr. Maurice Franken revealed that the city of Munich possesses many buildings, many currently unoccupied. To guarantee a secure market for our solution, we decided to establish a partnership with the City Administration of Munich. Moreover, this collaboration enhances the platform's credibility and reputation, fostering trust among potential users. Furthermore, it provides access to valuable data and insights from the administration, which can be utilized to refine the platform's features and align it with the city's specific needs and objectives. The partnership also opens avenues for collaboration on urban development initiatives, contributing to the sustainable growth and utilization of vacant spaces in Munich, and later down the line, Germany wide.

3. Methodology

Our solution is grounded in a comprehensive methodology that integrates insights gathered from previously mentioned expert interviews and independent research, especially looking at news articles as well as scientific papers. For this we also conducted an interview with Dr. Volker Thome, a Fraunhofer engineer, about their solution to break up concrete into its original components (Dr. rer. Nat. Thome, V.,2023). In the end, we chose to pursue the *Tinterim* idea, as reuse ranks higher in the sustainability pyramid than recycle. In this section, we provide a detailed explanation of our methodology, highlighting the value of the expert interviews and the role they played in shaping our understanding of the market gap we identified in the commercial real estate sector.

Expert Interviews:

To ensure a well-rounded perspective, we conducted interviews with professionals who possess extensive experience in the commercial real estate sector. Our panel of experts collectively boasts an impressive 30 years of combined expertise in various areas of the industry. These individuals were carefully selected based on their roles, expertise, and relevance to our research objective. During these interviews, common pain points can be identified that help us in developing our solution.

One of our key interviewees, Maurice Franken, is a Senior Consultant at Immocon GmbH. He provided a comprehensive overview of the commercial real estate market in Munich and Germany-wide (Franken, 2023). Furthermore, he also helped us map the Stakeholders involved in the commercial real estate market as well as identify potential clients that could be targeted by our solution.

Another key interviewee, Lea Karle, is an Investment Manager at the Domicil Real Estate Group (Karle, 2023). With her in-depth knowledge of the legal aspects and contractual nuances within the commercial real estate domain, she provided valuable insights into the specific challenges and gaps present in the market. Her expertise greatly enriched our understanding of the legal framework surrounding commercial real estate transactions and guided us in formulating our solution. Her information helped us to identify solicitors as key players when wanting to find out who owns real estate, which is especially important for our solution.

Our last key interviewee is Angela Flasig, the Managing Director at A-Form Fasig GmbH, an internationally active space planning office (Flasig, 2023). Her expertise in construction drawings and plans, analog as well as digital, supported the fine-tuning of our solution.

Interview Protocol and Data Collection:

Our interview protocol was designed to elicit detailed information regarding our identified market gap. The questions were carefully crafted to explore different dimensions of the issue, covering aspects such as market trends, client needs, existing solutions, and potential barriers. These interviews were conducted through face-to-face meetings.

During the interviews, we ensured a comfortable and open environment for the experts to express their viewpoints freely. Their responses were noted. All data collected from the interviews was treated with the utmost confidentiality and in accordance with ethical guidelines.

Data Analysis and Integration:

The data obtained from the expert interviews underwent a rigorous analysis process during the working weekend. We employed a thematic analysis approach, identifying recurring themes, patterns, and insights across the responses. By systematically organizing and categorizing the data during our weekly team meetings, we were able to identify common threads and discrepancies, providing a comprehensive understanding of the market gap. These common threads, also mentioned in the previous chapters, include the currently unrealized opportunities of building owners to rent their space and therefore cover their costs for the building, but also

the fact that the city of Munich will be our first client as they own a large stock of vacant buildings that could be repurposed.

The insights gathered from the expert interviews were then synthesized with the findings of our independent research. The independent research involved an extensive literature review, and data analysis of relevant market reports, p.ex. the Retail Market Property Report by the real estate office of BNP Paribas (BNP Paribas Real Estate, 2019). This integration of data from multiple sources allowed us to triangulate our findings and enhance the robustness of our conclusions.

Limitations:

While our methodology was designed to ensure validity and reliability, we acknowledge certain limitations. One limitation is the inherent subjectivity in expert interviews, as perspectives may vary based on individual experiences. Additionally, the sample size of experts interviewed was relatively small, which could impact the generalizability of our findings. However, we mitigated these limitations by selecting experts with diverse backgrounds and cross-referencing their insights with independent research. Nevertheless, we would have welcomed the opportunity to talk to more experts, like Michi Kern, the Executive Partner of the Lovecraft Interim project, and his team of lawyers and solicitors, or representatives of ImmoScout, but to this day, we have not gotten more feedback.

4. Final Product

The two-sided platform *Tinterim* provides a worldwide accessible webpage for tenants and building owners as depicted on the landing page in Figure 1. The concept of *Tinterim* draws inspiration from the popular online-dating platform "Tinder". The online-dating platform is mostly associated to "short term solutions", *Tinterim* offers interim solutions, hence the amalgamation of "Tinder" and "interim" for the platform's name. The slogan "*swipe your SPACE!*" serves as a foundational element and remains consistent across all subpages. Just like the "Tinder" application, the landing page incorporates a swiping visualization feature following the selection of either a tenant or an owner. In this paper, the prototype is described with the help of screenshots of the interactive online version, which is accessible via [this link](#).

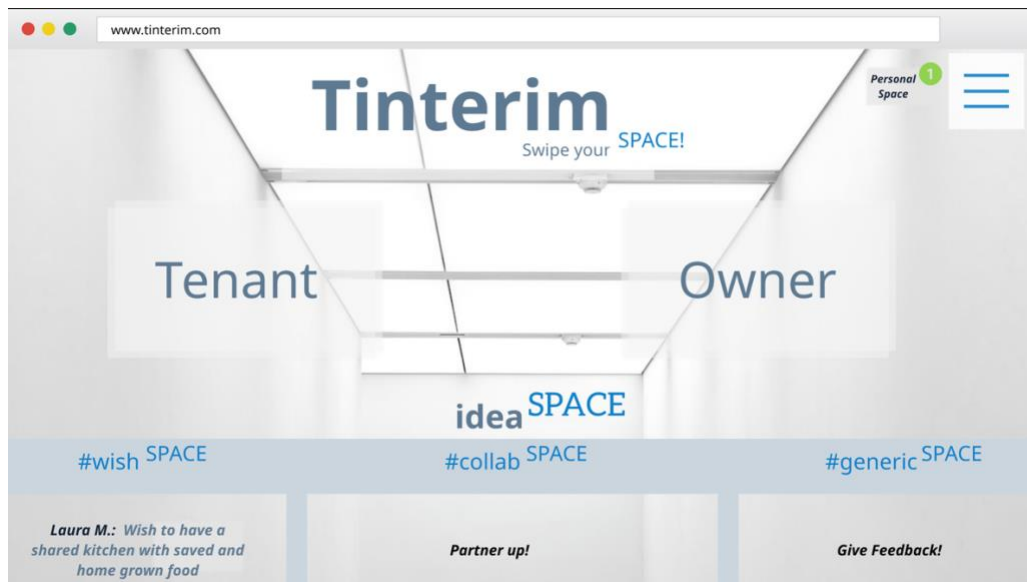


Figure 1 - Landing Page: Tinterim

Upon selecting either the *tenant* or *owner* option, the website transitions left or right, mimicking the swiping action familiar to users of the "Tinder" platform. The owner's subpage, labeled "*Supply SPACE*" (Figure 2), allows owners to explore other property listings and apply filters using icons that provide a quick overview of essential factors. These icons utilize a three-tiered colored scale to represent crucial aspects such as price level (Euro signs) and building condition (tool icons).

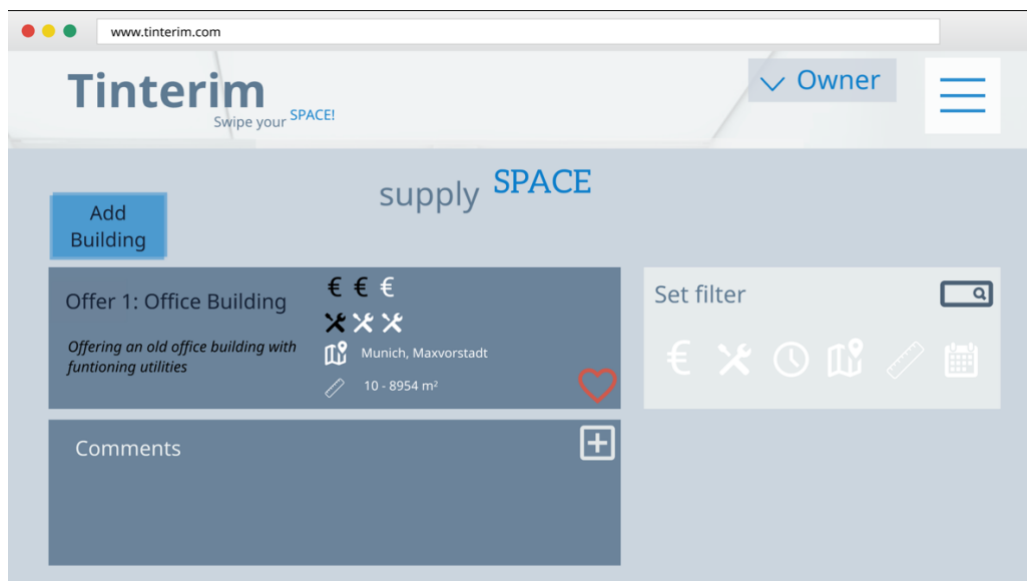


Figure 2 - Supply SPACE: Owners' perspective

Clicking on the "Add building" option leads owners to a subpage where they can upload images and floor plans of their vacant spaces, along with providing generic information (Figure 3). Additionally, owners can view the offer status of their spaces.

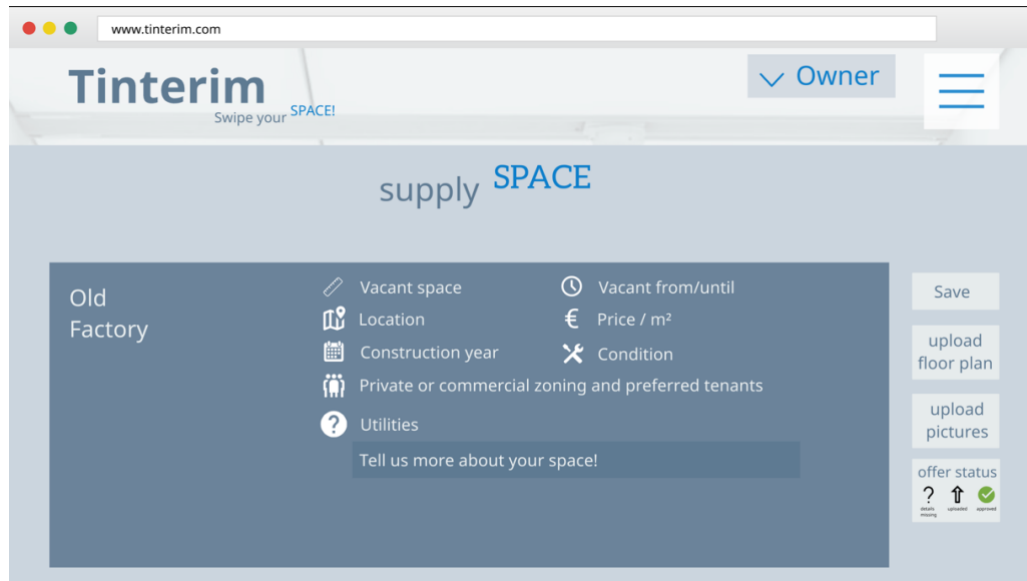


Figure 3 - Owners' perspective: Add building

The "Supply SPACE" page is designed differently for tenants. They can browse all available offers (Figure 4) and access detailed information and comments on each listing (Figure 5). Furthermore, tenants can view floor plans that display the application statuses and comments from other users about the rooms, facilitating an opportunity to assess potential neighbors and collaboration prospects in advance (Figure 6). This feature aims to foster a sustainable and open-minded working environment by connecting people, their ideas, and ambitions.

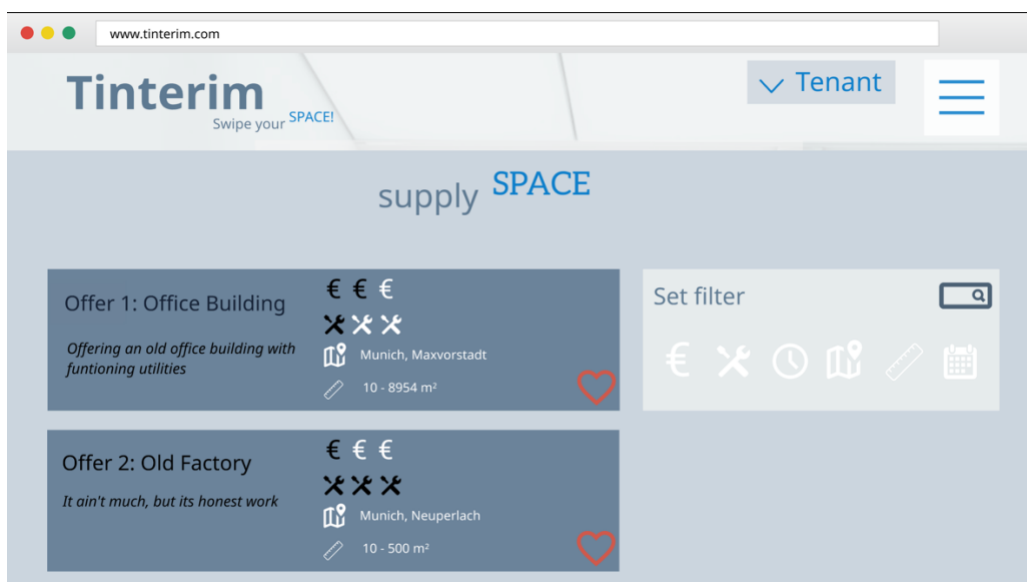


Figure 4 - Supply SPACE: Tenants view

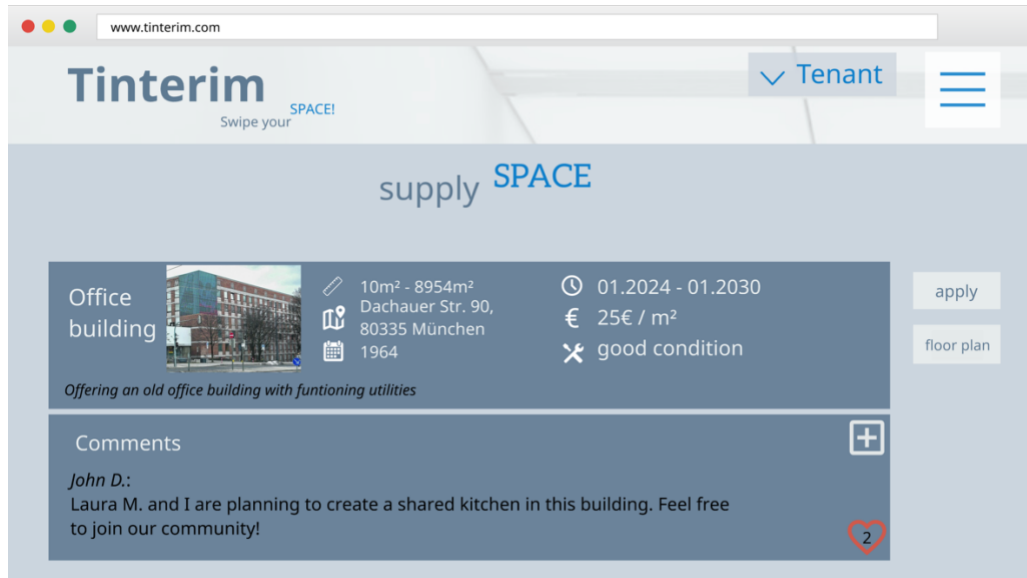


Figure 5 - Supply SPACE: Detailed view of an offer



Figure 6 - Your SPACE: floor plans

Moreover, the "idea SPACE" allows users to connect and share their ideas (Figure 7). Users can post their collaboration offers, requirements, and generic questions, which can be sorted and filtered based on hashtags indicating the topic of interest.

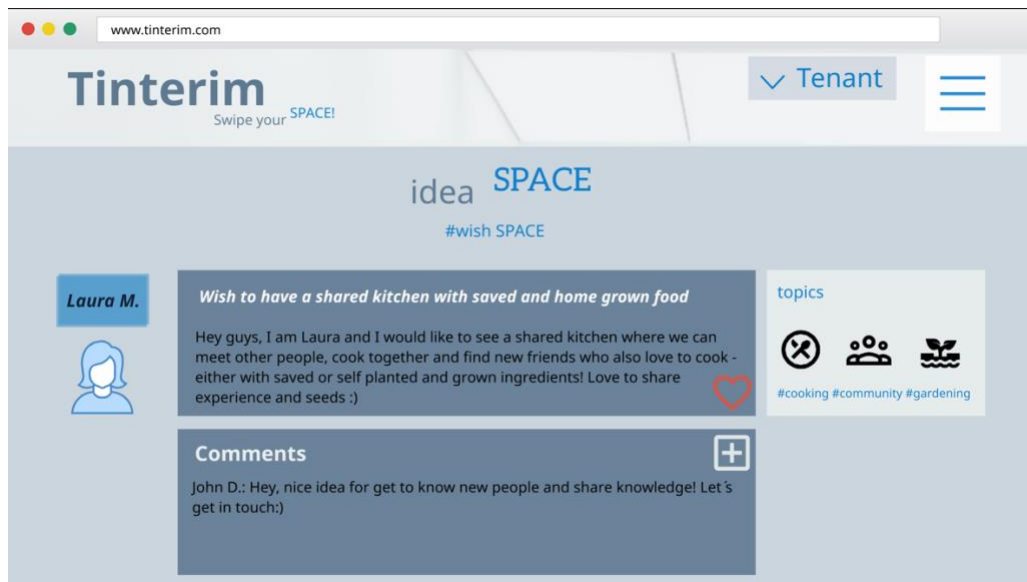


Figure 7 - Idea SPACE: wish SPACE

Each user must create a “*profile SPACE*”, visible to others upon clicking on their respective profiles (Figure 8). The “*profile SPACE*” offers an overview of the user, facilitates starting conversations, and displays all contributions made on *Tinterim*.

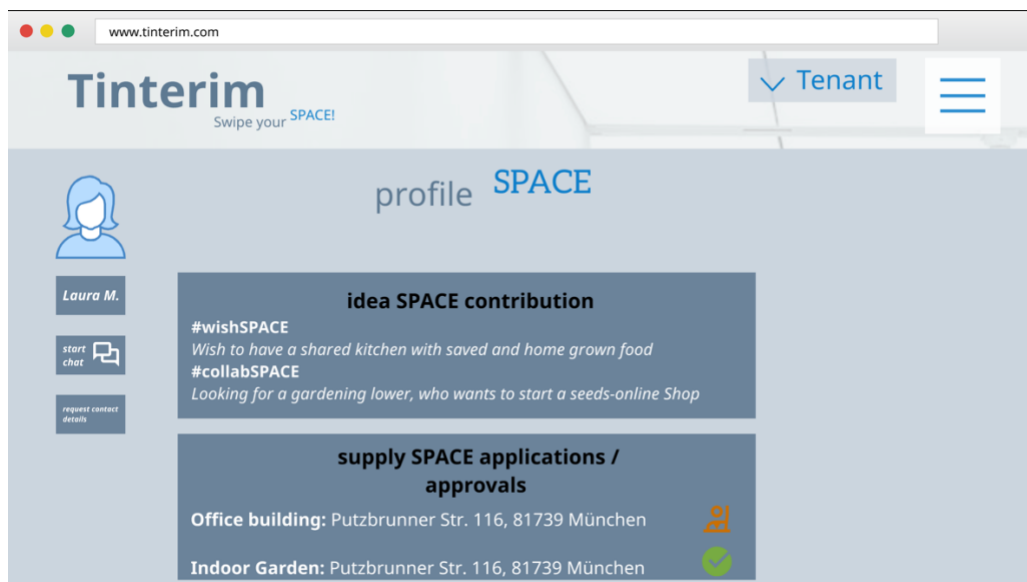


Figure 8 - Profile SPACE

The “*personal SPACE*” (Figure 9) is accessible exclusively to the respective user. It provides options to modify settings, engage in chats with other users, review personal “*idea SPACE*” contributions and their comments, as well as monitor pending applications and approvals.

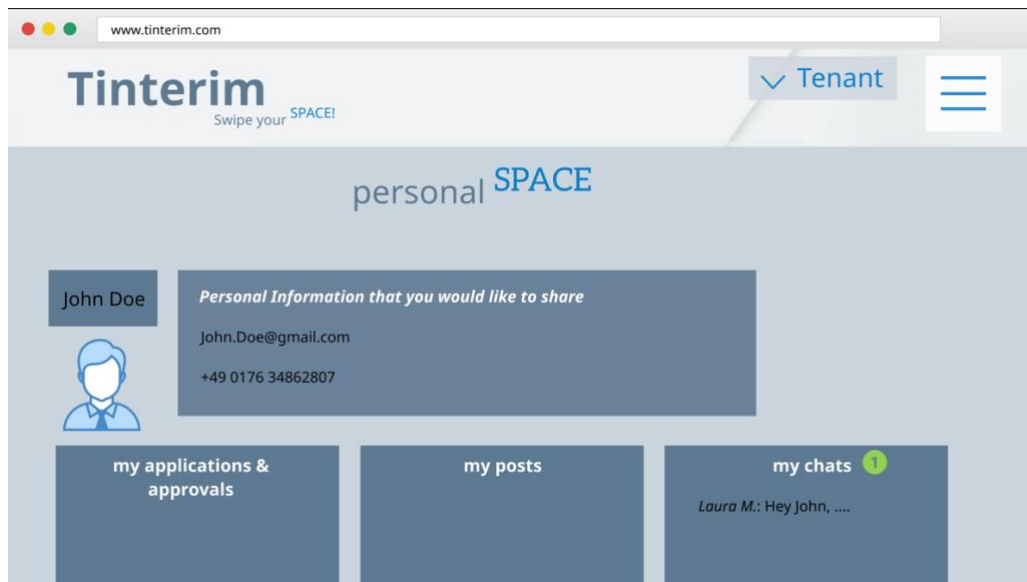


Figure 9 - Personal SPACE

5. Financial Analysis and Future Outlook

The company's financial analysis has been conducted mainly on an assumption basis considering the population that is present now using mobile networks who are in need of space and the growth of peer group companies such as Immoscout24, Immowelt.de, and so on until the current period. From the calculations that have been done based on Addevice. 2023, it is expected to have an expense of 130.000 Euros for the development of the website and for the costs of technology. For the efficient working of the website and the company, external sources of help are needed such as legal assistance, surveying, hosting, marketing, maintenance, and so on, and enough amount must be required for these, and it will probably be around 840.000 Euros for 1 year. Therefore, a total of 970.000 Euros will be the basic expense that *Tinterim* is expecting in the first year when founded (Appendix A).

Tinterim generates three revenue streams. First and foremost, the advertisement, where 50 cent will be charged for each click (LYFE Marketing. 2023) and is to be increased in the future. Secondly, an amount of 20 Euros as a service charge after each successful processing, a successful processing means that the contract has been signed and the tenants enter a rental contract relationship with the company. An amount of 20 Euros has been decided because of the convenience of every customer. And thirdly, there will be a commission fee of 10% of the rent that is paid each month, which is decided to make it more convenient for the customers and the company. Based on these revenues, as it can be seen in Figure 10, the financial analysis is showing a positive graph within 10 years after the launch, this is mainly because of the increase

in the number of users and different stages that is present in the timeline of the website. The number of users that are expected to be customers of *Tinterim* has been taken from the site Statista. (n.d.). Immobilienscout24, 2023 which has been multiplied with the average income that would be generated during the successful running of the website.

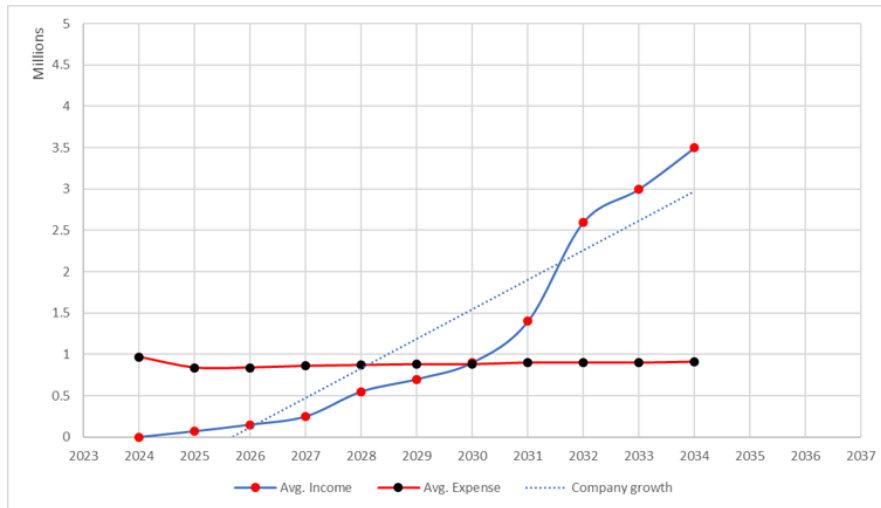


Figure 10 - Market expectations

Tinterim would likely be launched by the first months of 2024 and will be limited only to the Munich city administration during the first period of its venture. After the successful initiation in Munich, it will be opened to privately owned properties by 2027 so that private renters or property owners can also take part in the trading. This will not only increase the revenue but also the name of the firm in and outside Munich. By the start of 2030, *Tinterim* can be used in the whole of Germany and there it will cross the break-even point, point where expense meets income, of nearly 1 million that is present at that time. In 2032, a sister app will be created for effective long-term usage, and it will be scaled throughout Germany.

To better understand how *Tinterim* will grow, the marketing strategy will be presented in the following. The Platform business model relies crucially on user numbers (Hagel 2015). Our marketing strategy, therefore, pursues a holistic approach. We want to advertise our services and our platform's opportunities on social media, namely Instagram, LinkedIn, Facebook, and YouTube. To also engage with the elderly population and people with no internet access, we also want to use advertisements by local radio stations and through print media, especially newspapers. This allows us to target relevant communities and generate awareness for *Tinterim*'s offers in specific areas. Lastly, Posters with QR-Codes, that link to the building on

the *Tinterim* platform, as well as general information about our platform will be put up on-site at every building that is part of the *Tinterim* portfolio. Of course, we also hope that our services and the opportunities that *Tinterim* enables speak for themselves and that happy users are referring our platform to their friends and family. A perfectly analyzed business model canvas has been prepared for the efficient functioning of *Tinterim* (Appendix B) where different segments of the firm have been combined including the key partners, activities, value propositions and the beneficiaries. The expenses and the revenues have also been added to this to make it vivid.

6. Conclusion

Tinterim tackles the problem of vacant non-residential buildings in urban areas, focusing on Munich, Germany. The covid crisis and remote working have exacerbated the problem of empty office space. *Tinterim* aims to bridge the gap between letting and renovation/demolition, with an emphasis on circularity and sustainability. By connecting building owners and tenants through an integrated platform, *Tinterim* facilitates efficient space utilization. The user-friendly interface allows for easy search and selection. *Tinterim* team handles the administrative tasks, ensuring a smooth transition and allowing the parties to focus on their core activities. The methodology used for this project includes expert interviews and independent research, providing insight and shaping the solution. Financially, *Tinterim* expects initial costs for website development and operating costs. Revenue streams include advertising, service fees and commissions. The analysis predicts positive growth over ten years, with plans for expansion beyond Munich and into private properties.

In summary, *Tinterim's* innovative solution promotes circularity and sustainability. The platform optimizes the use of space for owners and tenants and has multiple unique selling points like the Idea Space, the possibility for the public to get involved in shaping the urban landscape, a robust methodology and a promising financial outlook. The platform allows building owners to reduce their costs by generating rental income. We improve public participation in brainstorming potential new uses for empty space. Finally, *Tinterim* provides a platform to generate ideas, share them on the platform, and make the final dreams a reality. *Tinterim* therefore aims to have a significant impact on commercial real estate and contribute to economic and social development.

7. Roles

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Appendices

Appendix A: Expense Calculation

Sl. No.	Expenses	Amount (€)	Remarks
	IT Costs		
1	Development of App	30,000.00 €	
2	Technology Costs	1,00,000.00 €	
	Initial Cost for Startup	1,30,000.00 €	
	Additional App Costs		
4	Hosting Costs	12,000.00 €	per year
5	Marketing Costs	2,40,000.00 €	per year
6	Maintenance Costs	12,000.00 €	per year
	Operational Costs		
7	Labour (HR Costs)	5,76,000.00 €	per year (30€/ph, 40 hours per week per person)
	Yearly repeating basic expense	8,40,000.00 €	
	Annual Total Expectation	9,70,000.00 €	

Appendix B: Business Model Canvas

KEY PARTNERS  <ul style="list-style-type: none"> • Building Owners of Non-residential buildings • Potential Tenants • Real estate agencies • Service providers • Legal Support • Advertising partners • Local authorities 	KEY ACTIVITIES  <ul style="list-style-type: none"> • Property listing and management • User acquisition • Data analysis • Marketing 	VALUE PROPOSITIONS  <ul style="list-style-type: none"> • Extensive property listings: <i>Provide users with a vast selection of properties for interim rent, catering to various budgets, locations, and preferences, targeting especially young start up, private persons and small Local businesses and organizations.</i> • User-friendly interface • Comprehensive property details • Additional services 	CUSTOMER RELATIONSHIPS  <ul style="list-style-type: none"> • Provide a self-service model for tenants • Customer support • Holistic care-free service for building owner 	CUSTOMER SEGMENTS  <ul style="list-style-type: none"> • Start-ups, Local businesses and organizations, Private people that have a (non-residential) interest in the space • Property owners of interim empty spaces: City of Munich • Real estate agents 	BENEFICIARIES <ul style="list-style-type: none"> • Communities • Regional Industries • Tenants • Building owner • Shareholders
COST STRUCTURE  <ul style="list-style-type: none"> • App Development & AI creation • Legal protection • Platform management • Marketing & PR 		REVENUE STREAMS  <ul style="list-style-type: none"> • Listing fees • Advertising on the platform • Fees for connection with experts 		SUSTAINABILITY BENEFITS <ul style="list-style-type: none"> • No waste of space • Reuse of space • Social sustainability 	

Declaration of Authorship of an academic paper

We hereby declare that the thesis submitted is our own unaided work. All direct or indirect sources used are acknowledged as references.

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