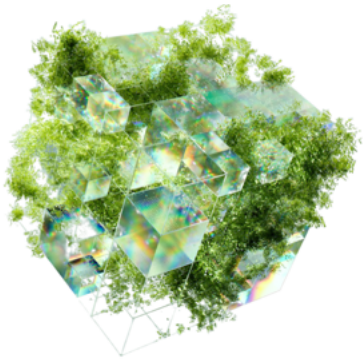


Project Report

Lisa Schowalter
Eric Edelmann
Fabian Rieth
Moriz Trenkner
Bartholomew Sean Then
Abby Yue

SustAInability
–
Perspectives & Prototypes

Introduction

As part of the EU Green Deal, the European Commission has proposed the introduction of digital product passports (DPPs) to enhance the sustainability of products and foster a circular economy. A DPP is an electronic document that provides comprehensive information about a product, including its materials, warranty, and lifecycle documentation. The aim is to increase transparency and extend product lifetimes. However, implementing DPPs comes with challenges such as the need for standardized data formats and the costs of establishing the required infrastructure. Despite these hurdles, the benefits, including waste reduction and resource conservation, significantly outweigh the challenges. This initiative aligns with the EU's broader goals of carbon neutrality and a sustainable economic model by ensuring products are designed to last longer and are easier to repair and recycle.

In this context, **LoopID, the challenge giver**, is a Munich-based start-up actively developing a Digital Product Passport (DPP) and preparing for these regulations. LoopID aims to leverage the DPP to create innovative solutions that promote sustainability and economic efficiency. Their objective is to devise a solution that utilizes the DPP to generate revenue or achieve cost reductions for end consumers or B2B customers. LoopID functions by providing comprehensive product information via the Digital Product Passport, which includes detailed data on the product's components, manufacturing details, usage instructions, and sensor data for specific products, such as washing machines.

Based on the DPP LoopID provided us, the CirculariTeam, the challenge was to explore how an AI-powered tool could utilize the wealth of information stored in the Digital Product Passport to create practical and financially beneficial applications. The aim was to identify a use case where the integration of a Large Language Model (LLM) with the Digital Product Passport could facilitate user interactions, thereby enhancing user experience, promoting sustainable practices, and providing tangible financial benefits.

Introducing RepairGPT

The furniture sector – a huge opportunity to create impact

Annually, an estimated 10.78 million tons of furniture waste are discarded into landfills worldwide, equivalent to approximately 4% of total municipal solid waste. To put this into perspective, this volume of waste is similar to the weight of about 7.2 million cars (European Commission, 2022). This waste primarily comes from furniture that is no longer usable, outdated in design, or deemed unnecessary by consumers.

To address this issue, the European Union introduced the "Right to Repair" legislation. This law ensures that consumers have the right to have their furniture repaired at a reasonable cost. It mandates that purchasers of furniture should have access to affordable repair services. The Digital Product Passport complements this legislation by providing detailed data about each product, including materials used, place of manufacture, and maintenance instructions. This transparency significantly enhances the convenience and accessibility of repair services (European Commission, 2023).

Despite regulatory advancements, furniture disposal patterns present significant challenges. Studies indicate that approximately 58% of consumers give away their furniture, 48% sell it, 31% donate it, and 20% discard it. These statistics highlight the need for a more structured and accessible solution for furniture repair and reuse (Fuchheim et al., 2023).

A survey revealed that when faced with a damaged sofa, 31.6% of respondents prefer to have it repaired, and 29.6% choose to repair it themselves. However, 20% ignore the damage, and 18.2% delay addressing it until they have the time and resources. Notably, 16.9% opt to buy a new sofa instead of repairing the old one. These behaviors emphasize the need for more accessible and efficient repair solutions to prevent unnecessary waste and promote sustainable practices (Fuchheim et al., 2023).

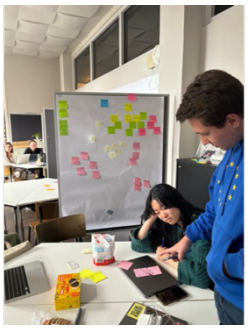
In light of these statistics and market research, we have identified a significant potential to meet future regulations and enhance product longevity by harnessing the untapped potential of furniture repair. This insight has driven the development of our innovative solution, **RepairGPT**, which is aimed at fulfilling this challenge.

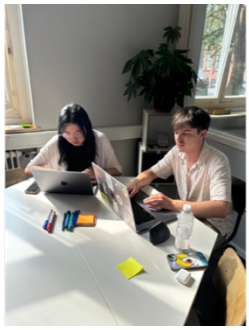
The **mission** of RepairGPT is to empower consumers worldwide to extend the lifespan of their furniture through accessible, user-friendly, and sustainable repair solutions. By leveraging advanced AI technology and comprehensive data from the Digital Product Passport, RepairGPT aims to reduce furniture waste significantly, promote a circular economy, and foster a culture of sustainability. We envision a future where repairing and refurbishing furniture becomes the norm rather than the exception, thereby conserving resources, minimizing environmental impact, and enhancing the overall value and longevity of consumer products. Through continuous innovation and strategic partnerships, RepairGPT aspires to be the leading platform for sustainable furniture management, offering seamless and efficient repair services that benefit consumers, businesses, and the environment alike.

How to fulfill this mission?

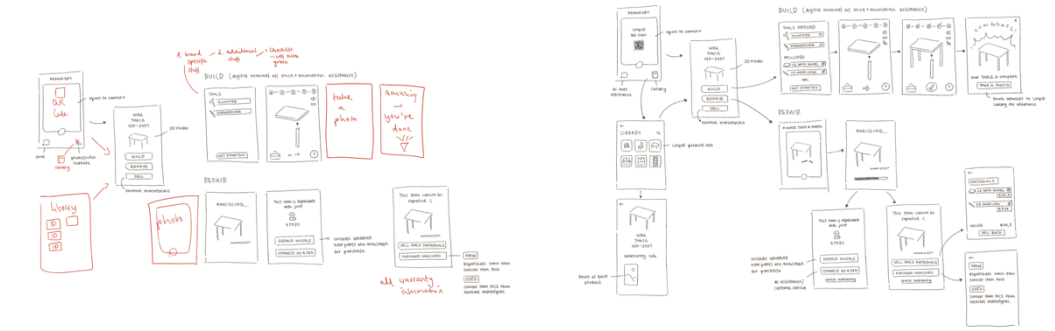
We began by conducting customer research through interviews to understand consumer behavior, preferences, and attitudes toward furniture shopping and repair. The survey included questions on demographics, shopping preferences, and perceptions of RepairGPT. Participants were asked about their preferred ways of buying furniture, their ability to repair furniture, and how they would feel about using an AI-driven repair assistant. The survey revealed valuable insights: most participants were open to the concept of RepairGPT but approached it with some skepticism due to the absence of a working prototype and concerns about AI technology. Before learning about RepairGPT, participants rated their self-assessed repair ability at 5.3 out of 10, which increased to 8.3 after understanding the concept. Over 75% stated that RepairGPT would motivate them to attempt repairs themselves. Nearly 90% expressed willingness to use the app, provided it was free and offered distinct advantages over platforms like YouTube.

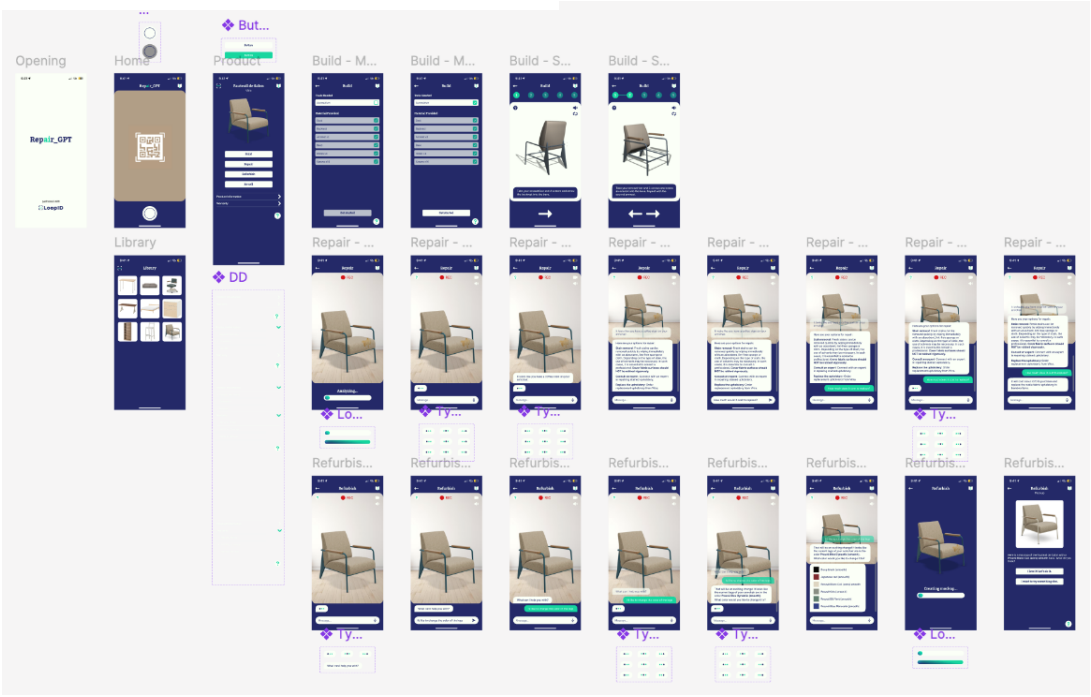
Using these valuable insights, we conceptualized the user journey of RepairGPT, an AI-driven platform providing step-by-step repair guidance, connections to licensed repair professionals, and access to necessary spare parts. Furniture is generally straightforward to repair with the right guidance, and the high costs associated with replacing furniture provide strong incentives for consumers to seek repair options.





We mapped out the app content, focusing on building, repairing, refurbishing, and reselling furniture. Our design team developed prototypes[1] and tested the user flow with potential users, iterating based on feedback to ensure a user-friendly, intuitive interface.





Once we had a working prototype we conducted thorough testing to gather more user feedback and refine the app further. This iterative process allowed us to address any pain points and enhance the overall user experience. We ensured that the app was easy to use, regardless of the user's experience with furniture repair, and provided a seamless and efficient repair process.

[1] **Figma Prototype:** https://www.figma.com/proto/HfzJdRIrsA6OUFixAukcX6/Repair_GPT-Prototype?page-id=2%3A2&node-id=2-7&viewport=91%2C266%2C0.14&t=M35I9BD0qlv1kGZN-1&scaling=scale-down&content-scaling=fixed&starting-point-node-id=2%3A7

Finally, we compiled our findings, prototype, and business model into a comprehensive pitch deck ready to be presented to potential investors and stakeholders. This pitch deck highlights the market potential, user insights, and the innovative solution that RepairGPT offers, positioning it as a key player in the growing furniture repair market driven by sustainability and the "Right to Repair" legislation.

How to use RepairGPT

Imagine spilling coffee on your couch and wanting to fix it. You open RepairGPT (see Figma) and navigate to the product library, selecting the couch now stained with coffee. Recognizing that the couch is worth saving, you choose the repair option. RepairGPT then offers you the choice to use your device's camera to take pictures or record a live video of the couch's condition.

Once you upload the images or video, RepairGPT analyzes the damage and provides tailored recommendations. These could include home remedies, contact information for professional repair services, or links to the manufacturer's repair program, if available. This intuitive and comprehensive approach ensures you have all the resources needed to effectively address and **repair** your couch, turning a potential frustration into a seamless and empowering experience.

Now, imagine you have a new couch to set up because the previous one could not be saved. You open RepairGPT and select your new couch in the product library, this time choosing the **build** function. Since this product contains a digital passport, the instruction manual is digitally available. RepairGPT lists the required tools you need before you start building your new couch. Once all the tools are ready, RepairGPT provides visual and audio aids as you progress with assembling your new furniture.

Let’s say you don’t like the color of the new couch. RepairGPT offers a **refurbish** option that allows you to visualize changes virtually before deciding to refurbish it. Imagine wanting to change the color of the couch legs. After selecting the refurbish option from the product options page, you inform RepairGPT of your preference. RepairGPT lists the available options provided by the manufacturer, and creates a 3D mockup that allows you to view the changes virtually. If you decide to proceed, a simple button click takes you to the manufacturer's website, where your selected options are ready to be added to your cart.

Through these functions, RepairGPT provides a seamless, user-friendly experience for repairing, building, and refurbishing furniture. By leveraging advanced AI technology and comprehensive data from the Digital Product Passport, RepairGPT empowers consumers to extend the lifespan of their furniture, reduce waste, and contribute to a circular economy.

Creating sustainable impact with a self-sustaining business model

The market for furniture repair and restoration is substantial, with an annual global revenue of €10.6 billion, and €1.1 billion in Europe alone (Kentley Insights, 2024). This highlights significant economic potential in the repair and restoration sector. The introduction of the "Right to Repair" legislation by the European Union is expected to significantly boost this market. This law empowers consumers to have their furniture repaired at a fair price, increasing demand for repair services and encouraging longer use of furniture. Additionally, the Digital Product Passport, which provides detailed product information, will facilitate informed decisions about furniture maintenance and repair. RepairGPT is well-positioned to capitalize on this growing market. By offering a user-friendly platform with tailored repair instructions and integrating the Digital Product Passport, RepairGPT can become a key player in the expanding furniture repair market. The combination of the current market size and future growth potential underscores the economic opportunity for RepairGPT in a sustainability-driven economy.

As we want to create a long-term sustainable impact, we also have to create a self-sustaining business model. Therefore, we decided to implement RepairGPT as an independent startup which collaborates closely with LoopID.

RepairGPT generates **revenue** through multiple streams, ensuring a sustainable and profitable business. For the first product iteration, we focused on three key components of the revenue model:

Commission Fees

RepairGPT earns commission fees from repair service providers for referring businesses to them. When users are unable to repair their furniture themselves and opt for professional services, RepairGPT connects them with licensed service providers. The app facilitates this process by providing users with a list of nearby providers, complete with cost estimates and user reviews. Each successful referral results in a commission for RepairGPT, creating a mutually beneficial arrangement for both the service providers and RepairGPT. This commission-based model not only incentivizes quality service from providers but also ensures that users have access to reliable and vetted repair professionals.

Product Sales

Another significant revenue stream for RepairGPT comes from facilitating the sale of repair products and materials directly through its platform. The app partners with suppliers of cleaning and repair products, integrating their offerings into the RepairGPT ecosystem. When users receive personalized repair instructions, they are also provided with recommendations and links to purchase the necessary repair products. This seamless integration simplifies the repair process for users, as they can acquire all the needed materials without leaving the app.

RepairGPT earns a margin on each product sale, contributing to its revenue while enhancing user convenience and satisfaction.

Partnership Fees

Furniture manufacturers and retailers can integrate their products into the RepairGPT platform with the help of the Digital Product Passport system offered by LoopID. This integration allows manufacturers to provide detailed product information, maintenance instructions, and repair guidance directly through the app. By enhancing the value proposition for their customers, manufacturers can improve customer satisfaction and loyalty. RepairGPT charges fees for these integrations, creating a steady revenue stream. These partnership fees not only support RepairGPT's operational costs but also foster closer collaborations with industry players, driving innovation and improving the overall quality of furniture repair and maintenance services.

Reflection

Our group work experience was both challenging and rewarding, shaped by the dynamics of a diverse and international team. While working in such a varied group can present its own set of challenges, the overall atmosphere within our team was productive and focused, which enabled us to achieve a successful project outcome. The team members' diverse backgrounds and skill sets played a crucial role in this success.

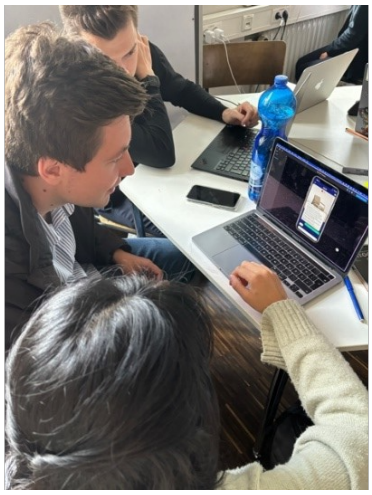
One of our group's key strengths is the balanced distribution of skills. Fabian is responsible for sales, ensuring broad reach and client relationships. Abigail focuses on UI and UX design for user-friendliness and developed the prototype. Eric set up the business plan and manages finance and budgeting. Sean contributes all his knowledge about AI and uses his technology skills. Moriz is specialized in sustainability and circularity to make sure our product is creating impact on every level. Lisa leads media and marketing to represent the future startup.

This allowed us to develop a well-functioning prototype, craft a compelling storyline, and design a robust business model that could evolve into a viable company. Each team member brought their own expertise to the table, contributing to different aspects of the project. This diversity in skills and perspectives enriched our work, ensuring the final product was comprehensive and well-rounded.

However, the journey was not without its difficulties. One challenge stemmed from the varied opinions and approaches within the team. While diversity is a strength, it also means that not everyone sees things the same way. In our case, this occasionally led to conflicts where more vocal members dominated discussions, potentially overshadowing quieter voices. This imbalance in participation sometimes meant that certain ideas were prioritized over others, not necessarily because they were the best, but because they were voiced more assertively. This dynamic required conscious effort to ensure that all perspectives were considered and that everyone had an opportunity to contribute.

Reflecting on our group work, the experience was both educational and enriching. The challenges we faced highlighted the importance of effective communication, inclusive participation, and the need for flexibility. Our ability to work through these issues and deliver a successful project is a testament to the team's dedication and collaborative spirit. Overall, we are more than satisfied with the outcome and believe that our diverse team, despite the inherent challenges, was instrumental in achieving our goals.

Thank you for connecting us to our team partners & the challenge giver and the continuous support!



Sources

European Commission. (2022, December 16). Innovative circular solutions for furniture. European Commission. https://cordis.europa.eu/programme/id/HORIZON_HORIZON-CL6-2024-CircBio-01-3

European Commission. (2023, March 22). *European Commission proposes common rules promoting the repair of goods* [Press release]. European Commission. https://ec.europa.eu/commission/presscorner/detail/de/ip_23_1794

Furchheim, P., Heierli, R., Stallone, V., Rettenmund, M., & Greschner, I. M. (2023). *Swiss Sustainable Consumption Study 2022*. ZHAW School of Management and Law. https://doi.org/10.21256/zhaw-2454

Kentley Insights. (2024, May 7). Furniture Repair & Restoration market Size: Global analysis. https://www.kentleyinsights.com/furniture-repair-restoration-market-size/