REAPIR.ME - a case-study on encouraging circular economy through connections of individuals and repair shops

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Abstract. *As resources become scarcer and prices rise, the transition to a circular economy becomes inevitable. Shorter product life cycles and planned obsolescence lead to higher consumption of products such as electronic devices, household appliances, accessories, clothes and furniture. Repairing products instead of replacing them is time-consuming and requires more effort on the customer side. Meanwhile, existing repair shops struggle to grow their businesses and need to rely on regular customers.*
The goal of this paper is to explore a particular application of digital platforms in the context of household object repair, which aims to encourage participation in the circular economy. Expected benefits include lower customers costs (repairing instead of buying), increased awareness of individual repair shops and a boost in the local economy.
This paper investigates the application of REPAIR.ME *- a platform connecting consumers to small and medium repair shops in order to increase awareness and to encourage repairing instead of purchasing. Moreover, the paper will highlight potential business processes which could be part of operating such a company, ways the company could be self-sufficient and methods to capture users and convince them to partake in the circular economy facilitated by* REPAIR.ME. *The aim of the platform is to make the repair process of appliances as convenient as possible through a streamlined processes, providing a friendly user interface and a variety of quality of life features.*
The paper aims to highlight the structure and operation of the proposed platform from different key perspectives. The business view will be shown through a business model canvas and value proposition canvas of different customer segments, while the customer view will be described through personas. Additionally, key processes will be shown using BPMN, while a more holistic view is provided through an ArchiMate model.

Keywords. digital platform, circular economy, repair solutions, platform

1 Introduction

In today's world, where the depletion of resources and rising costs are increasingly urgent concerns, the shift towards a circular economy [1] has become essential [2]. Unlike the traditional linear economy, which often leads to excessive waste through practices like planned obsolescence [3] and shorter product life cycles, a circular economy emphasizes sustainability by extending the lifespan of products. Many items we use daily, from electronic devices to household appliances, are discarded prematurely, leading to unnecessary waste and environmental harm. Repairing these products instead of replacing them can be a powerful way to counter this trend. However, repair processes are often seen as time-consuming and inconvenient [4], which discourages many consumers from choosing this option. Additionally, small and medium-sized repair shops, which are vital to promoting repair culture, often struggle to reach new customers and grow their businesses.

The motivation behind this paper is to explore how digital platforms [5] can play a crucial role in improving a circular economy by making repairs more accessible and convenient. The platform, named REPAIR.ME, aims to connect consumers with local repair shops, encouraging them to repair rather than replace their items. This initiative is a step towards reducing waste, conserving valuable resources, and ultimately contributing to a more sustainable and circular econ-

omy.

2 Decomposition

The decomposition diagram for REPAIR.ME outlines the main functional areas of the company's system. User management includes user registration, login, and profile management, ensuring users can easily access and manage their accounts. Service shop management oversees service shop administration, listings, performance monitoring and registration, allowing service providers to join the platform and offer their services. Customer management handles service requests, maintains service history and collects feedback and reviews, ensuring customer satisfaction. Order management covers order placement, tracking, and payment processing. Educational content management focuses on creating and distributing tutorials. Customer support includes live chat and real-time chat integration.

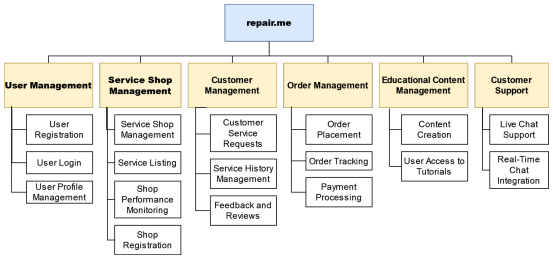

Figure 1: Decomposition diagram of Repair.me

3 Process View

To get a good understanding of the day-to-day business of the platform, a model was created highlighting one of the key business processes. The BMPN for the repair processes, as seen in figure 9 in the appendix, shows how the platform interacts with customers and repair shops in order to fulfil a repair order. The process describes how a user makes their order through the platform application. The item to be repaired is then collected by a REPAIR.ME driver, who delivers it to the selected repair shop. The repair shop handles the repair and once this is done, the driver collects the repaired item and brings it back to its owner, the customer. As seen in the model, communication between the parties through REPAIR.ME is key. Therefore, the platform has to be user-friendly to both the customer and the repair shops, as explained in the section about the user interface.

To reduce costs in the beginning, REPAIR.ME does not offer storage facilities. The items will be stored in the repair shops until they are collected by the delivery driver. To make this as efficient as possible, an algorithm will be devised to optimise the driver schedules. The approach would work similarly to rider optimisation in food delivery [6], albeit with lower frequencies.

The model also takes into consideration error cases. For instance, it is possible that an item can not be repaired by a repair shop. In this case, the repair shop notifies a driver to bring back the product to the customer unrepaired. To avoid frustration on the side of the customer, they will be refunded the service fee in form of a voucher (fix-coin as seen in the UI samples). With this voucher, they are able to waive the service fee for a future repair. This is implemented in order to retain customers even if they have a negative experience due to their product not being repaired. Using the voucher, gives them a "second-chance" at repairing their item at a different repair shop.

4 Business Architecture

In order to provide a holistic view of the REPAIR.ME platform and how some core processes are integrated throughout the business, an ArchiMate Model was created. In the model, the interactions between the business layer, technology layer and physical/technical layer can be seen. Two processes were modelled using ArchiMate. The "repair" process, described in the prior section and the "posting" process. Postings are an additional feature of REPAIR.ME which allows customers and repair shops alike to post articles educating users on repairs. For repair shops, it is also possible to link their shop profile on the article. This serves as an incentive to write articles, as they also provide marketing for the shops who write them.

As seen in the ArchiMate model (figure 10 in the appendix), the platform will be available through multiple channels, a website and an smartphone app with a mobile-first approach. This should facilitate repairing items as much as possible and make the process similar to ordering an item on a shopping or food delivery app.

Figure 2 shows a proposed tech stack which could be used to implement the application frontend and backend. To avoid server maintenance, a hosted web server would need to be rented, on which the application could be deployed. The platform uses a modern tech stack to ensure efficiency and scalability. JavaScript and Python will be used for programming, with React for frontend development and Flask for backend operations. NPM manages the required JavaScript packages. The databases are Supabase and PostgreSQL. Git would be used for version control and deploy on DigitalOcean and Netlify.

5 Business Requirements

There are certain features the platform needs to support in order to function in the intended way. Features are categorised into three types: *customer facing features*, *repair shop features*, and *platform functionality*.

Customers can search for repair shops and technicians based on location, expertise, and customer re-

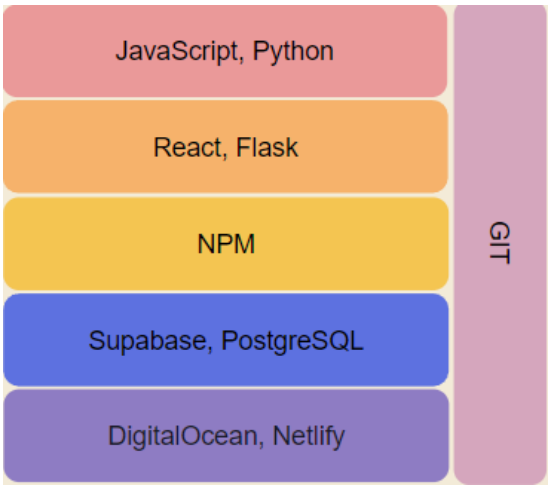

Figure 2: Tech Stack

views, ensuring they find the most suitable service providers for their needs. They can also upload photos and detailed descriptions of damaged items to receive accurate repair quotes from multiple shops, facilitating informed decision-making. The platform allows customers to schedule repair appointments or initiate a mail-in service, providing flexibility and convenience. Additionally advanced search and filtering capabilities enable users to quickly find the specific services and information they need. By using the review and rating system for technicians and shops, customers can share their experiences and help others make informed choices. Integrated secure payment processing ensures safe and reliable transactions for all repair services. Moreover customers can access a comprehensive library of self-repair guides and tutorials, empowering them to attempt simple repairs on their own.

Technicians and repair shops can create detailed profiles to showcase their expertise, services offered, and customer testimonials, attracting more clients. A management system, for handling repair requests and scheduling, assists service providers with streamlining their operations and improve efficiency.
The platform features secure user accounts and login systems to protect personal information and provide a personalised user experience. An integrated content management system (CMS) [7] supports the creation, organisation, and distribution of self-repair guides, ensuring users have access to high-quality, up-to-date information. Data analytics tools track platform usage and trends, providing valuable insights to improve services and customer satisfaction.

These business requirements are designed to create a seamless and user-friendly experience for customers and repair shops alike, facilitating the repair process and supporting the transition to a circular economy. By implementing these features, Repair.me aims to make repairing items as easy and appealing as buying new ones, thereby promoting sustainability and resource conservation.

6 Personas and customer journeys

As part of the proposed platform an idealised view of a customer and repairman was devised so that the solution could be more accurately modelled. What we have achieved is a representation including their basic characteristics and what REPAIR.ME is aiming to provide.

6.1 Persona - Customer

Our customers are individuals who do not want to or are unable to carry out or are not willing to get involved in the process of repairing themselves. Furthermore, they might not even know the repair shop that is suitable for the desired repair. Their pain points are exactly the limited time and knowledge that they have - the knowledge of shops is stored in the platform and the time constraint is addressed by delegating the logistics of the broken device to the REPAIR.ME platform.

6.2 Persona - Repair shop owner

The platform is inherently a connecting service and the other party of the process are the repair shops. By symmetry of the customer - they have the knowledge to repair the devices, but lack the recognition in the community. Commonly such shops are known only to a couple loyal individuals and cannot reach a wide customer-base. They are limited to their city or district. In part, these shops regularly do not have the means to do extensive marketing campaigns to attract attention. Their competition is also very strong in the face of repair centres of name-brands or online Do-It-Yourself (DIY) repair resources. The platform aims to provide a portal to reach potential customer that would not have otherwise encountered the shop.

7 User interface

In the following section highlights the main user interface, high fidelity wireframes that show how the REPAIR.ME platform will look as a web app on mobile screens.

The welcome page, or the home-screen of the app will lead users to login or sign up page. There are two types of users - customer and repairman. The customer, after they log in, will see welcome screen (middle photo) and choose category of repair that they need. When they select a category, the repair shops can be found for the type of the repair they need. There is filtering option - by stars, that are calculated by the reviews other, previous customers of the repair shop leave after the repair process, then the user can choose does he want fast delivery, so they will only get repair shops that can do the service fast, in maximum of four working days and the last filtering option is by tags, or specialities of the service shop.

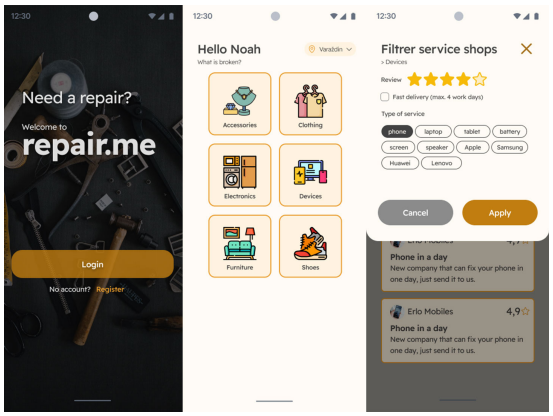

Figure 3: High fidelity wireframes - start screen (left), customers welcome screen (middle), filter shops screen (right)

The customer can confirm the order and schedule a repair process by a form. The form consists out of the approximated repair price (based on other prices from that repair shop for the similar type of work), title and the description of the problem, photo and the pick-up address so that the object can be picked up and delivered to the repair shop. If the customer wants to fix his object by himself, there is a section about repairing it on his own. The user can choose an article which describes their problem the best or look for the best repair shop in that domain underneath, if they give up and want to find a repair shop. Every article has difficulty, tools and steps in textual and video form in the YouTube video format.

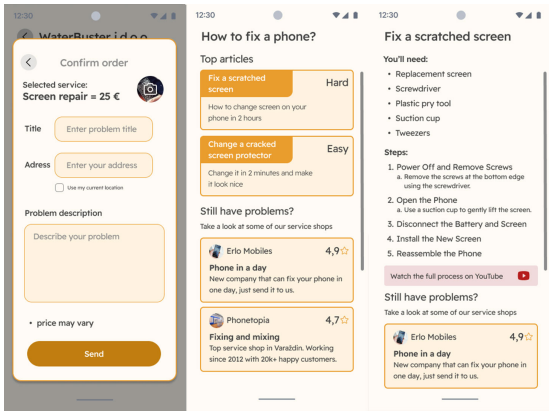

Figure 4: High fidelity wireframes - order confirmation (left), articles section (middle), article details (right

When the customer searches for the repair shops they see a list of companies. The shops are not listed in the randomised order. The top repair shops will be the ones which paid for it, as a type of ad. Then are recommended shops that are specialised in that type of repair and then come all other, standard repair shops. The repair shop can see requests made by the customers along with all other order data, displayed by date.

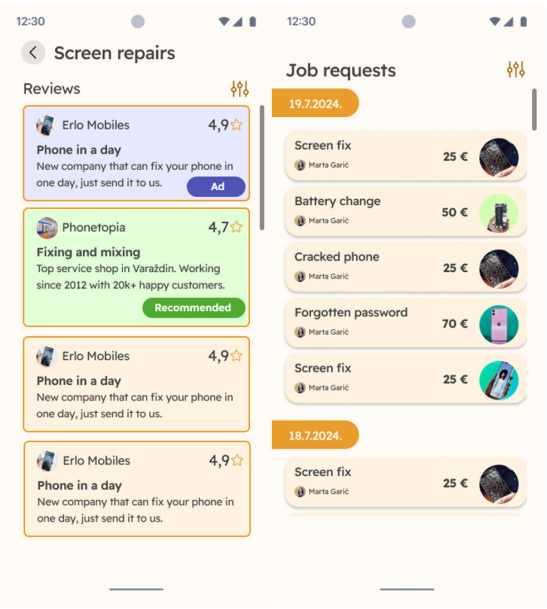

Figure 5: High fidelity wireframes - service shop listings (left), job requests (right)

The gamification [8] element of REPAIR.ME platform is on the dashboard screen. It is also the welcome screen for the repair shops. The repairman can see basic data about his work (total repairs in month, earnings) but also what they need to get recognized as a recommended shop or why, it is, that they are recommended now. Every recommended repair shop gets some kind of bonus points as discounts or similar. Also, the user can see ads for their shop or how it would they look like in the future. The gamification for the customer consists out of Service Coins. They can be used for discounts for future repairs, to waive service fees. After every repair the customer gets some percentage of those coins, based on how big, expensive or hard the repair is.

8 Marketing Channels

To achieve good network effects with the platform users on both sides need to be aware of REPAIR.ME. The most important marketing channel is search engine optimization (SEO)[9]. Showing up as a top result when searching for repairs is most beneficial to the platform and the user. Keywords related to specific repairs would be set on the pages of the individual repair shops to correctly direct the potential customer. This approach not only drives traffic to the platform but also establishes authority and relevance in the repair industry.

Leveraging the power of social media, the plan is to promote Repair.me through both organic posts and paid advertisements. By creating engaging content and targeting specific demographics, it can reach a wide audience. Social media platforms provide an excellent

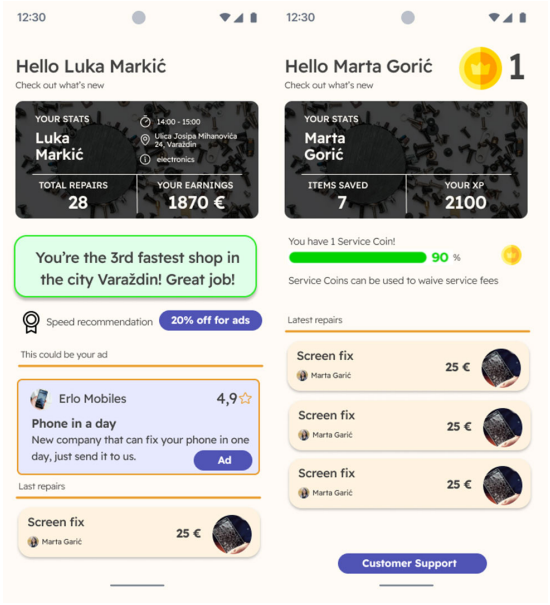

Figure 6: High fidelity wireframes - gamification for repair shops (left) and customers (right)

opportunity to interact with users, share success stories, and highlight the benefits of using Repair.me. Paid advertisements on platforms like Facebook, Instagram, and LinkedIn will further enhance the platforms reach and attract potential customers.

To target specific sectors, Repair.me will be promoted in relevant magazines. For example, advertisements in magazines focused on watches, shoes, appliances, and other repairable items will directly reach the potential customer base. This traditional marketing approach complements the digital efforts and ensures the platform can reach a broader audience.

Physical marketing materials such as posters and stickers in participating stores would also be used. These visual cues in repair shops and related retail outlets will increase brand visibility and encourage customers to consider Repair.me for their repair needs. By partnering with stores and placing these materials in high-traffic areas, the platform can effectively raise awareness and drive user engagement. By utilising these diverse marketing channels, Repair.me aims to establish a strong presence both online and offline, ensuring that it can reach and engage with its target audience effectively.

As part of the marketing strategy, the plan is to utilise an unconventional yet attention-grabbing approach by placing broken furniture and electronic devices, such as refrigerators, on the street. Attached to these items would be posters featuring the company's branding and information about Repair.me. This method leverages the common sight of discarded items to capture public interest and curiosity in an unexpected context. The aim is to highlight the issue of product waste and promote the benefits of repair services, thereby attracting significant attention and raising awareness about the platform.

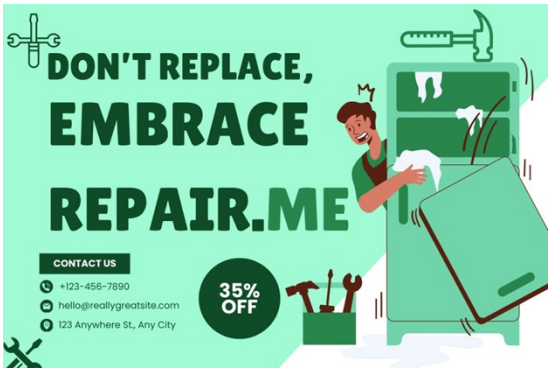

Figure 7: Example Advertisement

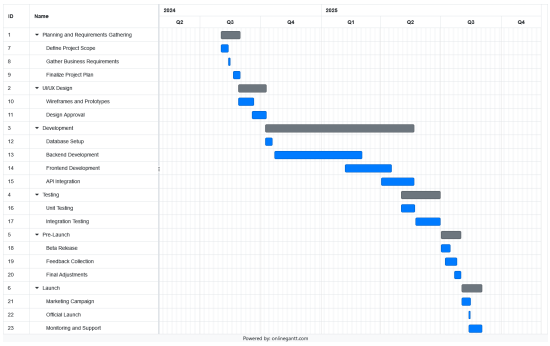

Figure 8: Timeframe

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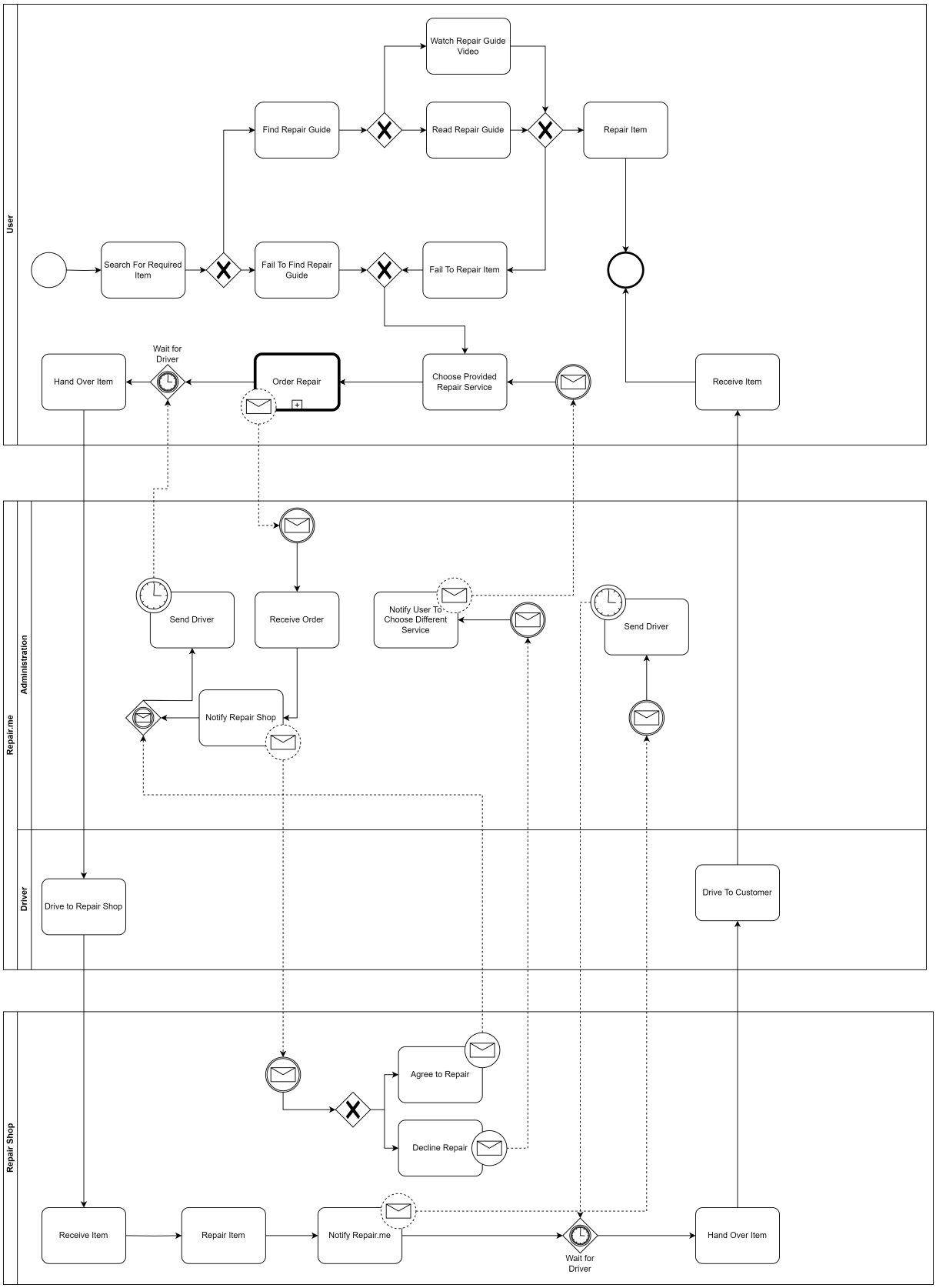

Figure 9: Repair Business Process Model

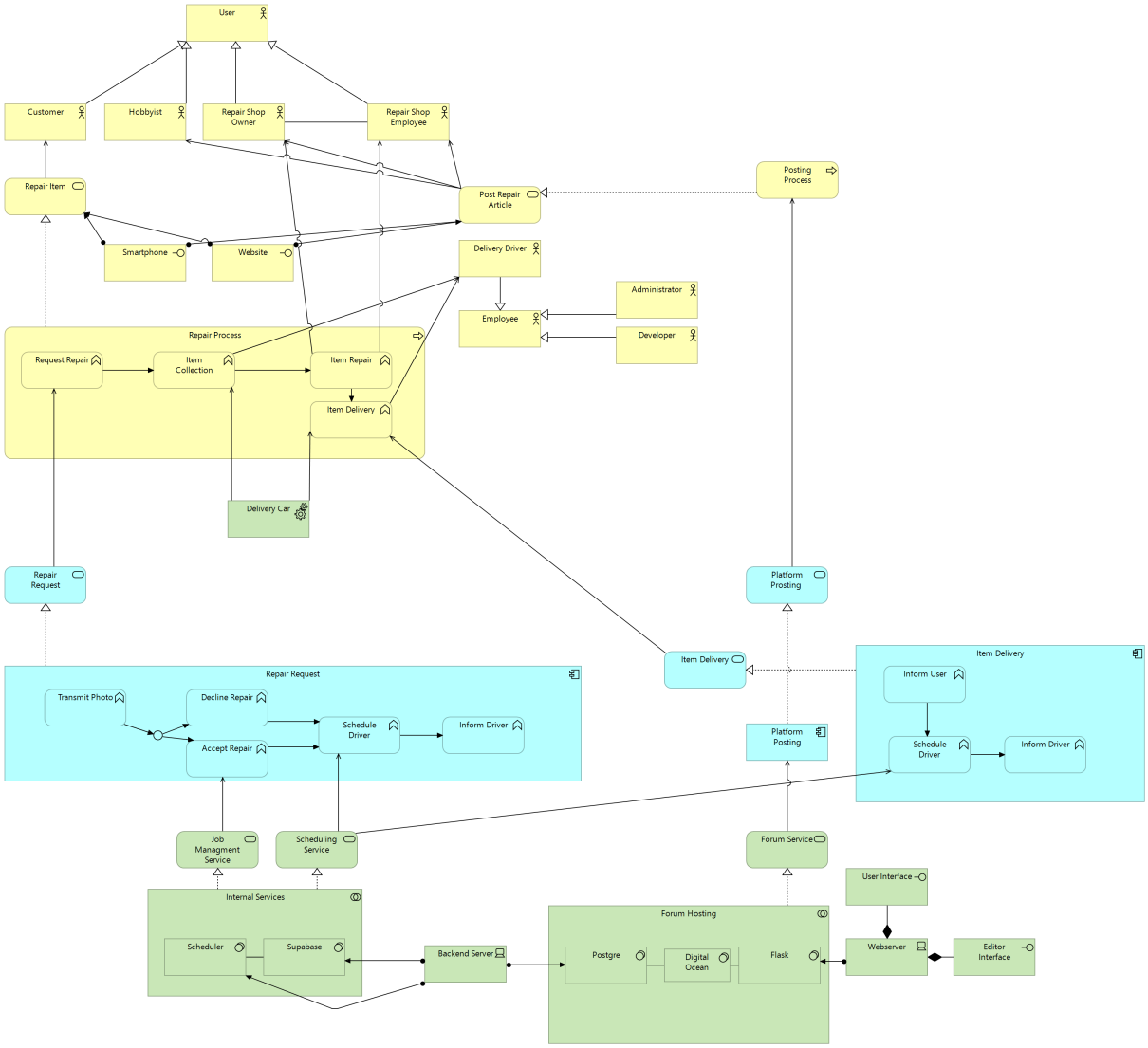

Figure 10: ArchimateModel