

Universitat de Lleida

Sprint 2

Commed

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1 Relevant links

- GitHub backend repository
- GitHub Mobile App repository
- GitHub Web client repository
- GitHub docs
- GitHub project management
- Slides of the presentation
- Spreadsheet documentation

2 Planification

2.1 User Stories

The first thing that was done regarding the planification of the project was to define the behavior of the application in a list of user stories. The next list exposes all of the actions that the user can do with it as well as different ways of interacting with it.

For this sprint, not only it has been changed the name of the user stories to be more precised but also it has been added new ones, related to the formal offer and financial operations. Although the last ones are not implemented, they do exist in set of user stories.

- **AUTH1:** As a guest, I want to register in the application
- **AUTH2:** As a user, I want to log in to the application.
- **AUTH3:** As a registered user, I want to create a profile of my company.
- **PROD1:** As a guest, I want to search for services or products so that I receive a list of services or products.
- **PROD2:** As a guest, I want to have a detailed view of the product/service.
- **PROD3:** As a registered user who has a company profile, I want to create services/products.
- **CHAT1:** As a user, I want to connect to a company because of a publication.
- **CHAT2:** As a user, I need to chat with the company that I connected with.
- **CHAT3:** As a company, I want to chat with the users that have sent a message.

- **FO1:** As a company, I want to send the Formal Offer which contains the contract pdf through the chat.
- **FO2:** As a company, I want to digitally sign contracts.
- **FO3:** As a user, I want to digitally sign contracts.
- **FO4:** As a company, I want to have a list of my sent formal offers.
- **FIN1:** As Commed, I want to get a 5% commission on each contract.
- **FIN2:** As a company, I want to publish the first 3 announcements freely.
- **FIN3:** As a company, I want to have the possibility to pay to promote my announcements.

2.2 Scrum organization and planification

Afterwards, a meeting was held in order to fulfill the product backlog with all the tasks that had to be done. These tasks were related to User Stories, but they were divided so that the product backlog had a small granularity in the given tasks.

According to the kanban, it has been created a milestone named *Sprint 2*, which groups all the issues from this sprint. Also, as in this sprint will be two new main projects added to the former sprint, which will be the web client and the mobile client application, it has been assigned new labels to sort the different types of issues in every repository:

- **wireframe.** The issue is related to the design of the application.
- **web.** The issue is related to the web client.
- **web-dev.** The issue is related to the development of the web.
- **mobile.** The issue is related to the mobile application.
- **mobile-dev.** The issue is related to the development of the mobile application.

2.2.1 Issues

Backend

- List Formal Offers for User
 - size: 3
- List User Products
 - size: 3
- Secure endpoints with authentication
 - size: 5

Web client

- Wireframe - Publication Detail
 - size: 3
- Wireframe - Profile Detail
 - size: 3
- Wireframe - Enterprise Detail
 - size: 3
- Wireframe - ListChat
 - size: 5
- Wireframe - ConversationScreen
 - size: 5
- Wireframe - ListProducts
 - size: 3
- Wireframe - Not Registered Main Screen
 - size: 3
- Wireframe - mainScreen Registered
 - size: 3
- Wireframe - ListFormalOffer
 - size: 3
- Wireframe - Initial Login State
 - size: 3
- Wireframe - Bad Login State
 - size: 3
- Wireframe - RegisterScreen
 - size: 3
- Wireframe - ListFormalOffer
 - size: 3
- Implementation of Register
 - size: 3
- Implementation of Login
 - size: 3
- Implementation of Product Detail
 - size: 5
- Implementation of 404 NotFoundScreen
 - size: 1
- Implementation of the NavBar
 - size: 3

- Implementation of Home
 - size: 5
- Implementation of Enterprise Detail
 - size: 5
- Implementation of Search Products
 - size: 8
- Implementation of Enterprise Edit
 - size: 5
- Implementation of Edit Product
 - size: 8
- Implementation of Create Product
 - size: 3
- Implementation of Chat
 - size: 8
- Implmentation of Formal Offer List
 - size: 3
- Implementation of Formal Offer Form
 - size: 5

Mobile application

- Wireframe Planification - State Diagram
 - size: 5
- Wireframe - RegisterScreen
 - size: 2
- Wireframe - Bad Login State
 - size: 1
- Wireframe - Initial Login State
 - size: 2
- Wireframe - Not Registered Main Screen
 - size: 3
- Wireframe - mainScreen Registered
 - size: 5
- Wireframe - PublicationDetail
 - size: 5
- Implementation of Localization Language
 - size: 2
- Implementation and design of Redux architecture
 - size: 13

- Implementation of Copy static method to create a new State in Redux
 - size: 1
- Implementation of RegisterScreen
 - size: 3
- Implementation of LoginScreen
 - size: 5
- Implementation of GenericSummaryWidget
 - size: 2
- Implementation of CarrouslleSliderWidget
 - size: 3
- Implementation of Product/Service Publication Screen
 - size: 5
- Implementation of ListChatScreen
 - size: 5
- Implementation of FormalOfferDetailScreen
 - size: 3
- Implementation of ListFormalOfferScreen
 - size: 5
- Implementation of ConversationScreen
 - size: 8
- Implementation of Profile Enterprise Detail Screen
 - size: 3
- Design and Title of the Application - Manifest
 - size: 1
- Implementation of SearcherView
 - size: 5
- Implmentation of Authentication Logic
 - size: 3
- Implementation of MainScreen without registration user
 - size: 5

2.3 Scrum analytics

As Github does not support milestones for a group of repositories but for single one, it has been created three different milestones for each project: **backend**, **web-client** and **mobile-app**.

backend

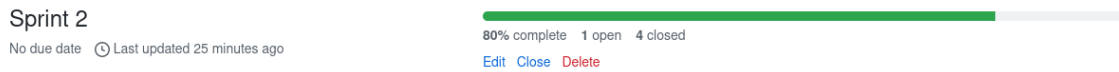


Figure 1: Backend Sprint 2 milestone

As it can be seen, the backend has only little modifications, that is why the percentage can be smaller even though it has been done all the tasks for this sprint. The task that is still missing is the authorization management of the endpoints called, which will be held on the next sprint.

web-client



Figure 2: Web client Sprint 2 milestone

In regards of the web client, mostly of the tasks are done. The tasks that are not done are depending on issues detected in backend, such as image management and chat. This issues will be postponed to the third sprint, where will be created new issues related to the back.

mobile-app



Figure 3: Web client Sprint 2 milestone

According to the mobile application, the things that are still in progress or in to do stage are about the integration of the API backend, which were formerly associated with this sprint. However, while iterating for this sprint, we did realize about that and it was considered that the issues of design and architecture were more important to be finished on this sprint.

3 Requirements - Product

In this section the list of requirements that the application has to offer to the user are on the list below. As matter of fact, the requirements have been more detailed in this sprint, the changes and new requirements are written in *italics*.

Functional Requirements:

- The application has to let all kinds of users search for products or services.

- The application has to let users register into the application *and it will create automatically an enterprise profile.*
- The application has to let users log in to the application if they have an active account on the system.
- The application has to let logged users publish products or services *in the web application.*
- The application has to let logged users interested in either a product or a service to start a chat with the owner of it.
- The application has to let logged users who are owners of a given product to chat with said interested users through a chat.
- The application has to let logged users send a commercial transaction contract when an agreement has been reached .
- *The application has to let logged users download a commercial transaction contract sent by the owner of a product that they are interested.*
- The application has to let logged users sign a commercial transaction contract sent by the owner of a product that they are interested.
- The application has to generate the evidences for both sides of the commercial agreement.
- *The application has to let logged users to view a list of the formal offers they are in.*

Non-Functional Requirements:

- The application has to be the most usable possible.
- The application has to be compliant and respect the laws that run in each country that it's available in.
- The application mustn't have large waiting times for the client.
- The application has to be portable and easy to deploy.
- The application has to be scalable and always leave the code open to the possibility of adding new features in the future.

4 Main use cases

4.1 Sprint 1

- **Register into application**

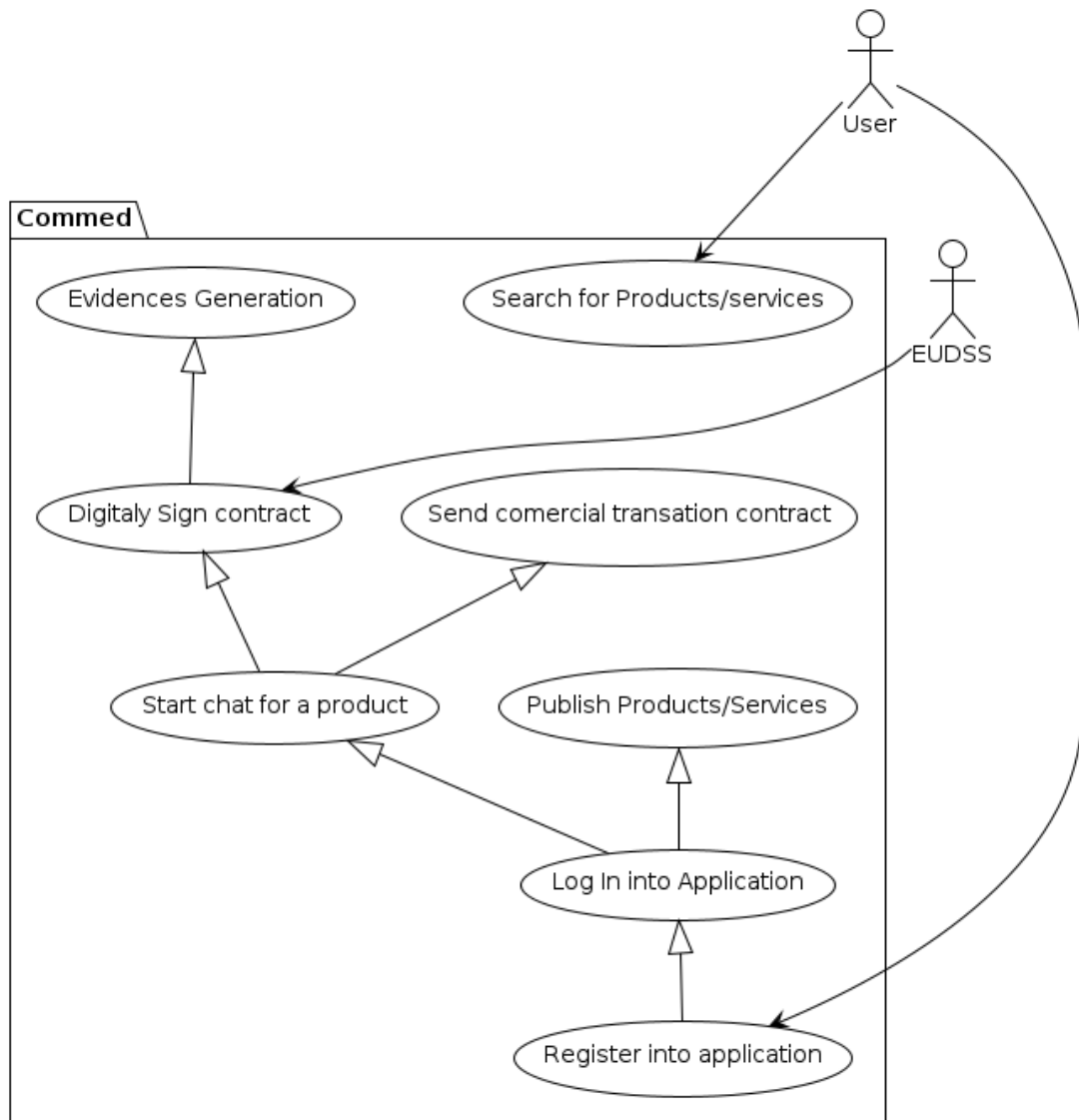


Figure 4: Use case diagram of the application.

- **Actors:** User
- **Purpose:** Let a user register into the application system
- **Description:** Provides a screen with a form in which the user is able to fulfill it and send the information to the system in order to be registered.

• Log In into Application

- **Actors:** User
- **Purpose:** Log in to the application to be able to use some of the application services.
- **Description:** Provides a screen with a form in which the user will put its email and password. Then, they will log into the application so that they can start using the services that it provides.

- **Search for Products/services**

- **Actors:** User
- **Purpose:** Search for any product or service the user is interested in.
- **Description:** Provides a searcher for every user so that they can look up the products or services that they are interested in.

- **Publish Products/Services**

- **Actors:** User
- **Purpose:** Publish services or products in order to be sold to other users.
- **Description:** Lets a logged user publish the products and services that they offer in order for them to be sold to other interested users.

- **Start chat for a product**

- **Actors:** User
- **Purpose:** Users can start a chat when they are interested in a product
- **Description:** Lets a logged user start a chat with the owners of either a product or a service that they are interested in, so that they can start a negotiation.

- **Send commercial transaction contract**

- **Actors:** User
- **Purpose:** Send a formal offer with a commercial transaction contract.
- **Description:** Lets the owners of given products or services send a formal offer containing a compliant commercial transaction contract within the chat in which the negotiations are taking place.

- **Digitally Sign contract**

- **Actors:** User EUSSD
- **Purpose:** Sign a commercial transaction contract sent within a Formal Offer.
- **Description:** Lets the users of the application sign digitally the contract that was sent as a Formal Offer in the chat in which the negotiations took place.

- **Evidences Generation**

- **Actors:** User
- **Purpose:** Provide users with evidences and the billing of a business transaction
- **Description:** The system will generate for both parts the commercial transaction with all the evidences and the billing of the contract.

4.2 Sprint 2

5 General architecture

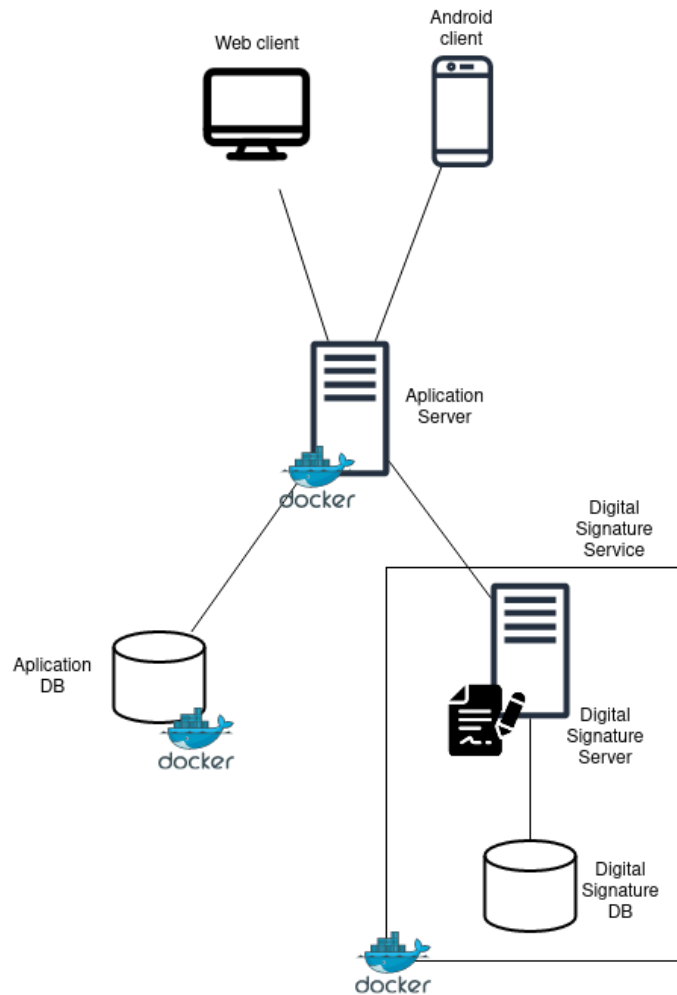


Figure 5: General architecture of the application.

5.1 Mobile app architecture

In this subsection, the decisions regarding the architecture of the mobile app will be explained, but not those that regard the user experience of the mobile. This will be explained in more detail at 7.

First, why we chose flutter and not other frameworks, as Android or React Native, will be explained. Then, it will be introduced the Redux for the state management of the app.

5.1.1 Flutter

Flutter is a multiplatform framework aiming to become a standard for building apps that have to work on either Android or iOS, as well as the web, desktop, and embedded operative systems.

As a tool, it has been proven that it can build more resilient and optimized apps than its counterparts, like React Native, while still being multiplatform. Even though it was taught how to work with native Android Applications, it was decided to choose this tool against it as the team had already some experience with it.

Even if the framework is young, the community behind flutter is active and has several repositories that have some application examples, as well as a libraries showcase that has and will help the development of the app.

5.1.2 Redux

State management in applications is a hot topic, and although both frameworks used by the clients in this project have some way to implement it, it was preferred to use a third-party option that is well consolidated, easy to use, and easy to manage.

Redux is an abstraction that provides a way to implement easier a reactive pattern, that is, instead of having the typical Model-View-Controller, it has a way of drawing a State, the buttons can launch actions, that is taken by reducers along the actual state, and return the next state, as shown at 6.

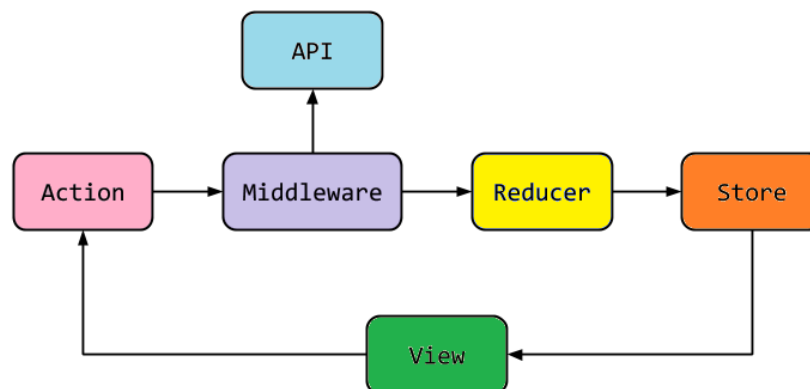


Figure 6: Redux Diagram.

This makes the components stateless, which makes it easier to work with them and provides a

way of mesmerizing them so they aren't computed that many times, making them faster than their counterparts.

This also helps to have a way of monitoring the changes that the state has suffered, as you can keep the states and the actions in a list for debugging, so it can be traced easily the changes. This adds when you have to have a shared object that won't be modified easily, but has to be read by most of the components, as an API token or a theme object.

Finally, as it was also used in the web applications, it makes the team be able to change quickly between the two frameworks, as the most difficult part is done the same way.

5.2 Reason on implementing a Web Client

As the application has his target user in the administrative world, we decided to implement a web alongside the mobile application that will make easier the usage of our services to our customers in administrative environments. We thought that the mobile app can be a really useful for doing little tramits, for chatting with some customers, for quick searches of products/services and enterprises... But we felt that in order to make it more usable and accessible for administrative purposes we should create a web client also.

Furthermore, the implementation of the web client showed some light on how to communicate with the backend and has lead us to iterate a little bit on the API endpoints that were implemented last sprint. This is nice because now on the third sprint the integration of the mobile app with the backend will be a lot more straightforward.

5.3 React

For implementing this Web Client we used React, which is a library built in javascript for creating User Interfaces. To be more precise we used React because it gives the opportunity of working with Hooks. Hooks are functions that comprehend inside him immutable components with independent states, wich makes the code a lot more clean and structured and simplifies the amount of chaos that we have to deal usually when we program with vanilla javascript.

Also React has a huge community, and it has a lot of libraries that have been key for making a lot more easier the programming task. Some examples can be:

- react-router-dom

- react-modal
- redux-react-session
- react-bootstrap
- ...

5.4 Web Client Architecture

By now This Web Client is still in a development phase, so for now we are using the default testing server that React provides to us. Although, we expect to use a nginx+docker when deploying our application to a production enviroment.

Right now the application is able to fully connect with the backend, beeing able to Register, SignUp and interacting with all the different features that our application provides.

5.5 Redux

In this part of the project, we also used redux. In fact we use a react library called redux-react-session, that builds a store to mantain the state of our session. Also it creates the correspondig Session Cookie to mantain the value of the authorization token provided by our backend. This way, every time we have to make a request that needs authoritization, we will be able to pass within the request the value of the token stored in the browser cookie.

6 Database model

The database model can be seen at figure 7.

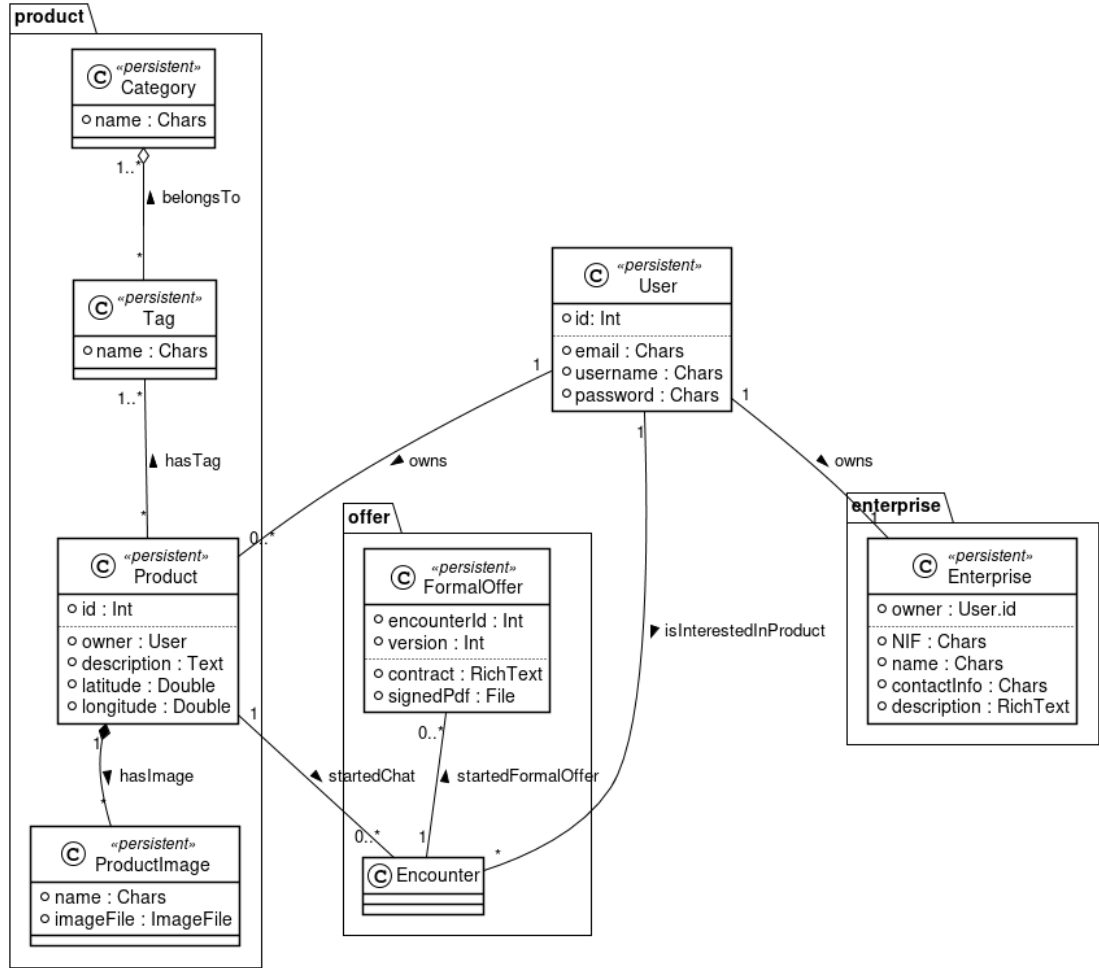


Figure 7: UML diagram of the models.

6.1 Modifications on the models

7 Main Screens

7.1 Mobile Application

7.2 Web Client

8 Financial Case

8.1 Monetization Strategy

The monetization strategy of Commed is mainly based on a percentage of the value of the commercial agreement contracts. When a contract has been finally set, an invoice will be generated. The value of the invoices depends on the value of the generated contract in order to make the invoices affordable for all types and sizes of companies. Therefore, in the first four years, the search of the

companies and the other features will be free. After these beginning years, it is something to study and plan if some other features can become freemium.

In order to get more publications in the first few years and popularize our service quickly, the first three publications will be free for any company. The next ones will cost 250 € per year, which will not depend on the size of the company publishers. In addition, any kind of publication could get a better position in the search by paying monthly. The fee of this kind of advertising will be up to 450 € per month and the position will depend on how much the company pays for that advertising.

Therefore, there are three possible incomes:

- 5% commission of each contract generated.
- Publish a 4th, 5th, ..., nth offer cost 250 € per new offer each year.
Publishers have 3 free publications.
- Payments for advertising by month, the payment will be chosen by the customer in the same way it is done on instagram and facebook. The more the company pays for the advertising, the more the offer will appear. The maximum fee should be 450 € per month.

As the search will be free, the companies could be able to negotiate and set the contract out of our reach. In order to sort this inconvenience out, Commed will finally generate the contract making this process so easy and the invoice very affordable as the payment is only the 5% of the contract.

8.2 Marketing Strategy

According to the marketing strategy, it has been set that the main focus in the first years will be getting the small and medium sized companies, in order to quickly popularize the platform and create small business ecosystems. For example, the main ecosystems to focus on in the first year will be in order of importance:

- Restoration, butchers and other food providers.
- Food industry and supermarkets.
- Organizations for seasonal work to get temporary contracts.
- Cleaning services.
- Security services.
- Logistic services.

After creating the small ecosystem, the focus will be on strengthening the ecosystem and widening the smaller ones in order to join with the others and make them become a greater one.

We choose to operate a door-to-door strategy to convince our first clients. Our sales men will convince them by proposing the pros of using our service, and state our welcome offer. As for the advertising channels, we have chosen LinkedIn, because we are in a B2B market, so our target are companies. As things progress, we rely on word of mouth to acquire more customers, both publishers and service seekers.

8.3 Speculation and flow chart

In order to create the simulation of the revenue, a speculation has been done on how many contracts will be held by our application in a month. This conjecture has been simulated over the first four years of the company. The revenue functions consists on these three variables:

- The income from the percentage of the contract between the entities. This variable has the main weight of the function as it is the main income generator. Mean value for small business contracts : 1000€. Mean value for big business contracts : 4000€.
- The revenue from the paid publications. In order to ease the simulation and know how many publications will be paid, a relaxation of the problem has been made. The paid publications ratio has been calculated with an approximation, which also is directly correlated with the amount of contracts held.
- The income from the payments for advertising a publication. This variable has also been approximated making a correlation from the number of contracts. We assumed that 5% of the publications are ads, for a cost of 30€ each.

According to the costs, its function depends on these variables:

- The cost of paying developers, which can be splitted into junior or senior developers.
- Marketing cost.
- As the platform will be growing, the costs of the server will be higher. Despite that, it is thought about creating a serverless backend using AWS Lambda to minimize this cost and only pay for the requests.

Three scenarios have been made in order to show a possible but different projection of the incomes generated by the platform:

- A pessimistic scenario, where the number of contracts increases in a linear way amongst the four years.
- An optimistic scenario, in which the contracts' function has an exponential form.
- A more realistic scenario, which also has linear function in the first years but in the lasts, it gets more the way of an exponential function.

| Year | 1 | 2 | 3 | 3 |
|--------------------------|----|-----|-----|-----|
| Small Business Contracts | 65 | 100 | 170 | 280 |
| Big Business Contracts | 0 | 0 | 40 | 73 |

| Year | 1 | 2 | 3 | 3 |
|--------------------------|----|-----|-----|-----|
| Small Business Contracts | 77 | 160 | 230 | 412 |
| Big Business Contracts | 0 | 0 | 60 | 137 |

8.4 Pessimistic Scenario

Number of contracts at the end of each year : In this scenario, the number of contracts increase linearly.

| Pessimistic | Years | | | |
|------------------------|-----------------|-----------------|-----------------|-----------------|
| Project | 1 | 2 | 3 | 4 |
| Income of contracts | 19 250€ | 46 000€ | 129 350€ | 261 200€ |
| Income of publications | 5 688€ | 8 750€ | 14 875€ | 24 500€ |
| Total Income | 24 938€ | 54 750€ | 144 225€ | 285 700€ |
| Senior Employee | 26 000€ | 26 000€ | 26 000€ | 26 000€ |
| Junior Employees | 36 000€ | 36 000€ | 54 000€ | 54 000€ |
| Marketing | 18 000,00 € | 18 000,00 € | 28 500,00 € | 36 000,00 € |
| Variables cost | 288,75 € | 690,00 € | 1 371,00 € | 2 475,75 € |
| Total Cost | 80 289€ | 80 690€ | 109 871€ | 118 476€ |
| Cashflow | -55 351€ | -25 940€ | 34 354€ | 167 224€ |
| ROI % | -168,94% | -132,15% | -68,73% | 41,15% |
| Net Income | 120 287€ | | | |
| PBP Years | 3,23664 | | | |
| PBP Month | 39 | | | |
| NVP | 109 104€ | | | |
| IRR | 43% | | | |
| BEP | 75 | | | |

Table 1: Pessimistic Cash Flow

$$ROI = (\text{Total Income} - \text{Total Cost}) / \text{Total Cost}$$

8.5 Realistic Scenario

Number of contracts at the end of each year : In this scenario, the number of contracts is the mean between the pessimistic and the optimistic scenarios.

| Year | 1 | 2 | 3 | 3 |
|--------------------------|----|-----|-----|-----|
| Small Business Contracts | 85 | 200 | 270 | 500 |
| Big Business Contracts | 0 | 0 | 74 | 180 |

| Realistic | Years | | | |
|------------------------|-----------------|----------------|-----------------|-----------------|
| Project | 1 | 2 | 3 | 4 |
| Income of contracts | 25 900€ | 72 400€ | 189 300€ | 401 450€ |
| Income of publications | 6 738€ | 14 000€ | 20 125€ | 36 050€ |
| Total Income | 32 638€ | 86 400€ | 209 425€ | 437 500€ |
| Senior Employee | 26 000€ | 26 000€ | 26 000€ | 26 000€ |
| Junior Employees | 36 000€ | 36 000€ | 54 000€ | 54 000€ |
| Marketing | 18 000,00 € | 18 000,00 € | 28 500,00 € | 36 000,00 € |
| Variables cost | 362,60 € | 1 013,60 € | 1 850,10 € | 3 354,40 € |
| Total Cost | 80 363€ | 81 014€ | 110 350€ | 119 354€ |
| Cashflow | -47 725€ | 5 386€ | 99 075€ | 318 146€ |
| ROI % | -159,39% | -93,35% | -10,22% | 166,56% |
| Net Income | 374 882€ | | | |
| PBP Years | 1,04321 | | | |
| PBP Month | 13 | | | |
| NVP | 340 029€ | | | |
| IRR | 129% | | | |
| BEP | 75 | | | |

Table 2: Realistic Cash Flow

8.6 Optimistic Scenario

Number of contracts at the end of each year : In this scenario, the number of contracts increase exponentially.

| Optimistic | Years | | | |
|------------------------|-----------------|-----------------|-----------------|-----------------|
| Project | 1 | 2 | 3 | 4 |
| Income of contracts | 30 500€ | 90 050€ | 230 400€ | 495 150€ |
| Income of publications | 7 438€ | 17 500€ | 23 625€ | 43 750€ |
| Total Income | 37 938€ | 107 550€ | 254 025€ | 538 900€ |
| Senior Employee | 26 000€ | 26 000€ | 26 000€ | 26 000€ |
| Junior Employees | 36 000€ | 36 000€ | 54 000€ | 54 000€ |
| Marketing | 18 000,00 € | 18 000,00 € | 28 500,00 € | 36 000,00 € |
| Variables cost | 396,50 € | 1 170,65 € | 2 074,80 € | 3 761,55 € |
| Total Cost | 80 397€ | 81 171€ | 110 575€ | 119 762€ |
| Cashflow | -42 459€ | 26 379€ | 143 450€ | 419 138€ |
| ROI % | -152,81% | -67,50% | 29,73% | 249,98% |
| Net Income | 546 509€ | | | |
| PBP Years | 0,71710 | | | |
| PBP Month | 9 | | | |
| NVP | 495 700€ | | | |
| IRR | 193% | | | |
| BEP | 75 | | | |

Table 3: Optimistic Cash Flow

8.7 Economic indices comparison between scenarios

All information related to the simulation and prediction about the first four years of the platform can be found in the spreadsheet attached to this document. Even though, the cash flows of each scenario can be found in *Tables 1, 2 and 3*. In this section, we will begin by comparing the three scenarios using the different indexes calculated above.

First, we want to show you the ROI index between the different scenarios, which can be found in Table 4. The ROI has been calculated every year, as it is more significant to us to analyze this information. Although it can be found that the ROI index in the first year is similar between the scenarios, the pessimistic scenario has some challenges to increase the ROI so as to be positive while optimistic and, actually, the realistic appear to have a better return on investment.

| | ROI | | | | |
|----------------|----------|----------|---------|---------|---------|
| Project / Year | 1 | 2 | 3 | 4 | Mean |
| Pessimistic | -168,94% | -132,15% | -68,73% | 41,15% | -82,17% |
| Realistic | -159,39% | -93,35% | -10,22% | 166,56% | -24,10% |
| Optimistic | -152,81% | -67,50% | 29,73% | 249,98% | 14,85% |
| Mean | -160,38% | -97,67% | -16,41% | 152,56% | -30,47% |

Table 4: ROI Index comparison between the three scenarios

According to the other indices, mostly all of them have better values in the optimistic scenario. One of the most valuable indices is the PBP in terms of months. Here, we can see that the optimistic has only 9 months of **PayBack Period**. On the other hand, realistic scenario is a promising case, as in only one year and a month we would be able to recover the cost of the investment.

Although ROI gave us bad values, specially in the pessimistic scenario, we can see that in all the scenarios the IRR is positive. For the interest rate, we chose 1,05, that is quite similar to the inflation rate. That gave us good information to know if someone is going to invest on the company. The only one index that has the same behaviour in all the cases it is the BEP, which is calculated monthly. That is because the costs are fixed, as the lifecycle of the software would be large.

| Indices | PBP (year) | PBP (month) | NVP | IRR | BEP (monthly) |
|-------------|------------|-------------|-----------|------|---------------|
| Pessimistic | 3,24 | 39 | 109 104€ | 43% | 75 |
| Realistic | 1,04 | 13 | 340 029€ | 129% | 75 |
| Optimistic | 0,72 | 9 | 495 700€ | 193% | 75 |
| Mean | 1,67 | 20 | 314 944 € | 122% | 75 |

Table 5: Indices comparison between the three scenarios

In Figure 8, we can see the contracts' function of all the scenarios and the total cost function, which is the same in all scenarios. In the optimistic scenario, we will start to recover the initial investment at the beginning of the first year whereas in the worst case, we will start generating benefits at the beginning of the third year.

Cash flow

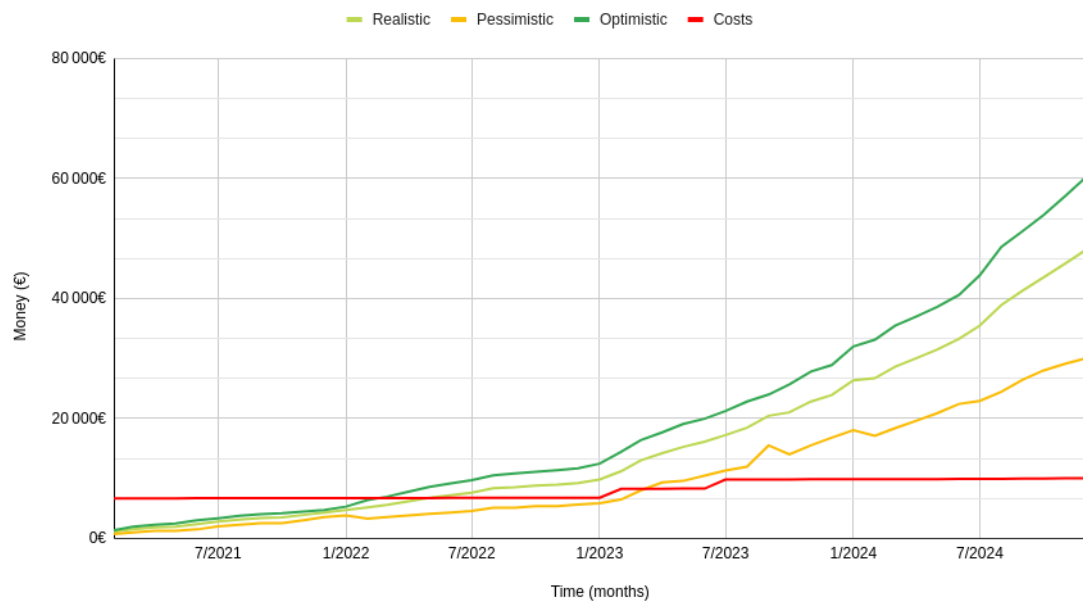


Figure 8: Cash flow of the different revenue function from scenarios and cost function