UKRAINIAN CATHOLIC UNIVERSITY

BACHELOR THESIS

Development of the Platform for Collectors to Organize Their Collectables

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Declaration of Authorship

I, Yana KRYSHCHUK, declare that this thesis titled, "Development of the Platform for Collectors to Organize Their Collectables" and the work presented in it are my own. I confirm that:

- This work was done wholly or mainly while in candidature for a research degree at this University.

- Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated.

- Where I have consulted the published work of others, this is always clearly attributed.

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- I have acknowledged all main sources of help.

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Signed:

_____

Date:

_____

"The most fundamental principle of the organized mind, the one most critical to keeping us from forgetting or losing things, is to shift the burden of organizing from our brains to the external world."

Daniel J. Levitin

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by Yana KRYSHCHUK

Abstract

All people tend to collect various things. Some treat it as a hobby for pleasure while others yearn to find an investment value in their collections. They want to keep everything in order and they are always on the lookout for new items.

The purpose of this thesis was to create a platform for collectors which would suit any collectable type and allow users to use additional features associated with estimating the price of collection. The first step was to determine the requirements and create the MVP with functionality narrowed to the needs of Tourist Stamps collectors to use the result as a case study for development of a complex platform with extended functionality, blueprint of which was aimed to create in this thesis as well.

The extensive research was conducted to analyze the market and existing solutions, get to know the end-users and their needs, and compose a value proposition.

The result of this work is a web platform for collectors of Tourist Stamps in Ukraine and a business model for further improvement and development of a full version of the platform.

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I am infinitely grateful to my family and friends for their priceless support and motivation which inspired me to endure and keep working hard despite the war and devastating situation in our country.

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Finally, I want to thank Kartel, my small university band, which became a family during these four years . . .

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List of Abbreviations

MVP	Minimum Viable Product
MVC	Model-View Controller
BMC	Business Model Canvas
TS	Tourist Stamps
REST	Representational State Transfer
API	Application Programming Interface
CDN	Content Delivery Network
UI	User Interface
EKS	Elastic Kubernetes Service
UML	Unified Modeling Language
AI	Artificial Intelligence
CRUD	Create Read Update Delete

For my Father to whom I owe all my achievements...

Chapter 1

Introduction

1.1 Overview

In this thesis a business model of a platform for collectors is described. The platform will allow them to effectively organize and manage items in their collection, create their own catalogs and share them. A particular feature of the platform is the ability to be adapted to any collection type, from popular coins to rare special editions of Barbie dolls. All this can be done in one space, creating an innovative approach to collecting, which one day may become a standard.

With time as the platform grows, users will be able to find like-minded people, who share their interests and exchange their collectables or just add existing instances to their own catalogs, without the need to take photos or create descriptions by themselves.

For MVP development, in this thesis the segment of users is narrowed to the ones who collect Tourist Stamps, which will be discussed in the following chapters. The initial version of the platform will support the needs of this user category. The overall scope of work will be provided with a justified business model.

1.2 Motivation

Everybody has a hobby which can be related to collecting various things. "In North America today it is estimated that nearly one in three people collects something" (Charlotte P. Lee, 2009). For example, some of them collect wrappers from chocolate manufacturers from different countries. Others are fond of collecting Tourist Stamps, coins, notes and already have thousands of items in their albums. "The type of object that becomes a collectable is almost limitless constrained only by the variety of that product that is produced" (Lafferty, n.d.).

The platform for collecting was chosen as a theme of this project precisely because it will be useful for us and our families in the first place, and it is really exciting to create things that are interesting to do and from which will benefit a wide range of people. That is why the heart and soul were put into writing this thesis, and it will never be regretted because there is strong faith that someday this product, improved and full of new functionality, will become popular all over the world and will bring worthy passive income. Also, one of the key goals in the future is to build and strengthen the community of collectors with the help of this platform.

1.3 Roadmap

The initial goal in this thesis was to determine user needs and define the value proposition for end-users which would make them stay with our product and do

not look towards the competitors. In order to achieve this, analysis of market and demographics of collectors of various kinds were conducted. Additionally, a special survey regarding user needs and vision of the platform was created and distributed among Ukrainian collectors. Also, there was created a comparative table of the nearest potential competitors of our platform, which describes their pros and cons and rating based on data from the real feedback of those platforms' users which were collected from various sources.

Speaking about target audience for MVP, the data about collectors was collected from TS websites of different countries. Moreover, an interview with representative of TS community was carried out.

The analysis described above resulted into creating User Personas for MVP and full-scale platform, considering all flaws of competitors and users' desires, and creating value proposition and other components of business model for further releases of the platform.

The next step after MVP development was creating a business model itself, for full version of the platform.

After this the blueprint of the platform was described in detail, which implies User Flow, Functional Requirements and outlined key features and functionality of the platform. Moreover, the mock-ups as the representation of future full-scale version of the platform were created.

Chapter 2

Problem Statement

2.1 Business Context

There are thousands of collectors around the world, from amateurs for whom it is purely a hobby to professionals who literally made collecting a matter of their lives and who are always on the lookout for rare additions to their collection. Some of them are motivated by the investment value. The committed collectors pay a lot of attention to their possessions.

Their collectables are usually organized and cataloged. They note data about each item in the catalogs, which may include the date and place where the piece was acquired, date of manufacturing, and value. They need a solution that can qualitatively cover all their needs at the same time.

2.2 Problem Description

Though there are plenty of similar platforms on the market, they do not cover customers' requirements all at once. If the software allows storing multiple collections from various domains, it cannot predict the preferences of all users and, accordingly, all types of collectables. Also, many browser platforms cannot be adapted for usage on smartphones which does not make them accessible and mobile.

Collectors face problems such as inconvenient and poor user interface or the mismatch of platforms to the needs of their collection. Many people use Excel, especially when it comes to arranging coins or notes, which is a headache for users if the number of items in the collection exceeds several hundred. It is really difficult to keep everything in order, search for items quickly or add pictures/scans.

The platform described in this thesis is aimed to give customers all the needed tools and solve their problems from different sides straight away.

Chapter 3

Market Research

This section will show how broad the collectors market is and what its prospects for endless growth are. This niche has not exhausted itself yet, because collecting was popular hundreds of years ago, and such a trend remains the same nowadays.

Why does collecting things remain so popular through the centuries? Starting a collection is much more enjoyable than simply buying something you want. When you collect something, you will always be on the hunt for it and will feel great satisfaction when you track down a new addition. Eric A. Kreuter even wrote a book called "The Collector Mentality: Modernization of the Hunter-Gatherer (Anthropology Research and Developments)", in which he explains the mindset of a Collector and their behavior through the anthropological lens. He calls collectors "a pseudo-sub-species of human who endeavors to amass items for building wealth, in the pursuit of a hobby or, in extreme cases, as a part of pathological hoarding behavior" (Kreuter, 2017).

3.1 Collectors Worldwide: Core Market Data

There are thousands of collectors all over the world. In summary, it is estimated that there are between 8,000 and 10,000 art collectors worldwide (database, 2020). Scarcely "Larry's List" database provides access to over 3500 art collector profiles from over 70 countries. Here is a geographic breakdown:

- 38% Europe

- 28% North America

- 18% Asia

- 8% Latin America

- 5% Middle-East & Africa

- 3% Australia

According to the reports, the global art market achieved total sales of $63.8 billion in 2015 (Kinsella, 2016). Below is the circle diagram which shows the global art market share by value in 2015.
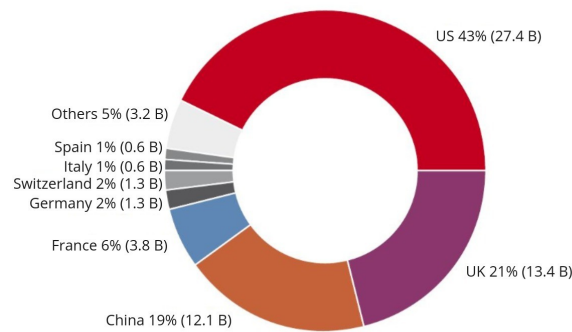
FIGURE 3.1: Global Art Market Share by Value in 2015(in $ Billions (Kinsella, 2016)

Therefore, geographical distribution and market share show most of the collectors are located in Europe and the USA, where are the most developed countries, which means people there have access to the internet, resources and budget.

Often people with common interests create their own communities. The art collectors are no exception. One of the world's largest art collectors communities is "Collecteurs" - an online platform whose mission is to expand the art world to global audiences and give the public access to millions of artworks in storage and private homes. It is a kind of social network for artists who can follow each other, leave comments, share the artworks, schedule events such as exhibitions, start threads and have access to "Collecteurs Academy". This program implies a unique educational initiative designed to help people understand, take part in, and navigate the ever-expanding, complex, and sometimes intimidating world of art and collecting.

Another example of community is coin collecting, which has a leading position worldwide among other collectables. According to experts, only in the USA, about 7 million to 10 million people are serious coin collectors (Wilkerson, 2012). Referring to the "Mhojhos Research" report, the estimated number of people that currently collect coins worldwide is 615 million, 246 million of which are in Europe. The approximate potential total addressable market is 940 million coin collectors globally and 404 million in Europe (Mhojhos, 2020).

Also, the report provides data on coin collection market size based on revenue, in which Europe gets 40% market share. It is shown in the chart below.
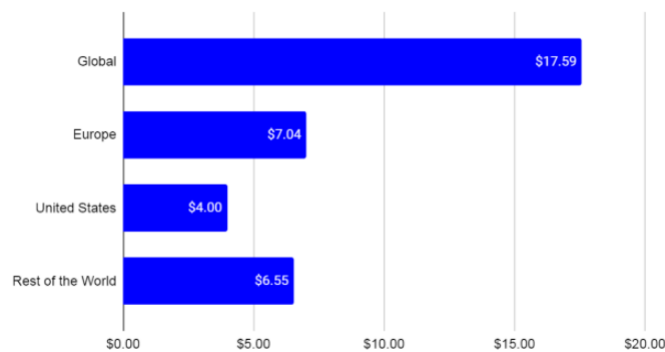
FIGURE 3.2: Coin Collection Market Size Based on Revenue (in $ Billions) (Mhojhos, 2020)

Based on these data, it can be assumed that Europe is leading in the number of collectors, respectively, in the number of end-users of the platform that is being developed.

According to studies from the 2020 year (Griffin, 2020), the top 8 most popular things in the world for collecting are the following:

- Stamps;

- Coins;

- Baseball Pins;

- Vinyl;

- Comic Books;

- Wine;

- Trading Cards;

- Toys;

However, some individuals have really unusual collections compiled of uncommon items (Tamino, 2021):

- Barf Bags - Niek K. Vermeulen (6,000 items)

- Nails - Richard Jones (3,000 items)

- Hot Sauce - Vic Clinco (10,000 items)

- Toilet Paper from Around the World - Richard and Floralee Newman (2,500 pieces)

- Hotel 'Do Not Disturb' Door Signs - Jean-François Vernetti (1,1000 items)

- Napkins - Martina Schellenberg (125,866 items)

At this point, Yotam Ottolenghi's quote "One man's trash is another man's treasure" is more relevant than ever in this context.

Here are some interesting thesis about collecting provided in Charlotte's P. Lee and Ciaran's B. Trace paper (Charlotte P. Lee, 2009):

- "collecting entails a valued connection between an object and the series or entirety to which that object belongs and that this relationship between objects means that some system of organization is required";

- "collecting is an active and selective process";

- "collecting involves an element of passion or obsession";

3.1.1 Tourist Stamps

Tourist Stamps are wooden disks with the image of a certain tourist attraction. It may be a cave, a tower, a castle, a national park, etc. Such a souvenir can be purchased only by visiting the object depicted on it. All Tourist Stamps have their own serial numbers and together form a system of unique souvenirs in each separate country where they are represented.

The idea of Tourist Stamps was invented in 1998 in the Czech Republic. Subsequently, they became popular among hundreds of thousands of sightseers in 20 countries all over the world. Ukraine joined this Tourist Stamps project in 2007. An important goal of connecting to the project was to promote the sightseeing and tourism industry in Ukraine, in particular little-known places that are definitely worth the attention of travelers from around the world. Another intention was to encourage Ukrainians to travel to other countries binding it with the fun collectable game.

FIGURE 3.3: Tourist Stamp №54 Devoted to The Buckingham Palace in London

3.2 Competitors Overview

While searching for possible competitors of the product, it was discovered that there are actually many platforms and mobile applications for collectors. However, most of them are adapted purely to the needs of a particular collection, in most coins or stamps. There are also several platforms that support the organization of different types of collectables simultaneously, but they have limited functionality and many disadvantages. The competitors' analysis was narrowed to such multi-collection platforms in order not to lose focus.

To gather the data needed for comparison were used feedback from Play Market, App Store, websites of the platforms, and user reviews found on forums. For some platforms, it was not possible to find user ratings. The applications were also installed and explored.

The data from all sources, which contains users' feedback and insights received during investigation of the platforms, was analyzed and summarized in the table below.

LOGO/NAME	OVERVIEW	COMMENT
My Collections	**Description:** · Suitable for various collectables · Allows to create custom collections · Can be used for Tourist Stamps **Number of users:** 100K + **Rating** (1,195 users): 1.8 ★★	**Pros:** · Wide range of customizable fields · Cloud synchronization · Desktop and mobile version · Lend collections and set due dates · Share collections via social media · Give access to view/edit your collections **Cons:** · Poor and confusing UI · Limited database of collections · Not stable server connection · Problems with uploading photos · Not possible to create subcategories
My Collections	**Description:** · Suitable for various collectables · Allows to create custom collections · Can be used for Tourist Stamps · Contains in-app purchases **Number of users:** 10K + **Rating** (79 users): 3.7 ★★★★	**Pros:** · Web and mobile version · Create collections with any level of containers (e.g. coin value, stamp country) · Custom searchable fields with String, Date, Number types · Add tags to items · Wishlist · Backup/export to Google Drive · Cloud synchronization · Give access to view/edit your collections · Product scanning by EAN/UPC **Cons:** · Contains ads · Poor UI · Not possible to move items between collections · Not possible to add items from public collections to your own collection
CatalogIt	**Description:** · Suitable only for limited collection types · Does not allow to create custom collections · Cannot be used for Tourist Stamps · Paid subscribtions **Number of users:** - **Rating** (45 users): 3.9 ★★★★	**Pros:** · Various subscription plans (Museum, Personal, Organization, Conservator) · Mobile and web version · User friendly interface · Mobile and web version · Multi-user collaboration · Cloud synchronization · Originally sized photos stored · Museum level professional functionality **Cons:** · Suitable exclusively for art collectors needs · No wishlists · Insufficient functionality for free plan · No ability to print out accession, deaccession and loan documents · Fields are not customizable
CollecOnline	**Description:** · Suitable only for art collectables · Does not allow to create custom collections · Cannot be used for Tourist Stamps · Free limited and paid subscribtions **Number of users:** 10,627	**Pros:** · Mobile and web version, SaaS · Virtual gallery 3D · Control copyright of images · Generate Excel reports · Available in 6 languages · Network, blog **Cons:** · Functionality is only suitable for art collectors
iCollect Everything	**Description:** · Suitable for various collectables · Allows to create custom collections · Can be used for Tourist Stamps · Contains in-app purchases **Number of users:** 10K+ **Rating** (7.2K users): 4.6 ★★★★★	**Pros:** · Possibility to create customizable collectable type · Big collections database · Possibility to share collection on social medias · Cloud synchronization · Supports input in any language **Cons:** · Paid subscription for large collections · No web version · Complicated UI
Collecteurs	**Description:** · Suitable only for art collectables · Does not allow to create custom collections · Cannot be used for Tourist Stamps · Social network, blog **Number of users:** 1M +	**Pros:** · Community, Social network · Possibility to like/follow collections · Nice UI **Cons:** · Functionality is only suitable for art collectors
Colnect	**Description:** · Suitable for various collectables · Allows to create custom collections · Can be used for Tourist Stamps · Free and premium membership **Number of users:** 311,140	**Pros:** · Large Database · Supports various types of collectibles · Wishlist · Forum · Marketplace · Wide localization · Mobile and web version **Cons:** · Poor UI · No statistics/price estimation

FIGURE 3.4: Comparative Table of Competitors

After observation of direct and indirect competitors, the conclusion is that each platform has room for improvement. There are really powerful systems that offer customers an incredible user journey with a great interface and many useful features, however, these platforms are limited to a single domain of collecting - paintings and art. The functionality of some platforms, which allow users to manage a wide range of collectables, resonates with the capabilities of the platform described in this paper but includes only a small part of the functions and not all at once, such as support of wishlists or possibility to share collections to the public.

Speaking of the user interface, this is an extensive downside that unites all these platforms, which was repeatedly mentioned in user reviews and noticed during the installation and exploration of the platforms.

The only direct competitor which stands out from others is "Colnect" with a huge database and even a built-in marketplace. Nevertheless, "Colnect" also cannot show off with a user-friendly interface and has limited functionality when it comes to recommendations for users.

Chapter 4

Target Audience

4.1 General Target Audience

4.1.1 Demographics

Based on section 1.3 it can be concluded that the main target audience of this platform is customers primarily from Europe and the USA.

As described in the survey (Artsy, 2019) which represents responses from 3,638 art collectors in 99 countries (53% of responses came from the USA), these collectors broke down across the following demographic groups:

Age:

- 8% 18-24

- 23.8% 25-34

- 20.7% 35-44

- 17.9% 45-54

- 15.7% 55-64

- 13.9% 65+

Gender:

- 47.9% male

- 47.5% female

- 1.3% as non-binary

- 3.3% declined to answer

Another survey (ArtBasel, 2020) shows that the biggest growth during recent years was observed in art collectors under 40, having increased by 6%, to 19%.

Thus the biggest group of art collectors pointed out is the ones aged 25-44 years old. For coin collectors, the situation differs. Over the years, their average age has been increasing. According to current estimates, it is now approximately 60 years (Gilkes, 2016). For 2015 overall, the demographics shows the following:

Age:

- 8% 18-44

- 40% 45-64;

- 52% 65+

Observations of collecting from the point of view of the modern and digitalized world are influential. Nowadays there are many things that were not available or simply did not exist a few decades earlier. This segment includes video games; collectables dedicated to famous fantasy universes (Harry Potter, The Witcher, Game of Thrones), and cartoons. There are also groups of hobbyists who are in search of collectables of distinct brands, for instance, Disney pins, lady Dior bags, Bratz dolls. Furthermore, there has been a logarithmic increase in the number of trips around the world over the last decades, as shown in the chart below.
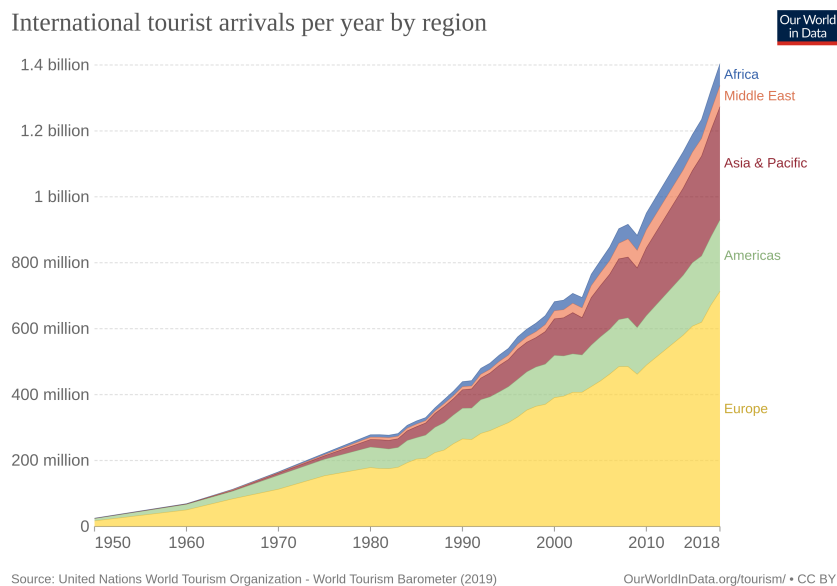
FIGURE 4.1: International Tourist Arrivals per Year by Region (Our-WorldInData, 2019)

Consequently, people are willing to bring back memories from the cities and countries they have visited, thus gathering special collections of various things, including Tourist Stamps. Thereby emerges a clear group of young 21st-century collectors who are familiar with technology and open to innovation.

Based on the conclusions about the most popular collectables and trends in their growth, it comes to an inference that the whole industry and, accordingly, the target audience within distinct segments will develop following this pattern.

4.1.2 Survey Results

A custom survey was created for this thesis and distributed among potential Ukrainian users of the platform. The list of questions was formed in such a way that it would be possible to distinguish the characteristics of a typical collector and their pain points, which would allow generating User Personas. Respondents aged 18 to 73 took part in the survey. The average age of a Collector is 29,6 years old.

Age Groups of Respondents
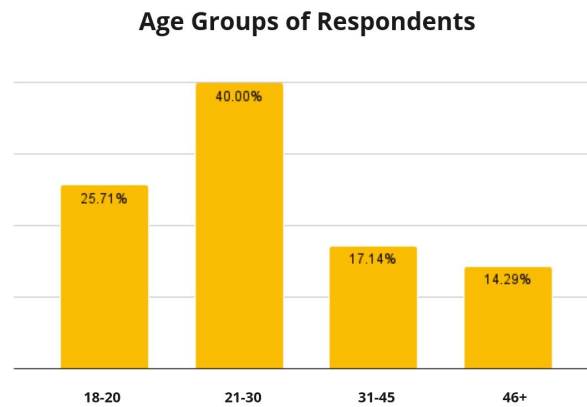
FIGURE 4.2: Age Groups of Respondents

Originally the survey was composed in the Ukrainian language, so for a relevant presentation in this work, the results were translated into English.
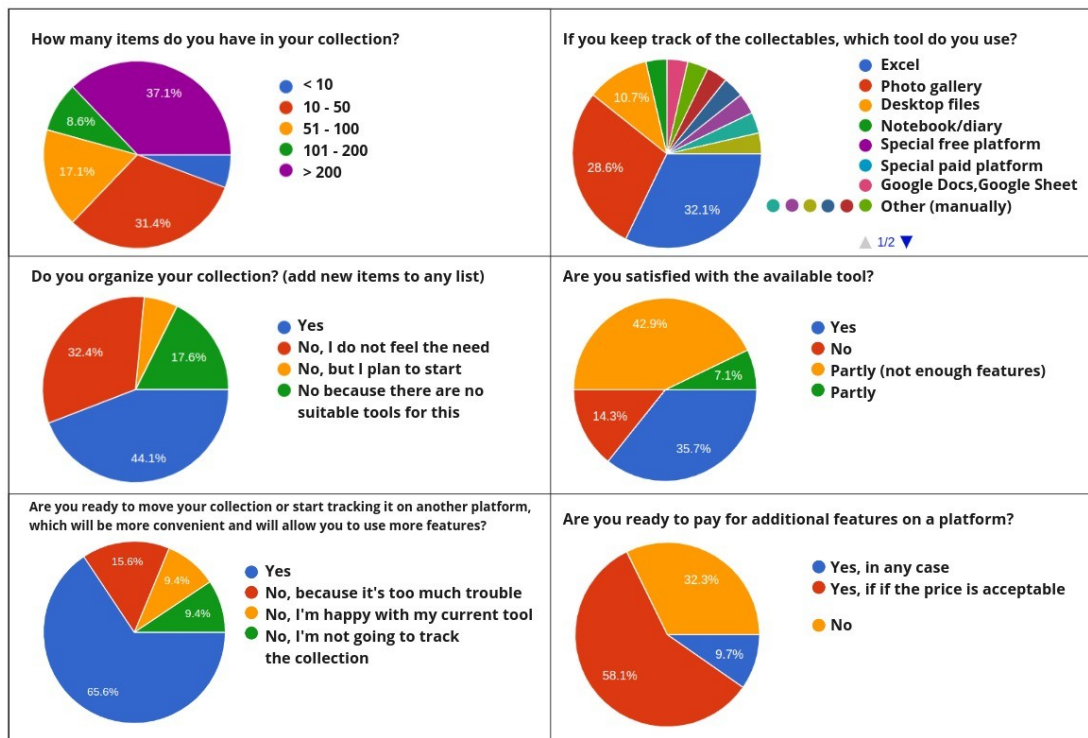
FIGURE 4.3: The Results of a Survey

The survey results show that 37% of the respondents have more than 200 items in their collections and 44% of them keep track of collections. 64% of answerers are not completely satisfied with their current tool and 66% are ready to move their collection or start organizing one on another platform which could offer convenience and more features available.

The most common collectables that came up in the answers were coins. Here is the list of all collectables (some answers were brought together for a cleaner data overview):
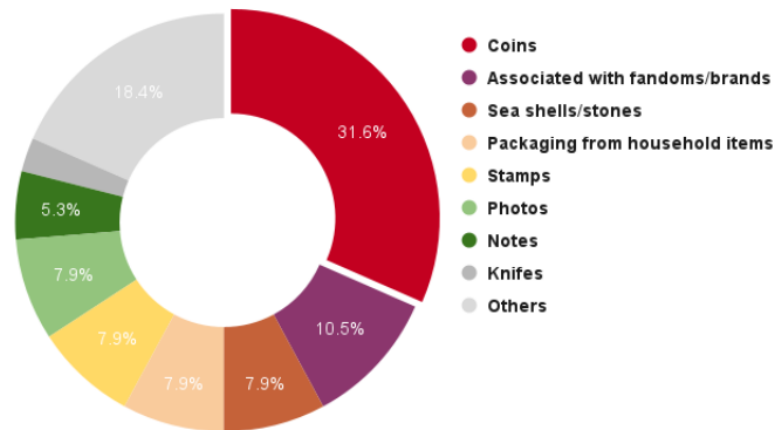
FIGURE 4.4: What Respondents Collect the Most Often

Generalized Pain Points of respondents:

1. No ability to transfer data from one device to another.
2. Google Docs and Google Sheets are inconvenient.
3. Stickers with data on the items fall off and get lost.
4. No ability to put points on the map where the item was found.
5. No ability to view collections of other people.
6. No ability to tag people on photos.
7. Limited sorting functionality.
8. Limited filtering functionality.
9. Limited search functionality.
10. Difficult and inconvenient to maintain the relevance of the collection.
11. No ability to add all the characteristics/descriptions in a convenient format.
12. No ability to add notes regarding collectables.
13. No ability to create catalogs or folders.

Willingness to pay:

According to the survey, 68% of the respondents are ready to pay for the platform. Part of the users supports one-time purchase of the entire application or individual features. Another part is in favor of monthly subscriptions with access to premium functionality.

- The monthly subscription price ranges from **$2** to **$10** with a median of $5.

- The price of a one-time purchase of the platform with access to premium features varies from **$20** to **$50**.

End-User Personas were created on the basis of a custom survey, taking into account demographic data from other studies described above. After data collection, filtering, and analysis, two user segments were identified. Their goals, needs, and pain points may be slightly different from those described in these portraits, but the consumer behavior unites all users of each separate segment. User Personas can be found in Appendix.

4.2   Specific Target Audience for MVP

Speaking specifically about my target audience for MVP, collectors of Tourist Stamps (TS) form communities and have their own websites in the following European countries:

- Czech Republic (2,775 TS)

- Poland (1,131 TS)

- Slovakia (941 TS)

- Hungary (419 TS)

- Ukraine (306 TS)

- Germany (232 TS)

- Austria (200 TS)

- russia (115 TS)

- Great Britain (106 TS)

- Switzerland and Liechtenstein (47 TS)

- Slovenia (28 TS)

- Spain (28 TS)

- Italy (20 TS)

- Romania (17 TS)

- Netherlands (16 TS)

- Latvia, France, Norway, Croatia (less than 13 TS)

Also, there are 10 TS in the USA and 1 in Australia.
The number of Tourist Stamps is updated on 06.04.2022, new ones are released regularly.
The total number of TS is 6,416 worldwide and this quantity continues to grow.

The websites of some countries display the actual and systematically updated ranking table of travelers by the number of collected Tourist Stamps. Only the tables with the largest amount of data were used to analyze the scope of the collections.

	Registered Users	> 50 TS	> 100 TS	>200 TS
Czech Republic	2,071	327	214	98
Poland	329	53	27	0
Ukraine	194	65	37	16

It turns out that in these countries alone there are about 500 persistent collectors who may be potential users of the platform.

Data of Ukrainian users (website, 2022) was analyzed more exhaustively and there are some considerable insights:

- In the list of registered users, there are representatives from each corner of Ukraine (21 regions). The following cities are leading in the number of collectors:

  – Kyiv - 48
  – Lviv - 39
  – Kharkiv - 13

- Throughout the data there was found a couple of correlations:

  – 61.46% - Number of collected Ukrainian TS to the ones bought abroad;
  – 84.62% - Number of Ukrainian TS to number of premium TS;

This means that the more passionate is a traveler, the more TS they will buy, therefore, they are more likely to visit sightseeings abroad.
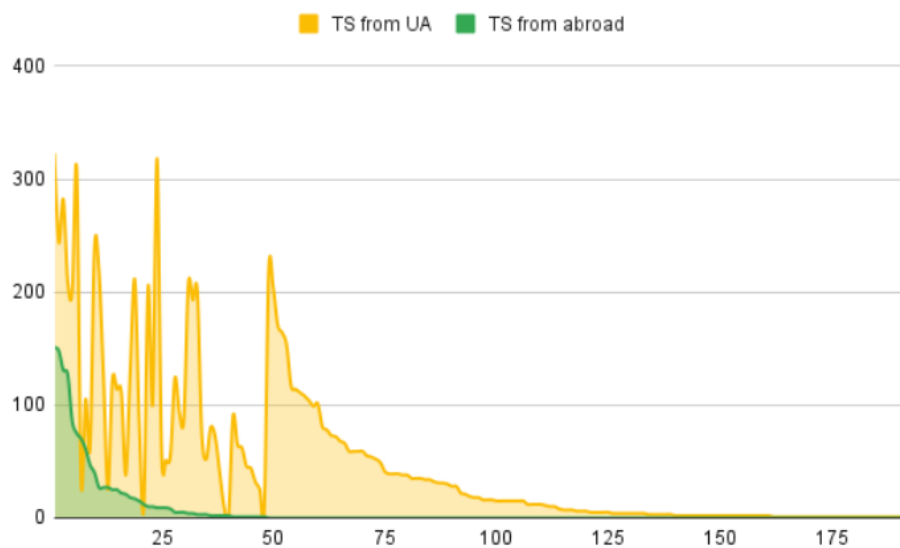
FIGURE 4.5: Correlation between TS from Ukraine and abroad within single collection

4.2.1 End-User Persona

User Persona for MVP was composed based on data collected above and insights from a one-to-one interview with Tourist Stamps Collector.

USER PERSONA

Emma

ABOUT

Emma is a passionate traveller. She has already visited 23 counties in Europe. In 2016 she discovered Tourist Stamps (TS). Since then Emma has been buying them at each accessible location and already has more than 600 ones in her collection. She saves pictures of TS in a folder on desktop. She has plenty of storied from her journeys related to looking for TS which are forgotten with time. Emma is not one of the computer geeks and it is difficult for her to get along with new technologies. Emma hesitated using available apps hense her collection is already too big and she would not like to spend hours entering data about each item.

AGE 29

JOB TITLE Owns a restaurant

STATUS Engaged

LOCATION Budapest, Hungary

COLLECTS Tourist Stamps

GOALS

- Collect TS from each counry where they are available
- Know where TS can be bought while travelling
- Share her collections with peers

NEEDS

- Tool which will be easy to use and allow her to conveniently import and manage large collection of items
- Ability to attach notes to records about TS
- Quickly find places where TC can be bought
- Ability to search/filter and group items

PAIN POINTS

- Current tools are inconvenient
- Difficult to manage big collection without proper search/filter functionality
- Impossible to add proper description or location
- Not possible to create groups of collectables

PERSONALITY

Introvert		Extrovert
Analytical		Creative
Busy		Time rich
Messy		Organized
Independent		Team player

FIGURE 4.6: User Persona - MVP

Chapter 5

Minimum Viable Product

5.1 Overview

In this thesis it was decided to narrow the target audience to collectors of Tourist Stamps who have formed their own communities in Ukraine and other European countries and create a platform that will meet their basic needs for the first release. The MVP will be used to test the level of user satisfaction and discover pitfalls and disadvantages of a solution.

In the scope of MVP, users are able to add TS to their catalog, filter, search TS and add locations of landmarks where TS were acquired. Also, they are able to view map with all TS pointed out.

5.2 Technical Implementation

Several considerations have been taken into account when designing the current application.

Catalog Designer Component

There is a hierarchical structure of items in the relational database (Postgres). This approach allows simplifying the catalog modeling as it allows the inheritance of common attributes from multiple items in the collections. At the moment there is a REST API to manage the items in the catalog. Future plans include a dedicated Designer Web Interface for defining the collectible items. There is no requirement to have extremely high throughput on this component as the items are typically modified in any domain relatively rare. The database of a Catalog designer also provides the items ownership information (which items owned by which users).

The application is powered by a Spring Boot (MVC).

Online Catalog Component

This component has in mind an extremely fast, powerful, and flexible search. The Online Catalog is backed up by an Elasticsearch, which provides full-text search facilities. It is important that the storage supports the localization of items (titles, descriptions in different languages) and that the items are structured by the countries (which is relevant for TS collections). The advanced REST API provided by this component is used by the Online Web application as a backend.

The application is powered by a Spring Boot (WebFlux).

Indexer Application

The purpose of an Indexer is to rebuild the Online catalog if there are any changes in the Catalog Designer. It is a pure event-driven flow based on the publisher-subscriber cross-application communication model. In other words, when there are some changes on Designer, it publishes the change event, which is then consumed by the indexer, and finally, the indexer performs recomposing of the detailed localized item from the relational DB structure into the searchable Document for Elasticsearch.

The Kafka message Broker has been chosen as the transport for the asynchronous messaging.

Web Application

The web application UI is based on the Angular framework with the REST API backend provided by Online Catalog and Catalog Designer components.

Google Maps Integration

Implemented with help of Angular Components for Google Maps.

Images Hosting

In order to effectively host images in different formats/sizes Cloudinary CDN is used.

Virtualization

The project aims to follow best practices of the Microservices Architecture. Each service is implemented as a deployable application containerized with Docker. At the moment for local development, the application is orchestrated by Docker Composer. Regardless, the chosen approach allows easy migration of the application components to any cloud-based platform, such as Amazon EKS or Google Kubernetes Engine, etc.
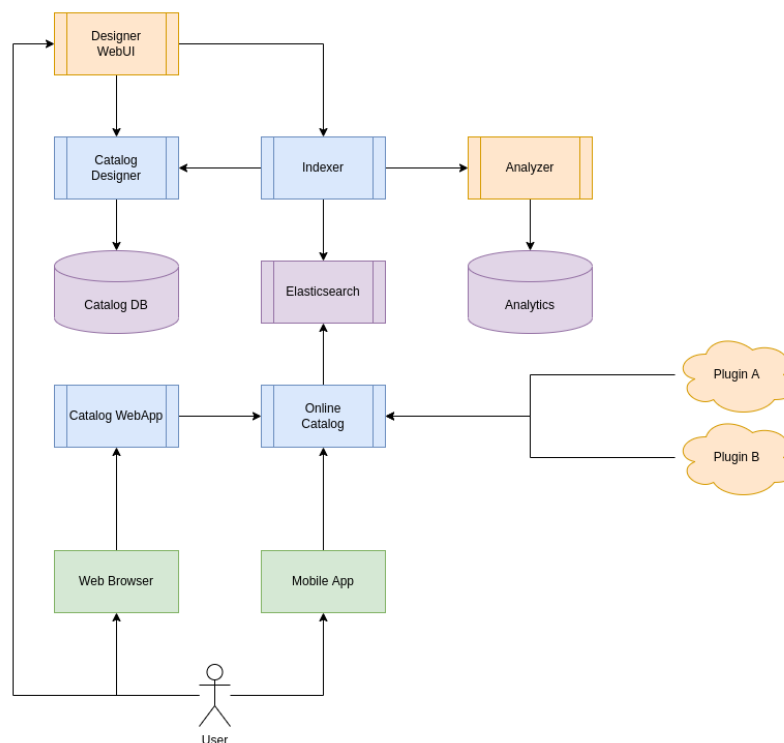
FIGURE 5.1: Platform Architecture Diagram Using UML Notation

5.3 Screens

In this section screenshots of the existing functionality of the platform are presented. Other screens can be found in Appendix.
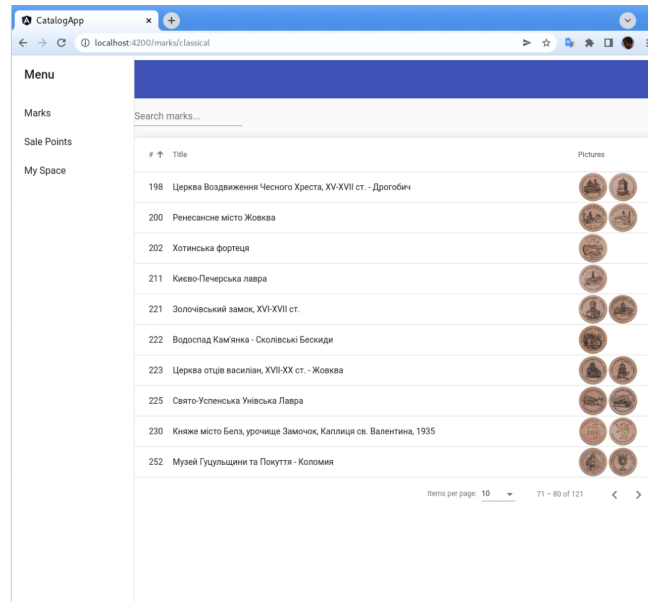
FIGURE 5.2: Screen: List of collected TS
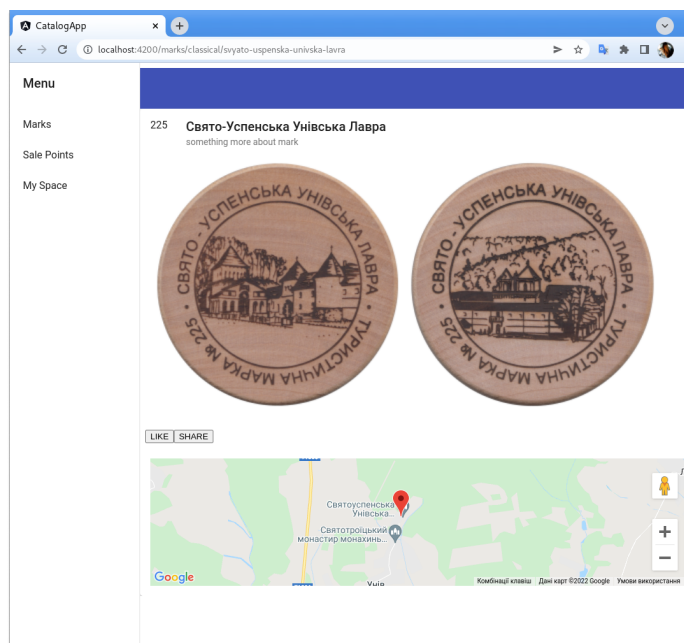
FIGURE 5.3: Screen: Individual TS Representation in Catalog

Chapter 6

Business Model

Alex Osterwalder's Business Model Canvas (Mansfield, 2019) was used for this chapter to summarize the opportunities and effectively bring together all elements of the development strategy for whole platform which supports variable collectable types and has extended functionality, which is out of MVP scope. BMC can be found in Appendix.

6.1 Value Proposition

A fundamental reason why customers will choose our platform over others and which sets it apart from the competition, is the combination of the features listed below. Any existing platform was able to bundle them and implement such a solution.

1. Recommendation system which suggests to users where they can buy a needed collectible at the best price, which will save time for "hunting";

2. Possibility to customize the catalog for any type of collection;

3. Wishlists system;

4. Extensive database with thousands of collectibles from various domains which users can add to their catalogs or wishlists;

5. The social network aimed at developing the community of collectors;

6. An integrated marketplace that allows users to sell and buy items they need to replenish their collections;

7. Possibility to view various statistics about collectables, such as their average price on the market, number of users who own the same item;

8. Possibility to estimate the value of the entire collection in case the customer wants to sell it (referring to the research (Sian, 2017), 26% of art collectors are thinking about selling all or most of their collection in the future);

The Venn diagram below shows the four dimensions as the most crucial parts which make our solution unique and valuable to users.
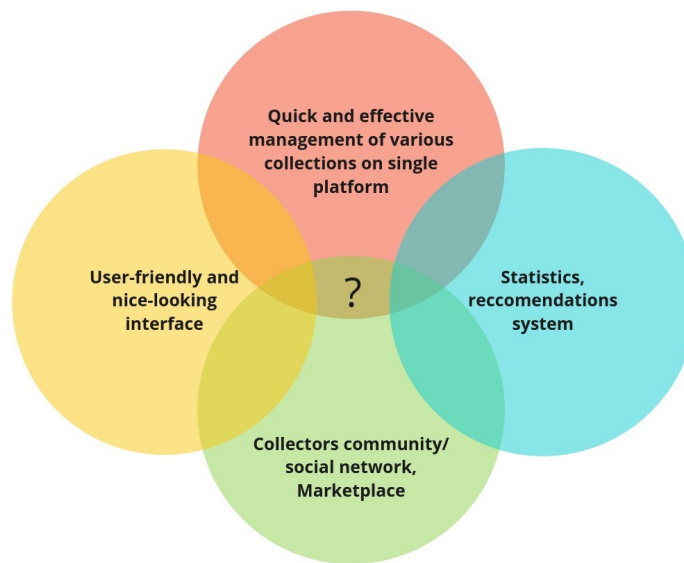
FIGURE 6.1: Venn Diagram Representing the 4 Dimensions of a Solution

6.2 Customer Segments

First of all, the initial version of the platform will support only the English version. Other localizations will be added later, so it is worth highlighting that the general group of users is European and American residents. Based on the target audience analysis in the section 4.1 above, customers can be clearly divided into a few segments.

1. **Serious Collectors**
   This group includes people who have been collecting things for many years and already have hundreds or even thousands of items in their collections. For them, it is crucial to clearly organize and have records about each element, which also implies its value, as a certain category of users collect rare and expensive items, such as antique books or jewelry.

2. **Amateur Collectors**
   This group contains users for whom collecting is a hobby. They usually do not possess costly collections in terms of the market, anyway it does not make them less important and valuable to their owners. These collectables might be stamps, chocolate wrappers, beer coasters, colored stones, stickers, etc. These are usually common items that hundreds of other people collect, so it is important for this group of customers to have extensive databases so that they can easily search and add items to their catalogs.

3. **Organizations**
   This segment covers museums that can add their exhibits to catalogs, thus filling and expanding the database. Also, they will be able to search for and add exhibits from other museums if they have copies. This category also includes stores that manufacture unique personalized items, such as jewelry, bags, or custom furniture. Since they sell these products, it would be worth having an example as a case for their future/existing customers, organizing it all in a convenient catalog.

6.3   Channels

Users will be offered cross-platform mobile applications (Android and iOS) and web application. In order for the product to gain a foothold in the market, it is essential to search and attract devoted customers.

6.3.1   Multi-Level Marketing

It is obvious that without a base of loyal customers, any product will not last long on the market. When it comes to launching new products with a bunch of strong competitors, it is important to attract users from the beginning. However, the focus should be not on the number of users. Primarily are needed people who will be doing all the work for us, distributing a word about the platform among other potential users, thereby attracting more and more new users, who will do the same. There through will be formed a kind of Multi-Level Marketing structure - a distribution model that companies use to get their product to consumers.

For users' motivation to recommend and share the platform on social networks, a reward system should be introduced. For instance, if users reach 20 enrolments by their link, they will be offered to increase the max number of collectables that can be stored in one collection within the Free plan.

The most probable limitations and risks are:

- A pool of potential users is limited by collectors.

- Users may recommend the platform to uninterested audience only for getting rewards.

6.3.2   Social Media and Bloggers

Any product cannot reach its target audience if they do not know about it. Since the platform is limited by the domain of collecting, it makes sense to widely spread information about it, so that the maximum number of potential users learn about it. Even if the mention of the platform is seen by a person who is not directly related to this domain, they will tell about it to friends who are collecting something. Below is a list of effective ways to achieve maximum publicity:

- Instagram influencers;

- YouTube channels cooperation;

- Facebook groups;

- TikTok;

- Posts on Reddit;

- Pay-per-click or Pay-per action advertising on websites;

6.4   Customer Relationships

Despite the fact that all three customer segments are different in terms of demographic and income, they are united by common needs that were taken into account while creating the functionality and the interface of the platform. In order for the

client to come back to us again and again and bring others, all the conditions for this must be created. Our goal is to walk each segment of customers through an unforgettable user experience and build **Long-term** customer relationships with them. A good system should take care of users, take into consideration their experience, and ask them to share impressions and desires about the functionality. That is why there will be constant monitoring of user well-being in the system and gathering of feedback.

Since the platform offers users a kind of social network, another type of customer relationship is **Community**. Inside of the platform users will be able to get to know each other, find people with similar interests, and share or trade collectables.

One more customer relationship type is **Co-creation**. Since the platform is opensourced, it will provide users with the ability to create their own plugins for different collectible types, given the templates and frameworks, which would allow them to customize the platform exactly for their needs. They will be able to trade plugins. In case the customer is not able to create a plugin by themselves and cannot find desired collectable type, they are offered to write a support request to the team and the plugin will be created within a short period of time.

6.5 Revenue streams

6.5.1 The Platform Fee

Subscription Plans

The most significant way of platform monetization is a subscription system. Each subsequent subscription level will include the features of previous levels. Since the platform is new and users may not be willing to pay right away, a Month Free Trial Period will be offered. The basic plan has limited functionality, so access to more features will encourage users to buy subscriptions.

The price of monthly subscriptions was finalized based on the results of a custom survey, in which potential users indicated what price is acceptable to them and under what conditions they are willing to pay for the platform.
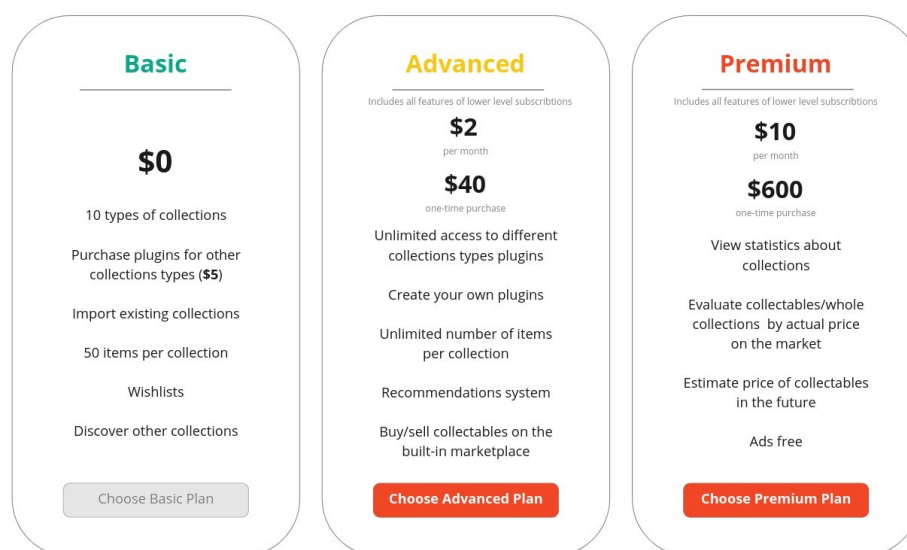
FIGURE 6.2: Details of Subscription Plans

One-time Payments

The Premium plan allows users to estimate the value of collection and predict its price in the future. This feature can be applied an unlimited number of times within the Premium plan. Meanwhile, users with lower subscription levels must buy such a feature each time they want to evaluate the price of collection.

Among other one-time purchases is to acquire plug-ins for storage and retrieval of statistics on individual rare types of collections, or customized ones for the needs of the user.

6.5.2 Others

It could be possible to get paid by displaying advertisements on the website that would be seen by the subscribers of the Basic plan. However, this option is considered reluctantly, because we have all been in the role of Users and no one likes advertising. Moreover, the main goal after the launch of the platform is to gain a loyal audience.

6.6 Key Activities

In order for the platform to thrive, it is necessary to regularly perform a number of activities that will ensure a stable increase of users and revenue streams.

1. Marketing and advertising in order to attract new customers.

2. Gathering feedback from users through surveys and evaluation forms in order to improve the platform according to their expectations.

3. Regularly update the system - testing and deploying.

4. Keep the Database of collections up to date.

5. Reward systems for existing users.

6. Development of mobile application.

7. A constant search for potential partners and suppliers at better terms.

8. Moderate content that users are posting.

9. Working on the ways of automation the most of processes.

6.7 Key Resources

There are some resources the existence of which ensures the operation of the platform:

1. Data obtained from other platforms.

2. Team to develop and maintain the platform.

3. Moderators of catalogs.

4. Customer support team.

5. Access to information about different collectables and storing their data types.

6. Access to technology and best practices.

Throughout the all development life cycle, it is necessary not to devalue these resources and try to expand them.

6.8 Key Partners

"No one can whistle a symphony. It takes a whole orchestra to play it." – H.E. Luccock.

6.8.1 Partnership

The business model on which my product is built is customer-oriented, so it is allocated to the B2C type. However, in the future, cooperation and integration with other businesses and platforms are not excluded. As was mentioned above, one of the customer segments is organizations.

Cooperation with museums

Accounting of museum objects is one of the main directions of the museum's work, which is carried out by registering in the stock-accounting documentation, including digital forms, objects of the museum fund ("About the statement of the Instruction on the organization of the account of museum subjects" 2016). However, many Ukrainian museums keep records of their exhibits in paper notebooks. Moving to my platform would be a powerful step towards the digitalization of Ukrainian historical heritage.

Handmade industry

Handmade shopping has grown in popularity in recent years. According to Ask Your Target Market's survey (Sian, 2017) of 1000 consumers, 72% of all shoppers think that handmade items are generally more special than mass-produced items; 49% think that handmade shopping is likely to continue gaining popularity; 25% of consumers purchased handmade products on eBay, Etsy or Amazon. Referring to Yahoo Finance research (report, 2019), in 2018, Etsy's Merchandise Sales Volume of the 2.1 Million active Etsy sellers was $3.9 Billion.

As we can see, this market niche is not slowing down and continues to expand, so it would be great to partner with such platforms for handicrafts, whose users will be offered my platform as a place to save a catalog of all products they have ever created. Ads on sites and sales offers are not eternal, and manufacturers would like to have records and photos of things they made, putting their heart and soul into the creation process. Also, the platform can be used as a marketplace for handicrafts. Currently, makers sell their wares on online platforms like Etsy, Artfire and iCraft, Amazon, Facebook Marketplace, and in-person retail.

6.8.2 Suppliers

There are integrations provided in the platform, without which it will not be able to function. These include integration with the payment system. Also, a cloud server to host the platform and store the database is needed.

6.9 Cost Structure

This section includes the costs the platform will incur as it operates. Pre-launching costs include a business plan, research expenses, borrowing costs, and expenses for technology. Post-opening costs include advertising, promotion, and employee expenses.

Fixed Costs

- Payment for back-end development;

- Payment for front-end web development;

- Payment for UI/UX design;

- Mobile app design and development;

- Payment for domain name;

- Payment for web hosting

Variable Costs

In the case of online platform, variable costs depend on the number of users of the platform.

- Payment for marketing;

- Payment for subject-matter experts consultations;

- Fees to the payment gateway (commission for each user transaction);

- Payment for maintenance team;

- Payment for a customer support team

To estimate the total cost of developing such a platform, it is needed to get access to related data and conduct in-depth analysis of development and maintenance process of similar websites/platforms and their expenses.

6.10 Summary

Considering all described in the business model above and taking into account the previous chapters related to the market and target audience research, it was decided to summarize it in the form of SWOT analysis to outline Strengths, Weaknesses, Opportunities, and Threats that can be encountered during the launch and operation of the platform. It shows which aspects are well established and addressed what should be done to minimize the risks.

STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS
Unique solution that fits any type of collection	It may be time consuming to transfer large collections to the platform	Entering the world market	Strong competitors
Features which are not available on other platform	Narrow and specific niche in the market	Creating a marketplace within the platform	Wars, emergencies and natural disasters can have a negative impact on the industry
Proven Business Model	Initially targeting only TS market	Connecting Machine Learning and AI to create a recommendations system for users	Not all users are ready to pay for access to the platform
User-friendly interface		Social network for collectors	Platform may not bring revenue untill there is sufficient number of users
Customers loyalty			

FIGURE 6.3: SWOT Analysis

Chapter 7

Future Releases

This section provides blueprint of full-scale platform for collectors with extended functionality and which supports features described in business model.

7.1 User Flow

There is a high-level User Flow Diagram that represents how users go through the platform starting from log in and which actions they can do.
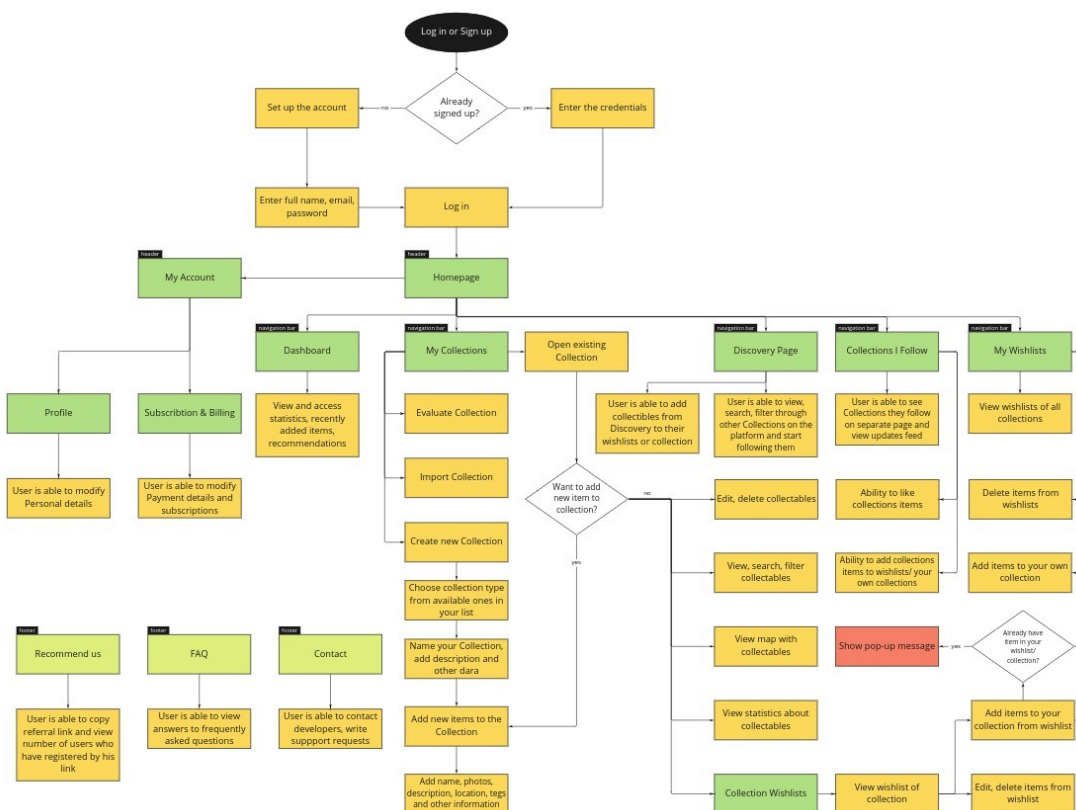

FIGURE 7.1: User Flow Diagram

7.2 Functional Requirements

Functional requirements are written in the form of high-level user stories that are divided into epics.

Epic	User Story
LOG IN	As a user, I want to set up the account, so that I will be able to register in the platform.
	As a user, I want to enter my full name while set up the account, email and password, so that I will be able to create the account to identify my personality.
	As a user, I want to enter the credentials, so that I will be able to log in my specific account.
	As a user, I want to log in the system, so that I will be able to receive the access to the whole functionality.
HOMEPAGE	As a user, I want to view and access statistics, recently added items and recommendations, so that I will be able to track the progress of my collection.
MY ACCOUNT	As a user, I want to modify personal details, so that I will be able to update my current information.
	As a user, I want to modify my payment details and subscriptions, so that I will be able to control the actuality of payment processes.
MY COLLECTIONS	As a user, I want to check my exciting collection, so that I will be able to CRUD it.
	As a user, I want to evaluate my collection, so that I will be able to see a current price and future price.
	As a user, I want to view a map with collectables, so that I will be able track all collectables in the map.
	As a user, I want to edit, delete collectables, so that I will be able to run update Collection.
	As a user, I want to view, search, filter collectables, so that I will be able to quickly find for interesting collectables for me.
	As a user, I want to view the statistics about the collection, so that I will be able to see trends and number of users who collect the same things.
IMPORT COLLECTION	As a user, I want to import collection, so that I will be able to transfer a collection from another platform.
CREATE NEW COLLECTION	As a user, I want to create a new collection, so that I will be able to conveniently manage specific type of collectables.
	As a user, I want to choose collection type from available ones in the list, so that I will be able to select the necessary ones that suits me.
	As a user, I want to name my collection, ad description and other data, so that it will be easier to identify the special features of my collection.
ADD NEW ITEM	As a user, I want to add new items to the collection, so that I will be able to organize them as well.
	As a user, I want to add name, photos, description, location, tags, and other information, so that it would be easier to identify the collection via filters.
	As a user, I want to attach the collectable for the location, so that user will be able to track the placement of collectable on the map.
DISCOVERY	As a user, I want to view, search, filter through other Collections on the platform and start following them, so that I will be able to track and follow interesting for me collections.
	As a user, I want to add collectibles from Discovery to my wishlist or collections, so that I do not have to input data about the same items that I have manually.
	As a user, I want to like collection items, so that I will be able to see based on my activity and collections you already posess.
COLLECTIONS I FOLLOW	As a user, I want to see Collections I follow on separate page and view updates feed, so that I will be able to check my favorite collectables.
WISHLIST	As a user, I want to view wishlists of collections, so that I will be able to CRUD the collectables.
	As a user, I want to have the ability to add collections items to wishlists, so that I will be able to track my favorite items and buy them when available.
	As a user, I want to edit, delete items from wishlist, so that I will be able to manage the items of wishlist in case my desires changed.
	As a user, I want to cross out items from my wishlist, so that they will be automatically added to my collection which means I got that item.
REFERRALS	As a user, I want to copy referral link, so that I will be able to share it.
	As a user, I want to view the number of users who have registered with my referral link, so that I will be able to see how many more users I need to attract in order to get a reward.
SUPPORT	As a user, I want to view answers to frequently asked questions, so that I will be able to cover my general questions.
	As a user, I want to contact developers and write support requests, so that I will be able to give my feedback.

7.3 Marketplace

Collectors spend whole days hunting for desired additions to their collections, or just passively wait for that thing to come across them. It depends on the type of objects they collect. Often various groups or forums dedicated to certain collectables can be found on social networks. This is a common manner of acquiring items, however, the problem is that these potential outlets are scattered all over the internet.

In the future, the built-in marketplace will be implemented so that the platform will provide users with a convenient way to purchase hunted collectables without leaving the environment and spending precious time searching for the necessary additions to the collections on websites and various groups on social networks.

Users will be able to put their items for sale and have access to thousands of collectables that other users want to exchange or get rid of. Also, the recommendations system implemented with the help of Machine Learning and AI will show users websites where they are likely to find the item in case it is not available on the platform. Moreover, the system will take into account users' preferences and the content of their wishlists.

7.4 Social Network For Collectors

It is important to remember the social aspect of the platform and its value in terms of community. Each domain of collecting is indeed important to its followers. It does not matter if there are matchboxes, ancient medieval artifacts, or expensive watches assembled by the luxury segment of collectors.

In the collector's mindset, there are 2 main traits distinguished: to replenish their collection and to share it with others since it is a kind of achievement for them. it is truly significant for them that people who understand a certain topic can admire their collection, and maybe even envy them. There is continuous competition in the ecosystem of collectors - who gathered a larger and more valuable collection. This can be clearly seen in the example of Tourist Stamps. The website has a ranking of collectors who hit the largest number of TS. In this way, they gain recognition from the community and other peers want to follow their example.

This platform will provide users with the opportunity to search for like-minded people and share their collections with them. Users will be able to subscribe to each other, browse, like and comment on catalogs with collectables. There are endless prospects for growth and improvement of the platform in terms of social networks for collectors.

7.5 Mock-ups

A visual high-fidelity representation of a final platform on mock-ups was created based on User Flow and User Stories provided in this chapter. Here are some examples. The other screens are provided in the Appendix
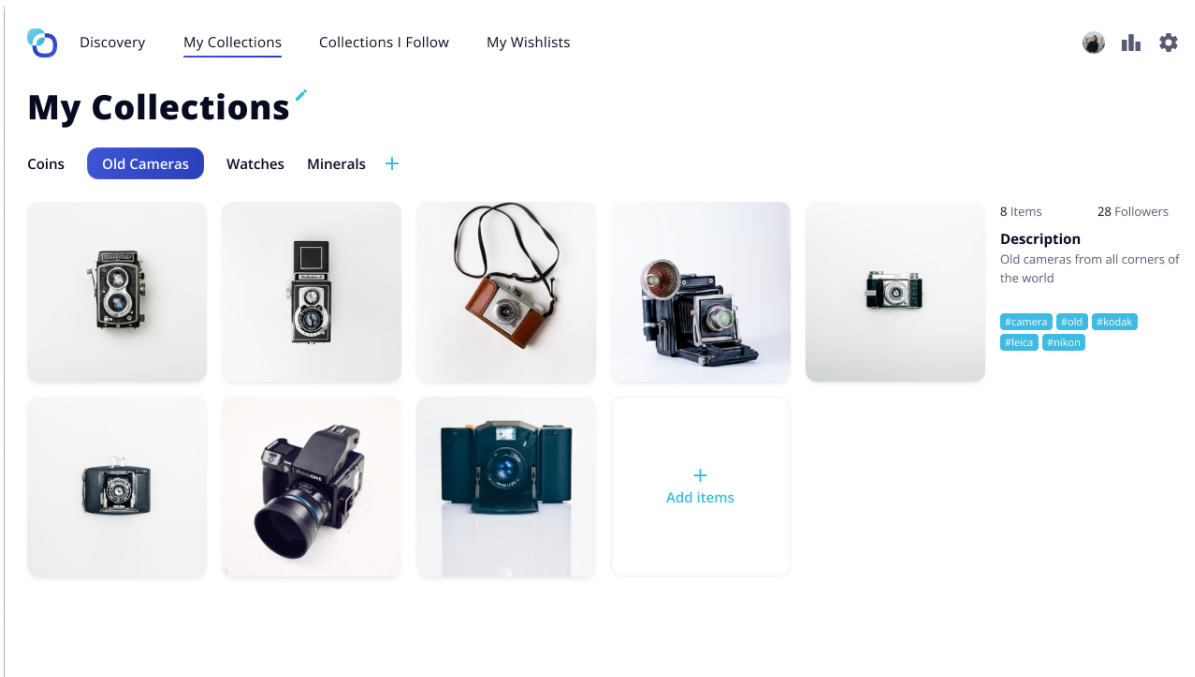
FIGURE 7.2: Screen "My Collections" in Web Application
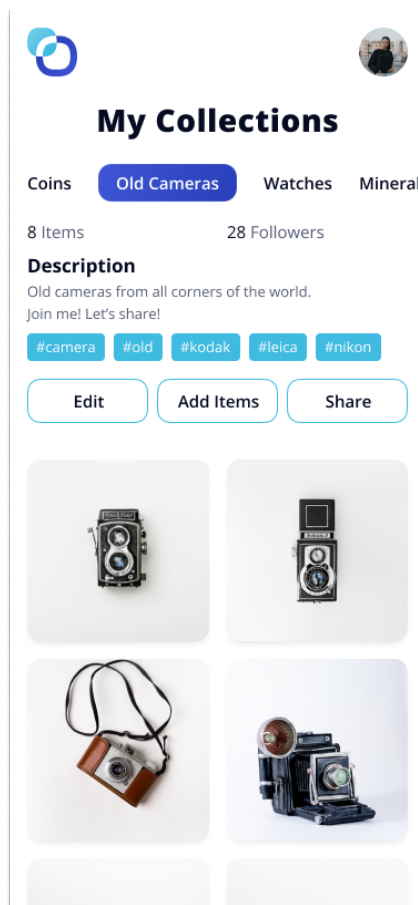
FIGURE 7.3: Screen "My Collections" in Mobile application

Chapter 8

Conclusions

In order to achieve the goals set in this thesis, a lot of efforts were needed, which implied the research, acquiring user-related data, business analysis and MVP development.

The investigation part of this work was focused on two main goals: getting to know the end-users, their pain points and needs; gathering best practices of existing solutions on the market.

There was performed extensive exploration of the market and existing solutions. Also, the target audience was analyzed and divided into a few segments of end-users. The data for analysis was obtained from performed research and related studies. Moreover, a special survey was created and distributed among potential users of the platform. Also, an interview with the prospective customer was conducted. The data about users on the website of TS retailers was also gathered and processed. All of this resulted in the discovery of significant insights which were used to generate an exceptional value proposition that would be able to attract and retain customers on our platform.

The implementation part included the creation of MVP which would demonstrate in practice probable scenarios for future development of the platform.

While working on this thesis, the knowledge gained in various courses during four years of study were used. Various practices and approaches to business analysis were applied to the research and construction of a solution. Having collected all the artifacts in this work in the scope of software development - user flow, functional requirements, user personas and mock-ups, the final step before starting development will be determining the estimated costs.

The goal set for this thesis was achieved, although we had to face many obstacles. The Business Model presented in this thesis has opportunities for buildout and improvements. The basic objective that will lead to success is to keep going. We should constantly work on improvements and instantly respond to the trends among the target audience.

Appendix A

A map with a geographical distribution of Art Collectors

Art Collectors Worldwide

Appendix B

End-User Personas

USER PERSONA

Sophia

ABOUT

Sophia started reading fantasy books when she was 10. She has a blog about DND games and started writing her own short fantasy stories. Sophia spends a lot of time on finding new statues of her favorite book characters. She already has collections related to Lord of the Rings universe, Warcraft and others. She has not started organizing her collectables yet properly and a few times she accidantely bought duplicates. Sophia tried to take notes in her diary but often forgets to update them. She did not find a single platform which would allow her to keep track of all her statues and quickly search for new ones.

AGE	20
JOB TITLE	Student
STATUS	Single
LOCATION	Kalush, Ukraine
COLLECTS	Fantasy and gaming figures

GOALS

- Collect all set of statues related to distinct fantasy universes
- Get unique statues of high quality
- Find like-minded people to discuss collections in her blog

NEEDS

- Ability to view already collected items
- Ability to create wishlist
- Relatable search results and direct access to marketplace
- Access to community of other collectors

PAIN POINTS

- Statues get lost
- Paper notes are not accessible all the time and often get lost
- Purchases of duplicates
- Too much time on searching new statues

PERSONALITY

Introvert		Extrovert
Analytical		Creative
Busy		Time rich
Messy		Organized
Independent		Team player

FIGURE B.1: End-User Persona 1

USER PERSONA

George

ABOUT

George was a software developer in the past and then started his own IT company. He inherited a large collection of rare coins and decided to expand it as a long-term investment, since over time the price of coins tends to rise. George investigated many platforms for his needs and even tried to use a few ones with paid subscribtion. However, each of the platform lacked one or another part of the functionality. Currently part of George's collection is not cataloged, part is stored on online platform and another part is listed in Google Sheets. George wants to unite the entire collection in one place and be able to conveniently manage it and know price of each element in the future to sell the collection at the best terms.

AGE 55

JOB TITLE Tech company CEO

STATUS Married

LOCATION Boston, USA

COLLECTS Rare coins/notes

GOALS

- Ease the process of inserting new items to collection
- Effectively search and filter through collection
- Profitably buy or exchange coins/notes
- Quickly identify and find wanted items

NEEDS

- Powerful recommendation system, wishlist
- Ability to evaluate/ predict the price of all collection/ separate items
- Ability to automatically import data on collectables from other platforms
- Large database of coins/notes
- Built-in marketplace

PAIN POINTS

- Tools that are currently used for keeping collection are not convenient and functional
- Not possible to predict value of coins
- Spends hours searching for wanted items

PERSONALITY

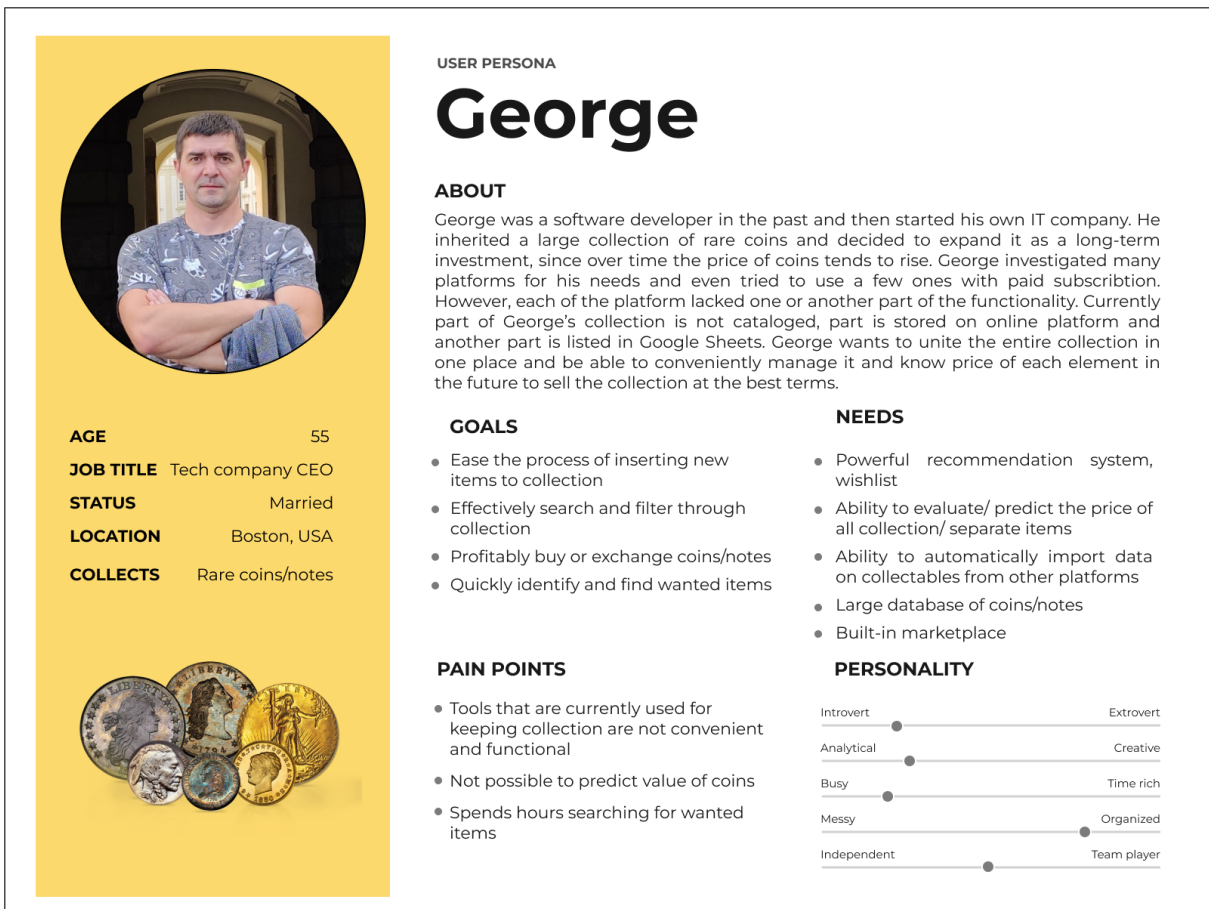| Introvert	Extrovert
Analytical	Creative
Busy	Time rich
Messy	Organized
Independent	Team player

FIGURE B.2: End-User Persona 2

Appendix C

Competitors websites

- My Collections
- My Collections
- CatalogIt
- CollecOnline
- iCollect Everything
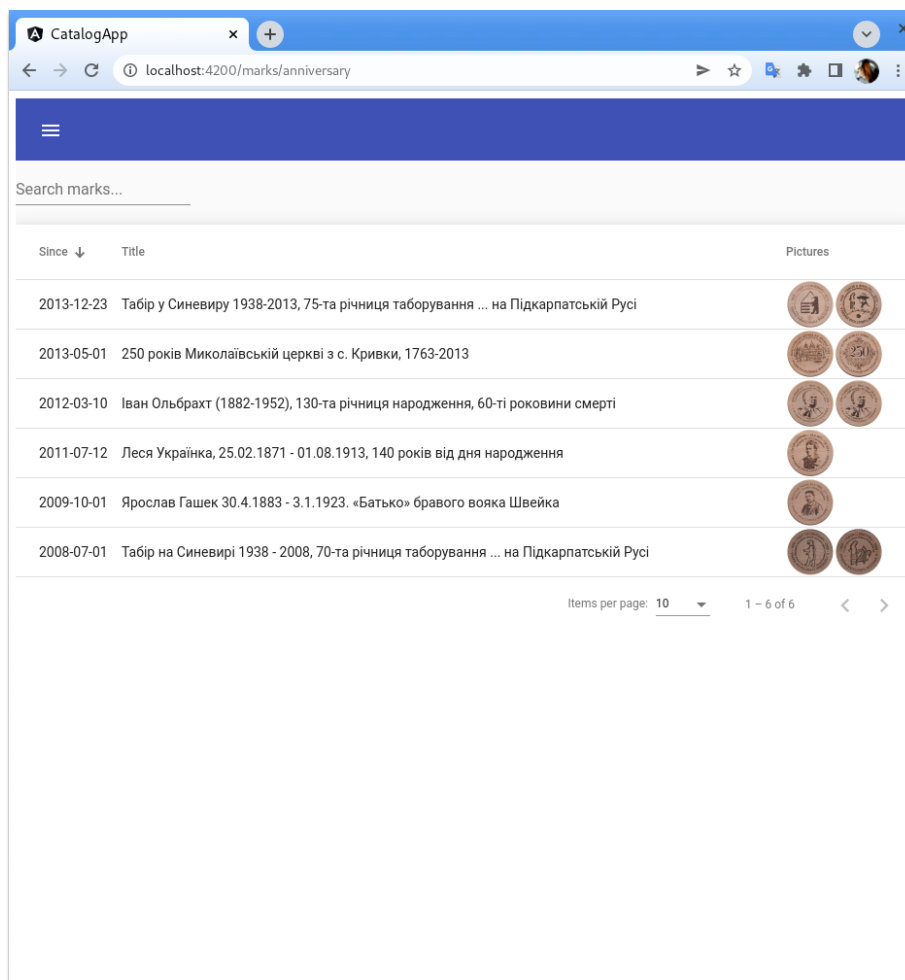- Collecteurs
- Colnect

Appendix D

Screens of MVP
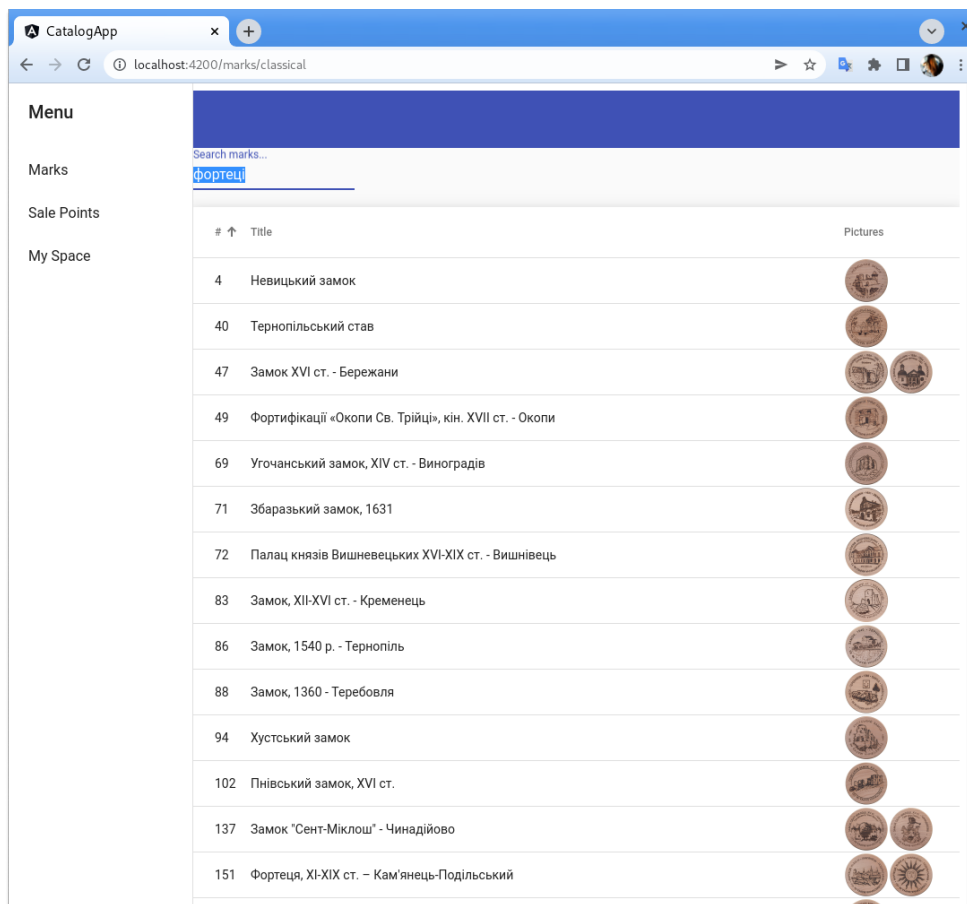

FIGURE D.1: Screen: Sorted TS List by Date Acquired

FIGURE D.2: Screen: Results of TS Search

Appendix E

Business Model Canvas

Key Partners 🔗

- Cooperation with museums;
- Handmade industry;
- Suppliers (cloud server, payment integration);

Key Activities ✓

- Marketing and advertising ;
- Gathering feedback from users;
- Regularly update the system - testing and deploying;
- Keep the Database of collections up to date;
- Reward systems for existing users;
- Development of mobile application;
- A constant search for potential partners and supplier;
- Moderate users' content;
- Working on automation of process;

Key Resources 🧑‍🏭

- Data obtained from other platforms;
- Team to develop and maintain the platform;
- Moderators of catalogs;
- Customer support team;
- Access to information about different collectables and storing their data types;
- Access to technology and best practices;

Value Propositions ∞

- Quick and effective management of various collections on single platform;
- Recommendation system;
- Wishlists system;
- Extensive database with thousands of collectibles from various domains;
- The social network;
- An integrated marketplace;
- Possibility to view various statistics about collectables;
- Possibility to estimate the value of the entire collection;
- User-friendly interface;

Customer Relationships ❤️

- Long-term;
- Community;
- Co-creation;

Channels 🚚

- Multi-Level Marketing;

Social Media and Bloggers:
- Instagram influencers;
- YouTube channels cooperation;
- Facebook groups;
- TikTok;
- Posts on Reddit;
- Pay-per-click or Pay-per action advertising on websites;

Customer Segments 👤

- Serious Collectors;
- Amateur Collectors;
- Organizations;

Cost Structure 🏷️

Fixed Costs
- Payment for back-end development;
- Payment for front-end web development;
- Payment for UI/UX design;
- Mobile app design and development;
- Payment for domain name;
- Payment for web hosting;

Variable Costs
- Payment for marketing;
- Payment for subject-matter experts consultations;
- Fees to the payment gateway (commission for each user transaction);
- Payment for maintenance team;
- Payment for a customer support team;

Revenue Streams 💰

- The platform fees which implies various subscription plans;
- One-time payments for access to special features;
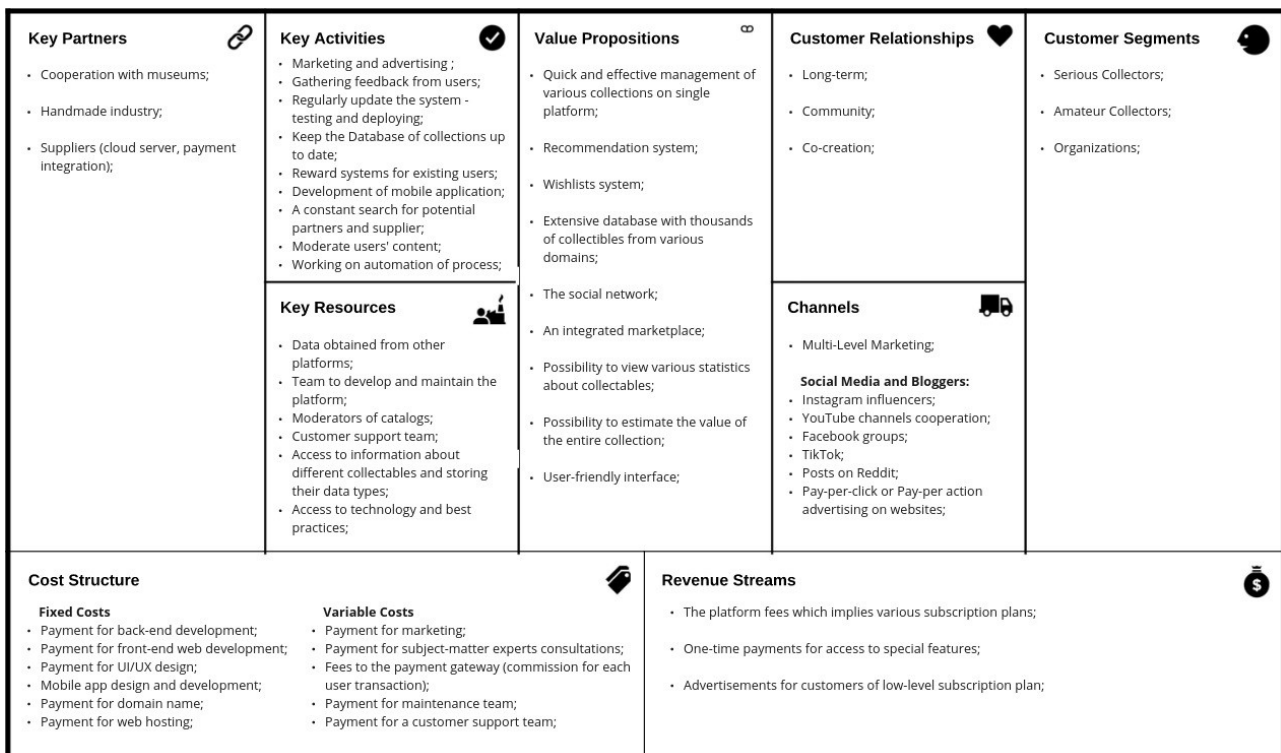- Advertisements for customers of low-level subscription plan;

FIGURE E.1: Business Model Canvas

Appendix F

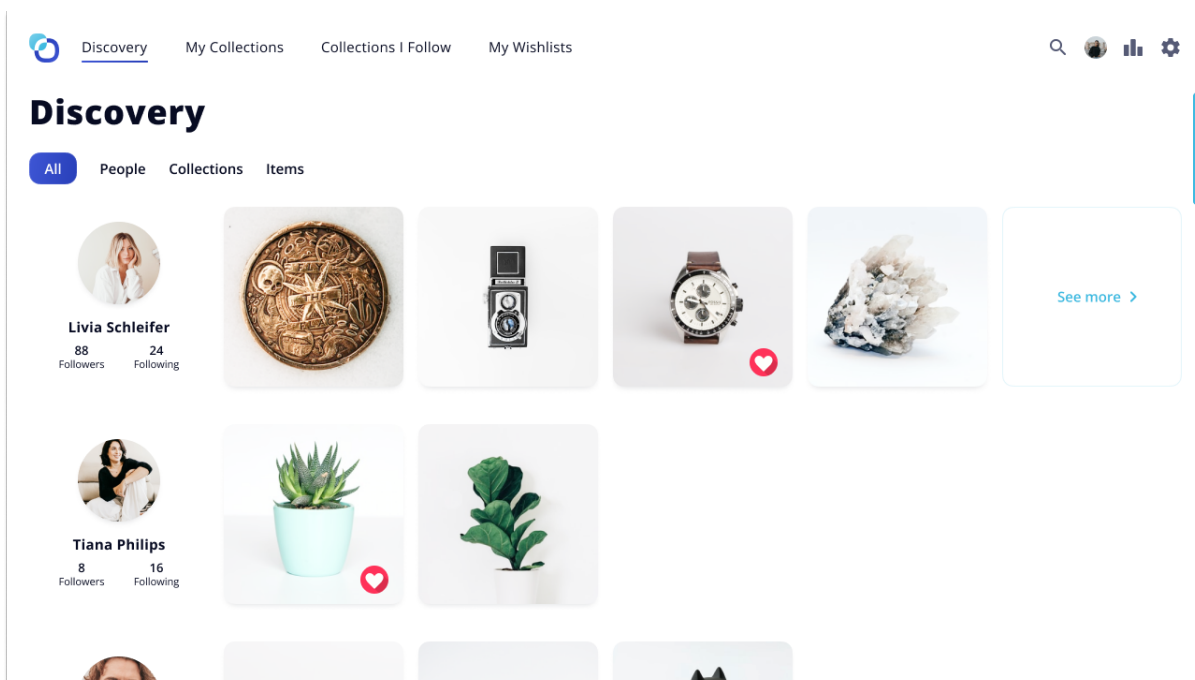# Mock-ups for future releases of the Platform

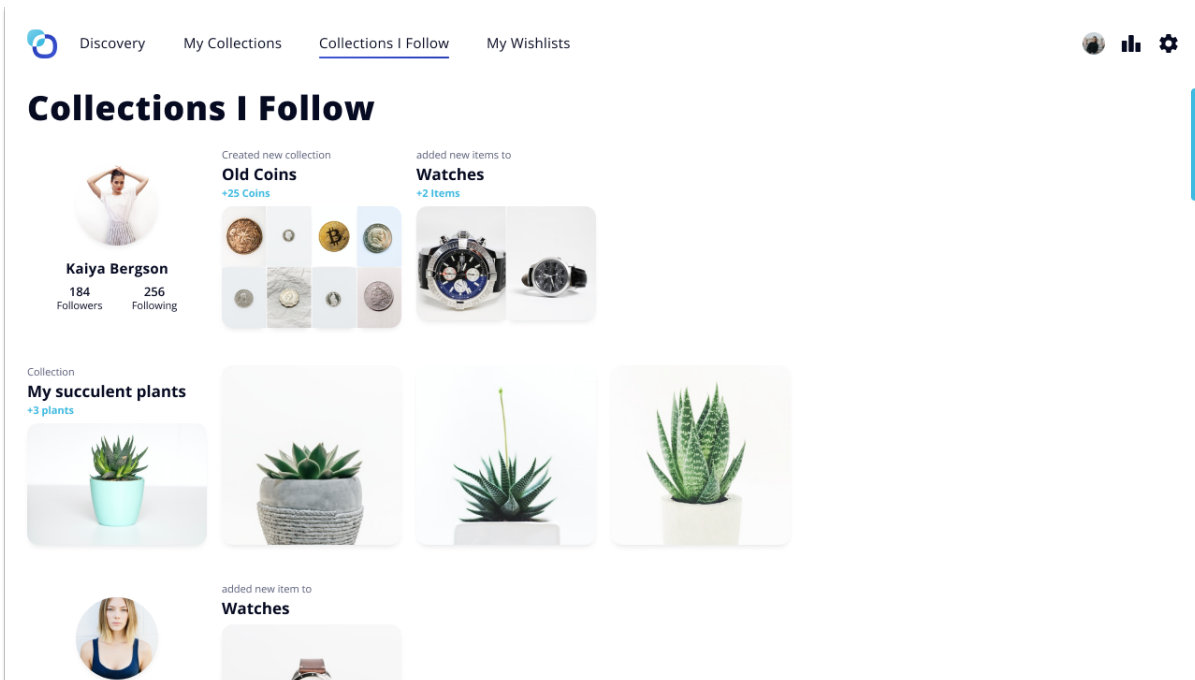FIGURE F.1: Screen: Discovery Page
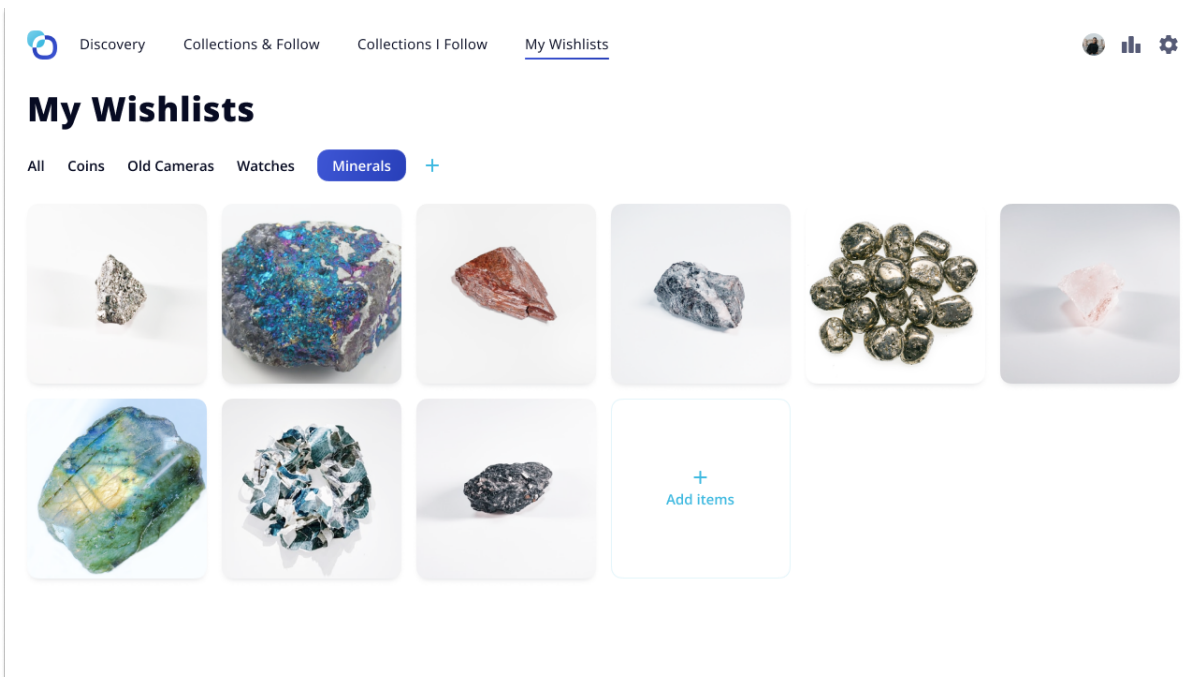
FIGURE F.2: Screen: Collections I Follow
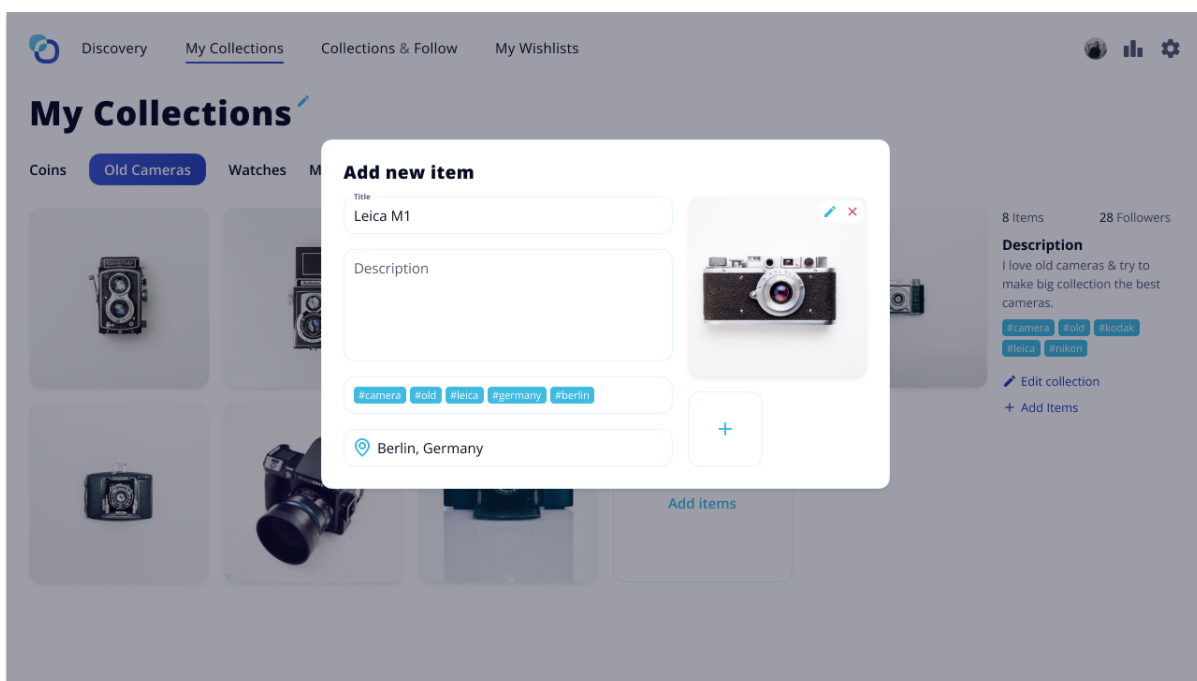

FIGURE F.3: Screen: My Wishlists

FIGURE F.4: Screen: Adding New Item to the Collection

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