



Algorithms and Data Structures Project

MasterMatch

MasterMatch finds the perfect program for you!

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Abstract

Looking for a Master's Program tends to be an extremely overwhelming and time consuming process. While searching for a suitable Master's program, students encounter many difficulties and often face an inefficient journey. Information is decentralised, students do not know all available options, so they cannot even research for them and they further can not filter the information they obtain based on their preferences. This results in a research process which is inefficient, tiresome and results in biased and most likely not optimised decisions. MasterMatch aims to tackle this problem.

MasterMatch is a program designed to help students find the most suitable Master's program according to their preferences. The program uses a hashtable data structure to efficiently filter through Master's programs based on various attributes such as program name, university name, and country name. With MasterMatch, students can easily find programs that match their preferences and avoid the inefficiencies and biases that come with traditional research methods.

Introduction: The Problem of Endless Searching

Looking for a Master's Program tends to be an extremely **overwhelming** and **time consuming** process. It requires a considerable amount of research and analysis to find the perfect program that meets one's interests and career aspirations. Not to mention that the Master's Program an individual opts to pursue will likely determine the course of their future, thus making the process extremely stressful. As a result, prospective master's students tend to dedicate large amounts of their time to finding the 'perfect' master's program that will increase their employability chances and build their skill set.

Prospective students face numerous challenges when navigating the global landscape of master's programs. The vast array of courses, institutions, and locations can be overwhelming, often leading to decision paralysis. Understanding entrance requirements, particularly for international universities, can be confusing and time-consuming. Furthermore, there can be significant barriers in terms of language, culture, and cost when considering overseas study. Reliable and comprehensive information about program content, quality, and outcomes can be difficult to find, making it hard to assess the true value of potential programs. Lastly, navigating the application processes for multiple universities, often in different languages and time zones, adds another layer of complexity to this already daunting task.

As a result, MasterMatch was created to facilitate and ease the search process for prospective master's students by efficiently incorporating **filtering options** in our program to allow the users to narrow down the possible program options to the programs that best fit their personal preferences and capabilities. Moreover, the **user-friendly, ergonomic** and **minimalistic** design of the front-end will create a smooth and error-free experience for our target audience.

Customer Segment Development

Customer Segment Characteristics

Initially, the primary customer segment identified consisted of current **bachelor students**, recent **graduates**, or **young professionals** looking to pursue a master's program. The customer segments previously mentioned are being targeted due to their lack of knowledge regarding the search process for finding an optimal master's program. More concisely, the main struggles our customer segment faces are the following:

- Inability to locate all the suitable programs for their preferences.
- Inability to efficiently compare programs with a few metrics.
- Uncertainty of opting for an unsuitable program.
- Unaware of the adequate program searching methods.
- Uncertain about which programs fit their personal preferences.

Overall, during the development of our final empathy map, we were able to conclude and realise that this customer segment faces the previously mentioned struggles due to the fact that the current available options are extremely overwhelming and large in number. Moreover, the limited filters make it difficult to find the right program as it is extremely difficult to compare the available options with the available resources in the market.

However, as we carried out the development of our project, we noticed that **college** and **university counsellors** along with similar departments are an extremely important segment we had disregarded which is capable of directly reaching the students that seek to pursue a master's program as they are extremely reliable sources. Therefore, having these departments utilise our program to search for new and upcoming programs they were unaware of to then recommend to their students could greatly expand our user segment.

Primary Research Findings

In order to further investigate the customer segment, we conducted primary research through interviewing eligible individuals (customers) on their stance, preferences, and expectations regarding the application process for Master's programs. To summarise, a total of 16 individuals were interviewed, each interview consisted of a total of 25 questions which delved into the challenges they were facing with the search process, their approach, preferences, and desires for a solution.

Firstly, the ages of the 16 respondents ranged from 19 to 35 years old, with a decent majority of the respondents ranging between 19-23 years of age. From these interviews we were able to

conclude the following: Around 38% of the respondents were not sure of which country, university and master's program they would like to pursue. Regarding the research process, a large majority of the respondents; 75% use the **internet** to gather information and contact necessary individuals regarding a program/university they are interested in rather than using traditional methods such as calling the admissions office or visiting the campus in real life. Hence, creating a product that is accessible online is clearly relevant.

Additionally, the main **online resources** utilised in the research process consisted of: HBS, FT rankings, university website and other reliable websites that rank universities. Most importantly, regarding the biggest **challenges** faced in the research process, all challenges mentioned revolved around the difficulty of finding relevant and specific information amongst the hundreds of resources available, as some respondents noted as well that university websites tend to be overwhelming and unorganised. Approximately 94% of the respondents agreed that their research process was extremely **biased** and impacted by how well recognized the university is, and by the recommendations of the current university they are enrolled in along with the preferences of their peers.

More crucially, respondents overwhelmingly agreed that available resources are not sufficient and suggested the following filtering features: financial ability, age, geographic location, interests, pros and cons lists, reliable reviews from alumni, ranking (and ranking criteria), application requirements, tuition fees, comparison of similar programs, curriculum, future benefits, and customised ranking (different aspects not just academic rigour). These **recommendations** were taken into account during the development of the program.

Business Model Canvas

The Business Model Canvas is a visual tool used to map out a company's value proposition, customer segments, channels, customer relationships, revenue streams, key resources, key activities, key partners, and cost structure. The purpose behind the Business Model Canvas is to provide a clear and concise overview of a company's business model, making it easier to understand and develop a business idea. Hence, we have filled out the Business Model Canvas to map out our start-up more comprehensively. Overall, before delving into the specifics of the Business Model Canvas, the main purpose behind the business model being developed is to create an easily accessible website for the targeted client to utilise as a search engine to find and compare various universities, master's degree programs, rankings etc. to make more deliberate decisions regarding their professional careers.

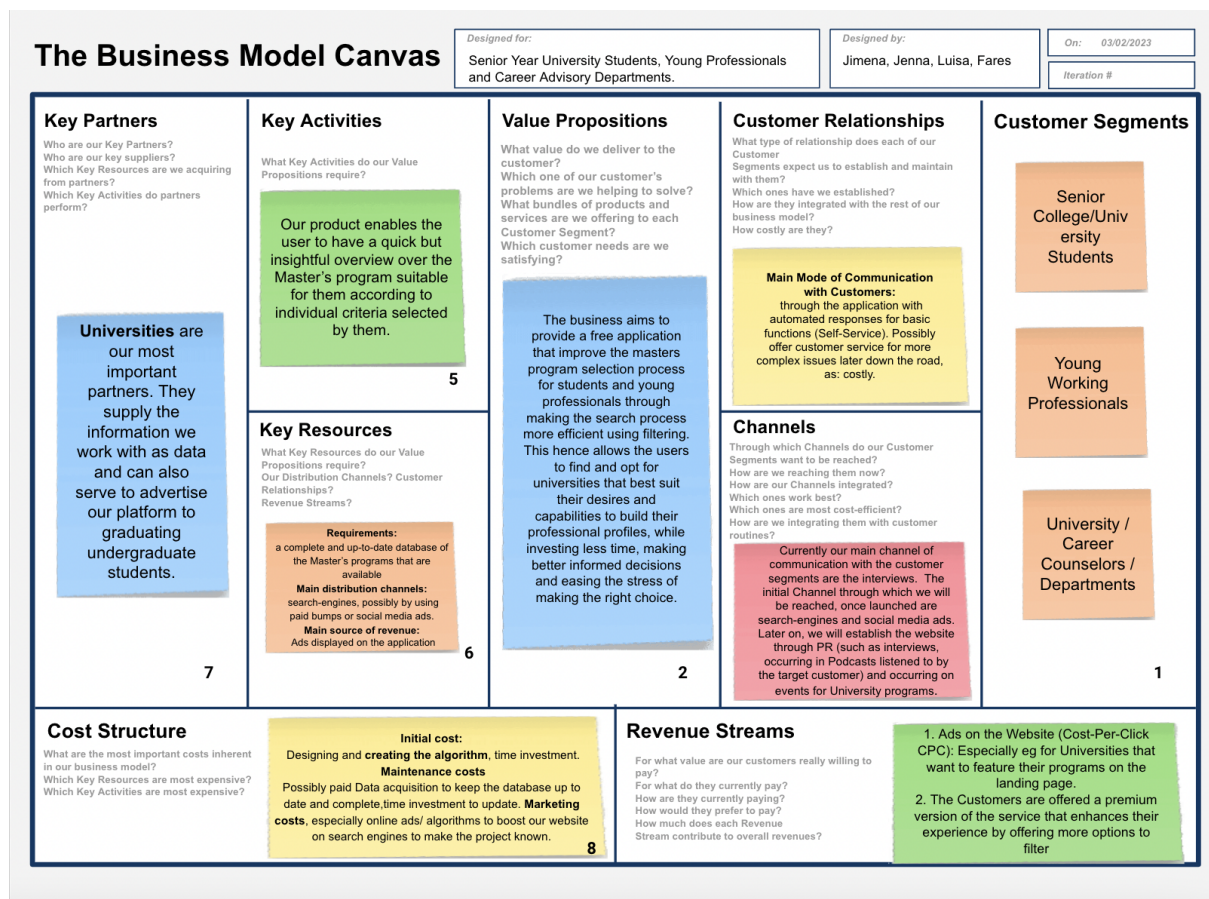


Figure 1: Updated Business Model Canvas

This section of the report aims to deconstruct and analyse the various elements of the business model canvas in order to effectively demonstrate the objectives and design aspirations of the MasterMatch program.

Customer Segment

Initially, regarding the customer segment, the targeted group of individuals and ‘buyer persona’ we aimed to deliver value to were current **bachelor students**, recent **graduates**, or **young professionals** looking to pursue a master’s program. However, **university** and **college counsellors** were then added to the customer segment due to the reliance of many student’s on such departments to find adequate programs. The aforementioned segments are the chosen customer segments due to a strong desire and tendency amongst these groups to undergo the search process to apply for a masters program. Therefore, this website helps non-professionals (students and young professionals) along with professionals (university counsellors) to facilitate and improve their experience and efficiency in finding adequate degrees and universities.

Value Proposition

Moreover, regarding the value propositions of the business model. MasterMatch aims to provide a **cost-effective** solution through an **easily accessible** interface that improves the master’s program application process for students and young working professionals through easing and **simplifying the search process**. To further elaborate, the program will allow users to **filter** through aspects such as country, program name, program type, duration, tuition fees, ielts requirements etc. in order for prospective master’s students to find programs that fit their personal preferences. Therefore, this allows the users to find and opt for universities that best suit their desires and capabilities to build their professional profiles and expose them to programs and universities that they were not aware of.

More specifically, the **unique value proposition** of our specific solution that other existing alternatives have not provided is that MasterMatch will more effectively filter and provide more personalised recommendations that are more accurate towards the user’s preferences. Overall, the project aims to develop a program that streamlines the process of researching for a suitable master’s program, allowing its users to not only save time during the process but also have a large variety of data at their disposal, allowing them to encounter programs they would have otherwise never come across. This will enable them to make the optimal choice based on their constraints and preferences and significantly improves the tiresome process of research.

Customer Relationship

The major mode of communication with customers is through our **website**, which has automatic responses for basic functions (**self-service**). This communication strategy enables us to provide efficient and effective service to our customers, offering a Minimal Viable Product, which

helps us to optimise our resources and improve our profitability. Our customers can expect prompt and reliable responses to their queries, and can enjoy the convenience of our user-friendly application. However, we are considering offering **customer service** for more complex issues in the future, which can however be costly. While this may incur additional costs, we believe that it is crucial to maintain a positive relationship with our customers and provide the necessary support when needed. Our goal is to ensure that our customers have a seamless experience with our application and find the right Master's program that fits their interests and career aspirations.

Channels

As for the channels that allow us to reach our customer segments. Initially, our main channel of communication was the customer segment **interviews** conducted which allowed us to gain primary research and valuable insights from primary sources during our research and planning period and early sprint stages. Currently, as we are undergoing the development of the MasterMatch program, along with the early stages of the launch, our main channel of communication with the customers will be through **search engines**, **marketing schemes** on social media, **events**, relevant **podcasts**, **advertising** and a heavy reliance on **word-of-mouth** amongst this community. However, once the website is running, the communication services provided on the website along with the previously mentioned **marketing schemes** will be our main channel of communication.

Key Activities

Our product is designed to help users find the perfect Master's Program that aligns with their interests and career aspirations, without the need for extensive research and analysis. Therefore, our current program allows users to **select** from a limited number of filters, **input** their desired preferences, and **display** a tailored list of suitable programs, sorted by university rank. By streamlining the search process, we aim to save users time and effort, while also helping them make better decisions about their future.

Key Resources

In order to develop a well functioning product, various key resources will be necessary. Firstly, a complete and up-to-date database of available master's degree programs is required, which will be obtained and updated from kaggle¹. Moreover, in order to develop the algorithm, Python will be utilised along with JavaScript, CSS, and HTML for the front end. Lastly, all the resources used, as

¹ <https://www.kaggle.com/datasets/anasfullstack/mastersportal-programs>

well as the python code developed, dataset etc. will be collected and published on the MasterMatch Github page as a repository.

Our main distribution channels are search engines, possibly using paid ads or social media advertising. Our main source of revenue will be advertisements displayed on the application. In addition, in-app advertising is our main source of revenue, allowing us to offer our service free of charge to users. We will continue to improve our processes and strategies to provide the best possible service to our users and maintain the profitability of our business.

Key Partners

As mentioned in figure 1, **universities** are crucial partners for our platform. They provide us with the information we use as data and can also serve as a means to promote our platform to graduating undergraduate students. We highly value these partnerships and strive to establish strong and mutually beneficial relationships with universities worldwide. We would aim to maintain clear and effective communication with university partners to be able to provide a more complete and up-to-date database. Additionally, our platform can serve as a useful tool for universities to communicate with their students and help them make informed decisions about their graduate education, which is why we would stress the decisiveness and importance of this key partnership if we want to promote, establish and improve our product.

Cost Structure

The initial cost of developing and implementing our platform is primarily associated with **designing** and **creating the algorithm**. This requires a significant time investment from our team to ensure that our platform is efficient and effective in delivering accurate information to our users. There are also **maintenance costs** to consider. Keeping our database up-to-date and complete is essential for the success of our platform. We may need to invest in paid data acquisition to ensure that we have access to the most current and accurate information available. **Marketing costs** and **customer service** costs are also an important consideration, particularly when it comes to online advertising. We may need to invest in algorithms and other strategies to boost our website's visibility. This is a significant cost, but it is essential for attracting new users to our platform and maintaining our user base over time.

Revenue Structure

We have identified two potential revenue streams for our platform. The first one is through ads on our website, which could operate on a **cost-per-click (CPC)** basis. This means that advertisers, particularly universities that want to promote their programs, can pay to feature their ads on our

landing page. This helps increase the visibility of their programs to our users and provides an additional source of revenue for our platform.

The second potential revenue stream is through offering a **premium version** of our service to customers. This premium version could offer the additional options to save searched outputs and obtain more information about the program directly through our website (to be developed), which could greatly improve the overall user experience. This upgraded service could be offered for a fee, providing another source of revenue for our platform while also adding value for our users.

These two options provide a good balance between generating revenue, also in earlier stages, and providing high-quality service to our users. As we continue to grow and develop our platform, we will remain open to consider new revenue streams and opportunities to improve our service.

Product Design

Inception Deck

We used the inception deck as a tool to deepen and clarify the project's objectives. This was done through defining the purpose of the project, key aspects of the program, key aspects to exclude from the program and much more.

Why are we here?

Team Member	Why am I here?
#1 Jenna	I am here to ease the experience of young professionals and students in search for a suitable master's program for them.
#2 Luisa	I am here to create a tangible product that individuals can use to find the most adequate master's program.
#3 Fares	I am here to change and enhance the methods students and young professionals use to look for a suitable master's program.
#4 Jimena	I am here to improve the methods already available for students to navigate and search for an adequate master's program for them.

Figure 2: 'Why are we here?' Table

As demonstrated in Figure 2 above, the initial task of the inception desk was to clarify the objectives that each member of the team held. Thus, through writing our objectives and purpose behind the project from our personal perspective, we were able to create a joint statement. Seeing as though all of the members had written quite similar objectives, we were capable of writing a joint objective that included aspects mentioned by all the team members.

Overall we agreed on the following:

*"We are here to **improve**, **ease** and **change** the search process for students and young professionals through **creating** a **website** that is accessible to all individuals"*

Elevator Pitch

In order to effectively communicate our product's value proposition and essence to our customers we have written an 'elevator pitch'. Before developing our final 'elevator pitch' we brainstormed the following elements to help us create a more effective 'elevator pitch' which will empathise with our customers' needs:

- **Pain/need:** Students and young professionals dedicate a lot of time and effort to look for possible programs with difficulty and find limited results. Therefore, they believe that they might be missing out on possible opportunities they are not aware of.
- **Solution:** Students, young professionals, and university counsellors resort to the clear and concisely built online website to search, filter, and explore different possible programs around the world.
- **Market:** The market is the online website that users utilise in their search process which allows free access to everyone.
- **Competitors:** Our competitors are already existing websites that offer ‘rankings’ of universities per field and comparisons of programs around the world such as: www.findamasters.com , www.mastersportal.com , and www.masterstudies.com
- **Team:** Our team consists of data analysts in training who seek to solve the problem.
- **Call to Action:** The interlocutor/mode of offering the service will be the online website available on all search engines.

Considering the aforementioned elements, we have drafted the following Elevator Pitch:

For students and young professionals who need an easily accessible user interface that is coherently organised and structured to recommend adequate master’s programs based on their preferences. **MasterMatch** is a website that ranks universities on a worldwide scale based on specific preferences indicated by the user in a systematic and intelligible manner. **Unlike** the already existing competitors, **it’s better in** communicating with the user through adequate filtering mechanisms. Existing solutions offer hundreds of previously created rankings, and a lot of unnecessary information in the search process that make the user overwhelmed, and thus do not create a coherent and comprehensible solution.

Not List

The creation of a "not list" helps to establish boundaries, as well as a benchmark of expectations of what our product can and cannot do, as well as what we should and should not aim for. In our case, we decided that creating and promoting events through the platform (such that would be related to the Master’s search) would fall out of the scope, as it is very high in cost compared to its benefits, and does not fit the focus of our project. The same holds true for the live assistance through a chat- box, as such a tool would not only be expensive in terms of personal cost maintenance but also very complicated in implementation. As demonstrated in figure 3 below, we can see the points that our team has decided are ‘within the scope’, ‘outside the scope’, and ‘undecided’.

Within the scope	Outside the scope
<ul style="list-style-type: none"> Filter programs according to interests from the variables specified in the dataset. User can create an account/profile. User can 'save' certain programs under a 'favorite' option. 	<ul style="list-style-type: none"> Creating and promoting events through the platform. Live-chat-box to provide assistance to the users.
Undecided	
<ul style="list-style-type: none"> Paid Ads displayed. Premium package that gives access to more features (subscription). How often the dataset will be updated on the platform with emerging programs and universities. 	

Figure 3: 'Not List' Table

Showing the Solution

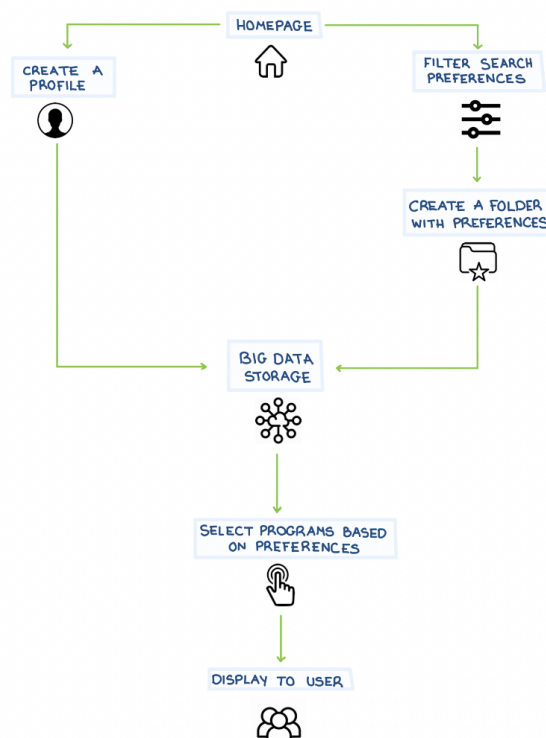


Figure 4: Solution Demonstration

As demonstrated in figure 4 above, we have demonstrated the solution in a simple diagram that demonstrates the architecture of the program. At the homepage, the user will have to either login

or create an account which will be saved into the big data storage. Additionally, the user will have to select certain filters according to their personal preferences and create an associated folder to save the programs of interest within which will also be saved into the big data storage. Then, the program will rank and list programs according to the user's preferences which will be then displayed to the user.

What Keeps Us Awake?

MANAGEABLE RISKS	UNMANAGEABLE RISKS
<ul style="list-style-type: none"> • Students and young professionals do not resort to using our platform. • Users are not satisfied with the service and content provided. • Database isn't regularly updated (weak content). • Marketing scheme not reaching a sufficient amount of users. 	<ul style="list-style-type: none"> • Rise in popularity/use of competitors' websites/products. • Post Covid-19 Recessions, i.e., not all individuals prioritize spending on master's tuition right now → no interest in looking for master's programs. • Inelastic demand → user interaction not changing → Business shuts down.

Figure 5: 'What Keeps Us Awake?' Risks Tables

To ensure the success of our project, we must identify the risks that we can influence and focus on solving them, rather than worrying about those beyond our control. While there are countless potential issues that could arise, we should prioritise the ones that are more likely to occur and that we can prepare for. It's important to avoid getting bogged down by concerns about things like the global economy or internal changes that we can't control. Instead, we should concentrate our efforts on supporting objectives that directly contribute to our project's success.

Firstly, we have identified the **manageable risks** in figure 5 that we will dedicate effort towards ensuring these risks don't occur. Primarily, we are aware that there is a possibility that our customer segment will not resort to using our platform, however with marketing schemes, ads, social events, university partnerships and more we aim to overcome this risk. Secondly, there is a chance that the user will not be satisfied with the service and content provided, especially regarding user experience. In order to diminish this risk, we aim to invest in a user friendly, ergonomic, and well organised user interface to facilitate the user's experience. Thirdly, if the database is not regularly updated, this may negatively impact the efficacy of our product. Therefore, we aim to continuously improve and update our database as efficiently as possible to diminish this risk. Lastly, there is a

chance that our marketing scheme does not reach the adequate audience and thus may severely impact the reach of our product. In order to diminish this risk, as previously mentioned, we are going to rely on several methods to spread the services of our product such as ads, social events, university partnerships etc.

On the other hand, regarding the **unmanageable risks**, we have identified various risks that may significantly hinder the success of our product, however are out of our control. Firstly, our competitors' products may significantly hinder our success in the case that there is a rise in popularity and use of their services. Secondly, due to the world's current economic state, during the post covid era recession, thousands of individuals worldwide no longer prioritise or have an interest in spending large sums of their savings towards getting a master's education especially with the availability of short and cost-effective courses online. Thirdly, the last unmanageable risk would be the occurrence of inelastic demand towards the market of master's programs finder, which may cause insufficient user interaction which will not be profitable or maintainable for our company and will thus cause the business to shut down.

Weighing It Up

This exercise involves estimating the duration and effort required for our project. While we cannot know the exact length of the project beforehand, we can estimate whether it will take three months, a year, or longer. If we find that we are creating a complex product with limited time, we may need to adjust our expectations. To carry out the exercise, we will follow these four steps: establish a baseline, break down functionalities into tasks, assign story points, and make a time estimation; a baseline in story points by using a programming task as a basis and estimating development tasks, break down the functionalities of the product into smaller tasks, story points are assigned to each task by the development team, and add up the story points and multiply by the time established in the baseline.

Description	Tasks	Story Points
Search Filtering Tool	Map all universities in our database according to their filter value e.g. price, location, ranking, review rating and grade requirements using a hash table	6
	Make the user select which filters they want to apply	1
	Access the all the universities (keys) to which the selected filter (value) is applied	1
	Then display all the universities which correspond to the filter options	2
	If a University is clicked by the user, display the information for that university	1

Figure 6: Weighing It Up - Search Filtering Tool

As demonstrated in figure 6, regarding the search filtering tool, we assigned the highest number of story points which is 6 to the task of mapping all university programs in our database according to their filter value from the dataset such as country, tuition cost, ranking, ielts requirements etc. using a hashtable. Afterwards, for creating a function that allows the user to select the filters they would like, we assigned that 1 story point as it will be a relatively simple task. Thirdly, to access the university programs (keys) to which the selected filter (value) is applied will be a simple task as well and thus we have assigned 1 story point. Fourthly, due to the fact that we would like to display the information in a certain layout which will be further explored in the mockups, displaying all the universities which correspond to the user's filter options will be complex and thus we have assigned 2 story points. Lastly, in the case that a university program is clicked on by the user, the user shall be displayed additional information regarding that program and university.

Description	Tasks	Story Points
Saving Favourites	User chooses to create new folder on the favourites screen, and inputs the desired name (e.g. MBA's in Spain)	1
	Create an empty list with the designated name	1
	When the user chooses the university they want to add, capture the university ID	3
	append the university ID to the list	2
	if the user selects the folder, we display the full list of University IDs	1
	allow the user to remove each university from favourites by pressing the a 'remove' button next to each item	1

Figure 7: Weighing It Up - Saving Favourites

As demonstrated in figure 7, regarding the 'saving to favourites' ability, the first task we have identified is that the user must choose to create a new folder on the favourite screen, and input the desired program name which will be facilitated by the following step of creating an empty list with the designated name of the folder in order to be filled later on by the user, both of these steps are not complex and will both constitute 1 story point each. Next, when the user chooses the university they would like to add to the folder, we must capture the ID and append it to the list (folder created by user), these steps will require 3 and 2 story points respectively. Furthermore, if the user selects the folder, we will display the full list of university programs (IDs) which will require 1 story point as it solely requires calling the list. Lastly, the user will be able to edit the folder created by removing a previously saved program, this will also require 1 story point.

Description	Tasks	Story Points
FAQs	Store questions in a hash table	2
	when user selects question, the answer is displayed	1

Figure 8: Weighing It Up - FAQs

Lastly, as demonstrated in figure 8, for the FAQs page, the questions and answers will be stored in hash tables as keys and values respectively which will rarely be updated and when the user selects the question they would like to view, the answer is displayed. These steps will require 2 and 1 story points respectively.

What Are We Going To Give?

Every project has several key execution factors, including time, scope, budget, and quality, and it's important to understand which factors are fixed and which ones can be adjusted. By having a clear understanding of these levers, it is possible to make prioritised decisions when facing issues and to ensure that the project is successful within the established constraints.

Preference Labeling Table										
	1	2	3	4	5	6	7	8	9	10
Budget		x								
Scope				x						
Time							x			
Quality							x			

Figure 9: Preference Labelling Table

- **Budget:** we gave the budget a lower ranking due to the fact that the development of MasterMatch will not be costly and so for the time being, until we release the platform and create a new budget for marketing, prioritising the budget at this stage of the project is unnecessary.
- **Scope:** having a well functioning product where the user is able to filter through options with ease is important and thus we have given the scope a priority ranking 4.

- **Time:** considering the fact that we have a strict deadline for developing at least a minimal viable product for the MasterMatch platform, we have given the time aspect of our project a high priority ranking.
- **Quality:** seeing as though quality of the platform is essential in order to attract users to our product. We have given the quality aspect of our project a high priority ranking.

How Much Is It Going To Cost?

Resource	Cost per Month	Number of Months	Total Cost
Fixed Costs: (Computers, Space etc.)	1000	3	3000
Marketing Campaigns	1500	3	4500
Experts (Computer Scientists, Data Analysts etc.)	2000	3	6000
Project Total Cost			13,500 €

Figure 10: Costs Table

The team must imagine that the project needs to be funded. In order to achieve such funding we must estimate the cost of the project, including the salary of the team members, and the cost of the product. As demonstrated in figure 10, the fixed costs of the project will be the resources such as computers and workspace which will have a total cost of 3000 euros. In order to develop the product, experts such as computer scientists, data analysts and software engineers are required to help build both the front and the back end which will have a total cost of 6000€. Lastly, when launching MasterMatch, we will be required to invest in marketing campaigns in order to effectively reach our customer segment which will have a total cost of approximately 4500 euros.

User Stories

As a recent college graduate, I was looking to pursue a master's degree in computer science. However, I was overwhelmed with the number of programs available and I didn't know where to start my search. I spent countless hours browsing through different university websites and program listings, but none of them seemed to be exactly what I was looking for. That's when I stumbled upon MasterMatch. The website was user-friendly and had a variety of filters that allowed me to select my desired program characteristics. I was able to filter by program name, university name, country, and other attributes. The program also allowed me to rank my preferences and provided a list of programs that matched my criteria.

After spending just a few minutes on the platform, I was able to find several programs that caught my attention. I was able to compare them side by side and read more about the universities and programs. I was also impressed with the amount of information available on each program, which helped me make an informed decision. I eventually found a program that was a perfect match for me and was able to submit my application with confidence. Without MasterMatch, I would have spent weeks or even months researching and comparing different programs. I'm grateful to have found this platform and I highly recommend it to anyone who is looking to pursue a master's degree.

User Conversation

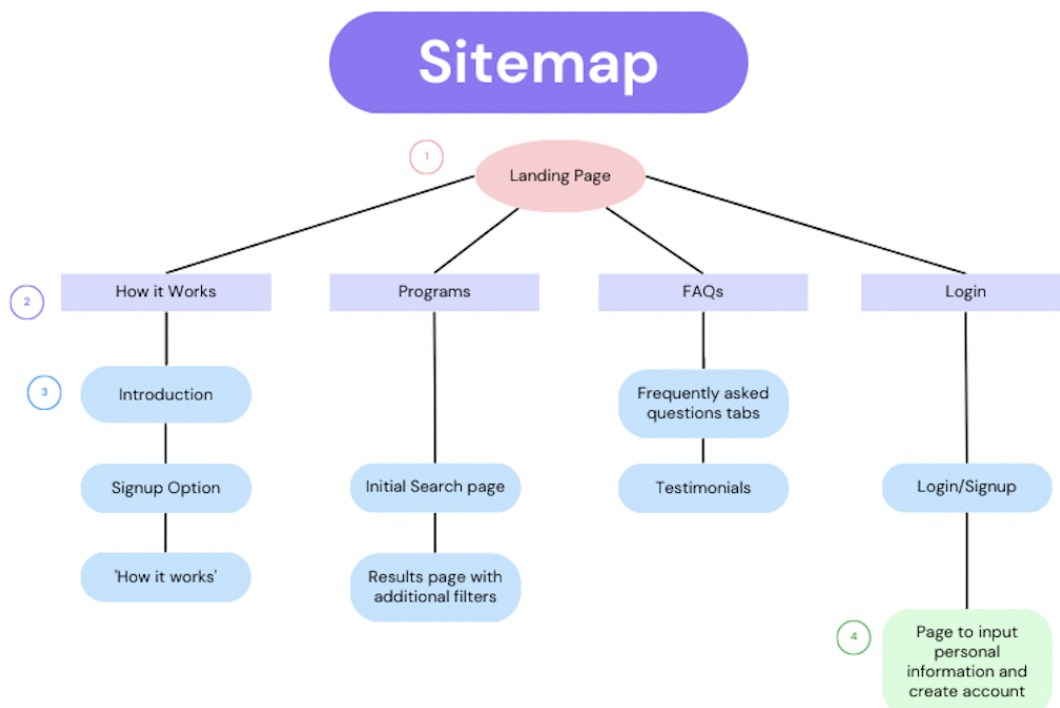


Figure 11: Site Roadmap

- Upon running the program, the user is presented with a landing page.
- The landing page provides options for the user to select filters based on their preferences.
- The user can select filters for program name, university name, country name, degree level, and language of instruction.
- Once the user selects their desired filters, the program displays a list of MasterProgram objects that match the selected criteria, sorted by university rank.
- If no matching programs are found, the program provides a message indicating that no programs were found and offers a list of available options for the selected filter.
- The user can modify their preferences by going back to the landing page and selecting new filters.

Mockups

The Mockup below serves to visualise and demonstrate how MasterMatch will be implemented in further development stages.

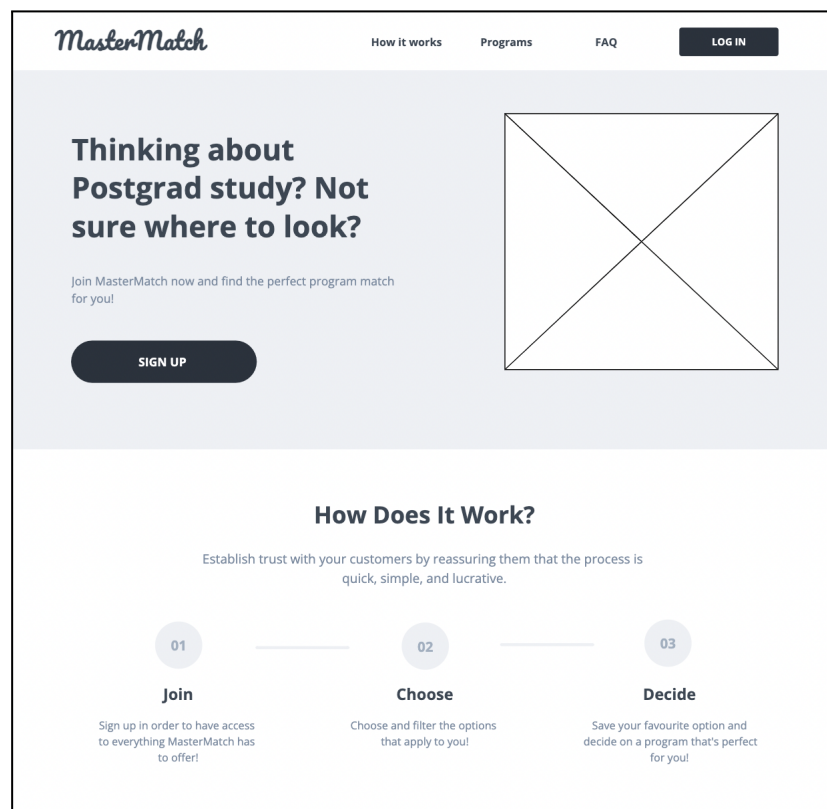


Figure 12: Mockup Landing Page

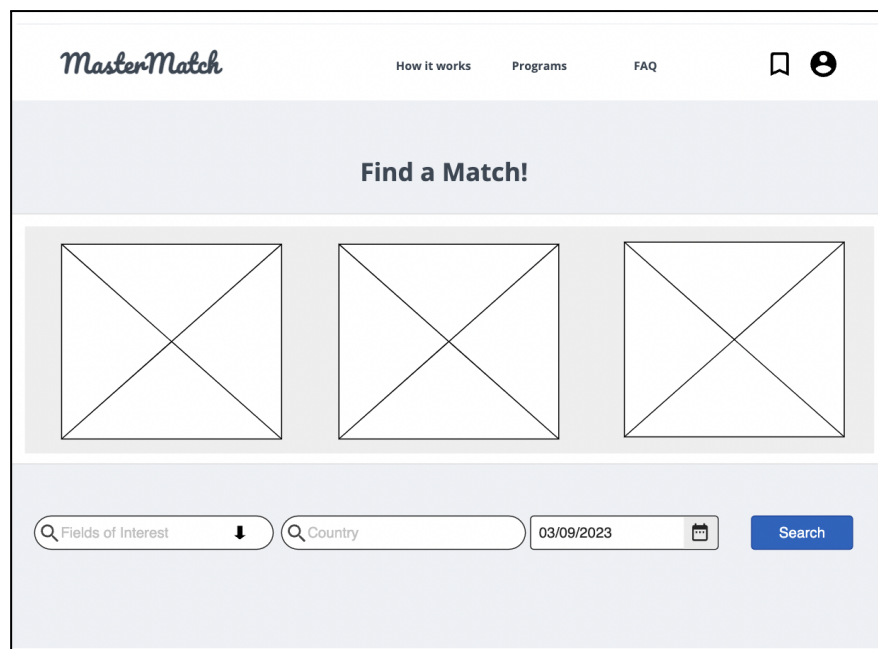


Figure 13: Mockup Filter Page

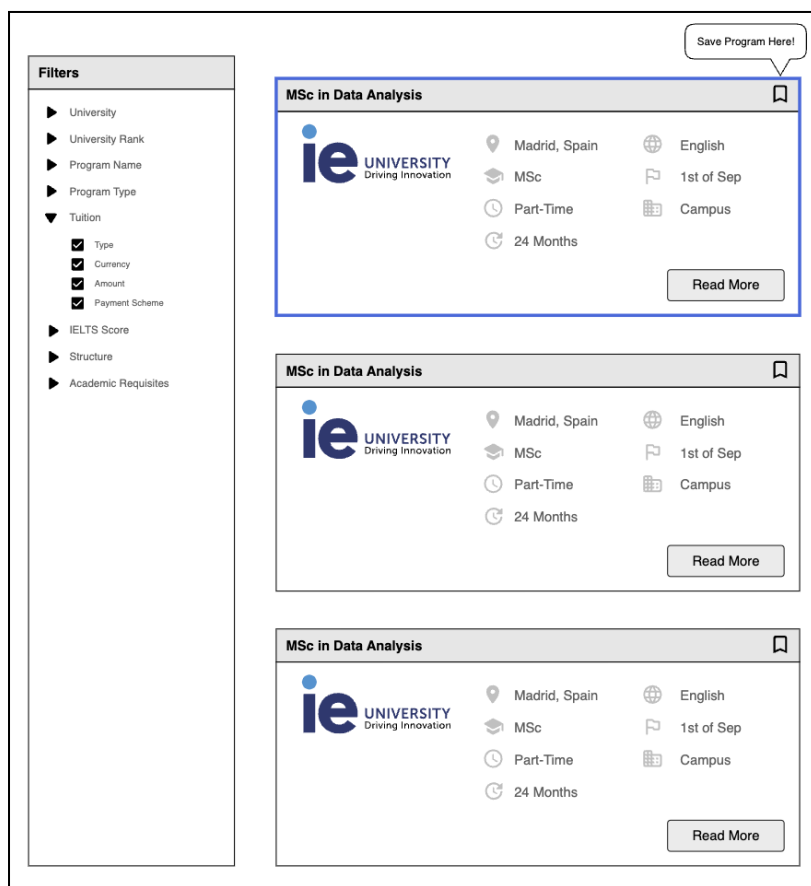


Figure 14: Mockup Results Page

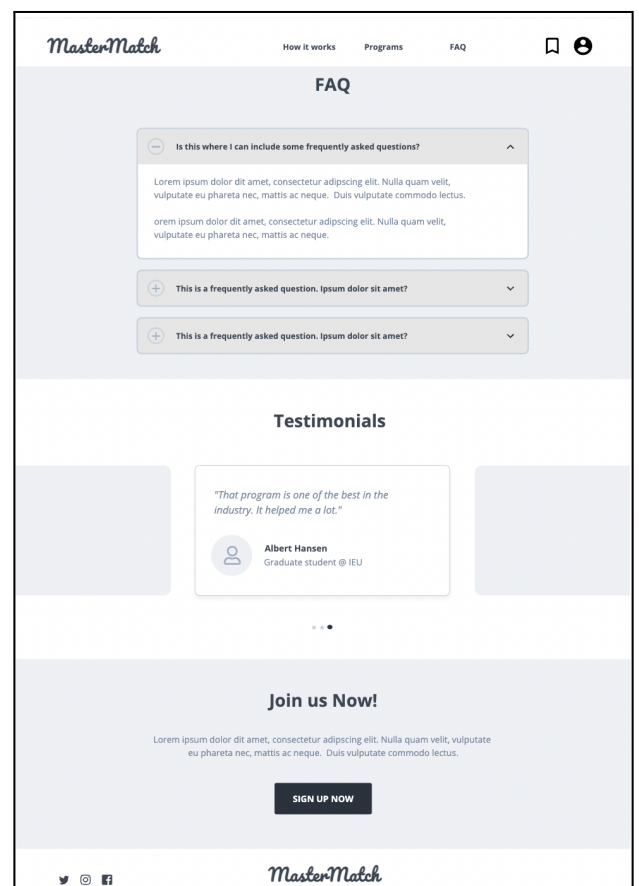


Figure 15: Mockup FAQs Page

Product Development

Scrum Retrospective

In the fourth and final sprint, what we did well this time was definitely to start early to work on our deliverables. Having the pitch in class and finishing a preliminary version of the final code for this date helped us a lot to point out the main weaknesses of our code and project and focus our efforts on tackling those. The main challenge during this last sprint was definitely fixing all the input validation errors in our code. Also, as we noticed late that we did not implement the Hashtable as we had intended to, changing that caused a lot of issues down the road, as, evidently, we were handling a completely different data structure now demanding a different approach in handling it, which forced us to go over all of our filters and took quite some time in fixing. This was lastly also a challenge in regards to working as a team, as it took quite some time for one person to get behind an error, and then made it hard to just pass on the work to the next person, as this person would then take very long again then to understand the structure, making it hard to split up the work equally. To improve productivity, we should focus more throughout the coding process and make sure we stick to and follow the data structure we had decided on, to avoid such struggles later on. This is definitely also the biggest long-term learning we took out of this sprint for our next similar project, which is to focus on the data structure and algorithm design to make sense with what we are trying to achieve with the program, and being sure to follow and constantly review this throughout the coding process.

UX Tests

Briefing

The first stage of the testing process was to brief our participants on what their role would be in our development process as well as what would be required of them in order to carry out the necessary tests. To do this we firstly instructed the participants on what our program actually is and how exactly to run our program, then we gave them a set of prompts to answer once they completed the test. Given that our product contained a large amount of code, we had to show them exactly where to begin. We then asked each participant to use the program by themselves, without giving them specific advice, because we wanted to generate the most natural results. After they ran the program once, the participants gave their feedback.

Task

Within each test, the participants carried out the following tasks:

- Run the program.

- Select the filters they would like to apply for their degree search.
- Display the number of results they would like.

Prompts

Before each test, we asked every participant to focus on the following:

- User friendliness.
- Practicality of the product.
- Problems they experienced.

UX1

The first user fit our standard demographic of a 2nd year university student who was looking to undertake a Master's degree. She was not accustomed to coding or programming in general, however, she displayed no difficulties in running our program.

After running the program, the user seemed very satisfied with the results, and stated that she would like to use it again in order to try out different filters. She reported no issues or negative feedback.

UX2

The second user was also a 2nd year bachelor student looking for a Master's course. This participant also experienced no issues with the code itself and the program ran very smoothly. He found that the program was useful, as he was able to find a course that he was looking for. He was thus satisfied with the results.

However, this user expressed some discontent with the interface, as he found it confusing, and he said that there were an excess amount of filters that were not necessary and useful to him.

UX3

This participant was a first year student and was using the program out of curiosity rather than as a tool to find a Master's program. Following the trend of the other participants, he experienced no issues in handling the program itself as he experienced no errors or difficulty. Despite not fitting the demographic of a student looking for a Master's program, he still displayed contentment with the results and had a positive experience. This user did not have any concerns or problems with the product.

UX4

The fourth user was a 2nd year student studying BBA and Data Analysis, and thus had a good understanding of coding before running the test. Given the prior experience, she had no

problems with running the program, and it seemed that she was fully accustomed to handling such tasks. In terms of the results, she was very satisfied with the options that were displayed.

She reported extremely positive feedback regarding user friendliness and overall enjoyment of the product.

UX5

The final user is based in the United states as we wanted to test whether one's country / location would have an impact on their perceived experience. This participant did not demonstrate any key differences with the others, as he experienced no technical difficulties in using the product. He also returned very positive feedback, citing the user friendliness and simplicity of the product as the key factors to his enjoyment of the experience.

Although he had a positive experience, he did give some points of critique regarding the interface and display, as he found the results page ‘messy’ and ‘not appealing to the eye’

Summary of the Overall Results:

- 100% of participants understood and enjoyed using the product.
- 0% of participants experienced technical difficulties.
- 40% of participants had complaints about the interface.
- 20% were overwhelmed with the number of filters.

Positive:

- Every participant enjoyed using the program and found it user friendly and simple.
- The results of the search were exactly up to the expectations of the participants.
- There were no cases of errors or failures in the execution of the program.

Negative:

- The layout of the program was confusing for some users.
- While some users found the large number of filters useful, others found it unnecessary.
- Format of the program was not visually appealing.

Conclusions and Next Steps

Creating the MasterMatch platform was an extremely ambitious and challenging project that allowed us to simulate an immersive and real life experience of working on developing a product in a group.

The motivation behind the MasterMatch application was to simplify the process of searching and selecting Master's programs for prospective students. We realised that the process of searching for a Master's program can be tedious, time-consuming, and overwhelming, with little to no guidance. We built the application to provide students with a comprehensive platform to compare and contrast different programs based on their interests and requirements, making the process more efficient and students better informed.

The MasterMatch application solves the problem of the tedious, time-consuming, and overwhelming process of searching for a Master's program. The platform provides a user-friendly interface that allows students to filter through a vast array of Master's programs based on their interests and requirements, empowering them to make informed decisions when selecting the program that best suits their needs and aspirations. The application streamlines the process of searching for a Master's program, and allows its users to optimise their research and decision making process.

One of the major challenges we faced during the development of the MasterMatch application was the creation of a front end. Not having any experience with front ends, we decided to focus on the structure of our algorithm and the optimisation of its workings, and leave the frontend step for a later development stage. Missing a front end, what also came as a challenge to us was the implementation of a 'save' function for favourite programs, as, not implementing it through a button in a front end, this could end up in a very tedious and time consuming series of yes or no questions for each option displayed, which we wanted to avoid in order to keep the user experience lean. Lastly, the same holds true for the function of displaying more of the desired data of the fitting programs to the user. We saw the possibility of implementing this through an extra question, in which the user could specify which attributes of the program they would want to be displayed, however, we preferred a lean user experience over a multitude of questions. Putting ourselves in the shoes of a user, we assumed that it would be sufficient to be able to filter for the attributes that we care about most, and thereby already make sure that those are fulfilled. This idea was also confirmed when revisiting our interviews and talking to our test users.

Besides that, making sure that our program does not crash, no matter what the user inputs (so mainly input validation) was also a big challenge. This was mainly due to many different data types being present in the dataset, which took us a while to understand and fix accordingly, like for example the fact that currency type was not a string and so on. This also challenged us to not only understand our data very well, but also to thoroughly understand the interaction between the filter functions and

the main functions, in order to know where to implement which error statements, and where to include the loops to repetitively ask for user input.

The MasterMatch application is still in development, and we plan to add certain features in the future. Firstly, the user's ability to create a profile to save their favourite programs, making it easy to access them later. Secondly, the user should be able to click on any program and get all information stored in our database, plus a link to an official website. Thirdly, a review and rating system that enables students to rate and review programs based on their experience, thereby providing insights for other prospective students. Fourthly, answering frequent questions about how the program works, possibly also serving as a resource to guide students in the process of making their decision.