

University of Vienna  
Computer Science (UA 033 521)  
051039 VU Projektmanagement (2020W)

# Project

## Museum Scavenger Hunt

By:

Max Bosak (11911415)  
Marat Dussaliyev (01642049)  
David Riley (11911367)  
Samuel Sulovsky (11915596)  
Michal Zak (11922222)  
(Group 6)

## 0.1 Table of Contents:

<b>1 Pre-project phase (Vorprojektphase)</b>	<b>3</b>
1.1 Corporate philosophy (Unternehmensleitbild):	3
1.1.1 What do we stand for? / Wofür stehen wir?	3
1.1.2 What do we want to achieve? / Was wollen wir erreichen? (Mission/Ziel)	3
1.1.3 How do we want to achieve it? / Wie wollen wir es erreichen? (Grundprinzipien/Strategie)	3
1.2 IS-SHOULD Analysis (IST/SOLL Analyse)	4
1.2.1 User Stories:	4
1.3 Stakeholder Analysis:	5
1.4 Project Scope (Projekt Abgrenzung)	7
1.4.1 Mobile App (Android)	7
1.4.2 Web Management Interface	7
1.4.3 Database	7
1.4.4 Staff training	7
1.4.5 Documentation (Guide Book)	8
1.5 Minimum viable product (MVP)	8
1.6 Hypotheses and key figures (Hypothesen und Kennzahlen)	8
<b>2 Achievement planning (Leistungsplanung)</b>	<b>9</b>
2.1 Results Planning (Ergebnisplanung)	9
2.2 Product structure plan (Produktstrukturplan)	10
2.3 Project Structure Plan (Projektstrukturplan)	12
2.3.1 Phase 1:	12
2.3.2 Phase 2:	12
2.3.3 Phase 3:	13
2.3.4 Phase 4:	13
2.3.5 Phase 5:	13
2.3.6 Phase 6:	13
2.3.7 Phase 7:	13
2.4 Work Packages (Arbeitspaketbeschreibung)	14
<b>3 Deadline and Resource planning (Termin- und Ressourcenplanung)</b>	<b>15</b>
3.1 Milestone Plan (Meilensteinplan)	15
3.2 Network Plan (Netzplan)	15
3.3 Workforce Schedule (Personaleinsatzplan)	15
3.4 Effort Estimation / Cost planning (Aufwandsschätzung / Kostenplanung)	15
3.5 Risk Assessment (Risikoanalyse)	16
3.5.1 Risk Identification:	16
3.5.1.1 Internal Risks:	16
3.5.1.2 External Risks:	16
3.5.2 Risk Evaluation:	17

# 1 Pre-project phase (Vorprojektphase)

## 1.1 Corporate philosophy (Unternehmensleitbild):

### 1.1.1 What do we stand for? / Wofür stehen wir?

We are a group of 5 friends, who after graduating from university, decided to found a small IT firm. We have already worked on countless smaller projects, gathering tons of experience, this however is the biggest project our company has faced yet.

Even though each of our employees is a developer, everybody has a specialization. We have a project manager, database expert, UI designer and 2 backend programmers.

### 1.1.2 What do we want to achieve? / Was wollen wir erreichen? (Mission/Ziel)

Making museum exhibits / public attractions / etc. more interactive especially for young people. A lot of children find museums tedious. We are trying to offer a solution, which makes exhibits more interactive using modern technology.

### 1.1.3 How do we want to achieve it? / Wie wollen wir es erreichen? (Grundprinzipien/Strategie)

Short description:

We want to achieve this by building an app where people can take part in scavenger hunts and explore the museum in a more interactive way. Through the wonders of modern technology we can make history come to life!

The following example will give a brief preview on how this application would work:

Imaging yourself visiting a museum and upon entering being offered the option to download an application which will let you experience the museum visit like never before.

Let's say there is a dinosaur exhibition being offered and to go along with the exhibition there is the option to take part in a scavenger hunt using our application for your smartphone. First you download the application and select one of the hunts available.

After selecting your will receive our first clue which could be something like:

"Which animal is extinct and has two big teeth"

With the first clue on your mind you should start exploring the exhibition and keeping an eye out for the animal in question. After a while you might find an animal which could fit the description and you go over and scan the QR-Code which is mounted there. When scanning the code you receive additional information about the animal as a text, image, video or a combination of those. When it turns out it was not the animal the clue was referring to, you should continue looking. Then you spot a saber tooth tiger which fits the description and you scan the QR-Code and get the confirmation that this is indeed the animal the clue was referring to and you get your next clue and some additional information about the animal.

This goes on until you have received all the clues and solved the scavenger hunt.

## 1.2 IS-SHOULD Analysis (IST/SOLL Analyse)

### 1.2.1 User Stories:

We organized a school trip to a museum. After the school trip we interviewed the children, the teachers, and the museum workers. In our opinion, these are the major points that were brought up:

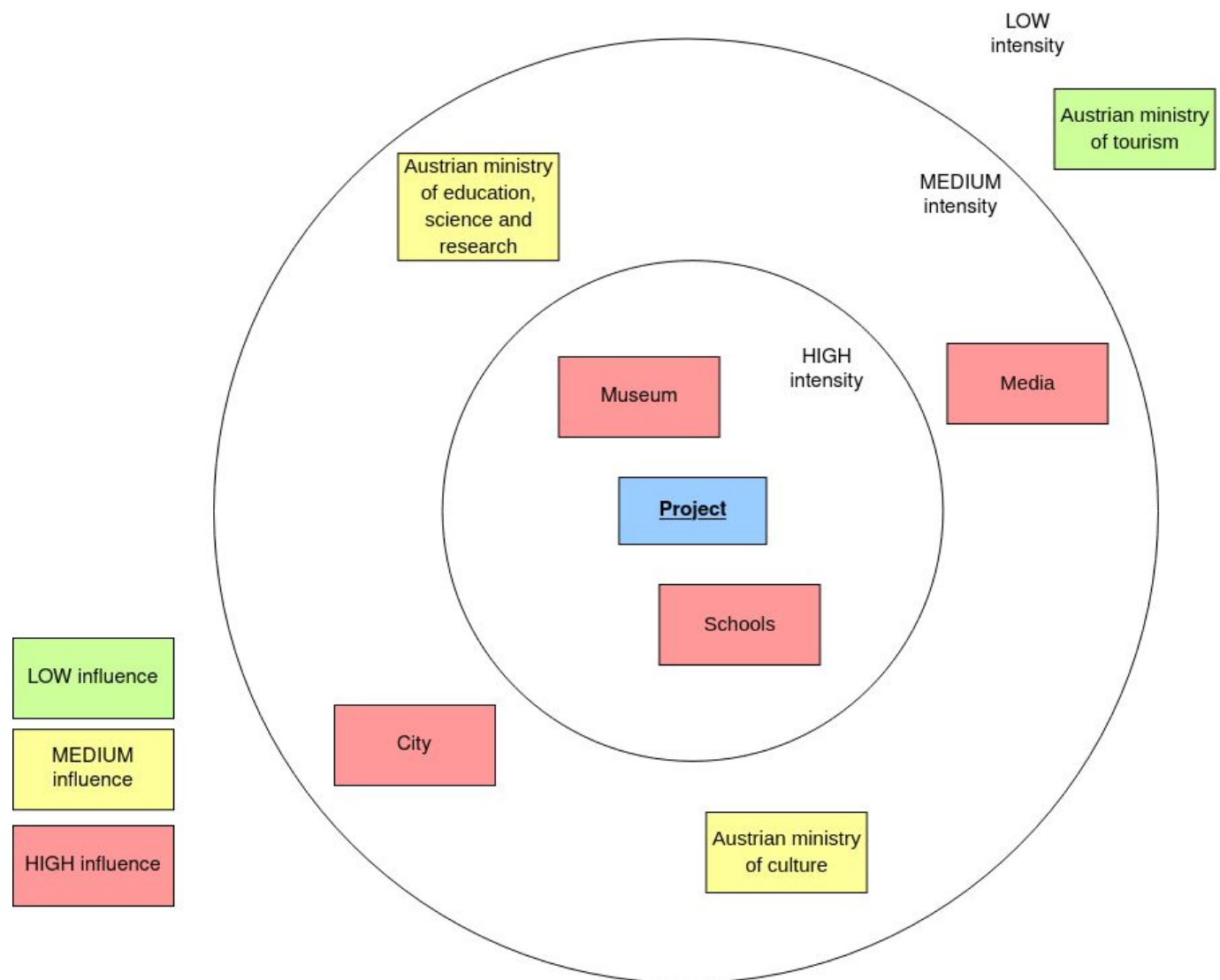
- “As a visitor of the museum I want to interact more so that learn more and am not bored to death right”
- “As a school teacher I want museums to be more attractive to children so that they could gain an appreciation for learning and are more eager to learn.”
- “As a museum director I want to make the museum more engaging to attract more visitors, increasing the museum’s reputation and earnings.”

<u>IS</u>	<u>Should</u>
Children often find it <b>very boring</b>	Museum visit should be <b>fun and informative</b>
Children <b>don’t learn as much</b> as they could	Museum visit should be <b>more engaging</b>
Children <b>don’t tend to read texts</b>	Museum visit should be <b>more interactive</b>
Museum visits often <b>don’t take advantage of modern technology</b>	Museum visit <b>should take advantage of modern technologies</b>

The study “Attention and curiosity in museums” (see Bibliography: 2) found that if an exhibition was made interactive, a significantly bigger portion (58.5% vs. 82.3%) of people came to take a look at it.

### 1.3 Stakeholder Analysis:

Based on our research, we created diagram [1], showing the stakeholder situation:



[1] - Figure 1; Stakeholder Analysis

Museum	The main party involved in this project. Our app will be deployed in it.
Schools	Schools are one of our main targets. Our app would provide a new fun way for children to learn.
City	On a city level, our app may have an impact on tourist numbers.

Media	If the media does not promote our app it may go unnoticed for a long while. We need a positive media presence for the app to be successful.
Austrian ministry of education, science and research	Our app provides a novel way to learn and teach information.
Austrian ministry of culture	Our app can boost the cultural knowledge of children/museum visitors.
Austrian ministry of tourism	Our app probably will not attract enough tourists to make a difference nationwide, but the project still may be of interest.

## 1.4 Project Scope (Projekt Abgrenzung)

### 1.4.1 Mobile App (Android)

The mobile app should provide the following functionality:

- **Multiple languages (German, English):** This feature is mainly for our foreign visitors. This will allow the user to select his preferred language for the everything shown in the application.
- **QR-Scanner:** This provides the functionality to scan QR-Codes which are placed close to exhibits and receive the available information for the exhibit.
- **Displaying of Text, Images, Videos -** This is used for feedback after scanning a QR-Code the user will be provided with information in the form of text, images or videos.
- **Download option for offline use:** This feature allows the user to download multiple hunts and use them offline. This is mainly aimed at users from foreign countries who might not be able to connect to the internet at all times.
- **FAQ:** Frequently Asked Questions should provide the user an easy way to find answers to some basic questions about the app, hunt or other important things.

### 1.4.2 Web Management Interface

- **User Statistics:** This should provide the museum with the most basic user statistics. How many QR-Codes have been scanned today. How many visitors are currently taking part in a scavenger hunt. Which hunt is the visitors favorite and other important metrics.
- **Hunt Creator:** Is a simple tool for creating a new scavenger hunt. This is for the museum management to create new hunts and upload images, text and videos for the exhibits which are then linked to QR-Codes.
- **QR-Code Generator:** Simple tool for creating the QR-Codes for the exhibits/hunts.

### 1.4.3 Database

- **Database Setup:** The initial setup of the database structure on the server as well as the configuration of all the elements that come into play.
- **Backend:** This includes the setup of all the elements needed for the functionality of the application (Web-Server, Logic, ...)

### 1.4.4 Staff training

- **Guide Book (manual):** This should provide the staff with all the information they need for keeping the daily operations running and maintaining as well as some simple troubleshooting steps.
- **Training: App, Web Management Interface, Hunt Creation:** This training should provide the staff with a basic understanding of the application and should ensure the correct usage of all the tools being provided.
- **Contact Person:** This contact should be used if any issues come up or the system is not working correctly.
- **Creating the first scavenger hunt together:** This should showcase how the staff can create a hunt from scratch and what issues might arise during the creation.

### 1.4.5 Documentation (Guide Book)

- Source Code Documentation
- App (Guide Book)
- Web Management Manual (Guide Book)
- Hunt Creator (Guide Book)

## 1.5 Minimum viable product (MVP)

The MVP should be an Application that allows you to start the scavenger hunt and receive the first clue. After that you will be able to explore the museum and look for QR-Codes to scan. After scanning a QR-Code the user will receive information about the exhibit (text, image, video). Scanning a QR-Code will also provide the user with the next clue and the scavenger hunt continues.

## 1.6 Hypotheses and key figures (Hypothesen und Kennzahlen)

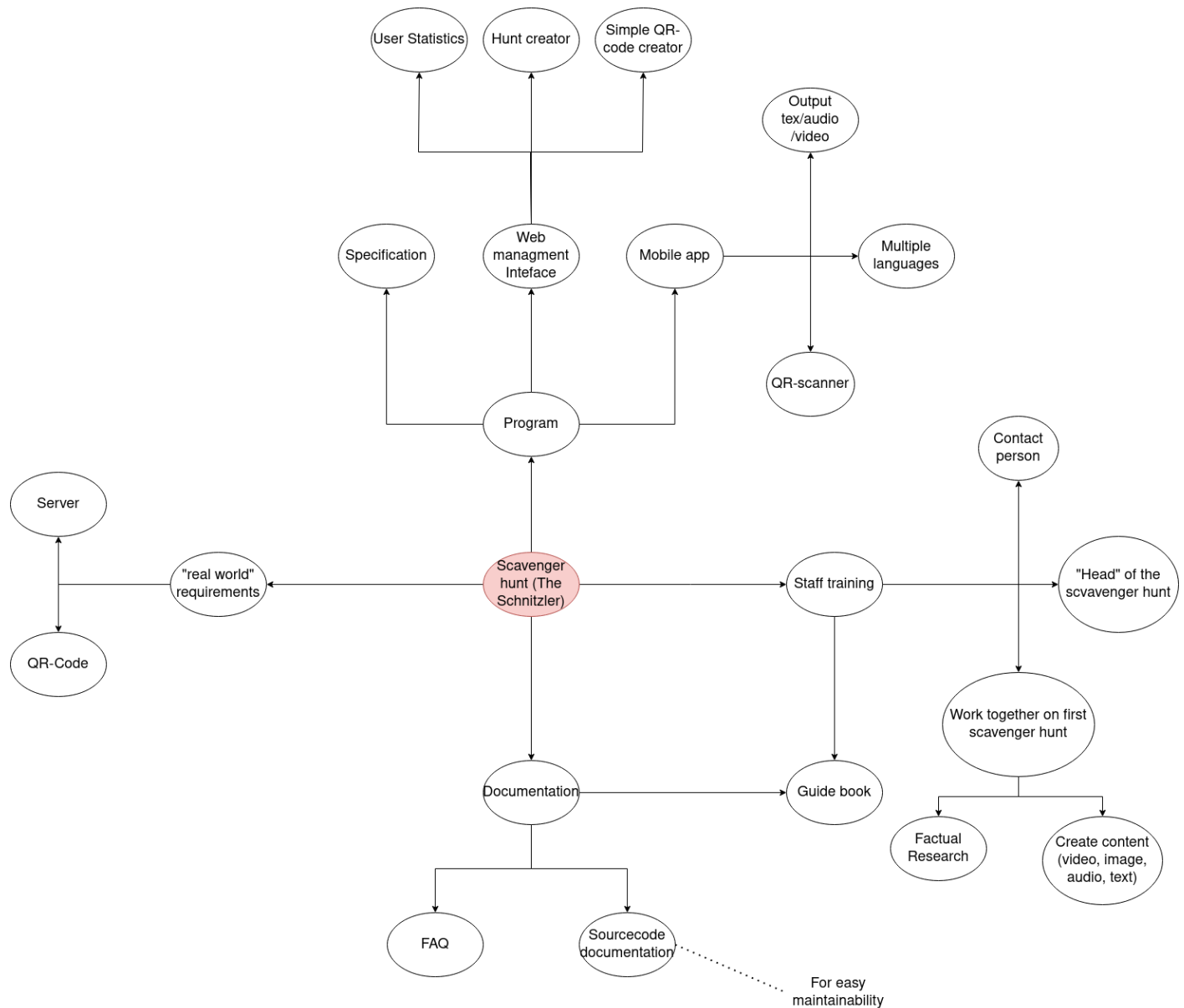
In the year 2018 Austrian Museums had a total of 19.394.100 visitors according to Statistik Austria (see Bibliography: 3). Based on the data in the document above, we have decided to aim for a 2% increase in visitors. Furthermore we have defined metrics that will help measure how successful our app is:

1. Visitors **using the app compared to** visitors visiting **without using the app**
2. **Downloads**: After entering the museum there is an ad for our app. How many people will download it?
3. **Scanned QR-Codes**: How many QR-Codes have been scanned in total. Which QR-Codes have not been found. Are some sections of the scavenger hunt too difficult? Do the users finish the scavenger hunt?
4. **Quiz after the scavenger hunt**: Send 2 groups of children, one with our app, one with a guide. Which one will have a better test result?
5. **User-Feedback**: Did the users think the app experience was fun?
6. **Returning customers**: How many users have used our app again?



## 2 Achievement planning (Leistungsplanung)

### 2.1 Results Planning (Ergebnisplanung)



[2] - Figure 2; Results Planning

#### Staff Training:

The Staff-training will be held before the final launch day and will cover all the important information for a successful launch. The training will start with an example scavenger hunt for the staff to make them familiar with the app and the concept of the hunt.

When everyone has finished the hunt we will ask the staff to give us their feedback on how the experience was and what can be improved. This feedback will then be used to polish the app before the actual launch.

Then we will go over the guide book which is like a manual for all aspects of the project and finally we will show them how to create a hunt from scratch using the Hunt Creator.

Another part of the training will be an introduction to the statistics web interface and certain troubleshooting practices.

**Documentation:**

The Documentation (digital only) will be made up of the Guide Book, Source Code Documentation and a FAQ for the most basic questions.

**Real World requirements:**

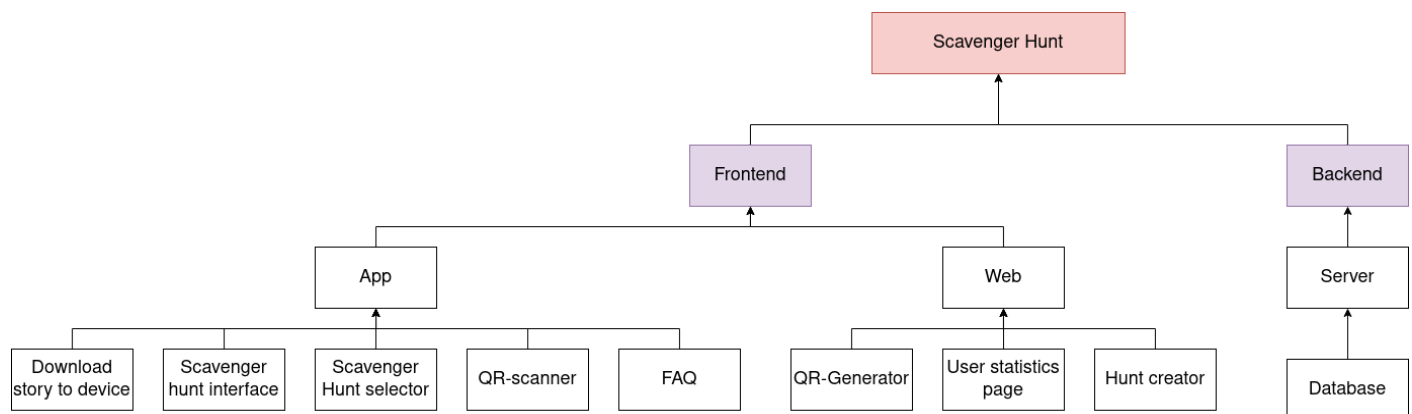
- **Server:** The Server should be provided by the museum itself, but the setup of the database and backend will be provided.
- **QR-Code:** Printed QR-Code for the exhibits, this should be done by the museum.

**Program:**

Our app consists of two main parts:

- The mobile phone app: To make the app accessible, multiple languages will be offered. The core part of the app is the QR-scanner, without which nothing functions.
- A web interface: A tool that helps museum employees manage and create new hunts.

## 2.2 Product structure plan (Produktstrukturplan)



[3] - Figure 3; Product Structure Planning

The scavenger hunt project will be split up in a Frontend and Backend.

The Frontend is further split up in an app for the visitors and a web interface for the museum staff.

**App:**

The app will provide the user with a tool to take part in the scavenger hunt. The app will provide the users with the following features:

- A simple QR-Scanner which is used to interact with an exhibit. An example would be an exhibit about a saber tooth tiger which has a QR-Code somewhere and if the user scans the QR-Code it will play a video of a saber tooth tiger in its natural habitat on the visitors phone.
- Scavenger Hunt Interface/Selector:  
Should provide an easy way to choose from multiple hunts which are available. The visitor should be provided with a description of where the hunt will take him and which parts of the exhibit will be covered.

- Download (Offline Use):  
This option should allow the user to download a hunt (preloading: text, images, videos, etc) and take part in the hunt without being connected to the internet. This enables users without mobile data to download the hunt in the museums lobby using the public wifi.
- FAQ - Frequently Asked Questions:  
This should answer the basic questions about the hunt and application.

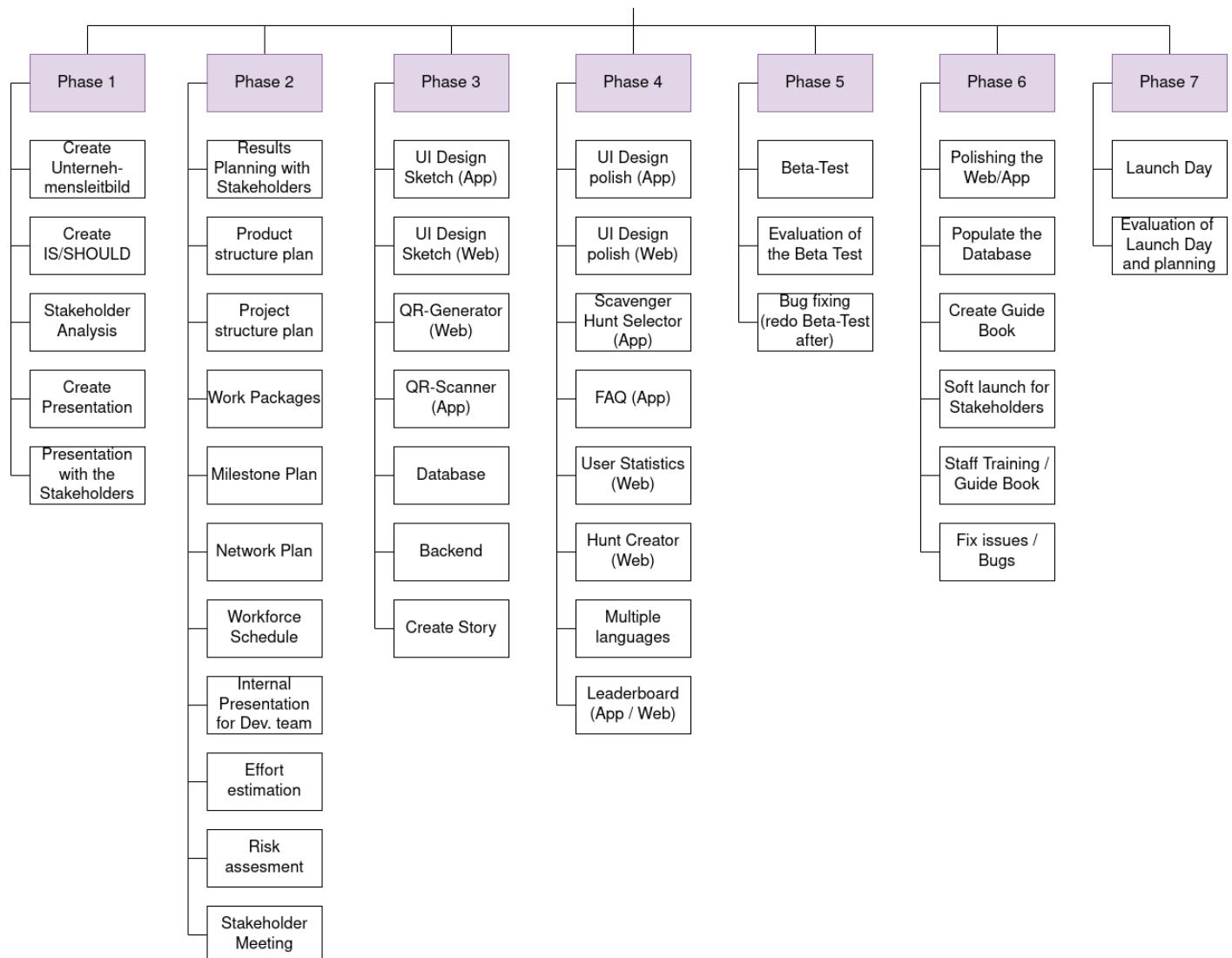
**Web:**

- QR-Generator:  
Simple tool to create QR-Codes which are linked to certain actions. An action could be a text, an image or a simple video. If the QR-Code is scanned the action will be displayed in the app when the user scans the code.
- Hunt Creator:  
In the Hunt Creator new "hunts" can be created. This tool provides a way to structure different paths in the hunt and manage the QR-Codes which are part of the hunt. There can also be dependencies between the QR-Codes, this can be useful for locking certain parts of a scavenger hunt until a certain QR-Code is scanned.
- User Statistics: The user statistics interface provides the museum staff with key metrics of the scavenger hunt. Some of the key metrics would be:
  - Currently active users (per hunt and in total)
  - QR-Codes which have never been scanned (to evaluate if part of a hunt is too difficult)
  - Visitors using the app compared to visitors visiting without using the app
  - ...

**Backend:**

The Backend will provide the backbone to our web interface and app. It will store all the text elements, images and videos which are displayed during the hunt. Furthermore it will store the user statistics and other key metrics. The database and backend setup will be done by us but the actual hardware should be provided by the museum.

## 2.3 Project Structure Plan (Projektstrukturplan)



[4] - Figure 4; Project Structure Plan

### 2.3.1 Phase 1:

In phase 1 we concentrate on getting the customer on board with the project. We do this by creating a presentation which gives them a brief overview of our company. Another important role is to show the customer how our project will impact the visitor numbers and the overall experience visitors have.

### 2.3.2 Phase 2:

In phase 2 we focus on the planning of the project which will help us to manage the available resources for the project accordingly (Work packages, Workforce Schedule, ...). We will also assess the risks which might occur and plan ahead so we can minimize the risk of the project.

Another important part is the Project Structure Plan and the Product Structure Plan which will help our team understand the project better and provide an overview.

### **2.3.3 Phase 3:**

In phase 3 our team will start with the development of the project. This includes the mobile application, web management interface, backend, database and the first UI-Sketches. In this phase we also create a sample story for testing the minimal viable product.

### **2.3.4 Phase 4:**

In phase 4 we will start to polish the UI-Design and start working on the remaining features, which include the: Scavenger Hunt Selector, FAQ, multiple languages, and so on.

After this phase the development should reach the point that beta testing can take place.

### **2.3.5 Phase 5:**

Phase 5 is mainly just for testing our current Application with all its backend systems. For this purpose we will launch a Beta-Test, after which we evaluate the current state of our project and are going to fix all the bugs that got discovered during the test.

### **2.3.6 Phase 6:**

After the Beta-Test in phase 5 we will have gathered tons of feedback on our app. The user may find a part of the UI not intuitive to use, or a feature may go unnoticed by our testers. The goal in phase 6 is, to create a finished, ready to ship product. For this we implement the feedback from phase 5, create a guidebook and do a test run with our stakeholders, among other things.

### **2.3.7 Phase 7:**

Phase 7 is the final phase of our project. Here, we officially launch the app. After a short while we meet up with the client to conduct a final evaluation and discuss future ideas and features that could be implemented.

## 2.4 Work Packages (Arbeitspaketbeschreibung)

	Working Package-specification
Responsible Person	David Riley; Max Bosak
Duration	3 days
UI Design Sketch (App)	Contents: <ul style="list-style-type: none"> <li>• Sketch UI</li> <li>• Create UI elements</li> <li>• Test UI</li> <li>• “Glue” UI together</li> </ul>
	Not-Contents: <ul style="list-style-type: none"> <li>• Adding functionality to UI elements</li> </ul>
	Result: <ul style="list-style-type: none"> <li>• UI that is: <ul style="list-style-type: none"> <li>○ Appealing</li> <li>○ Intuitive</li> <li>○ Efficient</li> </ul> </li> </ul>
	Progress Measurement: <ul style="list-style-type: none"> <li>• Finished UI elements</li> <li>• Test feedback</li> </ul>

	Working Package-specification
Responsible Person	Michal Zak; David Riley; Marat Dassaliyev; Max Bosak; Samuel Sulovsky
Duration	14 days
Beta-Test	Contents: <ul style="list-style-type: none"> <li>• Design AB-test</li> <li>• Feedback evaluation</li> <li>• Fix bug reports</li> <li>• Gather user analytics</li> </ul>
	Not-Contents: <ul style="list-style-type: none"> <li>• Evaluating the story/factual elements</li> <li>• Evaluating App-Aesthetics</li> </ul>
	Result: <ul style="list-style-type: none"> <li>• Close-to-polished version of App</li> <li>• List of issues</li> </ul>
	Progress Measurement: <ul style="list-style-type: none"> <li>• Version iteration (how many version we created in the beta)</li> <li>• Time spent in beta</li> </ul>

## 3 Deadline and Resource planning (Termin- und Ressourcenplanung)

### 3.1 Milestone Plan (Meilensteinplan)

The table below lists our milestone structure and their deadlines

Milestone	Date (MM/DD/YY)
Milestone 1 - Project got approved	12/9/20, 5:00 PM
Milestone 2 - Planning phase done; Kick off development	12/21/20, 5:00 PM
Milestone 3 - MVP created; Test MVP	1/15/21, 5:00 PM
Milestone 4 - Beta version created	3/15/21, 5:00 PM
Milestone 5 - Beta-Version passed	4/20/21, 5:00 PM
Milestone 6 - Project ready for launch	5/19/21, 5:00 PM
Milestone 7 - Project finished	5/25/21, 5:00 PM

### 3.2 Network Plan (Netzplan)

Please reference the file *NetworkPlan.pdf*

Can be also found on our github:

<https://github.com/IMerlin1009I/Scavanger-Hunt/blob/master/PMDData/NetworkPlan.pdf>

### 3.3 Workforce Schedule (Personaleinsatzplan)

Please reference the file *WorkforceSchedule.pdf*

Can be also found on our github:

<https://github.com/IMerlin1009I/Scavanger-Hunt/blob/master/PMDData/WorkforceSchedule.pdf>

### 3.4 Effort Estimation / Cost planning (Aufwandsschätzung / Kostenplanung)

We calculated that an employee costs roughly 62 Euros per hour. This would lead us to a total cost of labour of 210.552 Euros (~3444h) by the end of the project. (refer to Scavanger\_Hunt\_Price.pod; can be found on our github)

Operating Cost (Office Supplies, Electricity, Test equipment, etc) - we charge 25 Euro per working hour. This leads us to  $3436 \cdot 25 = 85.900$  Euro

+200.000 Euro profit

The project ends up costing roughly 500.000 Euro

Name	Cost
Labour	210.552
Operating Cost	85.900
Profit	200.000
Sum	496.452 ~ 500.000

## 3.5 Risk Assessment (Risikoanalyse)

### 3.5.1 Risk Identification:

After reviewing the key parts of the project the following risks have been found:

#### 3.5.1.1 Internal Risks:

- Employee negligence
  - Low hunt quality
  - Nonoptimal system security measures
    - Keeping passwords in cleartext, not enforcing 2FA, etc.
  - Low quality control and testing for features
- Promotion mismanagement
  - Client side lack of expertise in promotion of our product

#### 3.5.1.2 External Risks:

- Pandemic
- Competitors
  - Actionbound (see Bibliography: 1)
- Hardware failure:
  - Denial of service attacks
  - Forces of nature
- Destruction/Inhibition of real world hunt elements
  - Detachment of QR codes
  - Vandalism
  - Wear and Tear through negligence of upkeep



**3.5.2 Risk Evaluation:**

The risks need to be evaluated according to the impact and the probability of occurrence.

This will provide a clear picture of which risk might be project endangering or have a significant impact.

	Risk Description:	possible cause	probability of occurrence	Impact	Measures
1	Employee Negligence	Low rewards and/or motivation, lack of expertise in area, pressure to deliver at all costs	medium	critical	The work packages hours have been adjusted to account for tasks taking longer. Workers have been assigned tasks matching their expertise. Sick days are taken into account when planning the project.
2	Promotion mismanagement	Outdated promotion measures, lack of need for profit from clients (due to established business model, government funding or anything else).	medium	critical in some areas	In-house experts can offer to advise the client on how to promote the hunt. We also build our own brand to promote our hunts and bring people to museums where we implement our hunts (promotion not reliant on the client).
3	Pandemic	Disease, currently the COVID-19 coronavirus.	unknown	uncritical	Vaccination is currently taking place and the general public will likely go back to normal by the end of the project. In the future, as museums digitalise, we believe we may be at the forefront of such innovation.
4	Competitors	The museum might be offered a better offer for a similar project from a competitor company.	low	to neglect	In the event of counter offers, we will negotiate and provide more benefits and/or a lower price to outmatch competitors. Build out our own brand, garner reviews and positive feedback so that we are the default choice for clients.

5	Hardware Failure	Hardware is prone to failure and attacks.	high	critical in some areas	Instruct clients on proper security measures, keep backups of data on the cloud or on an air-gapped server, protect the data center with appropriate measures against the elements (rain, dust, fire...). Auto-enforce downloading of hunts on wireless (non-mobile hotspot) connections to ensure visitors access to hunts even during system outages.
6	Destruction and/or Inhibition of Real World Hunt Elements (QR Codes)	Visitors, unattentive museum staff or just time without maintenance.	low	uncritical	Include maintenance instructions within the handbook.

**Risk-levels:**

1. to neglect
2. uncritical
3. critical in some areas (with a negative impact)
4. critical (with a strong negative impact)
5. project endangering

## Bibliography

1. Actionbound. *Actionbound*. Actionbound GmbH, 2020, <https://actionbound.com/>. Accessed 17 12 2020.
2. Koran, John, et al. "Attention and curiosity in museums." *Attention and curiosity in museums*, vol. 1, no. 1, 1984, p. 7. *Attention and curiosity in museums*, <https://doi.org/10.1002/tea.3660210403>. Accessed 22 12 2020.
3. Statistik Austria. "Ergebnisse im Überblick: Museumsstatistik 2018." *Ergebnisse im Überblick: Museumsstatistik 2018*, 2018, [https://www.statistik.at/wcm/idc/idcplg?IdcService=GET\\_PDF\\_FILE&RevisionSelectionMethod=LatestReleased&dDocName=021257](https://www.statistik.at/wcm/idc/idcplg?IdcService=GET_PDF_FILE&RevisionSelectionMethod=LatestReleased&dDocName=021257). Accessed 04 12 2020.