

Appendix

Describing Images to Visually Impaired
Users: a Requirement Elicitation Approach

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Appendix - A Categories for different situations

People

Advanced description

Please choose the relevant additional information and fill in. (skip the aspects already mentioned)

Basic Description

People's number

Number of people in the picture

Activity

The ongoing activity or interaction of the person(s) in the image

People's expression

Facial expression or the possible emotion of the person(s)

Environment /set

Location and the prominent features of the background

Other important info

Any other important information in the image

An (#image type) depicts (#number) person(#name) who is/are doing(#activity) (#environment) and seems(#expression). (#Other unique features) ; Text in this image :

Connection with the context

Any other important information in the image

Details for subject(s)

Add details

Position

The position of the subject e.g., left/right (for the first person) or relative position (if not first person)

Gender

* To avoid wrong inference, please make sure it is relevant and verified

Skin-tone

* To avoid unverified inference, please use light/medium/dark skin-tones

Dressing / Attire

Dressing of this person

Other characteristics

Other noteworthy features, including hair color/ hair style/ Size / Age

The first(#number) person is (#Spatial). This person is possible (#gender), (#Skin-tone), wearing (#dressing). (Other features)

If contextual focus is different from visual focus, then the connection with the context is required

Sub-focuses

Objects related to subjects

Objects that interact with the characters in the screen, such as the the equipment they are using, etc.

Salient Objects/ Persons

Other worthnoting objects in the image, including its relative position, relationship with the subject, appearance, activities, etc.

If the contextual focus is an object, then the description of the salient object is required

Overall information

Background information

Important background informaiton

Emotion inspired

What kind of emotion may this image convey

Image style

The artistic style of the image

Overall color

Main color tendency of the image

If image type is drawing, this is required

Objects

Advanced description

Please choose the relevant additional information and fill in. (skip the aspects already mentioned)

Basic Description

Group

number of the objects - Single/
Multiple

Environment /set

Where and how the objects are
placed. What's the environment like

An (#image type) depicts (#Group)
object(#name). (#shape)
(#environment)

Connection with the context

Any other important information in the
image

Details for object(s)

Add details

Overall style

The overall style of the object(s)

#Form/ Shape

The shape/form of the object

Material

The material of the objects

Color

Any other important information in the
image

Other unique features

Any other unique feature of the object

If contextul focus is different from
visual focus, then the connection
with the context is required

Sub-focuses

Salient Objects/ Persons

Other worthnoting objects in the image,
including its relative position, relationship
with the subject, appearance, activities, etc.

#Relative Position

#Relationship

#Appearance

#Activities

If the contextual focus is an
object, then the description of the
salient object is required

an object(name) is to the left
(#location)

Overall information

Background information

Important background informaiton

Emotion inspired

What kind of emotion may this image
convey

Image style

The artistic style of the image

Overall color

Main color tendency of the image

If image type is drawing, this is
required

Event /Scene

Advanced description

Please choose the relevant additional information and fill in. (skip the aspects already mentioned)

Basic Description

Point of view

Bird's-eye/ Overlooking/ Eyelevel/
Looking-up view

Landmarks

Landmarks in the image and their names

Activity/ Interaction

What are the activities of the people

Salient element(s)

Brief introduction of the scene; The salient element(s)

People present

Is there any people presented in the scene? if no, skip

An (#image type) depicts a scene of (#elements) (or #Landmarks).
There is a group of people (#activity)

Connection with the context

Any other important information in the image

Details for subject(s)

Add details

Building Feature

Unique building features in the environment

Whether

The weather of the environment

Other noteworthy info

Any other important information in the image

Salient elements

Please describe the distinctive people or things in the picture in order, as well as their activities and characteristics

Salient Objects/ Persons_1

Worthnoting objects in the image, including its location, relationship with the subject, appearance, activities, etc.

#Appearance

#Activities

Salient Objects/ Persons_1

Worthnoting objects in the image, including its location, relationship with the subject, appearance, activities, etc.

#Appearance

#Activities

Overall information

Add details (from the first person)

Background information

Important background informaiton

Emotion inspired

What kind of emotion may this image convey

Image style

The artistic style of the image

Overall color

Main color tendency of the image

If image type is drawing, this is required

If **contextul focus is different from visual focus**, then the connection with the context is required

Appendix – B Questionnaires for research through design phase

Graduation_Test_Round1_section_1

* This form will record your name, please fill your name.

Introduction & Personal information

This survey intend to research about visually impaired people's different requirements on image description under different circumstance. In this test, you will be required to try acting and behaving as a visually impaired people. And give feedbacks to the image descriptions provided with different context.

1. Your age

2. Your education level

3. Your visual impairment type

4. Please rank your interest in the reading materials of the following topics

Economics

Politics

Arts

Sports

Food & recipe

Fashion

Literature

Popular Science

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 Microsoft Forms

Graduation_Test_Round_1.2_Section_2

* This form will record your name, please fill your name.

1. Participant number

2. Picture_Topic

- Economics
- Politics
- Arts
- Sports
- Food Recipe
- Fashion
- Literature
- Popular science

3. 1.1 Please rate your familiarity with the content of the article

	1-Never heard	2	3-Normal	4	5- It's my major
Familiarity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

4. 1.1 Please rate your interest in the content of the article

	1-I want to skip	2	3-Normal	4	5-Highly interest
Interest	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

5. 1.2 Do you want to know more about this picture/ need more description?

- Yes
- No
- Maybe

6. 1.3 To what extent do the current descriptions meet your needs for images?

	1-No meaningful information	2	3-Not enough but okay	4	5-Fully satisfied
Coverage	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7. 1.4.0 Do you think the picture description is too long?

- Yes
- No
- Maybe

8. 1.4.1 Please rate the efficiency of the image description

	1-All of the information is unnecessary	2	3-Some information is necessary but too long for me	4	5. All of the information is necessary
Efficiency	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

9. 1.4 Do you have any guesses or imaginations about this picture in your mind? What is it like?

10. 2.0 Please choose the additional information you need?

- Celebrity
- People's characteristic
- Connection with context
- Salient objects
- Overall Emotion/ Atmosphere
- Overall color
- Overall Style
- Material & Texture
- Weather
- Lightning
- Landmarks
- Building Features
- Text
- Activity
- Environment

11. 2.1 Do you think the additional description content helps the understanding of the picture?

- Yes
- No
- Maybe

12. 2.2 To what extent do the current descriptions meet your needs for images?

	1-No meaningful information	2	3-Not enough but okay	4	5-Fully satisfied
Coverage	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

13. 3.1 Please choose other information you guess important to understand this picture

- Celebrity
- People's characteristic
- Connection with context
- Salient objects
- Overall Emotion/ Atmosphere
- Overall color
- Overall Style
- Material & Texture
- Weather
- Lightning
- Landmarks
- Building Features

14. 3.2 The options help you think about the information you want?

	1- They interfere with my thinking	2-Not helpful	3-Maybe	4-Definitely helpful	5-They cover all the options I want
Whether helpful	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

15. 3.3 The options provided cover the content you want to ask

0	1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	---	----

16. 3.4 Other information you want to know about?

17. 4.1 Please rate the sufficiency of the information you get from the image description?

	1-I miss the main idea of the picture	2	3-Enough but need more details	4	5-Fully satisfied
Sufficiency	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

18. 4.1 Please rate the accuracy of the information you get from the image description?

	1-I misunderstand the picture	2	3-Actually not helpful	4	5-My understanding is right
Accuracy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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Microsoft Forms

Survey about the requirements on image description system from visually impaired people

* Required

1. Which type of visual impairments do you have? *

Mark only one oval.

- Congenital Total Blindness
- Congenital Blindness with some color/light perception
- Acquired Total blindness
- Acquired blindness with some color/light perception
- Congenital Low-Vision
- Acquired Low-Vision
- Other

2. How old are you? *

Mark only one oval.

- 0 - 10
- 10 -20
- 20 - 40
- 40 -60
- Over 60

3. Which devices do you mainly use to acquire information (at least once everyday) in your daily life? *

Check all that apply.

- Computer with screen reader (Audio Output)
- Computer with braille reader (braille output)
- Computer with large screens (without Audio/Braille output)
- Mobile phone
- Physical tactile material

4. Which of the following medias do you mainly visit and read everyday? *

Check all that apply.

- News Website or news application
- E-publications
- Social network website

5. How frequently will you use news website and application everyday? *

Mark only one oval.

- More 3 times everyday.
- 1 to 3 times everyday
- will not use everyday but will check news several times regularly every week
- I never use news websites or applications

6. Have you encountered images while reading news? *

Mark only one oval.

- Yes
- No

7. Please rate the accessibility of images while reading news. *

Mark only one oval.

- | | 1 | 2 | 3 | 4 | |
|-----------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|---------------------------|
| No description or almost helpless | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | Definitely helpful for me |

8. Please rate the importance of image description for reading news. *

Mark only one oval.

- | | 1 | 2 | 3 | 4 | |
|---|-----------------------|-----------------------|-----------------------|-----------------------|---|
| Image description is redundant for news website | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | Good image description can help me acquire more information |

9. How much time will you spend on E-publications every week? *

Mark only one oval.

- More than 20 hours (on average 3 hours every day)
- 7 to 20 hours every week (on average 1 to 7 hours everyday)
- Less than 7 hours everyday
- I rarely read E-publications

10. Have you encountered images on E-publications? *

Mark only one oval.

- Yes
- No

Appendix - C Questionnaires for interview with VIPs

11. Please rate the accessibility of images while reading publications (books, magazines, etc.) *

Mark only one oval.

1 2 3 4

No description or almost helpless Definitely helpful for me

12. Please rate the importance of image description for reading publications (books, magazines, etc.) *

Mark only one oval.

1 2 3 4

Image description is redundant for news website Good image description can help me acquire more information

13. Please fill in an e-mail if you want to get updated with my progress.

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Google Forms

Survey about the requirements on image description system from visually impaired people

* Required

1. Which type of visual impairments do you have? *

Mark only one oval.

- Congenital Total Blindness
 Congenital Blindness with some color/light perception
 Acquired Total blindness
 Acquired blindness with some color/light perception
 Congenital Low-Vision
 Acquired Low-Vision
 Other

2. How old are you? *

Mark only one oval.

- 0 - 10
 10 - 20
 20 - 40
 40 - 60
 Over 60

3. Which devices do you mainly use to acquire information (at least once everyday) in your daily life? *

Check all that apply.

- Computer with screen reader (Audio Output)
 Computer with braille reader (braille output)
 Computer with large screens (without Audio/Braille output)
 Mobile phone
 Physical tactile material

4. Which of the following medias do you mainly visit and read everyday? *

Check all that apply.

- News Website or news application
 E-publications
 Social network website

Requirement elicitation of visually impaired users of visual information project title

Please state the title of your graduation project (above) and the start date and end date (below). Keep the title compact and simple. Do not use abbreviations. The remainder of this document allows you to define and clarify your graduation project.

start date 10 - 06 - 2020 02 - 12 - 2020 end date

5. How frequently will you use news website and application everyday? *

Mark only one oval.

- More 3 times everyday.
- 1 to 3 times everyday
- will not use everyday but will check news several times regularly every week
- I never use news websites or applications

6. Have you encountered images while reading news? *

Mark only one oval.

- Yes
- No

7. Please rate the accessibility of images while reading news. *

Mark only one oval.

- 1 2 3 4
-
- No description or almost helpless Definitely helpful for me

8. Please rate the importance of image description for reading news. *

Mark only one oval.

- 1 2 3 4
-
- Image description is redundant for news website Good image description can help me acquire more information

9. How much time will you spend on E-publications every week? *

Mark only one oval.

- More than 20 hours (on average 3 hours every day)
- 7 to 20 hours every week (on average 1 to 7 hours everyday)
- Less than 7 hours everyday
- I rarely read E-publications

10. Have you encountered images on E-publications? *

Mark only one oval.

- Yes
- No

INTRODUCTION **

Please describe, the context of your project, and address the main stakeholders (interests) within this context in a concise yet complete manner. Who are involved, what do they value and how do they currently operate within the given context? What are the main opportunities and limitations you are currently aware of (cultural- and social norms, resources (time, money,...), technology, ...).

| Context |

Nowadays images are increasingly used for communication both in the traditional and new media. They serve an important complementary role together with the textual narration, supporting and facilitating the perception of information. But images used not to be accessible to people with visual impairments due to issues of cost, scalability, timeliness and quality, which engender limits on their reading experience. However, recent works on automatic image description and captioning shows possibilities to tackle this issue with the help of crowd computing technique. To develop such an unprecedented content processing system for visually impaired readers, a deep understanding of the requirements on image description, from the perspective of the target group, is an essential first step. In this project, a research through design approach will be used to develop new knowledge about the actual requirements of an image description system. The outcome of this project will be taken as reference for the further technical development of the image description system, which will presumably deploy automated solutions combined with crowd computing techniques.

| Stakeholders |

This graduation project is part of the large project "Efficient and Effective Visual Content Description for Visually Impaired Users", which is conducted in the context of the newly created Future Libraries Lab. The Future Libraries Lab is a research and innovation collaboration between the Delft University of Technology and the Koninklijke Bibliotheek. It aims at conceiving and prototyping possible futures for public libraries by combining design approaches and methods with state-of-the-art data science and artificial intelligence tools. Due to the complex context of this graduation project, various stakeholders are included, as is follows.

- Visually impaired users: Everyone should have equal access to public knowledge and information. The proposed accessory image description system is expected to better satisfy the information needs of the visually impaired people.
- Koninklijke Bibliotheek (National Library): With the outcome of this project, KB can provide more inclusive service and made its resources accessible to more people, contributing to better social well-being and fairness.
- Prototype developer: The outcome of this project can clarify the requirement and provide a promising direction for system under development.

(indirect stakeholder)

- Participants for crowd computing: A clear guidance for the participants of crowd computing, which probably is based on the outcome of this project, is essential for the operation of the processing system.
- Social organization which provide supports for visually impaired people

space available for images / figures on next page

introduction (continued): space for images

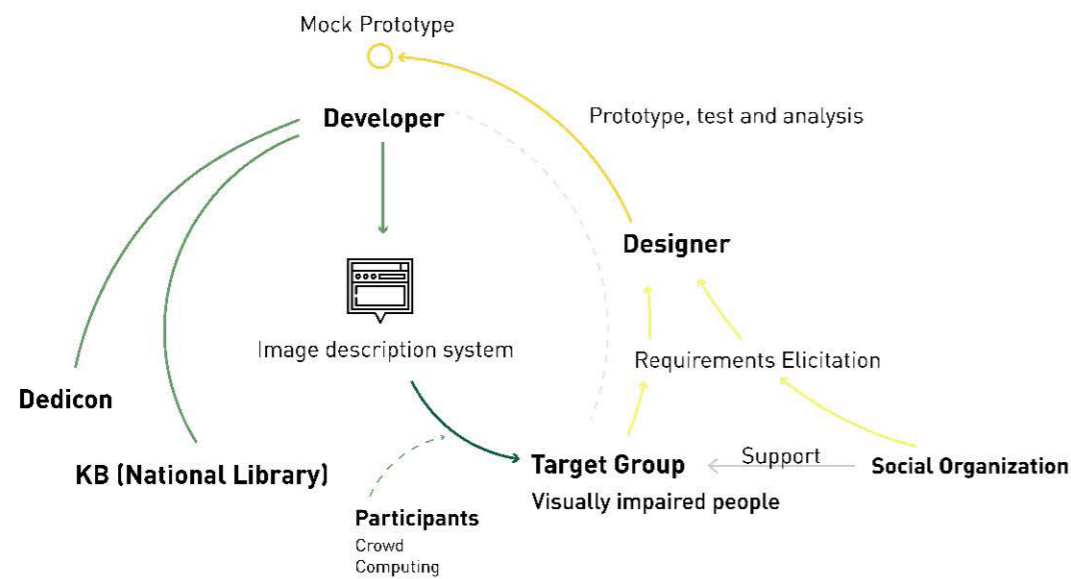


image / figure 1: Project Overview: Stakeholders

TO PLACE YOUR IMAGE IN THIS AREA:

- SAVE THIS DOCUMENT TO YOUR COMPUTER AND OPEN IT IN ADOBE READER
- CLICK AREA TO PLACE IMAGE / FIGURE

PLEASE NOTE:

- IMAGE WILL SCALE TO FIT AUTOMATICALLY
- NATIVE IMAGE RATIO IS 16:10
- IF YOU EXPERIENCE PROBLEMS IN UPLOADING, CONVERT IMAGE TO PDF AND TRY AGAIN

image / figure 2:

PROBLEM DEFINITION **

Limit and define the scope and solution space of your project to one that is manageable within one Master Graduation Project of 30 EC (= 20 full time weeks or 100 working days) and clearly indicate what issue(s) should be addressed in this project.

This project aims to develop a deep understanding of the requirements of images description from the perspective of visually impaired users.

The first problem within this project will be the complexity of the target group. To be specific, there are different types of visually impairment (such as congenital visual impairment and acquired visual impairment), which will result in different perceptions of the image content and different requirements when reading. And thus, sufficient desk research is crucial to learn about the target group and what kind of visual impairments will be within the focus and scope of this graduation project.

Based on my choice of the visual impairment types, this project will focus on the elicitation of their information requirements on image description, which is the key problem of this project. The development of image description technology provides the possibility for visually impaired people to read pictures. However, how to describe pictures to satisfy their needs is unknown. Should all images be described? How detailed the descriptions should be? What kind of elements is important to be described? To approach these problems, context mapping techniques will be deployed to gain insights and build assumptions. Then prototypes will be built to verify these assumptions and draw conclusions.

In addition, there are several minor issues I need to deal with during the progress:

- Build a clear understanding of the relevant technical fields to ensure a clear and feasible final prototype
- Adjust normal user research techniques to help the target group overcome communication problems and better express ideas
- Decide on the medium of image description to ensure it work effectively

ASSIGNMENT **

State in 2 or 3 sentences what you are going to research, design, create and / or generate, that will solve (part of) the issue(s) pointed out in "problem definition". Then illustrate this assignment by indicating what kind of solution you expect and / or aim to deliver, for instance: a product, a product-service combination, a strategy illustrated through product or product-service combination ideas, In case of a Specialisation and/or Annotation, make sure the assignment reflects this/these.

Develop a demonstrator to communicate the visually impaired people's requirements and their preferable interaction mode for a technological image description system

| Possible Research Activity |

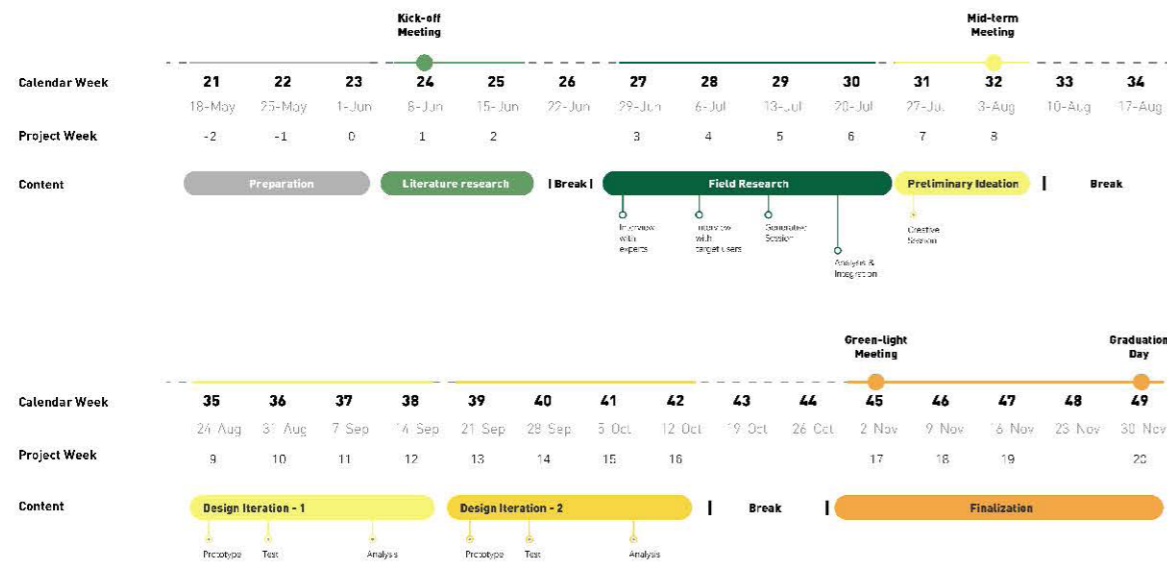
In the beginning, desk research will focus on overview of different groups of visually impaired people, their mainly reading materials, the potential relationships between text and images in these materials. Then some user research will be conducted to learn about the reading activities of the target group in daily life, the problems encountered, and their corresponding demands. Reading scenarios will built in this phase. According to the results of the research, the design scope will be narrowed down to a specific type of visually impaired group (and probably a specific type of reading content). At the midterm meeting, based on the understanding of context, a design brief will be proposed, which will contain a more specific design goal, interaction vision, and testable targets.

In the design phase, two rounds of iteration will be conducted. In the first round, based on insights and inferences at the research stage, several prototypes will be developed to represent different interaction modes. Then I will proceed with some user tests and analyze the collected data based on the testable targets I set. According to the analysis results, different prototypes will eventually be combined into one. Another round of tests and analyses will be done for evaluation and recommendation.

PLANNING AND APPROACH **

Include a Gantt Chart (replace the example below - more examples can be found in Manual 2) that shows the different phases of your project, deliverables you have in mind, meetings, and how you plan to spend your time. Please note that all activities should fit within the given net time of 30 EC = 20 full time weeks or 100 working days, and your planning should include a kick-off meeting, mid-term meeting, green light meeting and graduation ceremony. Illustrate your Gantt Chart by, for instance, explaining your approach, and please indicate periods of part-time activities and/or periods of not spending time on your graduation project, if any, for instance because of holidays or parallel activities.

start date 10 - 6 - 2020 end date 2 - 12 - 2020



| Calendar Week 21(18 May) to 23 (1 June) |
Preparation of project brief and kick-off meeting

| Calendar Week 24(8 June) to 25 (15 June) |
Kick-off meeting & Literature Research

| Calendar Week 27(29 June) to 30 (20 July) |
Field Research

| Calendar Week 31(27 July) to 32 (3 Aug) |
Preliminary Ideation & Mid-term meeting
Design brief (Design goal / interaction Vision/ Testable target)

| Calendar Week 35(24 Aug) to 38 (14 Sep) |
Design Iteration -1

| Calendar Week 39(21 Sep) to 42 (12 Oct) |
Design Iteration -2

| Calendar Week 45(2 Nov) to 49 (30 Nov) |
Green light meeting & Finalization & Graduation Day

MOTIVATION AND PERSONAL AMBITIONS

Explain why you set up this project, what competences you want to prove and learn. For example: acquired competences from your MSc programme, the elective semester, extra-curricular activities (etc.) and point out the competences you have yet developed. Optionally, describe which personal learning ambitions you explicitly want to address in this project, on top of the learning objectives of the Graduation Project, such as: in depth knowledge a on specific subject, broadening your competences or experimenting with a specific tool and/or methodology, Stick to no more than five ambitions.

| Motivation & Competence |

I have long been interested in the topic of how emerging technology, especially machine learning (ML), can be combined with a design mindset to contribute to people's well-being. In the past year, I have participated in several courses relevant to artificial intelligence in the faculty/by myself. This project provides the opportunity to participate the development of a practical implementation of ML, which I have always been looking for.

| About Competence |

Like most Dfl students I have already learned plenty of design skills and methodologies from the courses I have taken. To be specific, this project will be conducted in a "research through design" manner. And I have been familiar with this research method through the course Research Methodology and research electives. Moreover, since the target group in this project is one I totally unfamiliar with, probably participatory design will be taken as my main method to approach my design goal and a lot of context mapping will be included. I have learned a lot in this field from courses such as C&C, EI and CF courses. Last but not least, my experience with speculative design from my research electives may be helpful in this project since there is few existing solutions.

| Learning Goal |

Communication Skills:

- How to communicate with and coordinate different stakeholders.
- How to empathize with a target group that I am unfamiliar with
- Communication will be one of the main challenges for me in this project.

I am not a person good at communication so far, but this projects does require plenty of communication among different stakeholders. I hope I will gradually improve myself through this project.

Design skills:

- Participatory design: how to conduct context mapping with my target group (visually impaired people)

Depth knowledge:

- About Visual impaired people and their requirements about image description

FINAL COMMENTS

In case your project brief needs final comments, please add any information you think is relevant.