TUDelft

IDE Master Graduation

Project team, Procedural checks and personal Project brief

This document contains the agreements made between student and supervisory team about the student's IDE Master Graduation Project. This document can also include the involvement of an external organisation, however, it does not cover any legal employment relationship that the student and the client (might) agree upon. Next to that, this document facilitates the required procedural checks. In this document:

- The student defines the team, what he/she is going to do/deliver and how that will come about.
- SSC E&SA (Shared Service Center, Education & Student Affairs) reports on the student's registration and study progress.
- IDE's Board of Examiners confirms if the student is allowed to start the Graduation Project.

USE ADOBE ACROBAT READER TO OPEN, EDIT AND SAVE THIS DOCUMENT
Download again and reopen in case you tried other software, such as Preview (Mac) or a webbrowser.

STUDENT DATA & MASTER PROGRAMME
Save this form according the format "IDE Master Graduation Project Brief_familyname_firstname_studentnumber_dd-mm-yyyy".
Complete all blue parts of the form and include the approved Project Brief in your Graduation Report as Appendix 1 !

family name	_____
initials	_____ given name _____
student number	_____
street & no.	_____
zipcode & city	_____
country	_____
phone	_____
email	_____

Your master programme (only select the options that apply to you):

IDE master(s): ( ) IPD (★) DfI ( ) SPD

2nd non-IDE master: _____

individual programme: ____ - ____ - ____ (give date of approval)

honours programme: (Honours Programme Master)

specialisation / annotation: (★) Medisign

(Tech. in Sustainable Design)

(Entrepeneurship)

SUPERVISORY TEAM **
Fill in the required data for the supervisory team members. Please check the instructions on the right !

** chair	_____	dept. / section:	HCD-DA
** mentor	_____	dept. / section:	HCD-DA
2nd mentor	_____		
	organisation:	Össur	
	city: Reykjavik	country:	Iceland

comments (optional)
Despite both professors being from the same department, they cover the expertise I will need in my project specifically in design for well-being ( ) and form-giving design ( ). They also had successful prior collaborations as supervisory team and with the company Össur.

Chair should request the IDE Board of Examiners for approval of a non-IDE mentor, including a motivation letter and c.v..

Second mentor only applies in case the assignment is hosted by an external organisation.

Ensure a heterogeneous team. In case you wish to include two team members from the same section, please explain why.

APPROVAL PROJECT BRIEF
To be filled in by the chair of the supervisory team.

chair _____ date 08 - 09 - 2023   signature

CHECK STUDY PROGRESS
To be filled in by the SSC E&SA (Shared Service Center, Education & Student Affairs), after approval of the project brief by the Chair.
The study progress will be checked for a 2nd time just before the green light meeting.

Master electives no. of EC accumulated in total: **27** EC

Of which, taking the conditional requirements
into account, can be part of the exam programme **27** EC

List of electives obtained before the third
semester without approval of the BoE

(**X**) YES   all 1st year master courses passed

( ) NO   missing 1st year master courses are:

name _____ date 13 - 09 - 2023   signature _____

FORMAL APPROVAL GRADUATION PROJECT
To be filled in by the Board of Examiners of IDE TU Delft. Please check the supervisory team and study the parts of the brief marked **.
Next, please assess, (dis)approve and sign this Project Brief, by using the criteria below.

- Does the project fit within the (MSc)-programme of
  the student (taking into account, if described, the
  activities done next to the obligatory MSc specific
  courses)?
- Is the level of the project challenging enough for a
  MSc IDE graduating student?
- Is the project expected to be doable within 100
  working days/20 weeks ?
- Does the composition of the supervisory team
  comply with the regulations and fit the assignment ?

Content: (V) APPROVED   ( ) NOT APPROVED

Procedure: (V) APPROVED   ( ) NOT APPROVED

comments

name _____ date - KE 19/9/2023   signature _____

Initials & Name _____ Student number _____

Title of Project Boosting Well-being and User Engagement via Prosthetic Personalization

Boosting Well-being and User Engagement via Prosthetic Personalization   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   08 - 09 - 2023   16 - 02 - 2024   end date

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, ...).

"A prosthetic limb doesn't represent the need to replace loss anymore... It can stand as a symbol where the wearer has the power to create whatever it is they want to create in that space, so people that society once considered to be disabled can now become the architects of their own identities and indeed continue to change those identities by designing their bodies from a place of empowerment." (Mullins, 2009)

This graduation project will be carried out in collaboration with Össur, an Icelandic company, that specializes in developing, manufacturing, and distributing orthopedic and prosthetic products. It is a global leader in the field offering a diverse range of innovative solutions to enhance mobility and improve the quality of life for individuals without a limb or musculoskeletal impairments.
Prosthetics are devices in which functional aspects play a predominant role, but to promote the well-being of users, it is also necessary to consider the aesthetic of the devices. For this reason, exploring design solutions towards personalization and customization can yield interesting outcomes.

The literature analysis reveals that personalized and customized options can significantly impact user engagement, satisfaction, quality of life, and self-identity among prosthetic users.
Notably, a study conducted at the Limbitless Solution Laboratory highlights the importance of customization in fostering strong attachments between users and their prosthetic devices. Enabling users to personalize their prostheses leads to a positive sense of identity, with the prosthesis being perceived as an extension of themselves, resulting in enhanced self-esteem and increased social freedom. (Marasa, 2021)
In the clothing sector, an example of a company that offers its customers the opportunity to design the product they want to purchase is Nike. Through an immersive customization experience, this brand promotes mass production while ensuring the user a sense of uniqueness. (Nike, 2023)

In addition, new technologies such as 3D scanners and printers are bringing significant advantages to the field. This technology has demonstrated many potentials, which include customization and personalization, rapid prototyping and reduced fitting time, cost-effectiveness, material efficiency, material selection, collaboration and knowledge sharing, accessibility, and remote fabrication. (Xu, K., & Qin, S, 2023).

However, the availability of data concerning prosthetic users' preferences, behaviors, hopes, dreams, and desires regarding personalizing their prosthetics is currently limited. Further research is needed to understand modifiable factors related to device satisfaction as well as the specific needs and desires of users in this regard to offer more tailored and user-centric solutions.

The main stakeholders of this project will be the Prosthetic Users, Össur, the R&D team, Industrial Designer and other specialized Designers, Commercial team, Family members and Healthcare Professionals.

Opportunities: Demonstrate that the ability to select various options has significant benefits on user well-being. Show that customization and personalization can be integrated as inputs into the design project/process. In addiction to Advancements in Technology, User involvment in the design process, and Research & Data Collection.

Limitations: Cost and Resources, Cultural and Social Norms, Regulatory Constraints, Technological Limitations.

space available for images / figures on next page

Initials & Name _____   Student number _____

Title of Project   Boosting Well-being and User Engagement via Prosthetic Personalization

introduction (continued): space for images

image / figure 1:   Picture of personalized covers for lower limb prosthesis

Nike By You

image / figure 2:   Customer Personalization experience - Nike website for shoes personalization

Initials & Name _____   Student number _____

Title of Project   Boosting Well-being and User Engagement via Prosthetic Personalization

The positive effects on users' well-being of customization and personalization are evident in the literature. However, the availability of data concerning prosthetic users' preferences, behaviors, hopes, dreams, and desires regarding personalizing their prosthetics is currently limited. Further research is needed to understand the specific needs and desires of users in this regard to offer more tailored and user-centric solutions.
Many people with limb amputation reject prostheses, and many are not satisfied with their devices, more research is needed to understand which factors influence their dissatisfaction. (Resnik, et al. 2020).

Most of the companies on the market offer their clients the possibility to customize their devices by designing covers with different colors and shapes. So far this is the most common way to offer tailored solutions to customers but at the same time be appealing to the masses (Yoo & Park, 2016).

Marasa thesis project, however, discuss on how the use of these options to color or wrap prosthetics mechanical and functional parts with carbon fiber patterns can be costly and might not entirely meet user expectations. (Marasa, 2021). In Mullins' quote cited in the introduction, she uses the word "architect" to describe the desired role a prosthetic user should have in the development process. Fostering user engagement throughout the design process and integrating their input at an earlier stage, preceding the final cosmetic detailing holds the potential to yield to new designs, ideas, and ways of construction that better fit the limb's different communities segments.

In addition, not much is known regarding the experience of the user during the customization process itself. The company, Össur, wants to offer its client the best solutions to facilitate device selection, foster long-term usage and enhance comfort, psychological well-being, and social engagement.

With this graduation project I intend to design the user experience of the customization process by designing in the direction of a platform that embodies tailored and user-centric solutions. Through this attempt, my objective is to enhance user engagement, enrich the overall quality of life, ensure user satisfaction, and create an impactful and memorable experience.

This project's primary goal is, as mentioned in the problem definition session, to gain a better understanding of the users' experience. The final design aspires to engage with the users to foster their satisfaction. By working on the personalization experience, I would like to provide the users with a prosthesis that can be perceived as an extension of themselves and not as an external body.

I believe that the personalization process itself can already have beneficial effects on the users' well-being in an early stage than the final product. In addition, my solution aims to be inclusive and flexible to be able to engage with a wide range of people.
At the same time, the company is now interested in gaining more knowledge about the users' preferences, behaviors, hopes, dreams, and desires to then expand the customization option even more in the future. In this sense, I see the platform as a solution that does not only cope with the current users needs but that can evolve from now on together with the company and the users in upcoming scenarios.
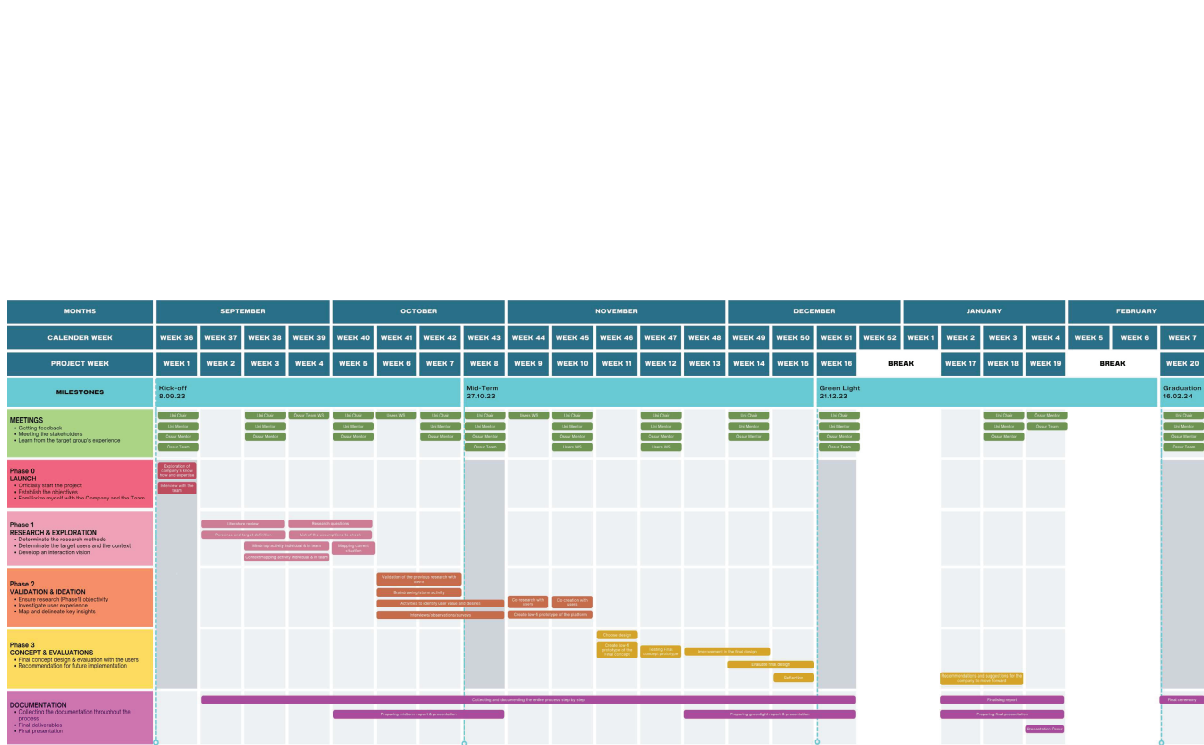
The success of the project wont merely be defined by the final design, but the main attention is given to the design process itself and to the collection of valuable insights. In order to gather these insights, the users will have a central role and constant involvement in the research, creation, and validation phases. I am going to collaborate with the prosthesis wearer by applying traditional research methods such as Interviews, observations and surveys together with some co-design activities.

Initials & Name _____   _____ Student number _____

Title of Project   Boosting Well-being and User Engagement via Prosthetic Personalization

start date   8 - 9 - 2023   16 - 2 - 2024   end date

The project is scheduled to be pursued for 20 weeks. Two weeks' holidays are planned during the Christmas break while the other two weeks' break are planned at the end of January and the beginning of February. Since I will move to Iceland to conduct the project there with the company, at the end of my staying in Reykjavik I will need some time to move back to the Netherlands and take some time to settle and plan the Final ceremony. Those two last weeks are flexible and I will also use them to finalize what is needed. I will not take breaks during the first 16 weeks because I want to make the most from staying in the company and working with the experts there.

Phase 0 - LAUNCH in which I will get more familiar with the company and the design team in Reykjavik.

Phase 1   RESEARCH & EXPLORATION in which I will research the users' needs, behavior, and desires and explore the research topic in depth

Phase 2   VALIDATION & IDEATION in which I will validate the previous research with the users and start to ideate with them first design ideas

Phase 3   CONCEPT & EVALUATIONS in which I will use the previous phases as inspiration and sources of insights that I will translate into the final concept, I will then evaluate the final concept with the users again to make recommendations and suggestions for further improvement for future works.

Since my project focuses on involving the users in the process, I am planning many touchpoints with the participants to conduct research activities with them. I would like to apply both traditional research methods together with co-design activities. From past experiences, I know how complex this aspect is to plan due to the availability of the participants so the Gantt chart showed above will be used as a guideline, but I will have to be flexible in case of last-minute changes.

Initials & Name _____   Student number _____

Title of Project   Boosting Well-being and User Engagement via Prosthetic Personalization

As a Design for Interaction student, I have developed a strong fascination for understanding people's behavior, desires, and needs. During my bachelor's degree, my interest in prosthetics technology began to grow, and it intensified further when I became acquainted with my new housemate, who wears a lower limb prosthesis. This encounter sparked a sense of duty and opportunity as a designer to contribute to the field and fulfill my curiosity.

This project presents a chance for me to combine my passion for design with a focus on improving the quality of life for individuals with limb loss. I am eager to understand the unique challenges and aspirations of prosthetic users and provide valuable insights to the company, enabling them to create tailored solutions that cater to users' specific needs. My ultimate goal is to make a meaningful impact on their daily lives through empathetic and user-centered design.

Throughout this project, I aim to showcase my ability to conduct comprehensive user research, empathize with users, and apply human-centered design principles. I want to demonstrate my skills in identifying user needs, defining design opportunities, and actively involving users in the design process. To achieve this, I am eager to delve into qualitative research methods, such as interviews and observations, to gain valuable insights and synthesize them effectively for design ideation.

Moreover, I see this project as an opportunity to enhance my collaboration and communication skills. I intend to engage actively with stakeholders, including users, caregivers, and experts, to gather diverse perspectives, receive feedback, and effectively communicate my design ideas.

In terms of personal learning ambitions, I aspire to deepen my understanding of the specific challenges and requirements associated with designing prosthetics. This includes aspects like comfort, usability, adaptability, and aesthetic considerations. Collaborating with experts from various fields will also allow me to explore interdisciplinary perspectives and gain insights into the complexities and interdependencies involved in prosthetics design.

I am intrigued by co-design modalities and approaches, which involve users as active participants throughout the design process. I look forward to experimenting with different design methodologies to foster meaningful and inclusive co-creation.

Ultimately, this project presents an exceptional opportunity for me to actively contribute to social impact through the design of prosthetics. I am enthusiastic about using my skills and passion for design to positively influence the lives of individuals with limb loss, making a difference in their well-being and everyday experiences.

Reference

Marasa, Remy, "Prosthetic Identity: Understanding the Relationship Between The Self, Prosthetic Design, and Society" (2021). Honors Undergraduate Theses. 1090 https://stars.library.ucf.edu/honorstheses/1090

Mullins, 2009 My 12 pairs of legs [Video]. TED Conferences. https://www.ted.com/talks/aimee-mullins-my-12-pairs-of-legs/transcript?language=en

Resnik, L., Borgia, M., Heinemann, A. W., & Clark, M. A. (2020). Prosthesis satisfaction in a national sample of Veterans with upper limb amputation. Prosthetics and orthotics international, 44(2), 81–91. https://doi.org/10.1177/0309364619895201

Shoes personalization - Nike By You. (n.d.). Nike.com. https://www.nike.com/it/nike-by

Xu, K., & Qin, S. (2023). An Interdisciplinary Approach and Advanced Techniques for Enhanced 3D-Printed Upper Limb Prosthetic Socket Design: A literature review. *Actuators, 12(6), 223.* https://doi.org/10.3390/act12060223

Yoo, J., & Park, M. J. (2016). The effects of e-mass customization on consumer perceived value, satisfaction, and loyalty toward luxury brands. *Journal of Business Research, 69(12), 5775–5784.* https://doi.org/10.1016/j.jbusres.2016.04.174