

# 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 !



<p>family name _____</p> <p>initials _____ given name _____</p> <p>student number _____</p> <p>street &amp; no. _____</p> <p>zipcode &amp; city _____</p> <p>country _____</p> <p>phone _____</p> <p>email _____</p>	<p>Your master programme (only select the options that apply to you):</p> <p>IDE master(s): IPD <input type="radio"/> Dfl <input checked="" type="radio"/> SPD <input type="radio"/></p> <p>2nd non-IDE master: _____</p> <p>individual programme:-- _____ (give date of approval)</p> <p>honours programme: <input type="radio"/> Honors Programme Master</p> <p>specialisation / annotation: <input checked="" type="radio"/> Medisign</p> <p><input type="radio"/> Tech. in Sustainable Design</p> <p><input type="radio"/> Entrepreneurship</p>
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### SUPERVISORY TEAM \*\*

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

\*\* chair \_\_\_\_\_ dept. / section: \_\_\_\_\_

\*\* mentor \_\_\_\_\_ dept. / section: \_\_\_\_\_

2nd mentor \_\_\_\_\_

organisation: \_\_\_\_\_

city: \_\_\_\_\_ country: \_\_\_\_\_

comments (optional) \_\_\_\_\_

- !** 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 Marijke Melles date 09-05-2023 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: \_\_\_\_\_ EC

YES all 1st year master courses passed

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

NO missing 1st year master courses are:

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

name \_\_\_\_\_ date \_\_\_\_ - \_\_\_\_ - \_\_\_\_ 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)?

Content:  APPROVED  NOT APPROVED

- 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 ?

Procedure:  APPROVED  NOT APPROVED

comments

name \_\_\_\_\_ date \_\_\_\_ - \_\_\_\_ - \_\_\_\_ signature \_\_\_\_\_

Improving the process and patient experience of Radiotherapy \_\_\_\_\_ 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 23 - 02 - 2023 22- 08 - 2023 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, ...).

Radiation therapy is a medical specialty that uses ionizing radiation to treat cancer and some benign diseases. It is a local treatment that can be used alone or with other treatment modalities. The goal of radiation therapy is to deliver the maximum amount of radiation needed to kill the cancer while sparing normal surrounding tissue. Benefits of radiation therapy include preservation of function and better cosmetic results.

Every year in the Netherlands, approximately 100,000 patients are diagnosed with cancer [NKR]. In about a third of these patients, radiotherapy is part of the first cure-oriented treatment (curation). Erasmus MC Radiotherapy uses radiation therapy in the vast majority for the treatment of cancer. In addition, radiotherapy is given to about the same number of patients to reduce complaints if the patient can no longer heal (palliation). In the Netherlands, there are a total of 21 radio therapeutic centers. Department of Radiotherapy is part of Erasmus MC, and within that, together with the Departments of Medical Oncology and Hematology, forms the Theme Daniel den Hoed.

Radiotherapy treatment takes an average of 16 steps to do so adding up to approximately 10 hours of processing time per patient. In Erasmus MC Radiotherapy, radiotherapists work together with clinical physicians, laboratory technicians, secretaries, and quality advisors to irradiate cancer patients on a daily basis (see fig 2). The lead time, which is the period from the decision to start the treatment for a patient to the actual start of the radiotherapy currently is an average of 14 days.

There are several department-specific factors contributing to the extended lead time beyond the planned date, which occurs at different points of the pre-treatment process. They occur as variations in working methods, shortage of staff, inefficient utilization of staff time, and errors arising from overworked staff to name a few. A significant bottleneck is the shortage of laboratory technicians available to perform CT scans, as illustrated in Figure 1. Furthermore, multiple quality checks are required, which add to the overall processing time before the patient can receive treatment.

For the patients, each case is unique when it comes to planning the treatment schedules. There are emotional, psychological, physical, social, and financial burdens accompanying the cancer diagnosis for a patient that one must be sensitive towards while designing for the Radiotherapy process. Furthermore, the need to cut down on the pre-treatment delay from the patient's perspective comes from the fact that longer waiting time can increase the spread of the cancer, and further prolong the emotional distress experienced by the patient owing to an unscheduled treatment start date.

To improve the situation, staffing and workload should be optimized, the scheduling process should be streamlined, and communication and quality should be maintained across different departments. Addressing these issues has the potential to significantly reduce lead times, decrease staff workload, improve overall efficiency and enhance the experience for the patient.

The direction for this project from the client (Erasmus MC) started off with the question- how can the Radiotherapy process be organized more efficiently with, for example, process optimization, robotics, artificial intelligence or automation, so that patients can be irradiated with fewer healthcare professionals but within 2 days.

I wish to interpret it with a slight modification - "How can we organize the Radiotherapy process/parts of the process so that we can irradiate patients more efficiently to ease the burden on the professionals and also improve the radiation therapy experience for the patient?"

This modification accounts for the patient perspective, and keeps the problem statement open enough to explore different tools/technologies to address the problem.

To address this brief, I intend to work with the "quadruple aim" as a driving force, which is a principle that pushes innovators to tackle healthcare problems sustainably, strategically, and meaningfully. It also urges me to think about the different stakeholders in this context. The 4 "aims" are: To improve patient experience, better population health outcomes, reducing cost of care, and improving staff experience.

It is beneficial to use the SEIPS 2.0 model to effectively map the system in the current/possible future radiotherapy process. The SEIPS 2.0 model is a human factors/ergonomics framework for studying and improving health and healthcare. It describes how sociotechnical systems shape health-related work done by professionals and non-professionals, independently and collaboratively. I believe this to be fitting in the context of the radiotherapy process and the aim of the project, hence I will be utilizing it during the thesis.

Sources:

[<https://www.macmillan.org.uk/cancer-information-and-support/treatment/types-of-treatment/radiotherapy/your-radiotherapy-team>](<https://www.macmillan.org.uk/cancer-information-and-support/treatment/types-of-treatment/radiotherapy/your-radiotherapy-team>)

Principles and practice of Radiation Therapy, Charles M Washington and Dennis Leaver  
[www.cancer.net](http://www.cancer.net)[www.cancerresearchuk.org](http://www.cancerresearchuk.org)

SEIPS 2.0: a human factors framework for studying and improving the work of healthcare professionals and patients.

introduction (continued): space for images

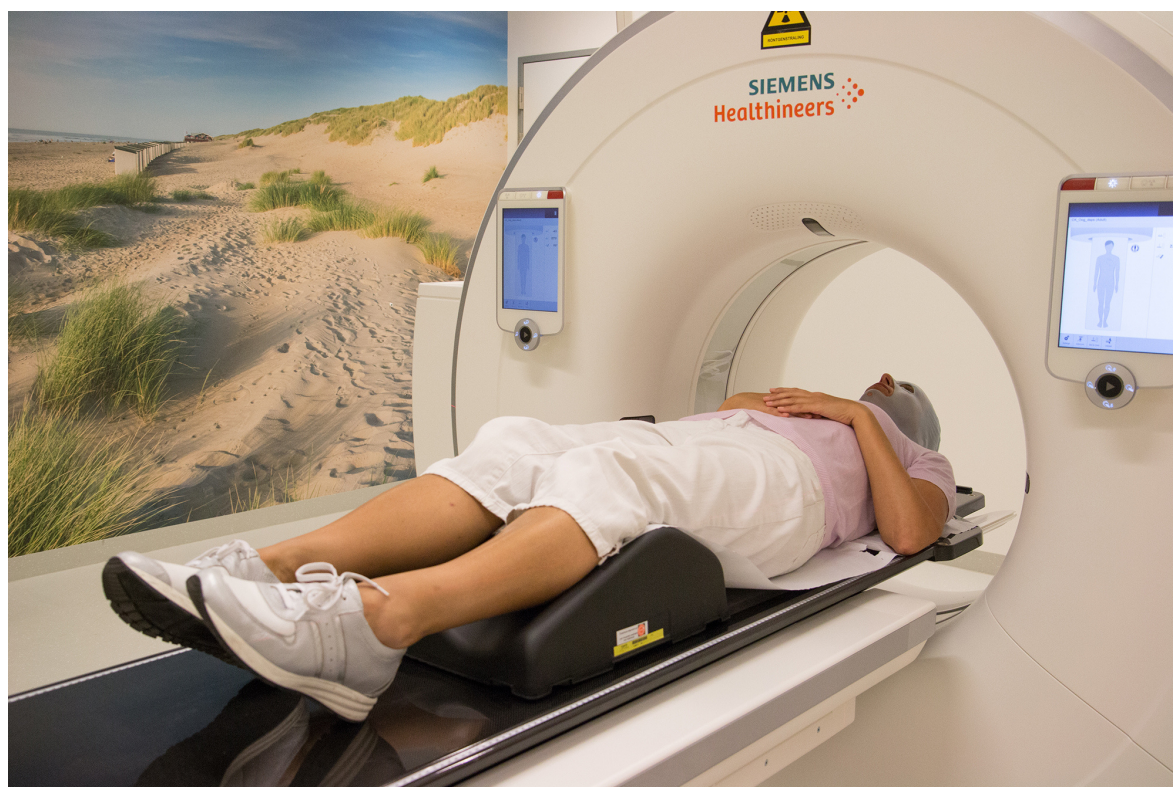


image / figure 1: Patient going through CT scan in Radiotherapy process



image / figure 2: Healthcare professionals assessing a brain scan

## 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.

The problem statement is to organize the Radiotherapy process/parts of the process so that we can irradiate patients more efficiently to ease the burden on the professionals and also improve the radiation therapy experience for the patient.

To scope this further, I am focusing on treatments that don't involve prior chemotherapy or include marker placements since in these cases there are factors involving departments outside of Radiotherapy that can affect the lead time of the patient's irradiation.

Since this brief tackles a broad problem, there is an opportunity to look further into parts of the process. For example, with the referral stage it is important to receive all necessary patient data in the correct complete format and during scheduling it is crucial to optimally utilize the time of the healthcare providers as well as the patients. Patients may have additional criteria based on which they are scheduled, both from a healthcare point of view (level of severity, surgery before radiotherapy), as well as personal factors of the patient (holidays, accessibility etc). These criteria make the scheduling process even more complex and prone to errors/delays.

During the dose planning stage, there are dosimetrists in conjunction with radiotherapists and other professionals who determine the most appropriate dosage for each patient. It is an important and time-consuming stage with back and forth between the different professionals involved, where the radiologists may be able to approve or give recommendations only after a day's consultations.

The above listed examples displays the complexity and various sub-processes that account for potential delays in the overall pre-treatment stage of the radiotherapy process. I intend to uncover these further through the project and determine a suitable, research-backed focal point to design for.

The nature of this problem also gives rise to certain design challenges. For example, to tackle this problem one has to take into account the learning curve for the healthcare professionals when introducing a new (possibly tech based) solution, which may in turn temporarily increase the lead time. It is also important to strike a balance between patient and professional needs (taking the example of scheduling), technology and human contact (where is automation required and where is it important for the patient to experience a human interface instead of a machine?), and quality and efficiency (ensure reducing time of certain processes doesn't jeopardize the quality of the output).

This problem statement also gives me the ability to look at the problem from a system perspective as well as an interaction perspective. The challenge is to ensure that any interaction level intervention can be implemented smoothly into the current radiotherapy system and process without adversely affecting other parts of the process. The nuanced and complex nature of this problem makes it all the more interesting to tackle this brief from the two levels.

## ASSIGNMENT \*\*

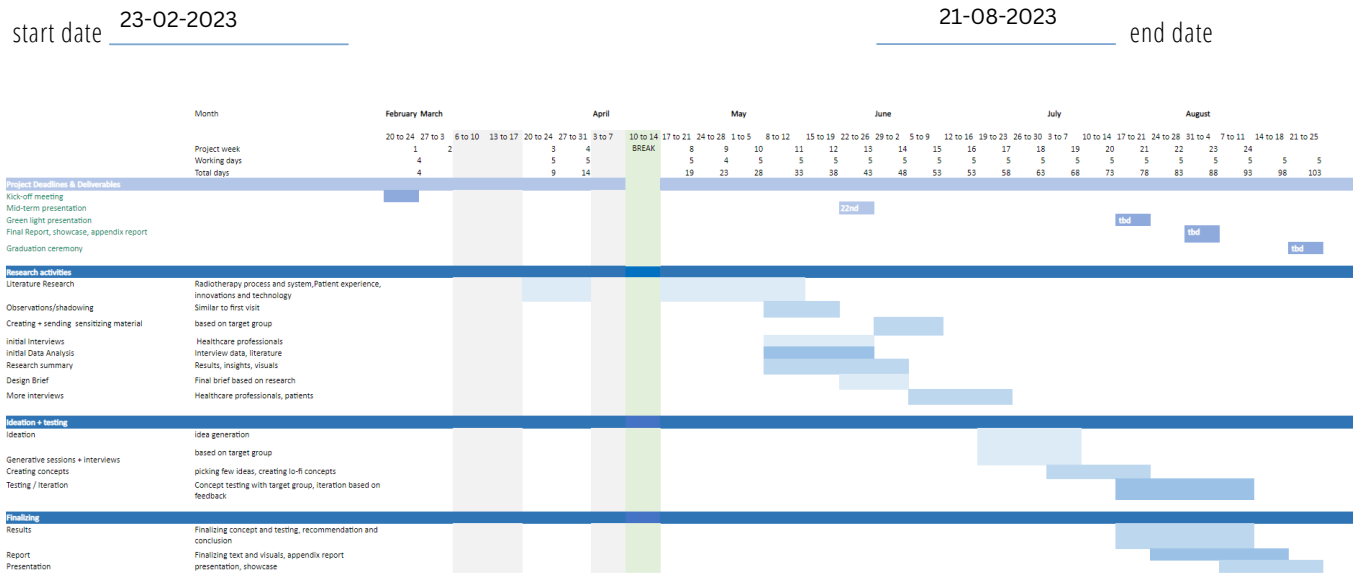
State in 2 or 3 sentences what you are going to research, design, create and / or generate, that will solve (part of) the issue(s) pointed out in "problem definition". Then illustrate this assignment by indicating what kind of solution you expect and / or aim to deliver, for instance: a product, a product-service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

Using design research and ideation methods, I aim to design a strategic intervention in the form of a product- service combination to help improve the process /part of the radiotherapy process and patient experience. Achieving this is possible through researching the current radiotherapy process with its stakeholders involved, identify inefficiencies, and generate ideas that can help tackle these inefficiencies to reduce the lead time for irradiation and manage the staff's workload better.

The Medisign Specialization project focuses on improving the system and processes of radiotherapy and enhancing the experience of stakeholders involved in the care of cancer patients. To achieve this goal, I will employ various research methods, such as literature reviews, interviews, shadowing, and generative sessions, to identify inefficiencies, innovations, and patient experiences. An essential step is to map the current radiotherapy process, including its steps, stakeholders, and touchpoints. Through ideation and prototyping sessions, potential solutions and interventions will be developed and tested with the target audience. Ultimately, I aim to deliver an intervention that operates at the interaction level and aligns with the broader system of the radiotherapy process. This intervention may take the form of a product-service combination that addresses inefficiencies. By considering the quadruple aim, which evaluates the problem from multiple perspectives, the solution is further strengthened.

## 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.



The project consists of three primary stages: Research Activities, Ideation + Testing, and Finalizing. To conduct a thorough investigation of existing issues, innovative approaches, and patient experiences in the radiotherapy process, I utilize research methodologies such as literature analysis, shadowing, personal interviews, and generative sessions to gather insights into the workings of the Radiotherapy department. During this phase, I will also analyze the data and present it in a format that maps the current process in the Radiotherapy department with the roles of the relevant professionals, their interactions, and a look at the system in a SEIPS format. This enables me to identify gaps and opportunities that I can generate ideas upon and devise a comprehensive design brief.

Using ideation and prototyping sessions for generating potential solutions and interventions, I can evaluate and test these concepts with the target audience in the Ideation and testing phase. These will be refined and developed until I attain the optimal solution. The resulting findings will be displayed in a comprehensive report and showcased in a presentation.

Please note- The grey areas marked in the timeline indicate the time periods that I couldn't work owing to sickness. Hence this updated timeline accounts for the sickness days and pushes the graduation to the week of 21-25 of August. This also accounts for the 100 working days expected for the project. All the professionals involved in the project have been informed and are aware of this situation.

## 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.

I am excited to embark on this project that allows me to explore new horizons within healthcare. I am motivated by the opportunity to work closely with a hospital on a real problem and contribute towards the care process of Radiotherapy, a field with constant innovation underway and has the power to save lives and/or improve the quality of life for cancer patients.

The ambitions I have set for myself include applying context mapping and other design research methods, using system, stakeholder and journey mapping and address the quadruple aim with the proposed intervention(s). Additionally, I will apply experience, usability design and testing methods to create the best possible care experience for patients. While taking a data-enabled approach is optional, I am eager to explore this to further enhance the project's potential impact.

This project is an inspiring endeavor that embodies my spirit of innovation, collaboration, and my commitment to improving the lives of those in need. I look forward to the challenges and opportunities that lie ahead and to making a meaningful contribution to the field of healthcare.

## FINAL COMMENTS

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