Study guide Bachelor End Project
1BEPIEX
1BEPIE
2023-2024

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Introduction

The Bachelor End project (BEP, year 3) is the final project of the major Industrial Engineering, and an assessment of the academic proficiency. The BEP is an **individual project of 10 ECTS** (1BEPIE - internal project)**, or 15 ECTS** (1BEPIE+1BEPIEX – external project), and can be performed in one quartile, or spread out over two quartiles. During the BEP, students demonstrate that they are capable of analyzing a **perceived business problem in the field of Industrial Engineering** and that they can communicate the set-up and findings of the research both in a presentation as well as in a written report. The course teaches students to individually perform research on a **specific business problem**, including the articulation of a clear **research question**, a transparent and relevant **research methodology, data collection** and **analysis**, and the **formulation of possible causes and explanations for the problem, and directions for improvement**. The project is carried out at, or in collaboration with a **company/ external organization (1BEPIE+1BEPIEX)**. Alternatively students can opt for an internal variant of the BEP (1BEPIE). Students are supervised by an academic member of the school of Industrial Engineering.

The products for BEP are a **final report** and a **final presentation**. Additionally, students write a **BEP assignment**, a **plan of work**, and are assessed on **professional skills** (PRV writing skills, PRV presentation skills, PRV planning and organization, PRV collaboration, PRV information skills, PRV reflecting).

Below you find the general outline of the BEP, including the most important deliverables and deadlines.

General timeline *preparation phase BEP* (semester prior to start BEP)

General timeline *BEP, semester planning*

General timeline *BEP, quartile planning*

Contents

1. Position in the curriculum

The BEP is the final project of the Bachelor IE, and contributes to the learning outcomes of the degree program. The project aims at integrating insights and skills that you have acquired in your studies. Among others, theory will be integrated with methods and techniques of data analysis, and with the interpretation of results.

The BEP is a learning experience and a bridge to a student's professional future, whether that will be by following a Master studies or starting a professional career.

The BEP is scheduled in Y3, Q3, Q4, or Q3+Q4
1BEPIE comprise 10 ECTS, corresponding to 280 working hours, resulting in a workload of ~2 days per week (semester planning) or ~4 days per week (quartile planning).
1BEPIE (10ECTS) **+ 1BEPIEX** (5 ECTS) comprises 15 ECTS, corresponding to 420 working hours. It is highly recommend to spread out 1BEPIE+1BEPIEX over the semester, with the most focus on BEP in the last quartile. This results in a workload of ~2 days per week in the 1st quartile, and of ~4 days per week in the 2nd quartile.

Depending on study progress, BEP can be postponed to Y4, Q1 and/or 2, or later.

2. Prerequisites and enrollment

1BEPIE + 1BEPIE+1BEPIEX are level-3 courses, and requires prior knowledge from year 1, 2 and 3. A student can only enroll in the course if he/she has obtained at the moment of enrollment:

- passed the first year exam (Propedeuse), and
- has obtained at least 50 ECTS major IE courses

    For students from cohort 2018 the following prerequisites apply:
    A student can only enroll in the course if he/she has obtained at least 110 ECTS at the moment of enrollment, of which:
    - All Basic courses (25 ECTS)
    - All first year courses
    - 65 ECTS major courses, incl. 1ZV00 (generation 2018) or
      1ZV60
    - 20 ECTS electives

Enrollment takes place in the semester preceding the BEP by (for specific dates see section 5.1. Course planning):
- registration in OSIRIS: 1IBS0 for start semB; 1IBS0B for start semA.
- Registration on CANVAS 1IBS0/ 1IBS0B, incl. the indication of preferred research group. Information about the registration procedure, set-up of the BEP, research groups, and the allocation procedure is also shared via these CANVAS pages by means of a quiz. **Make sure you complete the quiz before the due date.**

After the admission check (by the education office) students are informed regarding their acceptance in the course, and their allocated supervisor (half Nov for start in SemB, early May for start in semA). Subsequently, students schedule a meeting with their supervisor to discuss the content and possibilities for companies/ external organizations and or internal assignments for their BEP.

Note: scheduling meetings is fully the student's responsibility, and should be done as soon as possible after the allocation to ensure sufficient time for finding a suitable external organization and/or project.

3. Learning Objectives

Learning objectives are similar for 1BEPIE and 1BEPIEX. The

student shows that she/he is able to:

1. Define the aim and scope of the research, based on the identification of the business problem.
2. Develop and formulate specific and researchable research questions that logically flow from the problem statement.
3. Apply different methods and techniques for analysis with relevant assumptions and boundary conditions (including appropriate statistical measures when applicable).
4. Interpret the results by explaining the meaning in detail and with respect to the research questions.
5. Draw concise conclusions that answer the research questions, based on the results of the research.
6. Reflect on the research by discussing the results, the limitations of the research, and indicating directions for improvement.

Precondition for 1BEPIE+1BEPIEX is that it is mandatory to perform in a company/ external

1BEPIE+1BEPIEX expects more deepening. Some examples (not restricted to):

- o Broader research question
- o More data collection
- o More extensive surveys
- o Use of different/ additional analysis methods
- o More concise conclusions
- o Better comparison with relevant literature

Internal assignments are only possible for 1BEPIE.

3.1 Professional skills
1. The student is able to individually write a scientific research report (in English) applying standards for academic writing (PRV1 – written communication)
2. The student is able to present the research results orally, attuned to the audience and the purpose of the presentation, and with using tools supporting the presentation adequately (PRV1 – oral communication)
3. The student is able to work in a (multidisciplinary) team, being a reliable and effective team member by pulling weight in the team, and with taking responsibility for the (allocated) tasks (PRV2 – collaboration)
4. The student is able to critically reflect (with supervision) on own thinking, decision making, and professional behavior and to define an action plan accordingly (PRV3 – reflecting)
5. The student is able to make a feasible planning of the research and organize the research accordingly (including adjusting the planning and organizing when unforeseen circumstances occur) (PRV4 – planning and organizing)

6. The student is able to find and evaluate various sources of information on relevance and validity and to adequately refer to them in written communication (PRV5 – dealing with scientific information)

Ad 4: students reflect on their competences at the start of their BEP and at the end of their BEP. Reflection forms can be found in Appendix II – format Plan of Work *(reflection at start BEP, part of plan of work), Appendix IV –* reflection at end BEP *(reflection at end BEP), and on CANVAS.*
The reflection at start BEP is part of you plan of work and should be submitted concurrently. The reflection at end BEP should be submitted together with the final report, and will be discussed during the assessment meeting (see section 5.1. Course planning *for specific dates and deadlines).*

Ad 5: Making a planning is part of the plan of work (Appendix II – format Plan of Work*), and should be submitted concurrently. Note that the organization of the research is part of the whole BEP and is assessed as such.*

Ad 6: Teached and assessed in mandatory training on information skills, organized by the DML. Dates CANVAS. subscription: OSIRIS, IV002.

4. BEP Assignment

4.1. Company assignment (1BEPIE+1BEPIEX)

The BEP is an **individual** research project, formulated based on a business problem in an external organization, related to the Industrial Engineering domain. Acquisition of projects is done by the **students themselves** and should be completed in the semester ***before*** the start of the BEP (Aug 2023 for start in Q1 and/or Q2 2023, January 2024 for start in Q3 and/or Q4 2023).
For students registered for 1BEPIE + 1BEPIEX:

if the student has not found a suitable company assignment before the deadline "BEP assignment" (see for specific dates section 5), the student must be deregistered for 1BEPIEX and has to discuss the options for an internal assignment with the 1st supervisor. To complete the study program a different elective course (to replace 1BEPIEX) needs to be chosen. Please note it is the student's responsibility to inform the BEPcoordinator (ieis.education.coordination@tue.nl) in case the switch to an internal BEP (1BEPIE) is made. The BEPcoordinator will take care of the administrational matters.

Students are responsible for finding and defining their own project and thus have to contact companies themselves, but can also make use of the network of (the research group of) their TU/e supervisor. To help you approaching companies, a flyer with information on the BEP for companies is available on CANVAS. A successful application requires a good preparation, and making a good CV and pitch can be helpful. Note that external organizations are not obliged to offer any financial compensation. Travel allowance can be asked for.

Formulation and scoping of the assignment is always done in consultation with both the company and the TU/e supervisor. It is the responsibility of the TU/e supervisor to decide whether the assignment found by the student is suitable for a BEP or not. The assignment needs to be such that students **individually** and with a great level of **independence** investigate a **specific business problem**. This includes the articulation of a clear **research question**, a transparent and relevant **research methodology, (quantitative and/or qualitative) data collection** and **analysis**, and the **formulation of possible causes and explanations for the problem, and possible directions for improvement**.

> **BEP is carried out individually**
> **BEP is NOT based on a set of predefined research activities; the student has to make and justify his/her own choices.**

A format for the description of the BEP assignment can be found in Appendix I – format BEP Assignmentand is coupled to a CANVAS assignment. The TU/e supervisor needs to approve the assignment before you can start with your actual BEP.

During the BEP students are as much as possible physically present at the location of the external organization/ company. Activities there include meetings with the external supervisor, collecting data, taking interviews, etc.

4.2 Internal BEP assignment (1BEPIE)

The internal BEP assignment is usually related to one of the core research themes of the capacity groups of IE. Other options are (not restricted to): projects related to literature research or follow up studies on previous BEPs.
Note that also the internal BEP is an **individual** research project, formulated based on a business problem, related to the Industrial Engineering domain. This means that you are responsible for finding and defining your own project.

The internal BEP is in most cases research oriented, but the **analysis of a business problem** should still form the core of the project. Compared to an external BEP project (1BEPIE+1BEPIEX) there often will be less focus on data collection, and more on the independent development of a research proposal (incl. research question), analysis methods, relevance of the research, and positioning in the field.

Final formulation and scoping of the project is always done in consultation with your TU/e supervisor, who has to approve the project before the start of the BEP. The assignment needs to be such that students **individually** and with a great level of **independence** investigate a **specific business problem**. This includes the articulation of a clear **research question**, a transparent and relevant **research methodology, (quantitative and/or qualitative) data collection** and **analysis**, and the **formulation of possible causes and explanations for the problem, and possible directions for improvement.**

A format for the description of the BEP assignment can be found in Appendix I – format BEP Assignment and is coupled to a CANVAS assignment. The TU/e supervisor needs to approve the assignment before you can start with your actual BEP.

> **BEP is carried out individually**
> **BEP is NOT based on a set of predefined research activities; the student has to make and justify his/her own choices.**

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4.3. Internship agreements and contracts

The department IE&IS does *not* sign any contracts or other agreements with companies, as the BEP is an agreement between student and company. Most companies have their own internship agreements, describing e.g. liability issues, financial compensation and travel allowance.

If a company has no agreement text available, you can use the standard forms of the TU/e:
https://educationguide.tue.nl/programs/internships-and-graduation-projects/?L=2
For more information on liability issues:
https://educationguide.tue.nl/programs/internships-and-graduation-projects/liability

All agreements that need to be (co-)signed by the TU/e should first be reviewed by dr.ir. E. van der Geer- Rutten- Rijswijk, managing director department of IE&IS (e.v.d.geer@tue.nl).

5. Timeline

An even workload distribution is critical to ensure a successful completion of your BEP. We have pre-structured the BEP with deliverables and milestones, see section 5.1. Course planning This helps you to ensure timely progress and to cover all aspects of the research. The required deliverables (BEP assignment, plan of work, presentation and final report) are discussed in more detail in section 0. We expect you to hand-in all deliverables on time. In case of flagrant underperforming (not meeting deadlines, poor quality of deliverables) the first supervisor can at any time discontinue a project. If there are personal reasons for delay (e.g. longer illness), you can request an extension for your BEP project through the examination committee using (Appendix VI - Request for Extension BEP).

Doing research is not only about collecting some data or applying a methodology that you happen to know. It is a structured approach over different phases (for an elaborate explanation of the different phases of research, see Appendix III – Research Cycle). Every discipline has its own (slightly different) approach of doing research, making regular meetings with your TU/e supervisor necessary. In general, every research starts with drawing up a plan on how to tackle the problem, how to gather evidence and proof a point. At the end, it includes a phase in which you synthesize (bring everything together, what can you conclude, can you answer the research question) and reflect critically on where you stand. Research is an iterative process: you go back and forth several times between the different phases to clarify what is happening. Make sure not to get trapped in data collection. Gathering more and more data does not make your research more scientific when you don't have time to analyze your data, draw conclusions and reflect critically on them.

5.1. Course planning

Semester A

Timeline BEP in *Q1+Q2* (2023-2024)

	Deliverables	Deadline	remarks	Assessment criteria	Assessment deadline
Q1 + Q2 4 September 2023 – 19 January 2024	**BEP Assignment**	5 Aug 2023	By email to supervisor and on CANVAS	*Not graded - needs to be sufficient*	26 Aug, 2023
	Start BEP	4 Sept, 2023			
	Plan of work Incl. planning, reflection at start BEP and code of scientific conduct	29 Sep, 2023	By email to supervisor and on CANVAS	*Not graded – needs to be sufficient*	6 Oct, 2023
	Information skills training	T.b.a.	Subscription in OSIRIS, attendance required	PRV information skills	See CANVAS
	Final Presentation	≤ 2 Feb, 2024	At TU/e, invite company	Assessment form BEP (Appendix V)	9 Feb, 2024
	Final report Incl. reflection at end BEP	19 Jan, 2024	By email to supervisors and on CANVAS	Assessment form BEP (Appendix V)	9 Feb, 2024
	Resubmission final report	2 weeks after 1st assessment	By email to supervisors and on CANVAS	Assessment form BEP (Appendix V)	15 working days after submission

Timeline BEP in *Q1* (2023-2024)

	Deliverables	deadline	remarks	Assessment criteria	Assessment deadline
Q1 — 4 September 2023 – 10 November 2023	**BEP Assignment**	5 Aug 2023	By email to supervisor and on CANVAS	*Not graded - needs to be sufficient*	26 Aug, 2023
	Start BEP	4 Sept 2023			
	Plan of work Incl. planning, reflection at start BEP and code of scientific conduct	15 Sept, 2023	By email to supervisors and on CANVAS	*Not graded – needs to be sufficient*	22 sept, 2023
	Information skills training	t.b.a.	Subscription in OSIRIS, attendance required	PRV information skills	See CANVAS
	Final Presentation	≤ 10 Nov, 2023	At TU/e, invite company	Assessment form BEP (Appendix V)	17 Nov, 2023
	Final report Incl. reflection at end BEP	27 Oct, 2023	By email to supervisors and on CANVAS	Assessment form BEP (Appendix V)	17 Nov, 2023
	Resubmission final report	2 weeks after 1st assessment	By email to supervisors and on CANVAS	Assessment form BEP (Appendix V)	15 working days after submission

Timeline BEP in *Q2* (2023-2024)

	Deliverables	Deadline	Remarks	Assessment criteria	Assessment deadline
Q2 — 13 November 2023 – 19 January 2024	**BEP Assignment**	5 Aug 2023	By email to supervisor and on CANVAS	*Not graded - needs to be sufficient*	26 Aug, 2023
	Start BEP	13 Nov, 2023			
	Plan of work Incl. planning, reflection at start BEP and code of scientific conduct	24 November, 2023	By email to supervisor and on CANVAS	*Not graded – needs to be sufficient*	1 Dec, 2023
	Information skills training	t.b.a.	Subscription in OSIRIS, attendance required	PRV information skills	See CANVAS
	Final Presentation	≤ 2 Feb, 2024	At TU/e, invite company	Assessment form BEP (Appendix V)	9 Feb, 2024
	Final report Incl. reflection at end BEP	19 Jan, 2024	By email to supervisors and on CANVAS	Assessment form BEP (Appendix V)	9 Feb, 2024
	Resubmission final report	2 weeks after 1st assessment	By email to supervisors and on CANVAS	Assessment form BEP (Appendix V)	15 working days after submission

Semester B

Timeline for BEP in *Q3+Q4* (2023-2024)

	Deliverables	Deadline	Remarks	Assessment criteria	Assessment deadline
Q3 + Q4 **5 February 2024 – 5 July 2024**	**BEP Assignment**	19 Jan, 2024	By email to supervisor and on CANVAS	*Not graded - needs to be sufficient*	2 Feb, 2024
	Start BEP	5 Feb, 2024			
	Plan of work Incl. planning, reflection at start BEP and code of scientific conduct	8 March, 2024	By email to supervisor and on CANVAS	*Not graded – needs to be sufficient*	15 March, 2024
	Information skills training	*To be announced*	Subscription in OSIRIS, attendance required	PRV information skills	See CANVAS
	Final Presentation	≤ 5 July, 2024	At TU/e, invite company	Assessment form BEP (Appendix V)	12 July, 2024
	Final report Incl. reflection at end BEP	21 June, 2024	By email to supervisors and on CANVAS	Assessment form BEP (Appendix V)	12 July, 2024
	Resubmission final report	2 weeks after 1st assessment	By email to supervisors and on CANVAS	Assessment form BEP (Appendix V)	15 working days after submission

Timeline for BEP in *Q3* (2023-2024)

	Deliverables	Deadline	Remarks	Assessment criteria	Assessment deadline
Q3 **5 February 2024 – 5 April 2024**	**BEP Assignment**	19 Jan, 2024	By email to supervisor and on CANVAS	*Not graded - needs to be sufficient*	2 Feb, 2024
	Start BEP	5 Feb, 2024			
	Plan of work Incl. planning, reflection at start BEP and code of scientific conduct	23 Feb, 2024	By email to supervisor and on CANVAS	*Not graded – needs to be sufficient*	1 March, 2024
	Information skills training	*To be announced*	Subscription in OSIRIS, attendance required	PRV information skills	See CANVAS
	Final Presentation	≤ 19 April, 2024	At TU/e, invite company	Assessment form BEP (Appendix V)	26 April, 2024
	Final report Incl. reflection at end BEP	5 April, 2024	By email to supervisors and on CANVAS	Assessment form BEP (Appendix V)	26 April, 2024
	Resubmission final report	2 weeks after 1st assessment	By email to supervisors and on CANVAS	Assessment form BEP (Appendix V)	15 working days after submission

Timeline for BEP in *Q4* (2023-2024)

	Deliverables	Deadline	Remarks	Assessment criteria	Assessment deadline
Q4 **22 April 2024 – 5 July 2024**	**BEP Assignment**	19 Jan, 2024	By email to supervisor and on CANVAS	*Not graded - needs to be sufficient*	2 Feb, 2024
	Start BEP	22 April, 2024			
	Plan of work Incl. planning, reflection at start BEP and code of scientific conduct	3 May, 2024	By email to supervisor and on CANVAS	*Not graded – needs to be sufficient*	*14 May, 2024*
	Information skills training	*To be announced*	Subscription in OSIRIS, attendance required	PRV information skills	See CANVAS
	Final Presentation	≤ 5 July, 2024	At TU/e, invite company	Assessment form BEP (Appendix V)	12 July, 2024
	Final report Incl. reflection at end BEP	21 June, 2024	By email to supervisors and on CANVAS	Assessment form BEP (Appendix V)	12 July, 2024
	Resubmission final report	2 weeks after 1st assessment	By email to supervisors and on CANVAS	Assessment form BEP (Appendix V)	15 working days after submission

6. Deliverables

6.1. BEP Assignment

Write an assignment outline for your BEP project. Topics should fit the student's interest, as well as the supervisor's expertise and the request of the company/organization. The BEP assignment covers one page – see Appendix I – format BEP Assignment, for the format. It includes description of the context of the project, a description of the assignment, and references to relevant literature. It serves as discussion starting point with your supervisor about the individual research plan (research question, scope, data, etc.). The BEP assignment is coupled to a CANVAS assignment and needs to be approved by your TU/e supervisor before the start of the BEP.

6.2. Plan of work

The plan of work (Appendix II – format Plan of Work) contains a description of your research proposal, a detailed planning of your project, and a reflection on your professional skills. It serves to define the red line of your research, to formulate your research question(s), to specify methodologies of data collection and – analysis, and to define the limitations/ boundaries of your project (what you will NOT do). Furthermore, by making a detailed planning, it will put you in control of your own project. The plan of work is the starting point of your research, not the end point, and as such not a fixed plan without possible adaptations on the way. During your project you may have to deviate from the original plan due to changed circumstances, unexpected results or new relevant insights. Research is an iterative process as is also illustrated in the research cycle, and requires continuous evaluation and reconsideration of your plans and ideas.

The plan of work is coupled to a CANVAS assignment and will be assessed by your first supervisor and second supervisor. In case that your plan of work is substandard, your first supervisor can ask for a revised plan of work - to be delivered within a week.

6.3. Final report

The final report covers the whole research, from research question, to approach, to conclusion, and finally critical reflection on the research and its implications. Typically, the report is about 25-30 pages plus possible appendices. Note that the way research is reported depends on the discipline you work in. Therefore, discuss the structure your report with your supervisor(s) regularly, and already early in your BEP.

In your final report is that you start with a research question, you investigate it, and come to an answer. It is most important that your report is structured according to this logic, that there is a clear thread throughout your report. You don't have to follow strictly the set up as you specified in your plan of work at the start - some things may have changed over time, or a different ordering might make more sense. You also don't have to follow a chronological ordering, or to mention all activities, only report on them to the extent they are relevant for your research.

Submission final report:
- **Post a PDF version of your report on CANVAS,**
- **Send a pdf version to your TU/e supervisor, external supervisor, and 2nd assessor**

Your report will be assessed on the criteria as defined in the assessment form BEP (Appendix V –). You will receive your grade and feedback from your first supervisor during the assessment meeting. In addition, the first supervisor sends the assessment form to the educational administration. The administration checks whether all requirements have been met and then processes the final grade.

BEP reports are confidential and are not published in the university library. Examples of former BEP reports can be found on CANVAS/ documents/ best practices.

6.4. Final presentation

At the end of your BEP, you will give a presentation of your research. The presentation takes place at the TU/e (or online due to Corona) and you are responsible for inviting as well the company you worked for as your supervisor. Your TU/e supervisor (and 1st assessor) assesses the presentation and your presentation skills according to the assessment form BEP (Appendix V —). Planning of your presentation differs between research group and supervisor, but ultimately has to take place at the last day of the quartile or semester of your BEP (see section 5.1. Course planning for exact dates). Please note that you are responsible for planning your presentation.

Giving a presentation forces you to take a helicopter view over your research: what is the logic/ red thread in your research; can you answer your research question; what can you conclude from your research, what are the implications for further research; what are recommendations (for the company, or maybe even broader)?

Tips for a good presentation
- limit the number of slides; a rule of thumb is 1 slide per minute of presentation time
- keep in mind that you address laymen with an academic background, e.g. explain formulas for non-experts;
- to support your presentation use clear slides with not too much text; and a good use of colors, pictures and graphs;
- recommended structure is: intro, context + aim/goal of subject, shortly on methods used, results and conclusions, recommendations;
- finally: it is a training in time management: stick to the allocated time, and also schedule time for questions and discussion.

7. Tasks and responsibilities

The BEP is an individual research project, under supervision. Here we explain the different responsibilities of the people involved in your project.

The **student** is expected to be dedicated, spend time and meet all deadlines. In addition, we expect from you a professional attitude: you work autonomously; you are respectful in your communication and cooperation; you make appointments and keep them; you learn from feedback and provide others with constructive feedback. You are the project owner, project manager and project member of your own BEP, meaning that next to performing the research, you are also responsible for all organizational tasks (scheduling meetings, handing in forms, etc).

Students are assigned to a **TU/e supervisor**. The first supervisor is your coach on content and process with whom you will have regular meetings. He/ she is responsible for the formulation, scoping and acceptance of assignments, assesses the quality of deliverables and professional skills, and provides you with feedback. The TU/e supervisor is also responsible for arranging a second assessor. During the first meeting with your TU/e supervisor there are several things to discuss: when will you meet; what to send him/her prior to meetings; exchange contact details; how to approach the supervisor in case of problems, etcetera. In a later stage also discuss with your TU/e supervisor the main structure of the final report and presentation, and the assessment criteria.

The TU/ e supervisor assesses: BEP assignment, plan of work, final presentation, final report and the professional skills, with exemption of PRV 6 dealing with scientific information. In case the TU/e supervisor is a PhD student, assessment will be done by an examiner, who is advised by the PhD student. (Note that in this case the student has three supervisors).

The **external supervisor** is the daily/ weekly contact person at the organization that is the subject of the BEP assignment. He/she provides a workplace in the organization (if needed), introduces the student in the organization, and arranges cooperation of the organization in the data collection process.

The external supervisor has an advisory role in the assessment.

Each project has a **2nd assessor** (arranged by the TU/e supervisor). The 2nd assessor serves as a quality insurance – guaranteeing the learning objectives of the BEP, and equal grading over different topics and students.

The 2nd assessor has to approve the plan of work, and assesses the final report. The 2nd assessor does not have to be present at the final presentation.

Data management and library: *assessment of PRV6 – dealing with scientific information*

Other responsibilities
- The education administration takes care of all administrative matters and collects all reports (ATLAS, 3rd floor, central wing; ieis.csa@tue.nl)
- The **coordinator of the BEP, Erin Whettell** (ATLAS, 3rd floor North, room 3.421: ieis.education.coordination@tue.nl contact person for all organizational matters concerning the BEP. Takes care of allocation of the students to TU/e supervisors, organizes the BEP information meeting, training sessions for (new) TU/e supervisors, and is responsible for the information in the BEP study guide and on CANVAS. Also monitors the students and supervisors/ assessors to signal trends and potential problems.
- The Examination Committee (ieis.examination.committee.ie@tue.nl) regularly assesses the quality of a sample of the reports and their assessments. In case of special personal circumstances (severe illness, a close family member deceases), or in case of project delay caused by external circumstances beyond your influence, you can ask the Examination Committee for example to extend the deadline of the project; or to allow you to work on a same subject during the next round of final bachelor projects.
  Make sure you submit your request in time. More information can be found on https://studiegids.tue.nl/opleidingen/bachelor-college/majors/industrial-engineering/ examination-committee .

8. Assessment

Elements to be assessed for BEP:

Assessed	Assessed based on	Assessor	Form (for administration)
BEP Assignment *not graded – needs to be sufficient*	BEP assignment	TU/e supervisor	Not applicable (CANVAS)
Plan of work *not graded – needs to be sufficient*	Plan of work	TU/e supervisor and 2nd assessor	Not applicable (CANVAS)
Final report *Scale 1 – 10 (0.5 decimal)*	Final report	TU/e supervisor and 2nd assessor	Assesment form TU/e supervisor, 2nd assessor, final
Final presentation *scale 1 – 10 (0.5 decimal)*	Final presentation	TU/e supervisor	Assessment form TU/e supervisor
PRV1 writing skills *Good – sufficient - poor*	Final report	TU/e supervisor	Assessment form TU/e supervisor
PRV1 presentation skills *Good – sufficient - poor*	Final presentation	TU/e supervisor	Assessment form TU/e supervisor
PRV2 collaboration *Good – sufficient - poor*	BEP process	TU/e supervisor	Assessment form TU/e supervisor
PRV3 reflecting *Good – sufficient - poor*	Reflection at start and at end BEP	TU/e supervisor	Assessment form TU/e supervisor
PRV4 planning and organizing *Good – sufficient - poor*	BEP process	TU/e supervisor	Assessment form TU/e supervisor
PRV5 information skills	DML training	DML	DML

8.1.   Assessment procedure

Submission deadlines of the deliverables and following assessment deadlines (assessors) are listed in the timelines per quartile/ semester (section 5.1, p 7-9).

The TU/e supervisor hands in the final assessment at the education administration (ieis.csa@tue.nl), consisting of:
- Assessment form TU/e supervisor filled in and signed by TU/e supervisor/ 1st assessor (including scores for the final presentation and all PRVs (except PRV6 information skills))
- Assessment form 2nd assessor filled in and signed by the 2nd assessor (only part covering the report)
- Final assessment form BEP filled in and signed by both TU/e supervisor/ 1st assessor and the 2nd assessor

The assessment is discussed between student and TU/e supervisor in an assessment meeting.

Students pass the BEP when:
- **the final score is at least 6.0 (so 5.5 is not enough!)**
- **all main categories of the BEP rubric report (A-D) are assessed 5.5 or higher**
- **all main categories of the BEP rubric skills (A-E) are assessed sufficient or higher**
- **the BEP assignment and the Plan of work are assessed as sufficient.**

If the final grade is below 6.0, an opportunity for improvement during 2 weeks is given (deadline 2 weeks after 1st assessment meeting). Subsequently, the BEP supervisor and 2nd assessor determine again the final grade for the BEP which has to be available at the CSA IE&IS within 15 working days after submission of the revised bachelor thesis (see also tables in section 5.1).

If the new grade still is below 6.0, the student has to start a new BEP project (full project, 10 ECTS) in the same research group according to the following procedure:
- The student sends an email to the BEP coordinator of the CAP group and the general BEP coordinator (Erin Whettell, ieis.education.coordination@tue.nl) stating (s)he wants to do a second BEP project ultimately 4 September 2023 (primary BEP done in semB) or 5 February 2024 (primary BEP done in semA).
- The BEP coordinator organizes a new registration and contacts the coordinator of the CAP group
- The BEP coordinator of research group assigns to a new supervisor.
- The new project can start at any time and can also be performed full-time. All in consultation with the new supervisor.
- In case the student will not follow the standard quartile or semester schedule, an alternative schedule has to be set (deadlines etc.) in discussion with and approved by the TU/e supervisor and the BEP coordinator (Erin Whettell, ieis.education.coordination@tue.nl) and in specific cases the EC.
- In total, every student gets 2 attempts to do a BEP. Additional attempts need to be approved by the Examination Committee via an official request accommodated with a motivation and plan of action for a successful completion of the project.

Note: students that did not successfully finish 1BEPIE+1BEPIEX have to take 1BEPIE as second BEP project. To complete the major program an additional elective has to be added to the program.

If a student fails to deliver or when the submission deadline has passed, the BEP is not assessed (equivalent to 'NV'). The TU/e supervisor reports this to the student explicitly and sends the 'NV' judgement to the CSA. It is the students' initiative to take part in the next BEP allocation round.

Note: For the classification 'cum laude' students should pass the BEP with a 9.0 or higher. When students have performed a BEP in a project group (e.g. BEP @ Innovation Space), only regulations for the BEP IE account. Only in very specific situations the Exam Committee can decide to apply the cum laude regulations BEP for group project (score of 8.0 or higher). The complete regulations on the cum laude regulation van be found in the EER art. 6.5

9. Copyright and anti-plagiarism

It is compulsory to put the following 2 statements in the final BEP report:

1. **The author declares that the text and work presented in this thesis is original and that no sources other than those mentioned in the text and its references have been used in creating this thesis.**
2. **The copyright of this thesis lies with the owner. The author is responsible for its contents. TU/e cannot be held responsible for any claims with regard to implementing results of the thesis.**

Plagiarism or other fraud is not tolerated, and will be severely punished. In order to check for plagiarism, the detection program Urkund is used.

When you submit your work under your own name you are asserting ownership of that work. When using ideas of another person, you must give that person appropriate credit through referencing. Referencing serves multiple purposes: (I) it allows readers to further explore sources you have consulted, (II) it shows the depth of your own thinking and process of inquiry, (III) it allows you and your readers to compare and contrast your position with other people's positions, agreeing with some, disagreeing with others, and (IV) it gives proper credit to the hard work that many people have done before you.

Appendix I – format BEP Assignment

Name student **Student ID** **Name TU/e supervisor** **Name 2nd assessor** **Research group**	
Project title	

Description of context

Description of BEP assignment

References to literature

Appendix II – format Plan of Work

Name student:
Student ID:
Name TU/e supervisor:
Name 2nd assessor:
Name company:

Part A. BEP Research Proposal (2-6 pages)

Project Title
Include the most important variables (dependent and independent) in the title.

1. Introduction
Identification, definition and formulation of the perceived business problem.
What is the current situation? What is happening, when and where? Why do you think there is a problem? Who do you believe is involved? What is the impact, what are the consequences of not solving the problem? Do you know why it is happening?
What is already know from research/literature about (solving) the particular business problem? What is the aim of the BEP research?

2. Research question
Main research question
Formulation of the research question in the Industrial Engineering domain.

Sub research questions (if applicable)
What sub research questions need to be answered in order to answer the main research question?

3. Empirical context (incl. company description)
What is the business context in which you will be conducting the study? What industry/type of company? How does this context fit with your research question?

4. Method
Research Design/Approach
What is your research approach (qualitative: e.g. exploratory or quantitative: e.g. testing)? What type of data will you collect (e.g. interviews, survey, secondary data)? Why is this method suitable for answering your research question(s)?

Sources of data and data collection
Which sources (cases, companies, projects, persons, data bases) will provide you with the above data? How will you collect data?

5. Data analysis approach(es)
How will you analyze the collected data in order to answer your research question(s)?

6. Deliverables

Anticipated practical implications for company
What insights do you hope to generate for the company?
Anticipated theoretical insights
What new theoretical insights do you hope to generate with your study?

References
Reference list in APA format

Part B – planning

Planning of your work is important as it puts you in control over your project. It requires that you take a helicopter view over the full project. ***Describe a detailed planning for your entire BEP, including literature study, data collection, data analysis, writing bachelor thesis with milestones and deadlines.***

In support of your planning, include a GANTT chart in your plan of work.

A GANTT chart is a matrix with on the horizontal axis the total time span of the project; and on the vertical axis the actions that make up the project – see figure 1. The graph area contains horizontal bars for each task, connecting the period start and period ending. It can further include work load (per task, per week), dependencies between tasks, milestones for deliverables, criticalities, etc.
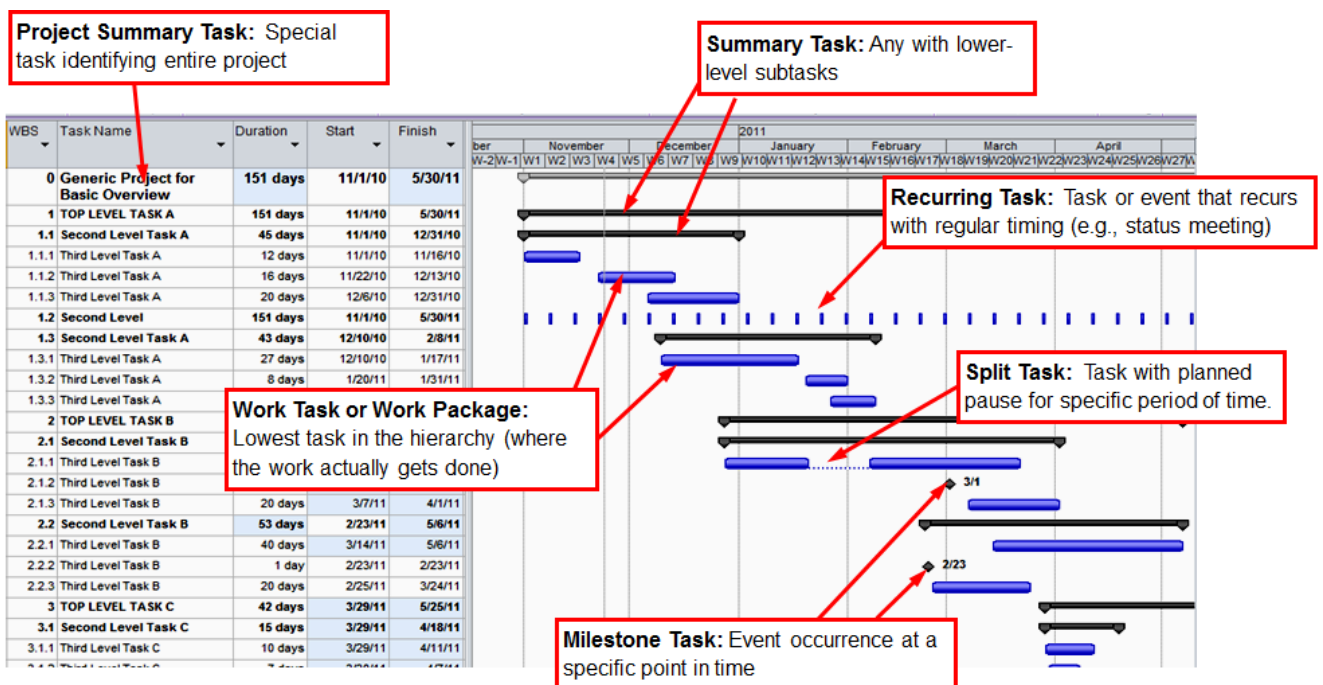

Figure 1: Example of a GANTT chart.

Part C – reflection at start BEP

The first reflection moment takes place at the start of BEP. Students should use the feedback on their PRVs to reflect on their professional development. Students and supervisors discuss the outcomes of this reflection form together and discuss what still can be learned and how to work on this during the BEP, resulting in a plan of action. At the end of the BEP, students will reflect on the development of their professional skills during their BEP, and discuss this during the final assessment meeting with their supervisor

1. PRV Planning and organizing
> a. Which activities did you undertake in year 1 and 2 for this skill, during the BSc program and/or in another context?
> b. Which feedback did your get for this PRV in year 1 and 2 by (STU/ ESA)-teachers?
> c. Which feedback did your get for this PRV in year 1 and 2 by fellow students?
> d. What have you learned with regard to this PRV up till now?
> e. What do you still like to learn, and how are you going to achieve this during BEP?

2. PRV Information skills
> a. Which activities did you undertake in year 1 and 2 for this skill, during the BSc program?
> b. What have you learned with regard to this PRV up till now?
> c. What do you still like to learn, and how are you going to achieve this during BEP?

3. PRV Writing
> a. Which activities did you undertake in year 1 and 2 for this skill, during the BSc program and/or in another context?
> b. Which feedback did your get for this PRV in year 1 and 2 by (STU)-teachers?
> c. Which feedback did your get for this PRV in year 1 and 2 by fellow students?
> d. What are your strong and weak points for this PRV?
> e. What do you still like to learn, and how are you going to achieve this during BEP?

4. PRV Presenting
> a. Which activities did you undertake in year 1 and 2 for this skill, during the BSc program and/or in another context?
> b. Which feedback did your get for this PRV in year 1 and 2 by (STU)-teachers?
> c. Which feedback did your get for this PRV in year 1 and 2 by fellow students?
> d. What are your strong and weak points for this PRV?
> e. What do you still like to learn, and how are you going to achieve this during BEP?

5. PRV Collaborating
> a. Which activities did you undertake in year 1 and 2 for this skill, during the BSc program and/or in another context?
> b. What are your strong and weak points for this PRV?
> c. What do you still like to learn, and how can you work on this during BEP?

6. PRV Reflecting
> a. Which activities did you undertake in year 1 and 2 for this skill, during the BSc program and/or in another context?
> b. What are your strong and weak points for this PRV?
> c. What do you still like to learn, and how can you work on this during BEP?

Appendix III – Research Cycle

Doing research is a step-wise and iterative process over several phases. A good example for the research done in the IE domain is the regulative cycle or 'problem solving cycle' by Van Aken, Berends and Van der Beij (2012)[1] (Figure 2). You can use this cycle as basis for your own research. Use it as guideline, not as a preset format of the different steps you have to take. There is not one good way of doing research, and every discipline will have its own variant on this cycle. Always discuss the different steps you take with your supervisor.

The research in the regulative cycle is divided into 6 phases that go from problem identification, to problem analysis, selection of (possible) solution, and implementing and evaluating the solution. Following this cycle is not a one –way road to success. During the process, you will go back and forth several times, evaluating your findings until then and (re)designing your plans. As the BEP comprises only 10 ECTS, time is limited and most projects will not allow you to go through the whole cycle. A good starting point is to cover the first three phases of the cycle in your BEP: (I) Identify and define the problem, (II) analyze the problem, and (III) identify possible solutions. In this case, he BEP ends with reporting the discovered causes and consequences of the problem, and formulation of possible directions for improvement. A more extended description of these first three phases can be found below figure 1. The entire problem solving cycle, including phase IV – VI, i.e. selection of the best solution and designing and implementing it, is typically covered in a master thesis project.
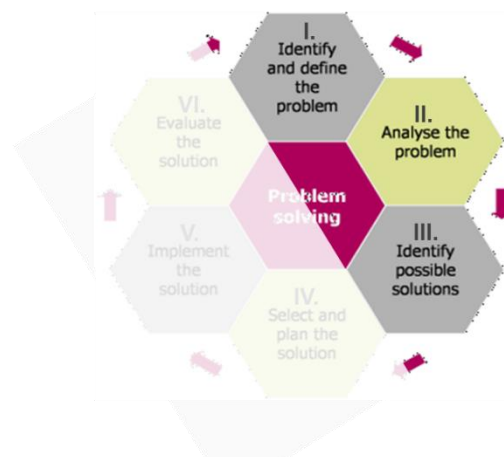
Figure 2: The regulative of problem solving cycle.[1] In general, steps I, II, and II are addressed in the BEP.

I.   Identify and define the problem
Step 1: formulation of the business problem and research question
Identification of the perceived business problem and subsequent formulation of the research question in the IE domain. Consider multiple points of view, to be able to make a well-considered choice for one point.

Step 2: Description of the research approach
Description of how to investigate the problem and answer the research question, based on:
- Examination of and modeling the business process and performance (e.g. through interviews) of the organization.
- Relevant scientific literature.

II.   Analyze the problem

Step 3: Data collection
Data collection through qualitative and/or quantitative methods, based on justified arguments.

Step 4: Data-analysis
Analyzing the data with proper justification for the analysis methods used.

Step 5: Problem Diagnosis
Developing a problem diagnosis, based on the data analysis, containing:
-   relevant causes of the problem
-   relevant consequences of the problem
-   mutual relationships between causes and consequences

III.   Identify possible solutions

Step 6: Conclusions and directions for improvement
Evaluation of the research findings resulting in a conclusion and answer to the research question, and giving possible directions for improvement.

Appendix IV – reflection at end BEP

At the end of the BEP project, the student writes the "Reflection after BEP". The student submits this reflection form together with the final report in the personal folder in CANVAS. The 1st supervisor will assess the reflection based on the assessment form BEP, and results are discussed during the final assessment meeting. Note that the complete reflection (reflection at start BEP and reflection at end BEP) should be assessed sufficient or good in order to be able to pass PRV 53 reflecting, and the BEP.

In the "Reflection after BEP", the student describes his/her own level. The student reflects on his/her weak/strong points, and sets goals for personal development in the future.

The student should incorporate information and feedback of the TU/e supervisor, external supervisor, fellow students, and/or colleagues at the external organization, in the reflection.

In addition to reflecting, in the "Reflection after BEP", students also look forward to the future. They write down the PRVs they would like to further improve in the future, e.g., during a master's program.

Answer the following questions (app. two A4 pages):

1. Inspect the reflection form "Reflection at start BEP": Which of the PRVs did you intend to develop mostly, at the start of BEP?
2. What is going well, what is not? Please indicate for the PRVs of question 1, the level of development you have achieved by doing BEP, and the feedback you have obtained.
3. How did you work on these PRVs?
4. Are you happy about the way you worked on these PRVs?
5. Which problems did you run into?
6. How did you solve these problems?
7. Which PRVs would you like to improve in the future, for example during a MSc program?
8. How are you going to do that?
9. What are your most important lessons learned during BEP?

Appendix V – Assessment forms BEP

Note: the rubrics behind the assessment forms are too elaborate to depict here and can be found on CANVAS.

Assessment Form Bachelor End Project (BEP Supervisor)

Student name:
Title project:
Data final presentation:
Name TU/e supervisor:
Name 2nd assessor:

		FAIL 1 - 4	POOR 5	SUFFICIENT 6	SATISFACTORY 7	GOOD 8	EXCEPTIONAL 9 - 10	Grade	Weight
A. Quality problem identification and theoretical framework								...	25%
Research problem, aim and question, relevance	Description research problem (clear, concise)	o	o	o	o	o	o		
	Connection between problem, research question(s) and aim	o	o	o	o	o	o		
	Substantiation of relevance (scientific, societal)	o	o	o	o	o	o		
	Definition scope and boundaries	o	o	o	o	o	o		
Theoretical framework	Reformulation research question/aim in theoretical terms	o	o	o	o	o	o		
	Definition main theoretical concepts and their relations (clear)	o	o	o	o	o	o		
	Combination bodies of relevant literature (multiple perspectives)	o	o	o	o	o	o		
B. Quality research strategy								...	15%
Scientific Justification	Research approach (adequate, thoroughly considered)OOOOOO approach								
	choices based on problem statement and literature OOOOOO								
	Originality and/or complexity research approach OOOOOO								
	Methodological steps (listed, explained)OOOOOO								
C. Quality of research execution								...	35%
Data collection and data management	Quantity of the data collection (size, diversity data set)	o	o	o	o	o	o		
	Quality of the data (validity, reliability)	o	o	o	o	o	o		
	Acquistion and processing data (adequate, transparant, justified)	o	o	o	o	o	o		
Data analysis and results	Analysis of the data (correct, thorough)	o	o	o	o	o	o		
	Results follow logically from analysis	o	o	o	o	o	o		
	Presentation results (clear, factual, organized, with interpretations)	o	o	o	o	o	o		
	Tables and figures integrated in the line of argumentation	o	o	o	o	o	o		
D. Quality of the conclusion and discussion								...	25%
Conclusions and implications	Formulation conclusions (exact, concise, grouped logically)	o	o	o	o	o	o		
	Conclusions based on analysis and linked to research question(s)	o	o	o	o	o	o		
	Substantiation by results and relevant literature	o	o	o	o	o	o		
	Formulation implications based on results	o	o	o	o	o	o		
Critical reflection on the research performed	Identification strenghts and weaknesses	o	o	o	o	o	o		
	Weighing impact on the main results and relative to each other	o	o	o	o	o	o		
	Identification (better) alternatives for research methods	o	o	o	o	o	o		
	Suggestions for future research	o	o	o	o	o	o		
							Grade Research Part	...	100%

		INSUFFICIENT With feedback and support, but not good enough result	SUFFICIENT With feedback and support, good enough result	EXCEPTIONAL Independent and proactive (little feedback/ support)
A. Writing and information skills		O	O	O
Quality of the research report	Quality of the message (line of reasoning, supportive evidence)	o	o	o
	Structure (clear organization subelements, connection, level of detail)	o	o	o
	Readability (academic writing style, balance text and graphs/tables)	o	o	o
	(English) language (grammar, vocabulary, textual mechanics)	o	o	o
	Referencing (correct, consistent, complete in text and list)	o	o	o
B. Planning and organizing skills		O	O	O
Planning and organizing the research project	Detail of planning (milestones, specifications of activities)	o	o	o
	Feasability of the planning	o	o	o
	Deliberation of back-up strategies	o	o	o
	Processing updates (clear, acurate)	o	o	o
	Recognition of urgencies and importance of aspects	o	o	o
	Prioritizing	o	o	o

NOTE ON THE ASSESSMENT OF THE PROFESSIONAL SKILLS
*When the student receives an 'exceptional' mark for one or more professional skills, the assessors together can decide to give the student a bonus of 0.5. This bonus comes on top of the grade for the research part.

*The student can only pass for the Bachelor End Project when all elements (research and professional skills) are assessed sufficient or higher. No compensation between elements.

Additional comments concerning Research and/or Professional Skills (obligatory):

B. Collaboration skills		○	○	○			
Professional communication and collaboration	Punctuallity for meetings Preparation for meetings (agenda, minutes, supportive documents) Active participation Professional communication with the supervisor and other stakeholders Informating about absence, progress and problems	o o o o o	o o o o o	o o o o o			
C. Reflection skills		○	○	○			
Depth of reflection	Reflection on own thinking, decision making and professional behavior Describing viewpoints and interpretations with argumentations Supported with examples (relevant) Plans for future (improving professional skills/attitude)	o o o o	o o o o	o o o o			
D. Presentation skills		○	○	○			
Quality of the presentation	Quality of the message (line of reasoning, supportive evidence, detail) Structure (clear organization subelements, easy to follow, timing) Verbal communication (voice control, use of correct language) Non-verbal communication (gestures, eye contact, posture, enthousiasm) Presentation design (lay-out, balance text, graphics and tables)	o o o o o	o o o o o	o o o o o			

Professional Skills Bonus?	...	+ 0,5

Final Grade BEP	...	

Name BEP supervisor:

Sign:

Assessment Form Bachelor End Project (2nd Assessor)

Student name:
Title project:
Data final presentation:
Name TU/e supervisor:
Name 2nd assessor:

		FAIL 1 - 4	POOR 5	SUFFICIENT 6	SATISFACTORY 7	GOOD 8	EXCEPTIONAL 9 - 10	Grade	Weight
A. Quality problem identification and theoretical framework								...	25%
Research problem, aim and question, relevance	Description research problem (clear, concise)	O	O	O	O	O	O		
	Connection between problem, research question(s) and aim	O	O	O	O	O	O		
	Substantiation of relevance (scientific, societal)	O	O	O	O	O	O		
	Definition scope and boundaries	O	O	O	O	O	O		
Theoretical framework	Reformulation research question/aim in theoretical terms	O	O	O	O	O	O		
	Definition main theoretical concepts and their relations (clear)	O	O	O	O	O	O		
	Combination bodies of relevant literature (multiple perspectives)	O	O	O	O	O	O		
B. Quality research strategy								...	15%
Scientific approach	Research approach (adequate, thoroughly considered)	O	O	O	O	O	O		
	Justification choices based on problem statement and literature	O	O	O	O	O	O		
	Originality and/or complexity research approach	O	O	O	O	O	O		
	Methodological steps (listed, explained)	O	O	O	O	O	O		
C. Quality of research execution								...	35%
Data collection and data management	Quantity of the data collection (size, diversity data set)	O	O	O	O	O	O		
	Quality of the data (validity, reliability)	O	O	O	O	O	O		
	Acquistion and processing data (adequate, transparant, justified)	O	O	O	O	O	O		
Data analysis and results	Analysis of the data (correct, thorough)	O	O	O	O	O	O		
	Results follow logically from analysis	O	O	O	O	O	O		
	Presentation results (clear, factual, organized, with interpretations)	O	O	O	O	O	O		
	Tables and figures integrated in the line of argumentation	O	O	O	O	O	O		
D. Quality of the conclusion and discussion								...	25%
Conclusions and implications	Formulation conclusions (exact, concise, grouped logically)	O	O	O	O	O	O		
	Conclusions based on analysis and linked to research question(s)	O	O	O	O	O	O		
	Substantiation by results and relevant literature	O	O	O	O	O	O		
	Formulation implications based on results	O	O	O	O	O	O		
Critical reflection on the research performed	Identification strenghts and weaknesses	O	O	O	O	O	O		
	Weighing impact on the main results and relative to each other	O	O	O	O	O	O		
	Identification (better) alternatives for research methods	O	O	O	O	O	O		
	Suggestions for future research	O	O	O	O	O	O		
Grade Research Part								...	100%

	INSUFFICIENT With feedback and support, but not good enough result	SUFFICIENT With feedback and support, good enough result	EXCEPTIONAL Independent and proactive (little feedback/ support)
A. Writing and information skills	O	O	O
Quality of the research report — Quality of the message (line of reasoning, supportive evidence)	O	O	O
Structure (clear organization subelements, connection, level of detail)	O	O	O
Readability (academic writing style, balance text and graphs/tables)	O	O	O
(English) language (grammar, vocabulary, textual mechanics)	O	O	O
Referencing (correct, consistent, complete in text and list)	O	O	O

NOTE ON THE ASSESSMENT OF THE PROFESSIONAL SKILLS

*When the student receives an 'exceptional' mark for one or more professional skills, the assessors together can decide to give the student a bonus of 0.5. This bonus comes on top of the grade for the research part.

*The student can only pass for the Bachelor End Project when all elements (research and professional skills) are assessed sufficient or higher. No compensation between elements.

Additional comments concerning Research and/or Professional Skills (obligatory):

Professional Skills Bonus?	...	+ 0,5
Final Grade BEP	...	

Name 2nd Assessor:

Sign:

Assessment Form Bachelor End Project (FINAL)

Student name:
Title project:
Data final presentation:
Name TU/e supervisor:
Name 2nd assessor:

		FAIL 1 - 4	POOR 5	SUFFICIENT 6	SATISFACTORY 7	GOOD 8	EXCEPTIONAL 9 - 10	Grade	Weight
A. Quality problem identification and theoretical framework								...	25%
Research problem, aim and question, relevance	Description research problem (clear, concise)	O	O	O	O	O	O		
	Connection between problem, research question(s) and aim	O	O	O	O	O	O		
	Substantiation of relevance (scientific, societal)	O	O	O	O	O	O		
	Definition scope and boundaries	O	O	O	O	O	O		
Theoretical framework	Reformulation research question/aim in theoretical terms	O	O	O	O	O	O		
	Definition main theoretical concepts and their relations (clear)	O	O	O	O	O	O		
	Combination bodies of relevant literature (multiple perspectives)	O	O	O	O	O	O		
B. Quality research strategy								...	15%
Scientific approach	Research approach (adequate, thorougly considered)	O	O	O	O	O	O		
	Justification choices based on problem statement and literature	O	O	O	O	O	O		
	Originality and/or complexity research approach	O	O	O	O	O	O		
	Methodological steps (listed, explained)	O	O	O	O	O	O		
C. Quality of research execution								...	35%
Data collection and data management	Quantity of the data collection (size, diversity data set)	O	O	O	O	O	O		
	Quality of the data (validity, reliability)	O	O	O	O	O	O		
	Acquistion and processing data (adequate, transparant, justified)	O	O	O	O	O	O		
Data analysis and results	Analysis of the data (correct, thorough)	O	O	O	O	O	O		
	Results follow logically from analysis	O	O	O	O	O	O		
	Presentation results (clear, factual, organized, with interpretations) Tables and figures integrated in the line of argumentation	O	O	O	O	O	O		
D. Quality of the conclusion and discussion								...	25%
Conclusions and implications	Formulation conclusions (exact, concise, grouped logically)	O	O	O	O	O	O		
	Conclusions based on analysis and linked to research question(s)	O	O	O	O	O	O		
	Substantiation by results and relevant literature	O	O	O	O	O	O		
	Formulation implications based on results	O	O	O	O	O	O		
Critical reflection on the research performed	Identification strenghts and weaknesses	O	O	O	O	O	O		
	Weighing impact on the main results and relative to each other	O	O	O	O	O	O		
	Identification (better) alternatives for research methods Suggestions for future research	O	O	O	O	O	O		
Grade Research Part								...	100%

		INSUFFICIENT With feedback and support, but not good enough result	SUFFICIENT With feedback and support, good enough result	EXCEPTIONAL Independent and proactive (little feedback/ support)
A. Writing and information skills		O	O	O
Quality of the research report	Quality of the message (line of reasoning, supportive evidence)	O	O	O
	Structure (clear organization subelements, connection, level of detail)	O	O	O
	Readability (academic writing style, balance text and graphs/tables)	O	O	O
	(English) language (grammar, vocabulary, textual mechanics)	O	O	O
	Referencing (correct, consistent, complete in text and list)	O	O	O
B. Planning and organizing skills		O	O	O
Planning and organizing the research project	Detail of planning (milestones, specifications of activities)	O	O	O
	Feasability of the planning	O	O	O
	Deliberation of back-up strategies	O	O	O
	Processing updates (clear, acurate)	O	O	O
	Recognition of urgencies and importance of aspects Prioritizing	O	O	O
		O	O	O
B. Collaboration skills		O	O	O
Professional communication and collaboration	Punctuallity for meetings	O	O	O
	Preparation for meetings (agenda, minutes, supportive documents)	O	O	O
	Active participation	O	O	O
	Professional communication with the supervisor and other stakeholders	O	O	O
	Informing about absence, progress and problems	O	O	O
C. Reflection skills		O	O	O
Depth of reflection	Reflection on own thinking, decision making and professional behavior	O	O	O
	Describing viewpoints and interpretations with argumentations Supported with examples (relevant)	O	O	O
	Plans for future (improving professional skills/attitude)	O	O	O
D. Presentation skills		O	O	O

NOTE ON THE ASSESSMENT OF THE PROFESSIONAL SKILLS

*When the student receives an 'exceptional' mark for one or more professional skills, the assessors together can decide to give the student a bonus of 0.5. This bonus comes on top of the grade for the research part.

*The student can only pass for the Bachelor End Project when all elements (research and professional skills) are assessed sufficient or higher. No compensation between elements.

Additional comments concerning Research and/or Professional Skills (obligatory):

Quality of the presentation	Quality of the message (line of reasoning, supportive evidence, detail)	O	O	O
	Structure (clear organization subelements, easy to follow, timing)	O	O	O
	Verbal communication (voice control, use of correct language)	O	O	O
	Non-verbal communication (gestures, eye contact, posture, enthousiasm)	O	O	O
	Presentation design (lay-out, balance text, graphics and tables)	O	O	O

Professional Skills Bonus?	…	+ 0,5

Final Grade BEP	…

Name BEP supervisor:	Name 2nd Assessor:
Sign:	Sign:

Appendix VI – Request for Extension BEP

TU/e

EINDHOVEN UNIVERSITY OF TECHNOLOGY
REQUEST FOR EXTENSION BACHELOR END PROJECT
DEPARTMENT OF INDUSTRIAL ENGINEERING & INNOVATION SCIENCES

Personal Information

Name:

Student Number:

BSc Program:	BSc	Industrial Engineering
	BSc	Psychology & Technology
	BSc	Sustainable Innovation

Name of the Mentor / First Assessor:

Start date Bachelor end project:

Extending until:

Reason extending:

Motivation:

Signature Mentor / First Assessor: Date:

_____

Signature Student   Date:

_____

To be completed by the Examinations Committee

Approval of extention:

Explanation:

On behalf of the Examinations Committee   Date

This document can be send to IE: ieis.examination.committee.ie@tue.nl or IS: ieis.examination.committee.is@tue.nl or hand it at Atlas 3.332