

Handbook for Planning and Organizing an Engineering Project Challenge

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Abstract

This thesis investigated if a project-based event/course, in the form of an engineering project challenge done in collaboration with companies, could be a good way to develop and deepen relationships between universities and the industry. It also looked into what kind of benefits such a cooperation might have to the participating parties, including the universities and companies as well as students.

The aim of the study was to see if such an event would be beneficial for the Technobothnia laboratory center in Vaasa and how this event would have to be arranged in order to satisfy all three target groups, being Technobothnia/its owner universities and the companies and students that would participate in the event. This was done by means of a case study of five cases. Three main cases, studied mainly through interviews with event managers, and two comparative cases studied mainly through material found online.

The results concluded that such an event would indeed be advantageous for Technobothnia by reinforcing its brand and helping Technobothnia fulfill one of its main principle of operations, to function as a connection point between the educational institutions and industry as well as other technical research institutes.

The collected findings from the study were also gathered into a handbook that can be used by any university as a manual for how to arrange their own engineering project challenge.

Language: English

Key Words: project-based learning, engineering challenge, event management, Technobothnia

EXAMENSARBETE

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Abstrakt

Det här slutarbetet undersökte huruvida ett projektbaserat evenemang/en projektbaserad kurs i form av en ingenjörsexamen, utförd i samarbete med företag, kunde vara ett bra sätt att utveckla och fördjupa relationerna mellan universitet/yrkeshögskolor och industrin. Arbetet undersökte också vilka fördelar ett sådant samarbete kan ha för de deltagande parterna, det vill säga skolorna och företagen såväl som de studerande.

Syftet med studien var att klarlägga ifall ett sådant evenemang kunde gagna laboratorietech Technobothnia i Vasa och på vilket sätt detta evenemang skulle arrangeras för att tillfredsställa alla tre målgrupper, Technobothnia och dess ägare såväl som de företag och de studerande som skulle delta i evenemanget. Det här gjordes med hjälp av en fallstudie på fem fall, varav tre var huvudsakliga och två var jämförande. De tre huvudsakliga fallen undersöktes till största del via intervjuer med evenemangsansvariga och de två jämförande fallen undersöktes huvudsakligen via nätkällor.

Slutsatsen av resultaten var att ett sådant evenemang skulle verkligen kunna gagna Technobothnia, genom att stärka dess varumärke samt hjälpa till att uppfylla ett av dess verksamhetsprinciper, att fungera som knutpunkt mellan skolor och industri såväl som andra institut för teknisk forskning.

Studiens samlade resultat förenades i en handbok som kan användas som en manual av andra skolor i det fall de vill arrangera en egen ingenjörsexamen.

Språk: Engelska

Nyckelord: projektbaserat lärande, ingenjörsexamen, evenemangsplanering, Technobothnia

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Tiivistelmä

Tämä opinnäytetyö on tutkinut, mikäli projektipohjaiseen oppimiseen perustuva tapahtuma/kurssi, insinööriprojektihaasteen muodossa, järjestettynä yhteistyönä yritysten kanssa olisi hyvä tapa kehittää ja syventää yliopistojen/ammattikorkeakoulujen ja teollisuuden suhteita. Työ on myös tutkinut minkälaisia hyötyjä tällainen yhteistyö voi tuoda tapahtumaan osallistuville osapuolille, eli koulut, yritykset ja opiskelijat.

Tutkimuksen tavoite oli ottaa selvää, jos tällainen tapahtuma voisi olla hyödyllinen Vaasassa sijaitsevalle Technobothnian laboratoriokeskukselle ja myös, miten tämä tapahtuma järjestettäisi, jotta kaikki kolme osapuolta, eli sekä Technobothnia/Technobothnian omistajakoulut, osallistuvat yritykset, että osallistuvat opiskelijat, olisivat tyytyväisiä tapahtumaan. Tämä tehtiin viiden tapauksen tapaustutkimuksen avulla. Näistä viidestä, kolme olivat pääasiallisia tapauksia, jotka tutkittiin pääosin haastattelemalla tapahtumajärjestäjiä, ja kaksi olivat vertaustapauksia, jotka tutkittiin pääosin netistä löytyvänä aineistona.

Tulokset osoittivat, että tällainen tapahtuma voisi tosiaan olla hyödyllinen Technobothnialle, vahvistamalla sen brändiä ja tukemalla sen toista toimintaperiaatetta, eli toimimalla kohtauspisteenä sekä koulujen, teollisuuden että muiden teknisten tutkimuslaitosten välillä.

Tutkimuksen kootut löydöt koostettiin käsikirjaan, joka voi toimia ohjekirjana samantyyppiseen tapahtuman järjestämiseen myös muille kouluille.

Kieli: Englanti

Avainsanat: projektipohjainen oppiminen, insinööriprojektihaaste, tapahtumajärjestäminen, Technobothnia

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1 Introduction

The result of this project is a handbook for planning and organizing an engineering project challenge for university students. The handbook is meant to be a tool for universities that would want to arrange a similar event. This thesis depicts the process of getting said handbook written.

In the following subchapters the reason for why this project has been done are explained.

1.1 Background

Technobothnia is a technology center that consists of technology laboratories. It is owned by three universities which are Novia University of Applied Science, the university of Vaasa and Vaasan Ammattikorkeakoulu University of Applied Science. (Technobothnia, 2022)

Vaasa, the city in western Finland where Technobothnia is situated, has a strong industry and is home to several successful companies related to the energy industry. Because of this, the region markets itself as “EnergyVaasa – The Nordic Hub for Energy Technology” (EnergyVaasa, 2022). According to their web page the hub represents more than 160 companies with a total yearly turnover of 5 billion euros and 12 000 employees. 200 000 euros is said to have been invested in research and development and a further 1.2 billion euros is planned to be invested in energy technology infrastructure before the year 2026.

The region's strong desire to develop and grow means that the need for technology know-how in the region is growing, as is the demand of an able workforce. Hence the demand on the universities to graduate new engineers. This also poses a challenge for the region, how to get the workforce to stay in the region and not move away, taking its know-how with it? The city of Vaasa has answered this challenge by creating something they call “The Energy Path”, which is meant to awaken and cultivate the interest in technology and science amongst the children and youth in the region (Energy Path, 2019). This they try to do by for example letting the pupils and students get acquainted with the work and career opportunities the region can offer, by for example cooperating with local companies by visiting them on excursions. If the local youth can study locally and get close ties to local companies, they hopefully also will work locally.

So, the connection between the industry and the education system in the region is very important. And this is also something that Technobothnia supports, as it is said in one of Technobothnia's three statements of its operation principles.

"Technobothnia is to serve as a channel of cooperation between educational institutions, companies and other research institutes and technology centers." (Technobothnia, *About Technobothnia*, 2022)

Technobothnia already does a lot of work to uphold its good contacts and cooperation with the region's companies, for example by arranging events where students and companies can meet (Technobothnia, *Corporate Services*, 2022). But in a SWOT analysis, based partially on a survey performed amongst local companies in 2020, in the final report (Sharma, 2020) of the research project Technobothnia Service Concepts showed that the local companies were not that familiar with Technobothnia and what it had to offer in terms of company-university collaborations.

1.2 Purpose and aim

The previous subchapter showed that both Technobothnia and the region's industry would benefit from more collaborations. By closer cooperation the universities better understand the knowhow the industry needs and can meet that demand, and the industry can show of its career possibilities, hopefully then appealing the workforce to stay in the region. At the same time Technobothnia gets good visibility which improves its brand and can lead to even further cooperation.

Hearing of the Saxion International Project Week (IPW), an event arranged annually by Saxion University of Applied Science in Enschede, The Netherlands (Saxion UAS, 2022), it was thought that this concept was something that could aid in above mentioned challenges. In short, the event (which is further presented in *chapter 4.1.1*) lets technology students work on real company cases and problems for a week's time, in collaboration with the local companies that provide said cases. Apart from this being a very educative experience for the students, they also get to network with the companies which out of a recruitment point of view is beneficial for students and companies alike. The companies of course also get innovative ideas and solutions to their cases and the universities can

deepen their relations with the companies at the same time they can offer an interesting course to the students, making their curriculum more competitive.

The aim of this project was to add a similar event to the services that Technobothnia offers, seeing as such an event would cater to many of the needs the regions universities and industry have. The exact line-up of this event would be done according to what could be decided to be the best practice after researching the subject and was of course not known at the beginning of the project. What was fairly certain though, was that the event would be in the form of an engineering challenge with a more hands on approach, involving local companies and industry. Looking at the growth of the regions industry it would also be good to add the international aspect that Saxion's International Project Week offers, in order to get visibility also outside of Finland.

1.3 Problem formulation

As stated in previous chapters, what this project wants to achieve is to engage students and universities alongside local industry, to create a synergy that is beneficial for all parties. The hypothesis is that this could be achieved with an annual engineering project challenge/event which raises the following research question:

- *Can the concept of an engineering challenge/event be copied and implemented at Technobothnia?*

And assuming that this can be done, and the project can continue, it leads to these additional research questions:

- *Which would be the best way to arrange this event in view of one of Technobothnias main objectives: to develop and support cooperation between the universities and the local industry?*
- *How to arrange this event so that all three parties (universities, students and companies) benefits from and are satisfied with it?*

This master thesis will hopefully answer those questions and result in a handbook for arranging such an event. This can be used by Technobothnia to arrange the event. Since the project has aroused interest amongst other European universities, the handbook will

be written as so as that it can be used by others as well. The main method used is case studies of similar events to find out what can be seen as best practices for this type of enterprises, which could then answer the two latter research questions. When knowing this, the first research question can be answered by internally looking at whether this arrangement is applicable at Technobothnia or not.

1.4 Limitations

Organizing an event is more than just hosting the event itself. It is a whole process that, according to *Events Management – principles and practice* (Raj, Walters & Rashid, 2013, pp. 258-260) involves as much as seven different stages. The entirety of event organization covers background work, planning and arranging, hosting and at the end, also event evaluation. The timeline from start to finish is long and the time available for making this thesis is limited. Therefore, the first limitation set is that this thesis would not cover the execution nor the evaluation of the event. It would be limited to the background work and planning of the event.

As mentioned previously the international aspect of an event like this would be of interest to Technobothnia. But seeing that neither this event nor any quite similar has previously been arranged by Technobothnia, it was decided by the Technobothnia steering group that as a start this would be planned and arranged for only Technobothnia's own students. Thus adding another limitation to the thesis. Though the internationalization of the event could still be a long-term goal, it was thought to be better to set the focus more locally at this initial stage. This also gave the possibility to divide more attention to the local companies and getting them involved, since they are key actors in the project.

Since the outbreak of the COVID pandemic in Finland in 2020, many events were either cancelled or re-organized as digital online events. Preparing for that possibility would be a wise idea if the alternative in a worse case pandemic scenario would be to cancel the whole event. But an online event is to its very nature very different from in-real-life events. Therefore it was decided that this thesis and the handbooks it results in will not cover the eventuality of an online version of the event, since this was seen as a project of its own.

1.5 About the Company

Technobothnia is situated at the Palosaari campus in Vaasa, Finland. On the campus three different universities operate, Novia University of Applied Science, Vaasan Ammattikorkeakoulu (VAMK) University of Applied Science and the University of Vaasa. All three universities offer technical education, either on bachelor's or master's level. Because of this they all have a need for technical laboratories. In the beginning of the 1990's they decided, as close neighbors with common interests, to cooperate and found a joint laboratory unit. Suitable facilities were found on campus, and the buildings that used to host a 19th century cotton mill were fully renovated in 1996. The purpose of this joint enterprise was not only practical, a synergy effect was also hoped for as an added value. To support this Technobothnia was given a principle of operation with the following three statements:

- *provide a framework for high-standard education and research in the field of technology*
- *serve as a channel of cooperation between educational institutions, companies and other research institutes and technology centers*
- *offer research, and product development, as well as education, measurement and testing services to the private and the public sector*

(Technobothnia, *About Technobothnia*, 2022)

Today Technobothnia houses approximately 20 laboratories on a surface that is roughly 8000 square meters. There are about 2400 technology students from all the three universities as well as dozens of researchers that use the facilities.

In addition to providing these modern laboratory facilities to said students and researchers, Technobothnia also aims to closely cooperate with the regions industry as well as with local schools and other actors. This is done by for example hosting excursions for school groups, offering marketing agreements (Technobothnia, *Marketing Agreements*, 2022) for visibility to companies, and hosting different events. One example being the annual MATCHing event (Technobothnia, *MATCHing*, 2022) where students and university personnel alike can meet up with companies to network and discuss in a casual environment, where even corporate speed dating is arranged.

2 Theory

This chapter is a review of the literature that was studied for this project. To give a good cover of thesis in consideration of the research questions the following four areas were chosen as the angle for the thesis: *experiential learning, industry and university cooperation, soft skills in engineers and event planning & manual*. The assumption of the literature review is that even though the writing of a handbook for an event might be considered to mostly and foremostly represent event planning, a successful event not only requires a good practical planning, the content of the event also has to be on point. This could be called “event content value”, which translates to that the organizer needs to make sure that the content is interesting enough to answer to the participants expectations and that it supports the main goal of the reason for organizing said event.

In this particular case there are several target groups for the event. For the students participating the event would have to be an educative enough experience that is also fun and engaging as well as offers an opportunity for networking. The companies might expect useful input and ideas from the students and also an opportunity to headhunt and recruit. The universities, which Technobothnia represent, will certainly want content and competitive students, deepened contacts to the industry and also a positive boost to their brand and reputation.

In the following subchapters each theory area will be reviewed separately to investigate whether or not these requirements can be fulfilled, in order to meet the research questions.

2.1 Experiential Learning

Since Technobothnia is first and foremost an educational laboratory unit, it is of importance that the educational aspect of the event is considered throughout the whole process. Looking at the idea of the event, an engineering project challenge, it lies within what is called “experiential learning”, which is the process of learning by doing (Kent State University, 2022). Looking closer it resembles what is called problem base learning, PBL for short. PBL was introduced in the 1960’s at the medical school at McMaster University. It is small-group learning that focuses more on helping the students to themselves figure out how to solve the problem, what they need to learn and how they can work together around

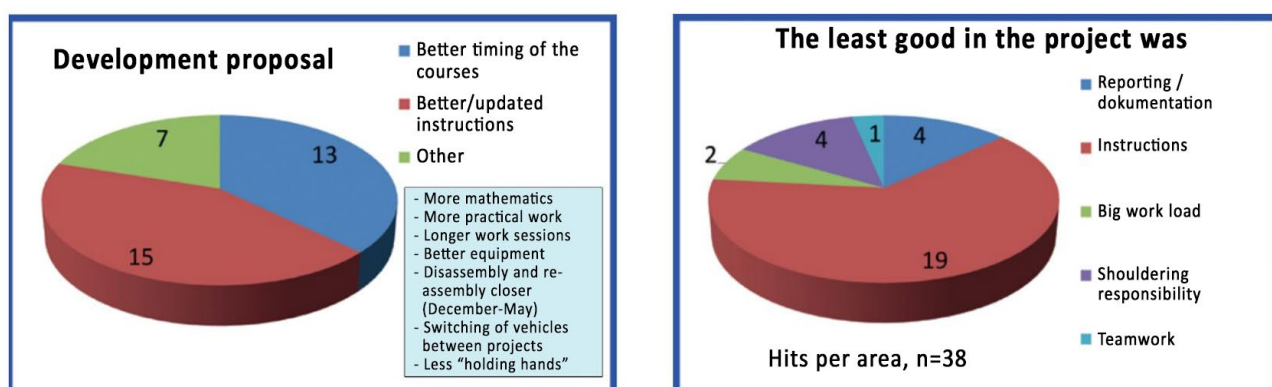
the solution, rather than straight up teaching a solution to the problem (McMaster University, 2015). Though it was originally developed for medical students it is now also being used in engineering educations, something the number of studies on the subject testifies.

In an article on the subject Mills and Treagust (2003) addresses problem-based learning out of the viewpoint of engineering education. According to them, the modern-day engineer needs a wider skill set than the more technical knowledgebase of a traditional engineer. These sought for skills include communication and teamwork skills and an understanding of social, economic and environmental impacts. With this type of added skill set engineers would be better at applying their more traditional tech know-how in practice. These benefits of experiential learning are something that also had been noted at the mechanical engineering department at VAMK University of Applied Science in Vaasa, encouraging them to introduce project courses to their curriculum in 2010 (Saarikoski & Ketola, 2011).

And a change in curriculum to include more problem-based learning is something that Mills and Treagust (2003) advocates, where this type of learning method is an opposite to the, in their words, traditional “chalk and talk” ways of engineering education. But they do highlight the difference between problem-based learning and project-based learning. According to them, problem-based learning, with its roots in medical science, usually only caters to one party, being the patient, and usually only has one solution, which is the correct diagnosis of the problem. This differs from project-based learning, which they find more suitable for engineers, because there the problem-solving process can include several parties, for example client needs, government regulations and cost limitations. And it also allows several different solutions to one problem and is something that can stretch over a longer period of time. In a medical problem the solution, being the diagnose, is usually needed within a much narrower timeframe.

And as Mills and Treagust (2003, p. 8) says that *“Almost every task undertaken in professional practice by an engineer will be in relation to a project.”* they find the project-based learning approach to be better suited for engineer students. And in their article, they also mention a few examples of cases where project-based learning has been introduced to the curriculum of engineering study programs, for example the Aalborg University in Denmark. And according to evaluations of the program (Kjersdam, 2010) both the students

and the international evaluation panel were of the opinion that this pedagogy method had equipped the graduates well for the work life, given them both confidence and skill. A closer example though is the aforementioned VAMK University of Applied Science. Saarikoski and Ketola (2011) describes how after two years of planning and a close dialog with the industry, the mechanical engineering department came up with a new curriculum where project work was highly integrated. The students work on different projects in project groups where they have to learn how to solve problems together and communicate within the group as well as with the “client” (being the course teacher). The project course is also supported in the curriculum in general by teaching useful skills, such as report writing, in other courses. They call this “juonneopetus”, freely translated by Saarikoski to “thread based education”, as in “a common thread”. A description which is supported by Norrgård (2010) in an article on the subject, where “juonneopetus” is described as competence-based education with an overall theme (freely translated from Swedish). After it was introduced in 2010, the curriculum was evaluated at the end of the academical year by the participating students. Amongst the things the participating students thought needed further development was instructions and guidance (*Figure 1*). Saarikoski and Ketola (2011) does emphasize though, that this material in fact was inadequate, due to it not being fully developed at this stage. What these findings still shows are that even in independent project work, guidance and instructions are important. Something that is supported by Reh



(2019) in his article for the web-based library The Balance Careers on the topic of effective communication with employees.

Figure 1. Here is shown what the students graded as the least successful in the project course (left) and what they thought needed to be further developed (right). In both cases the majority of the votes (red area) went to “instructions and guidance”. Figure texts freely translated from Saarikoski and Ketola (2011, pp 54 & 66)

But overall, the students evaluated the course very positively (*Figure 2*). The teachers did as well notice that the students were more engaged and motivated when working like this. Also, the skills that the industry had seen as insufficient amongst the students and newly graduated engineers (project work and technical documentation amongst others) had, according to the students that participated in the evaluation, improved. Saarikoski and Ketola (2011) describes the endeavor as a success story.

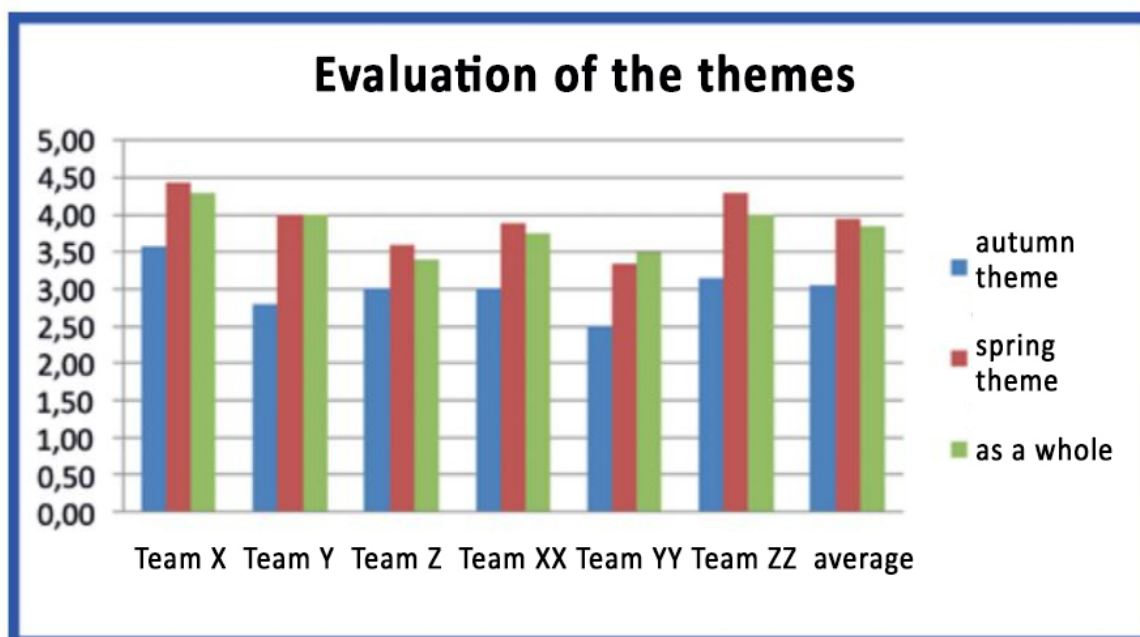


Figure 2. The grading (1-5, 5 is best grade) of the new curriculum at VAMK University of Applied Science given by the participating students teams. Blue grades are given for the autumn semester, red for the spring semester. The green grades for the whole academical year have an average of 3,84. Figure texts freely translated from Saarikoski and Ketola (2011, p. 62)

Though it has to also be acknowledged, that the more practical standpoint that project-based and problem-based learning offers, is not without its downsides. In comparative research on problem-based and example-based learning Lai, Mohd Salleh, Sulaiman, Mohaffyza and Yunos (2015) are of the opinion that example-based learning is a more effective learning method than problem-based learning. Where problem-based learning, as with project-based learning, has the students themselves figuring out to solve the problem at hand, example-based learning, as the name reveals, leads by examples. Meaning that when introduced to a problem the students are equipped with examples of the principles they need in order to solve the task, so that these examples can be used as

tools for solving the problem. The idea is that in order to solve a problem you need to understand it and being presented with comparable examples gives you the basic knowledge you need to manage the task. In their research Lai & All (2015) had two study groups which had to learn the same thing, "*the analysis of stress and strain in thin walled cylinders*". The first group got to learn this according to example-based learning and the other group according to problem-based learning. Before this, tests had been done to map their knowledge level. After the learning period another test to map their knowledge level was done, showing that the test group that had undergone example-based learning had higher scores in the test. Leading to the conclusion that they had learned more about the subject. The theory they present is that learning by example causes a lower cognitive stress on the brain therefore making it a more efficient learning tool because it enables more knowledge to be stored.

What though needs to be considered here, is that even if example-based learning could be a more efficient way of gaining knowledge and perhaps also of learning problem solving, it does not give the added skill set that the more practical learning methods of problem- and project-based learning do. And when looking at the subject of this thesis, an engineering project challenge, the main focus is not as much about learning new skills as such, as it is about learning how to apply the skills you already have in an environment that resembles a real work life customer project. Also, with an engineering project challenge, innovation is of great value, and innovation can by definition (Innovation, 2022) not be learned by example.

This all would indicate that the more practical approach to learning would be of benefit for the engineering students, learning a wider skill set during the project challenge, and that the project-based alternative would be more suited than problem-based learning. But the findings of Lai & All (2015) shows that this learning method also is harder for younger students, since they do not have the same knowledge base as more senior students. And it also showed that the cognitive load is heavier when working without examples or guidance. This would show that if working according to project-based learning, it would be recommendable to either not allow first year students in the project challenge or have project groups were there are students or different academical years. This way it can be ensured that there is a certain level of base knowledge in every project group. The finding of Lai & All (2015) would also indicate that it is important to ensure that the students get

guidance and help from for example tutors or teachers during their work. Which is supported by the findings of Saarikoski and Ketola (2011).

2.2 Industry Connections

One of the main angles in this project is to try to build new and develop existing corporate connections. And even if industry connections might seem like quite a different subject than experiential learning, these two are still closely linked together in the very old and common practice of internships. In an article on the subject of internships Boose (2004) calls internships “experiential learning”, a term that very well describes why many educations require some form of practical training or job placement. And even if it is not mandatory in the curriculum, most employers highly value former work experience. So in this matter the students and Technobothnia share the same interest in acquiring and maintaining close relations to companies.

In her definition of internship, Boose (2004) says that in an internship there are not only two partners (the student and the employing company), but three. The student, the company and the university, this because an internship is something that they all benefit from. She calls it (according to Ferguson, 2000) a “win-win-win proposition”. And even though an internship does not come without any cost for any of the three parties, it requires time and effort from all of them, it does come with several benefits that outweighs this. As for the students, Boose (2004) mentions for instance the opportunity to network and make useful contacts, personal growth and the possibility to get work experience without having to make a long commitment. Companies on their hand get a good chance to form relationships with possible future employees thus making recruitment processes easier at the same time that they strengthen their relations to the university and might enhance their reputation. Also the university, as the third party, benefits from their students participating in internships. What the universities have to gain is enhanced reputation for their study program amongst both students and industry as well gaining new learning for students and faculty alike, so that they stay up to date on current practices. Boose’s (2004) findings are also supported in a research report written for The Royal Academy of Engineering by Lamb, Artlett, Dales, Ditchfield, Parkin and Wakeham (2010).

The results of this report, as well as results from other reports, led to the The Royal Academy of Engineering making a guide by the name of *Effective industrial engagement in engineering education – A good practice guide* (Broadbent & McCann, 2016) that gives practical examples on how to build and develop industry relationships. They suggest that a close relationship between industry and academia is beneficial for both, but that there often are challenges that make this hard to achieve. To aid this their list of concrete examples is to function as a convenient tool for overcoming these challenges. The list includes aforementioned internships but also sponsored competitions, mentorships and fairs, which are the forms of suggested collaboration that touches upon the area of interest for this particular project. And of these, the sponsored competitions were the one example that resonated most with this thesis' setup. Out of five different sets of competition types, the following three seemed the most interesting:

- *Design competition – help set the brief and judge the winners; provide materials and tools for modeling.*
- *Scenario-based role-play – take on the roles of key stakeholders in a role-play scenario.*
- *Research competition based on an industrial problem – providing a context for the competition; offering site visits or interviews with staff to support research.*
(Broadbent & McCann, 2016, p. 14)

Since the initial idea of the thesis was to investigate the possibility and suitability of an engineering project challenge for Technobothnia, this report supports the assumption that such an endeavor would be beneficial and gives good ideas on what to consider when making up own plans. The guide also had two other types of competitions that as ideas were discarded, because they did not seem to fit the template of an engineering challenge as a group project, based on the theories of problem- and project-based learning. The discarded competition types were:

- *Paper-based competitions – setting the topics; coaching the writers and judging the winners.*
- *Debating competition – hosting the event; providing source material for debate.*
(Broadbent & McCann, 2016, p. 14)

Concrete ideas were also found in the article by Boose (2004), where she mentions both the timing of internships as well as the time leading up to the internships. Even if an internship is a commitment for a longer period of time (8-12 weeks in this particular example), the same principles apply in both the case of a longer and a shorter engagement. So, the occasion when such an event is held is to be supported in the curriculum, so that it does not interfere with other important events that could also prohibit students from participating. Also the time leading up to the event should be utilized well and in the same manner, building up company relations previous to the event, so as to enable a close cooperation throughout the event. The students need to be equally engaged, and this also requires effort and time.

Looking at how the idea of an engineering project challenge would be to involve not only two, but three parties in the same project it is of interest to look into three-party cooperation. As Boose (2004) quotes Ferguson (2000), it is about “win-win-win”. In a case study about a three-party cooperation between universities, companies and the social sector Lundberg and Andresen (2012) looks into the challenges and opportunities of these types of joint collaborations. Lundberg and Andresen (2012) came to the same conclusion about the benefits of cooperation as the previously quoted studies in this thesis, being that if they are successfully executed, they are highly beneficial to all participants. And apart from already mentioned benefits Lundberg and Andresen (2012) highlights that the cooperation often led to positive synergy effects that also had a positive outcome in motivating the people working with the collaborations.

Something that they emphasize was the importance of a positive attitude. Previous engagement and positive relationships facilitated a fruitful collaboration. Another side of this is the risk of losing face when you already have an established relationship. As they put it, the “*social capital was at risk*”, meaning that you are more likely to pull your own weight if knowing that by not doing so you will disappoint your friends. And Lundberg and Andresen (2012) found that by the parties having these close connections and ties to one another made that they developed shared goals, for example the concern for the wellbeing of the region. Something that in Vaasa can be seen mirrored in the EnergyVaasa Hub (EnergyVaasa, 2022).

They also noticed that amongst the challenges were things such as communication and difference in culture amongst the participating organizations. The importance of communication is something that is also highlighted by both Boose (2004) and Broadbent and McCann (2016). This indicates that clear communication is of high importance when aiming for a successful collaboration.

2.3 Soft Skills in Engineering

In chapter 2.1 experiential learning was studied, and these types of learning methods were all of a more practical and problem-solving nature. Because as noted by Mills and Treagust (2003), most of the work a professional engineer will do during their career is in, or closely related to, a project. It would be easy to assume that what an engineer needs to learn during a problem-based course would be things such as writing reports, making excel sheets or technical knowledge connected to the task at hand. But in the articles and research about the more practical learning methods studied for this project it was always a particular skill set that was mentioned as something that the students underachieved at, something that is often called “soft skills”. The term “soft skills” is said to have been created by the United States Army in 1960’s, according to Wikipedia (Soft skills, Wikipedia, 2022), and was used to refer to *“any skill that does not employ the use of machinery”*. Today the term is widely used also outside the military and is according to Dictionary.com (Soft skills, dictionary.com, 2022), who themselves claim to be the world’s leading digital dictionary, defined as *“desirable qualities for certain forms of employment that do not depend on acquired knowledge: they include common sense, the ability to deal with people, and a positive flexible attitude”*.

Positive attitudes, being able to work with and motivate people are all important in teamwork. But as noticed in the previous sub chapter about industry connections and cooperation, soft skills are also vital there. Lundberg and Andresen (2012) mentioned that positive personal relationships and connections made the work of joint projects smoother and easier.

But not only are soft skills something that can be seen as a valuable trait by a future employer. It is also something that gives added value to the employees themselves. According to Klimka and Budzińska (2015) being in tune with your character strengths and

having the ability to develop these is key in acquiring a satisfying work career. This is also supported by Viheräköski (2020) in her article, written as a summary on her thesis for the publications blog of Savonia University of Applied Sciences, on the subject of character strengths in career development.

Klimka and Budzińska (2015) say that if you want to help and prepare students for the job market, it is important to understand the student's perception of strength and positive qualities and how they value these when planning education programs. In their research they looked into different personal qualities that could be seen as strengths and what these included. With a research group consisting of Polish university students as well as foreign students studying in Poland, they investigated what the student's perception of these strengths were. For example, which did they value and which did they think were important career wise. They used the VIA classification of character strengths (VIA Institute on Character, 2022), that divides 24 character strengths into six groups, being wisdom and knowledge, courage, humanity, justice, temperance and transcendence. They did a survey amongst the students to see which traits they saw as most important in the aspect of career development. The results can be seen below (*Figure 3*), where the most important trait is graded as 1, and the least important trait is graded as 5. Note that the result from the native Polish students is shown separately from the foreign students studying in Poland. This to be able to see whether or not any cultural differences could be seen in the result.

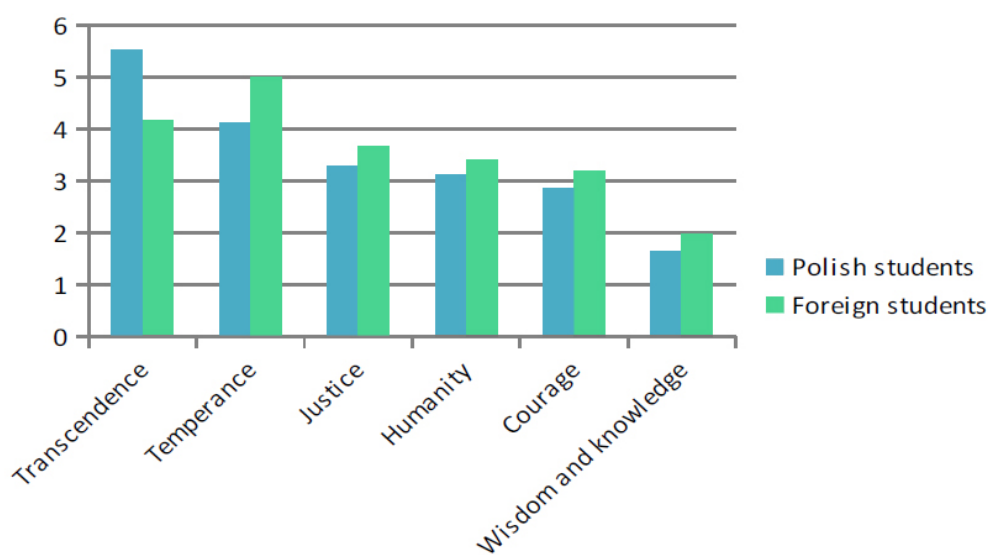


Figure 3. The result of a survey, made amongst native Polish university students and foreign students studying in Poland, about which character strengths they see as important in career development. Source Klimka and Budzińska (2015)

Klimka and Budzińska (2015) also looked into the relation between a positive orientation and job satisfaction amongst the students but could not find any significant results there. What they though could point out was that event though there were some differences in how the native Polish student and the foreign students prioritized the different character strengths in view of career development, the top three were the same amongst both groups. These top three being wisdom and knowledge, courage and humanity. Opening these character strength categories up reveals traits such as creativity, open-mindedness, persistence, social intelligence and perspective. This shows that the traits that students value and think are important also correlates to the innovative nature of teamwork projects that this thesis revolves around.

Also Deep, Salleh and Othman (2019) have come to the same conclusion as what was made in the beginning of this subchapter, being that many studies indicate that there is a lack of soft skills amongst graduating engineers. In their research they looked into how the soft skills of engineering students at the Universiti Tun Hussein Onn Malaysia, in Batu Pahat Malaysia, could be improved with the help of problem-based learning and e-learning applications for problem-based learning (ePBL). According to them, the problem-based learning that had already been used for some time in many western and some Asian countries had not been tested on Malaysian students. Therefore they wanted to see how the commissioning of these new tools (problem-based learning and ePBL) would affect the student's soft skills, conflict resolution traits and group learning abilities. They performed a pre-test survey amongst the students participating in the study, to map their level of aforementioned skills. After the test an assessment was made of the student's new skill levels.

During the semester -long test period the students participating in the research of Deep, Salleh and Othman (2019) had to participate in a mandatory course in "Effective Communication". They had to learn to use interactive learning environments and perform different types of tasks there, tasks that were also discussed and presented in class. The students also had to participate in classes where they performed group task that mirrored project work, such as brainstorming and writing project proposals. These tasks had "clients" that were *"real members of the community, including businessmen, schoolchildren, underprivileged housewives, the unemployed and fellow students of the university."* (Deep, Salleh & Othman, 2019, p. 666). During the test period the students had

thus to learn soft skills, project skills and problem-solving skills and also got the opportunity to try them out on different target groups. And during this time, they also faced the challenges that comes with group work and working for a client such as conflict, stress, confusion, amongst other.

The assessment of the student's skills that were made both before and after the test period included subjects such as their level of tolerance, open-mindedness and diplomacy. Teamwork, problem solving skills, analytical thinking and also "passion for learning" as well as language skills. The students evaluated their own skill levels in a survey before the test period, and the result from this pre-test assessment had a mean score of 2,88 (standard deviation 1,05), on a scale where 1 was the lowest grade and 5 the highest/best grade. After the test period the results from the assessment gave a mean score of 3,72 (standard deviation 0,78), which shows a significant improvement. The student's developments were also followed by a researcher at four different occasions during the test period. The observation results supported the results from the student's own evaluations in the assessment survey. The conclusion that Deep, Salleh and Othman (2019) drew from their research was that the problem-based learning model, supported by the e-learning tools, showed a significant improvement in the soft skills of the participating student. The skills they highlight especially are "*communication skills, general knowledge, conflict resolution skills, problem solving and research skills*", where the greatest improvement could be seen.

These findings are also supported by the earlier experiment at VAMK University of Applied Science when they introduced their new project-based curriculum for the mechanical engineering department. The conclusions of Saarikoski and Ketola (2011) lean in the same direction, that when having the students do work of a more project style nature, closer to that which they will encounter in their work life, they developed better teamwork and communication skills. This an interesting observation, because even though the research of Saarikoski and Ketola (2011) and Deep, Salleh and Othman (2019) were done in two different parts of the world, with students of different cultures, the findings on soft skills are still very similar. That could also support the assumption that the findings of Klimka and Budzińska (2015) could be internationally applicable, especially since there were no major differences in the research results from the Polish students compared to the foreign students studying in Poland.

So, for this sub chapter it could be concluded that the mastering of soft skills is vital in working life, and highly valued by employers, but also important in the personal life. Soft skills can for example facilitate project work, ease problem solving and enable business collaborations. But it seems evident that this particular skill set is often inadequate amongst engineering students and is therefore something that they need to learn and practice. Since soft skills are behavioral skills, a good way to attain them could be to follow the saying of “practice makes perfect”, where the model of problem- or project-based learning has shown positive results.

2.4 Event Planning & Manual

When looking at events in general, according to Shone and Parry (2015, pp. 7-9) in their handbook for successful event management, there are several different types of events that are all a bit different in nature. As head categories they mention leisure events, personal events, cultural events and organizational events. These can then be furthered divided into subcategories or be categorized into different typologies. This is something also supported by Raj, Walters and Rashid (2013, pp. 12-23) in their book on event management, where they also mention categories such as corporate events, community festivals and charity events. Regardless of how you categorize an event though, both Shone and Barry (2015, pp. 9-11) and Raj, Walters and Rashid (2013, pp. 23-24) mean that events are important to people and have always been so, finding examples in historical events such as the first Olympic games held in 776BC. As Raj, Walters and Rashid (2013, p. 4) put it (quote) *“They [events and festivals] have an important function within society, providing participants with the opportunity to assert their identities and to share rituals and celebrations with other people.”*

This shows that when planning an event, one should be careful of not forgetting the human aspect of events. According to the Merriam-Webster dictionary (Event, 2022) the definition of “event” in this context is *“a social occasion or activity”*, which implicates that it is in a sense the event attendees that make the event. This Shone and Parry (2015, p. 263) also mention when saying that the ambience of an event is often created by the people attending the event. EventMB (2017), an “online resource for event professionals” addressed this in an article about how to make event participants happy. Amongst the things they mention are that you need to show that you care about the attendee’s expectations and needs and that

you make sure they feel important. Event organization is of course a lot about practical and logistical planning as well. But it is a good idea to keep the needs of all parties in mind throughout the planning, including the customer, the attendees as well as other cooperation partners.

For the actual event planning there seem to be a rather standardized line of action supported by Raj, Walters and Rashid (2013) and Shone and Parry (2015) as well as various online blog articles and guides. Examples of these are an event planning checklist on the event planning company Eventspace's web page (Caramuru, 2021) or an event management handbook on the event software company event's blog (Howard, 2019). What they say is to pre-plan, plan, execute and evaluate. Combining these into an event life cycle gives a five-step action line, based on the models of Raj, Walters and Rashid (2013) and Shone and Parry (2015), as can be seen in *Figure 4*.



Figure 4. An event life cycle as combined from Raj, Walters and Rashid (2013), Shone and Parry (2015), Caramuru (2021) and Howard (2019).

According to Raj, Walters and Rashid (2013, p. 144), event planning starts out with outlining the idea of the event. As said in the event guide of the organization software company WildApricot “*Why are you organizing this event and what do you hope to achieve?*” (Morand, 2021). The objectives could be to raise money for a charity, to make a profit out of selling event tickets or, as in this particular case, to deepen industry relations, brand Technobothnia and make the students more competitive. Morand (2021) also highlights the practicality in trying to set measurable goals, if possible. These could be a certain number of attendees or a certain grade in a post-event feedback questionnaire. Clearer

goals are easier to work towards and they also make the post-event evaluation process easier.

Something that both Raj, Walters and Rashid (2013, 144) and Shone and Parry (2015, 105-106) point out is the testing of the event idea feasibility at this point. Not all ideas make for a successful transition from plan to practice, and with the help of a thorough pre-plan the decision-makers are able to evaluate if the planned event should or could be arranged or not. An issue which addresses the first of the research questions in this thesis.

When it comes to the more detailed planning and organizing of the event, Shone and Parry (2015, p. 120) illustrates the content of these steps in an informative figure (Figure 5). And as can be seen in said figure, the planning includes areas such as marketing, health, safety & security, staff, budget and location/venue.

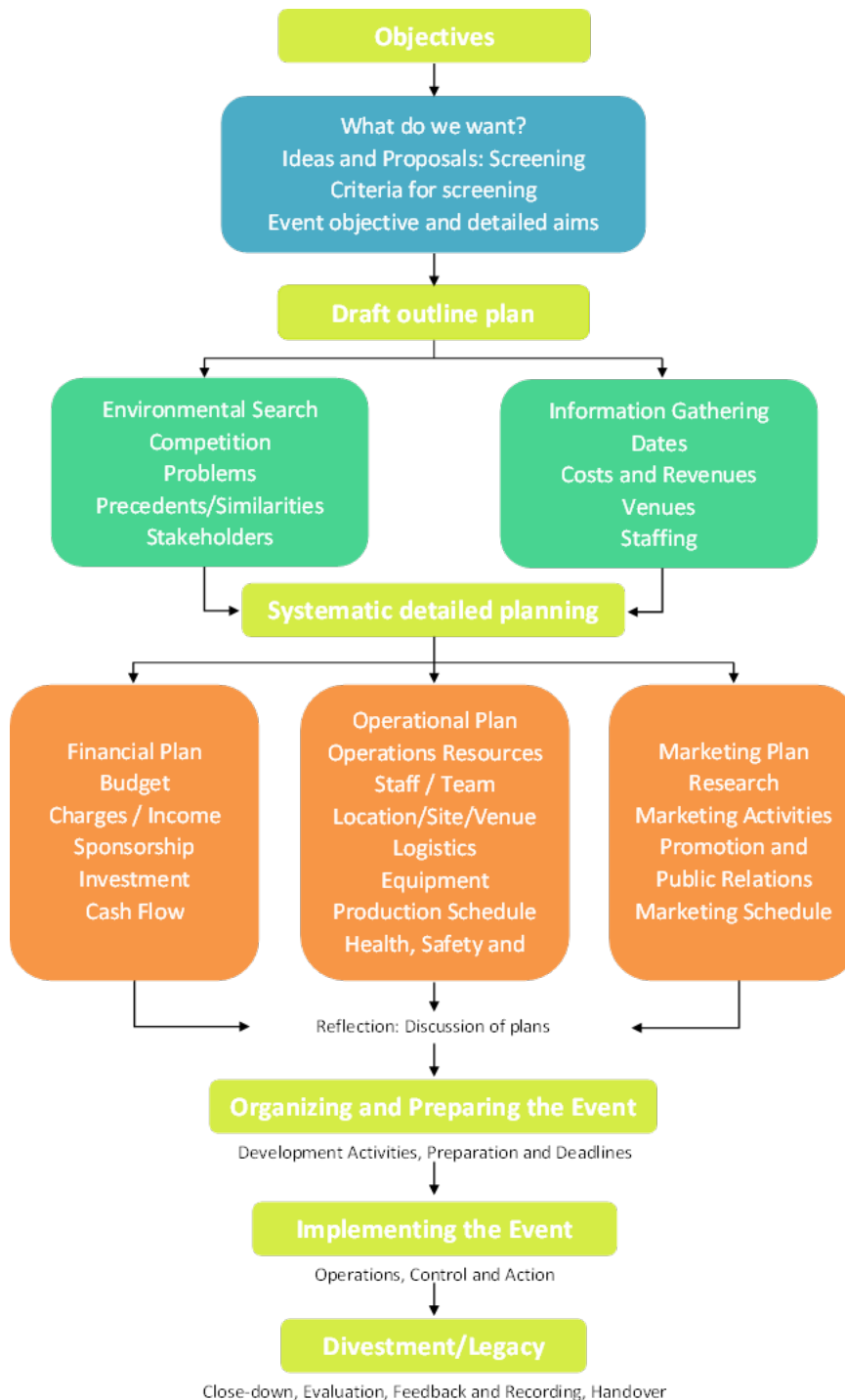


Figure 5. The planning process for events management, as by Shone and Parry (2015, p. 120).

What these steps contain and what all needs to be addressed is event specific. A deeper dive into the details of these steps can be found in the Handbook (Appendix 1), where they

are considered in the respect of the type of event this thesis revolves around. The making of a handbook, or manual, as Raj, Walters and Rashid (2015, p. 145) calls it, is something that they encourage. This is something that also Morand (2021) supports, saying that a “master plan” with all essential details, such as timeline, budget, work tasks, program etc. is a valuable tool when coordinating the whole event.

Caramuru (2021) gives concrete tips on how to format this manual, for example how to start off with more general categories, dividing them into subcategories. A manual for personal use can be more case specific and personal than a manual for general use. The handbook that is the concrete result of this project is supposed to be able to function as a tool for others and has thus has to be written with that in mind. On the web page of the University of Bath (2022) there is a guide on how to write a guide. The guide is directed at university staff, nonetheless it contains useful tips for any writer of a guide. The guide emphasizes the importance of writing in a clear and easily understandable language with concise phrasing. It also advises to write so as to directly addressed to the reader. Long sentences can be broken down into bullet lists and long paragraphs can be broken up into logical sections for easy reading, where the most important information always comes first. This is supported in an article on creating how-to-guides on the software company HubSpots webpage (Forsey, 2021), where Forsey also advises to write with empathy and let the reader understand the importance of emphasized issues. She also encourages the guide to give clear examples and use picture material and numbered lists to add further added value.

When all the planning is done follows the actual hosting of the event. With good planning and attention to details the running of the event should go smoothly, according to Shone and Parry (2015, 293). Though they do say it can still be challenging, due to all occasions being unique. They give practical advice on wearing suitable and comfortable clothing and remembering to hydrate and eat, to keep energy levels up. Howard (2019) also recommends a flexible attitude and to “*be ready for anything*”. After the event, everything needs to be closed down and the event should be evaluated. The importance of the evaluation of the event is supported in all sources on event planning quoted in this subchapter. The tools for this can be for example customer surveys and feedback and of course own observations or a follow up on budget. If the event is meant to be reproduced, the event valuation information is very valuable.

To sum up the topic of event planning and manuals, it can be concluded that the art of event planning is a finely honed one and there are a lot of expert advice to be found. There is a value in attention to details, on all levels, and the uniqueness of each event should be taken into consideration when planning one. Some kind of manual is crucial to keep track on everything, and these should be very event- or type-specific to be useful. A general manual can be a good base to start from, but details have to be added in order to get a functioning personal/event-specific plan.

2.5 Theory Conclusion

This thesis research questions are about how and if an event of an engineering challenge nature could be arranged at Technobothnia and how to organize and plan this event in order to develop Technobothnia's relations with local industry, as well as being beneficial for all participating parties. After reviewing literature on four different subjects, chosen by their potential of being able to cover all aspects of the research questions, it can be concluded that existing research supports the possibility of a positive outcome of this project.

The literature review on event planning proves the importance of what in the introduction to this chapter was called "event content value", and how to plan for a successful event bearing attendee satisfaction in mind. The theory research on the other subjects gave insight to what issues would need to be addressed in order to create content value for all participants. Project-based learning seems to be an efficient way to maintain both soft skills as well as a realistic insight to work life, that would benefit the participating students. This would also increase cooperation with local companies, as they would participate in a concrete way, thus enabling new personal contacts to be made. Personal contacts that are valuable both in for example future recruitments as in future collaborations for students and universities alike. The literature on event planning also covered the topic of the first research question, being event feasibility.

Even so, though there is both research on subjects that touches upon the main theme of this thesis as well as existing events of this nature, there are no research on precisely this subject. Therefore it seems justifiable to conduct such a study now, to find out how all these different aspects sums up and functions as a whole.

3 Methodology

The purpose of this project was to find a feasible way to aid Technobothnia in fulfilling one of its mission statements of functioning as a channel for cooperation between its universities and the local industry (Technobothnia, *About Technobothnia*, 2022). The objective of this thesis was that this could be done by arranging an engineering project challenge, which would strengthen the ties between Technobothnia and local companies and also give added value to all the three main participant groups, being Technobothnia/the universities, the companies and the engineering students.

The universities would get a competitive add-on to their curriculum and Technobothnia would strengthen its brand. The companies would get new ideas and also a possibility to head hunt. The students would get a fun and educative experience along with a valuable opportunity to network. Positive chain effects from this, affecting the whole region, could at best be the achievement of tying the newly graduated engineers to the region, where there is a high demand for competent work force (Vaasa, 2021).

How to achieve this with an optimal outcome has been the aim of this thesis. The concrete end result of this was a handbook on how to arrange such an event, that can also be used by others.

3.1 Research Method Choice

Since the idea for the project stemmed from an existing event, the Saxion International Project Week, a case study seemed to be the logical choice of research method. But to avoid the possibility to jump to biased conclusions also other options were considered before taking the final decision.

The most obvious approach, apart from a case study, would be to see if there already were other existing handbooks of this type. But through the literature study it could be deduced that such specific handbooks were not to be found. Apart from handbooks about event management in general, the closest match was a thesis conducted as a case study about an international conference arranged in Lahti, by Lahti University of Applied Science, for the organization Network of International Business School, NIBS (Do, 2014). This conference held similarities to the type of event that was the aim for this project. For

example, it was arranged by a university and had a case competition for students, also the thoroughly written thesis could act as a handbook of some sort to arrange similar events. But the differences were more than the similarities, for example did the conference not cater to engineering disciplines nor did it involve companies, thus this case study fell short as an alternative for an already existing handbook.

Since no suitable manual already existed, the topic needed to be studied so an own manual could be written. The table on relevant situations for different research strategies in *Table 1* (Yin 2003, p. 5) shows that a survey study or an archival analysis were not suitable for this study, since they answer the wrong type of questions (*how many, how much?*). Neither is an experiment study suitable due to it requiring a “control of behavioral events”, nor is a history study relevant because this project was about a contemporary event.

Table 1. Relevant Situations for Different Research Strategies (Source: COSMOS Corporation).

Strategy	Form of Research Question	Requires Control of Behavioral Events?	Focuses on Contemporary Events?
Experiment	how, why?	Yes	Yes
Survey	how, why, where, how many, how much?	No	Yes
Archival analysis	how, why, where, how many, how much?	No	Yes/No
History	how, why?	No	No
Case Study	how, why?	No	Yes

(Yin, 2003, p. 5)

Left is the choice of a case study. And according to Yin (2002, p. 9) the situation when a case study is the optimal choice is when “a “how” or “why” question is being asked about a contemporary set of events, over which the investigator has little or no control”. The setting of this project fitted well into that description. If there are several cases that could be studied, there is a choice between a single case study or a multiple case study. According to Säfsten and Gustavsson (2019, p. 4, according to Yin, 2018) the pros with a single case study is that the case in question can be studied and analyzed more thoroughly and deeply,

the downside is that you get nothing to compare with. Alas the pro with a multiple case study is of course the opportunity of comparison, but also the possibility to generalize and thus make predictions. Thus, the choice of a multiple case study was confirmed.

3.2 Choice of Research Cases

The purpose and aim of the thesis along with the theoretical framework set by the literature study gave the following list of requirements for the cases that were to be studied:

- *The event should incorporate several companies.*
REASON: This supports the development of university-industry cooperation.
- *The events main focus would be engineering projects performed by university students (age range 18-25).*
REASON: This caters to one of the main target groups (students) and the project-based learning method is supported by the literature studies
- *The students would work in smaller (4—6 people) groups.*
REASON: A group size of around 6 students is average in this type of setting and smaller groups give better results, as according to Chou and Chang (2018).
- *The cases for the engineering challenge would come from the participating companies.*
REASON: This would give the students an experience closer to real work life, compared to made up cases. It also allows for close contact between students-companies, to the benefit of both.
- *The time period for the event should be limited to 1-2 weeks.*
REASON: The event was to be planned as an on-campus event with the internationalization of the event was seen as a possible long-term goal. Taking possible non-local participants into consideration (housing needs etc.) a shorter event is more suitable. A shorter event also suits better for an intense event which is done full-time and not on the side of the students' normal studies.

- *The event should NOT be an online event.*

REASON: The event was to be planned as an on-campus event, thus examples and experience from such an event was sought for.

The Saxion IPW fulfilled these requirements and was chosen as the first case to study, thus also taking on the role of a pilot case. Further cases were looked for by inquiring teachers at different universities working with international collaboration. It was thought that these teachers would have a large network and thus a greater chance of knowing about similar events. Google was also used, with search terms such as “*engineering project week*”, “*engineering project challenge*”, “*student engineering challenge*” and different variations on that theme.

The results from those searches were compared to the list of requirements. Many were discarded due to not meeting the requirements, such as the STEM4YOUTH open student competition (STEM4YOUTH, 2020) and the Engineering and Science Challenge of the University of Newcastle, Australia (University of Newcastle, 2022). The cases that most closely matched the requirement were seen as fitting alternatives and contact attempts were made. Not all responded despite multiple contact attempt, for example the TIMES case competition arranged by ESTIEM, the European Students of Industrial Engineering and Management (ESTIEM, 2022). This left two suitable cases to study. These were the Global Engineering Challenge at the University of Sheffield (University of Sheffield, 2022) and the Intensive Program Engineering Visions (htw saar, 2015), which is an event where the responsibility of hosting the event circulates amongst the participating universities. These three engineering events, Saxion IPW, Sheffield Global Engineering Challenge and the Intensive Program Engineering Visions, were considered the main cases for this study.

To widen the perspective and give a base for comparison, also two Finish cases were chosen, even if they did not meet the requirements. The first was the earlier mentioned NIBS conference arranged in Lathi in 2014. This because the conference management had been so thoroughly documented in the case study by Do (2018). The second one was the Demola platform (Demola, 2022), which works to bring students and companies together to form innovative solutions and operates through multiple universities around the world, including 13 in Finland. This was chosen because it to its nature strongly resembles the

purpose of this project, even if the set-up is very different. These comparative cases would though not be studied as in-depth as the three main cases.

The number of cases, three main cases and two comparative cases, were thought to be a sufficient number. This leaning against Yin's (2003, p. 52) theory that a simple case-study where the cases are assumed to be literal replications with a prior knowledge to the outcome, a number of two or more cases is enough.

3.3 How the Cases Were Studied

All cases were first studied theoretically by looking for online information about them. In this way a first impression was made. The Saxion IPW was also studied by means of observation because participation at this event was possible. Participation in the other two event cases, Sheffield Global Engineering Challenge and the Intensive Program Engineering Visions, was not possible due to timing and the time frame of this study. The three main cases were also studied by interviewing key persons involved in the organizing of the events.

The Saxion IPW is normally arranged as an on-campus event. But due to the Covid pandemic it was arranged as an online event in 2022. So even if participation and observation was possible, it was not possible to do that under what can be considered normal circumstances for the event. Nevertheless, participation in all general meetings and faculty meetings was possible, as well as participation in the meetings of the student project groups. Since there were several hundred project groups and a to that proportionate number of company cases, it was not realistic to take part of the work of all student groups or all different company cases. Thus, one company case and the three student groups that worked on that particular case were followed.

Key persons from all main event cases were interviewed about the organization of their events. According to Yin (2003, p. 89) interviews are one of the most important sources of data in case studies. The benefits of interviews are also explained by Hirsjärvi, Remes and Sajavaara (2009, pp. 205-207) as lying in their flexibility. Questions can easily be adapted to the situation in order to further explore the interviewees experience. All the interviewed key persons had experience from both participating in and organizing their respective events. In the case of Saxion International Project Week, the interviewee had been in

charge for the event management for nine years, and previous to that he had assisted with the organizing. The focus of the interview lay on the IPWs arranged on-campus, more than the online event of 2022. The interviewee from Sheffield Global Engineering Challenge had been involved in the event for 11 years, out of which the last few years she had been in charge of the event management. The Intensive Program Engineering Visions stood out from the cases in that, that it is not arranged by the same host every year. Therefore there is no-one with as extensive involvement of arranging the event as can be found with the other two cases. In order to still be able to get an insight in the same amount of experience, three different people were interviewed regarding the Intensive Program Engineering Visions. Each of them had hosted the event at least once and participated in it multiple times. The interviews are explained more in depth in chapter 3.5 *Interview Questions and Techniques*.

The cases used as supportive comparison were studied theoretically. The NIBS conference in Lahti 2014 was studied mainly through the case study written on it by Do (2018). The Demola platform was studied by researching its web page. Focus was on four areas: objectives, setup, target groups and similarities/differences compared to main cases.

3.4 The Target Groups

The target groups for the event were the universities, the students that would participate and the companies that would provide the cases for the engineering challenge. It was important to grasp the wishes and expectations of the target groups in order to plan for an event that would satisfy them. Since the target groups would participate in the event, not organize it, their input was not deemed to be as crucial for the structural planning of the event. Not less important, but having another role, which was that of the decisive vote in cases of “yes or no” or “this or that”.

Technobothnia has a steering group consisting of the three deans of the technical departments in Novia University of Applied Science, the University of Vaasa and VAMK University of Applied Science and the Technobothnia coordinator. At the same time that the deans make up the Technobothnia steering group, they also **represent their respective university**, therefore they also represent one of the target groups. During one of the steering groups meetings in early spring 2022 this project was discussed in order to map

their expectations, and also to discuss possibilities of practically arranging the event. The concept of the project was new for the steering group, so a thorough briefing with a possibility to ask questions was necessary. Having the matter as a topic on the meeting agenda was thus decided as the most logical way to address the issue with the steering group. And of course, representing not only the universities but also Technobothnia, their opinion weighed the heaviest of the three target groups and they also had the option of exercising a veto.

The student angle was covered by gathering feedback from participants at the Saxion IPW through a survey, since that gave a possibility to use their existing experiences. An event is nothing without its participants, so it is good to keep them satisfied and to follow up their satisfaction levels with inquiries. As mentioned in chapter *2.4 Event Planning & Manual*, participant feedback is valuable when and if reproducing the event. The event that this project focuses on has though not yet been arranged, hence feedback cannot be collected. But it was possible to gather feedback from the participants at the Saxion IPW and this was done with the help of a survey. The students had the option of answering the survey questions either orally in an interview situation or by filling in an online questionnaire, where participation could be done completely anonymously. The two options were given the students to make participation as easy as possible to ensure that at least a few students participated. Saxion also performed their own student opinion poll after the IPW, where the main part of this project's interview/questionnaire questions had been added. The purpose for gathering the student feedback was to see if the objectives for the event, as set by the arrangers, were clear to the students and if the students thought these objectives were met. Also, the event content value from the participants standpoint could thus be assessed. The more extensive initial survey was answered by five students randomly chosen and the survey performed by Saxion was answered by 80 students. It has to be kept in mind though, that the object of this study was not to produce a copy of the Saxion International Project Week, but to use it as one example source amongst several as how to arrange this type of event. As such the student angle was hence seen as a source of supportive information, rather than principal information.

The companies' input was gathered by interviewing representants of a few local companies. The companies were chosen on the basis that they had done previous collaborations with Technobothnia involving students and visibility amongst students, for

example the in chapter *1.5 About the Company* mentioned MATCHing event and could therefore be seen as being potentially interested in participating in an engineering challenge event. Four companies out of a total of circa 30 were randomly chosen, though it was checked that they did not all represent the same type of industry, and all four agreed to the interview.

The questions from the student feedback and the questions from the company interviews can be found in the following chapter *3.5 Interviewing Questions and Techniques*.

3.5 Interview Questions and Techniques

Most of the information gathering in this project was done through interview. In this subchapter the different interview forms, as well as the questionnaire version of the student interviews, will be presented. Information was gathered from event organizers, event participants (students) and possible future event partners (companies) and each of these are presented in their own subchapter.

3.5.1 Event Organizers

As stated in chapter *3.3 How the Cases Were Studied*, event managers from three different cases were interviewed. The interviews were conducted via a video conference program during February 2022, as semi-structured in-depth interviews, according to DeCarlo (2018). This means that a set of questions was made but the interview was not conducted strictly according to these, but more in the nature of a conversation where the questions were used as a guide. This allows for the interviewee to freely tell of his/her experience and not get led too much by the interviewer. It was seen that this interview method would minimize the risk that the interviewers' assumptions or biases would affect the interviewee leading to important details, memories or advice getting left unmentioned. The role of the interviewer was more that of leading the discussion in the right direction, so that all important matters would get addressed. Written notes of the interview were diligently taken throughout the whole interview, and at the end of each interview these were compared to the set of questions, which gave the possibility to ask direct questions to fill out the information gaps where needed.

The interview guide can be seen below and was produced based on the studied theory about event planning, after participating in the Saxion International Project Week. The questions were split into themes and was from case to case followed up with more questions if seen necessary.

The Interview Guide – Event Managers

- The event in its current form
 - What is the aim of the event?
 - When and where is the event held?
 - How many students participate in it?
 - What kind of students participate (own students, students from other schools/countries, what disciplines etc.)?
 - What is the weekly program of the event?
 - How many students are there in each project group?
 - How are the project groups assigned?
 - How are the project topics assigned?
 - What kind of deliverables do the students need to produce?
 - Are the students awarded anything for participating, if so then what (study credits, monetary rewards etc.)?
- The project topics
 - What are the requirements for the project topics?
 - From where do you get the project topics?
 - If you get the project topics from external sources, how do you recruit these sources?
 - Do you find it easy or hard to recruit these external sources?
 - What kind of feedback have you gotten from these external sources about their participation in the event?
 - Do you find it easy or hard to get project topics that meet your requirements?
- The workload
 - How far in advance do you start planning for the following years event?

- How many people work with the organizing of the event?
- What is the workload of these people (% of total workload, or working hours)?
- Do you have staff working as “mentors” for the students/project groups?
 - How many, what roles?
 - What is their workload?
- Do any external people (such as company representatives or such) play part in the event? What roles do they have?
 - What is the workload for these external people?
- Costs
 - What is the budget of the event now?
 - Do companies have to pay for participation?
 - Do students have to pay for participation?
 - What finances the event?
- Facilities and equipment
 - What type of space do you need?
 - Do the facilities need to be equipped with something, if so, what?
- The beginning of the event
 - In regard to previous questions, how does the current event differ from how it was when it first started? For example:
 - Amount and type of participants
 - Budget
 - Curriculum
 - External participants (companies or such)
- Own reflections of the event
 - What are the pros and/or cons with the event?
 - Do you have any good advice to give?

3.5.2 Event Participants – Students

After learning how the Saxion International Project Week was organized and participating in the program for a few days, the questions for the student survey were done. The questions were chosen as to get a picture of the students' initial position when participating in the event and of course to map their opinions of the event. The survey was performed as a mix between a cross-sectional survey and interviews (Harris & Brown, 2010).

The survey could be answered orally via video conference, or in writing via Google Forms. The students could answer anonymously, and Google Forms did not collect e-mail addresses nor other contact details and there were no mandatory questions.

The first two answers to the survey were received orally and written down by the interviewer in the Google Form. This gave an opportunity to explain the questions, if needed, and thus also edit the question to make them clearer, if that was seen as necessary, without directly changing or adding any questions. No other discussion as such took place, as to not influence the interviewees answers. After every given answer, the written notes/answer was repeated to the interviewee to assure that the interviewer had understood the given answer correctly. Three survey participations were done directly to Google Docs.

In addition to this, when Saxion performed their own feedback survey after the event, some of the questions of this survey (marked by * and in *cursive text*) were added to theirs. This gave an additional 80 feedback answers for those questions.

The Questionnaire - Students

- General
 - What school do you study at?
 - **What field do you study?*
 - What years have you participated in the Saxion IPW, and what was your study year then (first year, second year... student?)?
 - Why did you want to participate in the IPW?
- The project

- What were the topics of the projects that you participated (if several, please mention with year of participation)?
 - Do you think that your own field of study was relevant in the project you participated in? Please motivate.
 - **What kind of benefits can you personally see in participating in a project that IS NOT within your field of studies?*
 - **What kind of benefits can you personally see in participating in a project that IS within your field of studies?*
 - **Would you prefer to choose your own topic/project? Pros and cons about this.*
- The tasks
- **Could you briefly tell what kind of beforehand information you got on your project topic, was it sufficient?*
 - Can you briefly tell what kind of hand ins your project required, was the briefs/beforehand information sufficient for you to complete your task well?
 - **What is your opinion on the program for Friday?*
 - *If this is your first time participating in the IPW, please answer according to your expectations.*
 - *If you have participated in the IPW previous years/on campus, please answer this question in regard to previous IPW's. What did you think about the market/fair, presentation of projects, award ceremony?*
- The project groups
- What are your thoughts about the group size (6 people)?
 - Would you like to be able to compose your own groups?
Pros and cons about this.
- The coaches
- **Please tell briefly about your experience from the contact with the company coach. Positives? Negatives?*
 - **Please tell briefly about your experience from the contact with the teacher coach. Positives? Negatives?*
 - **Did you feel that your coaches were available enough?*
- Support and extracurricular activities
- If you have visited the IPW office, how did you experience that, was it helpful? Is this service necessary?

- Was there any extra, not mandatory, activities that you participated (or are going to participate in)? Thoughts about these: are they fun, unnecessary, could have been better, the best with the whole IPW etc?
- General arrangements, housing etc.
 - Do you have any comments about the general arrangements of the IPW?
 - If you have participated in the IPW on campus and have needed housing, how was this arranged? Were you satisfied with the housing arrangements?
- Rewards and benefits
 - Thoughts about the competitions and awards. Of how much importance is the awards for you personally? Do you participate to win, or is the competition/awards not very important to you?
 - Do you feel that the amount of study credits you get from the IPW mirrors the work you put into it?
 - Do you feel that the IPW has given you a good contact with the company/companies? Do you think this experience might lead to an internship or an employment?
- Own thoughts and tips
 - If you have any thoughts of your own, or good advice to someone organizing a similar project week, please write them here.
- *These additional questions were exclusive for the survey performed by Saxion:*
 - *What was your role [in the project group] during the international project week?*
 - *What do you think of the online start of the day?*

3.5.3 Event Collaborators – The Companies

The company representants were met so an initial market sounding/mapping of their expectations and interest could be done. This was done after researching the event cases and looking into the student survey results, so that a general idea of how an own event would be organized already existed. The mapping was conducted via open discussion, either in person or via video conference, where the event concept was explained as an introduction. After this, it was possible for the company representant to be able to answer a few simple questions about the event, as to see firstly if they had any interest in participating in such an event, and secondly to gather their thoughts, suggestions and opinions. This was done in a very relaxed fashion, partly because the Technobothnia event

had at that point not yet any detailed plans about which the companies could have opinions, and partly because this allowed the companies to freely and frankly talk about their own interests and wishes without feeling that they would offend any ready-made plans.

The Interview Guide - Companies

- Would you be interested in such an event?
- What are your thoughts about:
 - o a participation fee for companies?
 - o legal rights of ideas that the students have during the event?
- Do you have any preferences regarding to when (during the year) this event would be held (regarding general vacation months etc.)?
- If you would participate, what are your expectations, what would you want to get out of it?
- What kind of information or tools would you need from us, if you were to participate in the event?
- If necessary (due to composition of participating students), would it be possible for you to prepare several project topics?
- In which field does your company operate and what is the size (number of employees) of your company (if this is okay to mention in the thesis)?

3.6 Analyzing the Results

The information from the interviews with the event managers was gathered in a table (*Appendix 2*) according to the interview guide questions. The similarities and dissimilarities of the different topics and areas of the event management could then be easily overviewed.

Information about the comparative cases was gathered online and as for NIBS, also from a thesis written on the organization of the event. The four focus areas were objectives, setup, target groups and similarities/differences compared to the main cases. After this the gained knowledge could be used in planning an engineering challenge event and writing the handbook.

The results from the student survey came from two sources, firstly from the own conducted interviews and the Google form and secondly from the survey answers from Saxion. The

first step was to gather all the answers in the same Excel spreadsheet, and after that the data was cleaned. Ten of the data rows in the Excel sheet had only answers to one or two of the questions (background information about the survey participant), and these rows were thus removed as being of no use. No other data cleaning needed to be done. But more than half of the participants of the Saxion survey had written all, or some, of their answers in Dutch so these needed to be translated. This was done with Google translate and the translated answers were not modified in any way. As for accuracy even though it can be highly uncertain for such a tool, it was deemed as sufficient enough for the information that was wanted from this survey.

After the data was cleaned and processed the feedback answers were categorized in three different categories, being “positive feedback”, “neutral feedback” and “negative feedback” according to a color code system, where positive was green, neutral yellow and negative was red. The positive/neutral/negative aspect of the answers was both in regard to how the student had experienced the situation, put into context regarding that student’s overall response, as to how well the students seemed to have understood the objectives of their tasks. After that the results were studied to see if any if any general similarities were found amongst the different categories and if any of the three categories were predominant. A compiled version of the student feedback can be seen in *Appendix 3*, where inferences of the answers to each question, as well as comments or suggestions that were especially interesting or occurred more than once, can be seen. All data was processed manually.

As for the discussions with company and university representatives, the main findings were noted and addressed in the results chapter.

3.7 Excluded Topics

Apart from the limitations mentioned in the introduction, that was set at the beginning of the project, a few more limitations were added during the research process. As the project moved forward and evolved issues occurred and needed to be addressed and evaluated on whether or not they should be covered in this thesis. The topics that thus emerged and were not included were marketing, school administration/curriculum and authorities.

Both marketing and the aspect of getting the event emerged into the curriculum are vital aspect to the organizing of the event. They were though seen as to be the responsibility of a marketing team/the marketing departments, respectively the heads of departments/disciplines at the universities. This thesis focused on the core operational planning of the event, with an assumption that the event manager does not work alone but has access to different teams to help with the various matters of the event organizing.

If arranging a public event in Finland, the organizer needs to get a permit from the police for this. Due to both the nature, size and location of the planned event, it is not classed as an event that needs a permit (Police of Finland, 2022). Since there in this circumstance (this type of event, arranged in Finland) was no need for any authority contact, this topic was not covered. Though it is to be noted, that would such an event be organized in another setting, for example in another country, the circumstances could be different, and therefore the issue of authority contact should not be totally dismissed.

3.8 Ethics and Reliability

As for ethical issues, information gathering was done anonymously when possible and relevant. Interviews were conducted either in person or via video conference, so of course these were not anonymous as such. In case names were written down in notes during interviews or discussions, permission to do so had been asked, but names have not been mentioned in any part of the texts nor appendices of this thesis. Survey answers were gathered without any contact information, such as e-mails or phone numbers. Neither has the names of the interviewed company representatives been mentioned anywhere in this thesis.

All interviewed people, as the students participating in the survey, were informed about the reason for the interview and this thesis project and possibility to verify their answers has been offered. The interviewed event managers were given the chance to read through the published material regarding their events, prior to publishing, and corrections were made to the material if needed. The students participating in the survey also had the chance to read through their answers before submitting them, and if the survey was performed orally the notes that were written down were read out loud to the students so they could approve of them.

The reliability of the research was ensured by several means. The cases that were studied were chosen according to a set list of requirements and the interviewed key persons were all event managers and had hosted their respective event on several occasions. The same set of interview questions were used for all the interviews.

A total of 85 students participated in the student survey of the Saxion IPW. The consistency of the survey is not 100%, since five of the students participated in the initial survey and another 80 in the additional survey performed by Saxion. The set of questions were not absolutely identical for the participants in the initial vs. the additional surveys, since the latter did not include all questions the first one had, and in addition to that the Saxion survey had one question not addressed in the initial survey. Even so, the total amount of answers to most of the question was 85, which is about 9% of the 960 participants and is therefore seen as representative enough. Also, the results from this survey have not played a decisive role in this thesis. All in all the reliability of this, taken its role into account, was seen as sufficient.

Giving a little spoiler as to the results of this project, the size of the event planned for Technbothnia was set to 50 student participants giving a need for three to five companies. In regard to this, out of the ~30 close company contacts that Technbothnia has, interviews with a sample of four companies, as for the company input for target groups, was seen as sufficient. The companies chosen all represented a different field of operation, so as to give a wider girth to the market sounding.

4 Results

In this chapter the results from the studies and research will be presented in the form of brief summaries with inferences of each section. Concluded results is found at the end of this chapter.

4.1 Researched Events

As earlier mentioned, the three main events that were studied was Saxion International Project Week, Sheffield Global Engineering Challenge and the Intensive Program Engineering Visions. They were looked into as arranged under “normal” circumstances, meaning on campus. The online “Covid-versions” of the cases was not researched further. Information from web pages and brochures was studied along with the material from the conducted interviews. The main findings from the interviews with the event managers, which were the primary source of information for these cases, are also presented in a comprehensive table (*Appendix 2*) that follows the structure of the interview guide.

The two comparative cases chosen for this research was a conference arranged for the Network for International Business Schools (NIBS) in Lahti 2014 and the Demola platform for company-student cooperation projects. They were studied from online material and brochures. As mentioned in the chapter on methodology, the study of these two cases were focused on four different areas, being objective, setup, target groups and similarities/differences compared to the main cases.

Compilations of the gathered information from the cases will be presented case-wise in the following subchapters. At the end is a conclusion of the findings.

4.1.1 Saxion IPW

The Saxion International Project Week takes place every year during the first week of February. It is mandatory for all engineering students at Saxion as well as open for both other disciplines as well as upper secondary students. And as the name gives away, also international students from other countries are welcome.

The project groups consist of six students from mixed disciplines led by a team leader, which is a third-year student that thus has participated themselves for already two times.

The team leaders get to choose their project topic from a list of topics, gathered by the team management from mainly companies. Usually there are multiple teams working independently on the same project topics. After that the groups are assigned by the event management, that do so semi-randomly, checking to see that a good mix of different disciplines and academic years is acquired.

The teams meet up with the company representatives, functioning as both “clients” and mentors, twice during the week. First for a project brief and a few days later for a check-up. They can also contact their company “coach” if needed. Help is also given from the teacher coaches, to whom the group is also to hand in different deliverables, such as vlog-videos, posters and/or final reports. On the last day of the event, the student teams present their projects to the company and teacher coaches, along with the other student teams that has worked on the same topic. The company representatives then participate in the grading of the groups, because the students receive both study credits and a grade for their efforts. Other company representatives then function as jury judges during a fair, where all the student projects are presented. A few of the best project are then awarded with monetary prizes.

The budget for this event, that has approximately 1000 students participating, is around 35 000 euros, out of which most is covered by the company participation fee of 750 euros. The rest is covered by the budgets of the participating departments, split according to attendance of respective departments students. To make this happen, the event has a management team consisting of twelve staff members. The event manager puts in around 300 hours, the others use around 40 hours each. Teachers coaches are all together around 50, each coaching three teams working on the same topic, their workload is around 15-20 hours each. The amount of company clients/coaches is the same approximate 50, and they have to put in an estimated eight hours of work for this. There are also 30 jury judges, that only participate in the Friday events.

The goal of the event is for the students to learn how to work interdisciplinary and interculturality, with projects that are not necessarily within their field of expertise. Much as normal work life. Emphasis lies on the process rather than the results.

4.1.2 Sheffield Global Engineering Challenge

The Sheffield Global Engineering Challenge takes place every year in the last week of January. The one-week course is mandatory for all 2nd year engineering students at Sheffield, and the five person groups are of mixed disciplines. It is only open for Sheffield students.

The project topics are chosen by the event management team from Engineers Without Borders UK's "Engineering for People"-challenges and are meant to highlight socioeconomic gaps and learn the students to think in innovative and culturally agile ways. The student can themselves request for preferred topics and mixed teams are assigned by the event management according to the students' preferences.

The students have one week time to work with their task, that has to be handed in and presented on the last day. To help them they have teaching assistants and also mentors from the industry (usually Sheffield alumni) from whom they can ask advice. For this work, the students get study credits, a few prizes for good achievements are also awarded. The students own the rights to the ideas they come up with.

The event is participated by 1200-1500 students and has a budget of 50 000 GBP (as of 3.4.2022, this is approximately 59 000 euro) and requires an event management team of five people. The event manager starts planning the event a year prior and uses roughly 200-250 hours for the event. Apart from the event management team, also 35 teaching assistants aid with the event organization. They use roughly 24 hours each for this, and their salaries stands for about 80% of the total event budget. Also teachers and industry coaches, 35 of each, participate with about eight hours of work each.

At the event web page for 2022, the objectives of the Global Engineering Challenge are stated as follows: *"In order to tackle the Engineering challenges of the 21st century, it is important to possess teamwork, design, problem-solving, communication skills and global awareness, as well as technical knowledge. The aim of the Sheffield University Global Engineering Challenge Week is to introduce and develop these transferable skills highly valued by employers through a cross-faculty group project."* (Global Engineering Challenge, 2020).

4.1.3 Intensive Program Engineering Visions

The Intensive Program Engineering Visions is a two-week international course. There are seven universities from seven different European countries that participate in this enterprise, and usually send seven students each, making the maximum number of participants 50. The responsibility of hosting the event circulates between the universities and is decided two years in advance. The event is held during the last two weeks of the summer holidays (August-September).

The project topics that the students work with during the event often comes from companies, which are recruited by the staff working on or participating in the event. The companies do not pay to participate in the event, but they have to put in an estimated 10-20 hours on this, by for example hosting company visits, functioning as mentors to the student teams and participating in the final presentations.

The students work in teams of five to seven people, which are assigned by the event organizer. Sometimes they have had the possibility to request project topics of preference, but the project topics are ultimately assigned by the event organizers. The concept of the two-week event is to get the students to think freely and innovatively and come up with new concepts for the company provided cases. A challenge here has been to set the expectations right for both the participating companies and the students, so that the solutions the students come up with are something that the companies find useful. Generally though, the company feedback of their participation has been positive.

The budget for the events varies, as the exact setup and program, from host to host and reportedly ranges from “not much” to 16 000 euros and is covered by the hosting university. The event management teams have consisted of two to four people that put in up to 400 hours work for this and starts planning for the event 6-9 months prior to it. Apart from the teachers accompanying the students to the event, there is often also other staff and student-helpers helping out with practical issues during the event.

The general aim of the event is to work internationally and interdisciplinary, teaching the students to think innovatively and freely so as to learn both hard and soft skills, because this is thought to be something that the engineers of today needs.

4.1.4 Comparative Case – NIBS Conference

The Network for International Business Schools (NIBS) conference is an event that is arranged annually for the members in the network. The objective of the event is to give the members a chance to meet in person to network and share new knowledge. In 2014 Lahti University of Applied Sciences hosted the event and the organization work was recorded for a bachelor's thesis. The thesis was written as a handbook that could be used by other NIBS member schools when they host the conference. This is one of the reasons this case was of interest, the other reason is that the event is hosted by universities having both other universities as well as their students as target groups. The conference was a three-day event that included seminars, meetings, company visits and a business plan competition for students. The event management team consisted of seven faculty members and nine students.

Looking at similarities of this event and the main cases there were three things that stood out, the conference was an on-campus event, it partially had the same target groups and it also contained a challenge for students in the form of a competition. The dissimilarities were that this event is a conference and not an interactive challenge event, it was only three days instead of a full work week (or two) and the target group was partially different, since this event was addressed to business students. Still the conference and especially the detailed documentation of its organization had a lot of insight and good ideas to give. For instance, examples of detail planning.

4.1.5 Comparative Case – Demola

The Demola organization is an online platform which's objectives are to function as an interconnecting agent between students and companies and create conditions for co-creation between these two parties, resulting in new, innovative ideas. Thus, students will also learn about team and project work in an (often) multidisciplinary team. The online platform offers different kind of projects topics ranging from humanistic to technology themes. The projects are eight weeks long and are to be performed on the side of the students' normal studies, with an estimated 10-15 hours of work required per week. For this they get study credits and an internship certificate as well as the intellectual rights to their ideas. Students can apply for these projects directly via the platform's web page, or then universities can set up Demola courses in somewhat of a franchise fashion.

The most prominent similarity between the Demola platform and the main cases is the objectives, which are very much the same. The target groups are also very similar, being both students and companies, even if the Demola projects are not exclusively technical challenges for technology students. The differences lie in the setup of Demola, being an online platform with projects that span over several weeks, whereas the main case events are all, under normal circumstances, arranged on campus and have the students to work intensely and exclusively on their projects for only one to two weeks. The franchise style of arranging Demola courses at universities also differs from an event arranged under the host name, where the event can be used to strengthen the host's own brand. Even so, having the differences being more than the similarities, also Demola as a case offered ideas that could be incorporated in an engineering challenge event.

4.1.6 Inference of Researched Events

Amongst the three main cases many similarities were found, out of which of course a few were to be expected, because of the criteria for choosing the study cases. Also things that were not quite the same but similar enough to support each other were found. These findings were then seen as best practices and used in the handbook, as well as in Technobothnia's own preliminary event plans, to build up the basic structure of the event. A few examples of these findings were the workload (200-400 hours for event management), budget (35-45 euros/student) and organizational timeline of the events (most intense work start 6 months prior), as well as project group composition and sizes (5-7 students, mixed groups). Not to mention general objectives of wanting the students to get an experience close to real work life at the same time as gaining soft skills and project-work know-how. All of them also incorporated companies in the student projects, albeit in different ways.

Differences between the events were for example the length of the events (one or two weeks), the source for their project topics (real corporate cases or theoretical cases) and the way the company contacts were utilized during the event. These differences were though not seen as something part of the fundamentals of the events, but more of individual choices regarding the style of the event. A more significant dissimilarity was that, that two of the events were open for non-local students, whilst one was arranged for the own students only. But neither this was seen as something that fundamentally affected the

basic setup of the events. Though it did of course affect certain areas of the planning and organizing of the events. More detailed information about the main cases can be found in *Appendix 2*.

Taking the comparative cases into consideration as well, the studies of both of them confirmed that their respective concepts were not the right choice for an engineering challenge of the type that this project aims for. Mainly because the NIBS event was a conference, which to its nature is not particularly interactive for the participants, and projects of the Demola platform did not offer the intense, on-campus experience that the events of the main cases present.

All of the studied cases, both main and comparative ones, did provide good practical tips and experience from lessons learnt. Especially the interviews with the event managers of the main cases brought attention to details that might otherwise have been overseen. Examples of this include “have enough staff”, “start small”, “make sure to put everyone’s expectations on the right level” and “get a LOT of extension cords”. Something that was also highlighted was the importance of interconnecting with the students. This could be done by having the teacher coach check up on them briefly once every day or have the students come in personally with hand-ins, by meeting up for coffee breaks in common spaces or to let them meet up with their company contacts in relaxed environments.

And one thing that all the three main cases, as well as the Demola platform to some extent, had in common was that the main focus of the event was not the end product or the results of the students’ work during the week, but the process of the work itself. Even though there were elements of competition, the main goal was to learn how to work in a group, to work towards a client, to see the benefit of others knowledge and to generally improve the students’ soft skills. Because, and as proved in chapter *2.3 Soft Skills in Engineering*, this is a skill set that many engineer students do not possess.

4.2 Target Group Feedback and Opinions

The main cases that were studied had the task of giving ideas as for the main structure of an engineering challenge event. The opinions of the target groups were of course also of both interest and importance. As mentioned in the previous chapter about methodology,

the role of the feedback and opinions of the target groups would be to add to the detailed planning of the event and being the decisive voice in a case of equally weighty options.

In this chapter the results from the studies of the target groups will be presented and a summary will be made in the end.

4.2.1 Students

Looking at the combined results from the two complementing student surveys of the Saxion IPW the feedback results were generally positive. As stated in the chapter about methodology the survey results were not studied in detail, because they were thought to not hold a core role in the overall picture. So in this chapter the findings will be described in a general manner.

The questions asked of the students were divided into eight different categories, *General Information, The Projects, The Task, The Project Group, The Coaches, Support and Extracurricular Activities, Rewards and Benefits and Own Thoughts and Tips*. The answers to the open-ended survey were classified in a general manner of being positive, neutral or negative, in regard to both the participants experience and their correlation to the events objectives. In *Figure 6* the distribution of the answers is shown. The general information was mainly part of the survey to see what type of students participated, looking at study year and discipline, to ensure that at least some width in the examined group was achieved. Thus this category, as with the category where the students could give own general comments and suggestions, was not regarded when classifying the answers.

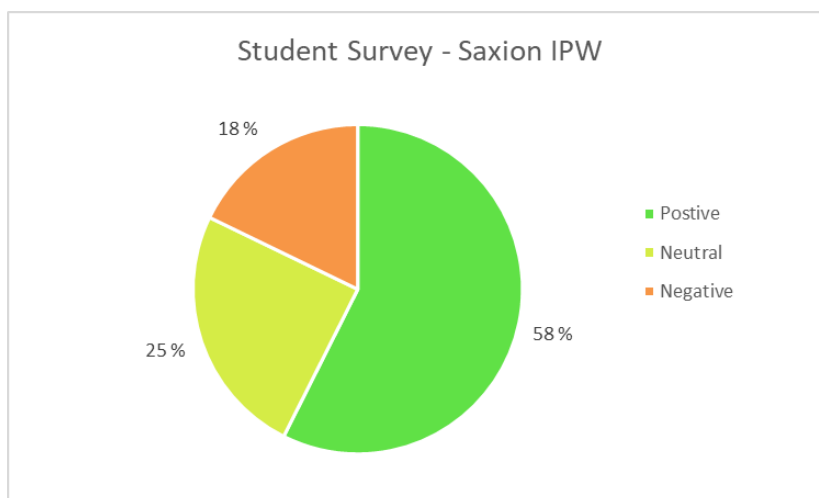


Figure 6. The distribution of positive, neutral and negative answers of the students participating in the surveys about the Saxion IPW.

Looking closer to the answers from the students reveals that not having the option to oneself chose neither your project topic (apart from the senior students functioning as team leaders) is somewhat of a thorn in the side for many. Though most still did acknowledge the benefits of being dealt **a topic**. Amongst the things mentioned was the fact that you rarely get to choose your own colleagues or work tasks in real work life and also the benefit of stepping out of your own comfort zone and challenging yourself. They could also see benefits in both working with a project topic within their own field of expertise, as well as something they weren't conversant in. This also translated to the project groups. They did see benefits in being assigned to a **mixed group** without any possibility to influence the group setup. **The size** of the groups (6 people) was also seen as good. In the main, the feedback from the students did support the system of semi-randomly assigned topics and project groups.

Looking at **the tasks** the students had to perform during the week, and the weekly program, they were happy with it in general. Complaints that arose was mainly about miscommunication or lack of communication about the project topic or deliverables. The online environment of the IPW for 2022 was also critiqued, but since this thesis does not cover online events, these comments are of little relevance. Though lessons could be learned, and suggestions taken into consideration, if ever planning to use online tools or having a hybrid working environment for the project groups.

The coaches for the project groups, being both the company "client" and teacher mentors, were given mainly positive feedback. What was highlighted was the importance of engagement and enthusiasm from the coaches, and availability. Communicative issues also arose in this category and not seldom was the role of the team leader criticized, the team leader often being the one with the sole contact to the coaches. The result from this category shows that communication and availability is very important and that the role and responsibilities of the team leader could be questioned.

"Yes [the coaches were available enough], we had a great communication and in case of any questions they were always there to help and keep us on the right track."

-Quote from student feedback.

As far as **extracurricular activities** and other support from the school, none of students participating in the survey had much personal experience of this due to the event being

online for the past two years and the setup of this arrangements thus different than under normal circumstances. Coaches, rewards and benefits.

The feedback on the **rewards and benefits** for students, in the survey questions referring to study credits, competitions and prizes and company contacts, was mixed. But this was also partly due to the online environment of the IPW. Especially mentioned though, was the competitions with money prizes, where some thought that the competition took attention away from the main goal of the week, which is to learn something new. Many students also did not find the competitions motivating, because the chance of winning was so slim, due to the sheer size of the event.

Looking at the feedback as a whole, the positive general outcome of it indicates that from the viewpoint of the participating students' experiences, the event objectives were met. The open-ended questions gave little to none measurable parameters as such and was thus hard to analyze in a statistical fashion. But as the results from the survey's had a more supporting role, rather than a principal one, it was thought that this level of accuracy was sufficient. The advantage of the open-ended questions was that this allowed for the students to freely "speak their mind" and open up about both good and bad experiences. This resulted in a lot of practical suggestions that were used in the making of the handbook. A compilation of the results from the survey can be found in *Appendix 3*.

What the survey results also showed was that most students seemed to see the benefit of the objectives of the event, but for those who did not, the experience was mostly negative. The support from both the survey as well as the theoretical research shows that it is a good and functioning concept. If there still is negative feedback about this, it could either be because some people just don't agree with the concept, or because they did not understand it. For those who just don't like the concept, little is probably to be done. But if the main problem then was that they did not understand the concept, this is something that can remedied with clear communication about the event objectives, so as to set the participants expectations right.

4.2.2 The Universities/Technobothnia

When presenting the general idea of an engineering challenge event for the Technobothnia steering group, their initial reaction was positive. They saw the benefits that this event

could give to Technobothnia and the universities. For this event to be able to happen, the universities would have to make the practical administrative arrangements for the event. Such as deciding on a suitable time for it to be held, so as it would fit in their respective curriculum, get it registered as a course and decide on study credits, reserve staff resources and set a budget. The technical deans of the universities, that together with the Technobothnia coordinator make up the steering group, were of the opinion that if they wanted the challenge to be held, they could make for it to happen.

This then effectively removed all issues of practical administrative arrangements from this step of the project, but still left the challenge of making a good enough practical suggestion that it would persuade the steering group to take an actual decision.

After studying both the cases and the student feedback from the Saxion IPW a first draft of an event plan for a Technobothnia Engineering Challenge was made, an English translation of this draft can be seen in *Appendix 4*. This was presented to the steering group and as far as it collected responses, they were generally positive. There were suggestions and thoughts about the details of the event, such as program content and possible cooperation with other organizations. As academic decision making is not known for its speed, at the time of writing, these matters are still under progress.

The project had though aroused general interest both on and off campus and contact was made by two different projects. The first being a new project by VASEK, a regional development company in Vaasa (VASEK, 2022), that is to work for keeping the newly graduated workforce in the region. The second, a Novia UAS research project called Praktik 2.0, working with developing the system of internships of the university to raise the profile of the educations and the university (Praktik 2.0, 2022), inquired about the possibility to cooperate on the project and also offered help if needed.

4.2.3 Companies

After having made up a first draft of the event plans, these plans were presented to and discussed with representatives from the four companies that had been contacted. The representatives all work within the field of university (and/or other) collaborations and were thus seen as the right people to talk to. The discussions started with a short briefing

on this project, basically an abbreviated version of the draft sent to the Technobothnia steering group (*Appendix 4*).

The four companies that were contacted described themselves as working in the following businesses: Industry Project Business (~300 employees), Energy Industry (~35 employees), Technology Company operating within Marine and Energy Sectors (~3500 employees in Finland) and Digital Services (~50 employees).

After the initial presentation, the companies were asked if they, on a theoretical level, would be **interested in participating** in such an event. All four said yes. One company was really enthusiastic and wanted to know, at the end of the discussion, when they would get information about when and where the event would take place. When being asked what they thought of a **participation fee**, and the suggested sum of 750 euros, all said that it was reasonable for them, and they understood that costs had to be covered. The general consensus was, that as long as it was under 1000 euros the decision was on a lower level within the organization, which made decision making easier.

The discussion on **legal rights** of the ideas brought forth interesting thoughts. The companies seemed to think, in general, that the idea would belong to the creator. On the other hand, if the company comes in with a quite specific case, they are naturally themselves interested of the rights to the idea. Of course, if the students know they are not going to own the rights to their own ideas, it might be demotivating and they might leave good solutions left untold to the companies, solutions that the companies might not themselves have come up with. One suggestion was that the issue could perhaps be bypasses by hiring the students, but would then all five in the group, or just a few, be hired? Many smaller companies might not have the possibility to offer, or promise, employment to several people in one go. Another thought about this subject was that the companies, having been the ones coming in with the case and giving details about it, would have priority purchase rights of the ideas, and they could be paid for to the students in the form of a stipend. Which in Finland also is a tax-free income and would not affect the students' rights to study grants. Obvious was, that these matters need to be discussed with legal experts and agreements need to be signed before the event. In relation to this, one of the companies had experience of participating in similar events (hackathons) and gave the good advice to add an agreement on photography rights, that would be signed by the

students. This since the event organizer would most probably want to take pictures during the event.

When discussing the **optimal timing** for an engineering challenge event, the summer months were ruled out straight away, this being the general vacation period. The middle of fall was suitable for most, though the very beginning of the year seemed to be the most favorable timing. This due to the event then naturally chiming in with the summer job/trainee application period.

The topic of **expectations of participation** gave a rather unanimous answer of “brand visibility and recruiting possibilities”. They wanted to get to meet and interact with the students. The companies were of course also interested in the ideas the students might have and the development opportunities of these, but also here highlighted the close contact with the students and the mentoring role of the company representatives. But the project results were generally seen as more of a bonus than the main objective.

As for **beforehand information** the companies were pretty straightforward on this issue. They wanted pure facts about for example, the composition of the groups they would work with (disciplines, experience, academic year etc.); event schedule with times, places and contact persons; requirements for the project topics they would have to come up with; resources input from their side (costs, working hours etc.).

The companies were also asked if they thought it would be possible for them to have a **“backup case”** for their project, in case the composition of the student group they were assigned was not optimal, or if some other company would pull out in the last minute. The companies acknowledged that coming up with suitable project topics is not done easily, but that a “plan B” could be possible. Especially if it would be sufficient to just change the angle of the primary case. This was hence seen as a doable.

The discussions were in general enthusiastic, and the company representatives had a lot of ideas and suggestions. The idea of imbedding a competitive element to the challenge was well met and gave a few suggestions. Such as having job interviews as a prize, which would be a more flexible solution than offering a job position as an award, which one company had previous experience of. Also awarding good team spirit was mentioned, and to embed smaller challenges in the type of voluntary “minigames” into the event. They also

highlighted the importance for them of close contact with and mentoring of the students, which they also saw as a means to get better ideas and results to the projects at the end of the event.

4.2.4 Inference of Target Groups

The findings from the target groups all pointed in the same direction and were thus supportive of each other. Examples of this were the group compositions (mixed groups of around six people), the importance of support and close contact between students and companies, the timing of the event (beginning of the year) and also the importance of sufficient practical information.

No real contradictions and dissimilarities occurred, and this both amongst the target groups themselves as well as compared to the findings of the case studies. Differences were more of the nature of “personal taste” than of differences in the actual concepts. Examples including the addition of competitive elements or not, the type and nature of said competitions how project groups and topics are best assigned and how to solve the issue of legal rights.

The findings from the target groups also aligned with the findings from the theoretical studies. For example, group size, advantages of project-based learning and experienced or expected benefits, such as gaining soft-skills and making new contacts.

A very interesting observation was, that during one of the discussions with a company representative, the representative’s own thoughts and ideas of an optimal event concept very much mirrored the arrangements of the Saxion IPW. And this without the company representative having been given any detailed information about any of the studied cases. As mentioned in chapter 4.2.3 *The Companies*, the only briefing of the concept the companies were given, was a very short presentation of a preliminary plan.

4.3 The Handbook

The handbook (*Appendix 1*) was the document where the gained knowledge from the theory and practical studies was gathered in a compact and handy format. The handbook would be used as a base for the Technobothnia Engineering Project Challenge, as well as it could be used by other universities planning on arranging something similar. A Word-template

was used as the base for the handbook, where the basic structure of the document already existed. Such as graphic profile, chapter division and headings and table of content. The template was modified to suit its purpose as a handbook for an engineering challenge. For example, Technobothnia stock pictures were used for the front and first page (*Picture 1*) and of course headings and headings/footings were customized. The main part was of course the content. For the handbook to truly be a useful tool it had not only to contain the right amount and type of knowledge, this information also had to be presented in a way that the reader could easily understand and embrace it.

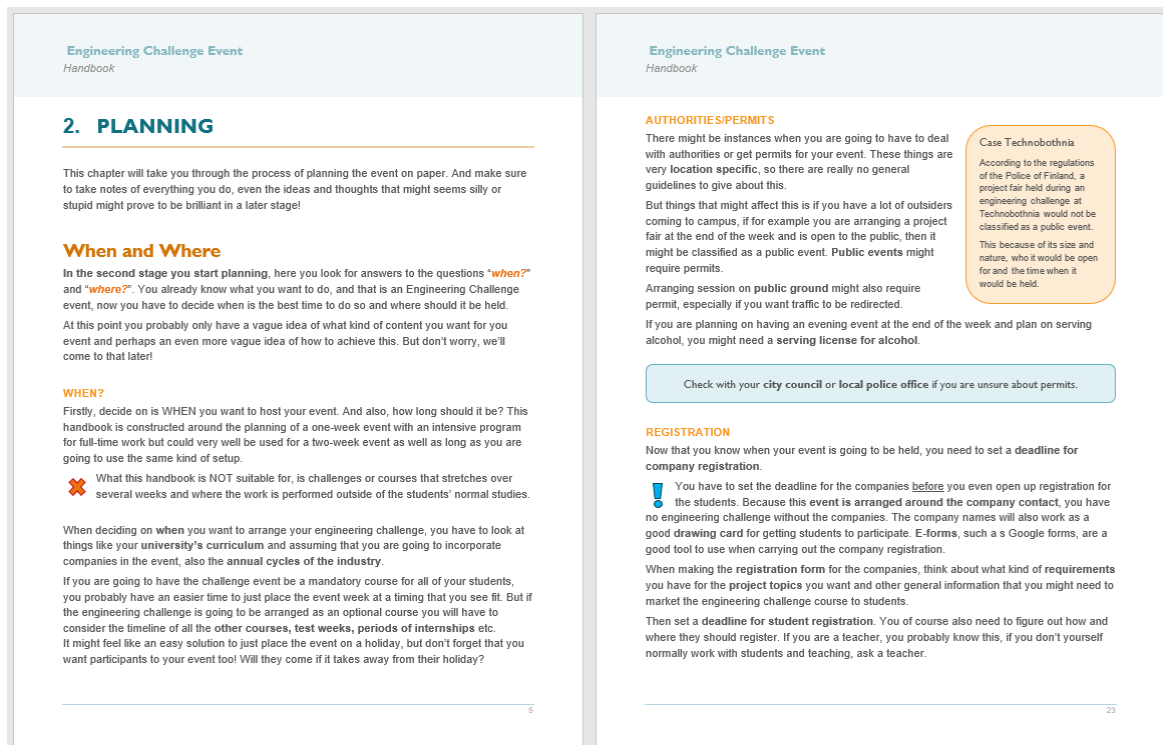


Picture 1. The front page of the handbook, as well as the first page with table of contents where the chapter division can be seen.

To achieve this, the handbook was written using the simple fundamental structure of *figure 4* on page 19, being a five-step action line describing the life cycle of an event. These five steps were *Pre-planning: Objectives and Ideas*, *Planning*, *Execution: Organizing and Preparing*, *Execution: Hosting Event* and *Evaluation*, and were used for the chapter division of the handbook. A set of simple fundamental questions were also used to further break the process down into more manageable portions. These questions were “**why?**”, “**when?**”, “**where?**”, “**what?**” and “**how?**”. This chapter division, that can be seen in *Picture 1*, made for a chronological and logical reading experience and was in line with the

theoretical findings on how to write a handbook that came up in chapter 2.4 *Event Planning & Manual*.

To avoid long, tedious texts in the handbook at the same time as allowing for the different subjects to be easy to find, the body text was divided into short paragraphs with describing intermediate headlines, as seen in *Picture 2*. The text was divided according to the different subjects addressed, here following the same basic setup used in many of the theoretical sources, one example being *Figure 5* on page 21. An index at the end of the handbook was added to make it even easier to find specific subjects.



Picture 2. Two example pages from the handbook, showing how the text was divided as well as the use of colors, fonts and graphics to highlight certain passages.

Different colors, text formatting and symbols were used to point out key words or important information. This was also something supported in the theory of writing handbooks, as to make for an easier reading experience for the reader. Bullet lists, that could be used as check lists, and tables were also used, when possible, for the same reasons, as seen in *Picture 3*.

Engineering Challenge Event Handbook

Table 1.

Workforce and -hours

Assignment	Tasks	Total time
Event team		
Event manager	Plan and coordinate the event organization	200 hours
Event assistant	Help the event manager	100 hours
Event hosts	1-2 sets of "extra hands", could for example be students.	20 hours each
	<ul style="list-style-type: none"> Helps with practical issues before, during and after the event. Tasks include preparing workspace for the project groups, running errands, cleaning up afterwards etc. Welcoming and guiding participants that are new to the campus. 	
Mentors		
3-5 University Mentors	1 teacher (or other staff) / project topic / 2-3 student groups	15-20 hours each
	<ul style="list-style-type: none"> Help, if necessary, to recruit companies through own contacts. Brief the project groups about the week's requirements, schedule, deliverables etc. Coach the project groups during the week. Follow and assess the groups work, participate in "client meetings" and final presentations Collect deliverables, grade the students - other administrative work, such as registering study credits etc. 	
5 Company Mentors	1 Company Mentor / project topic / 2-3 student groups	10 hours each
	<ul style="list-style-type: none"> Preferably invite the groups to a company visit. Brief the student groups about the project, acting as "client". Coach the group during the week. Participate, as client, in a project meeting with the groups once during the week. Participate in the final presentation of the projects on the last day. Give input to the University Mentors about the students' grade. 	
Other		
Jury members	5 (same amount as project topics)	4 hours
	<ul style="list-style-type: none"> Needed IF some form of competition is arranged as part of the challenge. Can be staff, company representatives or other prominent, suitable persons. Participate in the final presentations, judge these and participate in prize ceremony. 	

Engineering Challenge Event Handbook

Suggestions of questions you could use in your survey and/or feedback discussion:

- I thought the beforehand information was sufficient (1 - I do not agree at all / 5 - I very much agree)
OR What are your thoughts about the beforehand information?
- The opening session was meaningful (1-5)
OR How did you experience the opening ceremony?
- If participating in the workshop XXX: I thought the workshop was helpful/interesting/fun (or other suitable description) (1-5)
OR If you participated in the workshop XXX, what did you think about it, was it helpful?
- I had a lot of help from the teacher/company mentors (1-5)
OR Did you get a good contact with your teacher/company mentor?
- The estimation of workhours equaled to the real amount of work (1-5)
OR Was the number of workhours resourced for you for this event suitable?
- Our company made good contacts during this event (1-5)
OR Do you feel that you connected with the students? Did you find any possible recruits?
- Our company got usable solutions from this project (1-5)
OR Are you satisfied with the solution the project groups came up with?
- The overall arrangements of the event were good (1-5)
OR What is your opinion of the overall arrangements of the event?
- Do you have any suggestions, thoughts or ideas you want to share?

When receiving the feedback, you have to go through it and analyze it. Making the survey as an e-form, for example using Google forms where the participants can answer anonymously, will automatically give you nice graphics of your close-ended survey questions. If you succeeded well, the feedback will be positive. Remember though, that even the most successful events always get their fair share of negative feedback. You can never please everyone. So don't get to beat down about the negative things.

Picture 3. Tables and bullet list in the handbook could be used as easy checklists.

When knowing which general topics were to be addressed and how to set this up in a logical fashion, all the information from theoretical sources, mainly Shone & Parry (2015), Raj, Walters and Rashid (2013) and Do (2014), the studied cases and the input from the target groups were gathered beneath these. The combined information was compiled into suitable paragraphs, where interesting case examples were sometimes highlighted to give a practical example of the described subject (as seen on the top hand right in *Picture 2*).

As for the actual text, the good advice about the practicalities of writing a handbook that came up in the theory (chapter 2.4 *Event Planning & Manual*) were taken into consideration. This included using clear and simple language and to directly address the reader. In the handbook, the text is written for the reader, addressing the reader as "you" and the assumed event under planning as "your event". The text was written in a relaxed manner, also adding comments of more humorous nature every now and then.

Since this thesis project stems in the research questions regarding whether or not an engineering challenge event could be suitable for Technobothnia, many of the findings in the thesis are of course angled in regard to that. This means that some topics have been addressed on a very superficial level, or even not addressed at all, thus excluded. Since the handbook was meant to be a tool also for others, it had to be written from a more general perspective. This means that some of the topics that the thesis excluded, are included in the handbook. No detailed insight could as such be offered in these matters, but at least the issues could be brought to the reader's attention. Examples of this are authority contact and permits, and marketing and PR.

4.4 Result Conclusion

The general consensus of the results was that an engineering event challenge is a good idea for both universities and companies to get a closer contact through the project work of the students. The results support the theory that such a collaboration is a good way for companies and students to meet and get connected, at the same time that the students get an experience close to real work life and the companies might get the benefit of new, innovative ideas. The concept presented by the investigated case found support amongst all target groups (Technobothnia/universities, students and companies).

The results of the study could be divided into two categories, the Technobothnia specific results and the universal results used for the handbook. As for Technobothnia, the result conclusion is here presented in the form of a revised first version of a plan for the Technobothnia Engineering Challenge.

Technobothnia Engineering Challenge

- 1 week event, held in **January**.
- Open for engineering students from Novia and VAMK UAS and the University of Vaasa. **All disciplines and academic years**.
- **50 participants**, divided into 10 groups of 5 students each.
- **Project groups** are to be "designed" by the event management team, so to be mixed (disciplines/years) and suitable for the project topics assigned to them.
- Students are awarded **study credits** for their participation.

- Project topics come from **3-5 different companies** working in different fields, were 2-4 project groups work independently with the same company/on the same project topic.
- **Requirements for the project topics:**
 - a technical challenge suitable for engineers
 - something that allows for innovation and free thinking
 - nothing too specific, as no certain field of expertise can be guaranteed
 - have a realistic prospect of getting a usable solution in only 5 workdays
- Each company participate with one “**company mentor**”, also taking on the role of “client”, working closely with their respective project groups. The students should be able to keep close contact with their mentor. The estimated total workload of the mentor, including preparing the project topic, would be **~10 hours**.
- Companies can also participate with “**communal mentors**”, that all students can ask advice from. This contact gives added value to both companies and students.
- **3-4 jury members**, that can be teachers or business or industry representatives. Though not the same people as are functioning as mentors.
- The project groups also have help from a “**teacher mentor**”. All together this makes for **3-5 teachers** working with one project topic/2-4 project groups. The teacher follows, guides and grades their groups as well as taking care of administrative task, such as giving out study credits. The teacher mentor should be easily accessible for the students, even if they are not to participate in the students’ work sessions. Estimated total workload, **15-20 hours**.
- There is a need for an **event management team**, consisting of 1 event manager (Technobothnia coordinator) and 1 event assistant, for the event planning and organizing.
Estimated workload, **event manager: ~200 hours**
Estimated workload, **event assistant: ~100 hours**
- **Additional help**, 1-2 people, with the event organizing could be asked from business or marketing students, in cooperation with/as part of a suitable course touching on the topic of event management.
- Budget: **50€/student = 2500€**. This would cover necessary purchases, possible renting of equipment and the salary of the even assistant that would need to be hired.
- **Two separate competitions**. One which will reward **distinctives students** with job interviews with the participating companies. To counteract the possible competition between team members this might cause, the second competition will reward a whole group for **best team spirit**.
- **Preliminary program:**

- Prior to the event week: The companies get information about the composition of the project groups assigned to them. The project groups get to know which company they are assigned to and general information about their topic. The students are to do background research on their “client”.

- MONDAY
Opening session.
The project groups visit the companies with the teacher mentor, where the “client” briefs them about the case.
Project work.
Extracurricular/voluntary workshop in teambuilding or other suitable subject.

- TUESDAY
Communal start of the day, possibly with inspiring TED talk or similar.
Project work.
Meet-up with teacher mentor.

- WEDNESDAY
Project work.
“Client meeting” with company mentor, teacher mentor also attends, so the companies can meet the students, give feedback and make suggestions.

- THURSDAY
Extracurricular/voluntary workshop on e.g., presentations skills, poster making or report writing.
Project work.
Quick meeting with teacher mentor in afternoon. Final report and other deliverables to be handed in at the end of the day.

- FRIDAY
Presentation of project results in smaller groups, which allows for more questions and discussion.
The mentors (teacher and company) evaluate and grade the projects, whilst the students prepare for the afternoon event.
Communal lunch.
Project fair, where students and jury members can look at the projects.
Jury deliberates on winners, whilst students clean up their projects and workspaces.
Award ceremony and ending session.

Not all issues brought to light in the study are covered in this preliminary plan. Some because they do not affect the Technobothnia event, such as authority contact and possible permits from them. Others are not addressed because of the still early stages of the planning of the event.

All these matters are though taken into account in the handbook (*Appendix 1*), which is the conclusion and end product of the findings in general. The general interest, both from companies and projects, show that there is a need for such a handbook and the event(s) it hopefully will generate.

5 Thesis Conclusion & Discussion

This thesis has looked into the concept of an engineering challenge event/course for university students, as a means to let them advance their soft skills and connect with the industry at the same time that this would deepen the relations between universities and companies. The thesis was limited to on-campus events and did not cover online events.

The work started with reviewing literature in the four areas of *experiential learning*, *industry and university cooperation*, *soft skills in engineers* and *event planning & manual* with the aim of getting a good theoretical base for the work. The practical research method chosen for the project was case study, consisting of three main cases as well as two comparative ones. The main cases were studied by interviewing their respective event manager, and also by studying what material were found about them online. Out of the three main cases one was studied deeper, the Saxion International Project Week, by participating in the event of 2022 and also by performing a survey among the students participating in the event. The comparative cases were only studied by the material found on them online. More about this in the following subchapter.

The results from the research could then be used to form a preliminary plan for a Technobothnia Engineering Challenge Event. This plan was presented for reviewing to the Technobothnia steering group, consisting of representatives from each of the three universities that own Technobothnia. The initial response was positive.

Four companies, representing the local industry, were contacted to screen their interest of participating in the event. The companies were given a short briefing about the preliminary plans and then asked for their opinions. The feedback from the companies was positive and there was a definitive interest in such a cooperation.

This thesis was limited as to only cover the planning of the Technobothnia event, which at its initial stages are now done. The actual arranging and hosting of the event has, at the time of writing, not yet been done.

Other universities, apart from the three than own Technobothnia, had already in the beginning of the process shown interest for the project. Because of this, it was decided that the outcome of the project would be adapted to a more general plan that could be used by others. The collected findings from both the theoretical and practical research were

combined in a manual on how to plan and organize an engineering project challenge event. The literature studies on how to write good instructions and manuals were used to make the handbook, *Engineering challenge Event – Handbook (Appendix 1)*, a both interesting and instructive read.

5.1 Answering the Research Questions

The main research question of this thesis was:

- *Can the concept of an engineering challenge/event be copied and implemented at Technobothnia?*

Leading to the two follow up questions:

- *Which would be the best way to arrange this event in view of one of Technobothnia's main objectives: to develop and support cooperation between the universities and the local industry?*
- *How to arrange this event so that all three parties (universities, students and companies) benefits from and are satisfied with it?*

In order to answer the primary question, the two latter had to be addressed first. This was done by firstly looking into literature about *experiential learning, industry and university cooperation and soft skills in engineers*. Studying these subjects would give a theoretical answer to the research questions, that could then be compared to the results of the practical studies of three main event cases, along with theoretical studies of two comparative event cases. The main cases were the Saxion International Project Week, the University of Sheffield Global Engineering Challenge and the Intensive Program Engineering Visions, co-arranged by seven European universities. These events were chosen because of their compliance with the theoretical setup of an engineering challenge event, based on the literature studies.

The two comparative cases were the Network of International Business School Conference arranged in Lahti in 2014 and the Demola platform. These two cases were chosen because they shared some of the objectives of the theoretical setup, but still were different enough

to not qualify as main cases. The dissimilarities were the reason for them being interesting, as these offered a possibility to challenge the appropriateness of the theoretical setup.

The applied research of the cases supported the theoretical assumptions; thus, a method of best practice had been achieved. This also gave the answers to the two latter research questions:

- *An engineering challenge event, arranged in close collaboration with local companies, where students get to work on company provided cases would strengthen the relations between Technobothnia/the universities and local industries.*
 - *By taking the wishes and needs of all three target groups into consideration it is possible to arrange an event that satisfies all parties. This solution is presented in the preliminary plan of the Technobothnia Engineering Challenge in chapter 4.4.*
- Result Conclusion.*

There is a good possibility that amongst the 2400 students at Technobothnia there would be 50 students that would be interested in participating in this event. For this, three to five companies are needed to supply the project topics and company connections. Four companies have already been contacted and have shown interest. And the Technobothnia steering group had said that the practical arrangements are possible to do.

This then answers the primary research question with a simple “yes”, this could be done at Technobothnia.

5.2 Discussion

This thesis project was mainly based on qualitative research methods, such as semi-structured interviews and open-ended question surveys. The challenge with these research methods is to keep an unbiased approach to the results, which is always hard. More objective results could probably have been achieved with more structured interviews and closed-ended questions in the survey. The risk of in that way losing the valuable information that comes with a more open approach to the answers was weighed against the more incomparable results of said relaxed approach. It was deemed that in this case opinions, experience and advice was more valuable than systematic comparability.

Hence the validity of this thesis is seen as sufficient for its purposes.

Suggestions for further research include a deeper dive into the marketing and visibility aspect of this type of events. How do you market it most efficiently to both students and companies as to get interest but also to set expectations at a level that mirrors the objectives of the event? Another suggestion for further research would be the issue of the legal rights to the ideas from the engineering challenge.

And naturally, a follow up research of the Technobothnia event when it has been arranged would be very interesting, as to see how well the plan corresponds to real circumstances. Equally, if not even more, interesting would be to see a similar follow up research done on an engineering challenge event planned and organized by the help of the handbook from this thesis.

5.3 Final Words

This has been a very interesting journey for my part, even though it was a journey made from the confines of my laptop screen, and not an actual journey to the Saxion IPW, as first intended. Due to the covid pandemic almost all contact with the people I have worked with during this project has been made via video conferences. But even so, I am very glad of the possibilities these new pandemic safe solutions have had to offer, and it also has made me personally realize how important it is with real life connections. Thus, seeing the value of events where we get to come together and work with each other face to face. Especially for the pandemic age students, were some of them have never even experienced university life other than via a screen.

I would like to thank all the people that have helped me with my research, and I hope my results will meet your approval. I also believe and hope that others will have use of this research and the handbook it resulted in. And please, if you ever use the handbook, let me know what you thought of it!

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APPENDICES

Appendix 1 – The Handbook

Appendix 2 – Event Manager Interview Results

Appendix 3 – Student Feedback Compilation

Appendix 4 – Technobothnia Engineering Challenge Week – first draft
(translated from Finnish)



ENGINEERING CHALLENGE EVENT

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Engineering Challenge Event – Handbook

Josefin Stolpe

Published in 2022 by
Novia UAS as part of the Master's Thesis
*Handbook for Planning and Organizing an
Engineering Project Challenge*

INTRODUCTION

This handbook is the result of a master's thesis in Industrial Management and Engineering that was written for Novia University of Applied Sciences in 2022 by Josefin Stolpe.

The aim of the handbook is that universities or other organizations can, with the help of the handbook, arrange an engineering challenge event/course that improves their industry relations, enhances their brand and offers the students a competitive course where they can improve their soft skills.

This is done by a **problem-based/project-based learning method** where students work together in groups for a one-week intensive period, solving problems for an industry client. This handbook is for an on-campus event and will not cover online events.

Since there is no such thing as “one size fits all” (more “one size fits no-one”) this handbook does not offer a ready-made solution set in stone. Instead, it will give you a **general plan** and ideas for how to customize this plan according to your own needs and highlight things you have to think about.

When planning an event, there are some main, basic questions you should consider.

These are “**why?**”, “**when?**”, “**where?**”, “**what?**” and “**how?**”. If you have answered these questions thoroughly before hosting your event, the chances of it running smoothly are just that much higher.

The set-up of the handbook follows a five-stage action line (as shown to your right in *Figure 1*) that follows the life cycle of an event. Every stage will be described in its own chapter and will give you the answers to the questions of “**why?**”, “**when?**”, “**where?**”, “**what?**” and “**how?**”.

Three main cases were studied for the making of this handbook. These are the **Saxion IPW** (*Case Saxion*), the **University of Sheffield's Global Engineering Challenge** (*Case Sheffield*) and the **Intensive Program Engineering Visions**, arranged at different universities every year (*Case Engineering Visions Poland, Germany and The Netherlands*). The own plans for a coming *Case Technobothnia* in Vaasa, Finland, were also used as reference in this handbook.

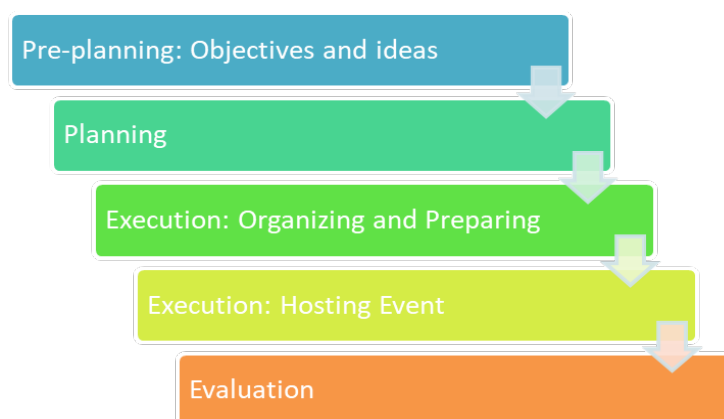


Figure 1. The five stages of event organizing.

1. PRE-PLANNING

The first stage is the pre-planning. And the first thing you have to do is to figure out what you want to achieve with your event. What is your motive? This will answer the question of “*why?*”.

Since this handbook is aimed for a very specific type of event, the objectives are already set. So, if you want to host an event that will achieve the following goals, this handbook is for you.

The Engineering Challenge Event aims to:

- Improve soft skills for the participating engineering students. These include for example teamwork, communication, presentation skills and project work.
- Give the students a “close to work life” experience by working with projects for a client.
- Improve the engineering students innovative thinking.
- Create a network possibility for students-companies-universities.
- Improve university-industry cooperation and relations.
- Help universities to improve their brand by adding a competitive course to their curriculum.

The following thing to do would be top draft and outline plan. For example, to think about where you want to host the event, look for precedents to benchmark from, costs and revenues and who the main target groups are. Again, this is something that is already done for you, so please take a look and see if the following matches your own initial plans.

The Engineering Challenge Event Pre-Plan:

- Main target groups are engineering students, local industry/companies and the own university
- One week event
- On-campus event using mainly own facilities/venues and own staff/faculty
- Non-profit event

2. PLANNING

This chapter will take you through the process of planning the event on paper. And make sure to take notes of everything you do, even the ideas and thoughts that might seem silly or stupid might prove to be brilliant in a later stage!

When and Where

In the second stage you start planning, here you look for answers to the questions “**when?**” and “**where?**”. You already know what you want to do, and that is an Engineering Challenge event, now you have to decide when is the best time to do so and where should it be held.

At this point you probably only have a vague idea of what kind of content you want for your event and perhaps an even more vague idea of how to achieve this. But don't worry, we'll come to that later!

WHEN?

Firstly, decide on **WHEN** you want to host your event. And also, how long should it be? This handbook is constructed around the planning of a one-week event with an intensive program for full-time work but could very well be used for a two-week event as well as long as you are going to use the same kind of setup.



What this handbook is NOT suitable for, is challenges or courses that stretch over several weeks and where the work is performed outside of the students' normal studies.

When deciding on **when** you want to arrange your engineering challenge, you have to look at things like your **university's curriculum** and assuming that you are going to incorporate companies in the event, also the **annual cycles of the industry**.

If you are going to have the challenge event be a mandatory course for all of your students, you probably have an easier time to just place the event week at a timing that you see fit. But if the engineering challenge is going to be arranged as an optional course you will have to consider the timeline of all the **other courses, test weeks, periods of internships** etc. It might feel like an easy solution to just place the event on a holiday, but don't forget that you want participants to your event too! Will they come if it takes away from their holiday?

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And the industries then? If you want company representatives to take an active part in your event, you also have to take their schedules in consideration. Easy example, July is a vacation month for many. So perhaps not then? This also applies to national holidays.

Many companies also have certain times during the year that they are **extra busy**. It might be due to annual service shutdowns or busy sales seasons. If you already have a few candidates for the company collabs, be sure to check the timing with them as well.

Be also sure to check that your event timing does **not collide with any other event**, academic or industry ones!

Sorry to say, but there are no easy fixes for this one. You just have to take a good look at your and everyone else's calendars!

 Also remember that planning takes time, so does arranging all the practicalities! If you find that the optimal timing for your event is in only a few months away, you could seriously consider postponing the event with a year. *(Have a look at the timeline in Appendix 1.)*

Once you have decided on a date, **be sure to put this in the curriculum**, your calendar and everyone else's too! And it's not a bad idea to send out "**save the date**" invitations to people and organizations you know you are going to collaborate with.

WHERE?

When the date is set, think about where you want to have the event held.

This of course requires that you have a general idea of how much space you need. Which is of course dependent on how many student participants and what kind of program you plan to have. Let's have a look at that next.

Workspace for the students. You will probably do just fine with normal classrooms and you can have a few student groups working in the same room. How many rooms you need depends on how big they are, and how many students are going to participate. But at least now this, you need workspace for the students!

Workshops or laboratories. If you want the students to be able to make prototypes or models of their projects.

Common rooms. If you have shared spaces where the students can have coffee and/or lunch breaks, this will help with the community feel and teambuilding process.

Meeting rooms. Occasionally used for when the students meet up with their company client, mentors or for project presentations and such.

Auditoriums or similar, if you plan on having an opening or ending session.

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Big open spaces if you plan on arranging larger common sessions, such as interactive workshops, fairs or project poster presentations.

Now that you know a bit more about the space you might need, you have to ask yourself where you can find that space?

Do you have it on campus, or do you need to look elsewhere?

Renting facilities will affect your budget, another way could be to check with other universities, the city or even museums and other public spaces if you could perhaps use some of their facilities for free.

It is a good idea to make **preliminary bookings** of the venues you have in mind. These can always be changed or cancelled later, if necessary.

Case Engineering Visions POLAND

During the two-week event a poster session that the students had to arrange was held in a textile museum.

This gave added value to the experience for the students as well as providing a free facility for the session.

This was arranged as an exchange of services between the museum and the university.

WORKBOOK

! Once you've got this far, you can already see that there is A LOT of things that you are going to have to remember and keep in mind. If you haven't done so yet, start an **event planning workbook** where you write down all the things you have planned, booked and decided on. This is valuable information, especially if and when you are going to start to get help from others.

What

Now we start adding details. You know what you want to have, when and where. Let's fill the event with interesting program now and see what all is needed for that.


This is a large part of the planning, so to make a bit easier, this is divided into two sections: **Content** and **Organizational Matters**.

Content


MANDATORY or OPTIONAL

A free choice or a mandatory part of the curriculum? Both options have pros and cons.

Having the event be mandatory removes issues about when to time the course, because if everyone is going to participate it's **easier to schedule** it without colliding with for example test periods. But depending on the size of your department/university, having the challenge mandatory might give you **a bite too big to chew**. So it all boils down to **size**.

 Also, if you are going to have the event to be a fixed part of the curriculum you have to be **very clear with the objectives** of the course when presenting it for the students. This is a new event for them and where many courses might highlight the end result or a final score, this is the type of course where **the progress is most important**, not the final destination. Feedback from students in *Case Saxon's* event showed that if you're not clear about this, there's a big risk that the students won't understand the aim of the course, loose motivation and you'll get unhappy participants. That we do not want!

This risk is of course present also when arranging the event as a **choosable course**. But when taking the event course out of free choice, the students hopefully from start are interested enough to get acquainted with the course objectives and are motivated. The **pros are thus more motivates students** and might also be **smaller size = more manageable**.

 **The recommendation** of this handbook is to start out SMALL and arrange the challenge as a choosable course at first. Gain some experience, make some mistakes, learn what works for you and then go mandatory and/or big!

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SIZE

Five students per project group is a team size that is, supported in theory (problem- and project-based learning), practice (*Cases Saxon, Sheffield and Engineering Visions*) and feedback from students (*Case Saxon*).


To start out with a **total 50 participants** gives you an even split into **10 project groups**, which is manageable even with small staff and few participating companies.

$$10 \text{ groups} \times 5 \text{ students per group} = 50 \text{ students}$$


WORKFORCE AND -HOURS

This handbook recommends that you a couple/a few groups working **independently on the same project** topics. This **reduces the need of staff** at the same time it will give the participating **companies more than one idea/solution** to their cases.

In *Table 1* on the next page, you can see recommendation for workforce and workhours. These are based on the previously mentioned **50 students**, working in **10 groups of 5 students each**, and the recommendations above which gives a need of **3-5 companies**.

 If you want to arrange your event **twice or triple the example size**, you can pretty much just double or triple the workforce needed (but don't double the event manager, no one wants more than one boss!).

Other help that might be needed could include the **chief of security**, if you have a lot of “non-campus” people coming in for the event, **IT-staff, janitors** and other type of support staff for network passwords, keys/access permits, office supplies and spare tables etc.

 When recruiting staff, make sure that you have cleared with **their superiors** on how the staff is supposed **to relate to their work tasks** during the event. Is it something that they do as a part of their normal hours, or is this overtime work that entitles **extra compensation?**

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Table 1.

Workforce and -hours		
Assignment	Tasks	Total time
Event team		
Event manager	Plan and coordinate the event organization	200 hours
Event assistant	Help the event manager	100 hours
Event hosts	1-2 sets of “extra hands”, could for example be students. <ul style="list-style-type: none"> Helps with practical issues before, during and after the event. Tasks include preparing workspace for the project groups, running errands, cleaning up afterwards etc. Welcoming and guiding participants that are new to the campus. 	20 hours each
Mentors		
3-5 University Mentors	1 teacher (or other staff) / project topic / 2-3 student groups <ul style="list-style-type: none"> Help, if necessary, to recruit companies through own contacts. Brief the project groups about the week’s requirements, schedule, deliverables etc. Coach the project groups during the week. Follow and assess the groups work, participate in “client meetings” and final presentations Collect deliverables, grade the students + other administrative work, such as registering study credits etc. 	15-20 hours each
5 Company Mentors	1 Company Mentor / project topic / 2-3 student groups <ul style="list-style-type: none"> Preferably invite the groups to a company visit. Brief the student groups about the project, acting as “client”. Coach the group during the week. Participate, as client, in a project meeting with the groups once during the week. Participate in the final presentation of the projects on the last day. Give input to the University Mentors about the students’ grade. 	10 hours each
Other		
Jury members	5 (same amount as project topics) <ul style="list-style-type: none"> Needed IF some form of competition is arranged as part of the challenge. Can be staff, company representatives or other prominent, suitable persons. Participate in the final presentations, judge these and participate in prize ceremony. 	4 hours

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STUDENT REWARDS

Of course the students will get a wonderful experience by participating in your event, right? But I think we all know, that most students also are going to need a promise of more than a fun experience for participating.

Study credits for the one-week challenge/event/course seems a suitable reward for participation. How many is up to you. Many universities might not hand out study credits in such small quantities as you would get for a weeks' worth of work. One way of solving it is to incorporate this week into a larger set of several courses, that are awarded with a "lump sum" of study credits.

A certificate of participation for their CV is a nice touch, and something that does not cost you anything more than a little time and some good quality paper. For certain projects *Demola* gives out certificates of internships, since the work with the projects are done for a company client.

Competitions with prizes, perhaps in the form of an internship, a guaranteed job interview or prize money is also something that might motivate the students and adds an element of excitement to the week.

 Here you need to be careful though! If your goals for the students are that they learn soft skills, teamwork and how to work with a client, it is **the process that is important, not the end result**. So make sure that your competition does not counteract your main goals. This could be done by closely considered WHAT it is that you reward in your competition? Is it the best innovation, the best team spirit or something else? Also think about WHO you reward. You don't want team members competing against each other. So individual prizes are perhaps not the best way to go, but if you still opt for this be sure to balance it up with that also rewards good teamwork!

Yet another thing to reward and motivate the students with, is **legal rights to the ideas** they come up with. Perhaps this event could be the birth of new companies? More about legal rights in the next chapter (page 22).

INTERNATIONAL

Having an international aspect to your events gives it an added value. It is of course not mandatory, but not that hard to add since there are several options on how to do so.

Welcome international students to your challenge and your campus or give the challenge an international twist by working with international projects. In *Case Sheffield* the project topics are chosen amongst the challenges of Engineers Without Borders UK.

Inviting teachers from abroad to arrange workshops or hold lecture is yet another way on how you can spice up your event with global elements.

GUEST ACCOMODATION

Having guest is always nice. And if you opt to open your event up for foreign students, or just students from another region, remember that they are going to have to have a place to stay for the night.

Either you can have them arrange this by them self, or as a good host you can help them out with housing. Many hotels and hostels can give a good deal for accommodation if you're arranging an event and have guest arriving from out of town.

Student BnB, as in *Case Saxon*, is also a nice option. The university coordinates the housing of the foreign students so that students from abroad can stay with local team members for the week. For this the students pay a small sum (100€) to their host, covering a place to sleep, bedding and breakfast.

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SIDESHOWS

All good events have **sideshows**, right? Extracurricular activity during your week adds that little extra to the experience. This also allows for the students to **socialize** with the other groups, which is especially nice if you have participants from other Universities, cities or countries. Hopefully they'll then learn a bit from each other and pick up on some additional soft skill.

A few examples on how you can do this is to arrange voluntary workshops on themes relevant to the event. Such as **teambuilding, presentation skills** or **model/prototype building**. These could be held by teachers from other universities or company representatives, for that extra bit of added value.

You can also collaborate with **student associations**. Perhaps they would like to arrange some fun social event during one of the evenings (preferable NOT Thursday evening, you want all students fresh and craps for final presentations!).

PROGRAM CONTENT

Now that you know a bit more about all the options you have for program content, it is time to make a few decisions. **What do you want for your event?**

Apart from the obvious, like briefing about the project topics and time work project work, you might want to include **motivational speakers**, aforementioned "side shows", **a networking lunch** or **a festive occasion** at the end of the week.

Think about what you want the program to include and weight this against what you think might be **reasonable** or **realistic**. Remember that extra program might make for extra costs, and you also have to let the students have enough time to work on their projects.

A **suggestion for an event program** can be found on the next page in *Table 2*.

Case Engineering Visions

Engineering Visions always have participants from seven different countries/universities.

To get the most out of this multicultural experience, they arrange a dinner where the students treat each other to food from their respective countries.

A fun way to learn about different cultures!

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Table 2.

Suggestion for Program		
Monday		
Opening Session	Brief about the weeks program, criteria for course grading, competition rules etc. Perhaps include a motivational speech.	1 hr.
Meet the Group	Let the groups meet up and meet their teacher mentors. The groups decide who will function as their team leader/spokesperson. E.g., with the help of free and easy/quick personality tests online.	1 hr.
Meet the Client	Company visits and briefing on topics.	2 hrs.
Project Work	Afternoon free for project work	
Extra-Curricular	Workshop on brainstorming or teamwork	1½ hrs.
Tuesday		
Start the Day	Begin the day together, to get everyone started and motivated. This could be by having a communal morning coffee, an online meeting or an inspiring TED talk.	½ hr.
Project Work	Most of the day free for project work.	
Mentor Check-up	A quick meeting, in person or online, with the teacher mentor at the end of the day ensures that everyone has got a good start to their projects.	15 min
Wednesday		
Project Work	Morning free for project work.	
Client Meeting	The team has to schedule a meeting with their client/the company mentor that is held during the day. Teacher mentor is also present. Check-up to see that the project is progressing to the client's satisfaction. This also gives the companies a possibility to get to know the students better and give them advice.	½ hr.
Thursday		
Extra-Curricular	Starting the day with a workshop on poster making or presentation skills gives the students good tools for the end of the week and hopefully gets everyone motivated.	1½ hrs.
Project Work	Most of the day free for project work.	
Mentor Check-up	A quick meeting, in person or online, with the teacher mentor during the day, before final project report hand-in.	15 min
Project Hand-in	Deadline for the final project report hand-in in the evening.	
Friday		
Project Presentations	Project presentations during the morning. Presentations in smaller groups give more time for questions and discussion.	1½ hrs.
Preparations / Grading	The groups have time to prepare for the afternoon events. During which time the teachers and company mentors can discuss grading of the projects.	1 hr.
Lunch	A communal lunch with for ALL participants	1 hr.
Project Fair	During the fair the students get to show off their projects and network with company representatives. An alternative for this is a big presentation session where all groups can give short 5-minute pitches to a jury panel. (Students clean up while judges deliberate)	2 hrs.
Award Ceremony	If you have opted for a competition in your event.	½ hr.
Evening Event	A festive mingle event is a nice finish to the week. Perhaps hosted by a student association?	

THE NOVELTY APPROACH

Hopefully your first event will be successful and only the first in many yet to come. If you want students and companies **to revisit your event** you have to keep it interesting, year after year.

 Avoid having the same companies coming in with basically the same projects year after another. There is nothing bad with working with the same companies, but make sure that the project topics aren't the same all the time.

A good way to maintain the novelty approach is to have **new general themes** for the event every year. This means that the project topics are related to the theme and workshops and lectures highlight the same subjects.

BUDGET


Once you know what you want to do, you can look up costs and make a cost calculation. This is then your proposal for a budget. If you know that the means you have to use are smaller than this, you can either:

- a) Cut down cost by changing your plans or removing expenses. Can something be done in a different, more cost-effective way? Can you change something to remove costs all together? **or**
- b) Try to find ways to cover for the costs exceeding your means. This could be applying for scholarships, project money or charging participation fees of either companies or students.

An **indicative budget** as a cost per student, based on the example cases, is ~40€. Giving a rather small total of **2000 euros** (50 students x 40€).

This is of course highly dependent on what kind of expenses you have and what is counted as an expense. If you for example have to rent venues, want to pay for a guest speaker or need to buy a lot of stuff (as those aforementioned extension cords) it will raise your costs.

And if you include staff costs, such as salary for the hours used or overtime pay, the estimated budget suggestion here might not cover it all.

 It might be tempting to think that you can manage all this on a budget close to zero. Especially if you won't have costs for venues, staff or material.

But do not budget too little! The costs per student, and thus for a whole event if kept small, are low. But it is much better to notice at the end of the event that you overbudgeted, than noticing that you had too little resources that resulted in a poor performance. That is something that will definitely not improve your brand or give you satisfied participants!

Organizational Matters

RECRUITING PROJECTS

The best source for company recruitment is **personal contacts**. You probably have companies that you already co-operate with, perhaps through internships or guest lectures. Reach out to these and ask your colleagues if they can help out with this too.

! A good tool when trying to get people to join something that is absolutely new is a **leaflet**
● listing the objectives of the event and the benefits the companies get out of participating. General main facts are good to add, such as timing, length, possible participation cost and required work effort from their part.

Make sure that you already at this stage have a clear idea of what kind of **requirements** you have for the **project topics**. This helps explain the event when trying to recruit companies.

Examples are the **level of detail of detail** they can expect from the solutions they'll get, **relevance to your theme** (if you have a certain theme) and **level of difficulty** of the task.

ASSIGNING PROJECT GROUPS

With a total amount of 50 participating students and ten project groups, it is possible to **design the groups** according to the projects at hand. When the students assign for the course, have them **fill out a form** about their discipline, major, study year, work experience or other information that can be useful. Or to rank their competence in certain areas. An e-form, for example using Google docs, is a handy tool that gives you all the answers directly in an Excel sheet.

Collecting info from the students also makes it possible to ask them for **their preferences**. Taking their preferences into consideration might end in happier students but might also mean more work for you. Having them rank their areas of interest, you can aim for letting everyone get a topic out of their top-three favorite subjects.

When assigning the groups, make sure to get a **good mix** of both different disciplines and years. A group with only first year students might find it hard to perform the tasks with satisfactory results.

! An algorithm for assigning the groups could be convenient tool, if you are good at those
● things. Perhaps not necessary quite yet, but if you are planning on expanding your event in the future, it will be a very valuable help.

ASSIGNING PROJECT TOPICS

You will probably not be able to get project groups full of experts on the subjects of the project topics. And that is not the main goal either. With mixed groups you get **different approaches** to the same problem and more innovative ideas.

But aim to have **at least one expert** in each group. This gives the group a better chance to come up with realistic ideas for their client.

Case Saxion and Case Sheffield

At Saxion the most senior students function as team leaders and get to choose the project topic for their group.

At Sheffield the project topics are assigned according to the students' preferences.

HANDLE EXPECTATIONS

You have to remember, to be very clear with both students and companies, that the main goal of the challenge is not necessarily to come up with a great new invention or product idea (though it would definitely be a great bonus).

! **The main goal is** for the students to acquire soft skills, meet companies and get a work like experience, and for the companies to get visibility and a possibility to headhunt, all whilst working on an engineering challenge.

If you are clear with this right from the start, when recruiting companies, marketing to students and assigning topics etc. you are going to put the **expectations** of the participants **on a realistic level**. Which will (hopefully) give you happier participants.

MARKETING AND VISIBILITY

This handbook will not delve deep into the subject of marketing and visibility, because this would require a handbook of its own. But be sure to think about these things. The reason you are using this handbook is probably because you've never arranged this type of an event before, which means it's new.

This means you are going **to have to market it** to both companies and students to get participants. You probably have a **marketing department** at your university, ask for their help with a cool **logo** for the event, **webpage**, **leaflet to companies** etc. if you are not handy with these things yourself.

Also try and get some nice **visibility** for your new event! Helps with your branding. Contact **local newspapers and radio stations** and invite them to come and have a look. Perhaps write an article for a paper yourself?

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EQUIPMENT

It is a very good thing to have a sit down, preferably with someone else for extra input, and think through all the small and big **things you might need during the week**. It's probably a lot! Be sure to make a list of all the stuff you might need.

Case Saxon

"You will need A LOT of extension cords!"

These might include:

- Tables, chairs and **room dividers** for the students' workspaces.
- **White boards, flip charts** or other for the students' brain storming, notes etc.
- **Stationary**. Paper, pens and post it notes.
- **Extension cords** for the students (own) laptops, screens, tablets, phone chargers and whatever other toys they might want to bring.
- **Coffee machine**, coffee, tea and cups if you want to arrange a communal space for all participating students. The best ideas are born during the coffee breaks, right? (Don't forget the milk and sugar, students use a lot of milk and sugar!)
- Perhaps **video conference equipment** (bigger screen, microphone and sound system suitable for video conferences) if some group might need to arrange a video conference meeting instead of meeting their mentors face-to-face.
- Screen, projector, sound system etc. suitable for both opening and final session
- Chairs, side tables, water glasses and pitchers for judges or "lions" if you have a **competition or a "lions' den"** session at the end of the event.
- If you have a **project fair** at the end of the week, tables, extension cords etc. for the project groups to arrange their project presentations.

CATERING

If you plan on hosting a **lunch, evening event** at the end of the week or something other similar, make sure to arrange catering for this. No matter how good a chef you are, you will not have time to cook during this week.

Perhaps you have a nice **student restaurant** at campus that could arrange the catering and host you event, or then you could **order catering to be delivered** to your common space and host a relaxed buffet dinner.

3. EXECUTION: ORGANIZING AND PREPARING

Once you have thought through what you want to do, the next step is figuring out how you are going to achieve all this. In this chapter we will have a look at how you get your ideas from paper to practice. And all the little things that comes along with that.

How

Hopefully you collected all your thoughts, ideas and bookings in an event workbook. Now is the time to look those through and start arranging the practicalities around your ideas. This is divided into two sections: **Operational Plan**, which covers what an operational plan is and what it should cover; **Practicalities**, that highlights things you do not necessarily have to write down in the operational plan, but still need to consider and remember.

Operational Plan

THE STARTING POINT

Use your workbook as a base for writing an operational plan for the engineering challenge. The operational plan is basically **a tidied-up version of your workbook**, that is written in such a fashion that **anyone can understand and use it**. This in case someone else will actually have to use it, you never know when your assistant will have to jump in for you.

The operational plan should include **all vital details**, such as names, assignments and contact information to all people involved in the event, this includes staff as well as company contacts, hired speakers and caterers etc.

So once you get down to actually getting staff, booking venues and recruiting companies, make sure to keep the operational plan up to date, and always **remember to take note of all details!**

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TIMELINE

The operational plan should also include an **event timeline**, where you mark deadlines, important meetings and other important event. A simple example of a timeline can be found in *Appendix 1*. Also include a **detailed program** for the actual event week, with details on who should be where, who is responsible for what and who to contact if any problems.


Make sure to set aside a **lot of time** in your operational plan **for practical stuff** as arranging furniture in the rooms you are going to use, getting all the small stuff and equipment you are going to need and to **check that all those things are actually working!**

If you think it's going to take an hour, book at least 1½ hours for it.

RISK MANAGEMENT

Do a brief risk assessment **with your team**, that you hopefully have gathered around you by this point and go through all the things you think could go wrong.

Make back-up plans for everything! Most things can be fixed with emergency solutions when they happen, if you are good at thinking on your feet. But it's always nice to have a plan B up your sleeve when this happens. Notice the "when", not "if"...

 Things that could go wrong and really mess up your events are companies or lecturers/speakers dropping out, facilities suddenly being unusable or key persons getting sick. Having students drop out also might ruin your designed groups and the dynamics in them.

It is impossible for you to have all possible scenarios covered. But having at least **thought these things through**, you are better prepared in case something happens.

A thorough and detailed operational plan is half the work done when it comes to **risk assessment!**

SAFETY AND SECURITY

If you start out with arranging the engineering challenge for your **own students**, it's **easy**. There are a lot of safety and security issues you do not have to think about. All of the students are native to the campus and probably have all the permits, keys and other things that they need. They probably also know where to find the nurses office and what the local emergency number is, and other similar things.

If you have students participating from **other schools**, especially **other countries**, they won't know where to go on campus, they won't have permits or keys to move in the different buildings and they do not know where to find emergency exits, help etc. if they need it. Then

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it's your responsibility to see to it, that they **get access** to all the places they need to go and also **safety and security information** about these places. Same goes for company mentors or outside speakers or lecturers coming to the event.

Having **people** participating **from outside campus** also might mean that there are **additional safety and security rules that apply** to them. Especially if the number of people on campus increases noticeably.

- ! As for number of people, also make sure that the **facilities** you are going to use are allowed to **hold as many people** as you have planned on coming!

Talk to your **HSS Officer**, they will know what you need to think about and who to talk to, to get everything arranged.

RESOURCES

In the previous chapter you got and suggestion for **what kind of staff** you need. At this stage, when you have a draft for an event program, you can start to think this bit through in detail. Do you think the suggested staff and work hours will suffice for you, or **do you need less/more?** (The suggestion here is that as a first-time even organizer, always opt for MORE)

And now is the time to try and **recruit that staff**. Be very clear with the staff about what their **responsibilities** would be and the **amount of work hours** you think they would need for this event.

- ! And as mentioned in the previous chapter, make sure to also **check with their superiors** to ensure that everyone is **fairly and equally compensated** for this work, and that they actually get to **set aside time exclusively** for this.

You have probably made an **estimation for a budget** as well. If you haven't got it approved yet, you need to **get I approved now**.

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LEGISLATION

Even if the main focus of the engineering challenge lies more on the process than the result, you still might see some **really nice ideas** at the end of the week. The question is then, **who owns these ideas?**

There are basically two options. Either it's the creators, being the student groups or it's the companies, that can be seen as a paying client (especially if they pay a participation fee). How you want to arrange this is really up to you and the companies that are going to participate in the event.

What was learnt from *Case Technobothnia* was that the companies are open to both ideas, but in general they want to make things easy.

One suggestion is to let the students own their own ideas but to **write agreements** where the companies can buy the rights for the ideas from the students. For example by **paying them in the form of a stipend** (which is usually tax free for the students).

Case Saxion and Case Sheffield

At the Saxion IPW the companies pay for participation, and they are the ones to own the rights of the ideas. There are several examples of IPW-ideas that have gone corporate.

At Sheffield the project topics do not come from companies, even if they have company mentors involved in the projects. Thus, the students own their own ideas.

Consult your university's **Legal Office** (if you have one) and have them help you draw up agreements.

Another thing you need to make **agreements** on is probably the right to take, and use, **photographs**. You are probably going to want to take a lot of pictures that you can use in social media, for marketing of the next event or for marketing your university. So make sure you have this bit covered as well. Your legal office or marketing department probably have forms for this.

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AUTHORITIES/PERMITS

There might be instances when you are going to have to deal with authorities or get permits for your event. These things are very **location specific**, so there are really no general guidelines to give about this.

But things that might affect this is if you have a lot of outsiders coming to campus, if for example you are arranging a project fair at the end of the week and is open to the public, then it might be classified as a public event. **Public events** might require permits.

Arranging session on **public ground** might also require permit, especially if you want traffic to be redirected.

If you are planning on having an evening event at the end of the week and plan on serving alcohol, you might need a **serving license for alcohol**.

Case Technobothnia


According to the regulations of the Police of Finland, a project fair held during an engineering challenge at Technobothnia would not be classified as a public event.

This because of its size and nature, who it would be open for and the time when it would be held.

Check with your **city council** or **local police office** if you are unsure about permits.

REGISTRATION

Now that you know when your event is going to be held, you need to set a **deadline for company registration**.

 You have to set the deadline for the companies before you even open up registration for the students. Because this **event is arranged around the company contact**, you have no engineering challenge without the companies. The company names will also work as a good **drawing card** for getting students to participate. **E-forms**, such as a Google forms, are a good tool to use when carrying out the company registration.

When making the **registration form** for the companies, think about what kind of **requirements** you have for the **project topics** you want and other general information that you might need to market the engineering challenge course to students.

Then set a **deadline for student registration**. You of course also need to figure out how and where they should register. If you are a teacher, you probably know this, if you don't yourself normally work with students and teaching, ask a teacher.

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Do take in mind, that the deadline for registration for this course might not necessarily follow normal protocol because the **project groups** you are going to have to make are **dependent** on **how many and what type of students** are going to attend the course.

- ! Think about how you want to **assign the students** to project groups and project topics those, when making registration forms for the students.

MARKETING AND VISIBILITY

As already mentioned in the previous chapter, this handbook will not cover marketing in any detailed way. But if you think you need **to market** the engineering challenge **to the students** or want to use it to get **visibility for your university** (which also leads to visibility for the participating companies = a good selling argument!), you can probably ask your **marketing department** for help with this.

But even if you outsource this, make sure that you yourself have **a good idea of what you want to achieve** with your marketing. Who are your **target groups**? Do you by your marketing want to reach the best students, or perhaps students that need internships or topics for their thesis? Do you need marketing material for recruiting companies as well?

Also think about the **main objectives of your visibility**. What is the message that you want to send people, when they see pictures of your event or read articles about it?

The answers to these questions will help the marketing department come up with a good strategy for you.

There is also a lot of things you might be able to do yourself, such as come up with **hashtags** and take **pictures** to use in **social media**.

See to it that you get all these details into the operational plan. Also, **timing is important in marketing**, so be sure to add optimal dates for marketing and visibility in the timeline.

Cooperate with your **marketing department** to make a marketing and visibility strategy for your operational plan.

Practicalities

BEFOREHAND INFO

Be sure to send out beforehand information **to students, teachers and companies alike**. If all parties are able to prepare for the challenge it will make the start easier and hopefully result in a better event.

The beforehand information needs to contain **practical information**, such as where you need to be and when, **contact information** to key persons and information on **what to expect** as well as what is expected of them.

The students need information on which company they are going to work with and a short description of their project. Information about the group composition is also a good idea. You can also already at this point send them information on which workroom they are assigned to, including maps of the premises, and which laboratories or workshops they have access to and when.

The companies will want information on the groups they are going to work with. What disciplines do the students represent, what kind of experience do they have (study year, former relevant work experience etc) and do they have any specific areas of expertise. This is not valuable for the engineering challenge alone but is also important information for the companies if they are set on headhunting.

The teachers will also need information on the project group they will be working with as well as the project topics.

A suggestion of other general information that might be good to include in your beforehand info (or the info the participants get at the very beginning of the week):

- Timetables and schedules
- Map of:
 - The different classrooms the groups are assigned to
 - Workshops or labs the students have access to
 - Meeting room or other where meetings are held
 - Auditoriums or public spaces where parts of the program are held
 - Communal spaces, such as coffee rooms
 - Toilets

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- Parking spaces for cars and/or bikes
- Emergency exits and emergency equipment
- Wifi-passwords
- Links to possible online environments
- Who to talk to if you run out of paper or pens, have problems with the internet or technical equipment, need keys or access to a room etc.
- Legal agreements that need to be signed, for example photo and video permits or agreements about legal rights to ideas.


BEFOREHAND TASKS

As always when working with a client, it is good to come prepared and have done some background research on the client's company. Ask the **students to read up on their assigned company** prior to the engineering challenge week.

If you want the students to have **different assigned roles in the team** during the week, you could ask them to take a **personality test** (for example a free one online) before the course starts. If the students are to themselves decide upon the different roles within the team, these test results can then be of help.

CHECK EVERYTHING

In chapter 2 you were presented with suggestions for all the things you might need during the event. Assumingly you diligently made such a list, now is the time **to start acquiring all those things**. Either by finding them in the depths of your university storage rooms, or by purchasing them.

 Do not assume that you have something. Make sure that you have it. Just because you know you used that one projector just two months ago, does not mean that it still exists, or that it is in the same place. **Check everything.**

Case Saxion

The tech students at Saxion participates in the IPW three times. The third-year students are automatically assigned the role of team leader.

Before the IPW starts they are to choose the project topic their assigned group gets to work on, and also have to contact and meet up with their respective companies prior to the IPW.

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The same goes for rented venues, catered meals or rented equipment. **Do not assume anything**, always double check. This is the reason for the saying “*there is no such thing as stupid questions*”. And even if it could be seen as a stupid question to ask “*will the rented tables come with table legs?*”, it is better to feel stupid when asking a stupid question, than to feel stupid when standing there with a bunch of tabletops without legs.

COMMUNICATION

Subpar, or just bad, internal communication is probably a problem that is infamous in organizations worldwide. Also generally speaking, **bad communication is an issue that often upsets people**. Sorry to say, this handbook cannot offer a miracle remedy to this problem, but it can give you a few ideas.

Bellow follows a few tips and suggestions picked up during the background research of this handbook.

Communication tips

- Even if the project groups assign a team leader, let all the students participate in the dialogue with both company and teacher mentors. This gives for a more educative experience for all students, as well giving the companies a possibility to learn to know all students in their project groups better.
- Mentors that show a genuine interest for the engineering challenge are much more appreciated by the students.
- Make sure that the teacher coaches have time set aside for their responsibilities during the engineering challenge, meaning that they are actually available to answer questions and give help, and not tied up with other responsibilities simultaneously.
- WhatsApp-groups could be a good idea for fast communication within the event management team and also for the project groups to contact their mentors.
- It would be a good idea to collect the general information of the event (such as that mentioned in the beginning of this chapter) on a platform that all participants have easy access to. For example, an event webpage or similar.

4. EXECUTION: HOSTING EVENT

If you have planned the event well and informed everyone thoroughly on where they should be and when, and what is expected from them, things will probably run smoothly. Even so, you will probably feel a lot of stress and will have to run around setting out fires during the whole week. That's where a few practical tips can come in handy:

- **Do not make any other plans** (work related OR personal) for this week.
- **Try your best to get a lot of sleep**, no late-night binge watching on Netflix!
- **Comfort before style** when it comes to clothing. The last thing you want is sore feet due to uncomfortable shoes when already stressed.
- **Remember to eat and drink properly**. When you have a lot to do, you might forget to eat or drink, or then you just live on quick snacks. Being hungry or dehydrated is never good.
- **Trust your assistant**. You have done good plans, right? So there is no reason for you to have to carry the whole responsibility of the event. Trust your capable assistant and let them help you.
- **Try to have fun**. This is the culmination of your months-long planning, try to enjoy the fruits of your work.

If you have time, try to get a **chat with the participants** during the event. It's a good way to "feel the pulse" of the event and get a sense of how it's going. You can also get valuable information about things that would otherwise not have reached your attention. Both good and bad.

Some problems you might be able to aid straight away, but others are best set aside as good suggestions to the following event.

Keep drinks, snacks and a change of clothes at your "event team HQ".

It's a good way to keep you and your assistants hydrated and fed.

And if you happen to spill coffee on your shirt right before you yourself have to make a representative appearance, you can make quick change and be good as new!

5. POST-EVENT EVALUATION

Hopefully your event went according to plans and the initial feedback was positive! But just because the event itself is now over, **it does not mean that the work stops here**. Now you have to clean up, get all paperwork done and assess the event.

! The post-event evaluation is important information for you when and if planning your next event.

The students, who are the biggest share of the participants, are most easily reached by a survey. Filling out the survey could with advantage be a mandatory part of the course, that they have to do at the very end of the last day or in the beginning of the following week, in order to receive their study credits. (Cleaning up their own workspace can also be a mandatory part of the course, as in *Case Saxion*.)

The type of survey that is most easy to analyze, is a **closed-ended questions** survey with for example, scaled questions (“*Did we succeed in the organization of this event? – 1. I do not at all agree <—> 5. I absolutely agree*”). But if you also want to read about experiences and suggestions, you should opt for **open-ended questions**, or a mix of both.

The companies, which in this example, aren't that many could perhaps best be reached via personal contact. Call or meet them and have an open discussion while going through a set of key questions that you want to check up on.

Also meet up with the **teachers and other university staff**. Perhaps take them out for lunch, as a thanks for their help, during which you all can discuss your experiences of the event and give praise, critique and suggestions for the following event.

Remember to personally thank everyone!

This goes a surprisingly long way.

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Suggestions of questions you could use in your survey and/or feedback discussion:

- I thought the beforehand information was sufficient
(1 - I do not agree at all / 5 - I very much agree)
OR What are your thoughts about the beforehand information?
- The opening session was meaningful (1-5)
OR How did you experience the opening ceremony?
- If participating in the workshop XXX: I thought the workshop was helpful/interesting/fun (or other suitable description) (1-5)
OR If you participated in the workshop XXX, what did you think about it, was it helpful?
- I had a lot of help from the teacher/company mentors (1-5)
OR Did you get a good contact with your teacher/company mentor?
- The estimation of workhours equaled to the real amount of work (1-5)
OR Was the number of workhours resourced for you for this event suitable?
- Our company made good contacts during this event (1-5)
OR Do you feel that you connected with the students? Did you find any possible recruits?
- Our company got usable solutions from this project (1-5)
OR Are you satisfied with the solution the project groups came up with?
- The overall arrangements of the event were good (1-5)
OR What is your opinion of the overall arrangements of the event?
- Do you have any suggestions, thoughts or ideas you want to share?

When receiving the feedback, you have to go through it and analyze it. Making the survey as an e-form, for example using Google forms where the participants can answer anonymously, will automatically give you nice graphics of your close-ended survey questions. If you succeeded well, the feedback will be positive. Remember though, that even the most successful events always get their fair share of negative feedback. You can never please everyone. So don't get to beat down about the negative things.

Engineering Challenge Event

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You of course need to take the feedback to heart and use it when planning your next event. The reason for negative feedback can be:

1. You did not succeed to meet your own objectives and goals.



Solution: Plan and prepare better for next year, so you won't miss your goals.

2. You met your objectives, but they did not resonate with your participants.

Solution: Revise your objectives.

3. Your objectives, which had very much taken your target groups in consideration, were met the participants were still disappointed.

Solution: Be clearer with your objectives to that the expectations of the participants are set at a realistic level.

-  Also remember to write down your own thoughts and experiences, you will be surprised
-  how soon you'll forget all the small details!

Good luck!

6. FINAL WORDS

This handbook was written as part of a master's thesis and is free to use by anyone who might find it handy. Here I have combined the information I got from the research I did for my thesis with the experience I have gained myself from event organizing.

If you read this handbook because you are actually going to arrange an engineering challenge of your own, I hope you found it useful! If you read it for other reasons, well, I hope you too found it useful at some level.

I would also very much appreciate if you would let me know what you thought of the handbook, was it handy? Should I go for a version 2 and add some bits? Please let me know, I'd love to hear from you.

Kind regards,

Josefin

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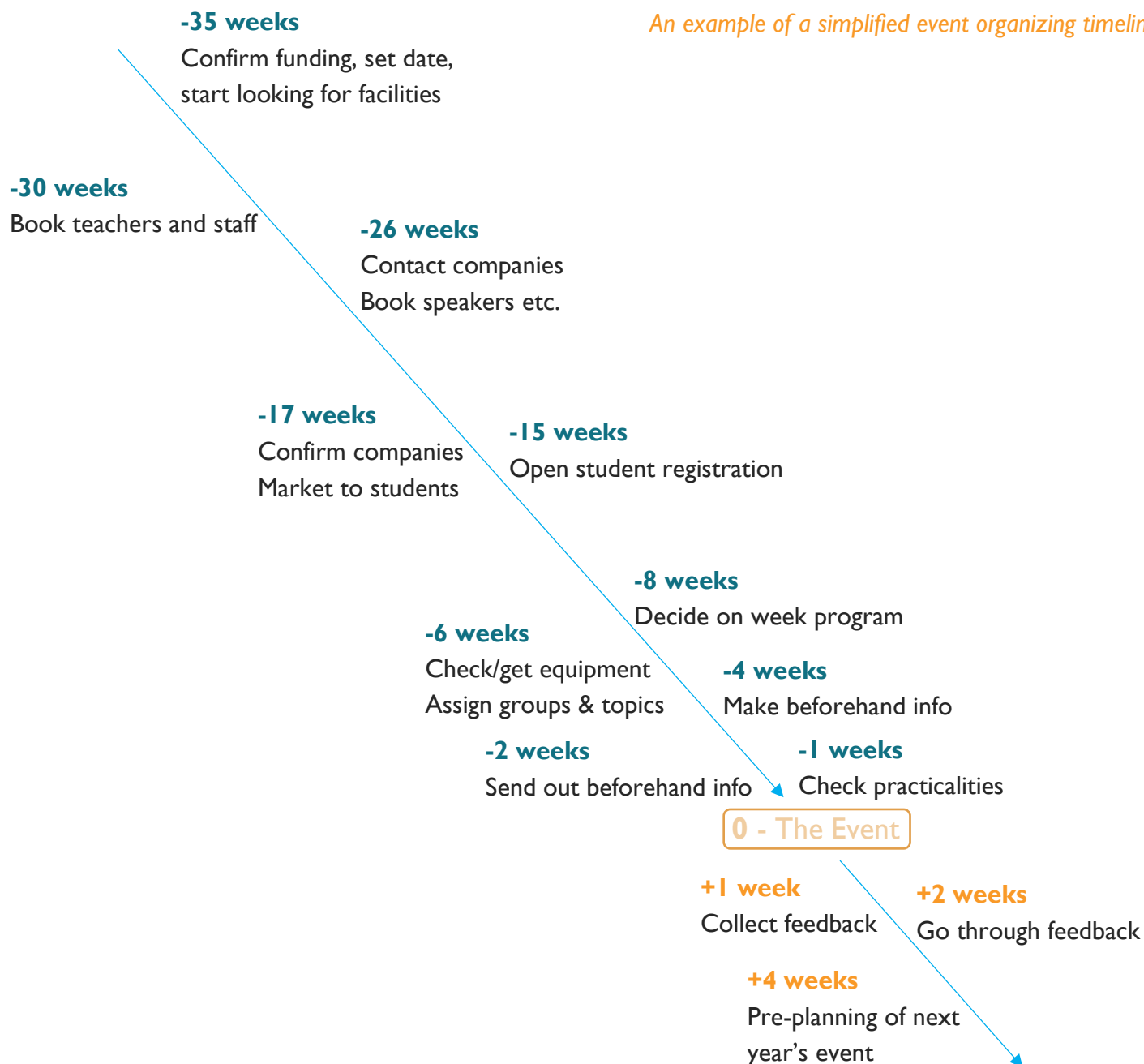
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APPENDICES

Appendix I- Event Timeline

An example of a simplified event organizing timeline



1/12

	Saxion IPW	Sheffield Global Engineering Challenge	Intensive Program Engineering Visions	Intensive Program Engineering Visions	Intensive Program Engineering Visions
The current situation			Dutch representative	German representative	Polish representative
What is the aim of the event?	<ul style="list-style-type: none"> • Learning to work in a project team - Intercultural - Interdisciplinary • Projects do not necessarily “fit” your own studies • Focus on concept thinking • Workfield orientation • The process is more important than the result <p>"A brainstorming session week"</p>	<p>That the students learn team work and (risk) project management. How to estimate and assess your ideas for criteria.</p> <p>Ethics, sustainability and decolonization is also important.</p> <p>= things that many engineering degrees otherwise does not pick up on.</p>	<p>To brainstorm and be innovative, to discover new things.</p> <p>Participating universities are from Sweden, Germany, Switzerland, Scotland, France, the Netherlands and Poland.</p> <p>The participating schools also get accreditation points for this.</p>	<p>For the students to have visions and futuristic ideas.</p> <p>Quote from web page that was referred to: https://www.htwsaar.de/studium-und-lehre/lehre/gute-lehre/best-practise/engineering-visions-internationale-visionen-ingenieurwissenschaftlicher-zukunftsgestaltung</p> <p>"The programs are characterized by interdisciplinarity and innovative aspects in terms of subject matter and methodology."</p>	<p>It's intensive and short, the students get to try out how it is to study abroad. And they develop hard and soft skills parallelly. They learn how to do creative engineering. It integrates all partners and help with university cooperations.</p> <p>From the Polish web page: https://www.ife.p.lodz.pl/en/Engineering-Visions-2016</p> <p>"The engineer of the future must be able to express his knowledge in a way that is accessible to the general population. Today, the population lacks a general understanding of a number of technological advances. Discussions tend to rapidly digress into passionate discourses. The job of an engineer will be more and more to pass on his knowledge to the general population in a way that they can understand. Thus, it is imperative for engineers to be exposed to courses in humanities, social studies, ethics, and philosophy. It is up to them to be able to explain the choices our society makes."</p>
When and where is the event held?	One week event, first week in February. At Saxion University of Applied Science in Enschede, the Netherlands	One week event, last week in January.	2 week event at the end of the summer holidays (August-September).		End of summer. The timing has to be chosen so that it suits all participating universities.

	Saxion IPW	Sheffield Global Engineering Challenge	Intensive Program Engineering Visions	Intensive Program Engineering Visions	Intensive Program Engineering Visions
How many students participate in it?	40 companies, about 40 projects = ~160 groups (4-6 teams on every project) and 6 students in every team. In 2022 there were 170 groups participating.	At the most 1500, in 2022 it was 1200	50 students		30-49 students. 40-50 is manageable, but it is a large group.
What kind of students participate (own students, students from other countries/universities, disciplines?)	Mandatory for all technology students, who participate three years (2 times as members, once as team leader). The IPW is open for all Saxion students and usually have participants also from technical management and chemistry programs. Open also for secondary school students and international students (usually around 100).	Mandatory for all 2d year engineering students at Sheffield. No students from other schools.	7 students each from 7 different universities.		
What is the weekly program of the event?	When project topics are handed out, the team leaders contact respective companies and meet up before the IPW. The IPW starts Monday with a "showy" seminar held in a theatre (due to its size), with interesting guest speakers. Monday - team leaders arrange for first meeting with company coach - project brief. The teams work full days and meet the company coach once more, usually Wednesday, Thursday evening - the project is to be ready. (continue...)	Start of week, project and group assignment. The students work full days on this project, the whole week. Wednesday - Board room session/panel discussion with the company representatives/alumins. (In the style of the tv-show "The Apprentice") At the end of the week the groups present their work to the industry mentor and a staff member.	"Pretty similar to the IPW, but with more time for other things too." Teambuilding activities at the start of the event. For example "Euro dinner", where the students get to cook food that represents their own countries. Creative activities and inspiring workshops held by the participating teachers. For example presentation techniques etc. The students all live in the same housing, so they spend a lot of time together. The weekend is free.	Company visits in the beginning of the week. "Get to know each other"-activities. Lectures. Final presentation for the companies at the end of week two.	Opening session on Monday. A lot of communication and team building. Intercultural activities. About every other day they had workshops where the students could be creative and playful, to get pleasure from the process of learning. This "learn via play" approach creates activity and openness to learning. It also builds a sense of community. Many of these activities took place outside, if the weather allowed. Final presentations the last day.

	Saxion IPW	Sheffield Global Engineering Challenge	Intensive Program Engineering Visions	Intensive Program Engineering Visions	Intensive Program Engineering Visions
What is the weekly program of the event? (CONT.)	<p>(continue...)</p> <p>Friday - project presentaion (1 hour total) to company and teacher coach + other teams working on same topic, afterwards the coaches grade the teams.</p> <p>A fair, where the projects are showcased to all participants, here the jury members judge the projects. Friday afternoon holds a free lunch for all students (eating arranged in shifts) and a separate lunch for company representatives and a price ceremony and an evening event with a few free drinks for all participants.</p>				
How many students are there in each project group?	6 students, out of which a senior student functions as team leader.	5 students when arranged on campus, 6 students when online. Experience was that with 6 per time, the workload was too little.	6 students	5-7 students per group is good. I fewer, the work load is too big. If more, people can get away with not doing anything.	~6 students
How are the project groups assigned?	The team leader is chosen first, then a topic is assigned. After this the teams are chosen with the help of an Excel sheet. Semi-randomly (they try to regard discipline, project topic and team composition)	<p>The groups are socially engineered by the event team.</p> <p>The groups/teams are a mix of home students and Sheffield's international students, and also a mix of disciplines.</p> <p>"This is the only time they will work in such diverse teams"</p>	By the host, mixed groups.	<p>In Germany they assigned them randomly, in Switzerland the students could put in requests.</p> <p>If you have companies involved, it is not optimal to have the students choose the topics themselves. You can't tell a participating company "no one wanted your topic".</p>	By the host, mixed groups.
How are the project topics assigned?	<p>The team leaders get to chose a project topic.</p> <p>There is 4-6- teams that have the same topic.</p>	They ask for the students preferences and assign the topics accordingly. They find that in this way there is a lower risk of failing the course.	By the host.	It differs. And it has been 2-3 groups working on the same topic. These increases the chance of the company getting at least one idea they are satisfied with. (continue...)	By the host.

	Saxion IPW	Sheffield Global Engineering Challenge	Intensive Program Engineering Visions	Intensive Program Engineering Visions	Intensive Program Engineering Visions
<p>How are the project topics assigned? CONT.</p>				<p>(continue...)</p> <p>Semi-random would perhaps be best, to make sure there is at least one "expert" on the topic in each team.</p> <p>To choose with the help of algorithms would perhaps be best, but then you need a lot fo information on both the students and the project topics. And this might be hard.</p> <p>It is important to emphasize that even if your topic does not interest you/is within your discipline, you might still be able to contribute with technical knowledge, and you can learn a lot from others too.</p> <p>"Take all the chances you get to do something that is a bit more free."</p>	
<p>What kind of deliverables do the students need to produce?</p>	<p>Team leader hands in presence check for every day.</p> <p>The students have had to make VLOGs of their progress. In 2022 they did one-pagers instead of VLOGs.</p> <p>They also have to keep their workspace tidy and clean it at the end of the week. If the workspace is not cleaned, they do not get any study credits.</p> <p>The companies own the rights to the ideas.</p>	<p>A report and a presentation at the end of the week.</p> <p>The students own the rights to the ideas.</p>	<p>Poster of their projects.</p> <p>Videos.</p> <p>Project presentation in front of an audience and a jury.</p>		

	Saxion IPW	Sheffield Global Engineering Challenge	Intensive Program Engineering Visions	Intensive Program Engineering Visions	Intensive Program Engineering Visions
Are the students awarded anything for participating, if so then what (student credits, monetary rewards etc.)?	Study credits, used to be 1 for team members and 2 for team leaders, now it is part of a bigger module (professional development) with a total of 5 credits. here is also a competition at the end with money prizes (For example the Saxion start-up department hands out a serendipity award).	Passing the course used to be a requirement for passing second grade, without study credits. The concept of pass/fail was liked by the event manager due to the freedom this gave the students to dare to try out different styles of working without pressure of grading. Basically only students who didn't attend didn't pass. It will be changed into awarding study credits. The best projects will be sent to an international competition.	4 study credits, which covers the 2 weeks at the event plus preparation work before the event.	Study credits	
The project topics					
What are the requirements for the project topics?	The project cases should require innovative/concept thinking and "out of the box" ideas. The students have to be able to brain storm around their ideas. The projects should not be too technical nor specific, so that the focus for the students is to be innovative and learn how to work in projects.	Highlight socioeconomic gaps. The students need to think in a culturally agile way and research the community they work with.	Engineering problems that need to require innovative solutions. The goal is that each student team has their own project topic. If that is not possible, two teams can share the same topic.	There is a lot of focus on "free thinking" when it comes to the topics. The projects can not require a detailed expertise to get a good outcome, because detailed expertise can not be guaranteed. Having topics with more applicable solutions might be better. In Germany the students had to come up with 2 solutions, one that would be realizable in 5 years, another of a concept that had not been invented yet.	When Poland hosted in 2016 the overall theme was "design thinking". The topics were different, but all had this unifying factor. Every host has their own theme for their event. They also had to address the legal side, considering who owned the rights for the ideas, get consent from teachers and students etc. This was discussed with the legal department.

	Saxion IPW	Sheffield Global Engineering Challenge	Intensive Program Engineering Visions	Intensive Program Engineering Visions	Intensive Program Engineering Visions
From where do you get the project topics?	From industry/companies, Saxion start-up companies and organizations such as hospitals etc. Or from research groups at Saxion.	Based on the projects of Engineers Without Borders UK. The project are chosen by the project team from the Engineering for People challenge and is based in different locations around the world.	Normally the hosting school tries to get topics from companies.	From companies, but not all the time.	We got them from companies. The university wanted to be involved in chosen the collaborative partners, for strategic reasons.
If you get the project topics from external sources, how do you recruit these sources?	5-6 companies participate every year. Otherwise it is companies that have student interns are contacted and also teachers try to recruit companies through their own contacts.		They reach out to the contacts themselves, mostly by calling them directly. They have a lot of help from alumni.	The professors that have research projects help out and use their contacts for this.	The staff participating used their own contacts for this.
Do you find it easy or hard to recruit these external sources?	They already have good contacts with many companies. In October they start recruiting project topics, and send out reminders to the companies in November. They try to get all project topics ready before Christmas.	The company mentors/alumni that participate are quite easy to find. If they have been a few short, the mentor have taken on more teams instead to even it out.	It depends on if you have good contacts or not.	It's hard work.	The companies we contacted already had good cooperations realtions with our university, so they were quite willing to participate.
What kind of feedback have you gotten from these external sources about their participation in the event?	Several of the ideas throughout the years have gone into further development at the companies and resulted in products.	Many seem to enjoy it and come back year after year.	The companies like to get new ideas from the students. Sometimes the companies already have a soltuion for their problem, but the want to see if they can get other ideas, or if someone else will come to the same conclusion as they did.	The feedback is always polite. But sometimes they have seen a bit disappointed with the results/ideas from the project teams. This because of differences in expectations. If a university looks for "ideas of the future", they think perhaps 20 year into the future. A company thinks 3-5 years. So the results from the projects have been too far fetched and not applicable. But it has happened that some of these "crazy ideas" then get realized a few years later.	I think they were quite satisfied with the ideas they were delivered.

	Saxion IPW	Sheffield Global Engineering Challenge	Intensive Program Engineering Visions	Intensive Program Engineering Visions	Intensive Program Engineering Visions
Do you find it easy or hard to get project topics that meet your requirements?	It is a lot of work		You have to explain the concept very clearly to the companies.	If from companies, be very clear and strict with your topic requirements. If you don't have very many students participating, it might be that some of the project topics can not be matched with suitable students. It could be good to ask the companies to have a "plan B"-option for the project topic.	It wasn't easy to find companies that were knowledgeable about "design thinking". If they didn't know about the concept, we had to spend time explaining it to them. It is a matter of talks and negotiations.
The workload					
How far in advance do you start planning for the following years event?	Right after the previous has finished. The planning starts in June (7 months in advance), planning and booking rooms. In October companies are booked and the other team members join in.	Right after the previous has ended. Main planning starts in June-July. Two weeks before the event is the most hectic time. The event manager plans the event (funding, facilities, staffing etc.), schools the teaching assistants, develops the material for the project and deliver this material to the assistants.	About half a year in advance. The event has to be promoted to the students, because it is not mandatory, and it takes place during the summer holiday.	This varies, depending on if you host or participate. Usually they decide the host two years in advance. For hosts, the planning starts 8-9 months prior. Even earlier, if companies are involved in the event. This due to decision making sometimes being slow in companies. The most intense arranging is 2-3 months prior to the event.	Poland has hosted the Engineering Visions once.
How many people work with the organizing of the event?	12 staff members	5 staff members * Event manager * Digital learning expert (for online event) * A team that works with alumni coordination	When arranged in the Netherlands (which has been done twice) they were 3 people. Work tasks: * social program * jury * company contacts	2 people, when they hosted. They got it to function, but the workload was too big. You need more help.	Three people full time (event manager, administrative person from the international office and one marketing/graphics person). One half time person from the international office. It is hard finding people to participate in the event, because it takes place during a holiday.

	Saxion IPW	Sheffield Global Engineering Challenge	Intensive Program Engineering Visions	Intensive Program Engineering Visions	Intensive Program Engineering Visions
What is the workload of these people (% of total workload, or working hours)?	<p>Event manager - ~300 hours, split into ~75 hours in the years first quarter, ~125 hours in the 2nd and ~25 hours each in the 3d and 4th quarters. This is sufficient.</p> <p>40 hours each for the others (for organizing housing, jury etc.) Out of which 12 hours per person is spent working in the IPW office (open 9.30-17) during the event.</p>	Event manager - 20-30% of total working hours	Perhaps 40 hours	200 hours each, so a total of 400 hours.	
Do you have staff working as "mentors" for the students/project groups?	Yes	Yes	Yes	You should have!	Yes, a few from faculty and also a few students.
If so, how many, what roles?	Every teacher coach has three student groups. (= ~54 teacher coaches).	<ul style="list-style-type: none"> * 35 teaching assistants (doctoral students/researchers) that look after 6-7- projects each. * 35 teachers coaches for the student groups * 35 industry mentors/alumnus 	The teachers that participate with their students have workshops and lectures during the event.	<p>You could have a small crew of students that help out with small practical things that inevitably will need to be done during the event.</p> <p>Make sure that participating staff have enough time and compensation for this.</p>	<p>The faculty worked as mentors for the student teams.</p> <p>The students helped with practical things during the event.</p>
What is the workload of the mentors?	15-20 hours They guide the teams, collect deliverables and grade the teams at the end of the week.	<p>Teaching assistants - 24 hours</p> <p>Teacher coaches - 8 hours</p> <p>The teacher coaches meet up with the students a few times during the week.</p>	The lectures and workshops they have are usually the same as the ones they have "at home", so not much preparation is needed.	They participate during the two weeks of the event.	

	Saxion IPW	Sheffield Global Engineering Challenge	Intensive Program Engineering Visions	Intensive Program Engineering Visions	Intensive Program Engineering Visions
Do any external people (such as company representants) play part in the event? What roles do they have?	Yes. Company coaches for the groups (same companies as those who provide project topics) and jury members (30 people).	Yes. The groups have an industry mentor, which is usually a Sheffield alumni working at a local company. The alumnus can chose which projects they want to work with. The students have appriciated this.	Yes. It is very similar to the IPW.	Yes.	Yes, at some of the events it has been so. In Poland we had company collaborations. What their roles have been has varied from time to time.
What is the workload for these external people?	They make the project brief, meet the team leader before the IPW and meet with the groups on Monday and Wednesday and participate in the project presentations (and competition judging, for the jury) on Friday. The jury members work in couples during the fair, judging around 8 projects per couple.	5 hours on Wednesday and 3 hours on Friday. The alumnus talk to the students in both small and large groups, in the style of panel discussion. This has worked well for them. They do not get paid, but their travel expenses are covered, and get a buffet dinner.	In the beginning of the event, the students visit the company, this takes about half a day. At the end of the evnt they participate in the project presenations and judging.	They have to come up with a suitable topic (a few hours), host company visits (a few hours) and participate in the final presentation. Totally perhaps 10-20 hours.	Sometimes they just host a visit at their company and participate and having some cintact with the students. Other times their involvement has been more intense, like meeting up with the students every other day. All companies can no always put in as much time, so flexibility is good.
Costs					
What is the budget of the event now?	Around 35 000 euros, after company participation fees around 5-10 000 euros still needs to be covered by the universtiy.	50 000 GBP (1 pound/student/hour) about 80% of this is salaries for the teaching assistans	The hosting school pays for teachers and facilities. Other than that, it does not really cost anything to host this event. The teachers get no extra salary for this, the trip is their "reward".	16 000 euros.	It wasn't big. We worked a lot with negotiating free access to different places, such as the museum adn the city library. In return we helped them with their projects. Many institutions of this type are interested in collaboration with universities.

	Saxion IPW	Sheffield Global Engineering Challenge	Intensive Program Engineering Visions	Intensive Program Engineering Visions	Intensive Program Engineering Visions
Do companies have to pay for participation?	Yes, 750 euros. But some organizations, such as start ups or non-profit organizations such as hospitals, can get a discounted price or even participate for free. The participation fees are used for arranging the event.	No, because they dont participate as such, rather help out.	YesNo	No But it's not a bad idea. They pay for it, and have to put work into it. But it is a perfect opportunity for headhunting and marketing. So in that sence it is cheap. With good marketing of the event, the companies logo can be seen in many places.	No, not when Poland hosted. The students are not seen as professionals, so the companies do not pay for their work. Also the companies put in time and effort when participating.
Do students have to pay for participation?	No	No, it is part of their noraml curriculum	No, for us the university pays for transport and housing of their own students. And teher is also Erasmus scholarships. The students have to pay for their own food and beverage during their two week stay.	The universities pay for the costs (travel, accomodation) for their own students. The host universty usually pays for some meals and travelling costs during the event.	No, not for participation. But they might have to pay for housing and food and such.
What finances the event?	The company participation fees and Saxion. The different disciplines pay from their budgets according to their student attendance.	The university's own budget	Normal university/department budget	Internal financing.	The universtiy's own budget
Facilities and equipment					
What type of space do you need?	About 30-40 classrooms with 3 groups (á 6 students) in each room. The IPW is held during an exam week (for other disciplines), this lets up space. Suitable spaces for opening meeting/ceremony and the fair on Friday. IPW office - with copying machine, help from IPW administrative staff etc. HOUSING for foregin students.	36 students per classroom (= 35-40 classrooms) Separate smaller rooms for the board room session on Wednesday.	Ther amount of participant is always the same, 50 students. So the planning for facilities is easy. They need a few classrooms for the student teams to work in, and perhaps a few more classrooms for the creative tasks.	Rooms for the groups to work in. One big room for lectures and socialising. Which is important. It also helps the teachers to interconnect with the students.	A project work classroom was used as the common class room, then every group had a room of their own. Lobby spaces were also used for the event opening and final presentations. They arranged one poster session in a museum, which they were able to use for free.

	Saxion IPW	Sheffield Global Engineering Challenge	Intensive Program Engineering Visions	Intensive Program Engineering Visions	Intensive Program Engineering Visions
Do the facilities need to be equipped with something, if so, what?	<p>Each team has their workspace in the classrooms with tables, room dividers, whiteboards, pens and paper, extension cords etc. Cost for copying/printing and coffee/drinks is covered.</p> <p>They also have access to the fablab and "arts and crafts" material, if they need to build models or prototypes.</p> <p>HOUSING is arranged so that the foreign students sleep at the houses of local students, to whom a sum of 100 euros is paid to cover housing and breakfast costs. The students are in the same project team, and the local student should help the students to for example finding to campus etc.</p> <p>Same gender housing.</p>	Nothing apart from pens, papers and such was mentioned.			
The beginning					
In regard to previous questions, how does the of the event current event differ from how it was when it first started?	<p>Started in 1997. Copied from a similar event in Amsterdam.</p> <p>It used to be in the autumn, but got moved to February.</p>		Started in Germany	<p>It was an Erasmus program that applied for funding for an Intensive Program.</p> <p>It was funded by the EU in 2013-2014.</p>	<p>Started in Saarbuckten as a Intensive Project funded by the EU 2011-2012. Poland was involved from the start. It has continued based on the belief that it is worthwhile, both for students and teachers.</p>
* Amount and type of participants	50-60 students from two disciplines. Not international	Same size, because it has always been mandatory	6 universities from different countries participated at the start.		
* Budget	0 euro	About the same as now	The first time it was arranged it was financed by project funding.		
* Curriculum/ Deliverables etc	The students used to hand in reports every day, but the work load was to big for both students and teachers, so this was discarded.	About the same as now		After the funding ended they decided to continue the program according to the original model.	Once it was arranged in February, otherwise at the end of summer.

	Saxion IPW	Sheffield Global Engineering Challenge	Intensive Program Engineering Visions	Intensive Program Engineering Visions	Intensive Program Engineering Visions
* External participants (companies or such)	Was already from the beginning meant as to build relationships with the industry/market.	The panel discussions for the alumnus is new. Before they used to be available for networking, where the students needed to approach them themselves. For many students the threshold was too high to do this.	This is different for each event, as the host have quite some freedom to arrange the event to their liking.		
Own reflections and thoughts					
What are the pros and/or cons with the event?	Pro: participants from both multiple academic years and diciplines	Having it on campus is better than having it online.	It is a really giving and fun experience for the students.	You might see some really interesting ideas and solutions. It is a lot of work.	It creates new possibilites for cooperation. You learn about corporate kulture, but also culture as such, when it is an international event.
Do you have any good advice to give?	Do NOT start out with having it international. Try it out "at home" first.	To have the course/challenge not be mandatory could mean that the students that do participate are the once that are motivated from the start.	"At work you can't always chose your own work tasks, so you need to learn how to work on projects that perhaps does not interest you so much" - Comment on wheter or not the students should be able tp choose their own project topic. The event timing is essential.	When recruiting companies, give them very clear information on waht they can expect from their participation. Setting the expectation level right is very important. Take the teacher coaches into consideration when assigning them to mentor project teams. If the teachers are too interested in the topics, they might get too involved. It is after all, the students that need to get ideas. And getting assigned to groups with uninterstering topics can still be intersting as a whole. You could ask international teachers that have participated in similar events to come in and have workshops.	Note that when getting staff to help out, some will see it as "extra work" and will want to be compensated, some see it as a part of their job. Take this into regard!

The following appendix contains a very compiled version of the student feedback received from the Saxion IPW of 2022, made for presentational purposes. Because of the massive size of the file, most data had to be removed, in order to present it in a manageable format.

Firstly some questions were altogether removed. This were general questions about the survey participant, because having to remove 95% of the answers removed the context of single answers, thus background was irrelevant.

The removed data was: **"answer from original survey or extended survey"**, **"original answer in Dutch or English"**, **"University"**, **"Discipline"**, **"Team role"** and **"Reasons for participating"**.

The second set of questions that were removed had answers of little to no relevance. This because the survey participants had no experience about the topic of the questions.

The removed data was: **"Experience from the IPW-office"** and **"Experience from housing arrangements"**.

Lastly two other questions were removed.

This data was **"Did you find your discipline relevant to your project topic"**, removed because the answers were basically repeated in later questions (the questions under the topic **"The Projects"**).

And **"Opinions about the online start of the day"**, removed because it was of little relevance to an event arranged on-campus instead of online.

The data removed from this presentational compilation was still taken into consideration in the writing of the thesis.

The data is presented as follows:

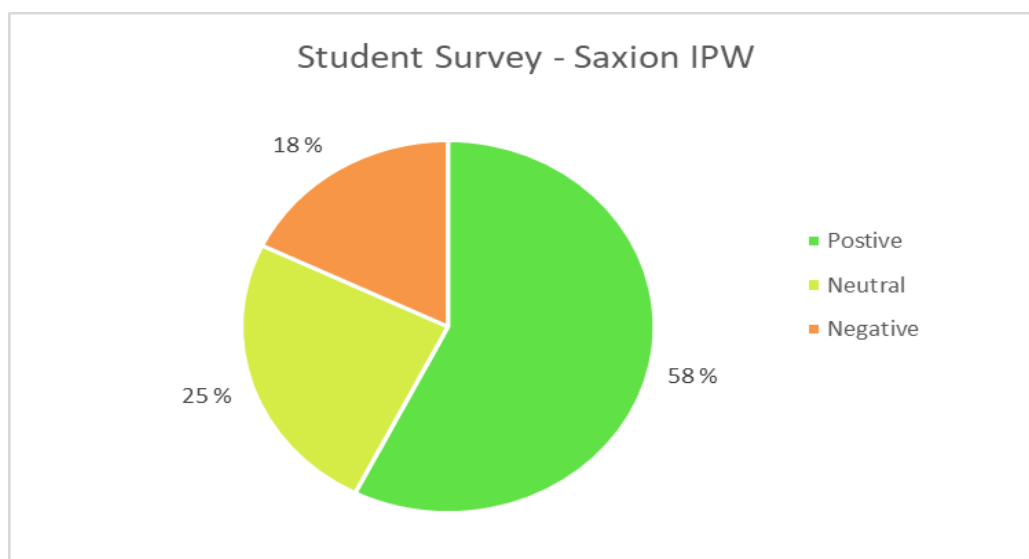
Question, percentage of positive/neutral/negative feedback.

One example each of unedited (apart from possibly translated) positive/neutral/negative feedback answers.

Conclusion of all answers in the whole survey to that specific question.

Graph picturing distribution of positive/neutral/negative answers.

The graphs below shows the distribution of answers for the WHOLE survey.



The Projects

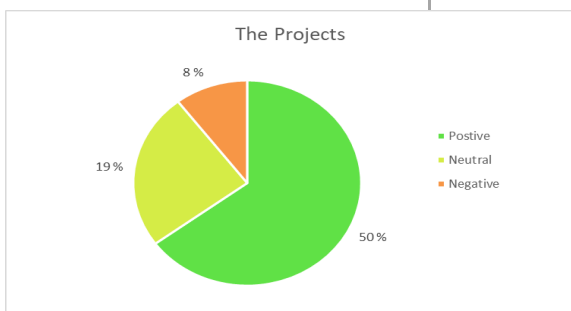
<p>What kind of benefits can you personally see in participating in a project that IS NOT within your field of studies?</p>	<p>What kind of benefits can you personally see in participating in a project that IS within your field of studies?</p>	<p>Would you prefer to choose your own topic/project? Pros and cons about this.</p>
<p>63 green - 17 yellow - 5 red 74% pos. / 20% neut. / 6% neg.</p>	<p>66 green - 17 yellow - 2 red 78% pos. / 20% neut. / 2% neg.</p>	<p>36 green - 29 yellow - 20 red 42% pos. / 34% neut. / 24% neg.</p>
<p>It is good practice to learn to work together with people with different skills and knowledge. Especially because later in the business world, people will also have to work together with other departments.</p>	<p>Expand knowledge and gain experience with assignments related to your field of study. In addition, getting acquainted with companies from your own direction is often more interesting for, for example, possible internship and graduation places.</p>	<p>It can be fun to choose your own project, and it gives a lot of possibilities. But if you have too many choices it is hard to choose. Sometimes it is actually nicer when someone else provides you with a project, so you don't have to go through the process of choosing. So it can be easier to have a task given to you by a company. Of course, being able to choose yourself gives you a lot of possibilities. But yes, being limited in your choices actually helps. Also, having limitations forces you to think outside the box and be more creative.</p>
<p>When you're new to school, it's collaboration and solution-oriented thinking. and for the people who speak bad English you can practice this quite well.</p> <p>I still think that if you've been at school for a bit longer, it makes little sense to do these kinds of projects.</p>	<p>I haven't really been involved in anything relevant to my studies. Maybe it can be useful someday to have some superficial knowledge of solid works (I worked with this a lot during the project week).</p>	<p>As a project manager it is nice to be able to choose a project. The advantage of this is that you are much more convincing when presenting the assignment to your project group. For project members I would rather be classified myself, this removes the pressure to research all projects and you also prevent that people are chosen because friends want to sit together</p>
<p>Not much. You learn nothing, you have no input and you do not participate actively. You get the less fun work, eg organizing a report or making a poster.</p>	<p>Just normal</p>	<p>Yes, you at least have something that is within your range of interest. Working on a random project for a week, while sitting at home as well, is really demotivating after 1-2 days.</p>

Most of the answers did see positive things about working with something that is does not lie within your own field of expertise. A few people did not see any benefits at all.

Some of the students saw none to little benefit with working with something they already know.

But most of the students saw this as a positive thing. They mentioned things as getting a possibility to gain deeper knowledge in the areas they already know and getting an experience close to that of the real work life. Also that they would have the theoretical knowledge to back up the groups ideas.

Many students said they would prefer to be able to choose their project topic themselves. The students were asked to state pros and cons about the own choice, and even amongst those who would prefer to choose the topic themselves was an understanding of the benefits of having a topic dealt to you. Cons mentioned were that groups would not be as mixed if chosen freely, the project situation would not be as resembling of real life situations were you seldom get to choose your own coworkers and that many would not choose to challenge themselves in such a way thus not learning as much from the experience.



The Tasks

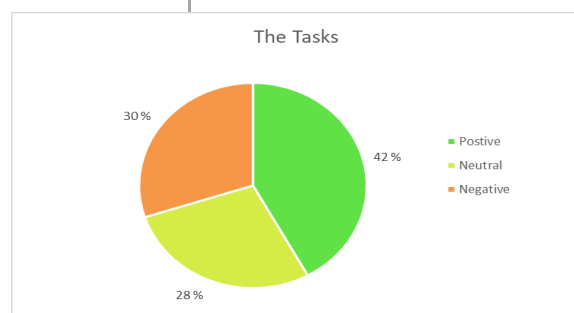
<p>Could you briefly tell what kind of beforehand information you got on your project topic, was it sufficient?</p>	<p>Can you briefly tell what kind of hand ins your project required, was the briefs/beforehand information sufficient for you to complete your task well?</p>	<p>What is your opinion on the program for Friday? - If this is your first time participating in the IPW, please answer according to your expectations. - If you have participated in the IPW previous years/on campus, please answer this question in regard to previous IPW's. What did you think about the market/fair, presentation of projects, award ceremony?</p>
<p>34 green - 21 yellow - 30 red 40% pos. / 25% neut. / 35% neg.</p>	<p>1 green - 1 yellow - 3 red 20% pos. / 20% neut. / 60% neg.</p>	<p>43 green - 23 yellow - 19 red 51% pos. / 27% neut. / 22% neg.</p>
<p>Information from the company itself is sufficient (were working with [company name]), however, reading through other projects, I can see the lack of information than what [company name] has given us, some are even too vague to begin brainstorming with. Perhaps, a standardized project topic introduction from the company might be a good idea in the future.</p>	<p>Each project group has a project leader. we did get briefs slightly in the first meeting. but the project leadet gets a list from the tutor. During the project we get guided on what we needed to hand in and when.</p>	<p>This year it's mostly just presentation on what you have been working on. It is quite similar to what we did during the last IPW. But then it was more of a market. you had your posters, your material etc. You showed what you had worked on to people passing by. sadly we don't have that this year. It was fun to interact with people.</p>
<p>We get a small presentation with the current situation and i think it was enough to start with. But they already had a solution but that was not good enough, but they told us that on wednesday so we also made a solution wich was almost the same as there's. That information could be given on monday so we know everything.</p>	<p>All years we had to hand in a daily summary of our work. At the end we needed to present our idea to the customer, along with a poster or something</p>	<p>I was fine with it, the market as usual was always very long, this suited me a lot better. I would recommend that the market next year, if the weather is physically possible, just let the market last a maximum of one and a half hours and send the same number of juries, so that it does not take unnecessarily long. Within an hour and a half, all students also have plenty of time to take a look at everything.</p>
<p>The information known for the project week was not sufficient. After a presentation of the company and some questions, the assignment was clearer. It may be useful if companies write down a list of requirements or a list of expectations, it becomes clearer for students more quickly.</p>	<p>No it wasn't sufficient because on the first day you become a detailed requirement list where it's all discribed and it's mostly not the same as in the assignment.</p>	<p>I think it's a very bad idea to have a cash prize. The aim of the project week is to learn and not to win money. Now you motivate people to win money and not to develop themselves and learn new things. The money price provides extrinsic motivation. And if you want to reward people for the good work, just pay them for the work they've done.</p>

In general the students seemed to want more beforehand information about their projects. The system at Saxion puts the team leader in charge of this responsibility, and all team leaders did not share this information to their team. Or according to many students, did not share it sufficiently.

This is of course something that is also very likely in a real life project for a paying client. But if you want the students to have a satisfying experience from which they could learn a lot, it is perhaps not so god if this is then highly dependent on the leading skills of student colleagues.

Problems with miscommunication or lack of communication.

Very divided opinions about the program for Friday. Supporters for both the online program and the on-campus program of previous years. Most negative feedback was about long perios of waiting.



The Project Group

What are your thoughts about the group size (6 people)?

5 green - 0 yellow - 0 red
100% pos. / 0% neut. / 0% neg.

We were originally seven and now we are six. The group size of seven or six is sufficient. Then you can make subgroups that can have different tasks. Its a good size in general, you can make three groups with two people, doing different things.
One group can make drawings, one group can work on presentation, one on cost calculations etc.
A smaller group would mean more work, and it would be noticed (negatively) in the quality of the project.
A bigger group (10-12) would make it more chaotic. A lot of different thoughts. So a bigger group would mean more people talking over each other and competing for the spotlight.

The size is good but it has to be a group of different students with different years of education. In our group we were all in the first year and others were all in the third or fourth year of education. It has to be mixed.

Would you like to be able to compose your own groups? Pro's and con's about this.

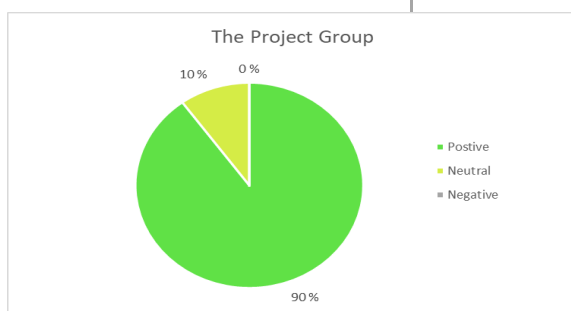
4 green - 1 yellow - 0 red
80% pos. / 20% neut. / 0% neg.

No i wouldn't like to be able to compose my own group because in this case you would only work together in groups of people you already know and wouldn't earn as much new experiences as in groups of foreign people with different education stands.

Yes because than you can be 100% sure that the team will be mixed.

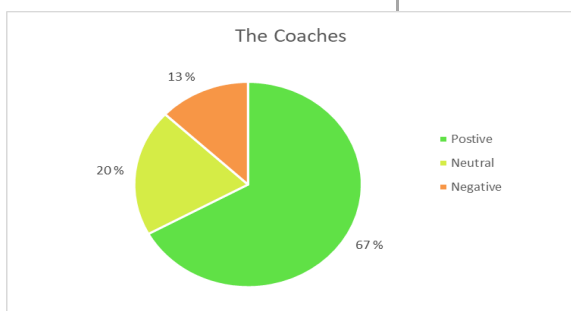
The students were content with the group size.

The general consensus seems to be that it is a positive things to have a good mix in the groups.



The Coaches

Please tell briefly about your experience from the contact with the company coach. Positives? Negatives?	Please tell briefly about your experience from the contact with the teacher coach. Positives? Negatives?	Did you feel that your coaches were available enough? (Please explain your answer)
<p>57 green - 21 yellow - 7 red 67% pos. / 25% neut. / 8% neg.</p>	<p>52 green - 17 yellow - 16 red 67% pos. / 25% neut. / 8% neg.</p>	<p>63 green - 12 yellow - 10 red 74% pos. / 14% neut. / 12% neg.</p>
<p>All project leaders were in a WhatsApp group together with the company coach. This was very easy for communication. And so we were able to easily schedule a moment to discuss progress.</p>	<p>The teacher coach has some good feedback every meeting, they were also good at keeping our tracks and actually remind us when we forgot something to add.</p>	<p>I think so, I could send them a message at any time of the day via teams or the mail and got in touch fairly immediately or got a phone call</p>
<p>It was fine. He was a nice man and seemed interested in our ideas, but he also had very little technical knowledge so at times we had a hard time answering his questions about why we had chosen specific features. This wasn't a very big deal though. He did however not show up when we were first supposed to meet with him online on the first day. We tried calling him and his assistant but could not get a hold of him and the meeting had to be moved an hour or two.</p>	<p>our teacher coach came to check up on us twice a day, which was kind of useless sometimes because all we really did was say what we had done that day and that was about it. it was nice for the few questions we had about presenting our pitch and to the company coach, but overall it was kinda of useless.</p>	<p>Okay. the contact moments were very short.</p>
<p>The company coach seemed bored in most of the interactions and I don't think we've received proper feedback when we presented.</p>	<p>I have never met that teacher before, and I felt quite voice-less in the group. It was mentioned that **only** the leader of the project group could contact the teacher coach, therefore I could not voice any concerns I had. It was a little unclear on how to get in contact, or if I can even contact them.</p>	<p>Maybe they should be more available, because once a day could be not enough</p>
<p><i>Generally positive feedback. What seems to be highly appreciated is that the company coach is easy to reach and responds quickly. And that they give constructive feedback and are genuinely interested in the progress of the student.</i></p>	<p><i>Generally positive feedback, though a few more negative comments, mostly about the teachers not being available.</i></p>	<p><i>In general they were satisfied with the contacts with the coaches. What people though did find to negative, was a lack of communication and that often only the team leader managed the contact.</i></p>



Support and Extracurricular Activities

Was there any extra, not mandatory, activities that you participated (or are going to participate in)? Thoughts about these: are they fun, unnecessary, could have been better, the best with the whole IPW etc?

Do you have any comments about the general arrangements of the IPW?

2 green - 3 yellow - 0 red
40% pos. / 60% neut. / 0% neg.

1 green - 2 yellow - 2 red
20% pos. / 40% neut. / 40% neg.

Previous year, we got to do a lot of cool little work shops. One about sustainability and one about techniques and machines you could apply to your product with examples from teachers etc. This year we had an online workshop about sustainability, but it would be more fun if it was physically. I see the extra curricular activities as valuable. You get more experience, see new people outside the group and its a lot of fun.

Fun to do, the international aspect really adds to it

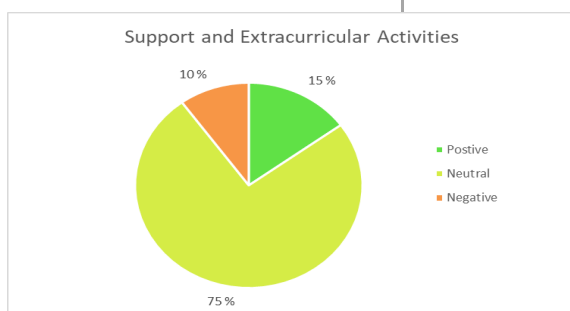
The first year we got assigned to a class room. We had a whiteboard and tables etc. It was sufficient to what project we had that year, but I prefer myself bigger tables. This year, we jsut took a room. Most are empty anyways. This year not sufficient, but we were not supposed to be on school grounds anyway.

The organisation of the groups was awful. Our Group leader didn't really know details how we had to work and was not ambitious.

Many had not participated, due to the online-format of the last two events.

Some complaints about arrangements, but this mostly connected to the online nature of the event.

And once again comments about the inadequacy of the team leader.



Rewards and Benefits

Own Thoughts and Tips

Thoughts about the competitions and awards. Of how much importance is the awards for you personally? Do you participate to win, or is the competition/awards not very important to you?

Do you feel that the IPW has given you a good contact with the company/companies? Do you think this experience might lead to an internship or an employment?

If you have any thoughts of your own, or good advice to someone organizing a similar project week, please write them here.

0 green - 3 yellow - 2 red
0% pos. / 60% neut. / 40% neg.

2 green - 1 yellow- 2 red
40% pos. / 20% neut. / 40% neg.

I did. The project I did in my first year invited us to the company which was nice

"Come up with fun projects!"
"Try to make a proper connection with the students. If you do this online, have a proper online environment for them. Proper schedule so they know what they have to do, when and where. This helps a lot.
It would be fun that students could meet up with other students from other field of studies. The mix it quite good as it is, because of the mix in the groups.
Previous I had a lot fun and I really liked the experience. I was proud of the work that I accomplished. "

It's not that important to me. It's more like a fun little game. It would be fun to win a big price, but for me winning is not the goal here. I'm here to learn and gain insights.

The IPW shoul give the companys more informantions about the groups. (which education stand do they have, are only dutch members or international ones too)

"It would be better for people to chose their own projects.
Maybe think more about the students and what they want

Listen to the students, so the morality wont go down.
A lot of people dont look forward to this now and don't see it as a nice thing, its more something they HAVE to do.
It doesn't have a good reptuation here now amongst the students."

Personally for me the awards aren't important because I took place to get new experiences, not to earn money an get proces. Also the competitions weren't fair because you fought against groups with much more knowlede experience.

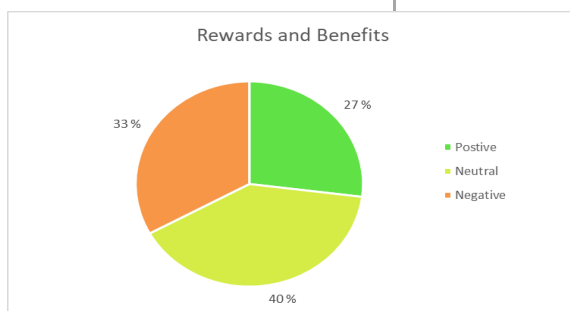
No, I don't think so.
I can't really remember the first year. Second year was on our own initiative. This year I haven't met the company coach, so no. I also think the company is in a different country.
I think people would be more eager to work for a company and the project, if you could choose your own project.

"The groups should be more mixed and the ranking system should be more rethought."

"The groups should include different education stands."

Mixed thoughts about the competitions. Not the main aim with the participation, and also that even if it would be important, the chances of winning are so slim that the competition does not motivate.

Contact was okay when possible on-campus. Online it was harder to get a connection.



Technobothnia Engineering Challenge Week

First Suggestion/Draft – 8.4.2022, Stolpe

Duration: 1 work week (in January?)

Participants: engineering students from Novia and VAMK UAS and the University of Vaasa.
All disciplines and years.

Number of participants: 50 students, divided in 10 groups of 5 students each.

Benefits to students:

- Study credits
- Fun experience
- Connections to the corporate world
- Learn so called “soft skills”
- Participation in two competitions:
 - Interview competition – All 5 participating companies choose one student each that will win a job interview with respective company.
 - Best team spirit competition – The team with the best team spirit wins a money prize to be split evenly by the whole group.

For this we need:

- **5 companies**, who each of them will come up with a suitable “case” (project topic).
2 student groups work independently on each case, giving the companies two separate ideas/solutions to their case.
- **1 company representative from each company**, functioning as both client and mentor.
Estimated workload: ~10 hours
- **5 teachers**, each will function as mentor/teacher coach to two groups, working on the same case. The teachers is to follow the progress of their groups, help and answers questions if needed, collect possible deliverables, grade the groups’ work and give out study credits.
Estimated workload: 15-20 hours
- **2-person event team**: 1 event manager + at least 1 event assistant, that together both plan and arrange the engineering challenge event.
Estimated workload, event manager: ~200 hours
Estimated workload, event assistant: ~100 hours
- **A few classrooms** in Technobothnia, that will function as workspace for the project groups.
Depending on the size of the rooms, 2-4 groups might use the same classroom.
- **Other facilities**, as for example an auditorium, lobby space and other similar. This will be clearer once the detailed plans are done.
- **Access to laboratories**, if necessary. Some groups might want to print prototypes or build miniature models.
- **Budget**, a preliminary estimation is ~50€/student (referenced from studied cases, and a bit over the top as a safety measure). Total budget would thus be ~2500€.
-> The company participation fee (suggested 750€/company) would cover all costs, including some of the salary costs for the event manager.
The aim is a non-profit event.

Benefits for Technobothnia:

- Better, more deep connections to the industry
- Strengthening the own brand
- Visibility
- Can thus offer the universities a competitive and interesting event/course, that also supports the thread-based curriculum at VAMK.
- A possibility to develop and expand the event to be international in the future

Benefits for companies:

- Better contacts to Technobothnia/the universities
- A really good marketing opportunity towards students
- A possibility to network and headhunt
- New innovative ideas to their cases
- Good visibility

Preliminary program:

- Monday: Opening session, the project groups visit their "own" companies with the teacher mentor, where the "client" briefs them about the case (info about this sent beforehand). Project work.
- Tuesday: Project work. Workshop about soft skills or project work, in English (held by an international teacher, have a few proposals already).
- Wednesday: Project work. "Client meeting" with company mentor, teacher mentor also attends.
- Thursday: Project work. Final report and other deliverables to be handed in at the end of the day.
- Friday: The groups present their projects to the "client" and the teacher. Possibility to look at the pther groups' work. Lunch for all participants. The teachers and company representatives meet and decide on winners. Award ceremony and closing session.

Because it is a new event, it is a good chance that local media (or other) will be interested in giving it coverage. This gives added value also to the companies. The event team will take care of this.

Interest for the project has been shown both internationally (a few international proposals has come already) and locally, for example from Vasek.