EPS Programme Spring Semester 2022 Novia University of Applied Sciences

FUTURE ECO AUTO TEAM ENDTERM REPORT

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PREFACE

In the EPS (European Project Semester) program of Novia University of Applied Sciences, most of the semester is dedicated to a project that the university provides and from which students can choose. Our team, Sanne Keizer, Freyja Peeters and Sam De Loose have been assigned a project to start and implement an eco-car racing team at Novia UAS.

During this project, the goal is to research how such a team is put together and find out how it functions and operates. Next to this, we are required to organize a student recruitment, form a team and finally provide them with the necessary documents for a smooth start.

Each with our own expertise, we threw ourselves into this project. This with a lot of energy, perseverance and enthusiasm. Because of the subject of the project, we had little experience in this area. Good support and feedback from our supervisor and customer ensured that we did not have to grope around in the dark and were able to keep both our feet on the ground at all times.

We would like to thank our supervisor Mikael Ehrs and our customer Tobias Ekfors for all the feedback and help we received throughout our project.

We would also like to thank Heikki J Salminen, Tharanath Tharanath, Miguel Zamora Corderoand, Kenneth Ehrström, Roger Nylund and all the teams we have interviewed without these people our project would not have been what it looks like today.

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01 INTRODUCTION

This endterm document shows the steps taken throughout the whole project. It builds further on the midterm report. To start, our team, the assignment and problem will be explained. Next, our customer's desires and needs are discussed. Furthermore, a summary of our desk research and useful background information will be presented. Then we will show an overview with interesting insights of interviews we conducted with existing racing teams. Also valuable information gathered from meetings with staff is included. Moreover, we will talk about the available resources and work spaces at Novia/Technobothnia. Afterwards the whole process of the recruitment and composition of the team is explained. Branding and marketing as well as sponsorships will also be discussed. To end this report we will talk through the implementation plan, which will be handed over in a seperate document to the first racing team at Novia UAS.

1.1 The Team

The FEAT-team consists of Freyja Peeters and Sam De Loose from Belgium and Sanne Keizer from The Netherlands. Our goal is to start and implement a multidisciplinary project at Novia University of Applied Sciences in which students can show what they have learned during their theoretical courses and develop additional skills. The project includes building the most energy efficient car and is a testing ground for the next generation of engineers.

Project

Our aim is for the future racing team to be participating in the Shell Eco-Marathon. The Shell Eco-Marathon is held each year in three world zones (America, Europe and Africa and last Asia Pacific and Middle East). The competition is perfect for STEM students (Science, Technology, Engineering and Maths), which there are plenty of at Novia. The main focus of the Shell eco marathon is building the most energy efficient vehicles by collaboration and innovation and working together towards a lower carbon world.

Our mission is to bring together a multidisciplinary racing team that, by working on this project, can show their hard and soft skills learned throughout their studies. Our vision is for our future team to participate in the Shell Eco-Marathon, make publicity for Novia as an UAS and work together towards a sustainable future by building the most energy efficient vehicle.

In appendix A, the team's code of conduct can be found. In appendix B, the team's contact information can be found.

1.2 Assignment

Background problem

An average student spends about four years at Novia University of Applied Sciences during their studies, but most of this time is spent inside a classroom. The downside is that most of the courses are theoretical with little to no direct real life connection or possibilities to show and implement learned skills. Our solution is giving the students the opportunity to take part in a multidisciplinary project so that their studies feel more relevant and interesting. Simultaneously, students learn how to work in a team, plan things, develop hard and soft skills, improve their technical and interdisciplinary skills and maybe even find new interests. Moreover, they get the chance to have a lifetime experience and even put this on their CV.

In addition, motivated students are an amazing asset for the publicity of Novia as they attract other students with their enthusiasm. Novia as an UAS will benefit from having the opportunity to participate in projects that transform theorical courses into practice. These projects could help and be a part of Novia's marketing and media involvement.

1.3 Stakeholders

There is more than just our client Tobias Ekfors that will benefit or be affected by this project. Other involved parties include:

- 1. Novia UAS
- 2. Teachers and staff at Novia
- 3. Students
- 4. Sponsors
- 5. Engineering and business department
- 6. Other universities situated in Technobothnia; VAMK and University of Vaasa
- 7. Vaasa Energy Week

Novia UAS as well as the teachers and students in the school will be directly affected by the creation of this racing team. Moreover, the engineering department will be involved and more than the marketing department, especially in the beginning. Sponsors and people at the Vaasa Energy Week are indirectly affected by the project, as they come in handy but do not participate first hand. Other universities might use our project in the long-term as well, or they could learn from it and try it themselves. All parties have things they need, to be able to lead the project to a good ending.

- 1. Novia needs accreditation to be trustworthy, international networking that can help to get attraction from abroad and publicity which will help to get acclaimed.
- 2. Teachers need a place to set up the project, motivated students, clearly defined goals and a possible starting budget
- 3. Students require resources, time, a reward or grade, freedom, flexibility, autonomy and motivation
- 4. Sponsors would require something to see success or progress, publicity, reach, possible involvement, communication and updates, experience
- 5. The engineering and business department need a challenge, success, innovation, a multidisciplinary team
- 6. Other universities require (international) networking and publicity
- 7. Vaasa Energy Week (or other conventions) require networking and publicity

02 DESK RESEARCH

Before deciding the competition the future racing team would participate in, research about other available competitions is conducted. In addition, non-car based competitions and other relevant background information is looked at.

2.1 Available competitions - Car based

Shell Eco-Marathon

One of the available and probably most well-known competitions is the Shell Eco-Marathon. Shell states that the marathon is a global academic programme which focuses on energy optimisation and is one of the world's leading student engineering competitions. The competition originates from 1939 and nowadays over 100.000 students from over 60 countries have participated. The academic programme brings students of different fields together to use their bright ideas for shaping a lower carbon future. The way to win the competition is mainly to build the most energy efficient vehicle.

The Shell Eco-Marathon is based on two main classes;

Prototype class

- 1. Internal Combustion Engine (available fuels; Unleaded 95, diesel, Ethanol E100)
- 2. Battery-Electric
- 3. Hydrogen Fuel Cell

Urban Concept class

The 'Prototype class' is divided in the three different powertrains; internal combustion engine (ICE), battery-Electric and Hydrogen fuel cell. The prototype cars are relative small and made for a single person. The 'Urban Concept' class is where students design and build energy efficient vehicles, which are closer to the modern passenger cars, compete against each other. Within the Urban Concept class, the same three different powertrain classes are available.



A prototype vehicle competing in the Shell Eco-Marathon, this vehicle was built by the REMMI-team of the University of Tampere, Finland



An example of a vehicle competing in the Urban Concept class in the Shell Eco-Marathon, this vehicle was built by a team from University of British Columbia.

The Regional Competition is held yearly in three World Zones; America (North and South), Europe and Africa and Asia Pacific. Next to that, the Shell Eco-Marathon hosts Challenger Competitions for orientating teams or teams who would like to improve their vehicle before the actual competition.

Requirements

Teams out of Finland are only allowed to compete in 'zone 2' which covers Europe and Africa, unless there is approval to compete in the other zones. Participants must be affiliated with an Educational Institution, in this case Novia UAS and at least 16 years old. The actual permission for participation seems to be fully dependent on the opinion of Shell Eco-Marathon as they state 'Organisers will review all applications and will select Teams based on the quality of their proposed entry and historical successes from previous Shell Eco-marathon events.' If the application meets all the requirements and the team gets selected to compete, all the On-track events will be open for every team. **Participation fee:** none

Formula student

This educational engineering competition originates from 1981 and was founded by The Society of Automotive Engineers (SAE) in the United States. Formula Student has a rich history, influenced by top figures in the automotive industry and F1. The competition moved to Silverstone Circuit in 2007, based in the United Kingdom. The aim is to encourage the young generation to take up a career in engineering and the project usually forms a part of a degree-level project. The team will be asked to produce a prototype for a single-seat race car, followed by presenting this to a hypothetical manufacturing firm. The priorities are: low cost, easy maintainable, reliable and high performance in acceleration, braking and handling. The team has to demonstrate the designed car including the substantiation of the proposal and must be able to convince the product can support a viable business model. The testing process is divided in static and dynamic events, which include among other things: tilt, brake and noise test, sprint, acceleration and endurance test.

Requirements:

To participate in Formula Student, the team must submit a Design Concept Specification (DCS) and the committee will review each DCS and registration form, following by selecting the teams based on the content of the DCS. Remaining teams will be placed on the reserve list, which does not guarantee a place in the competition. Within the team selection, there are a few criteria which will be favoured: national teams, top 10 finishers at previous competition, alternative fuelled cars and interesting technology and representation from as many countries as possible.

Participation fee: The pricing for participating Formula Student SAE in 2022 is about €2.500,-, within Europe the application fee is mainly around €2.000,- aswell.

Formula Student (SAE) has three categories

1. Formula Student

FSC: Formula Student Combustion (Internal combustion engine vehicles) FSE: Formula Student Electric (Electric vehicles) Alternative fuelled vehicles

2. FS-AI (Formula Student Artificial Intelligence) FSD: Formula Student Driverless (Driverless Vehicles; own vehicle or IMechE ADS-DV

(Autonomous Driving System - Dedicated Vehicle))

3. Concept Class

Mainly focused on vehicles in the design process which the aim to provide a Formula Student entry in a future competition year

Also Formula Student hosted online and hybrid competitions during the COVID-19 pandemic.

Other Formula Student competitions

Nowadays, there are 20 active known Formula Student competitions throughout the world. Within Europe a few of the competitions are the more well-known and prestigious ones and for applying the teams have to proceed to 'Rule quiz' weeks. This means that teams will have to study the Rulebook and answer questions about this, to be selected for the next application rounds. Each competition has somewhat different application requirements and class requirements, but the main rules are similar to each other.

Country	Competition
Australia	Formula SAE® Australasia
Austria	Formula Student Austria
Brazil	Fórmula SAE® Brasil
Canada	Formula SAE® North - Canada
China	Formula Student China
Czech Republic	Formula Student Czech Republic
Germany	Formula Student Germany
Hungary	Formula Student East
India	Formula Bharat - India
Italy	Formula SAE® Italy
Japan	Student Formula Japan
Netherlands	Formula Student Netherlands
Russia	Formula Student Russia
South Korea	KSAE Formula
Spain	Formula Student Spain
Switzerland	Formula Student Switzerland
Thailand	TSAE Student Formula
United Kingdom	Formula Student United Kingdom
United States	Formula SAE® California
United States	Formula SAE® Michigan

The known active Formula Student competitions, with the more well-known and prestigious ones in Europe in bold.

Two of the main European competitions are shortly mentioned underneath regarding their requirements: Formula Student Germany and Formula Student East.

Formula Student Germany (FSG)

For FSG 2022 a total of 100 teams are registered, 74 teams are on the waiting list and registrations are still open at the moment (February 2022). For registration the team needs to take part in one quiz for all competitions, which requires knowledge from all fields related to Formula Student. The registration fee is €1000,- for a 20-person team, extra team members is an additional €50.- per participant.

Formula Student East (FSE)

For FSE 2022 a total of 84 teams are registered, 144 teams are on the waiting list and registration is closed since 28th of January. Also for FSE the teams need to participate in a quiz, but specific for each category and includes questions about the rules, general engineering, business knowledge and facts about FSE. The registration fee is between €1.700,- and €2.200,-, depending on the chosen category. Unlimited team size is included in the fee.

FMMC – Finnish Mileage Marathon Club r.y.

This is an association which is coordinating all sorts of Eco-Marathon competitions within Finland. For example, the REMMI-team (Tampere) competes with the same car in both Shell Eco-Marathon and the FMMC marathons. The aim of this association is to use as less fuel as possible for the same distance and within the allowed time.

The yearly 'Pisaralla pisimmälle' competition is the most common one and has two classes:

- 1. Internal combustion engine; unleaded petrol or diesel
- 2. Electric

Requirements:

The allowed fuel types are unleaded petrol or diesel. The use of any other energy, such as electricity, compressed air, to move the vehicle is prohibited. Also modification of the aerodynamic shape of the vehicle is prohibited. The minimum age for the driver is 13 years. NB: the main language within the competition is Finnish, so international students or involvement is more difficult and Novia UAS itself is also a Swedish speaking University. The competition seems to be free of charge.

2.2 Available Competitions - Non Car Based

UAS Challenge

This is a fairly new competition which has been launched in 2014, with the aim of developing professional engineers and inspiring next generations. It is a global competition, where over 30 teams are participating in 2022. The mission is to fully design and build an unmanned aerial system (UAS) of maximum 10kg which could be used for specific missions, such as lifesaving missions with picking and dropping Aid Packages.

Requirements

The competition is open for Undergraduate or taught Postgraduate students over the age of 18 years. Universities are allowed to enter with more than one team, if they operate independently. As it is an annual challenge it is a cycle with a kick-off in October and a final event in June, with set deliverable dates as well.

Participation fee: around €1.000,-.

Extreme Tech Challenge (XTC)

This is a competition in the world's largest startup competition for entrepreneurs addressing global challenges, based on the United Nation's 17 Sustainable Development Goals. XTC is a non-profit organization that aims to help startups change the world.

There are 10 categories which bundle the 17 goals mentioned above:

- 1. Advanced Materials
- 2. AgTech & Food
- 3. Biotech & Medical Devices
- 4. Cleantech, Energy and Environment
- 5. Digital Health
- 6. EdTech
- 7. Enabling Tech
- 8. FinTech
- 9. Mobility

10. Sustainable Smart Cities

Requirements:

The competition is mainly based on companies which are in the process of developing a product based on new innovative technologies or an innovative application to an existing technology. Finland is an eligible country in their list, so is aloud to take part. Participants must be at least 18 years old and there is no participation fee.

The participants will be judged in the following criteria:

- 1. Tech for good / Responsible innovation for a radically better world
- 2. Product / Market fit
- 3. Product innovation
- 4. Team

ClimateScience (CS) Olympiad

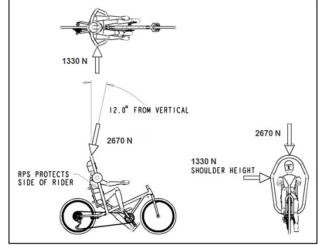
CS is a global student competition to find solutions to climate change. The ClimateScience Olympiad 2022 already has over 100 participating countries and is still counting until August. CS is a global non-profit organisation which created educational resources and activities to find solutions to climate change.

Requirements:

Participation is individual or in a team of two within the ages of 15-25 years which are divided over three age classes. There is no participation fee. The competition exists of four rounds which run from August to October, with a qualifier round, quarter finals, semi-finals and the final. In the Semi-Final the participants have to choose between three problem statements at 10 days before the event. The exact statement will be revealed at the start of the actual event, following 3 hours for research and writing essay response to questions related to the problem statement. The top 100 will continue on to the final.

e-HPVC

The ASME's Human Powered Vehicle Challenge (e-HPVC) is a engineering design and innovation based competition that gives students the opportunity for networking and practical appliance of their knowledge. The teams product is a human powered vehicle, such as an aerodynamic shaped bicycle in which the driver is laying or sitting.



An example of a possible product for the HPVC competition.

Requirements:

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The competition is open to teams from any college or university in the world and all members must be enrolled as students in that school. The team captain must be from the engineering department. Entry to the competition is free of charge. So far there is no cap on the maximum number of vehicles and if so, it will be listed on the website at least 90 days before the competition. Teams will be judged on the topics General, Design, Innovation, Analysis and Presentation Delivery.

2.3 Conclusion Available Competitions

As mentioned, there are several international engineering competitions available in which Novia UAS could compete. The client's wishes are to compete in a car based competition (see chapter 03 The Customer), but a few non-car based competitions have also been reviewed. The main decision and discussion points for choosing the right competition for Novia are as followed:

Participation fee; depending on the teams financial supply to reserve money for the fee.

Location; taking travel costs for the whole team into account, along with possible visas and other currencies.

Recourses at Novia UAS; can Novia UAS and/or Technobothnia provide the main recourses to build the product and participate in the competition.

Possibility to apply and get selected for the competition; the possibility to get actually selected for a competition needs to be taken into account, as the team will compete for the first time with a more simplistic product due to a relative low starting budget.



The estimated cost of the product; are we able to get enough sponsors or funds to financially provide the team to design, build and develop the product?



Wishes of the client, Novia UAS and the participating students; for which competition will the students have the most motivation, what are Novia UAS wishes in terms of publicity, what would the client like to see?

2.4 Background Information

Eco Cars

After the meeting with our customer and careful consideration, we decided to continue working on a car-based project. More specifically a project in which students focus on building an eco car that will be able to participate in competitions. In general, any vehicle that can increase fuel efficiency and decrease carbon emission is regarded as an eco car. In other words an eco car is a green vehicle, clean vehicle or environment friendly vehicle.

Different Types

- 1. Electric and fuel cell-powered
- 2. Hybrid electric vehicles
- 3. Compressed air cars, stirling-powered vehicles, liquid nitrogen vehicles
- 4. Improving conventional cars: Biofuel, compressed natural gas, and clean diesel
- 5. Electric Motor and Pedal Powered Vehicle
- 6. Solar vehicles
- 7. Wind-powered electric vehicles

The different necessary components of these cars depend on the various competitions.

Additional Value

With the issue of global warming rising, more focus on sustainability is necessary and becoming a very important thing. According to National Geographic, the world is still falling short on meeting its climate goals. Although many countries are revealing targets to reduce carbon emissions, it is still not enough. Finland is one of the countries that is making great effort. For companies to help keep global warming and climate change between acceptible levels this could mean many things. When talking about car companies etc. one of them could thus be selling more and more environment friendly cars. This is where our project comes into play as well. The future eco auto team of Novia will not be directly about making and selling more sustainable cars and trying to fix climate change, but it may indirectly raise awareness about these environmental problems nowadays. It keeps students awake and lets them think about how to improve the future.

Decarbonisation and electrification

Decarbonisation means decreasing the emission of carbon dioxide (CO2). To achieve this, a mindshift towards producing and consuming cleaner energy is a must. We need innovative solutions on lowering carbon energy sources and renewables. What is better than to start up a project focussing on cars (or other road travel for that matter), which are a big part of the greenhouse gases that contribute to climate change? Putting together a team of young engineers with state of the art knowledge and innovative solutions is a perfect way to start this mindshift. Another term we focus on is electrification. This refers to the process of replacing technologies that use fossil fuels (coal, oil, and natural gas) with technologies that use electricity as a source of energy. Knowledge about these topics is the starting point and underlying reasons why this project has an additional value besides competing and putting theory into practice.

03 THE CUSTOMER

After knowing which competitions are out there, we had to find out what exactly our client had in mind so we could start defining a scope and focus on his wishes. Our customer is Tobias Ekfors, as mentioned in the introduction. We had a meeting face to face together with the team; on the next pages the questions and answers are summarized to get an overview.

3.1 First Customer Meeting

An important part of the project is the contact with the customer, Tobias Ekfors. Out of the first meeting we summarized his wishes, ideas and requirements.

Scope

Tobias' wish is to make this competition program continuous rather than an onetime event, so this is what the team should aim for. He would like to see it in the form of a project, but some courses, such as automation and electrical engineering, could possibly be involved. It is possible to make a plan so that students can get credits for the project and replace some courses, teachers should also be involved in the project. The main goal for the team is that the students have fun while participating in the competition and that there is a good team spirit. He also recommends to look further than only the Shell Eco-Marathon competition and have a broad vision. The competition does not necessarily need to be the Shell Eco-Marathon, but could also be other projects where the school and students can participate in. Tobias would like the competition team to start next study year with a start off teambuilding session from Roger Nylund. Most likely the team will start competing with a car in 1,5 years. In terms of budget, a rough estimation is €20.000 for the development and building of the car. The majority of the budget needs to be obtained from sponsors.

Requirements

The requirements really depends on the chosen competition. For example, the Shell Eco-Marathon does not require a complete new design every single year. The team will need enough highly motivated students, which has to be investigated. The competition team has to exist out of 15-25 students of which 5-10 very active members. The team has to be divided into specialists and there will also be passive members working on it periodically. The preference is mainly third year students, as they have the best combination of time and knowledge. Although including some master students and second year students could be interesting as well. Further, as many studies as possible should be involved, to obtain a proper interdisciplinary team.

Contact Wishes

Tobias would like to be updated, but that does not have to be every week. Also, he would not like to receive too much detailed information, but just the main progress of the project. He rather wants to be available for any questions we come up with. The team suggested to have at least a meeting after the midterm and a few weeks before the end term, which Tobias agreed with. Tobias has full trust in Mikael and thinks the team can rely on him for most of the time and we do not have to ask Tobias for approval for every single thing in this way.

Network of Customer

Tobias	has	some	network	connections	which	he	recommends	getting	in	touch	with.
Wärtsilä	ä – Jul	ha Kytö	lä ———		- Ship	o enç	gine manufactu	irer, hydr	oge	n know	ledge
HiGtech	י —				⊸ Swe	dish	team competir	na in She	ell E	Eco-Mar	athon

Novia UAS R&D department – John Dahlbacka —	Funding and startups
Novia UAS Shiva Sharma	
University of Vaasa	

Deliverables

Tobias would like to see a plan for how to proceed, including a time schedule, supplies and contacts. This will be a lot of research work, but for next year Tobias will only need to make small adjustments if needed. Think into the future for about 2-3 years and think about what would fit Novia UAS.

Strengths

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Novia UAS has almost all the required knowledge in-house, companies and teachers can be involved if needed. As the Vaasa area has a lot of industry and is famous for its energy production, there is a lot of knowledge within the area which could be used.

The Main Points

Have a broad vision and network until you have a good vision of the possibilities.

Mikael can be a representative for Tobias.

The project should be able to start off next study year (autumn 2022) and be able to participate in approximately 1.5 years.

The team should consist of 15-25 students with a core team of 5-10 active students. A mix of mainly third year and master students with different study backgrounds would be great.

The main deliverable will be a plan about how to proceed and startup the team and competition.

After the first meeting with our client Tobias Ekfors, we took his wishes into account and decided to focus on a car-based project. This because of a few initial reasons. First and foremost our client's passion for cars, as a previous member of the REMMI team, a Mileage Marathon club based in Tampere, Finland. Their aim is to design and manifacture the most energy efficient vehicle that uses internal combustion engine. They participate in Shell Eco Marathon Europe and Pisaralla Pisimmälle competitions. Second, the many students with different educational backgrounds, which can form an incredible multidisciplinary team at Novia UAS. Third, the electrical and mechanical engineering professors willing to answer possible questions. Fourth, the already available resources at Novia/Technobothnia like workspace, tools, and machine opportunities. Last but not least, the fact that Novia never had an eco car team before!

3.2 Second Customer Meeting

As our project developed further, we decided to involve our customer once more to go over the things we researched and get feedback. Topics included the meeting with dean Kristian Blomqvist for approval of the project, the marketing plans for the Vaasa Energy Week, the competition choice in which the team will participate, the next steps in the project and the deliverable breakdown. To read the whole meeting, go to Appendix C.

Meeting Kristian Blomqvist

The idea of the project has been pitched to Kristian and he was very positive about the idea and gave green light to start this project by recruiting students. Usage of Technobothnia its workspaces and materials has been discussed and approved, details about this will have to go with the responsible personnel. In terms of finances, Novia UAS should be possible to sponsor in some way such as buying car materials, providing teambuilding and some other (smaller) supports. Next to that the national funds, which John Dalbacka talked about before, should be willing to sponsor.

In the customer meeting it was discussed that the next step would be to pin down the ECTS structure which will be used for students participating in the team. This should be talked through with the main head of departments of the engineering and business side.

Vaasa Energy Week

A business card was designed to hand out during the Vaasa Energy Week, the main criticism of Mikael was that it would give too little information and a flyer would be better. In that case it can be passed on by people, which will understand the idea of the project by just reading the flyer.

Competition choice:

An important part of this meeting was the competition preference and/or choice by our customer. This decision was needed to continue more specifically with our research, marketing and recruitment. The main choice was between the Shell Eco-Marathon and the Formula Student competition and the meeting resulted in a decision to let the team participate in the Shell Eco-Marathon. The main reasons for this were the fact that the sustainable vision fits better with Novia UAS, it has no participation fee compared to the Formula Students and it should be easier to start with regarding the technical requirements. Furthermore, the team will receive a lot of in-house knowledge of participation in the Shell Eco-Marathon from supporting members, such as Tobias himself and employees of Wärtsilä.

More specific about which class to participate in, there were some thought differences between Mikael and Tobias about which powertrain. This was mainly between electric and internal combustion engine, but there has been decided that it will be up to the team to decide this. All of us agreed on starting with the prototype class at it will be easier and foremost cheaper. Furthermore, this choice should not be seen as anything permanent, but a start up and possible to switch to other classes or even competitions later on.

The FMMC (Finnish Mileage Marathon Club) has been mentioned to also yearly participate in as a team, as it will be relative close by, gives more experience and publicity which should ease the fact of getting sponsorships.

The next steps and deliverable breakdown

The main next steps are focus groups with the interested students, gaining more publicity among students, teachers and possible sponsors and the branding of the team. During the focus groups the student will be involved in the brainstorm about the branding as well. Then, the students will be invited for the final presentation which will be streamed online. The deliverable breakdown has been discussed, also as a part of the project management task. The breakdown can be found in Appendix D.

The main points summarized

The dean Kristian Blomqvist gave green light to start up the team and use the resources of Technobothnia

- The racing team will start participating in the prototype class of the Shell Eco-Marathon, the powertrain choice is up to the team
 - The next steps will be setting up the team by inviting the students for focus group interviews and gaining more publicity amongst students, teachers and other involved parties
 - The deliverable breakdown has been discussed

3.3 Next Steps

3

After the second customer meeting, each of us threw ourself on a task and this way things really got a move on and progressed quickly. After the midterm, we finished the last interviews with existing teams and put our focus more on the recruitment of students and raising awareness of our project within the school, meeting with various teachers and stakeholders. We could also begin to think about the branding of our team. A website, business cards, flyers and logo are to be designed.

Below a list in chronological order of the action points and progress after the midterm;

- More team interviews: (Appendix F) Green Team Twente Eco Runner Team Delft UGent Racing Chalmers Vera Team Metropolia Motorsport
- Flyers (p.50)
- Vaasa Energy Week (p.57)
- Novia email (p.46)
- Website (p.51)
- Meeting Head of Programs
- Meeting Heikki and Tharanath (Appendix I)
- Branding (p.46)
- Focusgroups (p.36)
- Teambuilding (p.42)
- Informing potential important teachers
- Meeting with supporting teachers (Appendix I)
- Kick-off meeting (p.42)
- Poster (p.52)

04 INTERVIEWS EXISTING TEAMS

The main research within this project was interviewing existing teams that participate in racing competitions such as Shell Eco Marathon and Student Formula. In this way it was possible to see how other teams operate, how the team was set up and what factors might be important to take into account.

Amain question list was set up by the whole team, but depending on the interviews additional questions could be asked. The general question list can be found in underneath and in Appendix E as well.

Questions for teams and universities

- 1. How did the team start?
 - Part of courses? As hobby? How did you find out about it?
- 2. What is the utter first step to bring a team together? Dividing roles, meeting,...
- 3. How long is it been going on for? How long have you been inside of the team? Until when do people stay in the team?
- 4. Did you have any resources to start with? What is the starting budget/estimation? Who do you ask for materials?
- 5. How many team members do you have and what specialties do they have? How many actives?
 - Can people come and go?
- 6. Where can the team work on the car/ come together?
- 7. What are the stages the project/car goes through? Start to end?
- 8. How does the car work? What kind of car is it?
- 9. Is it possible to obtain a cost list of the components or give an idea of it
- 10. If ECTS points can be used, how many are used and how have you implemented this in the students timetable?
- 11. How is the relationship between the sponsors and how do you give feedback?
 - How do you approach companies to get sponsorship?

Teams were mainly contacted by calling the team manager or communication person, some teams were contacted by email if phone number were not provided. Also, some teams were contacted by own network. During the first weeks (February, beginning of March) teams seem to respond relative quickly and positive, in the last weeks of March and also April it became harder as the teams seemed more busy.

An example of an email which was written after a phone call, as the team manager was on a vacation at that moment:

Ні,

I am sending this email as you are currently on vacation. I am currently studying at Saxion Deventer and following an Erasmus Project Semester in Finland. Together with two others, our goal is to integrate a competition, such as Shell Eco-Marathon, into Novia University of Applied Sciences (Vaasa). We are therefore looking for teams that already participate and have experience, to create a good picture of the entire process, but also, for example, the intrinsic motivations of students. Although you already have a lot of information on the site, we would love to get in touch with (one of) you via a Teams meeting!

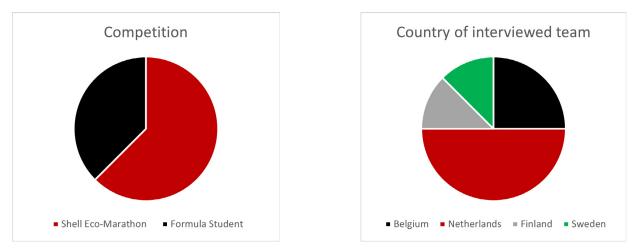
If you are interested in this, you can come up with your own proposals or ask us! Kind regards, ... In the end, the following 8 teams have been interviewed;

Team	University
UGent Racing	Ghent University
GreenTeamTwente	University of Twente
Metropolia Motorsport	Metropolia University of Applied Sciences
Chalmers Vera Team	Chalmers University of Technology
Formula Electric Belgium	KU Leuven University and Thomas More University College
Eco-Runner Team Delft	TU Delft
Lina Team	TU Eindhoven
HFS	HAN University of Applied Sciences

The outcomes of the interviews will be visually presented hereafter, however the tables of the charts can be found in Appendix G, as well as the complete interviews taken. The results for the topics such as the start-up of the team, team roles, the seasonal stages, etc. have not been taken into this result section as this is very variable information. However, this has all been taken into account in setting up the advice in the implementation plan and can be found back in the fully written out interviews. In this result section, the main results are about the structural part of the team, e.g. amount of team members and funding.

General information about the teams

To start off, some general information about the interviewed teams is given to get an overview.



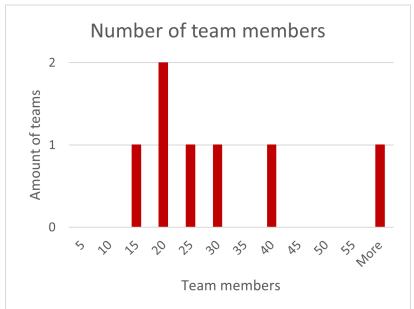
Left: An overview of the countries in which the interviewed teams are situated Right: An overview of the competition in which the interviewed teams participated in

Out of the total of 8 interviewed teams, 4 teams originated from The Netherlands, 2 from Belgium, 1 from Finland and 1 from Sweden. Of these teams, 5 participated in the Shell Eco-Marathon and 3 in the Formula Student competition. The Swedish team also participates in the FMMC competition (Pisaralla pisimmälle).

The GreenTeamTwente is working on an interesting switch to the Formula Student Competition:

'The Shell Eco-Marathon is much easier to start with as you will need a lower budget, because the cars drive on a lower voltage and power. The electric and protype class will probably be the best start for your team. Actually, this year we will compete in both the Shell Eco-Marathon and the Formula Student competition. We do have two different cars for this, the old car will participate in the Shell Eco-Marathon again. Our choice for Formula Student is because we want to start innovating faster and the competition requires driving on a much higher voltage and power. In the future we want to fully focus on the hydrogen class.'

Outcomes of the interview questions

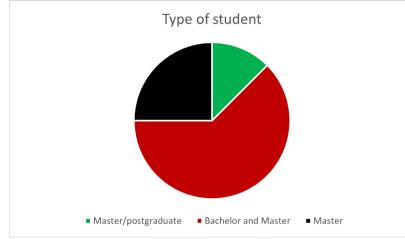


A histogram showing the number of team members per team

The amount of team members per team seemed variable, on the first look. However, teams with a higher amount of members (30+) usually work with a so-called 'core team'. This core team does most of the work on the car and within the team, whereas the other members help out with specific things or not continuously during the season. This results in the fact that most of the teams have a total team member or core team number of around 20 members. The outlier here was a team of 75 team members, but in this interview it was also said that this was quite extraordinary. In this team there were also a lot more passive members, which were helping out if needed.

The smallest team was the Chalmers Vera Team from Sweden with 11 team members;

'We have currently 11 team members, but it can vary a bit depending on how many apply and what competences they have. 11 is a balanced number in my opinion, however building a car from scratch may need more resources. It all depends on how motivated your team is and what they want to work with.'

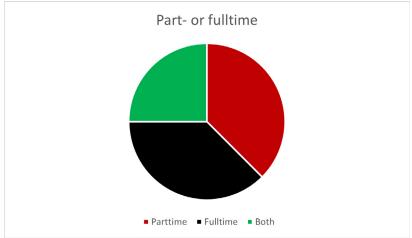


An overview of the type of students which could participate in the team

The majority of the teams allowed Bachelor and Master students (5 teams), whereas 1 team only allowed Master or Postgraduate students. This specific team also asked for a fulltime year working on the team and was quite serious about the competition. Then, 2 teams worked only with Master students, due to more knowledge. It is notable that of the 3 teams which do not allow Bachelor students, 2 teams participate in the Formula Student competition. In general, this competition has higher performance standards and will need a bit more knowledge and specialization compared to the Shell Eco-Marathon.

The Formula Electric Belgium team only allows master students or postgraduates with a bachelor's degree in engineering, however they would like to change this in the future:

'All team members in our team are master students / postgraduates and you must have gotten a bachelor's degree in engineering. Not everyone in the team agrees with this, as it might be good to include some people for specific business and marketing. We are changing this somewhere in the future.'

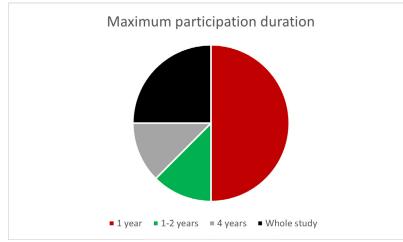


An overview if the interviewed teams required parttime, fulltime or both members

The division of the teams requiring parttime, fulltime or both members seems almost fully equal. It must be said that most smaller teams (≤ 20) worked with fulltime students, however not all of the small teams had this structure. Also, parttime can be seen in many different ways as it can be from 1 hour up to 36 hours a week.

The Lina Team from The Netherlands works without given ECTS and has a combination of full- and parttime students:

'The students are free to choose how long they work on the car. But most students choose to work on the car for one year, because otherwise they get too far behind on their studies. Another option is parttime, but this is only for the bachelor students. These students do small tasks that the fulltime students impose on them. This way, the bachelor students can still take subjects while participating in the team.'

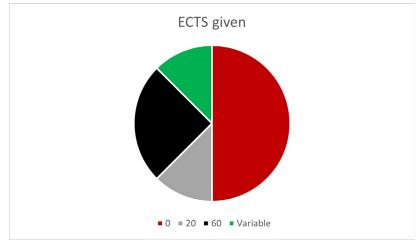


An overview of the teams giving a maximum duration to each participation in the team

Half of the teams used a maximum participation duration of 1 year, the majority of these teams were popular and existing for longer. Most of the teams chose for this duration, to give everyone a change to get this experience as they had too many applications each year.

The Eco-Runner Team from The Netherlands only allows students to participate for 1 year:

'Everyone is only allowed to take part in the team for one year, in this way as many students as possible could experience the team and the process. The team is connected to the university, which has multiple so-called Dream Teams which are several similar projects for motivated engineering students. In this way you could participate in similar competitions for multiple year and for this specific and popular team, only one year per student is allowed.'

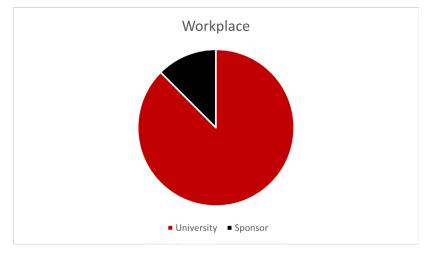


An overview of ECTS given for participation in the team

Half of the teams did not give out any ECTS for participation in the team. Some universities did not give out ECTS because it was too difficult to standardize the actual done work in combination with different study backgrounds. 1 team had variable ECTS, depending on the study background and 1 team gave 20 ECTS for 1 year participation. The two teams of 60 ECTS was for one team a full year of fulltime participation and the other team did split it up in several packages, such as working practice and thesis work.

The Chalmers Vera Team of Sweden has been working with ECTS before, but stopped doing this:

'No, not any more. Recording credits meant that a lot of time was spent on "paperwork" and less time was spent on improving the car.'

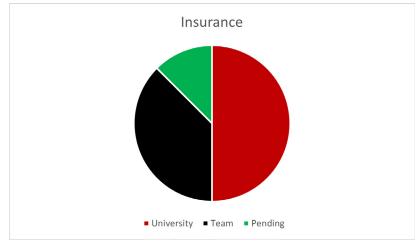


An overview of the workplace where the team builds on the car

Regarding workplaces, it is very clear that the majority of the teams were provided a workplace at the university.

Only one team had a workplace provided by a sponsor, which is UGent Racing from Belgium:

'Until November 2021 we were working in a separate hangar of 104 m2, which was very small for a team of 70-80 members and we did get some complaints about noise disturbances. So we have been searching for alternatives after this and we were contacted by a company named 'ABC'. We were told to have a look and eventually we got a hangar of 724 m2, which we renovated a bit and also added rooms for study and writing a thesis. We really would like to make this a place where everyone likes to be working. The only downside is the fact that it is relative far from the university, but we do stimulate students to come over here.'

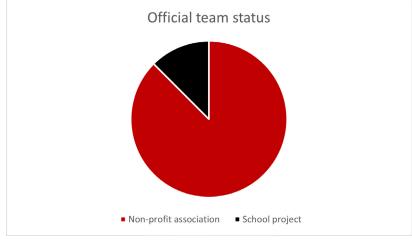


An overview of the insurance provider of the team

It is almost equal for the university or the team itself to provide insurance for the team members doing practical work on the car. One team is pending at the moment, as they would like to switch to an own insurance as they think it will be best to have full control on this.

The HFS team from The Netherlands has an insurance paid by the university, in combination with a contract and safety trainings:

'Dangerous actions such as welding, working under tension, drilling, etc. are allowed by the school because they have a diploma and are allowed by the school because they have purchased a wider insurance package for the team. Also, all students have to sign a document so that they are insured after school hours. Furthermore, some students in the team have a special safety certificate.'

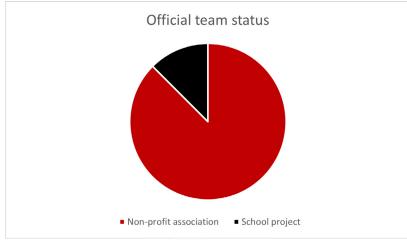


An overview of the official team status of each team

All the teams are non-profit associations on paper, however one team did rewind this not long ago to a school project. Their motivation was the fact that it were less officialities and mistakes, also there would be less responsibility for the team and their finances are done via the university right now.

The UGent Racing Team from Belgium operates as a non-profit organisation:

'We are a non-profit organisation since April 2021. The advantage of being a non-profit organization is that nothing is taken too seriously. For organization types with more rules, you usually would need to ask permission for every single tool and or machine you buy.'

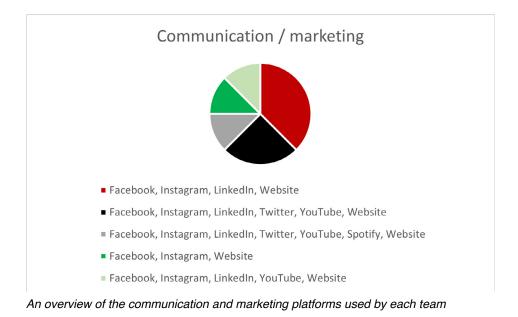


An overview of the funding for each team

About ³/₄ of the teams are fully dependent on sponsorships and are independent from the university. 2 teams receive a starting budget from the university and receive the rest from sponsorships as well. Some of the independent teams did receive financial help from the university during their start up, in terms of buying some material or car parts, but are completely independent now.

The Eco-Runner Team from Belgium has build some financial safety through the years:

'We do not receive any sponsoring from the university, we have to finance ourselves by finding sponsors. Through the years we built a large network of sponsors and partners and we are even that financially fit that we have a saved buffer for the next year. All of the budget is obtained through sponsors and we are a non-profit organization.'



Lastly, the used communication platforms were asked from the teams, as this is closely related to marketing, publicity and (potential) sponsorships. All of the teams use Facebook, Instagram and a website as communication ways. Then most of the teams use LinkedIn too and a few use Twitter, YouTube and Spotify. A website for Novia Racing SFS has already been set up by now.

The Green Team Twente from the Netherlands is using social media without a set number of posts:

'We also have a website and social media, LinkedIn and Instagram, where we do post quite a lot and frequent. But we do not have a set number or rules for these kind of tasks. I do find it important that a project has to be as free and flexible as possible, then students will initiate it themselves and work out of intrinsic motivation.'

The main outcomes of the interviews

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- 1 Total team member or core team size is usually around 20 members.
- (2) The majority of the teams allow both Bachelor and Master students to the team.
- Half of the teams use a maximum participation duration of 1 year, due to popularity among students.
- 4 Half of the teams give zero ECTS for participation, the maximum given ECTS was 60.
- 5 Almost all the teams have a workplace provided by the university.
 - The provider of the team insurance is almost equally divided between the university and the team.
- 7 Nearly all teams have officially a non-profit association status.
 - ³⁄₄ of the teams are fully independent in their finances and obtain this from sponsors, the others receive starting budget from their university and have additional sponsors.
- 9 All of the teams use at least Facebook, Instagram and a website as communication method, nearly all teams use LinkedIn as well.

05 RESOURCES AT NOVIA UAS

If a racing team will start at Novia UAS, the team will need some (preferably) long term space to work on the car and if possible to have some space to host meetings and store materials or documents. Next to that, the team will need finances and support from teachers or others with specific knowledge for troubleshooting. Also, the team could benefit from extra courses or supporting help and things like teambuilding. Several persons working at Technobothnia have been contacted for this reason, to research the possibilities for the team.

4.1 Interviews staff

Interviews or meetings have been held or contact was made with the following persons:

Name	Function	Resource
Josefin Stolpe	Coordinator Technobothnia	Workspaces and tools
John Dalbacka	R&D department Novia UAS	Financing of the project
Kristian Blomqvist	Dean of Engineering department	Approval of project, workspaces and financing
Roger Nylund, Ronnie Sundsten, Anna-Lena Berglund	Head of Program (Industrial Management, Electrical Engineering, Business Engineering)	Potential ECTS for participating students
Heikki J Salminen	Technical Advisor, teacher at University of Vaasa	Support for the team and ICE modeling class
Tharanath Tharanath, Miguel C. Zamora	Additive manufacturing, University of Vaasa	Support for the team, additive manufacturing and metal 3D printing
Kenneth Ehrström, Tobias Ekfors	Engineering teachers Novia UAS	Support for the team, integration of tasks into courses
Kaj Rintanten, Lars Backlund	Responsible for car lab Technobothnia	Usage of car workshop
Roger Nylund	Head of Program Industrial Engineering and EPS, teambuilding sessions	Teambuilding
Juha Kytölä	PhD, Director RDE, Wärtsilä	Support for team, potential sponsoring
Sebastian Dalaholm	Janitor	Contact for opening hours, keys and additional safety within Technobothnia

All these names' contact information will be mentioned in the implementation plan.

Depending on the question for the project, each meeting was prepared on paper by all the team members. Main questions were written down and additional questions were added by all team members. Most of the meetings were initially set up by email with an introduction about this project and for more important meetings, reports such as the mid term were added to the email.

An example of an email which introduces the project is shown underneath. This email has been set up to introduce the project to teachers of Novia UAS and to see who would be interested to support the team in the future.

Hi all,

As you are all mentioned by our supervisor Mikael Ehrs to be informed and potentially involved, we would like to introduce you to our European Project Semester in which we are setting up a Novia Racing team! In this e-mail we will give you briefly some information about the project and include our midterm report for the interested ones. In case this sounds really interesting to you and you want to be potentially involved, please contact/reply to us and we will set up a meeting with all the interested teachers to discuss this openly!

In short; we are Freyja Peeters and Sam de Loose from Belgium and Sanne Keizer from the Netherlands, a small group but very enthusiastic about seeing this project getting started in real life. Our customer is Tobias Ekfors, a teacher at Novia who has been involved in the REMMI-team from the Tampere University during his own studies. It is a dream of his to start a similar team at Novia and give students the same never-to-forget experience he had.

Since our start in February we have been doing research on how such a racing team should look like, what it will need and how to get Novia's approval. In our midterm you can find more detailed information about this, however we made a lot of new progress since this report! Right now the outlines of the team started and we are involving and selecting the interested students to setup the team. There is definitely interest among the students, as you can see in the midterm report. The team will yearly be participating in the Shell Eco-Marathon (held in Europe or Africa) and the students will build a prototype car themselves from scratch at Technobothnia, next to their studies but could potentially receive some ECTS for it.

As you all have knowledge in the fields in which the team will get into contact, you might be an important value to the team. The students will not only be building the car, but will also need to manage the project, do marketing, get partnerships, do their financing, etc. All of you are specifically mentioned to us and every input is valuable.

For more information, feel free to contact, read our (included) midterm report and have a look at our website (still a work in progress)! https://noviaracing.wixsite.com/nsfs

Kind Regards, Freyja Peeters, Sam de Loose and Sanne Keizer

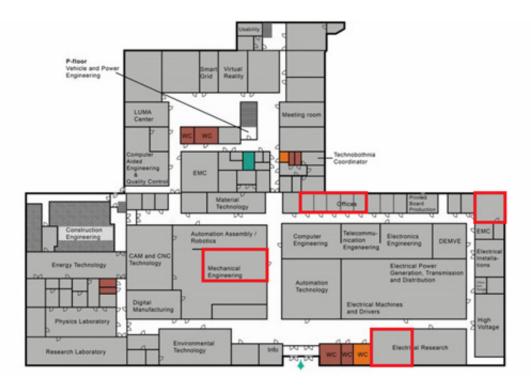
4.2 Work spaces

To discuss possible workspaces, contact has been made with Josefin Stolpe, coordinator of Technobothnia. She knows which rooms are used for what purposes and has the authority to assign rooms as well. An introduction tour through whole Technobothnia was given by Josefin and also potential important network contacts were written down. In this way it was possible to orient on the possible workspaces for the team. This was discussed with several people, such as supervisor Mikael Ehrs, to decide which workspaces would be most ideal for the team. All details such as door width, accessibility, floor, elevator, were taken into account regarding the transportation of the car.

The following workspaces have been discussed to use as workspaces, next to the public available study areas as well to host a meeting if needed.

Workspaces, car building

There are many cubicles at the ground floor of Technobothnia which are currently not used, but have a lot of papers, machines, products, etc. still in there which makes the spaces unusable. These spaces will be cleaned mid May 2022 to make them available again. Josefin can be contacted in order to possibly receive such a space for long term. The spaces could be both used for office, meetings and (clean) work on the car. The cubicles are marked in red in the map underneath, except for the Mechanical Engineering area in the middle which will be discussed hereafter.



Map of the ground floor of Technobothnia, the spaces marked in red are possible workspaces for the team.

The area marked red in 'Mechanical engineering' is a possible workplace for the car. Every year it is used for a specific project where students completely need to take apart a scooter and reassemble it again, while working together within the team and with another team. Not all these places are occupied each year, so it might be possible to get a workspace there if needed. Regarding the workplace for the car, the best case is a location on the ground floor because of transportation issues. Nevertheless, an elevator is available for parts of the car and it is possible to carry it up and down the stairs.



The mechanical engineering area on the ground floor of Technobothnia

Then there is an official car lab in the basement of Technobothnia, which provides running water, 240 / 400 V electricity and all common car tools. Access is or either through doors within the building or a roller door to the outside, which will make it easy for taking the vehicle out the building. The contacts for usage of the car lab are Kaj Rintanen and Lars Backlund. They are aware of the project and are willing to give the team space within the car lab, only safety issues will have to be discussed before performing any practical work. Additional to the car lab there are some spaces behind there to perform engine tests.





The car lab in the basement of Technobothnia

Another possibility which could be long term, is the wood-workshop in the basement. This room is not very often in use and could provide a storage spot for the car or car parts, when not working in the car lab or the mechanical engineering area. This will need to be discussed with Josefin Stolpe.

Additional workspaces, specialized practical work

Next to the spaces to possibly work on the car, there is a metal 3D printing lab offered by the University of Vaasa. In the future it might be possible to design some parts in this lab, with the help of the specialists. It will be relatively restricted for use, as it is expensive, specialistic and also used for applied research purposes. The contacts for this are Tharanath Tharanath and Miguel C. Zamora, which are both additive manufacturing specialists. Both of them will also be supporting the team in general, which will be mentioned in the next section and in the implementation plan.





The metal 3D printing lab in the basement of Technobothnia

Additionally, in Technobothnia there are several workspaces and machines, which the team might use in the future. This will mainly be the Electrical Engineering area, the CNC machines, welding and possibly the physical lab. Josefin Stolpe can be contacted to receive the current responsible contacts for each space.

Workspaces, meeting and office

Josefin Stolpe has a larger classroom mainly set up for meetings with bigger groups (TF4103). This room can be booked through her and could for example also be booked every other week continuously. There is also openly available meeting and working space across room F4111.





Meeting room TF4103

Available space across Room F4111

On the 3rd floor there is a classroom in the tower building, which is not in use anymore because of the air quality which is less compared to the other classrooms. If the team would like to permanently use this room, it can be discussed with Kristian Blomqvist. Also, just outside the tower building there is a hallway with tables and chairs which is never really used and could be a potential space for the team as well. It was allowed to bring two sofas to this space, which otherwise would have been thrown away. This has so far been the start off space and has been used for the focus group interviews. It is possible to get some locked closet/drawer for this space to store files in consultation with Josefin Stolpe and/or Sebastian Dalaholm.



On the left the classroom in the tower building (TB-F5302), in the middle the hallway before TB-F5302 where the sofas are located, on the right the transportation of the sofas is shown

Accessing Technobothnia

Students are allowed in the Technobothnia building from 7.30-21.00 Monday to Friday and on Saturday from 8.00-16.00. On Sunday and also on public Holidays, Technobothnia is closed.

In the summer month June, the building will be open from 8.00-15.00 and in July and August the building is closed, however this can be discussed when calling the janitor and access can be given between 8.00-15.00.

4.3 Teachers and support

The students will mainly be working fully independent on the car, but it is realistic that problems occur they are not able to fix themselves. Having available teachers which are aware of the project and enthusiastic about it as well, is very valuable. It should be easy for the students to contact these specific teachers. Because of this reason, potential important teachers from Novia UAS have been contacted as well as marketing by personally handing out flyers and spreading flyers through the universities. In this way some key support figures are assigned, shown in the list underneath.

Meetings have been held with Heikki J Salminen, Tharanath Tharanath, Miguel C. Zamora, Kenneth Ehström and Tobias Ekfors. Specific content will be mentioned in the implementation plan, but the meetings can be found in Appendix I at 'Teacher meeting' and 'Meeting Heikki'. The offered ICE modelling course will be further discussed in the implementation plan.

Name	Function	Support
Tobias Ekfors	Mechanical engineering teacher at Novia UAS	Main support for the team, specialistic knowledge and general guidance
Heikki J Salminen	Technical Advisor, teacher at University of Vaasa	ICE modeling course, technical knowledge
Tharanath Tharanath	Additive manufacturing specialist, University of Vaasa	Metal 3D printing, additive manufacturing knowledge, support next to Tobias
Miguel C. Zamora	Additive manufacturing specialist, University of Vaasa	Metal 3D printing, additive manufacturing knowledge
Kenneth Ehrström	Mechanical engineering teacher Novia UAS	Integration of tasks into courses, knowledge in product development, engineering design and materials
Hans Lindén, Joachim Böling	Electrical engineering teachers at Novia UAS	Specialistic electrical knowledge
Roger Nylund	Head of Program Industrial Engineering and EPS, teambuilding sessions at Novia UAS	Teambuilding sessions

The contact details of these supporting figures will be mentioned in the implementation plan.

4.4 Insurance

During the interviews of existing teams, there were in general two different options given regarding insurance while doing practical work on the car.

Insurance by school

Usually when workspace for the team was provided by the university, it was automatically covered by the school or the school added an additional insurance as the students worked independently from supervision. Josefin Stolpe mentioned that almost all work is covered by the insurance of Technobotnia, which is shared between the three universities. This might be restricted to some extent, as for example sometimes a minimum amount of persons should be present or a supervisor must be available. For every workplace this must be discussed with the contact persons and/or the janitor Sebastian Dalaholm.

Insurance by team

Most teams which or either worked at another location then provided by school or became more independent from school through the years, were covered by insurance paid by the team finances. If the team becomes an official (non-profit) organization, this might be needed and useful. This option will mainly be something to look at if the team continues in the future after a successful start.

4.5 The main points

- The team will have access to workspaces, machines and tools within Technobothnia. Long term usage and additional safety measurements will have to be discussed with the assigned persons.
- 2 The team will receive the contacts of teachers and other support who are willing to help out when needed or even support in courses. This support covers the most specialistic areas the team will work with.
- 3 In terms of insurance, the team will be covered within Technobothnia in combination with some agreements about safety measurements. In the future the team might want to set up an own insurance.

06 RECRUITMENT

The first and most important step in putting a team together is finding interested and motivated students. Without them, the project is not able to get started and will be less valuable. To gauge the interest of Novia students, we created a first survey. The survey includes a short introduction to our topic and a few questions to get all the information needed, such as what year they are in, what they study, why or why not they would be willing to participate, etc. After we collected a solid amount of students that would be suitable for the team, focus group interviews were held. Here everyone introduced themselves and we explained our plans for the competition and team. They asked questions where needed and got to know one another a bit already. Then, we sent out a second survey with more detailed information and questions about the team roles, teambuilding-, and kick-off date.

The first recruitment email goes as follows:

Dear students, In the link below you will find a short survey (max 2 min.) regarding the start of Novia's future racing team! It would help us a lot if you could fill in the questions, we are very interested in your thoughts about the project. Everyone is welcome, we need different experts and point of views! https://forms.gle/rYpdodocTyoEExuX7

Thanks in advance, Freyja, Sam and Sanne

6.1 Survey: gauging interest

In Appendix J, the whole list of questions from the survey can be found.

The survey introduction goes as follows:

Future-Eco-Auto-Team at Novia!

Hej alla! We are three erasmus students working on a plan to implement a project such as the Shell Eco-Marathon and Formula Students competitions in Novia. Lots of universities (also where we are from) have their own car-building and designing team and participate in these races. The project is a testing ground for the next generation of engineers! With this survey we want to check possible interest from students at Novia.

We thank you for taking this short survey, it helps us a lot!

Kind regards, Freyja, Sanne and Sam (representing Belgium and the Netherlands)

After a week, we looked into the answers and sent an email to every student at Novia that left their contact information. Out of 80 students that filled in the survey, 49 of them are intrigued to see what's next.

The student follow-up email goes as follows:

Hi interested people!

From the survey it looks like you are the ones that are hyped to create an eco car team at Novia!! We are so glad that you are willing to kick-off this project with us! In one of the following weeks, we want to sit together with you and talk about our plan, as it is still in its starting phase. During this fun focusgroup interview you can mention your opinions and ideas and see if this is something for you or not, there are no obligations!

Stay tuned, because we need to do some more research before we can have a meeting. More details will come soon, we are excited to see you all! And if you have friends that are still interested, feel free to bring them; the more the merrier!

Kind regards, Freyja, Sanne, Sam

6.2 Focus group interviews

Instead of doing regular interviews with our interested students we tried to create a more relaxed environment. We used big pieces of paper on which the main topics that had to be discussed were written down. Cookies were provided too. This way, our respondents could look at something on the table, feel more at ease and had room for debate amongst each other. Also, our conversations were in group, which led to people interacting with each other as well. Even if this was in Swedish, it was interesting to listen to and see the students be excited. This on its turn gave us the situations where they could connect and experience the same feelings, and which were more person specific. During the interview, we collected the most interesting data, which was written down on some post-its. The conversations gave us a lot of insights into the target groups' situation.

The focus group arrangements go as follows:

Hi everyone,

We are happy to see that you are interested in taking part of the brand new Novia Racing Team! We set up a spreadsheet where you can sign in for a suitable moment for you to attend the focus group interviews. This will be your first step to become part of the brand new racing team at Novia UAS! You will meet Sam, Freyja and Sanne who are starting off this project and having a talk about the team, its setup, your thoughts, wishes and to meet your potential teammates.

The dates and times are:

- Thursday 31st of March at 13.00
- Friday 1st of April at 14.00
- •Wednesday 6th of April at 14.00

• Thursday 7th of April at 10.00 and 14.00

We would prefer that you join us on the campus in the Technobothnia building, but if that would be very difficult for you we can establish an online connection. Just let us know in that case! The location will be the hallway just before TB-F5302.

You can sign in here: https://www.wejoinin.com/sheets/srxam

If none of the moments fit for you, do not hesitate to get in touch with us about this. We are looking forward to meet you all!

Kind regards, Sanne, Freyja and Sam

Focusgroup 1 31/03 14.00h - 15.30h

This first focus group started with less people than expected, but most of them arrived later and finally everyone who had subscribed was there or had been in touch with us about it. This interview started off quite easily and relaxed, everyone was confident about speaking English and sharing their thoughts and opinions. None of the students knew each other or had seen each other before. Most of the students were able to say what role they would like to have in the team, which was for example a coordinating role and





specialist. Some of the students also said they would be up for doing anything. Also, an exchange student from Spain joined the interview representing three Spanish students. They were all in their last year but were thinking about staying a few months more. Towards the end, the idea to have a teambuilding in the form of drinks arose from the group itself and a lot of enthusiasm and interest was shown. After the interview a WhatsApp group was made for communication. Most students stayed and discussed about the possible engines for the car in Swedish. This focus group was a very promising start as they showed enthusiasm, being proactive, giving input and were open to discuss with each other. Two of the students wanted to join the next focus group as well to meet the other students (and they did join).

Focusgroup 2 06/04 14.00h - 15.00h

The second focus group started with all the students being present, but they were clearly more shy compared to the previous focus group. The kick-off was a bit difficult as most students did not really know what to say and said they did not have questions. Some of them seemed to be more introverted engineers. The two students of the previous focus group came in a bit later and stayed a bit more observant, to see how the other students were. After some information and talking, two students started to participate more in the conversation. At some



point we closed the 'official' focus group, but most students decided to stay. After a

few minutes some started speaking to each other in Swedish and one student joined the two students who were at the focus group for the second time. Sanne started speaking to the three Spanish students, as they could practically not really join the team as their studies finishes soon. The atmosphere changed a lot at this point and more enthusiasm and open conversations were observed. Even the shyer students were participating in the Swedish conversation and also in this group, none of the students knew each other yet. The Spanish students told us that their follow up students at their university would be interested to join next year as their studies is 1 year long and they will have to perform work practice as well.



Focusgroup 3 06/04 14.00h - 14.20h

This focus group was a small one with only two students. Both Freyja and Sam fell ill that previous night, so the decision was made to continue the interview with only Sanne. These students were both friends and they knew each other before coming to study in Vaasa. One of these students has been contacting us before about ideas and for input, so he decided to bring his friend as well. There was a small conversation to introduce ourselves, get to know each other and some information about the competition and in what phase the project is in and how next year would look like. At the start of the interview one of the students did not really know yet what he would like to do within the team, but along the way he got more input and ideas about this. The other student knew quite well what he would like to do within the team. Everything seemed quite clear to them, and they were added to the WhatsApp group with all the interviewed students so far.

Focusgroup 4

11/04 14.15h - 14.45h

In this online focus group participated two students, one from Turku and one studying nursing at Novia. They both do not have a technical or engineering background, but were excited about the idea to learn something new. These students did not have anything particular they wanted to do in the team and are open to help with anything, which is great for the team, as there are other things beside building the car that need to be done! Overall they seemed interested in participating and broadening their horizon.

Main Conclusions

In total three focus group interviews were held, and two students were interviewed separately online and offline. Different things were observed during the focus groups, but overall, most things were corresponding between the groups.

Observations during the focus group interviews;

- 1. The students appear to be a bit shy to both speak English and meeting strangers, after some time they seem more relaxed.
- 2. It is way easier for the students to express and discuss in their own language, Swedish. Especially the more introverted students seemed to benefit from this.
- 3. After some time, most students are more confident to say what their skills are and what role they would like to have within the team.
- 4. For most students, the main motivation is to get to know new people and enjoy the team spirit rather than winning.
- 5. A big reason why they would like to participate in the team is because of the lack of practical assignments. They are a bit bored with all the theory and want to try something new.
- 6. The students seemed very open, friendly and non-judging towards the other students.

Our task now is to decide upon a team manager, who will take a more coordinator role and get the team in gear. Next to that, we have to find a date where all of these students can come together and have a teambuilding. Our approach was creating another survey with more specific questions for the team.

6.3 Survey: team creation

The reason why we decided to create this survey was for checking in with the students what kind of role they would prefer in the team, as they could not answer on the spot during the focus group meetings. Now they got the chance to think about it alone and really decide for themselves what they want, without us suggesting things.

The options for roles go as follows:

- Team manager
- Chief electronics
- Chief vehicle dynamics
- Chief powertrain
- Specialist
- Teambuilding events
- Business and advertisement
- Anything would be fine

By asking this, we already have an overview of the composition of the team. If there are multiple students wanting to take on the same role, we will check what year they will be next year and what their behaviour was during the focus groups and teambuilding and decide this way. In order for the team to run smoothly, it is important to select a good team leader, with possibly a bit of experience managing things.

Moreover, we contacted Roger Nylund to ask him if he would be willing to do a teambuilding session with the group, like he did with our EPS group. So in this survey we also asked about the most suitable date for the teambuilding with Roger. We found this an amazing opportunity for the team to get to know each other, because even though all the students study at Novia, no one really knew anyone yet! The teambuilding will be held in Swedish; we think this is better for the students in order for them to fully be themselves and not be self-conscious about speaking English.

Also, thinking about the future, the time and date for a kick-off meeting is questioned. This kick-off meeting is a more 'official' meeting with us shortly telling the students what we found during the project and our advice about how to start and handle things during the start-up. They will also meet the main supporting teachers, who will help out next year.

In Appendix J, the whole list of questions from the survey can be found.

In addition, it seemed in the Whatsapp group that the students would also like an informal meeting with the team, also because a few of them have friends that are interested in joining the team as well. We will grab a coffee or sit somewhere outside to chill and bond some more. Us three will be there to make sure all questions are answered and sound about team roles.

6.4 Outcomes of surveys

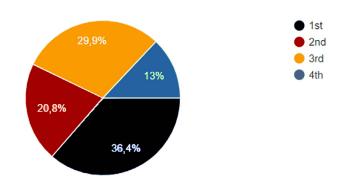
Looking back, making these surveys was very fruitful; we got a lot of information from the people we were looking to address and no useless answers. We asked the right questions, with none of them being unnecessary. The decision of the timing for sending them out was splendid too.

Graphs on the next pages show the summary of the answers. Quotes clarify the high level of interest! For an overview of all the graphs see Appendix K.

Survey 1: Visualisation most important results

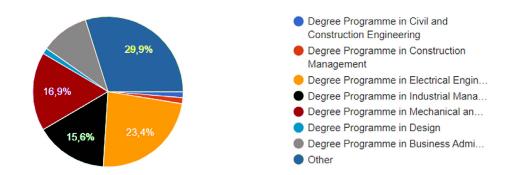
What year are you in right now?

77 antwoorden



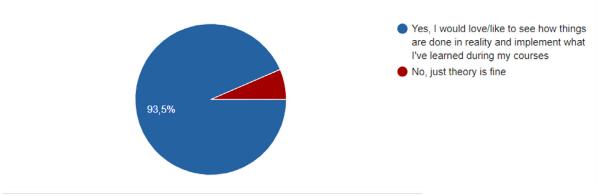
What are you currently studying at Novia?

77 antwoorden



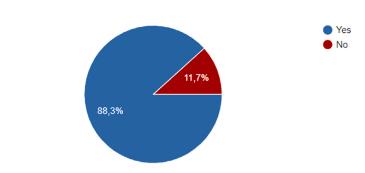
Do you want more hands-on approaches to learn? (not only theory)

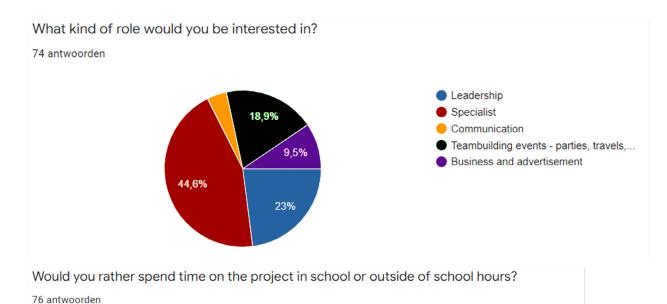
77 antwoorden

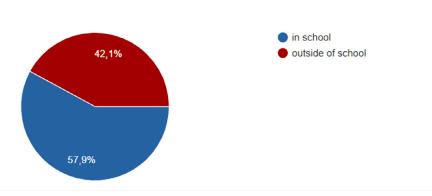


Would you be interested in participating in such a project?

77 antwoorden







Summary

- 1 Good mix between years; the majority is 1st year, then 3rd years
- Interdisciplinary team is possible looking; electrical- and mechanical engineering and industrial management would be the core
 3
 - 93% wants a hand-on approach to learn
 - out of 77 students, almost 90% is interested in such a project
 - The wishes for kind of roles are divided; good combination of leader, specialist etc.

Student's Quotes

"I like to try to invent new things or ways of doing something. I also ride ans race on a track as a hobby with a motorcycle."

> "I have a big interest in cars, but also doing such things with actual competition and results would greatly increase motivation."

"I love working and designing stuff, especially stuff that will end up having a real life purpose. one big reason why i picked up 3d modelning and printing as a hobby. would love to work on this project if it end up happening."

"I've found that the practical experiences you get throughout your time studying inproves your learning by a large amount. Some of my best memories while studying derives from projects and practical experiments."

"I have a great interest in cars, and have built or modified a few of my own."

"Dedicated within both motorsports and sustainability."

"I love battery technology, solar panels and motors."

6.5 Overall communication

We created an own email account for the racing team. Students and teachers could send their questions and concerns to this email. Mainly Freyja and Sanne were responsible for the communication with students. Through this email all information regarding arrangements about the dates for focus group interviews and questions about the team were communicated.

After our four focus group meetings, of which three were held physically and one online, we created a Whatsapp group. Here the students could find the information about the competition and link to the website. Also details about the teambuilding and kick-off meeting time and date were discussed here. After a while more students were added to the group.

6.6 Teambuilding

One thing which was mentioned in almost all the interviews with current European teams was the importance of having a good team atmosphere and spirit. For this reason, it was preferred to start as soon as possible to get the entire student team together to meet each other. During the focus group interviews some students already met each other and exchanged numbers, but to get everyone together in an effective way it was decided to organize a teambuilding session. As the EPS group received the teambuilding session from Roger Nylund at the start of the semester, he was contacted and asked if he would be interested to host a teambuilding session. He was very positive about this and a date was set very quickly, a lot of students could participate but quite a few also had exams and mandatory courses that day as it was the end of their study year. The teambuilding session was held in Swedish, as the students seem more confident and relaxed by using their first language, as was seen during the focus group interviews. The students received some tasks in groups and also the Belbin test was discussed and send later on per mail for the group to make and reflect upon.

Email for team building session for Novia Racing Team

Here the material for the Racing-team 1. Look through the slideshow about Belbin teamroles 2. do the belbin-test (questionnaire) in the excel-file 3. Discuss your respective results together in the team.

Kind regards, Roger

Roger his reflection on the teambuilding was that the students were a bit coming and going, so it was slightly hard to have a buildup in exercises during the day. However, he thinks some of the students really appreciated the day and they would be eager to do another teambuilding session at the start of next year.

6.7 Kick-off meeting

To get all the students of the newly formed team and the supporting figures together, in combination with a wrap up of the entire project, it had been decided to organize a so-called kick-off meeting. The main purpose of this meeting was to hand over the information and responsibility to the student team and introduce them to the support network, consisting of teachers at Novia, researchers at the University of Vaasa and former members of the Remmi Team and Sahyadri Formula SAE Team.

In this meeting we introduced ourselves once again, followed by some more detailed information about the competition choice and how to register for it. The team structure has been discussed and the team manager has been announced, he will further be in charge about choosing the other role positions. The potential workspaces have been explained and how to obtain these places, if the team would choose for it. Next, potential sponsorships were explained and the team was motivated to start networking within their summer internships. Also the possibility to receive some ECTS by participating in this project, were presented.

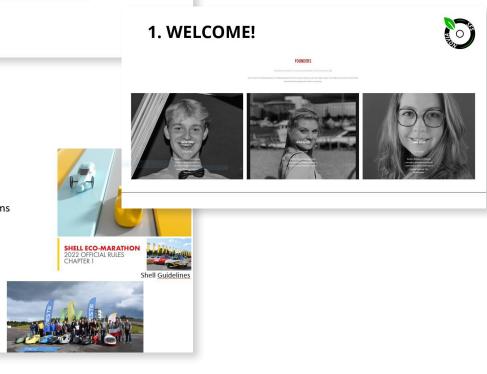
Before the break, the support figures of the team were mentioned and the ones present, introduced themselves shortly. This was the first time for the students to meet everyone, so an important moment. Lastly, the customer of this project and the main support for the team, Tobias Ekfors, was presented. After the break with catering and a relaxed atmosphere to meet one another, Tobias Ekfors presented himself and his experience with the Shell Eco-Marathon in an own presentation of about 25 minutes.

It was of great value that the future main support introduced himself, but even more that he could show and transfer his motivation and wonderful experiences during his time in the REMMI-team (Tampere). As this project was mainly set up to do all the important background research to create a racing team, it is important to say that the main drive to participate in the team is interest, motivation and team spirit. Tobias presented this in a very good manner.



CONTENTS

- 1. Introduction
- 2. Competition
- 3. Team roles and structure
- 4. Workspaces
- 5. Sponsorship
- 6. ECTS
- 7. Team Support
- -----BREAK-----
- 8. Presentation by Tobias Ekfors
- 9. Action points for team
- 10. Discussion/questions



2. COMPETITION

<u>Regional competitions</u> – 80-150 teams

Alternatives

- Shell <u>Eco</u>-Marathon <u>Challenger</u> <u>Competitions</u>
 - For new teams or <u>refining vehicles</u>
- The Finnish Mileage Marathon Club (FMMC)

An impression of the slides used during the kick-off meeting

Main support of the team

Tobias has taken the students along in his journey of building the car, troubleshooting, the travelling, what he has learned from it and why the students should participate. The presentation was held in Swedish, but the slides were in English so everyone could follow the presentation.

After this presentation, future action points for the team were briefly mentioned and little questions were answered. Overall, the meeting seemed to be very successful and went smoothly. One of the students who joined to see what the team was all about, entered the team after the presentation. In total, including the break with food and drinks, the meeting covered two hours and positive comments were received after the meeting.

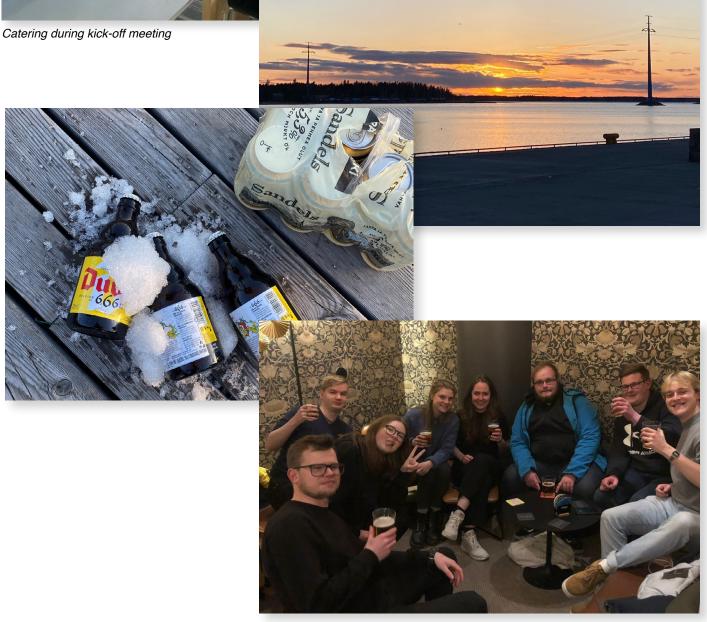


An impression of the slides made and used by Tobias Ekfors during the kick-off meeting

Informal teambuilding

An informal teambuilding was held right after the meeting. Here some of the team members joined us for a drink while talking and watching the sunset. This fun get-together set the tone for the team spirit! As seen in the pictures below, everyone got along and were already arranging new dates to meet again.





Teambuilding with a part of the team

07 BRANDING

In this section, the team name, logo, and everything about our branding and marketing is presented. First, the team name is explained. Afterwards we go deeper into the logo and different usages. Also our flyer, website, business cards and poster are shown. See Appendix L for all marketing materials.

7.1 Team Name

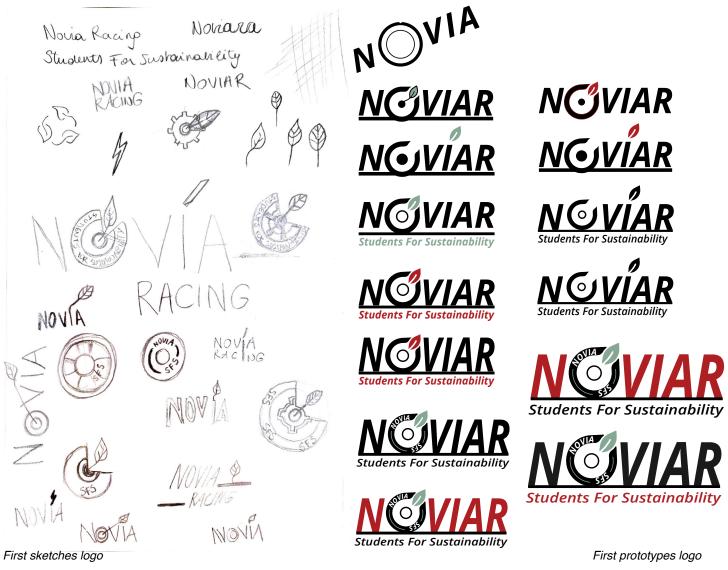
Novia Racing SFS stands for Novia University of Applied Sciences' own racing team. It is an eco racing team, as it will participate in the Shell-eco Marathon. This is also why we added 'SFS', which stands for Students For Sustainability. The name is easy to pronounce and remember. Also, it combines the school name, the fact that it is about racing, the members (which are students) and their sustainable vision, namely thinking about the mobility of the future and a lower carbon emission.

Important to note; when looking up the team name, it does not yet exist and has no significant meaning in other languages and thus no negative connotations.

7.2 Logo

Prototypes

The process behind the final logo is shown here. The first ideas were quickly drawn on paper and afterwards put in Illustrator. Here the second and third versions were also designed until we came to an agreement for the final logo with our team and customer.

















Students For Sustainability

ACING

RACING















FOR

Students For Sustainability

Second version prototypes logo











Students For Sustainability













Students For Sustainability

RACING

RACING





















Third version prototypes logo





























Different versions of final design

Graphic element

We can determine a strong circular shape from the logo, which illustrates one of the wheels of the racing vehicle. The large circular shape, also representing the letter 'O' in Novia, will therefore appear on the products as the badge of our logo. This can be done in different colors, depending on the surface on which it is placed.

Baseline

Our baseline "Students for Sustainability" refers to the team, our target group and vision. However, it is not necessarily the intention that this is included in every logo. Rather, it would be mostly used in business-to-business communication. This makes our vision immediately clear to other teams. Though, when the baseline is not directly included, it is still incorporated in a subtle manner into the 'O' of Novia.

Color

The colors were chosen in such a way that they match the Novia UAS colors. From the Novia red we chose a complementary green, which on its turn represents the sustainability we strive for. The hard tones emphasize the strength and perseverance of the team and feel powerful and timeless. The strong contrast between the colors can extended to all kind of products.

Mock-ups

Some examples of places and products on which the logo can be put. Additionally, the team could have their own merchandise with for instance a tshirt, hoodie and sweatpants. See Appendix L.



7.3 Marketing

Flyer

This is the flyer which we initially used to catch attention and spread awareness of the existence of our project. We put and hung these flyers all over Novia and Technobothnia; this plan really paid off! We got more emails of interested students and even from a former worker at Wärtsilä and former Formula Student participant, with whom we later met.

NOVIA RACING TEAM

WHO

Our kick-off team consists of Sam De Loose, Sanne Keizer and Freyja Peeters. Our goal is to start and implement a multidisciplinary project at Novia University of Applied Sciences in which students can show what they have learned during their theoretical courses and develop additional skills. The project is a testing ground for the next generation of engineers. Commissioned by Tobias Ekfors



Our mission "is to kick-off a brand-new project and bring together a multidisciplinary team that, by working on this project, can show what they have learned throughout their studies and

Shell Eco Teams

gain even more skills."



Prototype Class

COMPETITION

Shell Eco-Marathon: 'The global academic programme brings together Science, Technology, Engineering and Maths (STEM) students from across the globe to design, build and operate some of the world's most energy-efficient vehicles. All in the name of collaboration and innovation, as students' bright ideas help to shape a lower carbon future for all.'



Shell Eco-Marathon



MISSION

Novia University of Applied Sciences/ Yrkeshögskolan Novia

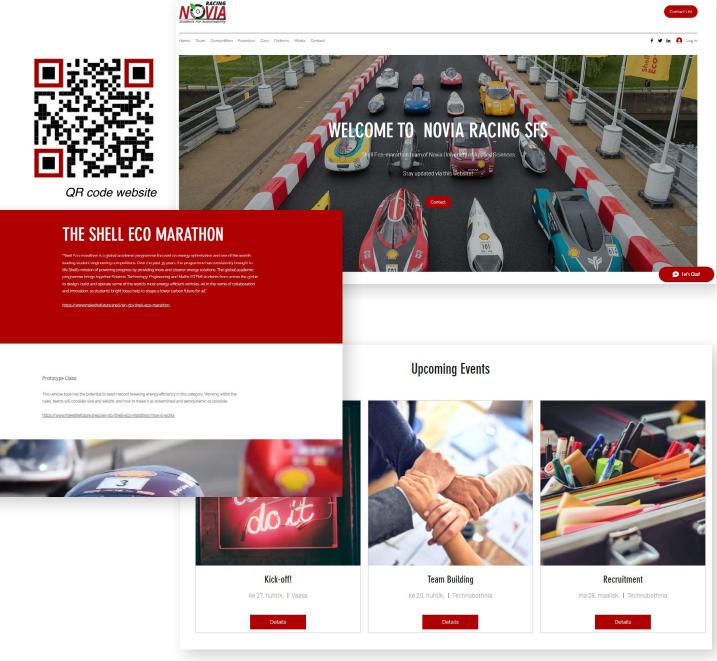
CONTACT

- Noviaracing@novia.fi
- 🜭 Sam +32 479 82 25 28
- 🛇 Wolffintie 33, 65200 Vaasa

Initial flyer to spread awareness

Website

On the website, people can find more information about the competition, mission and vision of the Novia Racing team, as well as the team members, founders, future cars and media involvement. It is still a work in progress, as we do not know yet the whole team composition, but the log in name and password will be put in the implementation plan for the team to later use.



Impression of website

Business cards

These cards could be used to hand out at events, conventions or competitions in order to spread attention and get more sponsors.

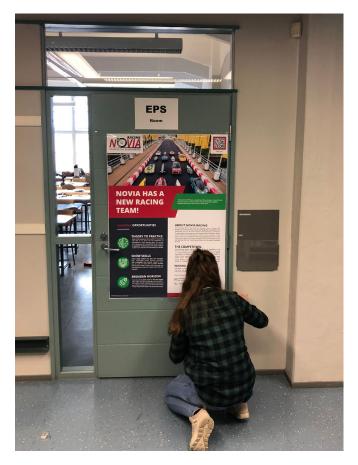


Business card template

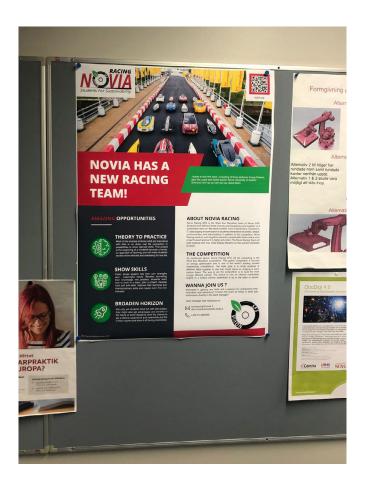
Poster

The poster will be used as a means of communication to the outside world, who do not yet know that the Novia Racing team exists. There is a short introduction about the project, what the team is all about and what their plans for the future are. The poster will assist in raising awareness in the university environment as well as the outside world. In addition, it will serve as a summary of our EPS adventure.

The poster is depicted on the next page. The print size will be A0; to be hung around Technobothnia and Novia University of Applied Sciences.



Process of hanging posters for recruitment



7.4 Typography

Throughout this report and all the marketing assets, two font families have been used. Both are sans-serif fonts, which give a softer, kinder and less sharp look. The first, used for the titles, subtitles and the logo, is 'Open Sans'. This is a structured geometric sans-serif, so there are no unnecessary embellishments. Also, Open Sans was designed with a neutral, yet friendly appearance, which fits our branding. The second font used for text and captions is "Helvetica". Helvetica has a dense, uniform design and is easy to read. It consists of straight lines and harmonious, geometric shapes. This further enhances the sense of strength, simplicity and essence representing our racing team. Both typefaces are widely used in media and are great for posters and websites.





VISIT US!

NOVIA HAS A NEW RACING TEAM!

Thanks to the EPS team, consisting of three students; Freyja Peeters, Sam De Loose and Sanne Keizer, Novia University of Applied Sciences now has an own eco car racing team.

AMAZING OPPORTUNITIES



THEORY TO PRACTICE

Most of the courses at Novia UAS are theoretical with little to no direct real life connection or possibilities to show learned skills. This project is the beginning of a mindshift towards a handson approach of learning and will make students' studies more relevant and interesting for real life.



SHOW SKILLS

Every single student has their own strengths and meaningful inputs. Besides converting their knowledge into practice, students learn how to work in a team, plan a project, develop hard and soft skills, improve their technical and interdisciplinary skills and maybe even find new interests.



BROADEN HORIZON

Not only will students have fun with this project, they might also get advantages and benefits in the future of work! Students have the chance to get a lifetime experience and meanwhile put this in their resume and show it off during internships.

ABOUT NOVIA RACING

Novia Racing SFS is the Shell Eco Marathon team of Novia UAS. Students from different fields of study and disciplines work together on a sustainable race car. We need students fond of electronics, mechanics, IT, data logging and simulation to students interested in business, design, communication and teambuilding! In addition to the competition, Novia Racing wants to work together towards a sustainable future and a more project-based approach in higher education. The Novia Racing Team will start building their first, most energy efficient car this autumn semester of 2022!

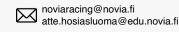
THE COMPETITION

As mentioned above, Novia Racing SFS will be competing in the Shell Eco Marathon competition. This global competition is focused on energy optimization and is one of the world's leading student engineering competitions. The main goal is to bring students of different fields together to use their bright ideas for shaping a lower carbon future. The way to win the competition is to build the most energy efficient vehicle. The choice to use an internal combustion engine or a battery electric powertrain is up to the team to decide.

WANNA JOIN US ?

Interested in gaining new skills and a passion for entrepreneurship, innovation and adventure? Contact the team by email or send your enthusiasm directly to the team manager!

Team manager Atte Hosiasluoma



+358 44 3384858



08 SPONSORS

In the first part of this project, we were already looking for companies that might be able to sponsor the team. Of course, in the second part, this could not be ignored, especially with the activities that were still planned after the midterm and before the endterm. The Vaasa Energy Week was still on our radar. We wanted to go there for our personal interests, but also to advertise for the future team and listen to other companies for probable sponsorship. The complete list of potential sponsors can be found below. The additional contact details will be found in the seperate implementation document for the students.

Research on companies that would support and perhaps sponsor the ecological and innovative solutions of our future auto team is conducted. Also the start of a contact list is set up; these are people willing to help in the future and to which students can reach out. See interview John Dahlbacka in Appendix I about possible private funds at the Research & Development department. These funds are mainly foundations which contribute to Swedish speaking organizations, such as Novia UAS.

8.1 Possible companies

Research on companies that would support and perhaps sponsor the ecological and innovative solutions of our future auto team is conducted. Also the start of a contact list is set up; these are people willing to help in the future and to which students can reach out. See interview John Dalbacka in Appendix I about possible private funds at the Research & Development department. These funds are mainly foundations which contribute to Swedish speaking organizations, such as Novia UAS.

Wärtsilä

Wärtsilä is a global leader in innovative technologies and lifecycle solutions for the marine and energy markets. They emphasise innovation in sustainable technology and services to hemp their customers continuously improve their environmental and economical performance. Because there is a growing demand for 100% renewable energy globally, there is an increasing need for Wärtsilä's balancing solutions. They are also the first company creating a green ammonia fuelled tanker, they are making big steps in innovation around green fuels. They are even bringing carbon-neutral fuels to road, transport, etc. Wärtsilä has build a new technology centre in Vaasa. In this technology centre they can welcome the whole partner ecosystem to work together in this collaborative environment. Wärtsilä is willing to provide the Novia's eco car team with their expertise and resources.

ABB

ABB is a leading global technology company that energizes the transformation of society and industry to achieve a more productive, sustainable future. By connecting software to its electrification, robotics, automation and motion portfolio, ABB pushes the boundaries of technology to drive performance to new levels.ABB is the co-founder of the Formula E World Championship. The ABB FIA Formula E World Championship is about bringing the thrill of electric racing to as many people as we can, on city-center circuits around the world. But more than that, it is a showcase for the world's most advanced e-mobility technologies, which are helping to drive progress towards a more sustainable future. The Formula E competition can be useful in finding partners, sponsors and experts.

Danfoss

Danfoss is a Danish multinational company, active in the next industries: Fluid control equipment, pump, seal, valve manufacturing, climate & energy. Nowadays they are strongly committed to their way of using and emitting energy. To give an example they want/going to be CO2- neutral by 2030. Danfoss is creating energy-efficient technologies, such as thermostats, high-pressure pumps, digital and electric solutions and motors to reduce emissions on a global scale. On the other hand Danfoss is creating power solutions. Danfoss Power Solutions optimize machine management with unmatched systems capability with hydraulics, fluid conveyance, electrification and software.

SKF

The expertise of SKF is based on the development, design, seals and lubrication systems. They also offer machine health evaluation systems, engineering and reconditioning services. But what they really offer is an arena for information – an opportunity for their customers to use the tools we provide to explore, improve or rethink the performance of their rotating equipment. A place where even the smallest adjustment can make a big difference.

The Michelin group

The Michelin group is a French multinational that started with making car tires. Michelin is the second biggest tire manufacturer in the world behind Bridgestone. Michelin is strongly committed to innovation, sustainability and the climate. Michelin has the so called "all sustainable" vision: it commits the entire Michelin Group to the constant search for a fair balance between people, the planet and economics and financial performance. It is translated into action for each of these three pillars: People, Profit, Planet.

Nordpipe Composite Engineering

NCE is a company that produce high quality (glass) fiber, reinforced plastic products or composite products. All their experts have one goal, and that is to find and create the most oppropriate and durable composite solution for their customers. They continuously develop both their manufacturing and construction methods.

BS-Metall

CNC-Metall is a CNC-machining subcontractor creating high-precision components. They are committed to constant improvement of their expertise and their state-of-the-art machining technology. CNC-Metall can machine a variety of materials, everything from copper and plastics to demanding alloys. Through their suppliers network they offer geat cuttings and surface treatments such as different hardening and electrolytic coatings. A big plus is that they have a lot of certifications attests such as ISO9001. This means that they continuously improve their way of working and ensure the best quality.

Elsteel

Elsteel is a versatile expert in sheet metal mechanics, both punching, bending, thread cutting and mastering Haeger rivets. They know the requirements of the electrical industry particularly well. They also offer assembly services and customised surface treatment. Our flexible production model adapts to the different needs of our customers. Small and large, from individuals to thousands - we are at our strongest in medium-sized series.

CSI Composite

CSI composite is a company that makes carbon fiber for every possible application. In product development, they always create 3D models of the product, which enable them to analyse manufacturing and raw material alternatives early on and make cost comparisons. 3D models also work as an illustrative communication aid when discussing matters such as linking the product to the rest of the structure.

OSTP

OSTP provides process pipes, specialty tubes and butt weld fittings from an extensive range of products and stainless steel grades, as well as specialised equipment for pressure corrosion applications. They are committed to customers and applications with the highest demands on quality. you can be certain of safety and performance, ensured through their specialisation, experience and reliable approach.

Stormossen

Stormossen's business is an example of a real circular economy. They deal with biowaste and sludge and convert it into compost soil and biogas vehicle fuel. The result is a climate-smart cycle of nutrients and energy. Stormossen handles the tasks transferred to them by the owner municipalities in a sustainable, modern, technically-efficient and cost-effective manner.

Finnish Minerals Group

The mission of Finnish Minerals Group is to responsibly maximise the value of Finnish minerals. They provide materials that enable Finland and Europe to strive for climate neutrality. Finnish Minerals Group attracts investments to Finland based on strategic partnerships by offering a unique access to local expertise and resources. At the same time, they also facilitate the creation of new industry and competences in Finland and enhance the value-add. Their role is to create new business opportunities by developing the battery value chain. Utilising their technological excellence and industry specific expertise, they deploy new types of industrial solutions. Their focus is on opportunities that enhance sustainability and the circular economy, increasing the value-add of energy transition materials.

FREYR Battery

FREYR offers a clean Nordic solution to the rapidly growing global demand for high-density and cost-competitive battery cells for stationary energy storage (ESS), electric mobility, and marine applications. They are targeting the production of environmentally friendly battery cells through a business model intended to maximize long-term value creation and unlock sustainable, superior returns to their stakeholders. They are planning to develop up to 43 GWh of battery cell production capacity by 2025 to position FREYR as one of Europe's largest battery cell suppliers.

Terrafame

Terrafame Ltd is a multi-metal company producing nickel, zinc, cobalt and copper at its mine and metals production plant located in Sotkamo, Finland. Their aim is to conduct environmentally sustainable, safe and profitable operations.

DIFF

DIFF – Ingenjörerna i Finland rf was founded in 1936 and has today about 3300 engineer members of which over 1000 engineering students. DIFF is a member of Akava and is its only Swedish speaking affiliate. Akava is a trade union confederation of affiliates for highly educated people. Together, Akava's 36 affiliates have unionized more than half a million employees and professionals. The members of Akava affiliates include employees, as well as students, entrepreneurs and professionals.

8.2 Vaasa Energy week

As mentioned before, we went to The Vaasa Energy Week after the midterm. We thought this would be the perfect opportunity to both feed our own interests and see what other exciting companies could help the future race team.



On Monday 21.03.2022 2022 we went to the opening day where two environment seminars were held. One in the morning and the other in the afternoon after a coffee break. We as a team went to the second seminar. The Nordic Battery Belt: The Most Sustainable Battery Value Chain in the world was discussed. We thought that this was the perfect opportunity to find better sponsors for the team, as this is also an option for the future car.

We listened to Miapetra Kumpula-Narti talk about The European perspective on energy innovations.

Then it was Vesa Koivisto's turn to speak about the SVP of battery operations of the Finnish Minerals Group. He spoke about Finland as a destination country for battery investments. We had a feeling that this company could become one of the future sponsors. So after his speech, we approached him, handed over our flyer and talked to him about the whole project. Unfortunately, this did not result in a business card, but it did result in awareness and an interested man in this company.

Next, it was the turn of Jarkko Vesa, who is the Senior Specialist, Battery Cluster, Innovations and Enterprise Financing, Circular Economy and Carbon Neutrality, Ministry of Economic Affairs and Employment of Finland. He gave an engaging speech on Implementation of the Finnish Battery Strategy 2025. We also spoke to Jarkko about our project, and like Vesa he was very positive about it. He gave us his business card saying that if the team needed a network of companies they could always contact him. His details will also be found in the contact list in The Implementation plan.

Finally there was an online speech by Tom Einar Jensen who is the co-founder and CEO of FREYR Battery. Unfortunately we could not speak to him as he was speaking online from Norway. But during his speech he also talked about the establishment here in Vaasa and also about the expansion of this establishment. We will therefore encourage the students to contact this company.



On Wednesday 23.03.2022 we saw on the schedule that there were again exciting presentations for our team. It was about Energy Transformation. It started with a presentation by Valerie-Anne Lencznar Adviser I Réseau de Transport d'Électricité RTE. She dealt with Presentation of the Smart Grid solutions and trends in France. Next it was the turn of Marcelo Godoy Simões, a professor at the University of Vaasa. He spoke about Artificial intelligence in control of renewable energy systems. Because he teaches at the University of Vaasa, we thought of a possible collaboration between Novia and the University of Vaasa. We approached him with this in mind. Just like Monday, we presented our flyer and our project. And just like the other presenters, he was also enthusiastic and definitely wanted to help the team with this project if there were any questions.

To conclude this exciting day, Veikka Pirhonen, CEO I VIBECO - Virtual Buildings Ecosystem Oy, Siemens, addressed us. He spoke about Virtual Buildings Ecosystem. Because he has good connections with Siemens, we also wanted to talk to him about our project, but unfortunately he had left before we could talk to him.

09 IMPLEMENTATION PLAN

9.1 Introduction

In the last part of this endterm report we will talk about the plan and documents we will hand over to the future racing team. In this part we will discuss how we approached the team building, the credits/ECTS points, also there will be a word about how we made the example of the sponsor packages. To close the implementation plan section, there will be a brief explanation of the financial breakdown documents we obtained during the interviews. All these elements of this chapter will be fully reflected in the implementation plan document.

9.2 Teambuilding

During the first week of the EPS programme, Roger Nylund gave a course on team building. The aim of this course was to get the students to know each other, to highlight challenges and opportunities with the EPS way of working and to help the students to create a better self-awareness. Communication, successful teamwork practices, and time management issues were also discussed. The course consisted mainly of activities, games and hands on practical learning.

Because we experienced this course as a very positive and instructive experience ourselves, we thought it would be a good idea to do the same for our students of the future racing team. We then introduced this to the students in each focus group and each time they were enthusiastic about the idea of doing a teambuilding. With this in mind, we went to Roger and asked if he was willing to do this.

After this request the answer was positive and Roger immediately gave us several dates he would be available for the students to do a teambuilding. After we had this information, the next step was for us to communicate this to the students. We then created a new small survey where the students could easily indicate when they wanted the teambuilding and what roles they would be interested in taking. After the teambuilding, we asked the students about their experience and thoughts. The response was as expected; Finnish, enthusiastic and positive.

9.2 Curriculum (ECTS)

During the interviews of other participating teams, a lot of different school and ECTS structures were used amongst the teams. Our opinion is that the students should be rewarded for participation in the team. The practical work, which they perform is very valuable next to their studies. Running the whole team will learn the team members about collaboration, communication, discipline, planning, self-development, technical troubleshooting, design, marketing and probably many more important things which will be useful in their work life. In general, most studies miss out on the actual practical experience which is useful for their further future and work. Participation in the team will give a more realistic view on an actual technical project with all aspects included.

Therefore a meeting was held with the most involved Heads of Programs;

- Roger Nylund Industrial Management
- Ronnie Sundsten Electrical Engineering
- Anna-Lena Berglund Business Engineering

Sadly, Kaj Rintanen as Head of Program Mechanical Engineering could not attend the meeting. An introduction to the whole project and interesting findings has been given, including an interview of a racing team from the Metropolia University of Applied Sciences in Helsinki. This interview is mentioned, because it is more relatable to the Finnish school systems and curricula. Their ECTS system has been explained to give everyone an example how such a system could look like. Both Heads of Programs for engineering and business students were positive about this and confirmed that student should and could receive ECTS for this.

The outcome of the meeting was that students should be able to exchange some ECTS for participation in the project. This will mainly be ECTS for working practice, which at least engineering and business students are eligible for and it has a maximum of 15 ECTS. The students must have done some hour tracking and writing a small report about what they have been doing within the team, in this way ECTS can officially be given. Depending on the hours spent within the team, the amount of ECTS will be decided.

9.3 Sponsor packages

From the interviews we had with the different teams it appeared that each team used sponsor packages to have a guideline for applying for sponsorship. Just as with the request for financial breakdown, this had to be approached in a careful manner, because these data is also very sensitive for a team. Fortunately, by handling this carefully, we were able to obtain four different sponsorship packages.

After obtaining the packages, we started to analyze them, because often it was not just an overview of the different packages but a whole brochure. This gave us the insight to do the same, as a brochure looks much more professional than a simple picture of the packages with amounts and benefits on it.

When this decision was made, we went on to look at what the good points were in the various brochures that we obtained from the teams. Then we decided to base the structure on the packages of UGent Racing and Green Team Twente. We did this because these teams already have about ten years of experience with their racing team. For the different packages and the number of different options (eg. Platinum, gold, silver, etc), we also relied on the data from Delft, and Arnhem. These teams also have several years of experience in this type of project. Overlapping prices were taken and averaged.

In Appendix M, an impression of parterfiles for the Novia Racing Team can be found. The whole package template is handed over to the team in a seperate document.

9.4 Financial breakdown

When the project was presented in early February, it was mentioned that an eco-car participating in the Shell Eco Marathon would cost around €20,000. It was also mentioned by our supervisor Mikael Ehrs that this was not an exact science. One of the questions from our supervisor and client was therefore to get a better idea of how much this project would cost. This was to give both the school and the students an idea of the price tag of this innovative project.

We had taken this question into account when preparing our questions for our interviews with other teams. Thus, one of our questions was whether it was possible to obtain the financial breakdown of the team. We also stressed during the meetings that we were aware that this is very sensitive information and we would handle it with care. In addition, we also suggested to obtain the breakdown of previous years, because these are less relevant as the team in question has already found new developments. Plus the younger the team's financial breakdown was, the more valuable it actually became to us.

By approaching this so cautiously and giving the teams as much confidence as possible, this turned out not to be the easiest of tasks, as expected. A lot of teams promised to help us, which made us very happy in the beginning, but nothing turned out to be further from the truth. After waiting for weeks, sending reminders and contacting the teams, we could only get two complete financial breakdowns. However, these breakdowns were from the most useful, well developed teams! As already mentioned, we promised the teams to be careful with this information. Therefore, we have chosen not to include these breakdowns in the final report, but to include them anonymously in the overhand package for our students from the future team.

With this documentation, the students will not only have a perfect overview of how much the car will cost, but also how much they will need from sponsors, which parts the car will consist of and how to make a financial breakdown.

9.5 Timeline

Planning and coordination will be an important part of the project, as there will be a set deadline for the competition. Also, the start of the building of the vehicle will be depending on sponsorships or in easier words, money. This timeline is based on the interviews taken with the other participating teams. Additionally, teambuilding session(s) and a kick-off meeting are added, due to the fact that it will be a team in a start-up which will need a bit more attention at the start. The team members will need to get to know each other and also all the team roles will be divided by then; this will shape the group dynamics more.

Start-up phase

In the start-up phase the main focus will be on the shaping of the team, setting goals and planning and obtain partnerships. When the team had some time for this and knows how to work with each other, the design phase of the vehicle will start and a list of needed materials/car parts can be made.

Middle phase

This phase will mainly be all about the vehicle, from the ordering of car parts, to the building and the start of the testing phase. Next to that, the management will work on next season to start off with marketing about the team and recruitment of new students. In this timeline, the recruitment has also been added during September and the first half of October, as the marketing is still going on with posters through Technobothnia, team members will talk to their classmates and new 1st years starting their study. If interested student could still join the team, it will be good to do this straight away to attend the important and valuable start-up phase.

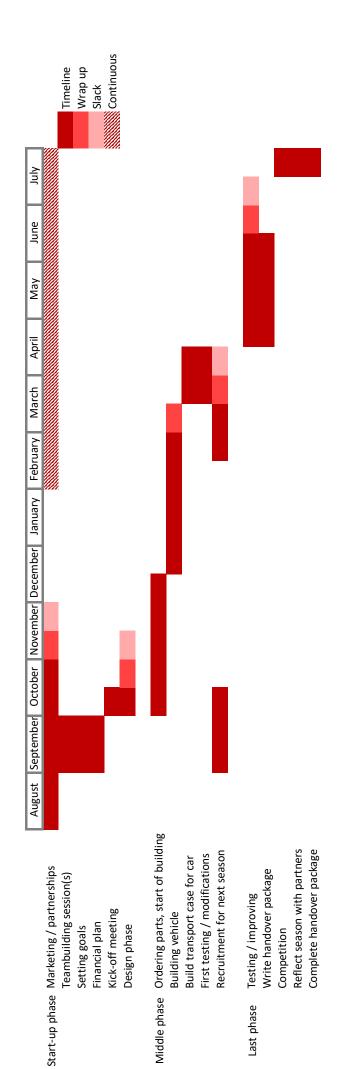
Last phase

Although the main part will be focused on the testing and improvement of the vehicle, followed by the competition, there will also be some officialities in this phase. A handover package will need to be written containing all the needed information for the next team in the next season. Next to that, the contracts with partners will need to be evaluated and hopefully extended if the collaboration has been good. The final part of the season will be the actual competition and additionally the FMMC competition, which is usually held in August.

Other comments on the timeline

During meetings with our customer and the support of the team, it was discussed that the team might need 2 year before participation if they build the vehicle from scratch. In case the team will be buying car parts from other teams, they might be able to participate within a year. However, if the team will need 2 years, it will be preferable if they build a proof of concept within a year. In this way, it will be easier to continue and obtain more or better sponsorships. The same timeline could be used for either participate in a competition within a year or finish up a proof of concept within a year, with some small additions. Because of this reason, it was chosen to keep it to one timeline, to keep things more simple.

Timeline



9.6 Contacts

In this project, we decided very quickly that an implementation plan would not be an implementation plan without possible contact lists. We can provide our team with all the resources, but what use are they if they have nobody to hold on to these resources?

Therefore, we decided to make an extensive overview of all the contacts we collected throughout the project in the implementation plan. The contacts all started with the head of R&D at Wärtsilä who we got through our customer Tobias Ekfors. We had a meeting and presented our project. He was very enthusiastic about the project, partly because he had also participated in a similar team. By his enthusiasm he opened up the knowledge of Wärtsilä to the students and even more. He provided a lot of other names that could possibly be useful.

Our next step was Novia's own head of R&D John Dahlbacka, with whom we also had a meeting. He too was very enthusiastic about this project. The students also have the opportunity to contact him at any time with questions. In addition to this, John also has the opportunity to use his network to obtain additional sponsorship, which is of course always welcome for the team.

After we were able to present this great news to our supervisor Mikael Ehrs, he gave us an additional list of possible teachers that could be useful for our future race team. We mailed these teachers to raise awareness about our project, and even after these mails we were flooded with positive comments about this project.

Shortly after this, the Vaasa Energy Week took place. As already mentioned in this report we found some extra companies that could possibly sponsor the future race team. During the Energy Week, we also introduced our project to a number of people. This also resulted in two contacts.

In the meantime, our project progressed further and we came to the point that we had made a flyer to advertise all over Novia and Technobothnia. We had already created our own mail for the racing team. Suddenly we received our first mail from Heikki J Salminen. This is an engineer who specializes in internal combustion engines. He saw our flyer in Technobothnia and wanted to help this future group of students with his knowledge and network. Heikki did not only come with his own knowledge, but also with a colleague and friend Tharanath, who works for the University of Vaasa and has himself participated in a similar racing competition with friends. Together with Heikki, they support our students in the project so that the team can participate in the Shell Eco Marathon as soon as possible.

All the contacts will be listed in the implementation plan.

EPILOGUE

The expectations of a young student at companies are getting higher and higher these days. Technical students are therefore increasingly likely to come into contact with other cultures or even to have to go abroad for work. For this reason, the EPS programme was created. The purpose of EPS is to teach students to function, communicate and work in a multicultural environment where they cannot speak their own native language.

As soon as the teams were divided and we knew who our team members were, it was immediately clear that we were getting along perfectly and we all had the same goal, namely to make sure that Novia got its own eco racing team! Because we had the same goal, we were very motivated to start this project. We started right away and worked at a fast pace. We knew that this was necessary because, compared to other teams, we had a small team. Our team consisted of four students, which was later reduced to three.

After the first meeting, we quickly came to an agreement on who was going to fulfil which role in the team. This also allowed us to quickly divide tasks and responsibilities, making everything even clearer for each individual.

Although the project went smoothly most of the time, not everything went as planned. In week three, Albert Schuetz decided to quit the EPS project for personal reasons. However, this was at a very crucial moment in the project. The tasks were already divided so Albert's retirement meant a lot more individual work for the remaining teammembers. As a team we reacted immediately and accepted the situation as it was. After all, problem solving is also an important aspect in a project.

Albert was not the only obstacle we had to tackle in this project. As already mentioned in the financial breakdown, it was not the easiest of tasks to get these documents from the teams. In addition, getting a core group of students together and keeping them interested and engaged was a challenge as well as a great learning experience.

As a group we can say that we have acquired a lot of knowledge through this project. Besides this project, it was also the intention that we could work on our social skills in a different culture than we are used to. As a team, we can conclude that each group member has learned a lot and made progress in their own knowledge, professional skills and social skills.

In conclusion, The Future Eco Auto Team is more than satisfied with the outcome of this project. The feedback we received throughout the project and weekly meetings will be taken up by each of us for future projects.

APPENDICES

10 APPENDIX

A - CODE OF CONDUCT

Team roles

Sanne: Secretary, responsible for e-mails, notes after weekly meeting, writing out interviews **Freyja**: Project manager, responsible for overall following of the planning, making sure everyone is doing what they are supposed to do, making agenda points for weekly meeting, time management **Sam**: Resource investigator, in charge of most of the contacts with stakeholders, as well as the financial topics

Team rules

- 1. Max 15 minutes late
- 2. Write and speak in English as much as possible
- 3. Do not disturb mode needs to be switched on on every electronic device when working together
- 4. Take a short break every hour or when you really need them, this stimulates efficiency
- 5. Communicate enough and clearly
- 6. When something is bothering speak openly
- 7. After meetings we state to do's and feedback from coordinator
- 8. Give the team members constructive feedback after milestones
- 9. Meeting times are discussed in the WhatsApp group
- 10. Update each other in the WhatsApp group after some work has been done
- 11. If a meeting has happened or research has been done make a summary of own work

When we meet

- 1. We meet at least twice a week as a group.
- 2. We plan the next team meeting according to our schedules.
- 3. We meet at the library, our apartments or at school.
- 4. We store everything on Teams.
- 5. In case of conflict we talk and find a consensus.

How do we compensate by going on trips?

In general: every person has his/her tasks that needs to be done; if everyone does what they are supposed to do, it doesn't matter how many trips you do. We keep each other updated at all times.

General team values

- 1. Respect each other's opinion
- 2. Listen and be open minded
- 3. Combine work with fun
- 4. Help each other when needed
- 5. Positive attitudes
- 6. Communication
- 7. Learn from mistakes

B - TEAM CONTACT INFORMATION

Sanne:

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Sam:

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C - CUSTOMER MEETING 2

Present: Tobias, Mikael (online), Sanne (leading), Freyja (notes), Sam Sanne starts with the powerpoint which consists of;

- Meeting with Kristian Blomqvist
- Business card design
- · Discussion about the competition choice
- The next steps and deliverable breakdown
- Feedback by customer and supervisor

Meeting with Kristian Blomqvist

Sam pitched our idea to Kristian and he gave us a green light to start a racing team at Novia UAS. His worry was the difficulty of involving all campuses of Novia, but suggested to start off to project at Novia Vaasa. He was positive about a starting budget and it should be possible to start off with something. We told him it was not necessary as we learned that all universities did this in very different ways, so it will be very helpful to receive something but it is not critical. Kristian is open to provide resources such as workplace, machines and tools from Technobothnia.

Tobias: There have been quite some discussions about removing the CNC machines from the laboratory in Technobothnia. It is not sure yet, but the teacher who was supervising it is retired and no one has taken over his courses so there is too little use of them.

We sent Kristian our midterm report to have a read through about our findings so far. He would like to talk about the specifics once we know more. Next to that, het is positive about ECTS implementation which should be possible in his opinion.

Tobias: What did Juha Kytölä (Wärtsilä) mention about the ECTS implementation? He told us that teacher involvement should not be included in the program, but students must be able to ask questions whenever they had problems they could not fix themselves. Juha has not been specific about the ECTS, but regarding our interviews so far it seems that every university has a complete different approach from 0-60 ECTS for the project.

Tobias: There should not be a problem to exchange some courses for the project.

Mikael: It just needs to be discussed with the right people and get pinned down to see how many ECTS are possible to maximum replace for the project. The main person for this should be Kristian Blomqvist and program leaders, like Roger Nylund, would probably decide. It depends per study and department (e.g. bussiness will be different from engineering) and also the kind of deliverable

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is important, they might need to deliver some sort of report. It might be good to have a meeting with the program responsible teachers and we could give a short 10-20 minute introduction of the project to get them up to date and enthusiastic. In this way we can get the ball rolling. I think 15 ECTS maximum should be possible, as this is nowadays also the amount of ECTS for the kinds of modules we integrated now.

Our question is if there are monthly teacher board meetings or something like that to get in touch with teachers.

Mikael:

We just had one for the technical institution, which also includes maritime teachers from the campus of Turku. This are relative large meetings, so you will not be able to have full discussions but you can do a short presentation. For decisions, it might be good to discuss and decide in smaller meetings. But it should be possible to integrate you in the meeting of April.

Business card

We show our bussiness card, which we want to use as a handout during the Vaasa Energy week (21-25 March).

Mikael: There needs to be more information about the project itself, about what our goals are and how it will look like. There is no information on the bussiness card and if people want to pass this on to someone else within the company, there will not be any information provided. It is better to make an A4 leaflet with more information about what we want to do.

Competition choice

We introduce the competition discussion we want to hold, to get to know our customers preference. There is an overview about some important specifications of the Shell Eco-Marathon versus the Formula Student. First we would like to know what Novia would like to carry out as a message and what the project should stand for

Tobias: We will need to pitch that sustainability is very important, like the Shell Eco-Marathon. For the potential engineering students it is good to show what the students could do as a project if they come to study at Novia UAS. There is not one specific message, but more a combination of sustainability and make the engineering studies more attractive. But sustainability and a greener planet in the future, is a good message to sponsors and for Novia.

Mikael: Students care less about the sustainable aspect, but Novia should be interested in this and this should also be the future as it is important. Battery and gas are becoming more relevant and combustion engines are getting out of fashion, we should follow the trends as well as a school.

Tobias: Something we really need to keep in mind is the fact that the car can change during the process. It is a living projects and it is possible to change car, engine and competition over time. Combustion engines would need the most resources and space, a battery would be best to start with and a switch from battery to hydrogen should not be too big of a problem.

Mikael: No one would really want to make a decision about which competition to take part in, I personally like the Shell Eco-Marathon more as I like their vision of sustainability.

Tobias: The Shell Eco-Marathon does not mention this anywhere, but they do provide some money for each team for travel costs. As I remember it might have been something like €1000,-. Sanne introduces our overview of the two competitions, Shell Eco-Marathon and Formula Student compared to each other. We see more advantages to start off with the Shell Eco-Marathon and keep the FMMC competitions as an additional competition as well.

Tobias: I think it is great to start of with the Shell Eco-Marathon, Mikael is also agreeing to it. My reasoning for this is that it will be easier to get started, we have the in-houe knowledge, it is a marathon so it is more about keeping the car running for a long time instead of a race and so it is not focused on speed but efficiency. Then in the future it will definitely possible to switch between the competitions.

Formula Student would have more costs to start with and also the rules are more difficult, based on the interviews.

Tobias: Then I would also really like to compete in the Urban Class, as we have done that in the REMMI-team as well.

The disadvantage of the Urban Class is that the car will need more material, which means higher costs. So we would suggest to start with a prototype and then switch to the Urban Concept if the finances are build up. Then, you could switch to the Formula Student if that would be your wishes.

Mikael: So this starts to sound more as a 10 year plan, as anything less would not be worth it. A mixture between the students (departments and years) would thus be great as the senior students could transfer their knowledge to the junior students within the project.

So our first step would be competing in the Shell Eco-Marathon. In any case the team does not get accepted, it will still be possible to compete in their Challenger or Regional events and the FMMC could be a backup option.

Tobias: I think we can take part in the FMMC anyways, next to the Shell Eco-Marathon. The board of the FMMC consists mostly of old REMMI-team members. So first we start with a prototype car for the Shell Eco-Marathon, but they should not get stuck there and see it as an evolution.

The next steps and deliverable breakdown

So the next steps at the moment are the focusgroups with the interested students, the competition decision which seems to be finished now, gaining publicity among students, teachers and possible sponsors and the branding.

Tobias: I would also really like to think about a name for the car already, as it needs a good name because you have to see it as a soul! But this decision will mostly be up for the future team. We will need to do a brainstorm session for the team name and we could also include this in the focusgroup interviews, as the students may come up with some good suggestions.

Mikael: We should also invite the students to your final report presentation, they could participate online in this. Then we could have a meeting with them where we discuss more about the team specifics and during the summer some student could maybe startup the marketing part and maybe even the design concepts. A Whatsapp group could be started up to keep them in touch with each other as well.

Mikael: Can you already show some examples of price lists to see what the most costly parts will be? In this way we know what kind of companies we need to focus on the most.

Sam says we are still waiting for a few and we will them make them anonymous, once we get this ready we will send it to Mikael and Tobias.

Tobias: You need to keep in mind that there will be a lot of other costs involved that some more experienced teams tend to forget to tell you, such as transportation boxes for the car, travel costs, etc. Also, all the thing you need to start with, maybe you need some better and stronger computers for the programming and these sort of things.

We present our deliverable breakdown and ask Tobias and Mikael for their feedback an ideas.

Mikael: So the ECTS structure should be discussed with the eductional board. The startup of the team will be at Novia and then we can always ask some 'help' or support of other universities in Vaasa. If it comes down to the sales pitch (briefly showed), add pictures specific of the Shell Eco-Marathon which helps with visualization. Then also add a summary of your findings so far when you will be talking to teachers, as they tend to be allergic to the sales pitch and not taking that seriously.

Tobias: I also would like to know how much teams receive for each type of sponsorship and what the team needs to give back in return, are there any guidelines for this? And also how many companies can we have for a small car and what do the sponsors want back for it?

So from the interviews the majority of the teams work with sponsor packages which are also captured by contracts with sponsoring and returns. We do have these contracts of some teams and we will present these also in our end term report.

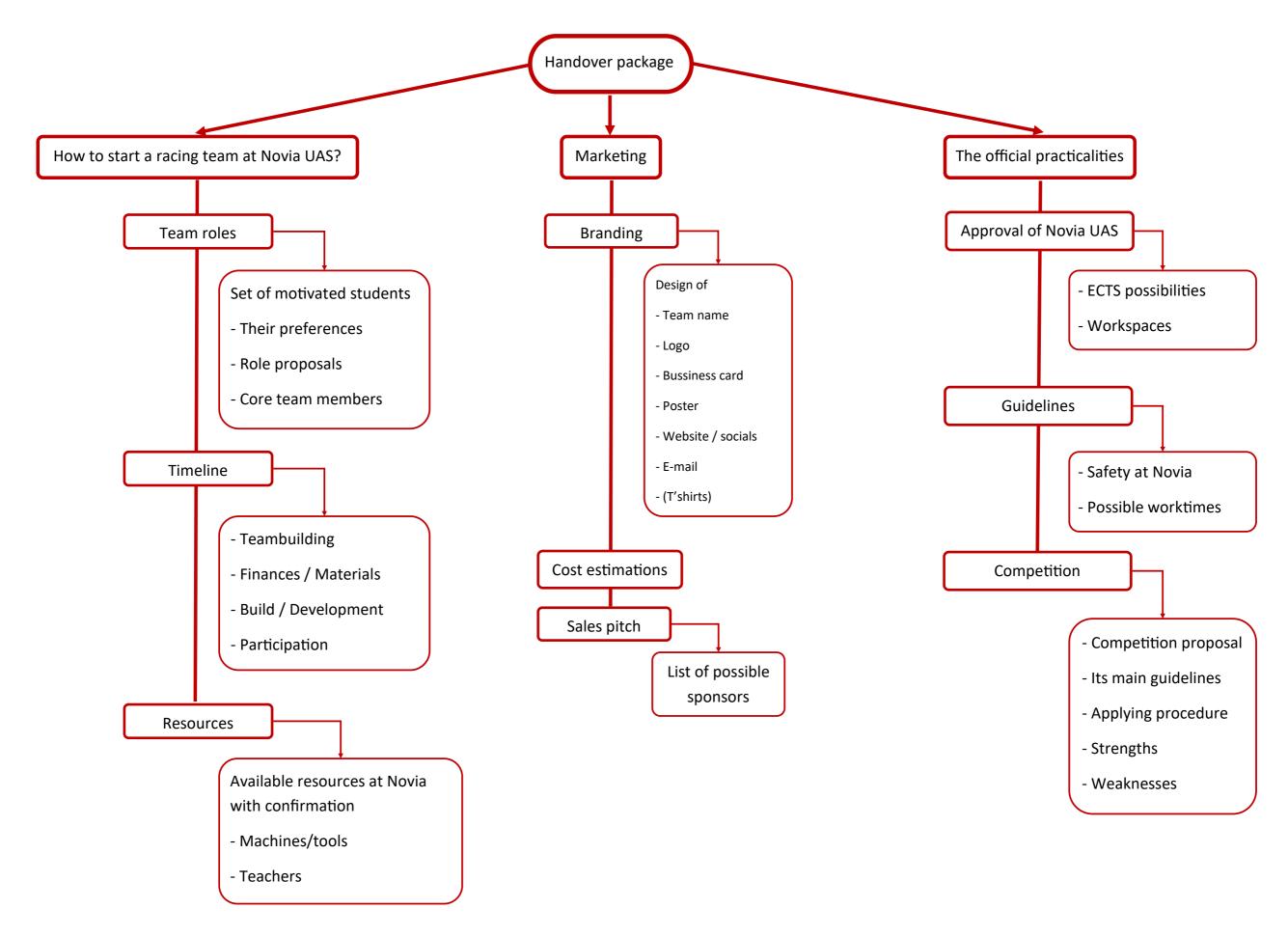
Mikael: A good point to carry on is that a big upfront sponsorship might be as much valuable as a small one who give something every year and thus reliable. John Dalbacka should also have access to some of the funds which will definitely provide us some money as well, such as Gustaf Svanljugns Fond.

Tobias: My main concerns are the student involvement, how do they keep motivated and put effort in it next to their studies and the startup finances. Furthermore, the PowerPoint of this project in the beginning covers all my questions and it seems like they are covered by your deliverable breakdown. The timeline should be an important thing to look into more as well. For the REMMI-team is was our first concepts of the design during the summer and autumn and have the car ready in spring, but we have been working during our summer holidays as well. Everything was new to us and we were networking in our summer jobs or internships and staying in touch with the entire team.

The main points summarized

- 1. The dean of the engineering department, Kristian Blomqvist, gave us green light to start a team
- 2. We need to raise awareness of the project among students, teachers and possible sponsors
- 3. The team will start in the prototype class of the Shell Eco-Marathon

D - BREAKDOWN STRUCTURE DELIVERABLES



E - GENERAL STRUCTURE OF RESEARCH QUESTIONS

The research questions were personalised depending on who we were interviewing, but there was a general structure we followed:

Questions for possible investors

1. What resources can the students obtain

2.Are you willing to sponsor and/or help the students of Novia with their project in the future? Like answering questions and giving feedback>

3. Who can the students contact if they need help

4. What are your expectations of the team (in case they want to sponsor/help)

How do you want to get on the car

How do you want them to perform

How often should there be feedback to you during the process

Questions for teams and universities

1. How did the team start?

Part of courses? As hobby?

How did you find out about it?

2. What is the utter first step to bring a team together?

Dividing roles, meeting,...

3. How long is it been going on for?

How long have you been inside of the team?

Until when do people stay in the team?

4.Did you have any resources to start with?

What is the starting budget/estimation?

Who do you ask for materials?

5. How many team members do you have and what specialties do they have?

How many actives?

Can people come and go?

- 6. Where can the team work on the car/ come together?
- 7. What are the stages the project/car goes through? Start to end?
- 8. How does the car work? What kind of car is it?

9. Is it possible to obtain a cost list of the components or give an idea of it?

10. If ECTS points can be used, how many are used and how have you implemented this in the students timetable?

11. How is the relationship between the sponsors and how do you give feedback?

How do you approach companies to get sponsorship?

F - INTERVIEWS EXISTING RACING TEAMS

1 - Interview KU Leuven FE Belgium

How did the team 'Formula Electric Belgium' start?

The beginning was about 13 years ago, two schools collaborated and started this voluntary project for postgraduates. You could see this as an extra master course of 60 ECTS, which you can do full-time in 1 year or divide parttime over 2 years. Other Formula Student teams usually integrate it as a part of the study, their downside is they have less time to work on the project. All team members in our team are master students / postgraduates and you must have gotten a bachelor's degree in engineering. Not everyone in the team agrees with this, as it might be good to include some people for specific business and marketing. We are changing this somewhere in the future.

How did you find out about this team yourself?

I found out about the team on accident, but nowadays they also do a lot of marketing within postgraduate projects. I already have a lot of interest in cars and racing, so I was immediately interested.

How does the team get enough participants?

We start with recruitment ourselves every February and March to announce the team and set up a team structure for the next year. The positions in our team are in the top:

- 1. Team manager; mainly the ultimate responsible
- 2. Chief Mechanical; combines the three mechanical departments (Viktor himself) Vehicle Dynamics (suspensions) Composites (e.g. carbon fiber) Powertrain (drive and battery)
- 3. Chief Electronics

This structure developed quite naturally, we reflect on this every year and if needed, we adjust the team structure. The new team starts in September, but you will get involved during summer for some insight and you are aloud to travel with us to the competition. In the month September the previous team is still present and will transfer all the knowledge, materials and supplies to the new team.

How many team members are you having at the moment?

Our team consists of 48 students in total, of which 23 students are the core team. We also do have 11 volunteers, because not everyone wants or could do a postgraduate project. Next to this, we have thesis students who collaborate in the research and development part.

Where do you exactly receive the 60 ECTS for?

You receive 44 ECTS for the teamwork, 10 ECTS for attending workshops and 6 ECTS for random chosen courses from the university (KUL). As said before, you will attend 1 fulltime year or 2 parttime years. The 60 ECTS are extracurricular and your Master studies will still contain the same components. We did have a previous participant who attended the 2 year track and started his thesis in our team after this, to stay involved in the project. Usually it pretty much never happens someone stays longer in the team than 2 years. A lot of universities will give less ETCS for participating in such teams, such as München in Germany. The downside is that team members usually take more time for study than the team, but they definitely stay longer in the teams which is also useful.

How does the applying procedure for the competition work?

There are about 10-15 similar car competitions in Europe. For the most prestigious competitions you get a 'Rule Quiz' every week to qualify yourselves for the competition, for the less known ones you just have to be on time to apply. Formula Students is one of the most prestigious competitions and we have chosen for this competition. You really need to be sure in advance which competition you will be competing in, as the rules for design, suspension, engine, etc. might differ between the competitions. We build a new car every year, which some competitions could require or you have to make significant adjustments. We do take sometimes parts of the previous car for implementation in the new design. For example, the Solar challenge asks for a complete new build car every year.

What is roughly the starting budget for the designing, building and developing of the car?

It really depends on the team and how long they are already participating in such competitions. For example, the University of Gent and the 'Vrije Universiteit Brussel' just started a team and are starting in a very simplistic way. Their budget is around $\notin 10.000-15.000$. We really have been building a network during the years with our partners and sponsors, which makes a financial budget or $\notin 100.000-110.000$ and about $\notin 200.000$ worth of materials. However, some university teams have budget which are close to a $\notin 1.000.000$. Our team usually is in the middle class, but we tend to finish higher due to higher reliability of the car. The teams with more financial possibilities usually have better cars, but mechanic problems on the track might lead to less results.

Which class are you competing within the Formula Students?

We participate in the fully electric class and also only within Formula Students Europe. Formula Students is one of the most prestigious competitions and has also one of the leading rulebooks compared to the other competitions. Right now we do have a driverless department which is developing a driverless car within the last 4 years. At the moment we still participate in the driver classes, but in the future we will switch to a driverless car. The next competition will take place on the 9th of July 2022 in the Netherlands and right now we just started in our 'building' phase. At the moment we have to laminate 18 hours a day for a month, to make the carbon fibre exterior of the car.

Where are you allowed to perform driving tests with the car?

We have a track called 'Ford Lommel' where we are aloud to perform tests and there is one other track we sometimes use. For drivers to be allowed on the track, they have do pass a test before driving. We also chose to train our drivers by 'Jescoo', to improve their driving skills. Of course, this is something completely up to the teams themselves.

Do you have an own location to build on the car and meet with the team?

Yes, we have in fact been quite lucky as our university provided us an office and workshop a little outside the city of Leuven (called Tesseloo), you could see this as a sponsor in kind. I personally think an office is highly needed for meetings etc. The workshop is located in a quite technical company, so all the equipment, like tools and machines, is present.

How does it work in terms of insurance while working in the workshop?

At the start of the new year with the new team, all the members will have to take part in a so called 'HSE' training and everyone needs to sign a document which states that you are aware of the hazards. Also, we have to hand in a large handbook where are the possible tools and machines are explained followed by all the possible hazards and precautions.

Is there someone in charge of the financial part and how do you work with your sponsors?

Last year we had someone accounted as head of marketing, but this year no one is specifically accounted and it is a shared responsibility. Our team is an official 'VZW' (non-profit association) with an accountant. For our sponsors we set up several packages (gold, silver, bronze, regular partners and supporters) based on the level of their support (material and/or financial). We have a partner file which we send out after a first contact with the partner, which states the levels and their specifications (we received these files). Also our service on return is specifically stated, in this way there will not be any miscommunications about this. We have one partner file for fledgling relationships and another one for more known partners which is more specific about finances. We are not always very strict in the partner levels, for example sometimes a long-term and solid partner could have a higher level than based on its sponsoring.

Sometimes we also work together with our partners on parts of the car. For example '3D Systems' introduced us to their new material and they would like to see this in their car. Together with the company, we designed and developed the exterior of the care with the implemented product. For them it is also a test to see it in practice, before bringing the product on the market. We do also have partners which are not car-related, for example 'Deloitte', the largest international organization in the field of financial and business services. They are a high level partner of our team and it is also mainly for recruitment reasons as our team consists of highly motivated people which could become their employee.

Do you have a list of car components which are needed to build such a car?

As mentioned before, it also strongly depends on which competition you will be participating in. As the rulebooks are sometimes quite different and the suspension design has totally different requirements, this could make a difference in your needed car components. Specific for Formula Students, I could provide a list for our electrical class car.

The main points

- 1. There is a relative strict participation regulation: Master students that must have a bachelors degree in Engineering or Postgraduates, 60 ECTS in 1 full time year or 2 parttime years
- 2. The team is officialy a non-profit association with an accountant
- 3. The team does everything themselves in terms of finance, team structure, sponsoring, marketing, communication, building, developing, etc.
- Their budget is approximatly €100.000-110.000 plus material worth of €200.000 Startups have their budget around €10.000-15.000 Some university teams have a budget up to €1.000.000

2 - Interview Lina Team TU Eindhoven

04_03_2022 10.00 - 11.00

The Lina team from the University of Eindhoven made a car that participated in the Shell Eco Marathon in 2015. Although they participated in the competition, the university's approach was different from others. The aim of the students/university was to create an ecological car and not to compete in a competition. The car was designed to drive on the ordinary road, but an ecological version. It was an electric car with a bodywork and chassis made from plant materials. The idea of making an entire car from plant materials came from the car that the university had built for the Lina car. Interview is held with Bas Huisman.

How did you put the team together (What are the different steps)?

While building the car, the team members had to look for students to replace the full-time students for the following year. Because most of the full-time students were in the team for 1 year, they had to recruit all the time. The earlier a student joined the team, the freer his choice was, and this was reflected in the management. Most of the students who joined early chose a management position. Of course, there were also students who absolutely wanted to participate in engineering and they got a task in the development of the car.

The disadvantage of having a lot of one year students is that every year you have to get new students to participate in the project. Another risk is that the management becomes bigger than necessary and that there are many discussions about some decisions that have to be taken.

Bas advises not to look at which students were there first, but which students are suitable for which tasks in the team. He is also a great advocate of a tracking system. Because the university was not involved in the team, the old team members could choose to make themselves available to the new team.

How many team members do you have?

The Lina team consisted of 20 students. Because the Lina team had too many managers, Bas would recommend dividing up the management as follows:

- 1. Team manager: This person arranges everything. He should not be afraid to take on the less pleasant tasks, e.g. arranging team shirts, washing, arranging lunch, etc.
- 2. Technical manager: This person will take care of the whole development plan of the car. Also the technical talks with the sponsors is part of his job. The technical manager will also report to the team manager.
- 3. Account manager: This will be the person who sets up and arranges the sponsor deals. He or she will have to contact the companies and ask them if they are interested in sponsoring. Also the social media aspect will be a responsibility of the account manager.
- 4. The account manager will also have to report to the team manager.
- 5. Financial manager: The financial manager will make sure that the income and expenses are in balance. Furthermore, they will be in charge of the accounting for the whole team. Just like the technical and account manager, he will also have to report to the Team manager.

Did you have a starting budget?

The Lina team received a starting budget of \notin 25,000 from the university to cover their start-up costs.

Where can the team work on the car?

The team could work on the car in the university. The last team now works in a hangar of a sponsor where all tools and equipment can be used.

Are credits or ECTS points recorded for team participation?

The team consisted of students studying at the university. At the University of Eindhoven, students can choose for themselves how long they want to participate in the team. The only thing is that they cannot take courses during the building of the car. So the students take a "study break" to work on the car (so no credits are taken). The students are free to choose how long they work on the car. But most students choose to work on the car for one year, because otherwise they get too far behind on their studies.

Another option is part time, but this is only for the bachelor students. These students do small tasks that the fulltime students impose on them. This way, the bachelor students can still take subjects while participating in the team. The more the team chooses to use part-time students to build the car, the bigger the team will become because more hands are needed to get a finished product in time. At the University of Eindhoven, there are no limits to joining the team. Apart from the fact that no credits were taken, the team had the opportunity to confront teachers with their problems. They also had the opportunity to follow small courses with professors.

How is the relationship between sponsors and the team and how do you give feedback?

The team produced a monthly newsletter that they wanted to spread as widely as possible. Of course, they also sent these letters to the sponsors. Also, the degree of feedback could be adapted to the sponsor in question.

How do you contact sponsors and maintain the relationships?

There are two types of sponsors, one gives money and the other gives materials. The team had prepared sponsorship packages that they could present to the potential sponsors. Depending on the size of the sponsorship deal, it ranged from a sticker on the car to taking the car to the company or a trade fair to show it to the company's (new) customers.

3 - Interview HAN Hydromotive Arnem

04_03_2022 11.00-12.00 The HAN college team from Nijmegen Arnhem in The Netherlands is a team that is participating in the Shell Eco marathon. The team consists of second year students. The interview is held with Joris Oosterhuis.

How did you start and how did the current car come about?

The college started an eco car team in 2009. As a student in college Nijmegen Arnhem you also have to make half year project during the 2nd year, those projects are 10 credits per semester. The two projects are also called Eco marathon. These are small half-year projects in which they also build a car on a smaller scale.

Since 2009, the college has decided to raise the level and participate in major competitions. The students can apply to participate for one year and replace the two small half-year projects with the Shell Eco Marathon team. This project then becomes a one-year project with 20 credits. The first HAN team to participate in the Shell Eco Marathon had an internal combustion engine. In 2013, they replaced the combustion engine with a hydrogen engine, which they are still using today.

How to put the team together (What are the different steps)?

The previous year's team is responsible for the recruitment of the next generation of students. Recruitment will also be part of the management's job description. The selection is done by applications from the first year students. The students have a presentation twice a year in which they explain the concept to the first-year students. Then, the interested students have to write a motivation letter, pass on their talents, which role they would like to have in the team and often the results are also looked at to make a selection.

The roles students can choose from are:

- 1. Management team: This team takes care of the commercial side and also ensures that the entire project is managed in the right way. The management team includes a PR manager, financial manager, team manager and a social media manager.
- 2. Brake and suspension team: As the team name suggests, this team is responsible for the suspension of the car and the brakes.
- 3. Power train team: This team is responsible for the hydrogen engine.
- 4. Body and chassis team: This team is responsible for the weight, aerodynamics and chassis of the car.

If the team has too few members to carry out some of the tasks, they outsource them to external parties (sponsors) or to the school. This way, the other directions at the college can also be involved in the whole project. A disadvantage that Joris found is that there is very little teacher involvement, also short courses on some subjects are not possible to follow. All the information they need they have to get from the sponsors. The information about hydrogen and the testing of their propulsion is done externally, just like the suspension, they get the information and supplies from their sponsors.

How many team members do you have?

The team consists of 17 students, all of whom have subjects in addition to the project. In some years, there are also interns. Interns are final year students who can do their internship in the team. These students from the 4th year can then tackle some of the more complex subjects that the second year students do not yet have experience in.

Did you have a starting budget to begin with?

The college does not give a starting budget, the students have to get all the funds from its sponsors. They did have the option of using a trailer and van to drive to the marathon, but they chose to get another sponsor for the transport.

Where can the team work on the car?

The students have a workshop at their disposal in the school. The students have hours in their project where they can work on the car. But they also have the keys to the workshop, so that they can still work on the car after school hours. Although the school is a technical college, they are not allowed to use the school's tools. Like the information, they have to get the tools from their sponsors.

Dangerous actions such as welding, working under tension, drilling, etc. are allowed by the school because they have a diploma. They are allowed by the school because they have purchased a wider insurance package for the team. Also, all students have to sign a document so that they are insured after school hours. Furthermore, some students in the team have a special safety certificate. For this, they have had to follow a course that allows them to give first aid in case of accidents as well as to extinguish fires and do other things.

How is the relationship between sponsors and the team and how do you give feedback?

The team sends each sponsor photos and small reports on the progress of the car. This way, the companies are always kept up-to-date.

How do you contact sponsors and maintain the relationship?

Like other teams, the HAN team works with sponsorship packages. The team had prepared sponsorship packages that they could present to the potential sponsors. Depending on the size of the sponsorship deal, it ranged from a sticker on the car to taking the car to the company or a trade fair to show it to the company's (new) customers.

Outside of the sponsorship packages, the team is flexible to make any adjustments to the standard sponsorship packages for a potential sponsor. To give an example, they have changed the colours of the car for a sponsor. Another example is that they once incorporated the sponsor's name into the team name.

4 - Interview UGent

UGentracing is a very young team which started in November 2020. They are participating in the Formula Student competition with the focus on an electric and driverless car. The interview is held with Jarne Bogaert, co-captain of the team.

How did you start in the team?

I joined the team in April 2021 while I was doing my bachelor study, this study year I started my masters Electrical Engineering. Last year, the team captain has approached me to have a larger role within the team for this year, which turned out to be a co-captain. Next year I will then be the team captain. I was actually also quite interested in an Erasmus program, but because my role within the team I cannot do that now.

How do you form the team and its roles?

It is the right timing to ask this question, as I am trying to solve this puzzle for next year. We will have a meeting soon where we ask the current team members if they would like to stay and what their role preference would be. Right now we do have 8 sub teams with mainly focus on to an autonomous electrical race car. It consists out of 4 mechanical teams, an autonomous team, a business team, a voltage team and a R&D team. However, we figured this is too many teams as it usually was quite chaotic, hard to take minutes, decision difficulties and lack of initiative. Because of this, we will continue with 4 sub teams next year: mechanical, autonomous, voltage and business.

Right now we have 10 management roles and only 3 students would like to stay for next year. Next year we want to cut the management roles from 10 down to 5. Also, we are slowly starting up our recruitment for next year. We start with an info session to introduce the team, explain what we do and show the possibilities and available positions. Last year we really needed this info session, but for this year we notice we already have a lot more publicity. The next step for the applicants is applying with their CV and motivation letter. This is mainly to separate the wheat from the chaff, you can easily see if people put effort in their motivation letter. Their CV is much less important, it does not matter if a student has much practical experience or not. We would like to provide the added value for the students in practical experience, as the studies are usually quite theoretical. If the applicant pursues to the next round, we will provide a case for them to solve in a team. This will be a new addition next year, as we select more specifically on personality. For example, not everyone is able to answer the question: 'Why would we choose you for our team?', especially for the more introvert engineering students. The case is meant to obtain some conceptual insights: how do you work together in the group. The third selection round is an individual interview, but this is not extremely selective. If a student has a high score in the case round, we will not deny them because of a less great individual interview.

How do you know what to select for?

Right now we are making an inventory of how many students we will need for specific positions. This is something we really did not know last year and we had more the attitude of 'we will see'. At the moment we are designing and developing the case exercises, which will be about 2 hours. For every sub team we have of course different cases. We find it quite difficult to come up with a case which covers the whole team and it has been a challenge so far. As an example for the mechanical team we would have a case to design a specific element with sketches, some research and thinking about the materials to use etc. The students have to show that they really think about their answers and put effort in it. For the business team we will have a case to organize an event; how would you tackle this and make a script about how you would present our team. After dozens of times having business meetings and pitching to possible sponsors, we fairly know what is effective and what we need. Within the business case we look who is collaborating, who is taking initiative and who is able to sell the team.

Do you have specific roles for the financial part of the team?

We are a non-profit organisation since April 2021. The financial part of the team is mainly done by the team and the co-captain, next year the business team will be more involved. But I have to say that next year one of our partners is going to do our accountancy. At the start of next year we hold a traditional design meeting with the budget estimations for each sub teams and we have a look how much money we will need for that year in total. This money we will have to obtain from partnerships, next year the aim is to secure all the partnerships in November at latest. This is a very challenging task, it contains a lot of work and will take your whole summer. You mainly will have to email and contact them continuously.

Do you obtain any ECTS for attending this program?

We do not get any ECTS for this program and is fully in our free time and outside of school. We do try to make connections between quite a few courses with some projects at faculties. However, this is not suitable for all the students as it depends on your study. People who have to do a thesis, can apply for a position in our team. Last year it was mainly aerodynamic theses, which is quite hard to work with for the team as their deadlines are not simultaneous at all. A thesis is not really focused on implementation but merely on research, so next year we try to let them perform their research over the entire year and use this for the following year.

How many team members does the team consist of?

You might be a bit shocked by this, but we do have 70-80 team members. This is for two reasons, one reason is the connection with courses as much as possible, much involvement with a meeting every two weeks for check-ups in progress and prospects. This makes our project accessible for most students to join us. The other reason is the fact that everyone attends a fulltime study next to this. You can also see this at our workshop, as it is quite empty during the day and start filling up in the evenings. We also looked into the option to include postgraduates, such as Formula Electric Belgium, but recently all the subsidies of our government became omitted and we are not entitled for this anymore.

Team members can take part in the team as long as they are student and until 7 months after finishing your studies. PhD's are however sort of grey zones, as they are in between study and work field. We also have for example a PhD who has been participating in another racing team and fills up an advisory role and tinkers around a little. If we have to choose who can attend the competition itself, we have to be selective and make a bottleneck.

Where do you work on building and developing the car?

Until November 2021 we were working in a separate hangar of 104 m2, which was very small for a team of 70-80 members. Also, we did get some complaints of neighbours in the end about noise disturbances. So we have been searching for alternatives after this and we were contacted by a company named 'ABC'. They had just bought some large hangars of companies such as 'ABB', which were not all in use. We were told to have a look and eventually we got a hangar of 724 m2, which we renovated a bit and also added rooms for study and writing a thesis. We really would like to make this a place where everyone likes to be working. The only downside is the fact that it is relative far from the university, but we do stimulate students to come over here.

Did the University of Ghent provide any tools to work with?

No, the university did not provide anything for us and we are also completely separated from them. We have been purchasing every tool and machine ourselves. We also have a completely separate insurance from the university.

How is the university connected to the team?

As I said, the university did not provide any financial support but only network contacts. There are departments and faculties which are really interested and do want to support us actively. For example a research group called 'IDlab', which is a part of iMEC, have a sponsor go-package at our team. The disadvantage is that you will be used as a showpiece. We also have something called 'Vice report', which is a sort of advisory board where teachers/ researchers will be connected with students to be able to ask questions about specific (technical) problems.

The university provides free to attend lessons (usual in Belgium), so team members do for example follow a workshop in composites. We do have a collaboration contract with the university that we are allowed to use their services. This is mainly for security of services /safety, facility and Legal Affairs /insurances. We actually do not use this much, as it is simply faster when we do this ourselves. Getting in touch takes a lot of time. For attending or providing workshops, we will just contact that specific teacher. This does not happen often. We can also just always ask any teacher, as they are usually very enthusiastic and willing to help. We mainly contact specific teachers than use services of the university. Sometimes we do meet with the security of services /safety team and they help us with any points of attention we might want to change. The advantage of being a non-profit organization is that nothing is taken too seriously. For organization types with more rules, you usually would need to ask permission for every single tool and or machine you buy.

How did you obtain your finances?

So the student who started up this team, was praeses from a large student association. This students association, together with another student association in Ghent, provided out start-up capital. Then a large marketing phase will start, where you basically have to sell air to companies. You have to tell them it is one of the most innovative projects and that they will invest money in something really important. I did not participate in this that much, as I started since April 2021. The team did make some film content which was helpful for the marketing, but they could not really show something specific so far. The university did not provide anything in financial or resource ways. We did meet with the rector last July 2021 and however the university would not sponsor us, it was a very successful meeting. He did bring the team in touch with a lot of investors, made a lot of leads and has enthused many companies. I would say the start will be very difficult, you will have to find a way how to do it and make a plan.

What are the tasks and roles regarding the financial part?

The tasks are making the budget estimation at the start of each year followed by achieving this by partnerships. They will have to list all the current partnerships and what budget is leftover from the previous year. The sponsor packages will be increased as we do get more publicity now. Then we will have to think about what type of companies and which sectors we would like to add to our partnership pool.

The expenses will be done on the basis of our budget estimation, which has not been done very consequently this year. Our excel sheet was not updated correctly, a task nobody really likes to do. We did not have a correct overview of mainly the expenses and the taxes of it, which gave a lot of stress when we had to pay our taxes with too little budget. We do need more control on our expenses, but next year at least our accountancy will be outsourced to one of our partners. Another problem we encountered were things such as ordering new sponsor banners for the cars, when we contracted new partnerships. I would say these expenses are quite stupid as it is not necessary. By contracting all our partnerships by November next year, we hope to prevent this next time as we can order all our merchandise after this. You will also need to think about things such as putting the name of a new sponsor on a previous car, make sure you state this somewhere. But also, it is a learning process and if something financially goes wrong, you simply have to seek for new partnerships.

How was the marketing part started?

We participated in our first event in October 2021 with our concept car. I say concept car as this car would never be allowed on the competitions as it did not comply with the rules. These event provide a lot of networking, input for social media and content for a proper website. Also, make sure your socials and website are up to date before attending such an event, so people can find you back on the internet.

What is the main thing you receive from sponsors?

Mainly, there is interest to sponsor materials, however this is usually quite specific and not always useful for us. As we preferably want money, we try to look for and boost the financial partnerships. Money will also be the most useful sponsored thing for start-ups. Keep in mind that companies usually want something back for it, think about what you do and do not want as a team. For example, they want to influence your logo, the colours of your car, etc. Next to seeking for financial partnerships, we often ask for discounts or free materials at companies. It sometimes does feel like begging, but it is definitely worth to do it. We are also in contact with a former CEO of a company which has been sponsoring the Electric Belgium team, which can also be very useful.

How do you maintain the relationships with your sponsors?

We do not really hold feedback sessions anymore with our sponsors. The contact also really depends on the sponsor package. For the platinum (highest) sponsors we did hold a 2- or 4-weekly meeting, but we figured that it was relatively useless as most of the times everyone said they were still happy with the sponsorship. Something we do is organize a workshop for our platinum partners, as they is a huge demand for engineers. Also they sometimes visit our hangar to film something for making video content. Some of our partnership contracts will be ending soon and we will be having an evaluation; what does the company think of the partnership and would they like to continue with us? It is possible that we have to do a partnership hunt again by then. We do pay less attention to the partnerships which have smaller packages than platinum or gold, as this will simply will cost too much of our time.

How do you maintain your social media?

We gave these tasks to our business team and to be more specific; the events team. For the marketing we have one photographer and one student for the social media and website. The social media student is often in the meetings with the larger companies and partners. The corporate team, together with the co-captain, manages the partnerships, but have to be in close contact with the social media student. Another task of the corporate team is the law and contact with lawyers, but I have to say the collaboration of the corporate team is not great at the moment. I would suggest to have a student on the social media, as we would never have enough time for this ourselves. A photographer is especially useful during events and also during the competition.

Do not forget how important social media is. As an example I will say the Belgian team VUB racing, who started around the same year as us, has little followers on LinkedIn (60) where we have about 700 followers now. We do see a big difference between our and their team in the network and our development rate. I would also say they are more down to earth and we are really driven and goal oriented.

At the moment we have LinkedIn, Facebook and Instagram as our social media, next to our website. We do post about once a week, but really depends on the amount of content and the phase we are in. Besides that, we post about partnerships, our development and the events we take part in. Watch out for possible spoilers, you do not want to reveal that. Also, sometimes our sponsors want to post content in our name, which is in their rights in specific sponsor packages.

The main points summarized

- 1. The marketing part is very important and do select people who are excelling in sales
- 2. Make sure your social media and website is updated regular, this will help to build up the network
- 3. Set up a clear organization of the team without too many sub teams
- 4. Have and keep your finances organized

5 - Interview GreenTeamTwente

15-03-2022 16.02 - 16.40

Wouter Groote Veldman is Team Manager of GreenTeamTwente, a team at the Technical University of Twente (UT) which participates in the Shell Eco-Marathon and is planning to participate in Formula Student in the near future.

How do you form a team and what are the steps to put a team together?

It starts with gaining interest in the team, we usually have a lot of interested students because of the practical experience. Their studies are mainly theoretical based and practical work is missing. We start of with more or less a bit of marketing and a campaign, as we want to reach as many students as possible. After this, the job application period starts. First, we organize a drink or lunch for interested students and explain what our team does. Students will have to send in a motivation letter and their CV. Sometimes we invite students personally if they have any questions about it, which usually helps a lot to gain their interest and get them applying.

After this deadline we will make a selection, where we invite everyone for an interview to check if their motivation letter reflects them as a person. We want to have this combination of a personal interview and a motivation letter, as for example a student can be bad at writing but strong in a conversation. After this first selection round, we present a casus to the students to check their capability. This is a different casus per function. As an example, for my function as team manager, I got a case how to act if someone in the team gets a burn-out. The casus is a challenge and we get insights if the student has really been thinking about their answers. Personally, I think that the motivation is one of the most important things. This function and project is there to learn practical skills. We do not have a set deadline for the casus, as someone will turn on the student exam mode if you only give them 2 hours to finish it. If you give someone the freedom, you get a better idea if someone is capable and if they put a lot of time in there which both reflects motivation. The casus is send by mail and they can work on it as long as they need.

How many team members does the team consist of?

Our team consist of 28, mainly full-time, team members. Right now we have a different team structure than the one we are going to have next year. I will explain the one for next year as I prefer that one more as well; there are 4 sub teams which are management, mechanic, communication and hydroelectric.

The two large technical teams (mechanic and hydroelectric) have a chief engineer, who does technical work for 50% of the time and maintaining team structure, communication and being manager of the sub team for the other 50%. The chief engineers are in direct contact with the technical manager of the management team. Within the technical teams we have roles as well, but it is 100% technical work. We are equivalent in our communication for each sub team and for the manager.

The management team consists of an extern and finance manager who is responsible for contact with the companies and the accountancy. The roles who are responsible for communication to the outer world do need to have close contact with the extern and finance manager.

Do the students receive any ECTS for participation in the project?

If you participate in our team, you can submit a request for this to the Examination Board. From our experience, it really depends on the study you do. Some studies do see this as a multidisciplinary project and give about 15 ECTS for it, some students receive no ECTS at all. Our team consists of University of Twente students, but we also have a few students from Saxion University of Applied Sciences helping out with some thing and they usually always receive ECTS for it.

For how long do students take part in the project?

As it is a fulltime project, most students take a study break for one year which is usually the maximum as well if you want to continue with your study. I think this is a slight problem as it is not helpful for the continuity of the team. So I would suggest to properly think about this. For example, the Solar Team Twente ask for 1.5 years which includes a part of handover and introducing the new team. You can definitely see the difference as their build up is better over the years. I would advise to make it a minimum of 1.5 years if you can, but students might lose their interest in participation quickly as they think it is too long.

What kinds of communication and social media does the team have?

We also have a website and social media, LinkedIn and Instagram, where we do post quite a lot and frequent. But we do not have a set number or rules for these kind of tasks. I do find it important that a project has to be as free and flexible as possible, then students will initiate it themselves and work out of intrinsic motivation. The only set thing is a monthly newsletter on which everyone can subscribe through our website, but it is mainly focused on the sponsors with our updates in the project. The output of the newsletter is very hard to measure as we do not really know how many persons actually read it.

Did you have a starting budget?

Not really, but as we already exist quite a few years we did work up to some financial buffer. The university does sponsor us in terms of resources and also acknowledges the activism within the team and sees the positive effects of it. A starting budget might be a difficult thing if you do not have a network yet. But at least in the Netherlands, companies are highly interested in engineering studies and projects like this, as there is a big shortage of engineers. So they start a partnership and sponsor relatively easy to gain publicity.

Where do you work on the car?

We do have an own building, which we share with 4 other teams. Half of the rental costs are paid by the university and the other half is divided by the 4 teams, which is still not cheap for us. The opening times are unlimited, as we have full access to the building. However, you do not want students to work on it the whole night as this will not be good for their wellbeing. The university also has a building where a lot of study Associations rent a space, in the very beginning we used to book a space there. The tools we got sponsored somewhere at the start, but I have to say I am not completely sure about this as the team already exists some time now.

Does the team have an insurance for working on the car?

This is an interesting question at the moment, as we are working on this a lot this year. Officially we are a foundation, which means we are not really connected to our university. In the very beginning we started as a commission at the university. At the moment we sign a quite shady contract at the start of each year, which pretty much states that you will not sue the management and you are responsible for your own actions. The management is officially the only members of the foundation and the rest of the students are volunteers. Probably this is not even legally valid when it comes down to it. Because of this, we are looking to get a liability insurance to solve this problem. However, the field of insurances is very complicated and for the first years of a team these kind of contracts are a temporary solution.

What kind of sponsoring does the team get?

So it is always a combination of material and financial sponsoring. Mostly companies would like to sponsor materials, depending on the type of materials. For example, a hydrogen cell costs about ≤ 10.000 for the production and is sold as ≤ 70.000 , so it is not easy to get something like that sponsored. In the end we preferably receive money, as you can choose yourself what you do with it. Because of this, we always look for companies which want to sponsor financially until we know we need some specific materials. To maintain the relationships with sponsors it is best to just organize a meeting and talk about what kind of interests you both have in this partnership. Why does the company want to sponsor the team and what can we give them in return as a team?

How do you maintain your sponsors?

We do make use of sponsor packages as well, with the different levels as a lot of teams have them in use. We do not distinguish this in our newsletter or something, but it is more a contract of how much they sponsor us (financial or material) and what we give them back in return. The task of the financial manager is the accountancy and contacting companies.

What kind of problems have you experienced while working in the team?

We did not really have any major problems so far. I would say the start-up of the year is extremely important to get a group of motivated students. Search for a fun competition to participate in and hype up the students for it. Search for their intrinsic motivation and wake them up. I think the start-up of partnerships and sponsors might be quite difficult as a starting team.

What are the costs of building a car?

This really depends on the type of car you want to build, in terms of combustion, hydrogen, etc. We want to focus more on hydrogen, but keep in mind that this is much more expensive and also more complicated. Also the competition is a big influence on the final costs. The Shell Eco-Marathon is much easier to start with as you will need a lower budget, because the cars drive on a lower voltage and power. The electric and protype class will probably be the best start for your team. Actually, this year we will compete in both the Shell Eco-Marathon and the Formula Student competition. We do have two different cars for this, the old car will participate in the Shell Eco-Marathon again. Our choice for Formula Student is because we want to start innovating faster and the competition requires driving on a much higher voltage and power. In the future we want to fully focus on the hydrogen class.

So you know more about the differences in getting accepted as a team between both competitions?

It was relatively easy for the Formula Student in our case, as we build a hydrogen car for it which is interesting to them so they accept you easily. Also, if you take part in your own country you will always get accepted, but keep in mind that Formula Student is a very popular competition. When I was in high school, I already participated in the Shell Eco-Marathon as they have a Challenger event. This event is a preliminary competition and if you succeed there, you can participate in the 'real' competition. Sadly we did not succeed then and they told us to work another year on the car.

If I can give you some more advice; focus a lot on your teambuilding, this is by far the most important thing. You need to get everyone at you university enthusiastic for the project, also teachers and other employees as this will gain popularity and publicity. In this way you will obtain a larger network and more opportunities.

The main points summarized

- 1. The team roles are set, but the students get quite some freedom to awake their intrinsic motivation
- 2. Teambuilding is one of the most important things, you need positivity in the team
- 3. The Shell Eco-Marathon is a much easier competition to start with than the Formula Student, as it is more low key and cheaper

6 - Interview Eco-Runner Team TU Delft

07-03-2022 18.10 - 18.40

Axel Stroeve is the team manager of the Eco-Runner Team of Technical University (TU) Delft. Every year the team participates in the Shell Eco-Marathon and their mission is to introduce and show people how the everyday transport life should look like, while taking part in the Urban Class.

How did the team start and how is the current car developed until now?

The team started 15 years ago by a student who was participating in some other Formula Student team building electric cars. He got frustrated by the fact that there was no focus on sustainability and started to look further into other possible competitions. Once he found the Shell Eco-Marathon, he convinced a few of the other team members to join him as a team, which was the Eco-Runner team. 3 years ago, we switched to the Urban Class which focuses more on efficiency than comfort, which emphasizes our goals and missions in sustainability. We have always been using hydrogen as energy source and before the Urban Class we joined the protype class. The car for the Urban Class is usually about 3-4x more expensive compared to the protype class, mainly because of the size which needs more materials. The cycle is one year and right now we are in the second half of the year, which is really busy. We are building and improving our car, but also doing the recruitment for next year.

If I listen to your project and goals, I advise to just do it and have the guts and courage. Also, you will need a good sales pitch and especially in the beginning it is difficult to show to sponsors and partners how it will look like and how the progress results will turn out. Start small and work your way up, the first aim should be a car which works and not winning the competition.

How do you form the team and its roles?

Everyone is only allowed to take part in the team for one year, in this way as many students as possible could experience the team and the process. The team is connected to the university, which has multiple so-called Dream Teams which are several similar projects for motivated engineering students. In this way you could participate in similar competitions for multiple year and for this specific and popular team, only one year per student is allowed. We do all the recruitment ourselves and students have to apply on team roles, as they would apply for a job. They will have to send their motivation and CV, we will do the job interviews and select the suitable students. After participating for a year, we know exactly what a team needs, and this recruitment process is also for us a learning curve. The grades of the applying students will be taken along but is not a decisive factor. Students do get more priority if their grades are exceptionally high as this reflects mainly a lot of self-discipline. We do divide specializations in:

- Bodywork strong and aerodynamic bodywork
- · Powertrain safe and efficient energy conversion
- Electronic & strategy communication between software and hardware
- · Vehicle Dynamics smooth connection between the car and the ground

On top of these specializations, we have the management and operations. The operations is specialized in the non-technical field such as sponsor contact and networking.

There is a lot of interests during the recruitment, and we need to select people for each function. The project is highly respected and one of the more well-known teams in the Netherlands which has finished on the first place several times as well. We do not think it is a disadvantage that you can only participate for just one year, I think it is a good thing in the way that as many people as possible can join the team. I would also say that the project manager is by far the most important team role, do not underestimate this. We select this team role by experience, but mainly personality. A team manager has to be extremely motivated and needs a strong personality. The manager must not be afraid to become mad at your team members every once in a while and keep everyone within its lines.

We do select our driver ourselves, in the testing phase they will need to be available about 8 hours each day. If there is anyone within the team who would like to do it and has the right weight and size that would be the first option. If not, we do send out a job offer with all the specifications of size and weight.

We do have a transition period of two full days where the old team introduces and helps out the new team. On top of that we have a handover document with all the needed information. We also have a alumni board, and the team members have a monthly meeting with them to ask for advice. The alumni will perform quality checks on the progress. Also, managers of previous years discuss the plans with the current team. Our team is a foundation, which means the management has the full power and responsibility. Alumni's and previous managers can in this way only advice and not influence decisions.

How many team members does the team consist of at the moment?

We do have 23 team members of which 8 are fulltime members and 5 are parttime members. Fulltime is the usual way to go and means a study break for a year. We do not receive any ECTS for the project and this is fully outside of school. The base is your own motivation, the knowledge you will get from it and it will be a boost for your work life later on.

Did you start with a budget this year?

We do not receive any sponsoring from the university, we have to finance ourselves by finding sponsors. Through the years we built a large network of sponsors and partners and we are even that financially fit that we have a saved buffer for the next year. All of the budget is obtained through sponsors and we are a non-profit organization.

Do you have an own workshop and/or office?

We received space on the university with both an office and workshop, where we can usually perform all our work. Only for some specific things, such as the hardening of the carbon in the oven, needs to be done externally. All the tools and machines are available at the university and covers everything we need. The materials are bought ourselves or obtained by partners. After school hours we are allowed to work until 22.00. All the students are covered by an basic insurance of the university and students who work in the workshops are covered by more extensive insurances by the university as well. There are always supervisors and experts present in the workshops until 22.00 and in case they are absent, the machines are not in use as there must be a supervisor present.

How is the relationship between the team and its sponsors and how do you maintain them?

As such a team, you cannot promise any large forms of return services except for being a progressive and green student project which can be used for publicity. Make sure you have a good business department within the team. For example, you can offer sponsors and partners to join recruitment days and tell about our project. We can also join conferences and fairs to present our team and our car in name of the company. Of course you can add logos on team clothing and the car for publicity. It is really a case of having a strong sales pitch to convince companies to invest money in your team. We also have sponsor packages with different levels of sponsoring and our return services.

The main points summarized

- 1. The team consists mainly of fulltime members who take a study break, no ECTS are given.
- 2. Workplaces, offices, machines and tools are mainly provided by the university
- 3. The projectmanager is by far the most important role, also make sure you have a good business team for networking and finances

7 - Interview Chalmers Vera Team

Communication by email

The Chalmers Vera Team is the racing team of the Chalmers University of Technology, Sweden. Due to the fact they were in a very busy season, our questions were answered by email by Axel Henriksson, Team Leader. The team competes both in the Shell Eco-Marathon and the Pisaralla Pisimälle (organized by FMMC) in Nokia, Finland.

How do you form the team and which steps are taken?

There are no specific steps, just make sure you have all the required skills within the team. We currently recruit new members by informing of what we do during lectures and inviting them to our workspace. After filling out an application form they are invited to a typical work-day after which they can decide whether you want to join or not.

How many team members do you have?

We have currently 11 team members, but it can vary a bit depending on how many apply and what competences they have. 11 is a balanced number in my opinion, however building a car from scratch may need more resources. It all depends on how motivated your team is and what they want to work with.

Did you have a starting budget to start with?

I can only guess the cost of building the car in 2014. Some was paid for by the school, but there were also a lot of sponsors, most notably composite companies.

Where can the team work on the car?

We have a dedicated area at Chalmers where we store our car and tools. We roll the car out into a workspace shared with other student projects when we want to work on the car. There are a number of student associations around Chalmers which provide the workspaces for work on the electrical and mechanical components of the car. There is also a composites lab which we can use.

Are credits or ECTS points recorded for team participation?

No, not any more. Recording credits meant that a lot of time was spent on "paperwork" and less time was spent on improving the car.

How is the relationship between sponsors and the team and how do you give feedback?

The relationship is of the nature that we reach out to companies which we think are suitable and try to establish a relationship with them if we have a need for their services. We give feedback in the way that the company finds suitable.

How do you contact sponsors and maintain the relationship?

We contact our sponsors through email and update by posts on social media.

What are the different team roles and their responsibilities?

In the work with the car the team is split up into 3 subteams. One works on, and is responsible for, the engine. The second works on the mechanical aspects of the car, breaks, steering, wheels etc. The third one is electrics. These team work mostly independently.

We have two legally required roles; chairman (i.e. team leader), and treasurer. It is the team leader's responsibility to keep the team informed on what is on, this mostly means I arrange the weekly lunch meetings. The treasurer is responsible for keeping track on the budget and invoices. The only other role we use is PR, i.e. social media manager. There are other roles available such as manager of sponsorships or competition coordinator, but these roles are fulfilled by the team when needed.

8 - Metropolia Motorsport Team Helsinki

29-03-2022 15.01 - 15.45

This interview is held with Patrik Aapro and Eero Toivonen, both team members of the 'Metropolia Motorsport team' of the Metropolia University of Applied Sciences in Helsinki, which competes in the Formula Student competition. Patrik Aapro is the team manager and Eero Toivonen is the technical manager of the team. At the moment they are rebuilding their current car after testing in Autumn and implementing improvements. They will start testing this innovated car soon.

How did the team start and how is the current team formed?

The Metropolia team has a pretty long history in de Formula Students community, which started in the year 2000 and in 2002 the first combustion car was produced. From 2013 the team made the first step to switch to an electric powertrain and nowadays we are still working with that choice. At the moment we have our first four-wheel drive (4WD) and that is our history in very short terms. It is hard to say for us how to start from zero, as we have data and reference each year from all the previous years.

The team structure is pretty new for every season with different roles and its responsibilities, such as sponsors, budget, vehicle, etc. Once the new team has gotten organized and everyone knows what to do, you start setting up the goals for the season about what the team would like to achieve. Every year the subsystems (explained underneath) have slightly different goals which causes troubles sometimes when putting things together, often compromises need to be made.

Our team roles for this year are;

- Team manager; makes sure that the team is working and provides available resources
- Technical manager; responsible for the car and bringing all the subsystems together Subsystems; frame, chassis, suspension, steering, frame, composites, dynamics
- Media and marketing

For how long can students take part in the team?

The team rules have been changing a bit now, but at the moment students are allowed to be a part of the team for 4 years which covers an entire Bachelor studies. Patrik is a 3rd years student and also in his 3rd year of the team, Eero is a 3rd year student and in his 2nd year of the team. Both of us are planning to continue in the team until the end of our studies. Regarding our thoughts about positions for next year, we leave this totally up to the team to decide. Patrik would like to be more a specialist in the design of the car and he also wants to do his thesis work within the team. Positions through the years changes from person to person, but usually the team tries to give each position to another person each year. The only guideline they have is to not have 4th year students responsible, as they will be graduating during the competition.

Do the students receive ECTS for the project?

Yes, in total a student could receive 60 ECTS maximum if they participate at least in the 3rd and 4th school year. This breakdown is as the following:

- Working practice of engineering studies, 1 per year and maximum 2 (2x 15 = 30 ECTS)
- Engineering reports of things you have done or built during the studies, maximum 3 (3x 5 = 15 ECTS)
- There is a specific course which is a innovation project in 3rd year, replacement with participation in team (10 ECTS)
- Making your thesis within the team in your 4th year (5 ECTS)

How do you recruit new students each year?

The managers of the new team are usually chosen from the past team members, but sometimes there are not enough previous members who want to fill in this position and a new student will be chosen. Within the recruitment period we accept application from pretty much everyone, next we invite them for interviews. The goal of the interviews is to get to know them, their motivation and personality. Then they can go for a 2-3 month test period after the interview, so they can show their real motivation. We think motivation is the most important as students do not get paid for it and do all the work within their free time. The start of each season is in August and the manufacturing and testing of each car is during the Spring and early summer. It can be difficult to recruit new people, mainly the automotive engineering students show a lot of interest. For example, the racing team in Oulu had trouble to recruit interested and motivated students. We usually get 30-50 applications each year and we have a core group of 15-20 students at the moment, with a total team size of 40 students. Most other teams seem to have the same kind of group size.

Does the team have a starting budget each year?

Every year we make a budget proposition to the school and we try to plan out everything we need, with sponsoring included. Then we come up with the budget we need from the school, they evaluate that amount and tell if they can provide this. The budget estimation is done by the manager, but of course the input and help is asked from the managers with knowledge about specific car parts.

Where does the team work on the car?

We build on the car at our own office and workspace at the campus, also the machine possibilities are on campus provided. The workspace is fully provided by the university. In case we do not have the resources to build something specific, we usually outsource it to sponsors.

How do you maintain the relationships with your sponsors?

We usually have sponsors which like to give out products and a few do give straight up cask. For example, the carbon fibre for the body we obtain from our sponsors. Our preference from sponsors is to only receive money so we can make fully our own choices, but this is not realistic.

In official terms, we make contracts for 1 year and every year we get in touch with them, evaluate the season and hopefully renew the contract. We make use of different sponsor levels from bronze to platinum, for example with a platinum sponsor we will join with the team at a fair stand as representatives of the sponsors. Usually we discuss the actual contents of the contract with the sponsors themselves. We give sponsors updates by using (social) media and making newsletters.

How is the team covered by insurance while working and testing the car?

We are fully covered by the school insurance and they also pay for this insurance.

How is the connection to the university?

We actually used to be a non-profit organisation, but we reversed this as there were too many problems with it. Right now we are officially a school project, which means there is a lot less responsibility and things the team has to account for. It is also easier for funding.

Do you have teacher involvement within the team?

Actually this season it is for the first time that we have an active teacher involved. We both think this has been very helpful to make the process going more smooth. Besides that, we can always ask teachers for help if needed. Having a responsible teacher has been helpful so far, otherwise it might have taken longer for some things to get to a certain point.

How does it work financially, does the team have its own bank account?

When we order something we first try to get an inquiry and the school pays that straightaway. Usually for online shops which do not give out inquiries we pay it upfront ourselves and then make a declaration for the school. The delay for payment by school depends due to the structure; under €500 is relative quick and easy and above the €500 we need to inform the school in advance. If the order was calculated within the budget it is not a problem and school will still pay this relative quickly.

As a Finnish racing team, do you have any other advice with starting up our own team?

We would advice you to use realistic deadlines in your planning, try to minimise to go past deadlines as this will give you a full delay. Also, good documentation is very important, this has been a problem in previous season(s) as nobody noted things and/or put it on paper. This resulted in repeated mistakes and a lot of frustration within the team. So write all problems down which occur, even the minimal ones. Also an example, people dealt with sponsors on the phone and did not document anything. Some sponsors have been forgotten because they were not listed anywhere. As being the management, things which are not documented will never reach you.

Then, get organized as soon as possible for every new season. Start planning workloads on people at the beginning of the season. Usually some students always say they can do everything, but throughout the season they have courses and their workload get too high. A lot of burn-out cases are the result of this, as a team manager you must look out for this.

Last but not least, the team spirit is extremely important: with good team spirit you will overcome the negatives. Also, try to keep everything simple, sometimes it is best to do it the most simple way and less in the engineering way you get taught at school.

The main points summarized

- Documentation is very important, even a minor thing must be written down
- Plan the workloads on students at the beginning of the season, look out for overworked students
- · Teacher involvement has been very beneficial for a smoother process
- Being part of the university instead of an organization, gives the team less officialities to work with and less hassle

G - OVERVIEW EXISTING RACING TEAMS

Team	A (KUL)	B (HAN)	C (Lina)	D (Twente)	E (Delft)	F (UGent)	G (Chalmers Vera)	H (Metropolia Motorsport)
Country	Belgium	Netherlands	Netherlands	Netherlands	Netherlands	Belgium	Sweden	Finland
Competition	FS	Shell EM	Shell EM	Shell EM	Shell EM	FS	Shell EM	FS
Team members	48 of which 23 core team, additional 11 volunteers and thesis students	17, sometimes additional interns	20	28	23, 8 of them are in the core team	70-80	11	40, 15-20 core group
Team roles	 Team manager Chief mechanical of 3 departments (Vehicle dynamics, composites, powertrain) Chief electronics 	Following teams: - Management (PR, financial, team and social media) - Brake and suspension - Powertrain - Body and chassis	Recommendation for management - Team manager - Technical manager - Account manager - Financial manager	- Management (extern manager, finance manager, team manager, technical manager) - Chief engineer - Communication -Hydroelectric	- Team manager - Chief mechanical (bodywork, powertrain, electronic & strategy, vehicle dynamics)	- Business - Mechanical - Autonomous - Electric	- Team manager - A team to work on the powertrain - A team that works on the other mechanical parts of the car - An electric team	 Team manager Technical manager Subsystems; frame, chassis, suspension, steering, frame, composites, dynamics Media and marketing
Students	Master or postgraduate	UAS students	Bachelor and master	Bachelor and master	Master students	Master students	Master and bachelor	Bachelor and Master
Full/parttime	Fulltime 1 year / Parttime 2 years	Parttime (still enrolled in some subjects)	Fulltime, parttime only for bachelor	Most of them fulltime	Fulltime and parttime	Only parttime students	Fulltime	Only parttime students
Maximum duration	Yes	Yes, 1 year	No	1 year some of them longer	1 year	As long they as they study, they can participate in the team	1 year	Maximum 4 years
ECTS	60	20	0	Depends on the study the student does	0	0	Not anymore because there was a lot a paperwork needed for credits	60, if participating for multiple years
Workplace	External office and workshop provided by university	Workshop at university	Workshop at university	Workshop from university that is shared with 4 other teams	Workshop and meeting rooms in the university	Workshop from a sponsor	Workshop from university that is shared for other student projects	Workshop at university
Insurance	Workplace safety training + certificate and signing document	Allowed because of degree, wider insurance package for team provided by uni, signed document for after school hours, some obtain safety certificates	The university has provided the team with additional insurance.	They have started to discuss insurance this year. Before that, the students had to sign a contract that they were responsible if something went wrong.	They have their own insurance for the team	A completely separate insurance from the university	They have their own insurance for the team	Completely covered by school insurance
Official status of team	Non-profit assocation	Non-profit assocation	Non-profit assocation	Non-profit assocation	Non-profit assocation	Non-profit assocation	Non-profit assocation	School project, non-profit organisation previously
Website / social media	Facebook, Instagram, LinkedIn, <u>Website</u>	Facebook, Instagram, LinkedIn, <u>Website</u>	Facebook, Instagram, LinkedIn, Twitter, YouTube, <u>Website</u>	Facebook, Instagram, LinkedIn, Twitter, YouTube, <u>Website</u>	Facebook, Instagram, LinkedIn, Twitter, YouTube, Spotify, <u>Website</u>	Facebook, Instagram, LinkedIn, <u>Website</u>	Facebook, Instagram, <u>Website</u>	Facebook, Instagram, LinkedIn, YouTube, <u>Website</u>
Start budget/ funding	Only sponsors	Only sponsors	€25.000 start off from university, rest sponsors	Only sponsors	Only sponsors	Only sponsors	A part of the car was paid by the university in the beginning of the whole car. Now they only use sponsors	Mostly funded by school, rest obtained from sponsors
Sponsor package	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes

Tables belonging to overview charts

Country of	2.
interviewed team	Score
Belgium	2
Netherlands	4
Finland	1
Sweden	1

Type of student	Score
Master/postgraduate	1
Bachelor and Master	5
Master	2

Part- or fulltime	Score
Parttime	3
Fulltime	3
Both	2

Workplace	Score
University	7
Sponsor	1

Competition	Score
Shell Eco-Marathon	5
Formula Student	3

Maximum	
participation duration	Score
1 year	4
1-2 years	1
4 years	1
Whole study	2

ECTS given	Score
0	4
20	1
60	2
Variable	1

Insurance	Score
University	4
Team	3
Pending	1

Score	
	7
	1
	Score

Funding	Score
Sponsors	6
University and	
additional sponsors	2

Communication / marketing	Score
Facebook, Instagram, LinkedIn, Website	3
Facebook, Instagram, LinkedIn, Twitter, YouTube, Website	2
Facebook, Instagram, LinkedIn, Twitter, YouTube, Spotify, Website	1
Facebook, Instagram, Website	1
Facebook, Instagram, LinkedIn, YouTube, Website	1

Number o	of team
members	
	48
	17
	20
	28
	23
	75
	11
	40

H - LIST OF CONTACTS EXISTING RACING TEAMS

Indicated in green the contacted universities, who responded and were interviewed. Indicated in red the contacted teams, who did not respond.

Team	country	University	Eco/Formula	Email	Name	Tel.	Role	Contact Page
1	Netherlands	Delft	Eco	a.stroeve@ecorunner.nl	Axel Stroeve	+31 6 51127991	Team leader	https://www.ecorunner.nl/contact/
2	Netherlands	HAN Hydromotive						
3	Netherlands	TU/ecomotive (Lina)						
4	Netherlands	Summa Automotive (MBO)						
5	Netherlands	Twente	Eco	info@greenteamtwente.nl	Wouter Groote Veldman	+31 6 23 427 844	Team leader	https://www.greenteamtwente.nl/contact/
6	Belgium	Ghent	Formula - EV	-	-	-	-	Contact UGent Racing
7	Belgium	VUB	VUBracing	https://vubracing.be/	website	website	website	website
8	Belgium	KUleuven & Thomas More	Formula Electric Belgium VZW	info@formulaelectric.be		+32 16 35 19 66		https://formulaelectric.be/contact-us/
9	Finland	Tampere (REMMI)	REMMI team	team.manager@remmi- team.com	tobias team			http://remmi-team.com/
10	Sweden	HiGtech	sweden team	jakob@higtech.se		0730-250 353	Jakob Vallin Team manager	
11	France	La Joliverie	Eco	polyjoule@univ-nantes.fr				http://polyjoule.org/
12	Sweden	Chalmers	Eco	team@chalmersverateam.se				https://chalmersverateam.se/?fbclid=lwAR oXpAKZX2LJFSXL2U0Vml9jjQhQ8k9AcTZ
13	Finland	Metropolia Motorsport	Formula	formula.team@gmail.com				
14	Finland	LUT University						
15	Spain	VilaNovia	Formula	Mireia.domenech.albiol@ estudiantat.upc.edu				

https://chalmersverateam.se/?fbclid=IwAR0fn9psk4s066i-ndbR oXpAKZX2LJFSXL2U0Vml9jjQhQ8k9AcTZmlF2S4

I - IMPORTANT MEETINGS

1 - Interview Juha Kytölä (Wärtsilä)

22_02_2022 13.00 - 13.50

Sam is introducing the project to Juha: We are three Erasmus students working on a plan to implement a project such as the Shell Eco-Marathon or Formula Student competition in Novia UAS. Lots of universities (also where we are from) have their own car-building and designing team and participate in these races. The project is a testing ground for the next generation of engineers! The aim of the project is to hand over a document which Novia UAS could use to kick-off an eco-car team themselves.

Tobias is our customer, we hear you guys worked together in REMMI team, can you tell us a bit more about that?

The REMMI-team is more a sort of a club, which has been created by students and ran by them as a private team. The University is not involved in the team, there are several teams around with a similar construction. I found out about this through a technical magazine 'Tekniikan Maailman' (World of Techniques), as my father was subscribed for this. I was involved through my whole studies which are 5 years in total, I started in 1984 and after my studies I moved back to Vaasa. My son has been taking part in the REMMI-team through his studies as well and finished about 3-4 years ago.

Did you have your own location for meetings and building?

The team was able to use the basement of Tampere University and we had keys for accessing the room anytime. We held meetings and worked on the car for almost every evening and throughout the holidays. However, a lot of students also had holiday jobs. The project was because of this limited to progress during the summer.

What was your motivation to participate to the team?

I really enjoyed working with machines and learning techniques and I wanted to do this more. All the students had very different motivations, such as competing, teamwork, building, designing, etc. I was mainly involved in the design, build and development of REMMI-4 and a little bit of REMMI-5.

How many team members did the team consist of and were they all active?

The total listed members were around 25-30 team members, of which the actual members were less. All team members had different study fields, but only technical studies; mechanic, electronic, construction, etc.

How did the REMMI-team obtain their money and materials?

The REMMI-team got help of other companies, which supplied some resources. Mainly, it were all smaller companies sponsoring the team. Materials were mostly given for free and as a return they got, for example, advertisement on the car. The current sponsors are shown on the website. Shell has also been sponsoring the team.

What is the main key to start and maintain a team such as REMMI-team?

Something that unites the students behind the project is a good idea, if the team is strong enough it would work. I personally think it was a good thing that the university was not involved at all. Students like to be independent and not getting told what to do. If the team ran into problems, teachers were always available to help us out. Sometimes teachers came to our basement out of curiosity and all teachers were really motivated to help out, also for using machines. There were always students needed who wanted to get skilled in specific fields (for example carbon), sometimes they did this for a summer job.

Did you have any involvement with the Tampere University, as you were still their students?

Yes, we mainly did some promotion for Tampere University, such as fairs, overalls and attracting new people to both the team and the university. Some of the students used the project as a part of a course and got credited for this.

How did the team maintain a team structure?

The team elected their chairman for a year and also some other roles, such as a team worker. The team was independent and responsible for its finances, discounts for components and other marketing.

What is important to keep in mind while building the car?

The design of the car is also important, mainly for air flow. We were allowed to use the wind tunnel of Tampere University, which was relatively small but the students helped to scale down the object so they could do the mathematics. Also, the start level of Novia UAS should not be that high from the start, the main goal must be having fun and learning something interesting. The main important thing is the team spirit.

How did new members join the team and what happened if there would be any conflicts?

The team had an open and inviting atmosphere, everyone was welcome to come over to the basement and have a look. When you were coming more often after this, you were asked if you wanted to join and get a role. You must show that you were motivated and work at it outside of school. Of course sometimes there was some tension between team members, but you were always free to leave. Also, some students only joined for half a year as they found out it was not something they liked.

Are there any things you think which should have been done differently?

If I am thinking back, I was mainly satisfied about how things were organized and done. Also, I think it is an advantage for the team to not include teachers right away, but give the space for the students to ask teachers themselves when they really need to. For example, the Helsinki Metropole University has a more strict program with ECTS and teacher involvement and the experiences is not as great as in the REMMI-team.

Where did you test the car?

The testing of the car was done on parking lots and sometimes on those tracks which are used for car inspections. Mainly, in spring time it is time for testing and competition and the winter time is used for inside building and developing the car.

Now about Wärtsilä, do you think the company could help the team and students in any way in the future?

I am not too sure if we can help out in terms of knowledge, as some things could be very specific sometimes and Wärtsilä is not a car company either. You should also have a look at other competing teams, as they are ready to share information or resources. These contacts might be better to get in touch with instead of Wärtsilä.

If we would provide the team with an expert from Wärtsilä, you would need to have a team ready with a few active members. In case there are technical problems in the future which the team cannot work out, Wärtsilä is open for contact. However, most problems with the car are mainly construction and less the engine, which more depends on the controls.

If the project is in the starting phase (actual building phase) the team could get in touch again with me, also my son could help out as it is not that long ago for him when he was in the REMMI-team. I am okay if my name gets written down on the teams contact list. Wärtsilä also has more employees which have been participating in the REMMI-team before, I can collect a list of these names for you.

The main points

- 1. The team might need to start more small scale than the Shell Eco-Marathon
- 2. We need to start with the students and find the highly motivated students to form a core team
- 3. Contact Josefin Stolpe for possible locations for the team to have their office and workplace
- 4. Sam shared his email with Juha for future contact

2 - Interview John Dalbacka - Novia R&D

Sam introduces our project.

John thinks he could mainly contribute to the funding. The estimated budget so far is around €20.000, according to Tobias Ekfors. We will need to set up a cost breakdown for this as well, once we gather more information out of the interviews.

John: Which study departments will be the main contributor to the team?

The majority of the involved students will be from the engineering department, but we would like to also include departments like bussiness, design (Jakosstad) and other departments.

John: I think the students will expect to receive ECTS while taking part in this course, but then teachers need to be involved. This might become difficult if you want to make this official. Your plan will include a high-level decision from Novia UAS. The dean, Kristian Blomqvist makes the decision for the Engineering department. It will probably be best if you pitch your idea to Kristian and if he approves, he could bring the idea in the steering group. Then the rector will be involved in that decision. The rector is usually quite busy, but accessible.

Out of our survey students showed a lot of interest in the project and we would like to plan some meetings with students to talk about the whole project setup and involve them.

John: how does it work in terms of insurance and safety when students work independently in Technobothnia?

We will ask Josefin Stolpe (Head of Technobothnia) about this. (See interview Josefin Stolpe)

John: how many man hours will the building take?

Ideally, the whole team consists of 15-25 persons with a core group of 6-8 students. Most of them will be working in the evenings and holidays, next to school.

John: it is important to contact universities to do some benchmarking, for example how do they keep students motivated and how can you prevent the fact that students coma and go?

We are already doing this and we would like to contact about at least 10 different teams, which are competing in either the Shell Eco-Marathon or Formula Students.

John: you might want to use the access from thesis-workers, but mostly they expect to get paid for this. Although there will always be students which do not find a suitable project and then start looking for non-paid projects.

We are curious what John thinks about the chance of success of this project so far, after out conversation.

John: It would be a very interesting project, at the moment we have nothing like this at Novia UAS. So this could be a big step forward and provide publicity for Novia UAS. I think it is possible to execute this project, it will not be too difficult to motivate the students.

You mentioned that you could mainly contribute in the funding, how does this look like?

John: There are quite a few private funds at our Research & Diagnostics department, who would like to fund this idea. These funds are mainly foundations which contribute to Swedish speaking organizations, such as Novia UAS. I do not think you will receive a lot of funding from companies.

You can contact me by the time the team would like to apply for this fund, as I have the links for this. Probably the students could write the application and submit it to John Dalbacka and then officially Novia UAS applies for the funding.

Make sure there are enough recources for the project. You could ask Olav Nilsson (Technobothnia) for suggestions and the contact person regarding electronics and sensors will be Hans Lindén.

The main points

- 1. The R&D department could contribute to our funding, contact John Dalbacka and send application when the team is set up.
- 2. To get Novia UAS approval, contact the dean Kristian Blomqvist and pitch your idea. He could discuss this in the steering group, followed by the rector.
- 3. Think about how you want to involve students and also how to keep the motivated for the project.

3 - Pitch to dean Kristian Blomqvist

17-03-2022 13.00 - 13.18

Sam starts our PowerPoint and pitch.

Introduction – background – what we think – conclusion

Kristian: This was a nice introduction to your topic and I liked the slides. I think it is a very interesting thing, something we have seen in many engineering schools in the world, also in Finland. It is not an uncommon thing what you are suggesting. I think it is also a suitable and interesting thing in our case and we already have the in-house automotive technology and good labs for the practical work on it. I have to say that I am very much intrigued. I am only not completely sure what your question is at the moment, what do you want from me and is there money involved? Also, tell me a bit more about the competition.

So our focus is mainly on two competitions at the moment, the Shell Eco-Marathon and the Formula Student. The students will have to build a car that has to be driven during the yearly competition. Money involvement would be good if that is possible from out of Novia UAS, but it is not mandatory as a lot of teams started from scratch without money from the university. The main thing we would like to hear if you agree to our plans and give us a green light.

Kristian: I will give you the green light for sure, I would say get a team together and just start. Also, do your investigation on what you exactly need and come back to me with specific needs and an inventory.

We have already done research on this and we will send you our midterm report with all our gathered information so far.

Kristian: I have a question about the ECTS, are you planning to integrate these? *It will be our preference to include some credits, but we have seen a lot of different kind of situations where universities gave 0-60 credits a year.*

Kristian: I think it is reasonable to do give credits for participating in the project and to involve teachers. This should also be possible to do so.

Also, we made a survey to obtain more information about student interest and 80 students replied, of which 45 left their contact information to get involved.

Kristian: I am happy to hear about the interest among students and I think this will not be a problem. There is always some kind of interest about cars. I think it is good to include everyone and make them interested, also the teachers and other possibly involved figures of the school. In theory and practicality it might be difficult to include all campuses, such as Turku. I think you should develop the concept here and then we can see how much this can be spread out later on.

The main points summarized

- Kristian Blomqvist, dean of the Engineering department, approves the concept of starting a racing team at Novia UAS
- · We should include and involve everyone as much as possible and gain enthusiasm
- · Later on there will be a meeting with more specified details for the setup of the concept

4 - Interview Heikki, Tharanath and Miguel

28-03-2022 13.00 - 14.30

Heikki J Salminen has been working for Wärtsilä for 25 years and has been active in the REMMIteam of Tampere university from 1981-1987. He made the engine which they still seem to use and optimise. He likes to work with (young) students and basically anyone who is willing to learn new things.

Tharanath Tharanath is an additive manufacturing specialist, a graduated M.Sc., as well as a project researcher at the University of Vaasa and is a collaborator of Heikki. He has been doing his thesis at Wärtsilä and designed a turbocharger for 3D-printing, this is where he met Heikki. Now he is doing additive manufacturing for the University of Vaasa, where customers usually want to have a product 3D printed. Tharanath will research if that will be possible and also if it will be efficient financially. In the past he has set up a Formula team (Sahyadri) from scratch in his home country, India. This team had about 22 students and a very tight budget with a total cost of about €11.000 for the car, which will cost an additional €10-15.000 in western countries such as Finland. The suspension was bought, the wheels designed but manufactured and the body was manufactured.

Miguel Zamora C. is also working together with Tharanath and has been doing projects in design, molds and just worked on a project for prostatic legs in Bosnia. For these legs he has been optimising both the exterior and interior design. For example, they have been able to decrease the weight from 2.4 kg down to 700 gr.

Organizing courses

Heikki approached us because of his interests and knowledge and offered us to give the team an ICE modelling course. He gave racing simulation classes to the motorsport class of the University of Applied Sciences in Seinäjoki. He gave similar classes to Finnish team which compete in the FMMC and a few years ago he also teached the REMMI-team from the Tampere University who visited Novia UAS. This course needs specific software of Gamma Technologies, 2D GT-SUITE. It simulates the operation of a vehicle and has special models for simulation. Later on it got updated with additional battery and fuel cell vehicles. This software is usually extremely expensive, about a few hundred euros a class. Heikki himself is mainly interested in internal combustion engines, as he thinks this is more future proof in the northern countries rather than electric cars. Also, he says Vaasa has the most companies performing research and building internal combustion engines. There is still future in them as you could let them run on carbon neutral fuels in the future. Internal combustion engines are Heikki's strongest area in knowledge and building.

The question is if it is possible to integrate Heikki his modelling course as an official course with ECTS at Novia UAS. The course covers multiple days and has a minimum of 5 ECTS, usually the duration is 3 months in the Spring semester at the University of Vaasa. He has cut down the course into a 1 month course before at Seinäjoki. Heikki mentions that for Novia students it is not required to follow these courses, but it could be very useful for both the project and their knowledge.

Involvement

The involvement of Heikki, Tharanath and Miguel depends on how it will be arranged, as they are not working at Novia UAS. However, they have a strong interest and are definitely willing to help out with the team. Next to that, a lot of former REMMI-team members will be available in Vaasa and might be useful to involve.

Experience of Tharanath

As said before, Tharanath has set up a Formula Student team in his home country before. This worked with even a very tight budget and without knowledge. He says they got the full design of the car from YouTube and started rebuilding that. The first year was very successful, but the 2nd and 3rd year of the team it started to fall apart due to decreased interest among the students. He mentioned this had mainly to do with the school system and also because the majority of the senior students graduated and left the team.

Tharanath advices us to make the motivated students co-founders to give them some tangible and meaningful role and get them motivated for the project. He suggests to look into the number of courses at Novia UAS and ask specific courses that you can offer them practical learning by helping the team out.

Tharanath does not have the full rights to teach, but is more than 100% in to support the team and is, together with Miguel, interested to help in the manufacturing of the car.

Network of Heikki

Due to his professional interest, Heikki already contacted the REMMI-team before this meeting. He had been talking to the current team leader and asked if he would like to meet us. The team leader showed interest for that. As the REMMI-team is building on their 8th car at the moment, they do have a lot of former cars and car parts. Heikki mentions that the REMMI-team has been selling cars and parts of it before to other teams and this might help our team to start off the project. He is thinking and talking about a physical visit at the moment.

The main points summarized

- Heikki would like to provide an ICE modelling course for the team which, worth minimum 5 ECTS
- Tharanath is very willing to help and support the team with his knowledge
- Tharanath and Miguel together can help the team out with the manufacturing of the car

Teacher meeting

20-04-2022 16.00 - 17.04

Present: Mikael Ehrs, Tobias Ekfors, Kenneth Ehrström, Heikki Salminen, Tharanath Tharanath, Miguel Zamora Cordero

Introduction

Small introduction for mainly Kenneth, as we have not met each other before

• Main goal of the meeting: it is preferred to have teacher involvement within this project to help the students out when needed.

Kenneth Ehrström

- Courses in mechanical engineering and specifically product development.
- Seeing the project as an opportunity to implement tasks into my courses.
- Tobias; it is great if Kenneth could be involved due to his extended knowledge.

Tobias Ekfors

- The customer of the project and will be mainly coaching the student team.
- Has taken part in REMMI-team at Tampere University during his studies which gives personal experience.
- Would like to involve the project in own courses as well, similar to Kenneth.

Mikael Ehrs

- Teacher of industrial management and supervisor of this project.
- In terms of courses/teaching it will not be really applicable to the project.

Heikki Salminen

- Interested right away as he used to be Chief design and Team leader in the REMMI-team during his studies.
- Been involved in other racing projects and experience at Wärtsilä.
- The ICE simulation course is something Heikki could offer as a class to include into the curriculum of the students team.

Miguel Zamora Cordero

- Invited to the project by Heikki and Tharanath.
- Support and experience for the team in general, focus on additive manufacturing.

Tharanath Tharanath

- Project researcher, colleague of Miguel and worked together with Heikki
- Set up a team and competed in Formula Student in India and AERO design in Texas, US
- Can help out with the team with the additive manufacturing/3D printing, have been discussing with supervisor about teaching the team under University of Vaasa

Kick-off meeting

As the student team has been formed and the European Project Semester (EPS) comes to an end, a kick-off meeting will be held to transmit all the knowledge and make an official start. Availability on the 27th of April from 17.00-19.00, auditorium in main building at Novia (W33)

- Tharanath won't be able to join
- Miguel and Kenneth are available, Heikki most likely as well
- The core student team (about 15 students) will be available and we will invite all students which showed interest before. Explanation: Two surveys have been held in which 45 students showed interest and out of them 20 were interested enough to join the focus group interviews.

REMMI-team; excursion, buying car parts

- Heikki: the student team should contact the REMMI-team for this. Lappeenranta and another team seemed to have bought car parts from REMMI before as well. Heikki has been talking to Samuli (from REMMI) but he has stepped out so he is not fully up to date anymore.
- Tobias: if the team is buying car parts, they should be able to compete within a year. Otherwise it probably takes two years.
- Heikki: Urban Concept might be easier to start with. Tobias thinks it doesn't matter too much
- We found in our research it is more expensive and a bit more difficult as it needs more power, because of its weight. That's why we chose the prototype. The main goal is to first build a car and then we can look more into the future, switching classes/powertrain/competition.

ICE course Heikki

It will need to be tailored for Novia its needs

Did de course in Seinajöki as well; 30 hours in 1 month, but that is still mainly introduction

- Tobias: we need to discuss this with Kristian about the tailoring, curriculum and finances
- The course is mainly for mechanical engineering students
- It is possible to add some additive manufacturing
- · Credits could be given from Novia its side

The team

We will assign two team managers this week, Team manager and Co-manager. Our question ifs if Tharanath would help out next to Tobias to coach the team.

- Tharanath could possibly give Additive Manufacturing courses, if he gets approval of his supervisor to teach under University of Vaasa
- Regarding supporting the team, Tharanath thinks it is way more important that the team managers should be in there at least 2 years and be really motivated. Otherwise Tharanath and Tobias would be pushing the team forward, but the motivation must come from the students or it will not work out. Teams needs to be run by the students, teachers are there only if needed.
- Tharanath: Let all the energy come from the students and we push them a bit on their back
- Mikael: the team could be an official (non-profit) organisation. Some team members need to get started on that, which have a bit more experience in business/management. Engineers are usually shy and might be hard to get sponsorships.
- In the handover package there will be information about possible sponsor packages, financial details, etc. to use as an example
- Tharanath: the team from Oulu which participates in Formula Student, have a good and neat website which could be used as example: <u>https://fsoulu.fi/sponsors/</u>

Tharanath: Wärtsilä has shown interest to keep students within Vaasa

- There should be opportunities for sponsorships around here
- Tobias: 3 year contract from Wärtsilä for the REMMI-team of €3.000,- a year, but they stopped it. Not sure if there is still interest in such things.

Tharanath: maybe something like a workshop for all Finnish teams could be given, and all the teams could get together for a week or so, to exchange ideas etc.

Notes

- Kenneth; make sure the Novia building is open at the evening of the kick-off meeting. Mikael will contact someone for that.
- Mikael; some electrical engineering addition might be needed, such as Joachim Böling or Hans Lindèn
- Tobias; Telemetry/diagnosis knowledge would be important as well, Hans has the knowledge in that field

Summary

- 1. Everyone can attend the kick-off meeting on the 27th of April 17.00-19.00, except for Tharanath
- 2. Everyone within this meeting wants to support the team in either being available, support or (implementation in) courses
- 3. ICE course Heikki: this will be further discussed with Tobias, approval of Novia needed. The same applies to buying car parts or excursion to REMMI-team

J - RECRUITMENT SURVEY QUESTIONS

Survey 1: gauging interest questions

Hej alla! We are three erasmus students working on a plan to implement a project such as the Shell Eco-Marathon and Formula Students competitions in Novia. Lots of universities (also where we are from) have their own car-building and designing team and participate in these races. The project is a testing ground for the next generation of engineers! With this survey we want to check possible interest from students at Novia. We thank you for taking this short survey, it helps us a lot!

- 1. What year are you in right now?
- 2. What are you currently studying at Novia?
- 3. Do you want a more hands-on approach to learn?
- 4. Would you be interesten in participating in such a project?
- 5. Why or why not? What would motivate you?
- 6. What kind of role would you be interested in?
- 7. Would you rather spend time in the project in or outside of school hours?
- 8. If this project really sounds like something you would like to be a part of, leave your email here! We can get in touch.
- 9. If you have any further questions/remarks/ideas feel free to contact any of us

Survey 2: racing team questions

Hej, in this small survey we want to check who would be interested in what role as well as what date for teambuilding and kick-off meeting would suit for you!

- 1. What is your name?
- 2. What do you study?
- 3. What year will you be in after summer?
- 4. What kind of role would you be interested in? (multiple choices possible!)
 - Team Manager
 - Chief Electronics
 - Chief Vehicle Dynamics
 - Chief Powertrain
 - Specialist
 - · Teambuilding events (activities, parties, travels...)
 - · Business and advertisement
 - · Anything would be fine for me
- 5. Date Teambuilding with Roger Nylund?
- 6. Date kick-off meeting?
- 7. Time kick-off meeting?
- 8. Opinions on logo prototypes?

Survey 3: Kick-off meeting

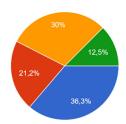
Wednesday 27th of april at 17.00-19.00!! happy to see you all there.

- 1. What is your name
- 2. For the catering do you have any allergies?

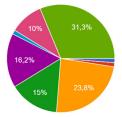
K - RECRUITMENT SURVEY RESULTS

Survey 1: answer visualization

What year are you in right now? 80 antwoorden

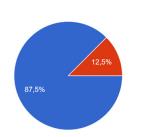


What are you currently studying at Novia? 80 antwoorden

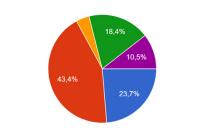




Would you be interested in participating in such a project? 80 antwoorden



What kind of role would you be interested in? 76 antwoorden

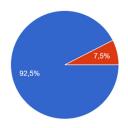


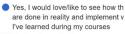
 Leadership Specialist Communication Teambuilding events - parties Business and advertisement

Yes

No

Do you want more hands-on approaches to learn? (not only theory) 80 antwoorden





Degree Programme in Civil and Construction Engineering

Management

Other

Degree Programme in Construction

😑 Degree Programme in Electrical Er

Degree Programme in Industrial Ma

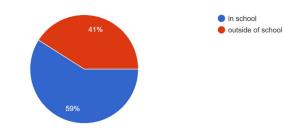
Degree Programme in Mechanical

Degree Programme in Business Ac

Degree Programme in Design

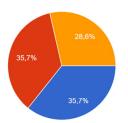
No, just theory is fine

Would you rather spend time on the project in school or outside of school hours 78 antwoorden

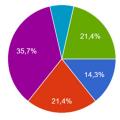


Survey 2: answer visualization

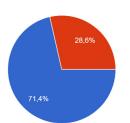
What year will you be in after summer? 14 antwoorden



What kind of role would you be interested in? 14 antwoorden



Date Teambuilding with Roger Nylund! 14 antwoorden





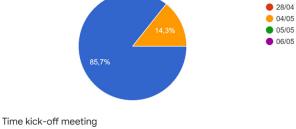
(multiple choices possible!)



- Chief Electronics
- Chief Vehicle Dynamics
- Chief Powertrain
- Specialist
- Teambuilding events (activities, parties, travels...)
- Business and advertisement
- Anything would be fine for me

14 antwoorden

Date kick-off meeting 14 antwoorden







27/04



L - MARKETING MATERIALS Logo different options





























Business card template



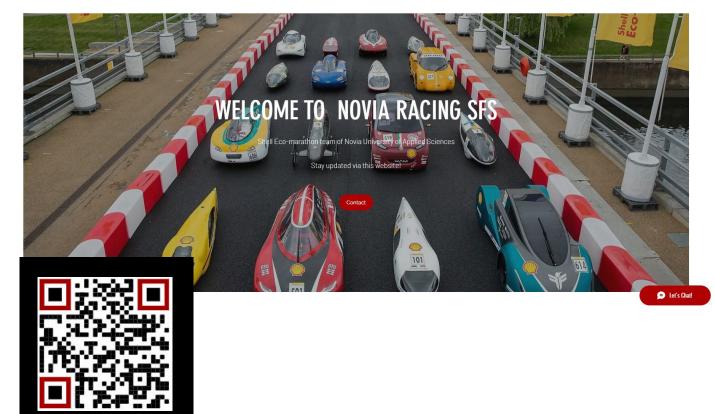
Website template



Home Team Competition Founders Cars Partners Media Contact



f 🎔 in 🧕 Log In



Merchandise





Poster





VISIT US!

NOVIA HAS A NEW RACING TEAM!

Thanks to the EPS team, consisting of three students; Freyja Peeters, Sam De Loose and Sanne Keizer, Novia University of Applied Sciences now has an own eco car racing team.

AMAZING OPPORTUNITIES



THEORY TO PRACTICE

Most of the courses at Novia UAS are theoretical with little to no direct real life connection or possibilities to show learned skills. This project is the beginning of a mindshift towards a handson approach of learning and will make students' studies more relevant and interesting for real life.



SHOW SKILLS

Every single student has their own strengths and meaningful inputs. Besides converting their knowledge into practice, students learn how to work in a team, plan a project, develop hard and soft skills, improve their technical and interdisciplinary skills and maybe even find new interests.



me Spring sem

EPS Progra

BROADEN HORIZON

Not only will students have fun with this project, they might also get advantages and benefits in the future of work! Students have the chance to get a lifetime experience and meanwhile put this in their resume and show it off during internships.

ABOUT NOVIA RACING

Novia Racing SFS is the Shell Eco Marathon team of Novia UAS. Students from different fields of study and disciplines work together on a sustainable race car. We need students fond of electronics, mechanics, IT, data logging and simulation to students interested in business, design, communication and teambuilding! In addition to the competition, Novia Racing wants to work together towards a sustainable future and a more project-based approach in higher education. The Novia Racing Team will start building their first, most energy efficient car this autumn semester of 2022!

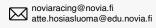
THE COMPETITION

As mentioned above, Novia Racing SFS will be competing in the Shell Eco Marathon competition. This global competition is focused on energy optimization and is one of the world's leading student engineering competitions. The main goal is to bring students of different fields together to use their bright ideas for shaping a lower carbon future. The way to win the competition is to build the most energy efficient vehicle. The choice to use an internal combustion engine or a battery electric powertrain is up to the team to decide.

WANNA JOIN US?

Interested in gaining new skills and a passion for entrepreneurship, innovation and adventure? Contact the team by email or send your enthusiasm directly to the team manager!

Team manager Atte Hosiasluoma



+358 44 3384858



105

M - SPONSOR PACKAGE TEMPLATE

Partnerfiles Novia Racing SFS

Invest in the insights of future mobility

Preface

Dear (future) Partner,

Through this partner file, we would like to inform you about the **Novia Racing Team**. Our goal is to design and build an electric race car within less than a year. This includes the design, construction, testing and optimization of the car. During all these phases, our focus remains on **innovating towards a better future** and letting the world know what possibilities there are for the mobility of the future.

With this race car, we will compete in the **Shell Eco Marathon competition** and more specific in the prototype class. In this competition we will compete against other teams from all around the world. In general, this race will challenge students to design the most power efficient cars.

We cannot achieve our goals all by ourselves. To build an innovative car each year and come with new insights and solutions, we rely on a network of various partners. This cooperation is of **mutual gain** with communication between the team and the partner during meetings and various events. Therefore, we are always looking for partners, such as you, with whom we can guarantee the success of this project.

In this partner file, we offer you an overview of who we are and our project and possibilities to participate. We look forward to a fruitful collaboration with you!

Who are we?

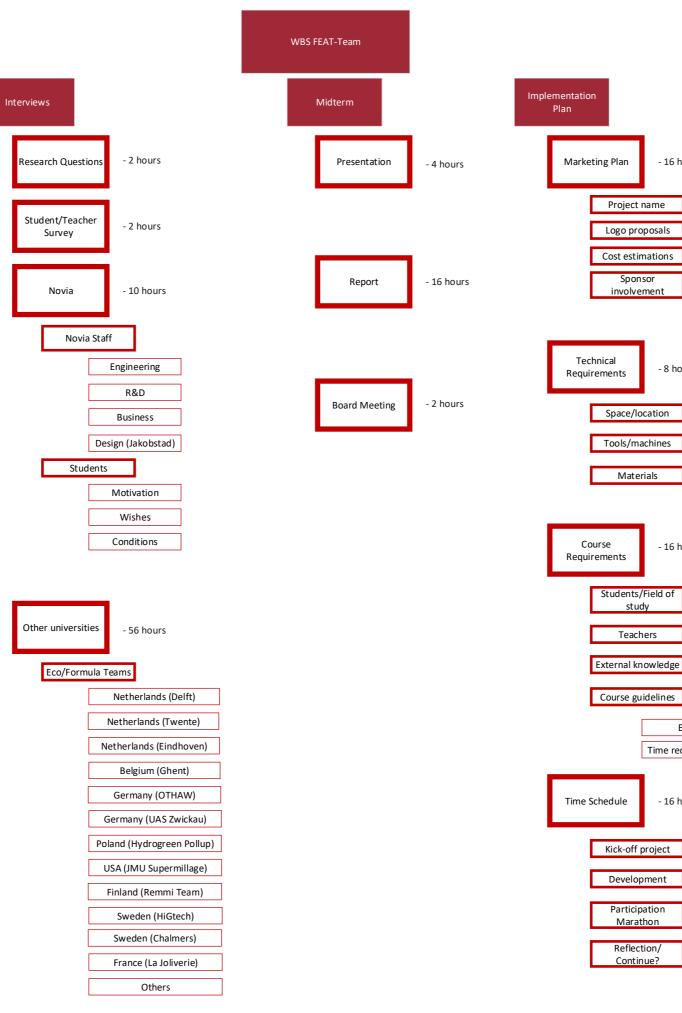
Novia Racing SFS consists of XX students. These students are from different majors at Novia University of Applied Sciences. Each year all the students fully commit themselves to the design and development of their eco car. To have a strong base the students have access to all the engineering, management and business teachers.

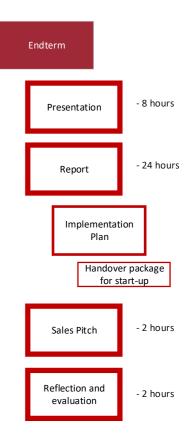
In order to make the construction of the car run smoothly, the team is divided into four large sub teams: Electronics, Mechanics, Powertrain and Marketing. Next to that, we have Management that keeps everything in order.



N - WORK BREAKDOWN STRUCTURE

Research Available - 16 hours competitions Shell Eco Marathon Formula Students Others Benefits Requirements/ Rules Limitations vailable resources - 16 hours at Novia Space/Location Machines/ tools Fields of studies Teachers Students Network Budget - 16 hours Preparation Background info Basic technical knowledge (cars,. Companies - 16 hours Wartsila Vaasa Energy Week ABB, Danvos, Mervento SKF





- 16 hours

- 8 hours

- 16 hours

ECTS

Time requirements

- 16 hours

O - RACI MATRIX

- R responsible
- A C accountable
- consulted
- I informed

As our team has only 3 participants, we take shared responsibility for all tasks.

RA WBS- paket	Ereyja	Sanne	Sam	Kommentarer
Research				
Available competitions	I	A		
Available resources at Novia	A	A		
Preparations	A	С	С	
Companies	1	I	A	
Interviews				
Research questions	С	С	A	
Student/ teacher survey	A	I	1	
Novia	A	A	1	
Other universities	A	A	A	To divide, at least two participants per interview
Midterm				
Presentation	С	A	A	
Report	Α	С	С	
Implementation plan	·		·	
Marketing plan	Α	С	Α	
Technical requirements	С	A		
Course requirements	С	A		
Time schedule	С	С	A	
Endterm				
Presentation	С	Α	С	
Report	A	A C	C	
Sales pitch	1		A	
Reflection and evaluation	Α	A	A	

Einddatum Voorafgaande taken	11/04/2	28/02/2				21/03/2									3/03/22			7/03/22													/04/22							celeal a	77 Icole			10/05/2230	•	8																	30/05/242			
Begindatum Eindd	maa 7/02/22maa 11/04/2	maa 7/02/22maa 28/02/2				maa 21/02/2maa 21/03/2									woe 2/03/22 don 3/03/22			maa 14/02/2maa 7/03/22													maa 21/02/2vri 8/04/22								maa 26/02/2 2002 22/02/22			maa 11/04/2din 10/05/2230																			woe 11/05/2maa 30/05/242			
Duur	46 dagen	16 dagen				21 dagen									2 dagen			16 dagen													35 dagen	1 dag	5 dagen	4 dagen			10 dagen		1 dae	3 dapen	1 dag	22 dagen	3 dagen					2 dagen			acord C	o dagen				3 dagen					14 dagen	2 dagen	5 dagen	
Taaknaam	Research	Available competitions	Shell Eco Marathon	Formula student	Others	Available recources at Novia	Space/Location	Machines/Tools	Fields of studies	Teachers	Students	Notwork	INETWORK	Budget	Preparation	Background info	Basic technical knowledge	Companies	Wartsila	Vaasa Energy Week	ABB	Danfoss	SKF	The Michelin Group	Nordpipe Composite	Engineering	BS-Metall	Elsteel	Composite	Stormossan	Interviews	Research Questions	Student/Teacher survey	Novia	Novia staff	Students	Other universities	Racing teams	Presentation	Report	Board meeting	Implementation plan	Marketing plan	Project name	Logo proposals	Cost estimations	Sponsor involvement	Technical requirements	Space/Locations	Toosl/Machines	Course securisements	Course requirements Students/Field of study	Teachers	External knowledge	Course guidelines	Time schedule	Kick-off project	Development	Participation marathon	Reflection/Continue	Endterm	Presentation	Report Implementation plan	
Taakmodus	*	*	er.	*	₹.	*	*		-	-	-	-		C.K	*	er.	*	*	*	×	er.	er.	c.	er.	t.		64	24			*	*	. *	t.	×.	*	24	2		*	· f	*	A2	et.	* ·	4	E.K	*	ter.	**		e te	t.	t.	2	S.	. *e.	-	5 4	ŧ	*	£ 1	e	
C	1	2	m	4		•	1		0	10	11	10	2 :	m	14	15	16	17	18	19	20	21	22	23	24		2 2	8 5	200	3 8	30	31	32	33	34	35	30	10		40	41	42	43	4	45	46	47	48	49	05 12	5 5	20 5	54	55	26	57	58	20	99	61	62	8	8 8	

P - GANTT CHART

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