Management Portfolio

Silverstone, UK

09th July - 15th July

Content

References:

"Project Management Guide 2022", F1 in Schools in association with Educational Foundation PMI, 2022
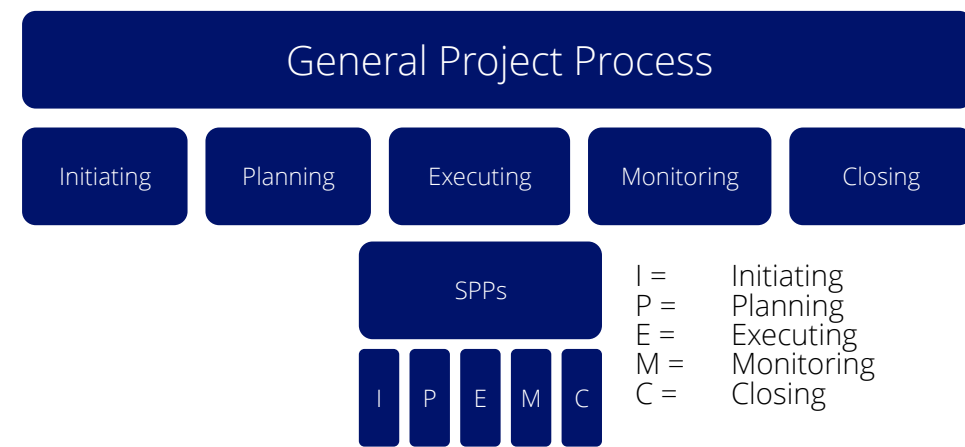
"Portfolio DM 2020", Sonic Boom, 2020

Work breakdown structure

During our initiating phase we came up with the idea of differentiating between the general (**GPP**) and specific project structure (**SPP**). The GPP was the process in which we discussed our general project structure and set up the requirements in the "GPP-Project charter 2021". But to address issues more specifically we introduced SPPs where we would use the same basic structure as in the GPP with some differences which will become clear once we explain our project management.

Project stages

In both processes we had the following five project stages: Initiating process with kick-off meeting, Planning process, Executing stage, Monitoring process and closing stage.

General Project Process

Initiating | Planning | Executing | Monitoring | Closing

SPPs

I | P | E | M | C

I = Initiating
P = Planning
E = Executing
M = Monitoring
C = Closing

An example for an SPP would be a testing day in the engineering cycle. We discussed our requirements and the deadlines for the engineering cycle in our general management. But the specific acceptance criteria and the risk assessment was done in the planning of the testing day.

SPP Planning Checklist

☐ Risk Assessment done?

☐ Quality Acceptance criteria created?

☐ Involved Stakeholders highlighted?

☐ Scope created and justified through Scorecard?

☐ Responsibilities assigned?

☐ Schedule created?

☐ Awareness for assumptions?

Fig. 1: SPP Checklist

Initiating phase

Kick off Meeting and Project charter

In the initiating meeting of the GPP and all SPP's we defined the respective deliverables and stakeholders. We furthermore developed a scope statement. To ensure the best quality possible we assessed all risks in this stage of the project and then created the quality acceptance criteria. All of this was then summarised in our project charter.

Risk Assessment

Knowing how to handle risks is crucial if you want to succeed in this competition. That's why we targeted risks in the early stages of the project. The risks we assessed in the GPP can be found in the graphic below (Fig. 1). Read more under 'Risk management' to find out how we targeted risks in specific processes, like testing or car submissions.

General risks

Financial risks

Budget not raised or spendings over budget

Submission Deadlines

Project elements not finished until submission deadline

Dependency on partners

We depend on manufacturing partners and other sponsors. This involves the risk of losing a partner who is crucial for the project progress.

Fig. 2: General risks

Stakeholder

We identified our stakeholders exclusively in the initiating phase of the GPP. We differentiated between four different stakeholder categories. Every new stakeholder is assigned to one of these categories.

Teachers	Sponsors	F1 in Schools HQ	New teams from our school	Judges
Stake STEM marketing, education	**Stake** Evidence of ROI, brand visibility, learning progress of the team, general marketing of the team, showcasing the partnership	**Stake** Popularity of competition	**Stake** Progress of our team, success in their own competition	**Stake** Progress of our team, evidence of work through all competition elements
Action STEM evenings (refer to Enterprise Portfolio)	**Action** Public showcasing of sponsorship, sharing of learning experiences, share testing results, newsletter	**Action** Show progress on social media; mailing list; STEM marketing	**Action** Provide guidance and learning opportunities, social media	**Action** Public newsletter, show work on social media

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Quality Assessment

In order to ensure quality, the respective acceptance criteria had to be concise. We had to find a perfect balance between time constraints, quality acceptance and resources. In the GPP we created 5 minimum requirements that every acceptance criteria had to fulfil in the later stages of the project. The requirements can be seen in figure 2.

Quality Acceptance Checklist

☐ All requirements detailed?

☐ Testing method for all requirements defined?

☐ Responsibility assigned?

☐ Expert reviewer assigned?

☐ All risks from Risk assessment targeted?

Fig. 3: Quality Acceptance checklist for SPP's

Deliverables

Deliverables are goods which we have to present for judging. Identifying these elements was crucial for creating the project schedule. During the initiating phase of our GPP we identified the following deliverables:

📖 Portfolios (Engineering, Enterprise Management)

🎥 Videos (Presentation, Pit Display)

✏️ Technical Drawings and Renderings

🏎️ Cars

Scope Statement

In our general kick-off meeting we issued a scope statement that helped us identify the goals we had as a team. The scope statement in the GPP was a guideline that always reminded us what is relevant with respect to the score cards.

Scope statement

Goals*

Becoming World Champion 2022

Acquisition	Consistency	Learning outcome
- 20,000€ of funds - Non-financial sponsors for manufacturing car parts, photo shootings and much more	- Recognisable brand - All work justifiable with respect to scorecards - All work fulfils the acceptance criteria - Deliverables submitted in schedule	- Personal learning experiences for every team member - Guidance for career choice - Learning outcome through collaboration

*Deadlines were assigned to the goals in the full scope statement

Requirements for Scope Statements in SPP's

All goals have to be set up according to the SMART criteria. An example would be the goal of reducing the weight of our wheels in the engineering process.

Specific: The weight has to be reduced by 1.5 g.

Measurable: Measurable with a scale

Attainable: Through meetings with our partner we reviewed the attainability of this goal.

Relevant: The goal is relevant for our car's performance.

Time bound: The final wheel has to be finished until the 25th of November 2021.

Fig. 4.1: Scope Statement for GPP

Project schedule

The project schedule is perhaps the most important aspect in any management process. In the GPP we used the traditional method of a Gantt Chart to build our schedule. In Figure 4.2 you can find an extract of our schedule for the car development.

Sprints

A sprint is a phase in the schedule where at least the majority of the team dedicates most of their available time to that respective
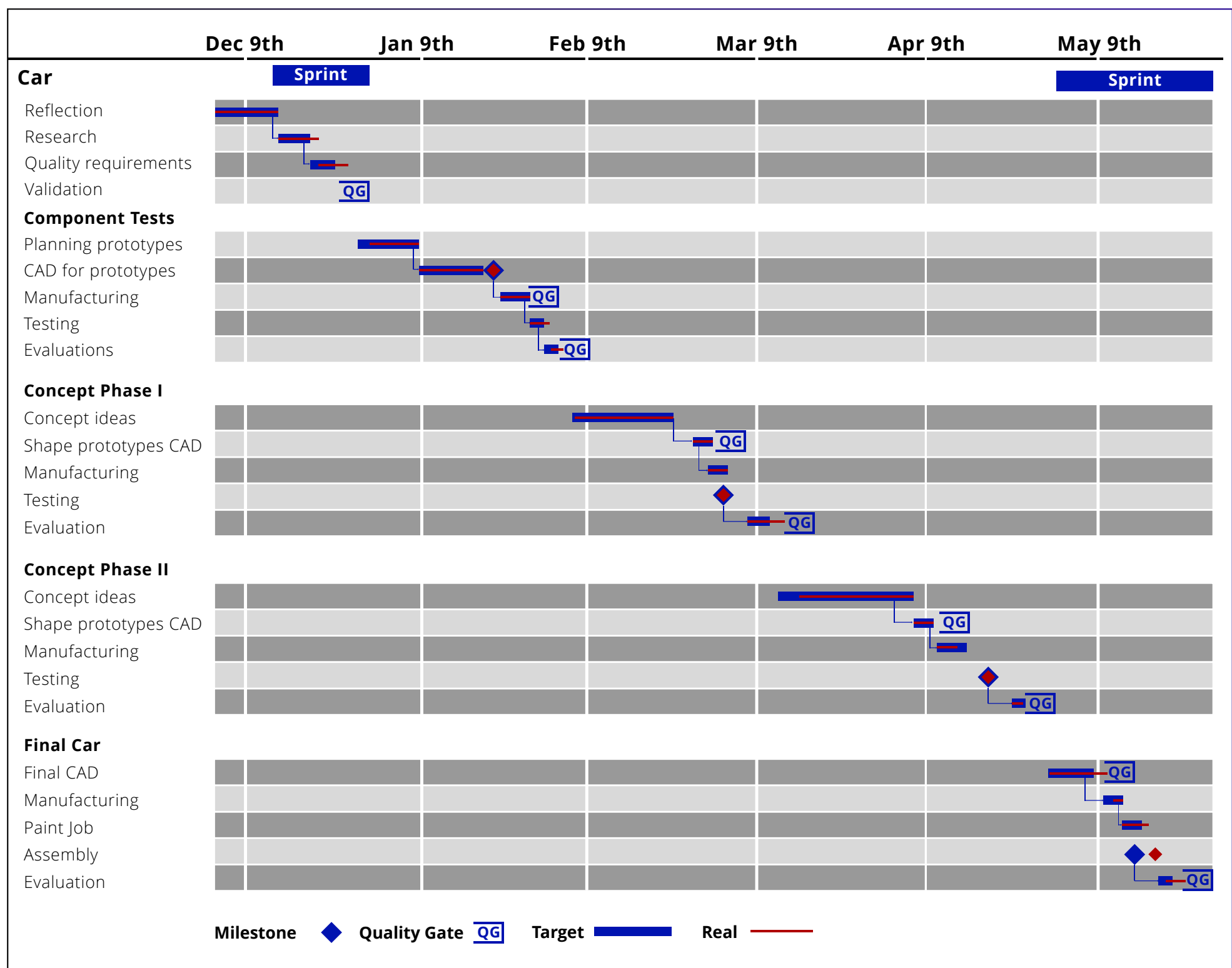

Fig. 4.2: Extract from our schedule for Car development

element of the schedule. In this phase, all team members contributed ideas and research results. This helped us in finishing important work before a deadline. When determining the schedule for a sprint it was also important to take into account the schedules of the individual team members.

Quality Gates

Quality gates are phases in our project in which we reflect on our work and goals. This was also when we would evaluate our acceptance criteria and reassess our risks (see more on page 7).

Variability

Our schedule had to be variable in order to be able to react to changes of the world finals' date or delays in any of the project phases. We therefore always tracked the progress of our team in the schedule and reevaluated certain elements accordingly.

Tools

To create our schedule we used the tool "ClickUp". This tool also gave us the functionality of Kanbans. We would use this when it came to planning short-term tasks in SPPs.

Types of resources

In this project there are three types of resources which all have to be managed the best way possible to guarantee competition success. We differentiated between labour, capital and financial resources. In our risk assessment we identified the following major risks with respect to Resources (Figure 5).
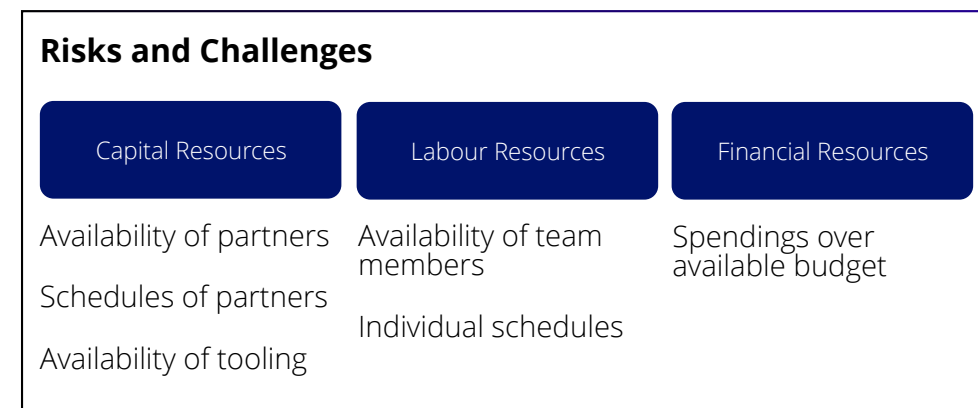
Risks and Challenges

Capital Resources	Labour Resources	Financial Resources
Availability of partners	Availability of team members	Spendings over available budget
Schedules of partners	Individual schedules	
Availability of tooling		

Fig. 5: Risks and Challenges with Resource Management

Capital Resources

Capital resources are resources which we obtain thorough non-financial sponsorship. ´Whenever we where planning a part of the project we made sure whether the involved partners were available.

An example would be our partnership with WB. They provided all wheels for our prototype testing stages and for the final car. In the beginning of our partnership we agreed on a total of 60 front and 60 rear wheels. Throughout our engineering cycle we had to keep track of this resource, so that we could renegotiate our deal accordingly if due to failures we would not have enough wheels available. We also asked all our partners to tell us at which times of the schedule they would not be available so that we could highlight that particular time frame in our schedule.
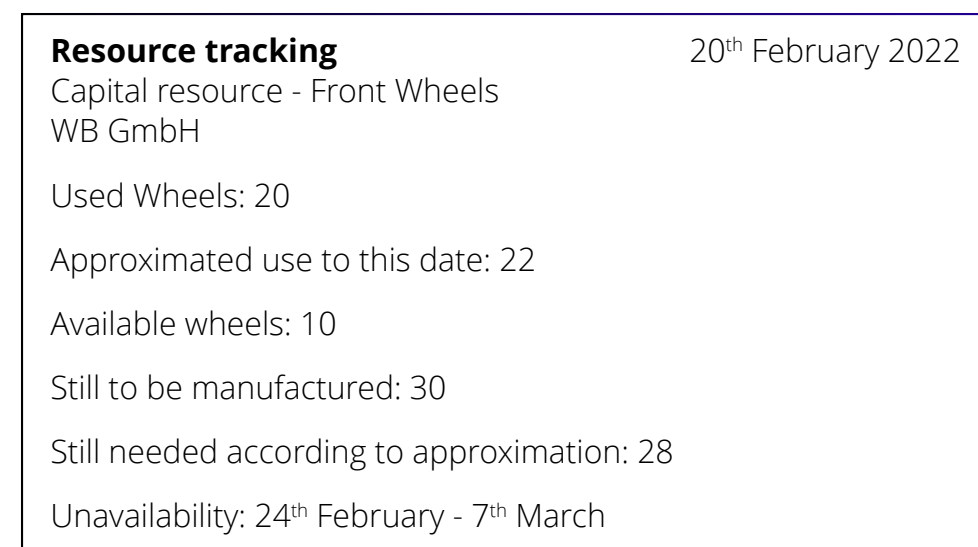
Resource tracking 20th February 2022
Capital resource - Front Wheels
WB GmbH

Used Wheels: 20

Approximated use to this date: 22

Available wheels: 10

Still to be manufactured: 30

Still needed according to approximation: 28

Unavailability: 24th February - 7th March

Fig. 6: Resource tracking for wheels on the 20th of February

Labour resources

Since most of us had already finished school the schedules of the individual team members where very different. This made tracking the labour resources even more crucial. We made sure that in sprints and the closing stages of the project all team members where available.
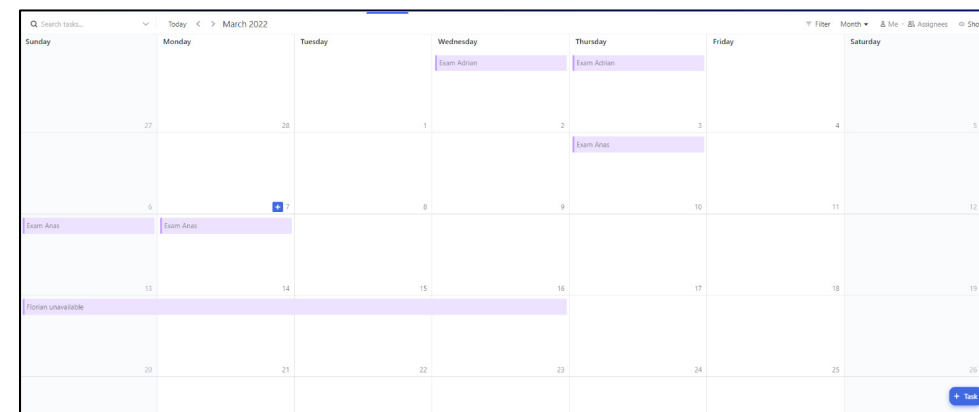
Fig. 7: Blocked labour resources for March 2022

Financial Resources

There is a great risk which comes with financial resources. That's why our focus from the beginning of the project was on optimising the way we handle our financial budget.

Revenue

Through retention of previous sponsors and acquisition of new partners we were able to raise funds of 23.000 €.

Sponsor	Value
Wilhelm Stemmer Stiftung	9.000€
Siemens	4.950€
Ansys	2.700€
Semtrade	2.500€
Compact Dynamics	1.500€
Left from nationals	850€
VDI Hamburg	500€
Fahrschule Leitner	500€
Anonymus sponsor	500€
Total	**23.000€**

Fig. 8: revenue
Values are rounded

Cost tracking

In order to track all costs we created a prognosis in the starting stage of the competition. It was important to us to constantly track the expected costs. That's why this prognosis was linked to the document where we tracked our expenses. Whenever we had an expense we would replace the approximated value by the real value. Thus we could always adapt our expenses accordingly.

Prognosis

	Value
Pit Display	**7.700€**
Travel and Entry fee	**9.200€**
Teamwear	**2.000€**
Engineering	**1.170€**
Marketing	**1.500€**
Buffer	**1.000€**
Miscellaneous	**430€**
Total	**23.000€**

Real

	Value
Pit Display	**6.473€**
Travel and Entry fee	**10.243€**
Teamwear	**1.910€**
Engineering	**1.173€**
Marketing	**1.245€**
Buffer	**1.000€**
Miscellaneous	***430€**
Total	**22.474€**

*TBD

Fig. 9: Cost prognosis vs. real costs
Values are rounded

One example for the efficiency of using this method of cost tracking was when the entrance fees for the world finals were announced. We where calculating with significantly lower costs.

Resource tracking 17th March 2022
Financial resources

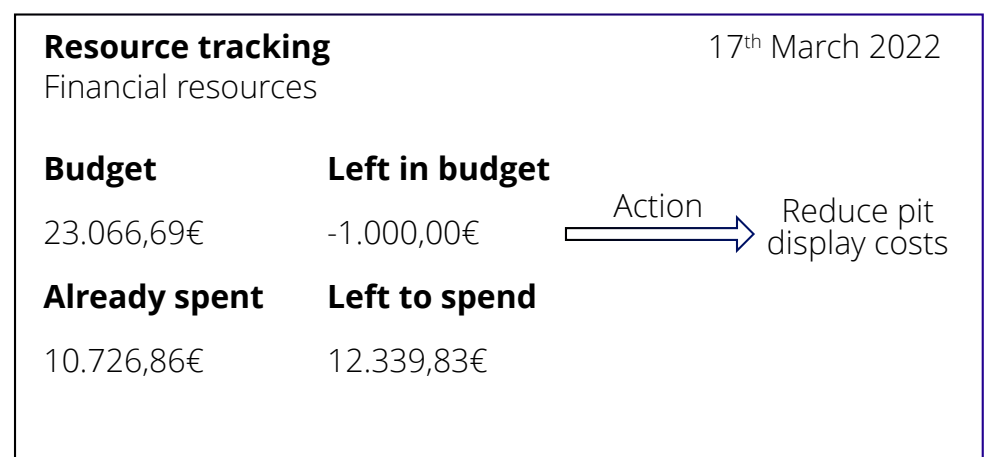| Budget	Left in budget	
23.066,69€	-1.000,00€	Action → Reduce pit display costs
Already spent	**Left to spend**	
10.726,86€	12.339,83€	

Fig. 10: Finance cost tracking for 17th of March

Through constant tracking of our finances we were able to identify this issue quickly and to act accordingly. In this case we reduced the costs for our pit display significantly.

General Roles and Responsibilities

The general roles and responsibilities where discussed in the very first kick-off meeting for this project. We used a RACI-Matrix to assign the respective roles. We also decided on principles that would guide us with assigning roles over the project schedule.

A RACI Matrix has four different categories. 'R' stands for responsible. This is the person in charge of doing the work. 'A' stands for accountable. This means that the respective team member has the responsibility of ensuring that the work is getting done. Project members who are consulting, 'C', are not directly involved in the process, but provide crucial feedback for the respective element. Finally, 'I' for informed. These are all people who are interested in the progress of a task but are neither directly nor indirectly involved in the work.

It's important to note that assigning roles was not limited to the team members. In specific tasks a partner or other stakeholder could be assigned to some of these roles.

Deliverable/ Activity	Anas	Florian	Adrian	Jakob	Jannis	Lukas
Sponsors	A	C	R	I	I	C
Manufacturing	A	C	I	R	R	I
Presentation	A	R	R	R	R	R
Pit Display	A	R	R	I	C	R
R&D	A	R	I	R	R	I
CI	A	C	R	I	I	R
Marketing	A	I	R	I	I	R
CAD	A	R	I	C	R	I
Engineering Portfolio	A	R	C	R	R	C
Management Portfolio	A	C	C	C	C	C
Enterprise Portfolio	A	C	C	C	C	R

R = Responsible   A = Accountable   C = Consulted   I = Informed

Fig. 11: RACI for general roles and responsibilities

Specific Roles and Responsibilities

For specific tasks we used a slightly different workflow for assigning the roles. While we still used a RACI-Matrix to set the roles and responsibilities, it was crucial to identify the required tasks.

Work Breakdown →	Scope →	Assign Roles
Flow Charts	Scope Statement	RACI Matrix
	Eisenhower Method	

Fig. 12: Work flow for assigning roles in SPPs

Flow chart

To help us identify the rough structure of a particular project we used flow charts. This helped us break down the structure and in the next step identify specific tasks easier.
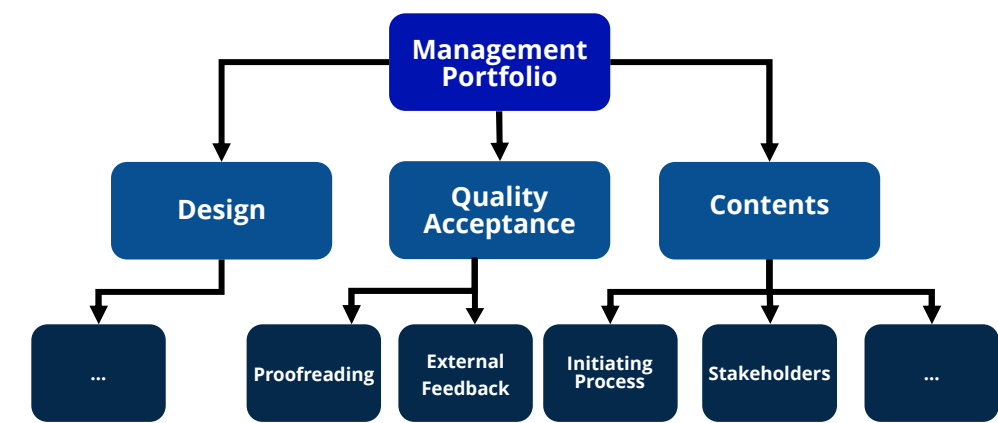
Fig. 12: Extract from Work Breakdown for Management Portfolio

Eisenhower method

The Eisenhower method was a way for us to identify the needed tasks for a specific project element. According to the Eisenhower method , depending on the urgency and the importance of the task, there are 4 ways how to act. We adjusted the method slightly so that it suits our work in the project better.

Since the classical method is designed for individual people and we wanted to use it for our work as a team, we changed the action for the case of high urgency and low importance. Instead of delegating the task to someone we decided to analyse task and prioritise more important tasks.
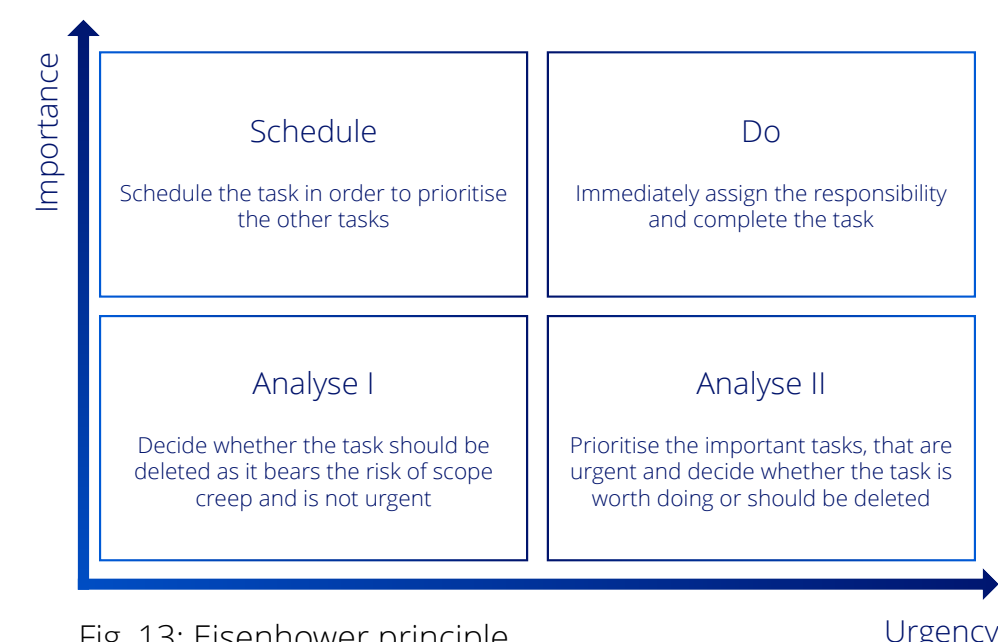
Schedule
Schedule the task in order to prioritise the other tasks

Do
Immediately assign the responsibility and complete the task

Analyse I
Decide whether the task should be deleted as it bears the risk of scope creep and is not urgent

Analyse II
Prioritise the important tasks, that are urgent and decide whether the task is worth doing or should be deleted

Importance / Urgency

Fig. 13: Eisenhower principle

Job Rotation

To give everyone the chance to widen their knowledge in every field of the competition we applied the concept of job rotation. Each member in the team had the chance to work on every area of the project. This helped us in our constant effort to innovate.
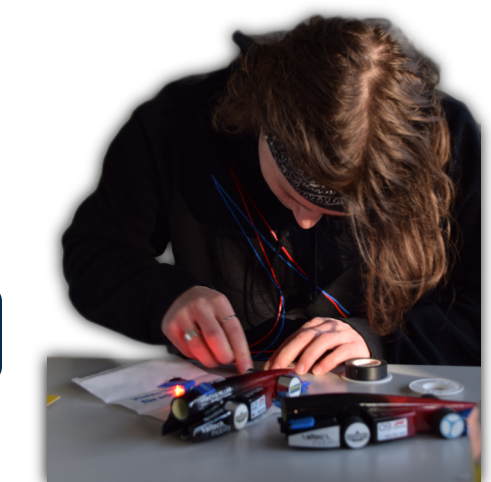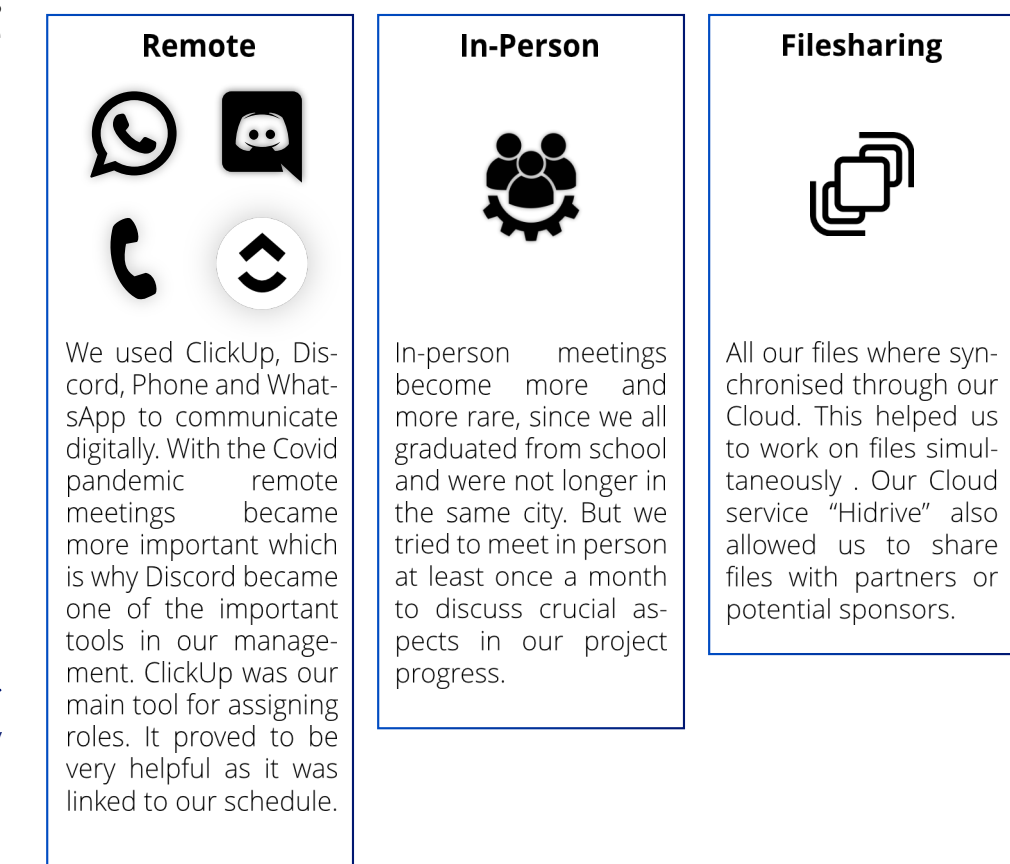
Our Graphic Designer learned how to create precise technical drawings, our Marketing Manager learned how to fix breakages on the car efficiently and our Design Engineer was able to obtain deep knowledge about colour schemes and corporate identity. This helped us to grow as a team and create the best possible project elements, since we had 'external' reviewers for every element.

Fig. 14: Our Marketing Manager working on the cars, by Anas Izaaryene

Team Communication

Communication is one of the most important aspects when it comes to managing an F1 in Schools Team. Our communication was carried out through three platforms.

Remote
We used ClickUp, Discord, Phone and WhatsApp to communicate digitally. With the Covid pandemic remote meetings became more important which is why Discord became one of the important tools in our management. ClickUp was our main tool for assigning roles. It proved to be very helpful as it was linked to our schedule.

In-Person
In-person meetings become more and more rare, since we all graduated from school and were not longer in the same city. But we tried to meet in person at least once a month to discuss crucial aspects in our project progress.

Filesharing
All our files where synchronised through our Cloud. This helped us to work on files simultaneously . Our Cloud service "Hidrive" also allowed us to share files with partners or potential sponsors.

Stakeholder Communication

Communication plan

After having identified our stakeholders in the initiating phase it was important to agree on a communication plan which we would follow throughout our project. The communication plan would contain information on when and what we would communicate to which stakeholder. Whenever we where planning a specific project, like a testing day for example, we would reassess the communication plan and add or remove stakeholders accordingly.

Who to contact	What to communicate	Method	When
ReikaTex	Progress of hoodie design, material selection, colour schemes, incoming orders…	Phone and In-person meetings	After first design draft, for help with material selection, after final design, after incoming orders
Other Sponsors	Availability of Sonic Boom hoodie, sustainable design process	Newsletter, in the regular meetings	After hoodie is ready to order
Fanbase	Availability of Sonic Boom hoodie, sustainable design process	Newsletter via social media	After hoodie is ready to order
….	…	…	…

Fig. 15: Communication plan for apparel brand

Sponsor Meetings

Over the course of the competition we arranged regular meetings with our sponsors.

This was an opportunity for us to present our progress as a team and discuss new opportunities with our sponsors. Meeting in person with our partners, especially with manufacturing partners, was crucial for the results of the project elements.

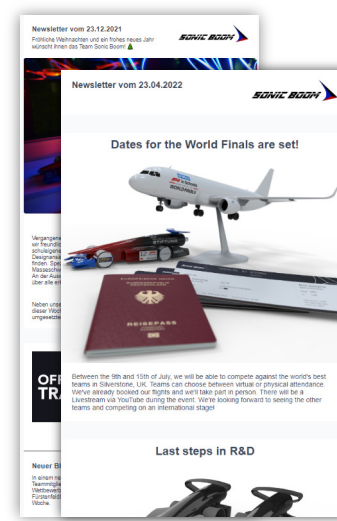Fig. 16: Jakob at our Meeting with WB, by Anas Izaaryene

Newsletter

Another way of communicating with our stakeholders was our newsletter. In order to target the stakeholders' interests more individually we designed a "Members Newsletter" which we would share publicly and for which you could sign up on our website and "Sponsors Newsletter" where we controlled the mailing list. This allowed us to share more in-depth data from our project progress with our sponsors without disclosing any information to our competitors.

Fig. 17: Screenshots of two Newsletters

Risk Management

Stages

When handling risks there are three phases:

1 Identify   2 Classify   3 Control

Risk Identification

We identified the main risks in the initiating phase of the GPP. Apart from that we would identify all risks that may occur at the beginning of any SPP which we would start.

For the risk identification we usually used a simple mind map. All team members had a tablet at their disposal. Creating these mind maps could be easily done be using a shared, online whiteboard.
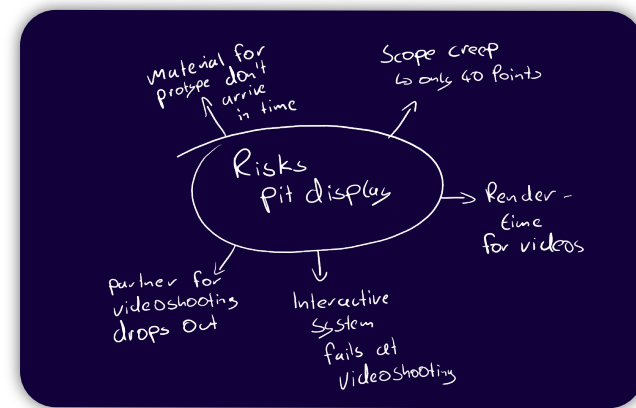
Fig. 18: Extract from Risk mind map for pit display

Unpredictable risks

Despite all planning unpredictable risks might still occur. In these occasions it was important to stay cool-headed and to find the best possible solution. We decided to implement a clear emergency plan for these cases.

1 Identify   3 Discord Meeting with every available member   5 Search for solution
2 Contact Team Manager   4 Classify risk   6 Vote for solution If equal: Team Manager decides

→ Action

Fig. 21: Plan for unpredictable risks

Risk classification

For classifying risks we used a risk matrix which we developed in our preparations for the national finals. This matrix helped us in deciding the further steps with any risk that would occur.

	negligible	Low	critical	catastrophic
Very likely				
likely				
possible				
unlikely				2
Very unlikely			1	

● Ignore Risk   ● Avoid Risk   ● Manage Risk

1 Over Budget at the end of the season   2 Manufacturing partner drops out

Fig. 19: Example from risk classification, National Finals

Risk Control

Once the risks are identified and classified it is important to find a way of targeting the risks and finding solutions. We differentiated between preventive and corrective measures and identified the worst-case scenario of every risk.

Risk	Preventive	Corrective	Worst-Case
Manufacturing partner is unavailable	Time buffer, organize partner who could step in	Contact alternative partner	Car not finished in time
Shipping issues with car submission	Time buffer, alternative cars ready	Fly cars in personally	No points for racing and scrutineering
Data loss	Decentralized storage, local backups	Almost impossible	Files have to be recreated

Fig. 20: Example for Risk Control

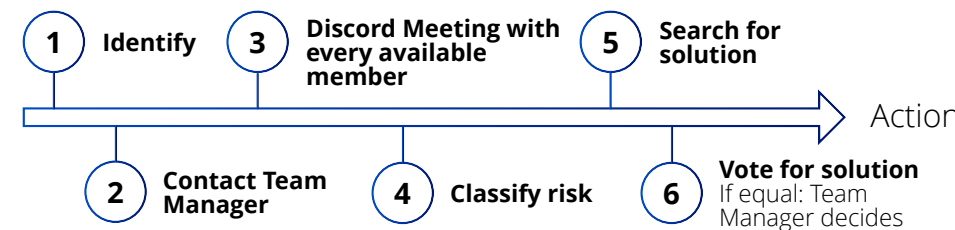
Quality Management
It was important that quality was being assessed regularly throughout the whole project. We designed a process that helped us identify deficits in quality and taking corrective measures at the right time.
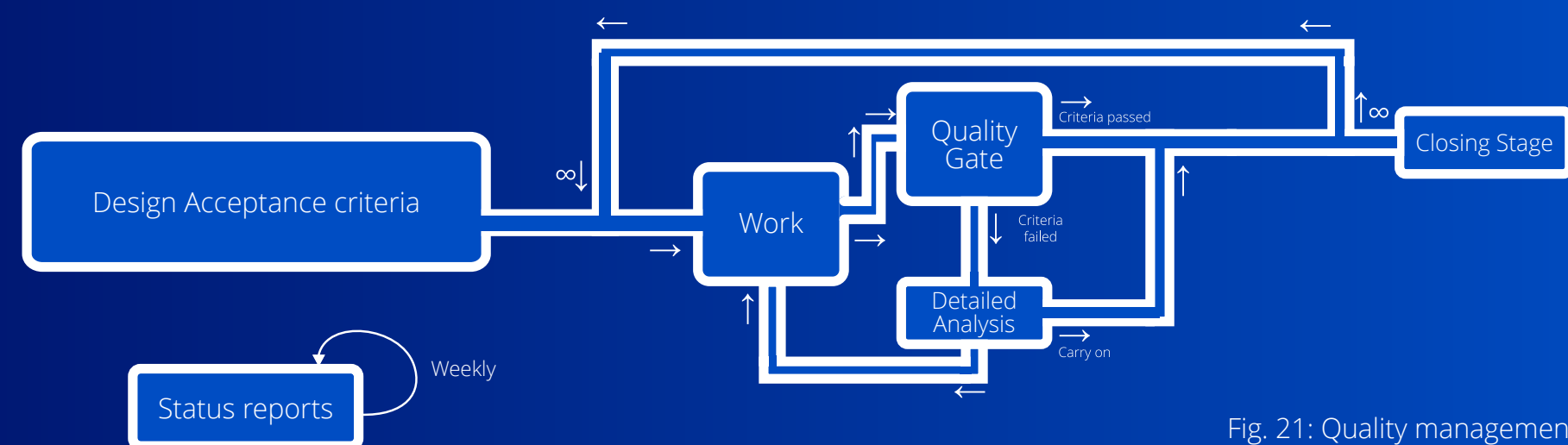
Fig. 21: Quality management cycle

Quality Gate

Part of our quality management was the introduction of quality gates. As already explained, these were the phases where we would reflect on the quality of the respective project element. It is important to highlight that we did not only introduce quality gates when a project element was finished. They rather were a tool for us to assess the quality of our project outcome regularly. An example for how we asses quality is our testing day. After carrying out track testing day III we analysed our procedure. Through our quality acceptance criteria we came to the following result:

Quality Acceptance   13th March 2022
Testday WF III

Breakages?

☐ Yes   ☒ No

If yes, describe breakage, fixing method and analyse comparability:
_____
_____
_____

Difference between prototypes outside Standard Deviation?

☐ Yes   ☒ No

If no, acceptance criteria failed. Go into detailed analysis to decide on further action

Fig. 22: Extract from acceptance criteria Testday WF III

Analysis after failure of Acceptance criteria

We decided to design guidelines which would help us with our decision beforehand but to always decide on concrete action depending on the situation. Carrying on the example shown in Fig. 22 we had to raise the following questions:

13th March 2022

What is the impact of this failure?
Results from testing day can't be used completely.

Which ways do we have to solve the issues?
Option 1: Decide on the results using the limited testing data, our experience and results from CFD.

Option 2: Re-run track testing with the prototypes which were incomparably close to each other.

Which consequences do these solutions have?
Option 1: Schedule could be fulfilled, decision not rigorous → We may choose the wrong direction in our development
Option 2: Schedule has to be adjusted → Manufacturing sponsors need to be contacted, more reliable results

Financial consequences?
25 additional cartridges have to be bought for option two.

Are Sponsors involved?
Manufacturing partner has to be informed of a possible delay of two days for the final CAD if option two is chosen.

Action:
Based on our analysis we decide to choose option two. This causes a slight delay in our schedule but allows more reliable test results.

Fig. 23: Extract from action plan for Testday WF III

Status reports

Status reports were a great way for us to communicate the progress in our team. We shared the progress in our daily team meetings. But for bigger tasks a weekly status report was needed. To avoid scope creep a clear justification for the respective tasks had to be issued in the status report. A great example is our status report for the Hoodie marketing.

7th May 2022

Status report
Hoodie

Justification
Sustainable marketing material which will last. Hoodie is produced under fair standards and with low environmental impact. Great learning and collaboration opportunity with our partner 'ReikaTex'. Potential points for marketing, sponsorship, innovation and collaboration.

Signed-off tasks
Agreement with sponsor, agreement with our school to receive payments for hoodie orders, creation of design, printing and finishing of Hoodie

Issues:
None

Work in progress:
Integrate online shop to our website

Still to do:
Create excitement for our product, post Instagram photos, post blog, ask for feedback

Fig. 24: Status report from the 7th of May 2022, regarding our hoodie

Closing stage

Whenever a task is finished we would discuss the outcome as a team. When risks endanger the success of a particular project element we would do a root cause analysis. In any case we documented the lessons learned from creating the particular element.