

Hydron PROJECT MANAGEMENT PORTFOLIO



WELCOME TO OUR JOURNEY ■

TABLE OF CONTENTS

- 2. Initiation Process - *Initiation Process*
- 3. Project Schedule - *Project Schedule*
- 4. Budget & Resource Management - *Budget & Resource Management*
- 5. Roles & Responsibilities - *Roles & Responsibilities*
- 6. Executing & Monitoring- *Team and Stakeholder Communications & Risk Management*
- 7. Executing & Monitoring - *Risk Management & Monitoring & Controlling*

KICK-OFF MEETING

The purpose of a kick-off meeting is to orient a project team in the direction of success, and cultivate the beginnings of strong team morale and communication.

Our team hosted its kick-off meeting on October 12 2021, ending the hiatus that followed our National Finals campaign. The aim of this meeting was to answer the six fundamental questions of project management. The answers to these questions informed the creation of our project charter. We also discussed the communication platforms that the team would use, and began to survey for our risk register.

In preparation for the kick-off meeting we created an agenda. This became the precedent for all succeeding meetings conducted by the team, and formed the basis of our agenda template. The meeting date, location, attendees, description, structure and outputs were all recorded by the meeting organiser. To the right is the agenda used for the kick off meeting.



Credit: Hydron

We began our kick-off meeting by inducting the team's newest member, Alastair Murphy. This ensured he felt immediately included, as he was brought into the group from the start. Following a quick recap of the National Finals, we turned our attention to defining the project.

By the end of our kick-off meeting, the team had produced the following answers to the six fundamental questions of project management:

- » Why are we competing at the World Finals?
To reach a new level of the F1 in Schools competition and become the 2022 F1 in Schools World Champions.

- » Who are we doing the work for?
We are doing the work for ourselves (the team), the sponsors who have supported us and the school.
- » What are the deliverables?
The deliverables are the three portfolios, car, scrutineering booklet, verbal presentation, pit display, sponsorship prospectus, uniform and digital media.
- » When will each deliverable be done?
Prospectus and digital media should be completed in the next eight weeks. Assuming the submission date is in the middle of June, our car should be finished by the middle of May. All other deliverables need to be completed by the beginning of June to avoid any exam clashes.
- » Where will we use each deliverable?
The prospectus will be sent to potential sponsors. Our uniform will be worn for digital media elements and public events. All other deliverables will be part of the final competition submission.
- » How will we achieve and measure success?
We will achieve success by working collaboratively as a team, integrating our different skillsets into one body of work. Adhering to project management plans will keep us on-task, and ensure the project is completed to the highest possible standard. Success will be measured by our competition results, as well as our own satisfaction with the quality of work produced.

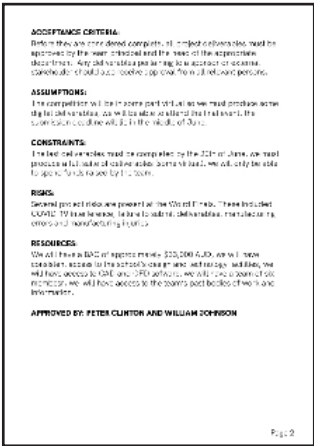
As set out in the agenda, the last part of the meeting was dedicated to identifying risks. An open-forum brainstorm was conducted, and any risks mentioned by a team member were added to a list. After the meeting, our Team Principal sorted the risks by category and added them to our preliminary risk register.

PROJECT CHARTER

A project charter is necessary to attain authorisation for any project. It should succinctly describe the project purpose, deliverables, stakeholders, constraints and risks. This document is the first step in defining project scope.

After the kick-off meeting we were ready to begin drafting the project charter. We used information collected at the kick-off meeting, and our organizational process assets (National Finals project charter and scope statement) as inputs for the project charter.

Our Team Principal wrote the first draft and presented it to the entire team at a meeting. We discussed its contents and suggested edits to each parameter in a brainstorm. Below is the final version of our project charter:



Credit: Hydron

Once this version had been agreed upon, our Team Principal and supervising teacher signed off. This marked the authorisation of the project. Our charter was later used as an input tool for further scope definition, risk management and resource management.

SCOPE STATEMENT

To properly manage scope, it must first be defined. Defining scope allowed us to partition deliverables into activities and establish clear goals for the competition. Any project is restricted to the domain of its requirements and constraints. For our project, these were our deliverables and acceptance criteria, stakeholder conditions, budget and timeframe.

Understanding these attributes is essential to accurately define scope, as we are seeking to understand the total domain of the project. We defined our scope through four tools; a scope statement, work breakdown structure, preliminary timeline and a preliminary BAC (budget at completion).

Scope statements are used to outline a project's deliverables, define acceptance criteria and set goals. A proper scope statement is a prerequisite for scheduling and time management processes.

We used our project charter, National Finals Scope Statement and the kick-off meeting as inputs for our scope statement.

Our Team Principal hosted a meeting to review the first draft and discuss acceptance criteria. We agreed that for a deliverable to be considered complete, it must first receive approval from the relevant Department Head before the Team Principal could sign off. With deliverables such as digital media which often concerned a specific sponsor, we also decided that approval from our contact at the organisation was necessary.

Below is our final scope statement for the 2022 World Finals:

PROJECT SCOPE STATEMENT			
PROJECT MANAGER	Will Johnson	DATE	October 2021 - July 2022
NAME	Hydron 2022 F1 in Schools World Finals Project		
PROJECT OBJECTIVE	The successful and complete submission of project elements by the due date (20/06/22).		
SCOPE DESCRIPTION	In Scope: - Submission of deliverables - Acquisition of funds - Maintenance of World Finals team Out of Scope: - Preparation for future competitions - Sourcing of fundamental resources (machinery etc.)		
ACCEPTANCE CRITERIA	For a deliverable to be accepted, it must first receive approval from the relevant sub-team head (see Team Structure page 5). Following this, the work should be scrutinised by another team member before it is finalised.		
DELIVERABLES	Cars, Sponsorship Prospectus, Design & Engineering Portfolio, Enterprise Portfolio, Project Management Portfolio, Scrutineering Booklet, Registration Documents, Digital Media, Uniform, Trade Display Video		
CONSTRAINTS	- Budget: \$33,000 - Timeframe: 9 months - Team Size: 6 members - Limited time at school		

Credit: Hydron

PROJECT SCHEDULE

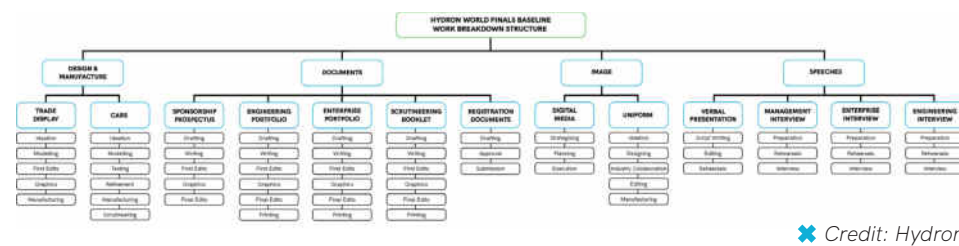
WORK BREAKDOWN STRUCTURE

A Work Breakdown Structure (WBS), is a document that itemises deliverables into increasingly specific and manageable activities. This provides a substructure for the work that must be done to achieve success.

The WBS inputs were our project charter, scope statement, environmental factors (competition submission guidelines) and organizational process assets (National Finals WBS).

Our Team Principal began by decomposing the project into key work packages. Each work package was then broken down by deliverable, as this best suited the competition format. Finally, we decomposed each deliverable into a series of activities necessary for its completion.

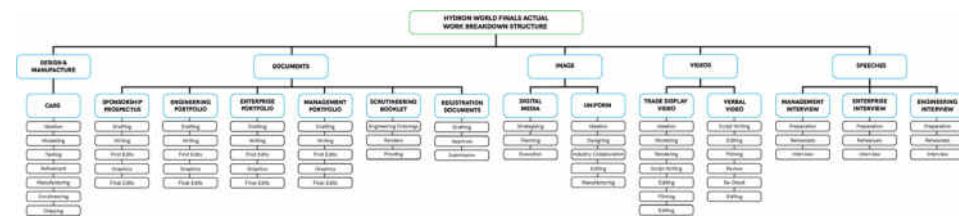
Below is the our WBS scope baseline:



Credit: Hydron

At the time our WBS was created, 2022 competition regulations had not yet been published. When they were published, our scope had to be adjusted to account for the new “hybrid” competition and the deliverables it outlined.

Below is the final version of our WBS:



Credit: Hydron

SCOPE CONSTRAINTS

During the scope definition process, deliverables were identified as our primary constraint. This was because they were fixed by environmental factors (competition regulations) and so couldn't be adjusted.

Despite this, we wanted to elaborate on scope definition for two other defining constraints: cost and time.

PRELIMINARY BUDGET AT COMPLETION

To better integrate cost with our scope definition, we constructed a preliminary budget at completion (BAC).

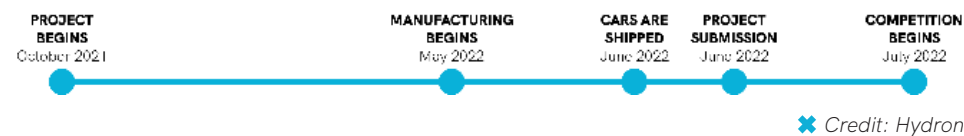
Organisational process assets were used, as we adapted the cost of competing for one of the school's previous teams with parametric estimation. Our reference figure was the \$29,940 that it cost Evolve AU to compete in Abu Dhabi. Considering the more expensive flights and accommodation for travel to the United Kingdom, as well as an additional team member, we estimated a BAC of \$39,000.

This estimation allowed us to set an initial financial goal for the competition, which could be later developed by more precise financial estimation processes.

PRELIMINARY TIMELINE

In order to more specifically define our scope's time constraint, we created a preliminary timeline.

We used our draft scope statement (v1.1), and environmental factors (competition details) to linearly map important project dates. These included competition dates, submission date and baseline completion of work date. Below is the preliminary timeline:



This estimation was used as a rough guideline for the creation of our comprehensive scheduling tools.

PROJECT SCHEDULE

Schedule management is conducted to ensure the timely completion of a project. Our activities had already been defined, but they still had to be sequenced and have their durations estimated. To complete this stage of the schedule management process, we applied the Critical Path Method (CPM) and a Gantt chart.

Note: Registration documents were excluded from our schedule, as we couldn't predict when this deliverable would have to be completed.

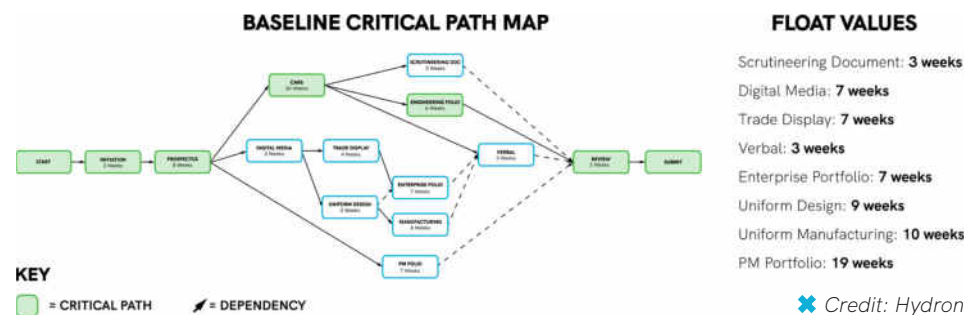
CRITICAL PATH METHOD

The critical path method identifies the activities which can not be delayed without an extension of the overall project duration. This is done by sequencing activities with duration and dependencies in a network, before calculating the longest path from project start to finish.

This process also allows for activity float, or “slack” as it is colloquially known, to be calculated. For instance, if an activity's path is two weeks shorter than the critical path, it has a two-week float. This means the activity can be prolonged by up to two weeks before it lengthens the total project duration.

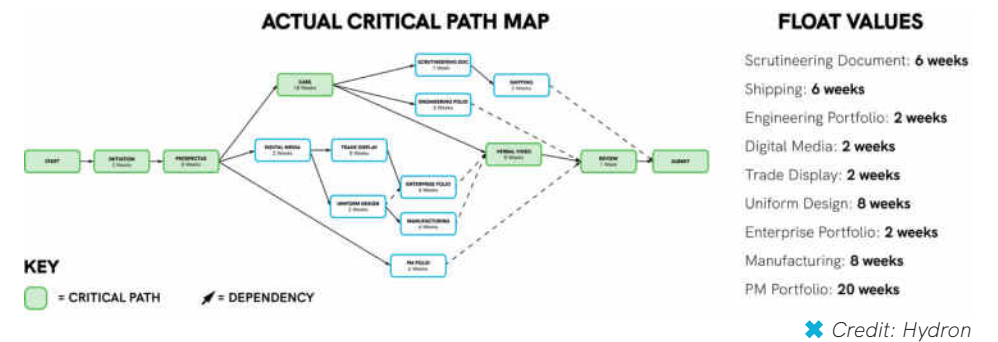
The inputs used for this tool were our project charter, scope statement, work breakdown structure, preliminary timeline and environmental factors (competition submission guidelines).

Below is the baseline critical path map with activity float values.



We used our critical path map to ensure that the overall project schedule wasn't delayed. For example, when our car design process fell behind in its tenth week, Alex (Digital) began to assist with wheel development. The two-week float attributed to the Trade Display meant that while this activity took a week longer than expected, the overall project deadline could still be met.

Below is the critical path map that reflects the team's actual schedule:



GANTT CHART

A Gantt chart is a project management tool that presents schedule information in a table. They can be extremely specific, and depict time estimations and dependencies on the scale of activities (tasks).

Our Gantt chart inputs were the scope statement, work breakdown structure, preliminary timeline, critical path map and environmental factors (competition submission guidelines).

We began creating our Gantt chart by laying out deliverables as they were sequenced in the critical path map. Each deliverable was then partitioned into the activities stipulated by the work breakdown structure. At this point, a clear list of all project tasks had been achieved.

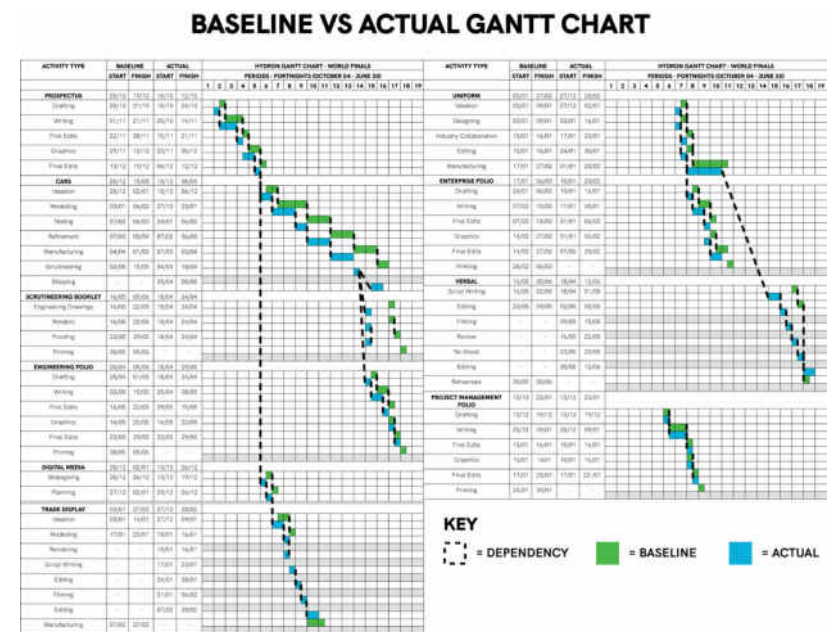
Our critical path map already had time estimations for each deliverable. This acted as a reference point for calculating activity durations; the duration of a deliverable's activities would sum to the duration of the deliverable.

Finally, dependencies between activities could be linked. Intra-deliverable dependencies were connected first, before the last activity of each deliverable was linked to the first of another in accordance with the critical path map.

By completing these three stages, we successfully created a baseline Gantt chart that outlined activities (tasks), time estimations and dependencies.

Schedule variance led to some disparity between our baseline and actual Gantt chart. See page 7, Monitoring and Controlling, for schedule variance analysis information.

Below is a Gantt chart that depicts both our baseline and actual schedule:



Credit: Hydron

PROJECT MANAGEMENT PORTFOLIO

BUDGET & RESOURCE MANAGEMENT

COST ESTIMATION

It is often necessary to estimate the total cost of a project before preparing a budget. This is particularly true when the budget is constructed to meet a fixed cost.

As outlined in our preliminary BAC (budget at completion) (see Initiation Processes), parametric estimation was the first technique used to approximate net expenses. Considering the cost to compete for 2019 World Finalists Evolve AU, we reached a parametric estimation of \$31,000 AUD.

Three-point estimation was used as a more comprehensive tool to verify our parametric estimation. We chose to use a beta distribution, as it considers both project opportunity (minimum potential cost) and project risk (maximum potential cost). These are weighted with the likely project cost in the following formula:

$${}^c_m = \text{Minimum cost} \quad {}^c_M = \text{Maximum cost} \quad {}^c_P = \text{Likely cost} \quad {}^c_E = \text{Cost estimate} \quad {}^c_E = \frac{{}^c_m + 4 \times {}^c_P + {}^c_M}{6}$$

We used the below values for our minimum, maximum and likely project cost estimations:

$$\begin{aligned} {}^c_m &= \$26,000 \\ {}^c_P &= \$31,000 \\ {}^c_M &= \$48,000 \end{aligned} \quad \frac{26,000 + 4 \times 31,000 + 48,000}{6} = \$33,000 \text{ AUD}$$

When entered into the above formula, our three-point estimation predicted a total project cost of \$33,000 AUD.

PROJECT BUDGET

A budget is a financial plan for revenue and expenses over the course of a project. Proper budgeting should consider and account for potential revenue decreases and cost increases. We used our WBS, Gantt chart and cost estimation data as input tools when creating our budget.

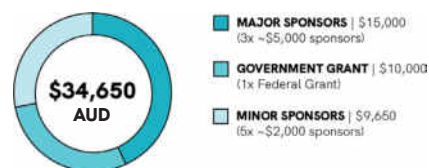
Our \$33,000 AUD expenditure BAC had already been calculated with cost estimation processes. For our revenue BAC, we added an additional management reserve buffer of 5%. A management reserve is an amount of money set aside for unexpected cost increases. This brought our projected revenue BAC to \$34,650 AUD.

We split our expenditure budget into deliverables to itemise costs. We also split our revenue budget into sources of income. This allowed us to understand the number of sponsors and amount required of each to reach our revenue BAC. Our Gantt chart was used to specify initial timeframe windows for expenditure.

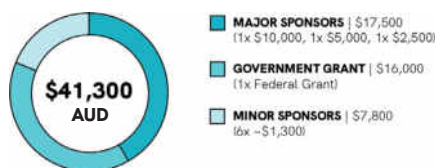
Below are our baseline and actual revenue and expenditure budgets for the World Finals:

REVENUE BUDGET

BASELINE



ACTUAL



✖ Credit: Hydron

EXPENDITURE BUDGET

BASELINE



ACTUAL



✖ Credit: Hydron

MICROSOFT EXCEL

We used Excel as our primary tool to track finances. Below are some of the more advanced functions we used for efficient resource management.

Conditional formatting: Conditional formatting allows you to automate cell properties based on axiomatic rules. For instance, in our own spreadsheets, if total expenses exceeded revenue the cell colour changed from green to red. This made it easier to visually monitor the team's financial status.

✖ Credit: Hydron

Currency conversion: By connecting our spreadsheet to a currency exchange rate database, we were able to obtain live currency conversions from GBP to AUD. This made tracking expenses easier for our team, as it accurately standardised the currency for costs such as accommodation.

✖ Conversion 09/04 vs 16/05. Credit: Hydron

RESOURCE ACQUISITION

Acquisition of resources is the process of accruing finances and materials to facilitate project operations.

» Where?

We used organizational process assets (National Finals acquisition breakdown) and our revenue budget to define where we would source our resources from.

With these inputs, sponsorship and government funding were identified as our two sources of monetary support. See our revenue budget for where we planned to (and actually) acquired finances from (left).

We also recognized preferred and secondary supply options for material resources. The critical materials we had to obtain were: CFD software, PEEK wheels, bearings, 3D prints and uniforms. Below is a table with potential and actual suppliers for each of these materials:

RESOURCE:	PREFERRED SUPPLIER:	SECONDARY SUPPLIER:
CFD Software	Leap Australia	Ansys International
PEEK wheels	Dotmar Plastics	Arptech
Bearings	CGB Precision Products	Boca Bearings
3D Prints	Objective 3D	3D Systems
Uniforms	S-Trend	2XU

☐ = Actual Supplier

✖ Credit: Hydron

» When?

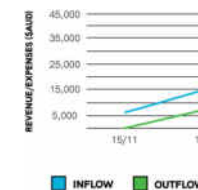
Resource acquisition is a dynamic process that evolves with time. We used a cashflow diagram to plan when each resource had to be acquired.

Cashflow diagrams depict net inflows and outflows with respect to time. If net outflows exceed net inflows, the project is in deficit with no available finances.

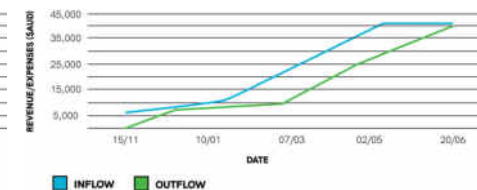
To avoid cashflow issues, we pushed fundraising in the leadup to projected high spending periods (in accordance with our expenditure budget).

Below are our baseline and actual cashflow diagrams:

BASELINE



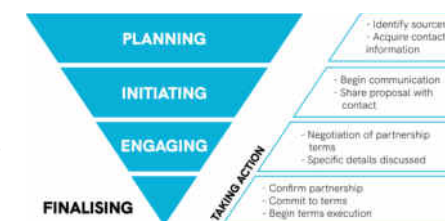
ACTUAL



✖ Credit: Hydron

» How?

Our resource acquisition plan was the roadmap to our World Finals goals. This plan detailed four phases: planning, initiating, engaging and finalising. To the right is a diagram explaining our resource acquisition plan:



✖ Credit: Hydron

RESOURCE EXPENDITURE

Expenditure is the process of exhausting project resources on deliverables.

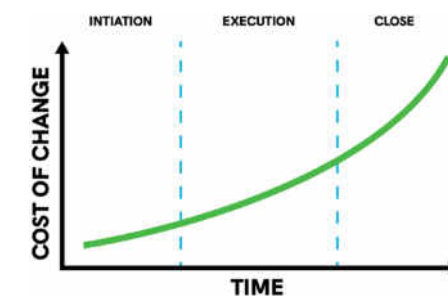
» Where?

In our expenditure budget, deliverables were identified as the primary contributor to project cost. Because of this, we used deliverables as the critical divisor when breaking down our expenses. See our expenditure budget (left) for an itemized list of where we spent our resources.

» When?

Like resource acquisition, expenditure is not a static process - the rate at which we spent resources varied greatly throughout the project.

The cost of change increases as you approach the project deadline. With this in mind, we pushed major expenses as far forward as possible in the project to account for potential change if needed.

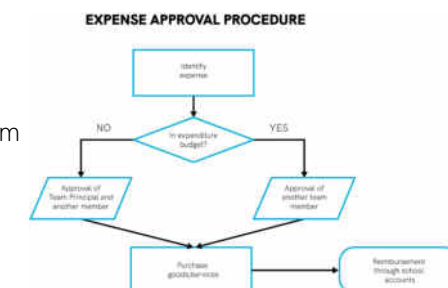


✖ Credit: Hydron

Our planned and actual expenditure timelines are outlined in our cashflow diagrams (above).

» How?

To control expenses, we created an expenditure approval procedure. To the right is a flow chart that explains this process with the steps to be taken by team members at each phase.



✖ Credit: Hydron

05 PROJECT MANAGEMENT PORTFOLIO

ROLES & RESPONSIBILITIES

TEAM MEMBERS

A project team is a group of individuals with a diverse set of skills, knowledge and experience. To be most effective, a team should work collaboratively towards a common goal.

This common goal was clear for our team; to win the World Finals.

To properly structure the team, establish accountability and assign responsibilities, we first had to identify our team members and understand the skills they brought to the team.



WILL JOHNSON
Team Principal

- Experience:** Three years as an Enterprise or Quality Control Manager.
- Skills:** Ansys, CATIA V5, Fusion 360, KeyShot, QuickCam Pro.
- Knowledge:** Aerodynamics, Computer Aided Manufacture, PMI Methodology.



ANDREW YEANG
Head of Engineering

- Experience:** Four years as a Lead Engineer.
- Skills:** Adobe Design Suite, Ansys, CATIA V5, Excel, Fusion 360.
- Knowledge:** Aerodynamics, Kinematics, Material Properties.



BEN NOONAN
Head of Enterprise

- Experience:** Four years as a Marketing Director.
- Skills:** Adobe Design Suite, MailChimp, Meta Business Suite, TikTok, Twitter.
- Knowledge:** Advertisement, Image Composition, Marketing, Social Media.



ALEX LIU
Digital

- Experience:** Four years as a Team Manager and Graphic Designer.
- Skills:** Adobe Design Suite, Ansys, Blender, CATIA V5, Fusion 360, KeyShot.
- Knowledge:** Aerodynamics, Image Composition, Kinematics.



ALASTAIR MURPHY
Engineering

- Experience:** Two years as a Design Engineer.
- Skills:** Adobe Design Suite, Ansys, CATIA V5, Fusion 360, KeyShot.
- Knowledge:** Aerodynamics, Kinematics.



TIM CRICHTON
Manufacturing

- Experience:** Four years as a Manufacturing Engineer.
- Skills:** Adobe Design Suite, Fusion 360, QuickCam Pro.
- Knowledge:** Computer Aided Manufacture, Kinematics, Material Properties.

TEAM STRUCTURE

Strong structure is a prerequisite for any well-functioning project team. Appropriate structure enables the establishment of efficient information streams, job functions and responsibilities.

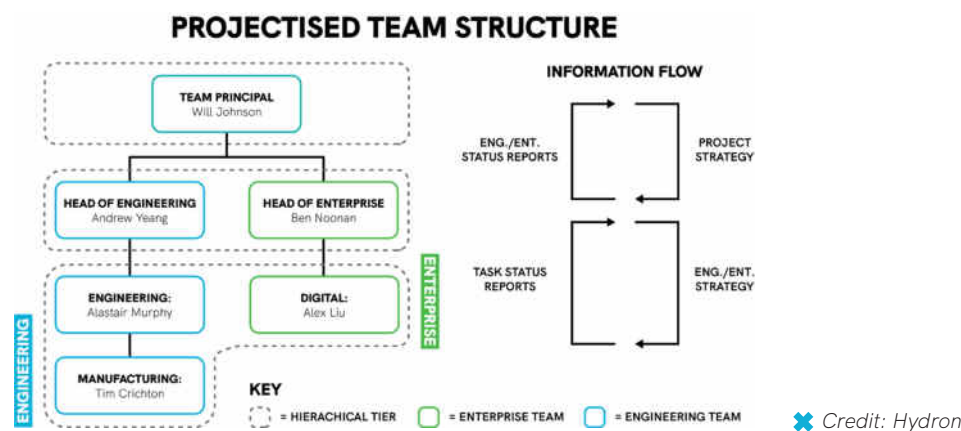
Our team was structured in accordance with a projectized organizational layout, one of several archetypes prescribed by the PMI. Projectized structures revolve around a team's projects and, by extension their work packages and tasks. Team members are also typically collocated, and projects are run exclusively.

As deliverables were our project's anchoring constraint, it made sense to build the team around this parameter. The WBS and Critical Path Map became our input tools, as they detailed our work packages, deliverables and tasks.

To adhere to project and structural demands we devised and organised the following roles: Team Principal, Head of Engineering, Head of Enterprise, Digital, Engineering and Manufacturing. This created a hierarchical flow of information (see diagram below) - moving down the stratum members propagate strategy, while inversely they report on project status. This optimised communication and information exchange throughout the team.

With roles established and structured, we proceeded to define job functions (see Job Functions). Once this was completed, each role was allocated to a team member. Finally, tasks and responsibilities were assigned (see RACI Responsibilities) and our structure was complete.

Below is an overview of the final projectised structure implemented by our team.



JOB FUNCTIONS

Understanding the explicit functions of each role allowed us to better integrate individuals within the greater team function.

When defining each role, we considered both the individual and broader team demands. Through this lens, we constructed a series of brief role descriptions. Organisational process assets (National Finals job functions) were used as the primary input for these summaries.

Below are our team's job function descriptions:

- Team Principal:** Manages the overarching project strategy and daily operations.

- Head of Engineering:** Manages the team's engineering work packages. Devises strategy for the engineering team.

- Head of Enterprise:** Manages the team's enterprise work packages. Delivers strategy to the enterprise team.

- Digital:** Designs the team's digital content. Assists with marketing campaigns. Documents and writes marketing and digital content for the portfolios.

- Engineering:** Models CAD prototypes and conducts CFD simulations. Documents and writes engineering content for the portfolios.

- Manufacturing:** Operates CAM software and completes hand-finished manufacturing. Documents and writes manufacturing content for the portfolios.

RACI RESPONSIBILITIES

A team member involved in a task is responsible for it to some extent. Clearly defining these responsibilities mitigates the risk of tasks receiving too much or too little attention from the team.

Having defined our job functions, responsibilities were delegated with a RACI matrix. The inputs for this process were our projectised structure, job function definitions, as well as our WBS.

The team's projectised structure was especially useful when assigning responsibilities - engineering and enterprise tasks were compartmentalized and assigned to their respective teams. This strengthened our team structure, as it enabled members to specialise in their relevant task skillsets and work collaboratively in smaller units towards task goals.

A RACI matrix visually classifies team members in accordance with the acronym; people are designated as either Responsible, Accountable, Consulted or Informed (RACI) on any given task.

The main benefit of using a RACI matrix was its simplicity. The level of involvement for each team member on each task was clear and could be followed with a simple acronym. This prevented confusion and allowed for peers to cross-check adherence to the guide.

Below is the RACI matrix employed by our team at the World Finals:

	TEAM PRINCIPAL	HEAD OF ENGINEERING	HEAD OF ENTERPRISE	DIGITAL	MANUFACTURE	ENGINEERING
Cars	I	R			A	A
Sponsorship Prospectus	C		R	A		
Engineering Folio		R			C	A
Enterprise Folio	C		R	A		
Management Folio	R	I	A			
Scrutineering Booklet		A			A	R
Registration Documents	R		C			
Digital Media			A	R		
Uniform	C		A	R		
Trade Display Video	A		C	R		
Verbal Video	R	A	A	C	C	C
Management Interview	R		C			
Enterprise Interview	I		R	C		
Engineering Interview	I	R			A	A

KEY

- Responsible
- Accountable
- Consulted
- Informed

Credit: Hydron

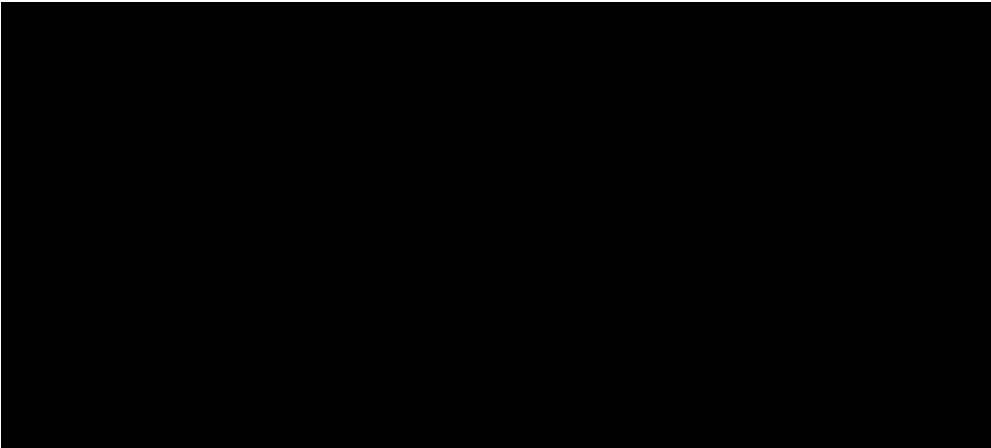
STAKEHOLDER REGISTER

Stakeholder is a term that refers to any group or individual directly impacted by the success of our team. The creation of a stakeholder register was the first step in our stakeholder communications process.

With a team brainstorm we were able to identify seven key stakeholder types: Team members, supervisors, mentors, sponsors, media, judges and supporters. During this brainstorm we also drafted a list of stakeholders.

Our National Finals stakeholder register was stripped down and used as the base for our World Finals register. We added new stakeholders and attributed to them a role, organisation, type and set of contact information.

Our stakeholder register was updated throughout the course of the competition. Below are our baseline and actual stakeholder registers:



Credit: Hydron

COMMUNICATION

Communication is the transfer of information from one point to another within a project. Clear communication tools are conducive to efficient and effective communication.

We began our communications process by outlining our suite of communication tools for the World Finals. See the communication tools index below:



DISCORD

Functionality: File sharing, messaging, video and voice calls.

Stakeholders: Team members, mentors, supporters

Frequency: Used daily



MICROSOFT OUTLOOK

Functionality: Clear, large volumes of information.

Stakeholders: Team members, supervisors, sponsors, mentors

Frequency: Used daily



MICROSOFT ONENOTE

Functionality: Collaborative interaction in a live document.

Stakeholders: Team members

Frequency: Used 4+ times a week



MICROSOFT TEAMS

Functionality: Video calls with Microsoft suite integration.

Stakeholders: Team members, supervisors, mentors

Frequency: Used once a month



__OOM

Purpose: Video calls with external stakeholders.

Stakeholders: Mentors

Frequency: Used once a month



MAILCHIMP (ELECTRONIC DIGITAL MAIL)

Functionality: Emails to dynamic subscriber base.

Stakeholders: Supervisors, mentors, sponsors, supporters

Frequency: Used once a month

COMMUNICATION PLANS

After our tools were defined, we constructed communication plans for our team and relevant stakeholders. Each plan describes the information communicated, the frequency of contact as well as the platform used to deliver information.

Due to the relatively small scale of our project, we opted for concise communication plans. The simplicity of these plans made them easy to follow for the entire team, with little compromise to quality of information.

Our stakeholder register and communication tools index were used as input tools for these plans. See below our stakehodler communication plans:

TEAM MEMBERS

- Stakeholder:** Team members
- » **Communicated information:** Status reports, project data, project schedule, scope, finances, risk assessment.
 - » **Frequency of communication:** Daily
 - » **Communication platforms:** Discord, Microsoft Outlook, Microsoft OneNote, Microsoft Teams

STAKEHOLDERS

- Stakeholder:** Supervisors

 - » **Communicated information:** Status reports, finances, risk assessment.
 - » **Frequency of communication:** Weekly
 - » **Communication platforms:** Microsoft Outlook, Microsoft OneNote, Microsoft Teams
- Stakeholder:** Mentors

 - » **Communicated information:** Status reports, project data.
 - » **Frequency of communication:** Monthly
 - » **Communication platforms:** Discord, Microsoft Outlook, Microsoft Teams, Zoom, Mailchimp

- Stakeholder:** Sponsors

 - » **Communicated information:** Status reports, project data, finances.
 - » **Frequency of communication:** Weekly
 - » **Communication platforms:** Microsoft Outlook, Zoom, Mailchimp
- Stakeholder:** Supporters

 - » **Communicated information:** Status reports.
 - » **Frequency of communication:** Weekly
 - » **Communication platforms:** Discord, Mailchimp

RISK IDENTIFICATION

Risk identification constituted the first phase of our risk management process. In the project initiation phase, we had already established a preliminary risk register.

To build on our list of identified risks, we used the Delphi technique. This method uses a panel of experts to anonymously assess ideas. Our panel was comprised of our Team Principal, Primary supervising teacher and Manufacturing engineer. Each member of the panel submitted a list of the risks they had identified. The group then went through the items and voted to approve or reject risks from the risk register.

Our application of the Delphi technique left us with the following list of risks:

- » Missed submission
 - » Shortage of resources
 - » Increased costs
 - » Decreased revenue
 - » COVID-19 isolation
- » COVID-19 lockdown
 - » Cars fail to arrive on time
 - » Cars break in transit
 - » Car manufacturing error
 - » Proportional penalty

AREAS OF IMPACT

We also categorised risk by area of project impact. The areas we identified corresponded to our four project constraints: Resources, schedule (timing), scope and quality. The deliverables affected by each risk event were also integrated with our risk register (see extract below):

RISK	RESOURCES	SCHEDULE	SCOPE	QUALITY	DELIVERABLES
Increased costs					Cars, uniform
COVID-19 isolation					All deliverables

 = CONCERNED AREA OF IMPACT

Credit: Hydron

IMPACT ASSESSMENT

A probability and impact matrix (PIM) is a risk assessment tool that quantifies the likelihood and impact of a risk event. Each risk is given a score from 0 to 1 on these two measures. The product of probability and impact scores gives the PIM rating.

We devised a scheme to categorise risks as high, medium or low threat based on their PIM ratings. These threat levels were used in the response planning stage to determine which risks needed the most attention. See our PIM and threat level scheme below:

PROBABILITY	IMPACT						
	0.00	0.20	0.40	0.60	0.80	1.00	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	THREAT LEVEL SCHEME  = Low-threat: 0.00-0.20 PIM Rating  = Medium-threat: 0.21-0.40 PIM Rating  = High-threat: 0.41-1.00 PIM Rating
0.20	0.00	0.04	0.08	0.12	0.16	0.20	
0.40	0.00	0.08	0.16	0.24	0.32	0.40	
0.60	0.00	0.12	0.24	0.36	0.48	0.60	
0.80	0.00	0.16	0.32	0.48	0.64	0.80	
1.00	0.00	0.20	0.40	0.60	0.80	1.00	

Credit: Hydron

PROJECT MANAGEMENT PORTFOLIO EXECUTING & MONITORING

Our PIM was applied to each area of impact for every project risk. In doing so, we achieved assessment on impact to resources, schedule, scope and quality for every risk event. This analysis was included in our risk register (see extract below):

RISK	RESOURCES	SCHEDULE	SCOPE	QUALITY	DELIVERABLES
Increased costs	0.60	0.32	0.32	0.24	Cars, uniform
COVID-19 isolation	0.64	0.80	0.08	0.24	All deliverables

✖ Credit: Hydron

RESPONSE PLANNING

Our risk response plan was segmented in accordance with our assessed risk threat levels:

- » **High threat:** High threat risks had the potential for ruinous project impact. For this reason, we planned a mitigation and avoidance strategy for each one. Mitigation plans lowered the potential impact of each risk, while avoidance plans reduced the probability of occurrence.
- » **Medium threat:** Medium threat risks were still considered hazardous. For each medium threat risk we targeted either event probability or impact - whichever had scored higher in our PIM. This meant that each medium threat risk was met with a bespoke avoidance or mitigation plan based on the nature of the risk.
- » **Low threat:** Low threat risks had minimal potential for negative project impact. We planned one strategy for each low threat risk, as this required less ongoing attention.

See an extract of our final risk register with response plans below:

RISK	RESOURCES	SCHEDULE	SCOPE	QUALITY	DELIVERABLES	RESPONSE PLANS
Missed submission	0.00	0.40	0.20	0.40	All deliverables	Avoidance: Allow +1 week submission buffer.
Shortage of resources	0.40	0.24	0.32	0.24	Cars, Uniform, Digital Media	Mitigation: Identify secondary materials suppliers.
Increased costs	0.60	0.32	0.32	0.24	Cars, Uniform	Mitigation: Identify secondary suppliers for cheaper goods.
Decreased revenue	0.40	0.32	0.24	0.32	Cars, Uniform, Prospectus	Mitigation: Identify backup sponsor options.
COVID-19 isolation	0.64	0.80	0.08	0.24	All deliverables	Avoidance: Wear masks and RAT tests. Mitigation: Prepare digital content for at home work.
COVID-19 lockdown	0.20	0.20	0.00	0.20	All deliverables	Mitigation: Establish virtual communication platforms preemptively.
Cars fail to arrive on time	0.00	0.20	0.16	0.16	Cars	Avoidance: Allow +7 days shipping buffer.
Cars break in transit	0.00	0.20	0.16	0.16	Cars	Avoidance: Send in foam camera box.
Manufacturing error	0.32	0.40	0.00	0.48	Cars	Mitigation: Produce 2 reserve cars as backup for error.
Proportional penalty	0.00	0.00	0.00	0.20	Cars	Avoidance: Scrutinise cars to check for PP before sending.

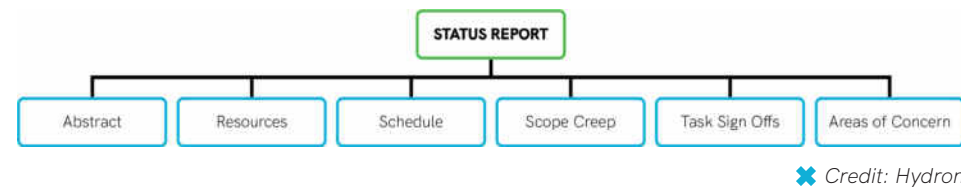
✖ Credit: Hydron

STATUS REPORTS

A status report is a document that summarises the state of a project. Status reports should be delivered by the project manager and distributed to stakeholders on a regular basis. Effective status reports are simple, informative and standardised.

Our organisational process assets (monitoring techniques) were the primary input tools used in the creation of our status reports.

Each report was split into six distinct sections for clarity and consistency:



✖ Credit: Hydron

CONTENT BREAKDOWN

Abstract: This introduction detailed events that had occurred since the last report. The abstract section also included a series of sliders to indicate general project performance for each of the key areas covered in the report.

KPI: RESOURCES



✖ Credit: Hydron

This section allowed stakeholders to ascertain a quick overview of project status before reading the entire document.

Resources: To monitor resource status throughout the project, we used cost and revenue variance analysis. These techniques compare predicted and actual values to monitor financial performance. When variance was positive, it meant the project was performing better than expected. Below is an extract of our cost and revenue variance calculations:

PREDICTED COST
\$14,500 AUD

ACTUAL COST
\$9,930 AUD

COST VARIANCE
\$4,570 AUD +

Taken from 07/03 Status Report

✖ Credit: Hydron

We included variance analysis data and our budgets in each status report. This content was primarily targeted towards sponsors who were directly invested in the team's resources.

Schedule: We also used variance analysis to monitor project schedule. Schedule variance is almost identical to cost and revenue variance, but measures how far ahead or behind schedule a project is.

Schedule variance was calculated by comparing predicted and actual task timeframes within our Gantt chart. Below is an extract of our schedule variance analysis:

PREDICTED TIMEFRAME
04/04 - 01/05

ACTUAL TIMEFRAME
07/03 - N/A

SCHEDULE VARIANCE
28 DAYS +

Taken from 07/03 Status Report

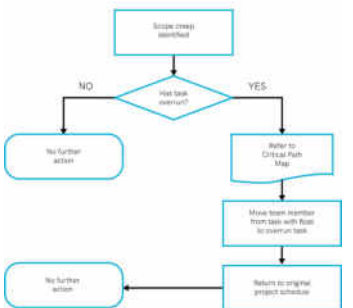
✖ Credit: Hydron

Each status report included schedule variance analysis and the most recent version of our team's Gantt chart. This allowed stakeholders to track our progress in the lead up to submission.

Scope creep: Scope creep is the uncontrolled expansion of project scope, usually as a result of a change in project requirements. If scope creep isn't managed it can lead to unexpected increases in costs and schedule delays.

We identified scope creep by auditing team member activities on a monthly basis. These activities were collated in a list and compared with our "in scope" activities, as defined in our scope statement (see Initiation processes).

SCOPE CREEP ACTION PLAN



✖ Credit: Hydron

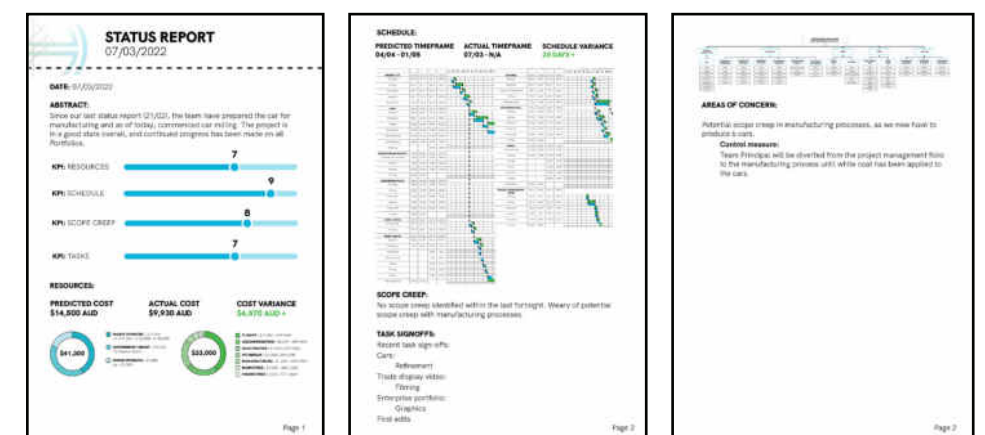
Whenever tasks overran as a result of scope creep, our team followed a management action plan. This plan was devised by our Team Principal and distributed to team members as a flow chart (above):

Task sign-offs: Recent task sign-offs were listed in each status report. Once the Team Principal had signed off on a task, it was added to our growing list of completed activities.

All task sign-offs were documented in a colour coded WBS: Green tasks had been signed off on, orange tasks were active and blue tasks were yet to be started.

Areas of concern: To conclude each status report, we highlighted the areas of concern that had emerged from our monitoring processes. Where applicable, we also listed the control measures being implemented to prevent project impact.

See below an example of one of the team's status reports, published on 07/03:



✖ Credit: Hydron

Issue log: Our issue log was used to report and document project problems. The log was hosted in OneNote for live editing and accessibility. At meetings, the Team Principal would raise new entries to the team's attention for a solutions brainstorm. Once an adequate solution had been achieved, it was added to the log entry and the issue was marked as resolved.