UKSEDS COMPETITIONS



OLYMPUS ROVER TRIALS 2026 - 27

[INSERT TEAM NAME]

PRELIMINARY DESIGN REVIEW

SPONSORED BY

AIRBUS

UKRI Science and Technology Facilities Council

RAL Space

Guidance

The Preliminary Design Review document has a word count limit of 4000-6000 words, which includes everything except the appendices **(all contents of tables are included as well)**. Any information beyond the 6000 word count limit **shall not be marked. Hence, if the document is longer than 6000 words, the team will lose a lot of marks from "missing" sections past the 6000 word limit.**

The appendix does not count towards the word count limit, and thus will not be awarded marks - content in the appendix shall only be used as supplementary material in marking to aid understanding.

Feel free to format the document as desired, but bear in mind that marks are allocated towards communication and presentation so please avoid cramped figures and tables!

You can use this template as a guide, but feel free to change the structure if you think it would help. For more details on the content expected in the PDR, check out section 3.4.4 of the Olympus Rover Trials Statement of Work document (ORT SOW 3.4.4), and the referenced ECSS standard. This document will be reviewed by industry systems engineers, who will provide written feedback on your design concept, documentation, and project management arrangement. The marker will be familiar with the competition, but not necessarily aware of the exact brief or requirements, and the report should be written accordingly.

Please export your document as a Word document (.docx) before converting to a PDF, since converting directly to PDF reduces image quality.

Please contact rovers@ukseds.org if you have any further questions.

The deadline for the submission of this PDR is the **13th December 2026 at 18:00**.

Below is a weighting of marks awarded for each individual section. This can be used as an indicator for how much information you should be providing for each of them.

Section	Weighting
Introduction	5%
Project Management	15%
Systems Overview	25%
Preliminary concept	30%
References	5%

The remaining weighting is for general communication and presentation of the report and the effective utilisation of appendices.

OLYMPUS ROVER TRIALS

2026 - 2027

[Team Name]

[Team Logo]

Issued by (Project Lead): <Project Lead Name>
University: <University Name>

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1 Introduction

Use this section to introduce your project, team, and concept. Mission patches are welcome!

Top Tip: this section should give a brief overview of who you are, and your approach to the competition. E.g., are you an interdisciplinary team from an SU space society looking to get a foundation in robotics, or a team of engineering students entering for a coursework project? Maybe somewhere in between! Don't worry if your team composition changes a little bit, that's natural, but please notify us of significant recompositions such as replaced members.

Give a quick overview of your approach here too; propulsion method, payload system, and any novel features you want to shout about! Again, don't worry, nothing is set in stone at PDR stage.

1.1 Mission Statement

The mission statement is a short statement that describes the overall goal of the team.

Outline the key purpose of the rover, highlighting the mission context and key requirements. This will make your report a standalone document and remove the assumption that the reader is as familiar with the competition as you! This will help solidify your own understanding of the requirements, and it will also be useful if you ever refer back to this PDR, or pass it on to future years to remind them of this year's rules! This is also a good place for setting out non-core requirements that you may be targeting. For example, developing a fully autonomous rover or inspiring more students to pursue a career in the space industry.

2 Project Management

Project management is easy to overlook, but get it right and you will be a far more efficient team. We're all here to build a rover right, not do paperwork!? Well, establishing a good project management approach early on will reap rewards later. Remember, you're a team of students, everyone has other important (and not so important) things on throughout the year, and unlike paid employment you need to incentivise everyone to show up!
Think about how work will be assigned to match everyone's skills, interests, and development goals. How will you de-risk this so that entire systems aren't reliant on one person?

2.1 Assigned Roles and Team Roster

Include a table of team members and their assigned roles.

Name	Role	Year/Course	Email

Outline your team structure. By PDR it's good to have decided on a role structure. Will you have one project manager and everyone else just "engineers", or will you have sub team leaders? Perhaps assign an outreach person?

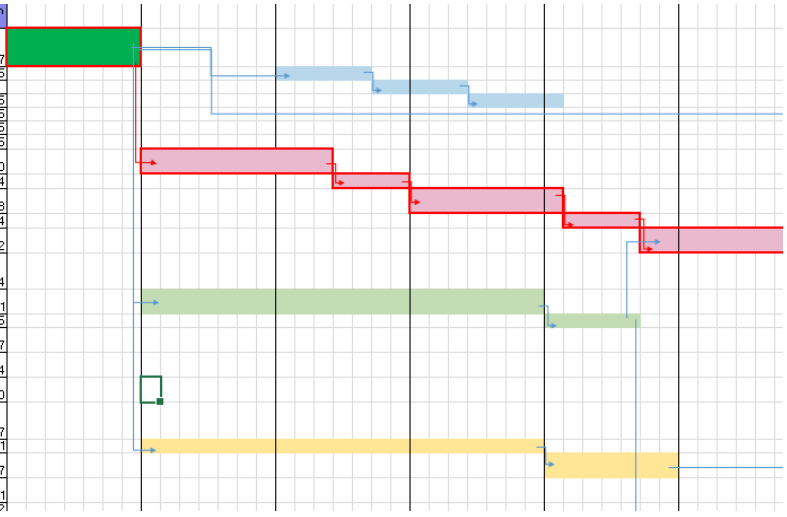
2.2 Preliminary Schedule

Include your proposed schedule for the project, from inception to competition date. Include a work breakdown structure and a proposed test plan. Teams will be required to produce a Gantt chart of the project. This will be essential in risk identification and management. Be sure to add slack to your Gantt chart to ensure each task can be completed.

A logical way would be to always start with the work breakdown structure. Think of this as decomposition. You start with the big task which is a fully functional rover and you break it down into multiple smaller tasks. These tasks are then broken down further until the smallest task is equivalent to one singular job. This can help in management of task allocation, responsibilities and further time management of the whole project as it outlines everything that must be done to get to your rover.

A critical path can be shown through your Gantt chart or a network diagram. A critical path is basically a chain of tasks that cannot be shifted in time. Think about the whole project from start to finish, your team will have multiple tasks running simultaneously on the timeline with some tasks dependent on others. Now the longest path of tasks would make the critical path.

Stage			Task	Duration (days)
Planning 0	0.1 Roles and responsibility decided	0.1	Initial team bonding and introduction	7
	0.2 Project Management	0.2.1	Work Breakdown Structure	5
		0.2.2	Network Diagram	
		0.2.3	Gantt Chart	5
	0.3 Quality Management	0.3.1	Requirements Management	5
		0.3.2	Risk Assessment	5
		0.3.3	DFMEA	5
Design 1	1.1 Aerodynamic Analysis	1.1.1.1	Evaluate sweep angles and taper ratios	10
		1.1.1.2	Downselect the HTP Shape	4
		1.1.2.1	Use of Xfoil or other software for simulations	8
		1.1.2.2	NACA Profile downselected	4
		1.1.2.3	All HTP and Elevator dimensions finalised	12
		1.1.2.4	Hinge moment and further detailed aerodynamic calculations	14
	1.2 Structural Analysis	1.2.1.1	Strength, stiffness, and stability tests	21
		1.2.1.2	Finalise spar dimensions	5
		1.2.2.1	Material downselection for Ribs	7
		1.2.2.2	Design and configuration selection of Ribs	14
		1.2.3.1	Work with VTP team to design HTP and VTP joint	10
		1.2.3.2	Integration of the HTP spars with the box and readiness for the Graphite Goose test	7
	1.3 Avionics	1.3.1.1	Downselect the mechanisms	21
		1.3.1.2	Confirm selection with the Avionics team	7
		1.3.2.1	Designing Integration of servo with the structure	21
		1.3.2.2	Integration of an angle	21



Above is an example Gantt Chart, and the main focus is the critical path shown through the red outlined boxes. As you can see the "pink" chain of tasks takes the longest time compared to others. In the case of delays: "blue, green and yellow" tasks have a period of time they can extend to without impacting the rest of the project timeline. However, with the critical path it is most difficult to accommodate delays and hence, they should be given the highest priority. You can consider further factors as well for example tasks being dependent on external factors like availability of labs and other resources. The point of the whole process is knowing what tasks need to be prioritised the most. The end result of critical path analysis should be knowing the maximum number of days needed to complete the whole project.

Think about if Friday evening is REALLY the best time for meetings? Are you planning on saving everything until the last week of May, or will everyone have exams then? Are enough of you happy with staying behind for an extra week in the summer to build the rover or do you need to do it sooner? And more!

A Gantt chart is one way of doing this, but please! Put some thought in and don't just draw a diagonal line on an Excel calendar made 2 hrs before the PDR deadline! Try blocking off no-go dates (e.g., exams and revision periods maybe) first, and then mark on the university holidays as dates where people may be able to work, but not physically travel to uni. Then put in the ORT deadlines. Yikes, where did the time go!? You've possibly only got February and March completely free now right!? So maybe, just maybe, you need to put some proper thought into how to design a rover in this time.

Also don't disregard testing. You should at least be ready by the TRR. But that's cutting it fine, and really the TRR isn't for your testing; it's for us to make sure you don't hold up the competition day by showing up with a rover that has never been powered on before. A test plan of key scenarios is a good place to start such as driving on the required terrain, operating the payload, comms range etc. But give yourself plenty of time to bug fix any issues.

2.3 Preliminary Budget

Include your proposed budget for the project, covering the rough build costs of the rover.

Firstly, how much money do you have, and where are you getting it from? A budget of much over £1000 is likely unnecessary for this competition. Is this money coming from the SU? Memberships you charge team members or external grants from the University Department or industry?

Next, do some cost estimating. Rovers can get expensive quickly! Do you have components you can reuse? Have you costed basic parts that you think you'll need at this stage? Don't forget fabrication costs. Many teams rely on 3D printing – who's doing that for you? If you need external printing from the university workshops, find out their rates ASAP. 3D printing is cheaper than milling out of aluminium, but even cheap components can add up fast if there's enough of them! If you are taking a sub-systems approach it could be a good opportunity to sub divide your budget between each sub-system lead and sanity check that they think it's feasible.

2.4 Project Risks and Mitigations

Identify the major risks associated with your project and rover design, and how you expect to manage these throughout the development process.

There are both safety and programmatic risks. Safety relates to injury risks. These include the severe but unlikely such as serious power tool accidents, or common but less severe such as getting fingers pinched in moving parts. Risks need to be mitigated, so outline some strategies for handling risks that have been deemed unacceptably hazardous and reducing these to acceptable levels. An example of this is giving adequate training for tool use. If you plan on using workshop facilities at university, they may already have risk assessments in place. Reading and obeying these documents may form part of your risk assessment mitigation strategies.

The second type are programmatic risks. These are things that will impact your ability to meet competition requirements such as deadlines, and include team member dropouts and going over budget.

3 Systems Overview

Present your rover systems concept overview. Describe how your concept addresses the requirements with an overview of major design decisions made. Include images and references where necessary.

Start with the big picture! Show off the overall rover design you're going to go forward with, bringing all the subsystems (propulsion, imaging, structure etc.) together.

This will give you a chance to see how everything fits together and you should be considering how it will be assembled and manufactured, and what the interfaces between each system are. Following this section, you will provide more detail about the preliminary design of each individual subsystem and why you have made the choices you have.

Whilst the design will be developed until the CDR, getting as much done as possible now is likely to be in your favour. CAD models or drawings (whether digital or on paper) should be used in this section to show your concept. It's a chance for you, and your assessor, to identify any glaring issues with the design before the detailed design in the CDR.

4 Preliminary Concept

This is where you can detail your preliminary rover design. This will be built on through the year so it does not need a high-level of detail at this stage.

This is the key area of the report. A bit of a misnomer, we are not after an early stage (i.e., preliminary) concept, what we are looking for is your down selected final concept that you will be taking forward to develop into your final, completed design for the CDR.

The below sections offer a good structure for your thinking:

Firstly, break your system down into its constituent parts. Feel free to add sections here, such as propulsion or mission systems.

Identify requirements. These will be taken from the Requirements Specification document (ORT-RS) ***and*** *inferred from general needs of the systems (it is expected that teams derive and specify their own requirements beyond those mandated within the Requirements Specification). It can be useful to weight requirements on a scale from Must Haves to Non-essentials.*

Identify concepts, and evaluate them. For example, consider methods of propulsion and trade them off against each other to find which is the best. Sometimes in these discussions you will stumble across new requirements! Always add these in to the requirements list as it is an evolving document. E.g., you might think "XYZ would be really difficult to manufacture" and now you have a new requirement: "Should be easy to manufacture"

Area of impact	Weight	Option 1		Option 2		Option 3	
		Score	Justification	Score	Justification	Score	Justification
Mass	0.15	6		2			
Cost	0.25	6		1			
Complexity	0.4	10		4			
XXXXX	0	7		5			
YYYYY	0	10		6			
Overall score		6.4		2.15		0	

There are multiple methods of selecting concepts off a list of requirements – look them up!

A quick final note: there are rules governing the reuse of components. Even if you are reusing something from a previous year (that you are allowed to) choosing that solution because you

have it and its at zero cost isn't a robust engineering justification. You need to convince us you have reevaluated the requirements and that you haven't let what you did last year dictate this year's design.

Finally present your selected concept. You may do some initial design development at this stage. Whereas concepts at this point may have existed as nothing more than a text description or free hand sketch, now's the chance to invest some time in sanity checking your selected concept. Let's say you've selected wheels as a propulsion method. For the concept analysis stage "wheeled propulsion" was probably all you needed to say. Now is the chance to decide on some things such as the wheel diameter? Are you using off the shelf wheels or manufacturing your own? How much will they cost, and are they in budget? What torque and motor RPM is needed and what motor candidates can you find online? You may find you have another round of concepting and analysis to decide between these options here!

4.1 Mechanical design

4.1.1 Requirements

4.1.2 Concepts & Evaluation

4.1.3 Selection

4.2 Electrical design

4.2.1 Requirements

4.2.2 Concepts & Evaluation

4.2.3 Selection

4.3 <Additional Subsystems>

5 Acknowledgements

Use this section to recognise anyone who assisted with or contributed to the project, but was not part of the team.

6 References

No particular reference style is preferred. Include citations in the text.

Your report is expected to have at least a few references - this could include further research but should also cover the brief documents! Remember your references count towards 5% of the marks, and so leaving this section empty will lose those. Having a specific referencing style and keeping the section well formatted will help you achieve full marks.

Appendices

Any supplementary material, which is not essential to understanding the project, but will provide a more comprehensive overview of the project, can be included as appendices.

An example list of content that should go into appendices is summarised in the table below.

Main report	Appendices
Overview/Snapshot of Gantt chart	Detailed/Full Gantt chart
Overview Budget	Detailed Budget
Important figures of rover system/ subsystems e.g. CAD model screenshots	Engineering drawings
Overview of the trade off tables	Detailed trade off tables