SPACE in Schools

Re-Engineering Australia Foundation Ltd

STEM 4.0 LIFE-LONG LEARNING

2020

Design a Biomedical Space Hub on Mars

Proudly Supported by

Australian Government
Department of Defence

AN INITIATIVE OF
RE-ENGINEERING AUSTRALIA FOUNDATION

Visual Connections

Medtronic
Further, Together

AUTHORISED AGENT

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Introduction

The capabilities and enthusiasm which exists within our children is a blessing for Australia's future. Engaging their interests in Science, Technology, Engineering and Mathematics are critical to the future growth and competitiveness of our nation.

As was recently highlighted by our Chief Scientist of Australia,

> *"The enemy of our future prosperity is complacency. Past investments in skills development have underpinned our strong economy and enviable lifestyle, which in turn have diminished our sense of urgency. While our school system remains above average among OECD countries, the achievement of our students across science, literacy and numeracy is declining".*
>
> *"To meet the challenges of ever more sophisticated international competition in advanced products and services, employers need to be able to access an increasingly skilled workforce, whose skills include traditional sciences and mathematics, communications technologies (ICT), and the 21st century skills that prepare our youth for a lifetime of unfolding career opportunities".*
>
> *Dr Alan Finkel AO Chief Scientist Australia (2017).*

STEM is not about 'what you learn'. STEM is about 'how you bring together what learn to solve problems' ... 'its what you do with what you learn'. Driving student interest in STEM is about maximising the value they gain from the education process and helping them focus this in a way which will prepare them for the transition to the world of work.

A focus on STEM education is a driver which will produce innovators and innovations which will help Australia compete in a competitive world stage.

This STEM challenge aims at engaging students with an inspirational project which they can relate to, the colonisation of Mars. Students are required to bring together, what they learn in the classroom, and combine it with a range of soft skills such as teamwork, communication, collaboration and innovation to solve a complex problem. It is a challenge designed to expand their thinking.

Program Supporters

John Alexander OAM MP
Member for Bennelong NSW

Dr Katie Allen MP
Member for Higgins Vic

Julian Simmonds MP
Member for Ryan Qld

Contents

Overview

The SPACE in schools STEM Challenge, tasks school students to design and build a virtual Bio-Medical Space Hub proposed for construction on the surface of Mars.

The students' task is to form a virtual design company which will make a bid for the design of the Bio-Medical Space Hub. They will have to build a 3D model of the Space Hub and then present their design ideas to a team of industry judges.

The challenge is an exciting and fun learning environment for students. Students are encouraged to go beyond the minimum, be creative and innovative to explore different design options. Some of the problems students will face when designing the Bio-Medical Hub may combine the challenges faced by engineers when building a full-scale hospital with those required when creating small operational spaces on the Future Submarine project.

The program will expose students to 3D design software and provide design challenges that will provide opportunities for creativity. The problem will introduce students to virtual reality software, help students develop problem-solving skills and will promote working and contributing to a team environment.

This competition will allow schools to participate in a sophisticated STEM program at minimal expense and does not require to have access to a significant Design and Technology workshop facility.

For Teachers

This project does not require teachers to have any unique or specialised skills. There is no need for knowledge of coding or specific Design & Technology skills. This project is all about having the students think through a problem of human habitation, brainstorm a broad range of ideas and concepts and then rationalising the best of these ideas into a solution that meets the design criteria.

The project has students draw on knowledge and skills in science and math and then using this knowledge in the context of solving a real problem. They should develop design scenarios and then use research in all areas of Science, Technology, Engineering & Mathematics (STEM) to develop their concept for a Biomedical Space Hub.

3D Design: We have specified the use of a product called Sketch-up upon which the students will build a 3D model of their design. Sketch-up is a straightforward and easy to use 3D modelling tool which the students will learn quite quickly. There is a plethora of on-line training material on how to use Sketch-up.

https://www.sketchup.com/learn/videos/826Questions

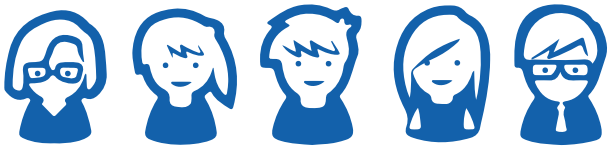
If you have any specific questions about the challenge, please email us at.

space@rea.org.au

Challenge Task - Students

You are a team of Engineers, Scientist and Entrepreneurs and you must form a virtual company consisting of up to five students who will all have different roles and responsibilities in the process of designing the Bio-Medical Space Hub.

As a newly formed company, you'll need to create a well-structured organisation. Each member of your team needs a clear role, title and share the workload for the duration of the project. These roles may include the following:



- Team Leader
- Team Scientist
- Design Engineer
- Virtual Reality Engineer
- Mars Environmental Engineer
- Marketing and Communications Manager

As a new business, you'll need to come up to speed quickly on all things involved in space travel. You will need to understand how a crew might use the Hub and define a definition for the use of the Hub.

Setting up on a new planet will require some detailed planning. You are new to the space industry so you'll need to learn about the latest issues influencing space travel.

The stand-alone, modular Bio-medical Space Hub should be able to be operated as a laboratory, medical centre and operating theatre. You will need to consider design options which will set your design apart from the competition.

Your task is to not only design the Bio-medical Space Hub, but you must present and sell your ideas to industry professionals. You'll need to create marketing material and develop awareness for your company and your design. You could achieve this through the development of logos, advertisement, media exposure, social media and marketing materials.

Presentation of your project will involve the following elements:

1. Development of a virtual 3D model of your design built using Sketch-up.
2. Create a trade-display highlighting your team, profile, the science behind your design and the benefits your design offers over alternatives. These benefits may include transportability, operational efficiency and sustainability.
3. Deliver a six-minute verbal presentation to a group of Engineers, Scientists and Managers from industry. The presentation should describe the make-up of your team, the different roles you each played, the detail of your design and its key advantages over alternatives.
4. Produce a 12 page A3 or up to 20 page A4 portfolio covering your company, your team and your design.

Your project will be assessed based on a range of criteria including the application of Science, Technology, Engineering and Mathematics principles, any collaboration with industry you undertake and your design process.

The Competition

Competition event will be arranged in the major locations in Brisbane, Sydney, Melbourne, Adelaide and other key locations.

Competition Timing:	The competition events will be arranged to align with either the end of the 2nd Term of the beginning of the 3rd Term in each state.
Competition Day:	**Dates for each State are to be confirmed shortly and will be available on the REA website. (www.rea.org.au)**
Times:	9:00 am until 5:00 pm
Competition Location:	TBC
Prizes:	Prizes will be awarded on the day
Competition Inquiries:	space@rea.org.au

Industry Support

Engagement with industry is encouraged.

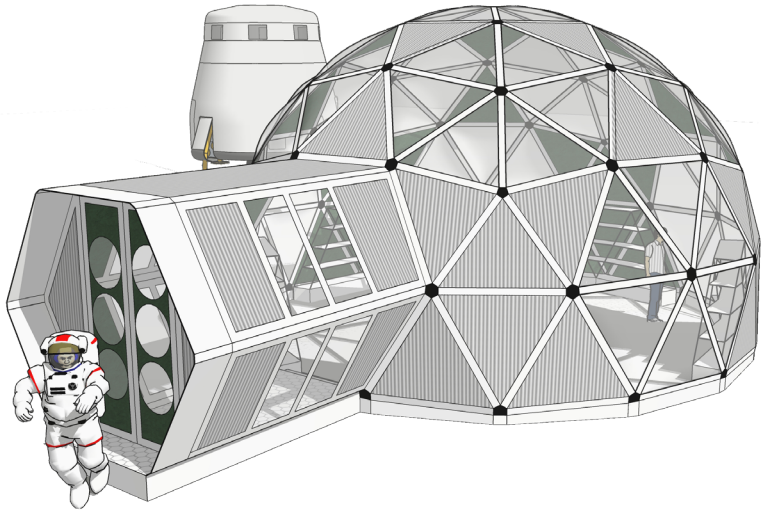
Visual Connections, the Industry Association that represents the Print, Graphics and Sign industry in Australia is working with REA schools to arrange links between schools and its member organisations in the sign and print industries, willing to help students with their graphics, printing and signage requirements for this project.

To be eligible, you must first register your schools on the REA website using the link below.

https://rea.org.au/school-registration-form/

Once you have registered your school, you can then register to connect with an industry mentor at the following link

https://rea.org.au/request-industry-mentoring/



Space Hub Specification

Space and weight are significant limitations to a design of the Bio-medical Space Hub. You will need to be very conservative in the choice and use of materials and layout. The following specifications are critical:

1. The max floor space must be limited to 25 sq meters.
2. The building shape is free.
3. Window space is free but should be determined based on the research you undertake.

The facility must be able to facilitate the following:

1. Act as a medical centre and operating theatre if needed.
2. Be able to be used as a laboratory for undertaking scientific and biomedical experiments.
3. It must be able to store and provide access to all of your medical and experimental supplies.
4. Be self-sustainable if possible

Other Considerations

1. Layout - This is one of the most critical aspects of the design. You need to consider how they move about the hub and work in unison as a team.
    - What is the work-flow/process of preparing, experiments or performing an operation?
    - Do scientists use stations to complete different tasks?
    - How do the scientists access the raw ingredients, through to disposing of the waste?
2. Storage of equipment - Space is a premium inside the hub so a conventional home pantry might not be the solution. How do you bring a sense of structure and organisation to the storage of equipment?
    - Where is equipment stored?
    - How can different equipment be stored? Is there an order of storage which will impact to access?
    - How do the doctors access equipment for operations as compared with experiments?
3. Disposing of waste/ rubbish
    - How do you dispose of waste?
    - How do you minimise the space take up on board a Hub by rubbish?
    - Will there be an odour from the rubbish you'll need to consider?
4. Appliances
    - Commercial appliances vs equipment suitable for space travel, what's the difference?
    - Size of appliances vs efficiency?
    - What appliances do you need?
5. Human Ergonomics
    - How high do you make a bench top, how deep should a bench be? All these considerations are related to human ergonomics

Note: The external shape and appearance of the HUB is NOT the focus of this design. The design intent is to focus on the internals of the Hub and how humans would operate within this very small space. Spending to much time on the external appearance will not gain you extra marks. The judging will be focused on how you manage the interior design.

Objective - Overview

1. Produce 3D Model of the Space Hub

   Produce a 3D model of your chosen space. The model should allow for presentation as an interactive walk-through. You MAY use any 3D software package; however, the recommended software package for this project will be Sketch-Up.

2. Project Portfolio (up to 12 x A3 or 20 A4 pages including cover)

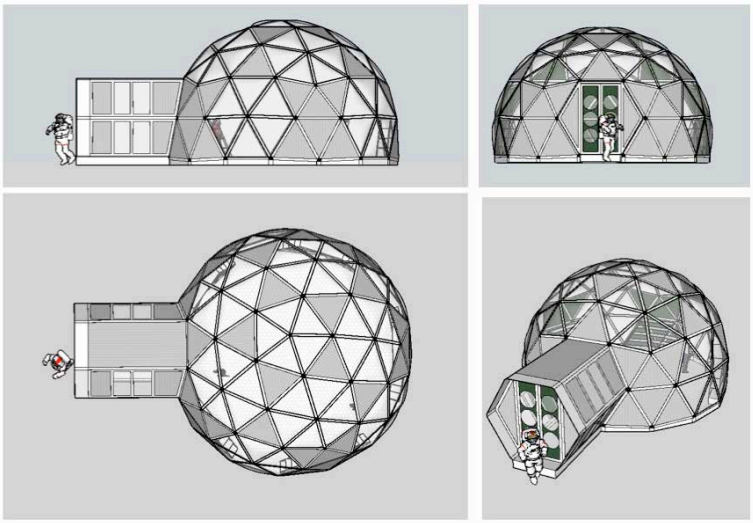
   The portfolio should contain two sections. The first 2-3 pages should focus on your team and your virtual company with the remainder on your design and its unique strategic advantages.

3. Trade Booth

   Produce a trade display. A trestle table will be available on the day of the competition. The trade display should highlight your marketing material and be a platform for you to promote your design to the judges.

4. Verbal Presentation

   Prepare a eight-minute verbal presentation. As an introduction, it should cover the role of each member of your team, title, members responsibilities. The bulk of your oral presentation should focus on explaining your design and the thinking behind the design. Your presentation will be to a group of industry personnel.



3D Model Development

A significant component of any product development process is the development of a 3D model. It is from a 3D model that many design decisions are made. A 3D model can also be a very useful component of the sales process. Remember that you are selling your idea to the space industry.

A vital component of this challenge will be to have the students develop a 3D model of their design using a product called Sketch-Up. Sketch-Up is available for download from the following schools' web page. This website also provides curriculum materials and tutorials specifically designed for students and the classroom. Students will be able to download a version of Sketch-Up for use at home to help develop their skills.

https://www.sketchup.com/education/sketchup-for-schools

Students will be required to bring their 3D Sketch-up model on a memory stick to the competition.

Virtual Reality hardware will be available at the competition for the students to use. The students will be able to upload and walk through their models.

If schools would like to implement their own Virtual Reality (VR) environments REA can facilitate the equipment specification and access to software which would allow the school to undertake VR within the school.

The system which will be provided for the students to use during the competition will be based on IrisVR software & tools.

It is not a requirement of this challenge that the students to understand complexities and use of the VR technology. We will have people available on the day of the competition to help transfer model into the VR equipment.

Project Documentation

The 3D Sketch-Up model can produce 2D images. These images should form part of the team portfolios. A drawing of the 3D design, including critical dimensions which show how the 25 sqm of floor space has been used, must be included as part of the portfolio.

Project Portfolio

Students are required to produce three copies of a 12 page A3 portfolio covering the critical components of their project development.

The portfolio should be in two sections; the first 2-3 pages should focus on your team and your virtual company with the remainder on your design and its unique strategic advantages.

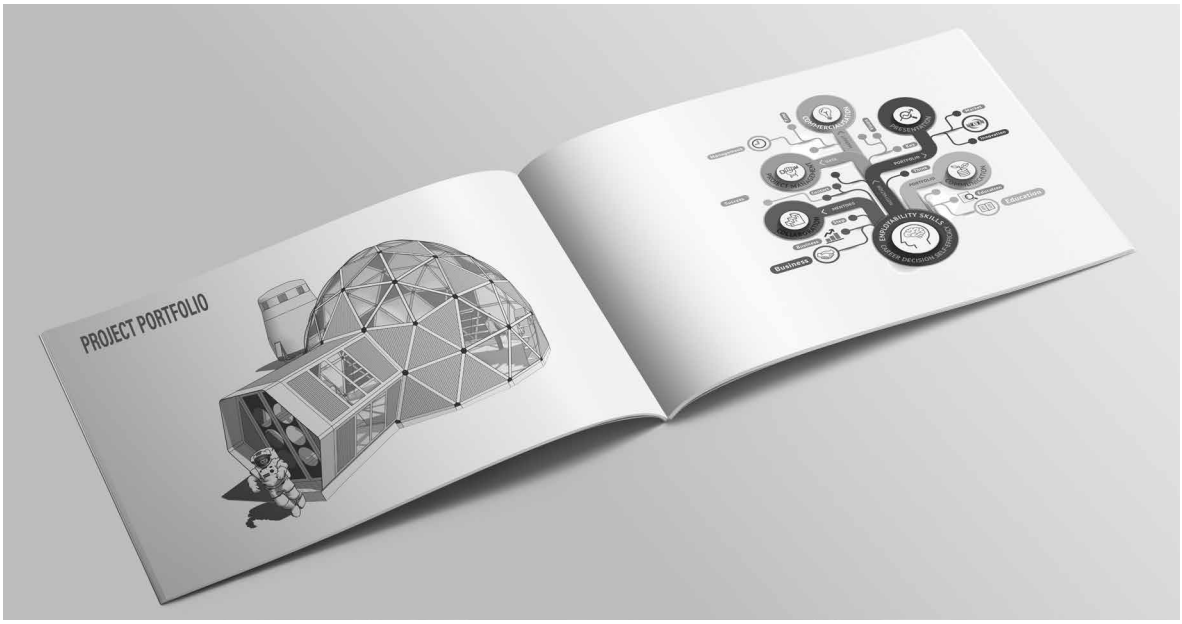
A team's Portfolio tells the story of the team's journey including the knowledge and skills they have acquired along the way. It is also a useful tool for selling the team's capabilities and the design of the Biomedical Space Hub.

A portfolio is a professional business document. Attention to detail is paramount. Most importantly, teams need to read the Portfolio judging scorecards carefully to ensure that all areas of the assessment process are addressed within the context of the Portfolio.

The main elements of your portfolio should include the following:

- Team roles and duties,
- The science and engineering behind the significant aspects of your design,
- The human environmental design including energy generation, usage and storage on board the Hub and propose alternative and innovative energy solutions that could address areas such as, lighting and room.
- A study of impacts of the atmosphere on Mars.
- Your design cycle and Innovation,
- Your marketing strategy

2D drawings of your 3D design showing key dimensions should for a part of the portfolio.



Verbal Presentation

Teams will be required to deliver an oral presentation of their design to the Judges. The submission must last longer than eight (8) minutes. Teams must bring a laptop with any slideshow or other multimedia files that form part of the presentation. Teams should have available VGA and HDMI cables to connect to a data projector/TV monitor.

Who Needs to Attend?

All team members must be present and contribute to the Verbal Presentation.

Team Preparation

Each team is required to prepare an oral presentation. Teams need to have all presentation resources tested and ready to go before entering the room. Most importantly, teams should read the verbal presentation judging scorecard carefully to ensure their presentation features all elements and content that the verbal presentation judges will be scoring.

Judging Process / Procedure

Teams will be given time at the start of their presentation to set-up and test their laptop and any other presentation resources. The team will inform the judges when they are ready to begin. At the conclusion of the team's presentation, the judges may choose to provide some feedback or ask any clarifying questions they feel necessary.

Verbal Presentation Judging Provisions.

A meeting room, where the team will deliver their presentation will be made available. This space will include a data projector and screen or large TV monitor. Multimedia sound systems may not always be available, and teams may have to bring portable speakers. If possible, these will be in fixed positions but usually with sufficient cable length to allow teams some freedom for choosing where they wish to locate their laptop. A single table will also be made available with its use and location in the presentation space being optional.

Verbal Presentation Judging Criteria

Refer to the Verbal Presentation scorecard for individual point scoring and key performance indicator information.

Technique (70 points)

What will be assessed?

1. Presentation Energy
2. Team Contribution
3. Visual Aids
4. Audience Engagement
5. Articulation
6. Structure
7. Use of Time

Content (60 points)

What will be assessed?

1. Team Objectives
2. Description of Bio-medical Space Hub
3. Innovation/Refinement
4. Collaboration
5. Learning Outcomes
6. Overall Clarity

Trade Display

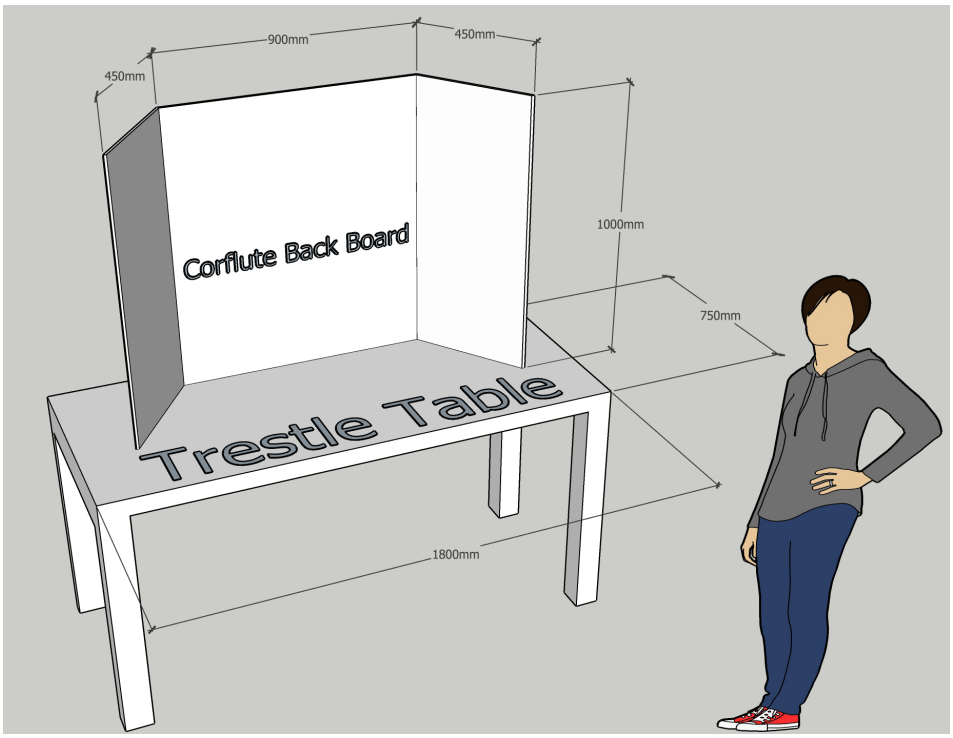
Teams should produce a backboard using a Corflute or similar material as per the image below. It is upon this backboard that the students apply their marketing and branding material. A trestle table is provided for each team.

Backboards should be nominal 1800mm long x 1200mm high.

Assesment

The judges will assess a team's ability to market their design primarily within their Trade Display. Specific areas to be highlighted with the trade display could include the following:

1. Team Name & Logo Development
2. Team Branding
3. Key components of the design
4. Use of ITC
5. Display Models
6. Team Presence
7. Team Knowledge



Engineering Design & Project Management

As part of the evaluation of the portfolio judges will examine the engineering design and project management involved of the projects.

Engineering Design Assessment

The judges will assess a team's ability to apply Engineering design methods to their project. Specific areas to be highlighted with the portfolio could include the following:

1. Requirements Analysis
2. Ideas
3. Development
4. Analysis
5. Ideas Testing
6. Evaluation
7. Overall Design Technical Merit

Project Management Assessment

The judges will assess a team's ability to apply Project Management techniques to their project. Specific areas to be highlighted with the portfolio could include the following:

1. Team Roles & Tasks
2. Scope & Time Management
3. Finance & Risk Management
4. Internal Communication
5. Stakeholder Engagement
6. Evaluation

SCORING

Points will be awarded to teams across four (4) categories with maximum possible scores as detailed in the following table.

Points Allocation Table	
3D Model	100 Points
Trade Display	70 Points
Verbal Presentation	130 Points
Engineering Design	70 Points
Portfolio	160 Points
TOTAL	530 Points

VR Model Score Card

Judging Sub Category	VR Model	Team ID	
Primary Evidence	VR model	Team Name	
Secondary Evidence		School	
Criteria	5	Competition Class	

	Low	Developing	Advanced	Score
Criteria	0 1 2	3 4 5 6	7 8 9 10	/10
5.1 Sketchup Model	No Sketch-up Model	Model of limited complexity	Well considered, meaningful model which was easy to interpret.	/10
5.2 Model Complexity	Limited model complexity.	Some complexity in the 3D model but little consideration of human environmental issues	Detailed model complexity with the students understanding on the interaction of humans within the environment	/10
5.3 Surface Finishes	Limited surfaces finishes applied.	A good attempt to apply surface finishes to the model.	Clean, well-organised layout of all surfaces rendered to highlight the different elements within the model. Surface finishes were appropriate for the items within the model.	/10
5.4 Model Detail	Limited Model Detail	Some detail in the modelled elements in the 3D model	Excellent detailed design of the elements used with the model.	/10
5.5 Human Habitation	Limited consideration of human habitation	Some relevant consideration of human habitation	Creative and justified design with excellent use of space and consideration of human habitation. Evidence of development considering factors, eg: use of different spaces, unique adaptation of the environment, consideration of human factors.	/10
			Trade Booth GRAND TOTAL	/50

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PORTFOLIO CLARITY & QUALITY SCORE CARD

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JUDGING SUB CATEGORY	CLARITY & QUALITY	TEAM ID	
PRIMARY EVIDENCE	TEAM PORTFOLIO:	TEAM NAME	
SECONDARY EVIDENCE		SCHOOL	
CRITERIA	1	COMPETITION CLASS	

	Low	Developing	Advanced	Score
Criteria	0 1 2	3 4 5 6	7 8 9 10	/10
1.1 Production Quality of Materials	Poor quality	Basic printing and binding.	Quality printed document on quality paper in appropriately durable binding	/10
1.2 Production Quality of Content	Missing documentation	Basic documentation provided.	Correct number of pages. All required documentation included and professionally presented. Space Hub rendering and team logo on cover page in keeping with branding.	/10
1.3 Content Organisation	Disorganised content	Some content organisation	Highly organised and managed portfolio content with logical structure and flow of information.	/10
1.4 Layout Design	Distracting imperfections weaken the work	Some layout design format attempted.	Well formatted layout design consistently applying margins, alignment, spacing, graphics and design elements with consideration of visual balance and flow. All pages optimally used and uncluttered. Creative style realised.	/10
1.5 Typography	Font choices are distracting or weaken the work	Some consideration for type treatment.	Consistent use of typography with appropriate choices and limited number of text and headline font sizes, styles, colours and hierarchy. In keeping with branding. Easy to read.	/10
1.6 Photos & Images	Poor quality or use of images. No captioning.	Basic quality and use of images. Some reasonably concise captioning.	Justified use of excellent, un-pixellated, clear, undistorted photos and images that are concisely and accurately captioned. Properly sized, coloured and integrated with text to illustrate key messages. Considers branding.	/10
1.7 Creative Graphics (Visual effects and infographics)	Poor graphics and/or execution. No captioning.	Graphics attempted with some success. Some reasonably concise captioning.	Justified, well executed and placed, un-pixellated, undistorted graphics that are concisely and accurately captioned. Consistent use of colour/ tones/ shapes, without visual overload, in keeping with branding.	/10
1.8 Editing/Proofreading	Error ridden. Poor attempt at proofreading.	Good attempt with additional editing required for clarity.	No errors detected in text and graphics	/10
1.9 Referencing/Plagiarism	Obvious failures in referencing.	Some attempt at referencing. Some errors evident.	No detected plagiarism with excellent use of referencing for author's written word, graphics/photos and video sources etc.	/10
1.10 Writing & Readability	Difficult to understand. Unable to read.	Does not sustain reading or interest. Does not 'flow'.	Concise, appropriate, grammatically correct text, captions, and headlines. Inviting and engaging. Sustains the reader's interest.	/10
			GRAND TOTAL	/100

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PORTFOLIO CLARITY & QUALITY SCORE CARD

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JUDGING SUB CATEGORY	CLARITY & QUALITY	TEAM ID	
PRIMARY EVIDENCE	TEAM PORTFOLIO:	TEAM NAME	
SECONDARY EVIDENCE		SCHOOL	
CRITERIA	1	COMPETITION CLASS	

	Low	Developing	Advanced	Score
Criteria	0 1 2	3 4 5 6	7 8 9 10	/10
1.1 Production Quality of Materials	Poor quality	Basic printing and binding.	Quality printed document on quality paper in appropriately durable binding	/10
1.2 Production Quality of Content	Missing documentation	Basic documentation provided.	Correct number of pages. All required documentation included and professionally presented. Space Hub rendering and team logo on cover page in keeping with branding.	/10
1.3 Content Organisation	Disorganised content	Some content organisation	Highly organised and managed portfolio content with logical structure and flow of information.	/10
1.4 Layout Design	Distracting imperfections weaken the work	Some layout design format attempted.	Well formatted layout design consistently applying margins, alignment, spacing, graphics and design elements with consideration of visual balance and flow. All pages optimally used and uncluttered. Creative style realised.	/10
1.5 Typography	Font choices are distracting or weaken the work	Some consideration for type treatment.	Consistent use of typography with appropriate choices and limited number of text and headline font sizes, styles, colours and hierarchy. In keeping with branding. Easy to read.	/10
1.6 Photos & Images	Poor quality or use of images. No captioning.	Basic quality and use of images. Some reasonably concise captioning.	Justified use of excellent, un-pixellated, clear, undistorted photos and images that are concisely and accurately captioned. Properly sized, coloured and integrated with text to illustrate key messages. Considers branding.	/10
1.7 Creative Graphics (Visual effects and infographics)	Poor graphics and/or execution. No captioning.	Graphics attempted with some success. Some reasonably concise captioning.	Justified, well executed and placed, un-pixellated, undistorted graphics that are concisely and accurately captioned. Consistent use of colour/ tones/ shapes, without visual overload, in keeping with branding.	/10
1.8 Editing/Proofreading	Error ridden. Poor attempt at proofreading.	Good attempt with additional editing required for clarity.	No errors detected in text and graphics	/10
1.9 Referencing/Plagiarism	Obvious failures in referencing.	Some attempt at referencing. Some errors evident.	No detected plagiarism with excellent use of referencing for author's written word, graphics/photos and video sources etc.	/10
1.10 Writing & Readability	Difficult to understand. Unable to read.	Does not sustain reading or interest. Does not 'flow'.	Concise, appropriate, grammatically correct text, captions, and headlines. Inviting and engaging. Sustains the reader's interest.	/10
			GRAND TOTAL	/100

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PORTFOLIO - PROJECT MANAGEMENT SCORE CARD

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JUDGING SUB CATEGORY	PROJECT MANAGEMENT & LINKING SKILLS TO CAREERS	TEAM ID	
PRIMARY EVIDENCE	TEAM PORTFOLIO	TEAM NAME	
SECONDARY EVIDENCE		SCHOOL	
CRITERIA	5	COMPETITION CLASS	

	Low	Developing	Advanced	Score
Criteria	0 1 2	3 4 5 6	7 8 9 10	/10
5.1 Team Roles & Tasks	Limited understanding of roles and responsibilities	Team roles and responsibilities identified	Highly structured team with clear roles and responsibilities. All team members provide critical contributions with evidence of supportive/overlapping interactions. Relevant skill development/mentoring undertaken. Plan Changes discussed	/10
5.2 Scope & Time Management	Limited understanding of scope or evidence of time management	Some planning used to guide progress of project goals and stay on task.	Excellent control of all project deliverables understanding requirements and setting goals to maintain focus and evidence of using effective management methods and tools to stay on task and meet deadlines. Plan Changes discussed	/10
5.3 Finance & Risk Management	Limited budgeting or risk awareness	Some resources identified, budgeting and contingency plans	Excellent resource management, understanding of budget control and evidence of financial accounting methods. Reasonable contingency plan and risk assessment prepared and/or undertaken.	/10
5.4 Internal Communication	Limited team communication	Basic team communication processes discussed.	Excellent use of multiple communication tools and methods for effective team planning and accountability.	/10
5.5 Stakeholder Engagement	Limited stakeholder engagement	Basic understanding and application of stakeholder engagement	Excellent understanding and application of initiating and maintaining stakeholder engagement with collaborators, sponsors, mentors and supporters using multiple tools and methods.	/10
5.6 Evaluation	Limited evaluation	Some evaluation applied	Evaluation processes applied throughout the management of key deliverables.	/10
			Team & Project Management GRAND TOTAL	/60

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PORTFOLIO – ENGINEERING DESIGN CONTENT SCORE CARD

JUDGING SUB CATEGORY	ENGINEERING DESIGN CONTENT	TEAM ID	
PRIMARY EVIDENCE	TEAM PORTFOLIO:	TEAM NAME	
SECONDARY EVIDENCE	TEAM INTERVIEW	SCHOOL	
CRITERIA	4	COMPETITION CLASS	

		Low	Developing	Advanced	Score
Criteria		0 1 2	3 4 5 6	7 8 9 10	/10
4.1	Requirements Analysis	Limited development of objectives	Good development of objectives	Excellent statement of objectives supported by research	/10
4.2	Ideas	Single or basic concepts	Multiple concepts with links to research.	Several technically inspired ideas for different car features/functions	/10
4.3	Development	Limited development shown	Logical design developments explained	Clearly justified developments based around research and testing	/10
4.4	Analysis	Little evidence of analysis	Analysis which is relevant and results documented	Quality analysis methodologies. Accurate results and data linked to design revisions. Advanced use of CFD and other design tools.	/10
4.5	Ideas Testing	Little evidence of testing	Tests which are relevant with results documented	Quality experimental methodologies. Accurate results linked to design revisions.	/10
4.6	Evaluation	No or limited evaluation	Evaluations at different stages	Excellent ongoing evaluations linked to improvement actions	/10
4.7	Overall Design Technical Merit	Basic design process with little technical merit	Developed design process with some technical merit	Original & clever developed design process with excellent technical merit	/10
				Portfolio Content GRAND TOTAL	/70

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PRESENTATION TECHNIQUE SCORE CARD

SPACE in Schools
Re-Engineering Australia Foundation Ltd

JUDGING SUB CATEGORY	PRESENTATION TECHNIQUE	TEAM ID	
PRIMARY EVIDENCE	TEAM PRESENTATION	TEAM NAME	
SECONDARY EVIDENCE		SCHOOL	
CRITERIA	4	COMPETITION CLASS	

	Low	Developing	Advanced	Score
Criteria	0 1 2	3 4 5 6	7 8 9 10	/10
4.1 Presentation energy	Artificial and/or low energy	Speakers generally enthusiastic with lively delivery	Passionate with effective and appropriate levels of liveliness	/10
4.2 Team Contribution	Minimal team participation	Good contributions from most team members	Excellent team work with all members participating effectively	/10
4.3 Visual Aids	Little use of aids	Some aids used effectively	Well produced, highly relevant and integrated aids effectively improve communication	/10
4.4 Audience Engagement	Minimal engagement	Some audience connection at times	Audience fully engaged and excited throughout presentation	/10
4.5 Articulation	Difficult to understand and/or hear most presenters	Inconsistent speaking ability	Excellent articulation, use of language and voice projection by all members throughout the assessment.	/10
4.6 Structure	No structure presented, difficult to follow	A basic structure / outline provided and could be followed by audience	Clear presentation outline / overview. Excellent connections between topics and easy for audience to follow	/10
4.7 Use of Time	Too fast or ran out of time	Good timing. Balanced topic depth and pace	Ran on time or just under. Excellent balance of depth for each topic	/10
			GRAND TOTAL	/70

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PRESENTATION CONTENT SCORE CARD

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JUDGING SUB CATEGORY	CONTENT	TEAM ID	
PRIMARY EVIDENCE	TEAM PRESENTATION	TEAM NAME	
SECONDARY EVIDENCE		SCHOOL	
CRITERIA	3	COMPETITION CLASS	

	Low	Developing	Advanced	Score
Criteria	0 1 2	3 4 5 6	7 8 9 10	/10
3.1 Team objectives	Limited statement of objectives	Good statement of objectives	Excellent statement of objectives supported by sound reasoning	/10
3.2 Description of Space Hub Product	Basic description of Hub only	Good description of Hub, components and features	Excellent description of Hub, components and features including design decisions.	/10
3.3 Innovation/Refinement	Little innovation or refinement presented	Innovations or refinements described and justified	Originality. Clever innovations or refinements with high positive project impact	/10
3.4 Learning outcomes	No real reflections discussed	Good explanation of some learning outcomes	A range of personal, life-long learning and career skills acquired and identified as project outcomes for a range of team members	/10
3.5 Collaboration	Little collaboration discussed	Links with industry or higher education described	Collaborations justified with links to learning and project outcomes.	/10
3.6 Overall clarity	Several concepts lacked clarification	Clear and appropriate concept explanations	Everything presented was understood through excellent explanations	/10
			GRAND TOTAL	/60

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STEM 4.0 LIFE-LONG LEARNING

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