Name:

ENGINEERING DESIGN FOLIO

The Australian Virtual Astronaut Challenge

Week 1

SISP
STEM Industry School Partnerships

Splat® 3D
Think. Draw. Design.

v 1

Key AVA Resources

United Nations - 17 Sustainability Goals

In 2015 United Nations member states agreed upon a shared blueprint for peace and prosperity for people and the planet, now and into the future.

At its heart are the 17 Sustainable Development Goals (SDGs), which are an urgent call for action by all countries - developed and developing - in a global partnership. They recognise that ending poverty and other deprivations must go hand-in-hand with strategies that improve health and education, reduce inequality, and spur economic growth – all while tackling climate change and working to preserve our oceans and forests. These goals should be the blueprint for design activities for AVA.

Exolab-9

The ExoLab-9 mission builds on the success of ExoLab-8 and continue to investigate how the stress of spaceflight affects the symbiotic relationship of red clover and nitrogen-fixing Rhizobia bacteria.

Fifteen red clover seeds are currently on the ISS for this replication mission aiming to confirm root nodulation during spaceflight. The AVA challenge will be using Exolab-9 as a case study. Learn more about Exolab-9.

ALDRIN FAMILY FOUNDATION

Aldrin Family Foundation - Home on the Moon Project

The Home on the Moon project is an initiative of the Aldrin Family Foundation and was developed as a result of students who were learning from home.

In this project, students work in teams to understand how systems work on Earth and how they can be modified to work on the Moon.

This project is similar to the AVA challenge and will provide a great resource base for the challenge. The Aldrin Family Foundation is also a collaborative partner for the AVA Challenge.

Setting the Scene

Artemis Missions

With Artemis missions, NASA will land the first woman and first person of colour on the Moon, using innovative technologies to explore more of the lunar surface than ever before. They will collaborate with commercial and international partners and establish the first long-term presence on the Moon. Then, NASA will use what they have learned on and around the Moon to take the next giant leap: sending the first astronauts to Mars. Now you can help.
Click here for more information about Artemis

Magnitude.io

The mission of Magnitude.io is to cultivate generations of brilliant scientists, engineers, and leaders through stellar STEM experiences igniting curiosity, inquiry, and ingenuity. Magnitude.io allow students to conduct authentic research in space with programs such as ExoLab.

ExoLab is an experiment platform that brings together classrooms and the International Space Station in a collaborative investigation of the effects of microgravity on living things.

Your mission, should you accept it, is to assist Ted and his team from Magnitude.io to design a new plant growth mission, either on the International Space Station (ISS) or on the moon.

AVA - 6 Week Challenge

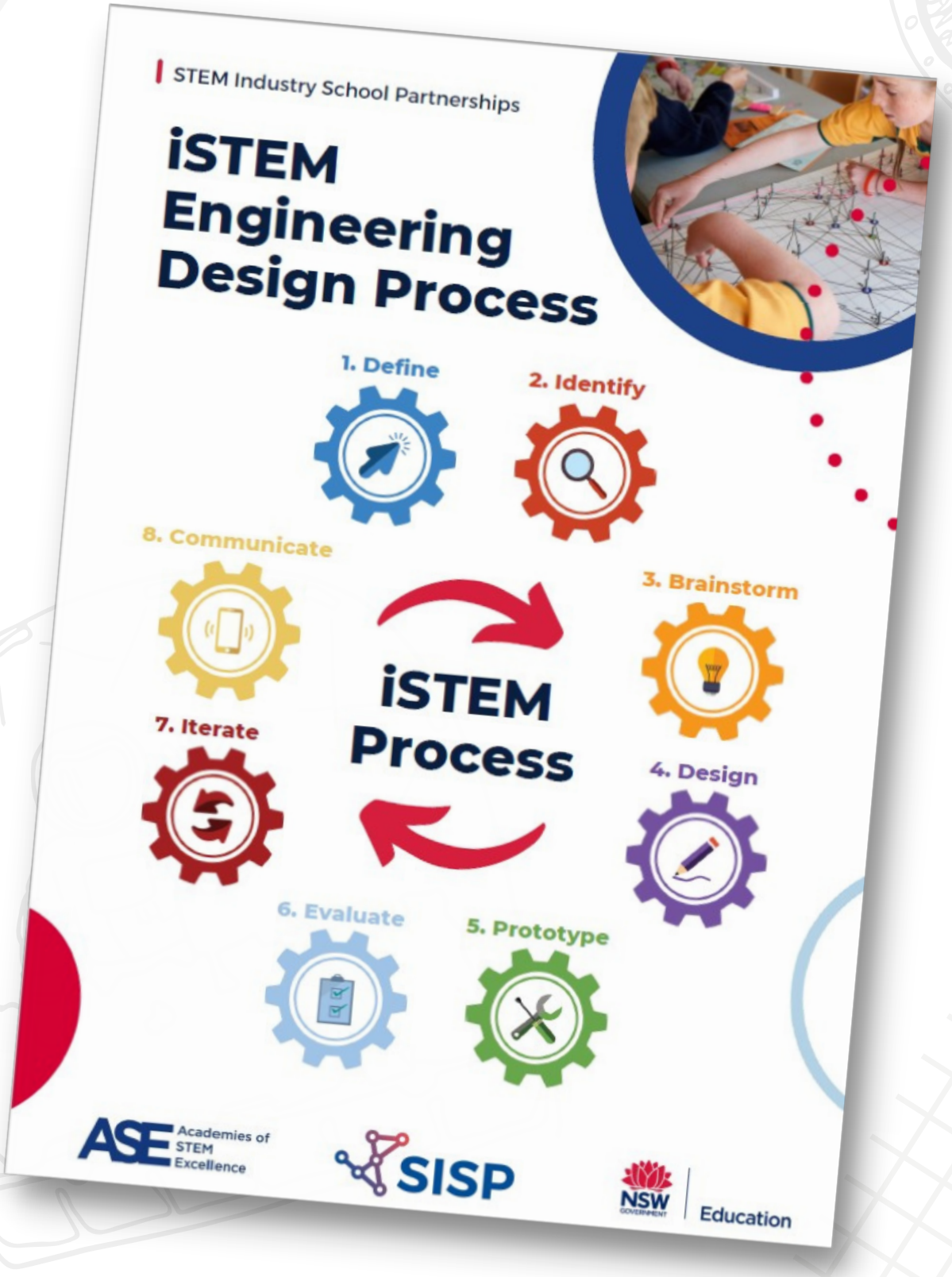
You are part of a team of astronauts, scientists, engineers and leaders who are are working on the Artemis program. In this 6-week design sprint, students will complete an engineering design process to develop a new plant growth mission for the International Space Station or for the moon.

This mission could be a new growth experiment, device or environment, your client will be Ted and the team at Magnitude.io. Throughout the 6 weeks, students will complete activities as if they were real astronauts on a mission and will complete a series of collaborative activities leading to a 1-minute video pitch in week 6.

Design Brief

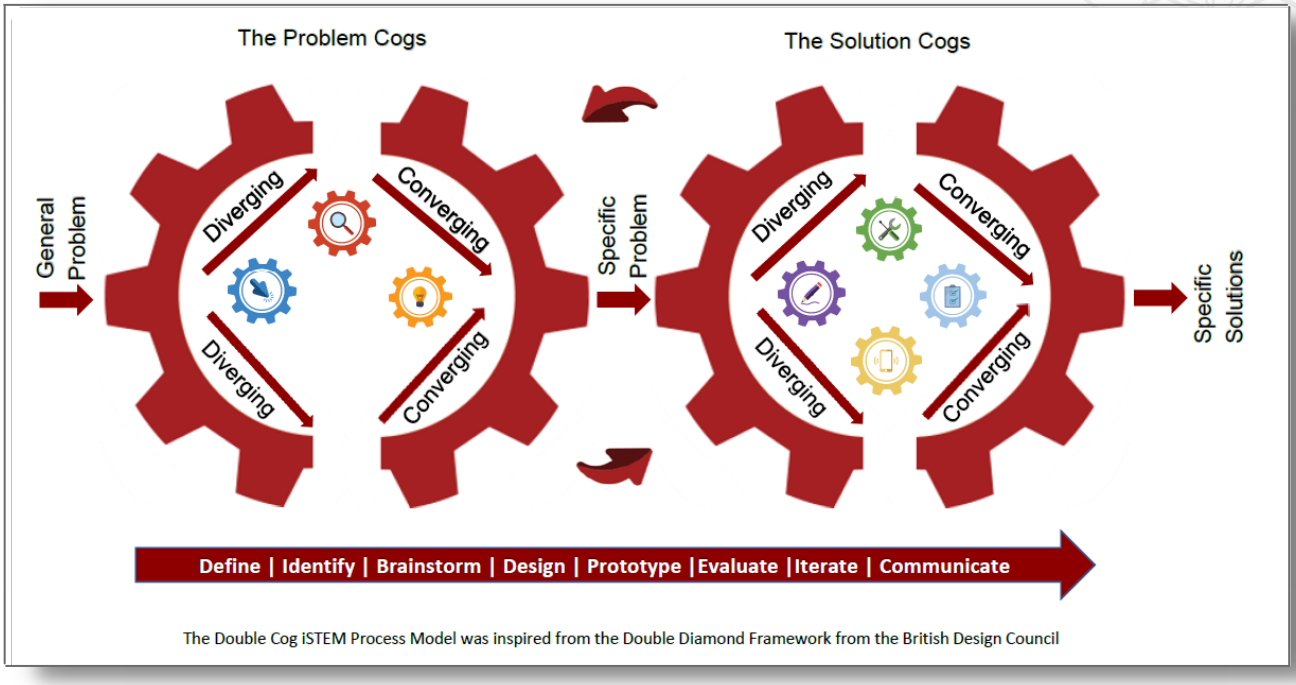
Students are to design a new plant growth mission for Magnitude.io in pursuit of NASA's Artemis program. This mission could be in the form of a plant growth experiment, device or environment either on the International Space Station or on the moon itself. The mission should align to at least one of the United Nations Goals for sustainable development. Each week students will work through an engineering design process to develop solutions to the problem.

The iSTEM Process



The iSTEM Process has been developed by the STEM Industry School Partnerships program. It is a series of steps also known as 'COGS' that guide students through an industry recognised engineering design process. This eight step process will be used as a guide for the Australian Virtual Astronaut Challenge. For more information click here.

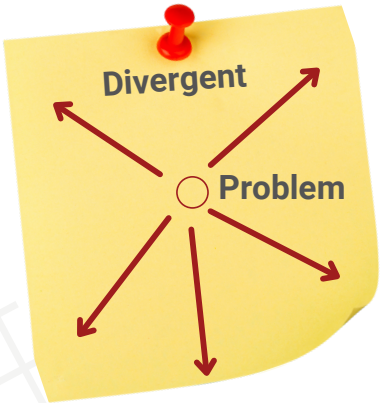
Double Cog iSTEM Process Model



Throughout the AVA program students will be guided through the iSTEM process, shown on page 4 and will apply the Double Cog Model shown above. Do not be concerned about understanding the model, the most important concepts are to apply divergent and convergent thinking.

Divergent Thinking

Divergent thinking is the process of generating multiple ideas to maximize the range of possible solutions, applications, examples, etc. It is the initial stage of creative problem solving where learners have the space and freedom to explore out-of-the-box ideas, take risks, push beyond obvious answers, probe deeper, and defy some of the conventional boundaries and constraints of a particular discipline. Typically, divergent thinking involves brainstorming, collecting spontaneous and random associations with a given topic, and increasingly expansive ideation.



Convergent Thinking

Convergent thinking usually follows divergent thinking. It is a process in which learners critically sift through the collection of possible solutions by considering realistic limitations and feasibility, comparing positive and negative attributes. Divergent thinking unfolds and broadens; convergent thinking narrows down and focuses, filtering the set of creative options to identify and clarify the next step. The challenge during divergent thinking is pushing through the initial blockers, blinders, and biases, and resisting the natural inclinations to turn toward convergent thinking prematurely.

Define

Skills audit

Activity: Look to form teams, start with writing down your skills. Try to find team members with different skills to yourself.

What Makes a Good Team?
Need some tips on how to create a great team dynamic? Look no further. Find out which characteristics make up a high-performing team.

1. **Diversity** - Thriving teams value diversity.
2. **Communication** - A thriving team has open and honest discussions, sharing their thoughts, ideas and opinions.
3. **Clear goals** - As a team, members should agree on and set goals.
4. **Leadership** - A good leader is an essential component of a successful team.
5. **Trust and respect** - Every thriving team relies on a high degree of trust
6. **Managing conflict** - If the environment empowers team members to challenge one another in a constructive and open manner, then the working relationship within the team is likely to be more creative and productive.

Teamwork
People with strong teamwork skills are sought out by organisations for many reasons—they demonstrate leadership, collaboration, and good communication.

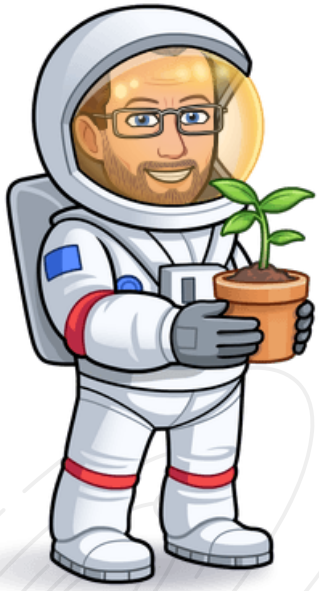
NASA have already selected an initial team of astronauts - the Artemis Team - to help pave the way for the next lunar missions including sending the first women and the next man to walk on the lunar surface.

Activity:
It is now time for you to select your mission team and to select different roles based on your individual skills. Roles could include; Mission Commander and different Mission Specialists such as science officer, communications.

Mission Team

Define

Your Team - Extension Activity 'Bitmoji'



Time for some Creativity!
The image of Dr Sleap to the right has been created using the Bitmoji App. In this activity we want you to come up with a team name and for each of your team to produce a spaced themed Bitmoji. Challenge: Paste all your team members Bitmoji's in the space below.

Download on the App Store

GET IT ON Google Play

Our Team -

Define

The Brief:

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Divergent Thinking Activity

Individually, see how many thoughts or ideas that you can come up with in 2 minutes on the type of mission that you might develop for Magnitude.io. Write them on the post it notes below. If you run out, simply write more on an additional page.