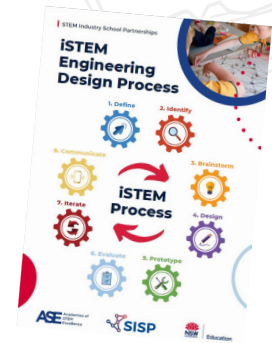


Define the problem



An integral part of the iSTEM Engineering Design process is the definition of a meaningful and actionable, mission statement. This is one of the most challenging parts of the process, as the definition of a problem also (known as the mission statement) will require careful consideration.

The mission statement will guide you and your team's work and will kickstart the ideation process.



What makes a good mission statement?

A good mission statement should have the following traits. It should be:

- **Human-centered.** This requires you to frame your mission statement according to specific users, their needs and the insights. The mission statement should be about the people the team is trying to assist, rather than focusing on aspects such as; technology, money or product details.
- **Broad enough to be creative.** This means that the mission problem statement should not focus too narrowly on a specifics regarding the implementation of the solution.
- **Narrow enough so it can be achieved.** On the other hand, a mission statement such as, "Solve World Hunger," is too broad and will likely cause team members to easily feel daunted. Mission statements should have sufficient constraints to make the project achievable.



How to produce a mission statement?

In order to produce a good mission statement you need to clearly define, 'What is the problem you are going to solve'? In the Australian Virtual Astronaut (AVA) challenge you have been given four different scenarios from which your team has selected one to develop into a design project.

In order to define the problem you must **first analyse the problem** then brainstorm potential problems to be solved related to that scenario and develop a better understanding of who you are designing the solution for.

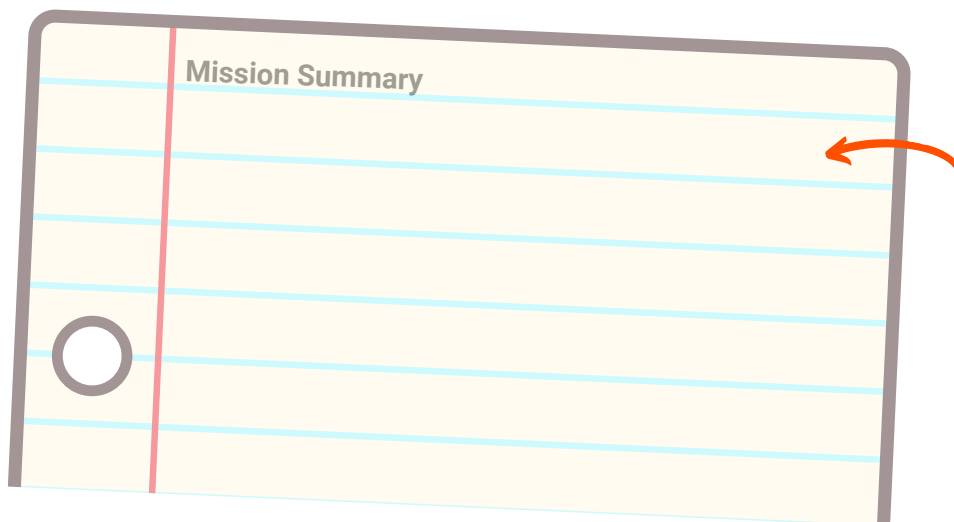


Define the problem



Analysing the problem worksheet

AVA scenario chosen: _____



Mission summary task: From the week 1 scenario sheets, summarise the mission outline in the space provided.

Team Deliverables

Deliverables task: In the space to the right list what the team needs to deliver in order to complete this design sprint. If the scenario has any science goals and objectives please list them here as well.

Problem solving task: In the boxes below indicate;

- Who is the problem being solved for?
- What are you going to solve? and,
- Why does the problem need to be solved.



Problem Solving

Who	What	Why



Brainstorming:

Now we have done some analyses of the chosen scenario we now need to do some ideation to develop some different ideas for **problems that we might like to solve**. We are going to describe two different 'Brainstorming' techniques that your team can use to generate ideas. We recommend you watch the 'Brainstorming' video from Ian Preston prior to undertaking this task. Choose the best method to use for your team.

Method 1: Space Saturate and Group

Step 1 Brainstorm: Each member of the team has a set of post it notes. On the post it notes they write down or draw pictures of different **problems** that they might like to solve in a 5 - 10 minute period.

Step 2 Space Saturate: The team saturates a wall space, desk, whiteboard, etc. with the post-it's notes with lots of **problems** to be solved.

Step 3 Synthesize: In order to synthesize the information, teams organise the post-it's into groups of ideas that are similar. By grouping these thoughts, you're able to identify key themes which will help you create meaningful decisions.

Step 4 Rank: Now as a team, respectfully rank the ideas by moving the most interesting Post-It's to the top of the board.



Method 2: Crazy 8's

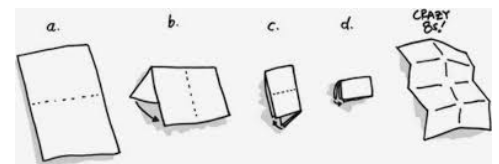
Crazy 8's is a core Design Sprint method. It is a fast sketching exercise that challenges people to sketch eight distinct ideas in eight minutes. The goal is to push beyond your first idea, frequently the least innovative, and to generate a wide variety of ideas.

Step 1 Fold: Each member folds a piece of paper in half 3 times. Then unfolds the paper to have 8 equal rectangles.

Step 2 Brainstorm: Individually, each team member sketches one **problem to be solved** in each rectangle adding a few words, doing their best to fill all sections in eight minutes.

Step 3 Group: Group the different problem ideas that are similar together.

Step 4 Expand: Now you have seen what the others in the group have done, redo the exercise as a group. As a fun extension in the final two blocks fill them out as if you were Elon Musk or a NASA scientists.



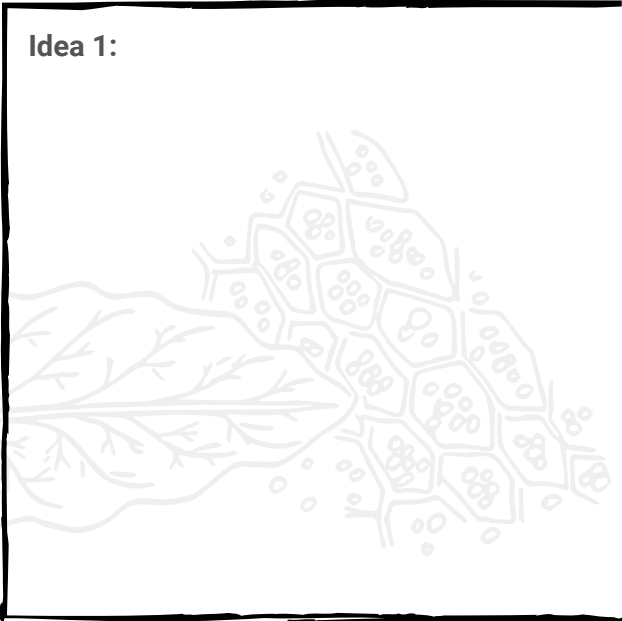


Synthesize your ideas

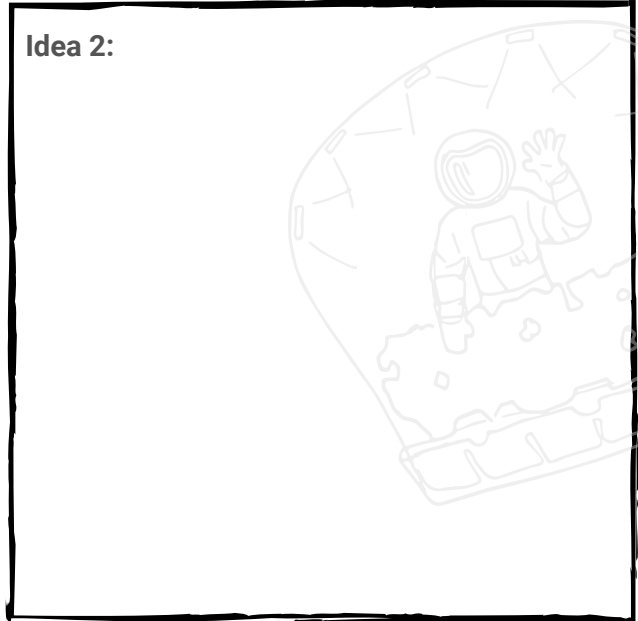
From your brainstorming session select the four best ideas that you have come up with and evaluate them by documenting their Pro's and Con's.

Remember these are problems that you wish to solve not solutions.

Idea 1:

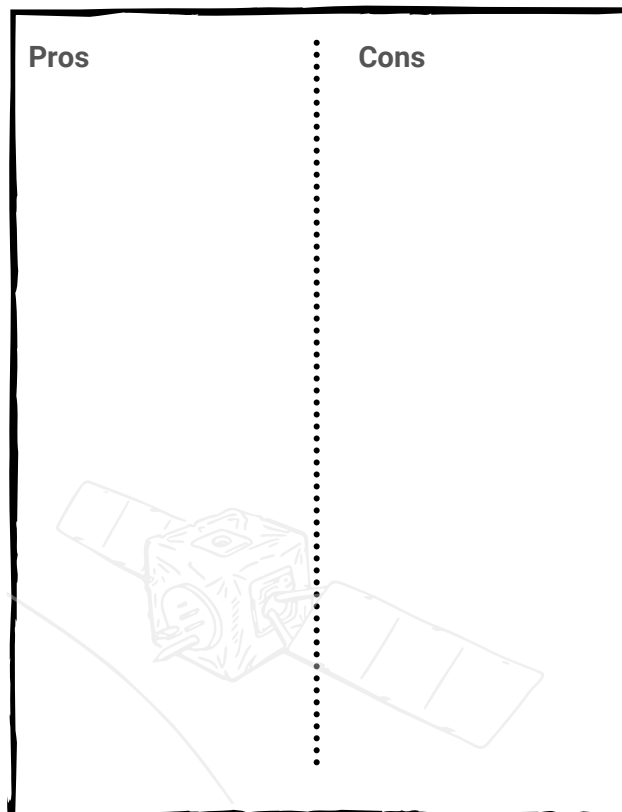


Idea 2:



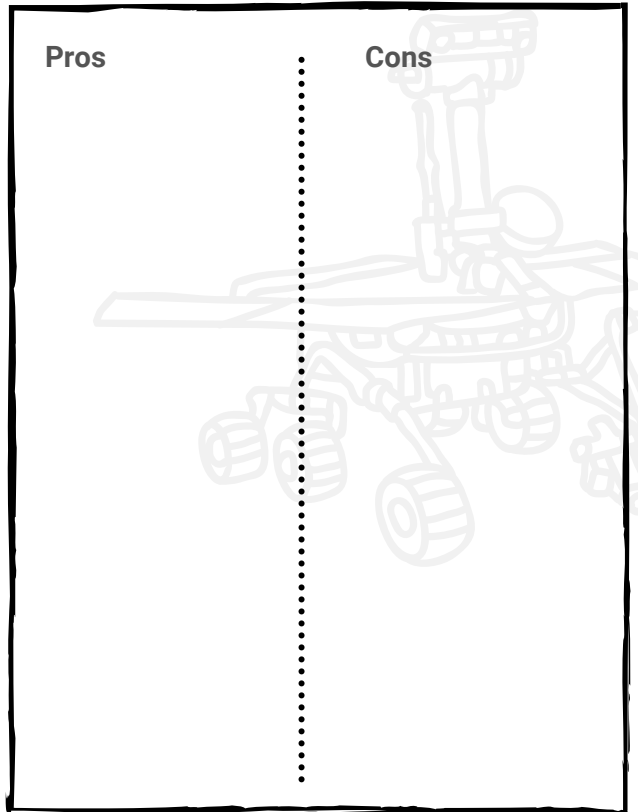
Pros

Cons



Pros

Cons





Idea 3:

Idea 4:

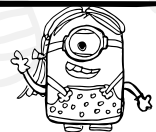
Pros

Cons

Pros

Cons

Selected problem to solve with justification





Empathy mapping

Now you have decided upon a problem that you are going to solve, the next step is to complete an empathy map so you can get a deep understanding of the end user.

What is an empathy map?

An empathy map is a simple, easy-to-digest visual that captures knowledge about a user's behaviors and attitudes. An empathy map consists of four quadrants. The four quadrants reflect four key traits, which the user demonstrates or possesses. The four quadrants refer to what the user: **Said, Did, Thought, and Felt.**

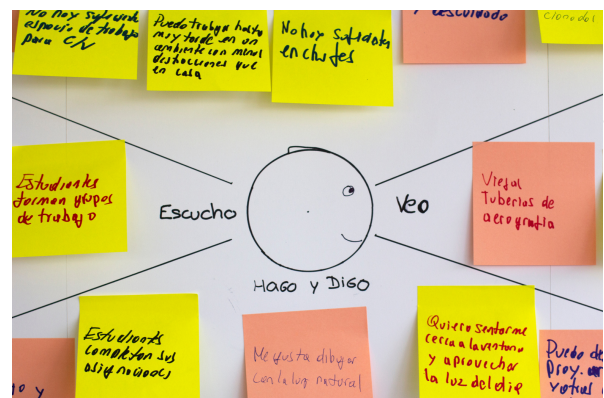
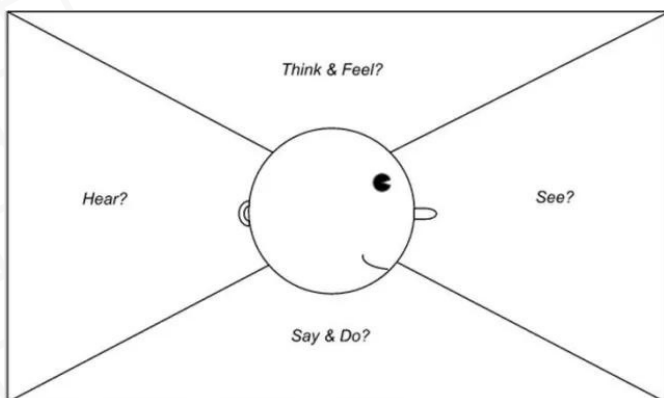


Empathy mapping task:

- First determine who is your end user, they go in the centre of the empathy map diagram. E.g. This may be a family member living on a Family Outpost on the Moon. You could ask a family or team member to play act what it would be like living on the moon in order to complete this task.
- Conduct research, observing their actions and conducting an interview.
- Take notes and draw picture's using post-it notes.
- Set up the four quadrants on a wall, whiteboard or use an image similar to that shown below.
- Team members write down or draw observations for each quadrant.

When completing the observation and research consider the following:

- **What did the user SAY?** Write down significant quotes and key words that the user said.
- **What did the user DO?** Describe which actions and behaviours you noticed or insert pictures or drawing.
- **What did the user THINK?** Dig deeper. What do you think that your user might be thinking? What are their motivations, their goals, their needs, their desires? What does this tell you about his or her beliefs?
- **How did the user FEEL?** What emotions might your user be feeling? Take subtle cues like body language and their choice of words and tone of voice into account.





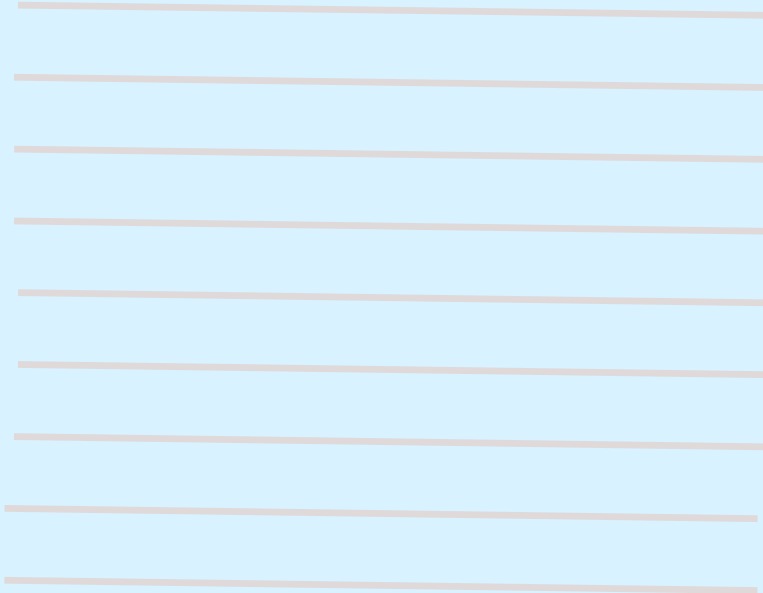
Mission statement

By now you have done the following tasks;

- Selected the mission scenario
- Identified who is the problem being solved for, what is being solved and why.
- Brainstormed and determined the problem that you wish to solve
- Completed an empathy map to better understand the needs of the end user.

You are now going to produce a mission statement that will guide you and your team's work based on the research and analysis that you have undertaken.

Mission Statement



Task: In the space provided write your mission statement which is human centred, not too broad but is also narrow enough to be achieved.

Sample Mission Statements

- **Team X** will develop a concept for a moon-based compound designed for a family of four, 2 adults and 2 schools age children. The family who would be working, studying, playing and living on a future Moon outpost. The team will produce a range of concept drawings for a moon compound.
- **Team Y** will produce a prototype semi-autonomous rover designed for scientists at the Australian Space Agency and NASA. The prototype will meet the Trailblazer mission parameters but will also complete several other ongoing scientific experiments to help learn about the moon surface.
- **Team Z** will design a CubeSat program that could be utilised by high school students around the world to learn about the effects of climate change. The team will use micro bit devices and sensors to collect environmental data a photographs around school locations, so that they can compare data with ground observations.