Identify the Constraints

What is a Constraint?

Design constraints are limitations on a design. These include imposed limitations that you do not control, and limitations that are self-imposed as a way to improve a design.

Nick De Leon - Royal College of Art UK, School of Design

Nick leads the development of the School's research and knowledge exchange relations. He received his PhD from Imperial College Business School, where his research addressed the impact of information and communication technologies on the social and economic vitality of cities. Nick has an engineering degree from Imperial College and a Master's degree in Industrial Design from the Royal College of Art.
Nick began his career as an industrial designer at IBM, moving from designing products then services, through to developing entire new businesses in his role as Business Development Director for IBM's Global Services division in Europe.

Nick De Leon Video
If you have not watched the Mission 2 video with Ted Tagami and Nick De Leon, please do. In this video Nick discusses constraints. Video link click here.

'**Every constraint is a gift. It is a gift that enables you to show your creativity and capacity to innovate.**'

A designer's approach to a problem begins with an acute observation of the users and of the system's context and constraints.

Constraints may be:
- Technological
- Spatial (physical dimensions)
- People (communities)
- Social
- Commercial (affordable)

Combinations of designing something that is not only technically feasible and exciting, but is truly desirable and commercially viable should be your aim.

'Every constraint is an opportunity to innovate'
'If you give a group of people complete leeway to design anything, they will design nothing'

Ted Tagami - CEO Magnitude.io
The impetus is on the customer like Mangitude.io to have well formed constraints t provide to the designers. So that it is not an uninhibited mission to do anything you want.

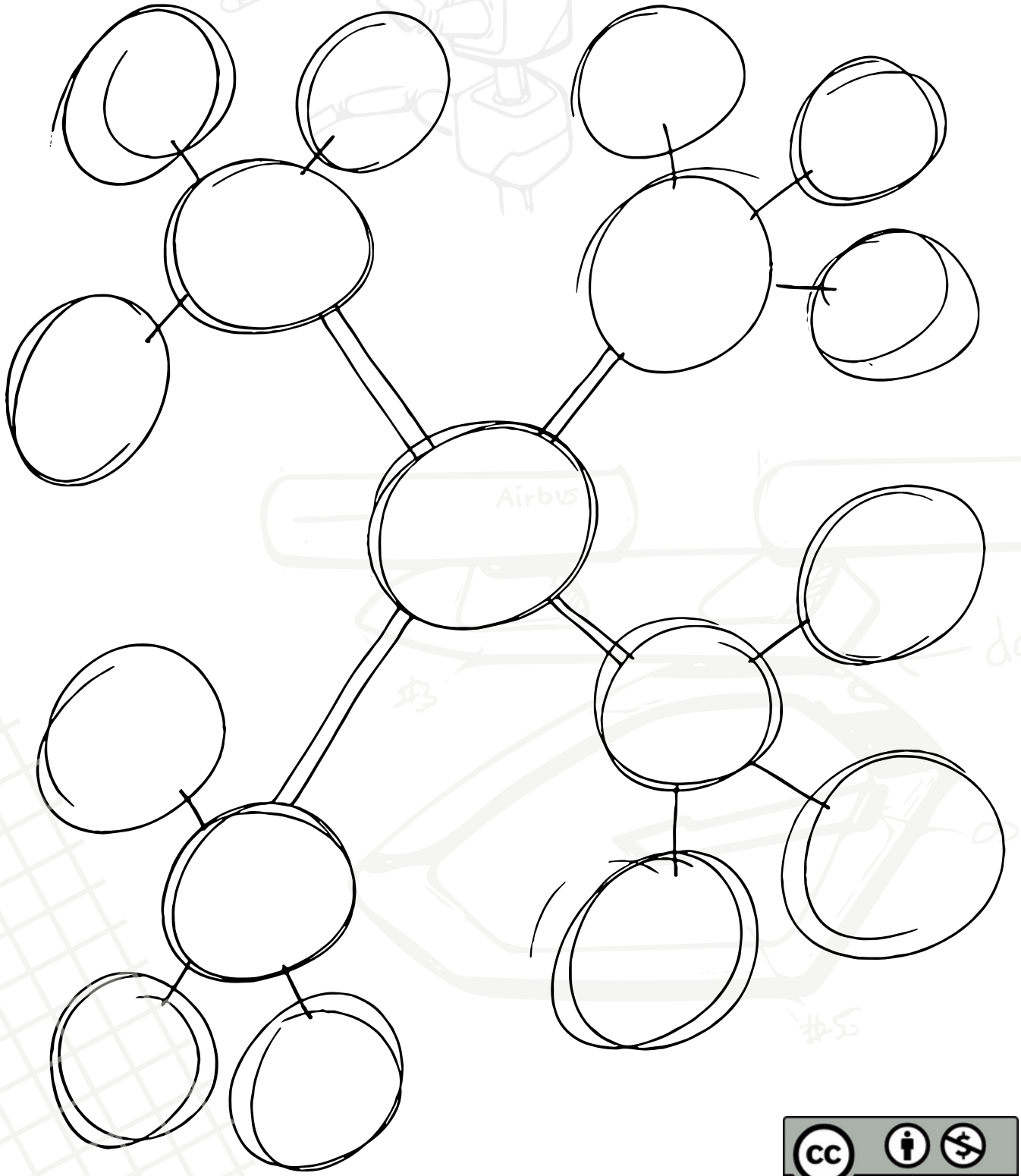
You need to have very specific constraints. For example a CubeSats constraints could include ;
- Volume
- Mass
- Deadlines
- Materials
- Cost

Identify the Constraints

Clearly identify the specific constraints of the mission

Last week you produced a mission statement which provided the scope for your project. You now need to identify any imposed constraints that are set from the initial scenario. Additionally the team needs set the self-imposed constrains to narrow the overall scope so the project is achievable.

Activity: Using the Mindmap below, brainstorm as many different constraints on your project. Add ones that are imposed by the scenario (e.g. deadlines) and those that you impose on yourself (size).



Identify the Constraints

Constraints

Constraints
Now you have brainstormed many different constraints, your team needs to decide upon the ones that are most important and those for which you must impose on the project.

Activity
In the spaces provided detail the different constraints that you are setting for this mission.
For Example:

- The project must be completed by what time?
- A video no longer than 90 seconds must be produced that details the design solution.
- The prototype must be produced that is semi-autonomous
- The Moon base must be suitable for a family of four and 2 pets.

Criteria to Evaluate Success
It is important for teams to determine at the beginning of a design process what success will look like. Also in order to effectively evaluate the final solution, you need to set the criteria for success of your design solution.

Activity:
In the space provide list the different criteria that you will use to determine if your solution was successful. E.g. Did the design function as it should, did it look appealing, did it meet the needs of the people using it, etc.

Note: You should also consider at this point how are you going to determine whether the completed project has been successful. e.g. ask an expert to give an evaluation, ask your friends, survey the general public or ask the people who the project was designed for.

Criteria for Success

Identify the Constraints

Materials

Identify Materials
The available materials is an important constraint. Identify (name) the materials that you have access to in order to complete this design challenge.

Activity: Add to this list as the project goes forward. Consider the following:

- Materials needed for a prototype
- Potentially the materials required for the final design solution. E.g Raspberry-Pi, aluminum sections, tec
- The video or poster requirements

Tools and Equipment
Now is a good time to identify the tools, workspaces, and equipment that you might need to complete this task.
Activity: List any tools and/or equipment required to complete the challenge in the space provided below.

Tools and Equipment

Activity: The different mission scenario's may have specific rules and guidelines to follow. Use the space below to identify these or the science goals or objectives.

Identify the Constraints

Project Management and Team Work

Introducing Allan Ryan, Adjunct Professor at UTS Business School and founder of the Hargraves Institute. In our week 3 webinar Allan will demonstrate how Trello can be used for project management and communication.

AVA 2021 Video: Watch video produced for the 2021 AVA challenge in which Allan runs students through a couple of design sprints, to generate some creativity. All and members of the AVA Team, Ben Newsome, Ted Tagami and Dr Scott Sleap discuss idea generation and teamwork concepts. Link to video;

Hargraves Institute Challenge 1:
In 30 seconds students individually come up with as many different ideas based on 'What would you do with a moon rock'.
Activity: After completing the exercise students compare how many different ideas they were able to come up with in 30 seconds.

Hargraves Institute Challenge 2:
In 2 minutes students individually come up with as many different creative ideas for the 90 second pitch that is to be done at the end of this challenge.
Activity: After completing the exercise students compare how many different ideas they were able to come up with in 2 minutes.

Trello is Australian software that combines project management with team communication. Below is a free public template that you can use for your project.

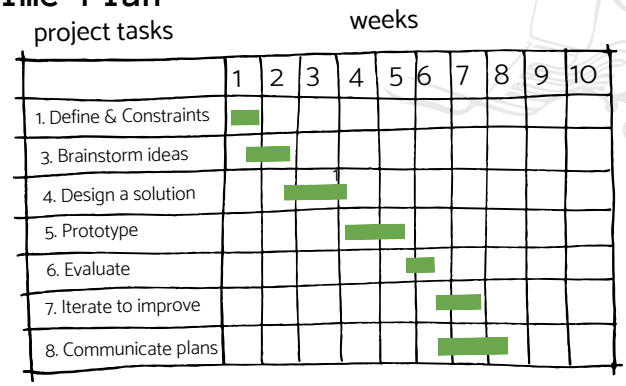
Projects need clear communication on tasks between team members. Software like Trello could be used to help coordinate and mange your project.

Activity: Search for Trello and investigate if it would be suitable for your team. Are there other project management software titles that could be used?

Identify the Constraints

Project Management

Time Plan



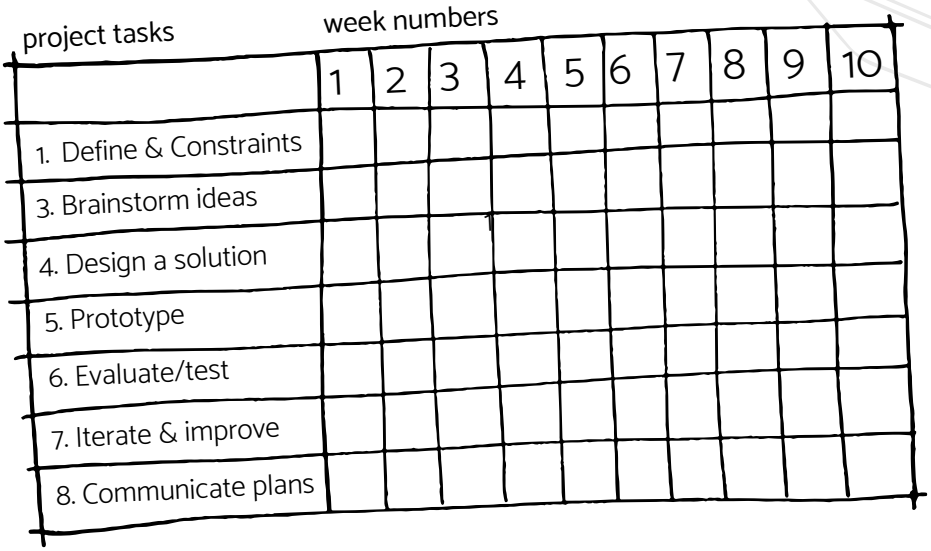
Gantt Chart

A Gantt chart is commonly used by industry as a tool in project planning. In the project shown (left) 'Iterate' and 'Communicate' are scheduled for the same week. Why might that be?

Challenge: Find out how long it took for NASA to put a person on the moon after President John F. Kennedy's famous speech to congress on space exploration?

Activity:

Try scheduling your own project in this blank Gantt chart (right) . Your teacher will specify a project completion date. You may also be given a date for 'deliverables'. It could be that you report on your progress at agreed 'milestones'.



Action Plan

An action plan is a list of steps you plan to follow to complete a project. This is usually completed in sequential order and details what actions need to be taken to complete the project.

Activity:

Teams complete an action plan for the AVA Challenge.