SDG 9 Future of Space

Micro Module 7: Space Design Problem to Pitch

MM7: Space Design Problem to Pitch

Phase 3 Implementation

Lesson 1 What is Design Thinking?

Subject Areas: Art and Design, CPSE, Climate Action and Sustainable Development, Engineering, Technology, SPHE

Lesson Title and Summary: What is Design Thinking?

Design Thinking is a cognitive, strategic, and practical approach to creative problem-solving that enables individuals to tackle complex challenges in innovative ways. It involves understanding the needs of users, reframing problems, and brainstorming potential solutions through a human-centred lens. This problem-solving framework is widely used in various industries, from technology and product design to education and business, making it a highly relevant and versatile approach to mastering real-world challenges.

This lesson will introduce students to the five stages of the Design Thinking process—Empathise, Define, Ideate, Prototype, and Test—providing a foundational understanding of how to navigate these phases. By guiding students through each step, the lesson fosters both creative and analytical skills, helping them learn how to deeply understand a problem, generate multiple ideas, and refine solutions through iterative feedback.

Vocabulary: Empathy, Context, Culture, Qualitative, Users, Stakeholders

In this lesson, the learner will:

- be introduced to Design Thinking
- explore the 5 stages of Design Thinking create their own understanding of the
- stages through quick practical tasks
- work as pairs and individuals to begin to
- understand the iterative processes
- practice time management

Materials:

- Worksheet: Introduction to Design Thinking
- Worksheet: Flipped Classroom worksheet
- Worksheet: Stakeholder mapping activity
- Teacher's Guide: Stakeholder Mapping support
- Computers and internet access
- pens and paper

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L1: What is Design Thinking?

Activity Instructions

In preparation for this module, it would be useful to have the learners complete the Flipped Classroom activity, after this lesson as an introduction to the broader ideas behind this approach to developing and managing projects. This introduces key terms and concepts such as complexity, wicked problems and prepares them for a more circular approach to Design Thinking.

Activity 1 Introduction to Design Thinking (25 mins)

1. If working digitally share the worksheet: Introduction to Design thinking or this can also be projected. You can also circulate handouts and ask them to keep all their work in a folder to be assessed at the end of the module. The first activity completes the worksheet up to the section on Define.
2. Watch the short video 'What is Design Thinking? then have students working in pairs complete the activities in the worksheet: Introduction to Design Thinking, ask learners to find the meanings of the words and re-write them in their own words.
3. Have each pair share their meanings with the class, photograph or upload each groups answers to an e-classroom e.g. Microsoft Teams or Google Drive and use this to create a 'group' design thinking vocabulary list / glossary.
4. As a class discuss the 5 stages of Design Thinking image – reviewing any terms that are new.

Activity 2 Ideate Worst Idea Good Idea (25 mins)

1. Allow students 30 minutes for learners to complete the Ideate and Prototype task of the worksheet in pairs. Remind them that they will have to manage their time to allow for the prototyping and testing stage. The aim is not to create masterpieces but to work quickly and experimentally – it should be made clear that given the limitations, it's just to quickly show the idea in 3D.
2. If possible, ask learners complete the Flipped Classroom worksheet before the next lesson.

REFLECTIVE EXERCISE: 3-2-1

- Three things they feel they have learnt from the tasks
- Two things they found most interesting and would like to explore more
- One – their opinion they have about the tasks

Use Post-its or a mentimeter survey - www.mentimeter.com - to gather reflections

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EXTENSION / REDUCTION ACTIVITIES

Reduction: For a shorter class remove Activity 2 and spend more time in building the collective vocabulary list – have each student type up their words and definition and add to a shared document

Extension: For a longer class give students more time and materials for the Ideate – Prototype stages of Design Thinking.

Option B :Learners could work through the Flipped Classroom worksheet rather than complete this at home

Option C: Learners could begin the worksheet: Stakeholder Mapping Scenarios and beginning working on the Design Scenarios as a way to develop skills that maybe of use to their fashion project.

MEDIA BOX: (materials, online video links, extra resources, case studies etc)

What is Design thinking - Video - [1:57 mins] https://www.youtube.com/watch?v=a7sEoEvT8l8

Design thinking Mindsets - Applying Design Thinking in Schools poster
https://www.makersempire.com/design-thinking-for-schools-poster/

SDG Focus: MM7: Space Design SDG Challenges

- Introduction to SDGs for Young People https://www.un.org/sustainabledevelopment/youth/
- https://www.unoosa.org/oosa/en/ourwork/space4sdgs/index.html
- Explore the SDGs https://sdgs.un.org/

Local Trip / Expertise / Additional Work and Assessments

Stakeholder Mapping worksheet supports students to focus on fashion, its issues and its audience. This uses two Fashion Scenarios that supports learners to explore ideas and develop skills.

Linked learning: Communication Skills and Media Communication Skills micro-modules support the development of the 4Cs skills – Creativity, Communication, Critical Thinking and Collaboration.Tutors are encouraged to work with other tutors to develop the project through multiple outcomes such as video, poster, Pecha Kucha, Interviews or Podcasts and SDG 4 supporting Skills: Reports Writing - https://www.muinincatalyst.com/s-projects-basic

MM7 L1TG: DESIGN THINKING STAKEHOLDER MAPPING

Space Stakeholder Mapping Worksheet

Facilitating the Stakeholder Mapping Activity - if you wish to undertake a stake holder mapping this could be extended into an additional lesson. This guide is designed to help teachers facilitate a stakeholder mapping activity in the context of a space project. The goal is to guide students through identifying and categorising stakeholders and understanding how to engage with them. Whether the focus is a pop-up store in a space tourism hub or a sustainable space technology show, this exercise can be applied to various contexts. By the end of this lesson, students should:

- Understand the concept of stakeholders and their role in project success.
- Learn how to map and categorise stakeholders by interest and influence.
- Develop strategies to communicate and engage with different stakeholders.

1. Introduction to Stakeholder Mapping

- Explain the Concept: Begin by introducing the concept of stakeholders: people or groups that are impacted by or can impact a project. Use simple, relatable examples (e.g., a sports event needing sponsors, venue owners, local government approval).
- Discuss the Space Scenarios: Introduce the two space project (pop-up store in a space tourism hub or a sustainable space technology show) and explain that fashion businesses also need to consider various stakeholders (e.g., designers, suppliers, customers).
- Class Engagement: Ask learners to think about what kinds of people or groups they think are important in space projects. Write these ideas on the board to create an initial list.

- **Launching a Space-Themed Pop-Up Store in a Space Tourism Hub**
  - Imagine you're launching a pop-up store that will be located in a space tourism hub, such as a spaceport or space-themed attraction. This store will sell space-related merchandise, apparel for space travellers, and collectibles celebrating space exploration.
  - You'll need to map out key stakeholders such as space tourism companies, local space enthusiasts, government regulators, potential investors, and international space organisations.

- **Stakeholder Mapping Prompt Questions:**

  - Who are the primary customers for the pop-up store?
  - Are they space tourists, local space enthusiasts, or the general public? What are their expectations for this store?
  - Which space tourism companies or organisations are involved in the area?
  - Are there partnerships or collaborations with companies like SpaceX, Blue Origin, or Virgin Galactic that could be valuable?
  - What regulatory bodies oversee commercial activities in this space tourism hub?
  - Are there any local, national, or international regulations that you need to consider, such as space commerce laws or licensing?

- What type of support do you need from local authorities or spaceport operators?
- Do you need permissions, space allocations, or security clearances to operate within the hub?

2.Organising a Sustainable Space Technology Show Featuring Innovative Space Designers

- You are organising a sustainable space technology show, focusing on eco-friendly innovations for space exploration. The show will feature local designers and engineers showcasing sustainable spacecraft materials, energy-efficient space habitats, and other green technologies for space missions.
- Stakeholder mapping for this challenge would include aerospace companies, sustainable technology advocates, space agencies, space startups, environmental organisations, and tech investors.

Stakeholder Mapping Prompt Questions:

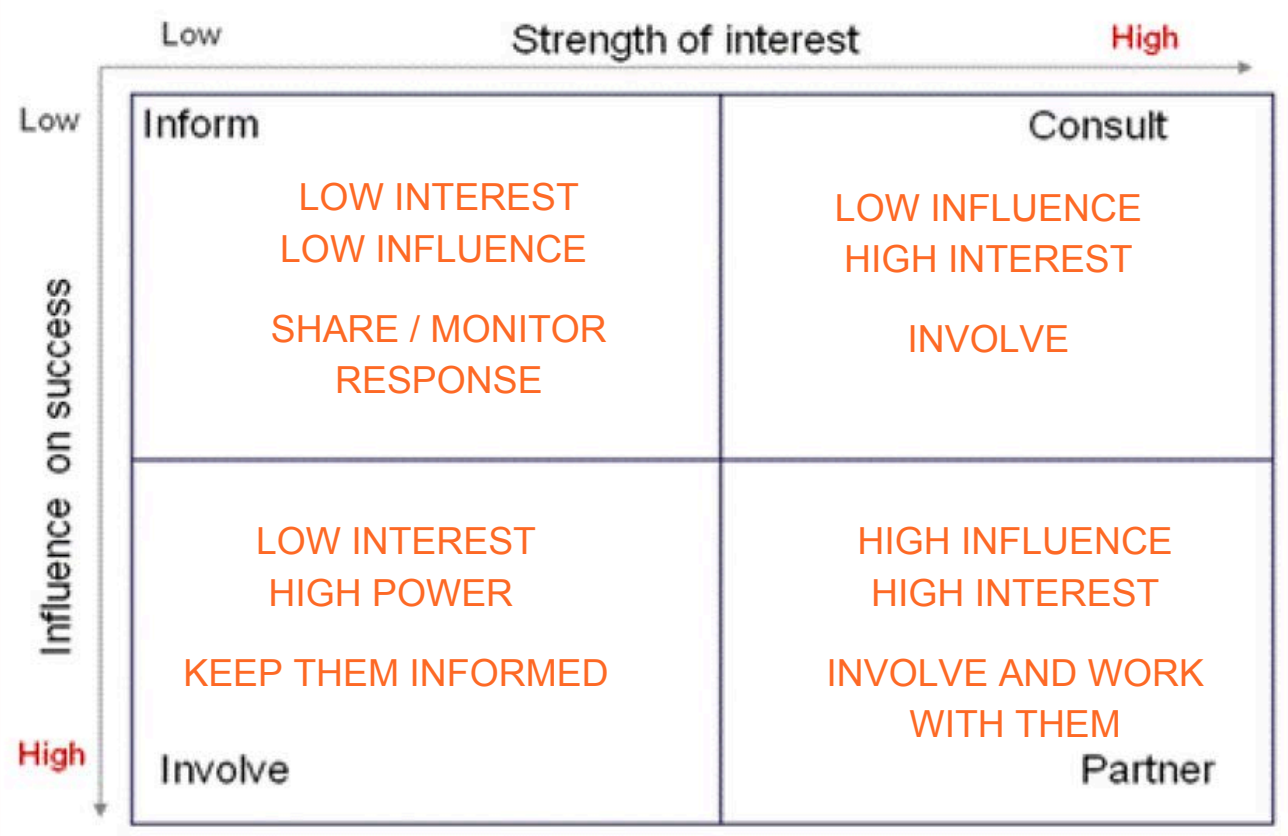
- Who are the key designers, engineers, or companies focused on sustainable space technologies?
- Which individuals or organisations are leading the way in developing green technology for space missions?
- What space agencies or organisations should be involved?
- How can you engage NASA, ESA, or other space agencies to showcase their sustainability efforts or endorse the event?
- What investors or venture capitalists are interested in sustainable space technologies?
- Are there any venture funds or investors with a focus on green technology in space exploration who may want to attend or support the event?
- Which environmental or sustainability-focused organisations might want to participate?
- Can you collaborate with organisations advocating for sustainability, even those outside of the space industry?
- What is the role of government or international space organisations in this event?
- Are there regulations or governmental bodies that need to be involved? How do they impact sustainable space initiatives?
- How can the local space-tech community or universities contribute?
- Are there any academic researchers or local startup incubators focused on sustainability in space exploration?
- What are the media and public relations opportunities for promoting sustainability in space?
- Which space and environmental media outlets should you target to maximise exposure and public awareness?
- What technologies or materials are most pressing in space sustainability?
- What specific innovations (e.g., recyclable spacecraft materials, solar-powered space stations) should be highlighted to engage stakeholders?

MM7 L1TG: DESIGN THINKING STAKEHOLDER MAPPING

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

2. Explanation of the Stakeholder Grid (5-10 minutes)

- Walk through the Grid: Introduce the four quadrants of the stakeholder grid:
- High Interest / High Influence: Involve these stakeholders closely.
- Low Interest / High Influence: Keep these stakeholders informed but not overly engaged.
- High Interest / Low Influence: Engage these stakeholders but don't rely on them for big decisions.
- Low Interest / Low Influence: Monitor these stakeholders but minimal engagement is needed.
- Real-world Example: Use a real or hypothetical fashion example (e.g., a pop-up store needing engagement from local fashion influencers, customers, and textile suppliers) to illustrate how stakeholders might fit into the grid.



Once stakeholders are categorised, tailor your communication and engagement strategies for each group. For example:

- High Influence / High Interest: Collaborate directly with key partners like ethical textile suppliers or media platforms to shape your project's direction.
- Low Influence / Low Interest: Provide updates to stakeholders like local community members or tangential industry organisations through newsletters or passive communication.

By mapping out these relationships, you can prioritise where to focus your efforts for maximum impact in launching and growing your fashion business.

MM7 L1TG: DESIGN THINKING STAKEHOLDER MAPPING

3. Scenario Setup and Group Work (20-30 minutes)

- Return to the Scenarios offered:
  - Launching a Space-Themed Pop-Up Store in a Space Tourism Hub
  - Organising a Sustainable Space Technology Show Featuring Innovative Space
  - Designers
- Split the students into small groups and assign each group one of the scenarios.
- Worksheet Activity: Ask the groups to:
  - Identify stakeholders specific to their selected scenario.
  - Place all the stakeholders into the four quadrants of the grid (Interest vs. Influence).
  - Discuss and note down strategies for communicating and engaging with each group.

4. Group Presentations & Discussion (15-20 minutes) - also possible assessment activity

- Group Presentations: Have each group present their stakeholder map to the class. Encourage them to explain why they categorised stakeholders as high or low interest/influence and how they would communicate with them.
- Class Discussion: After each presentation, engage the class in discussing:
  - Were any stakeholders missed?
  - Would they place any stakeholders in different quadrants?
  - How would their communication strategies vary for different stakeholders?

5. Wrap-Up and Reflection (5-10 minutes)

- Summary: Recap the importance of understanding stakeholders in any project and how this applies to the fashion industry, emphasizing the key takeaway that different stakeholders need different types of engagement based on their interest and influence.
- Reflection: Ask students to think about other projects (either in fashion or other areas) where they could use stakeholder mapping. How might this process help them think more critically about project success?

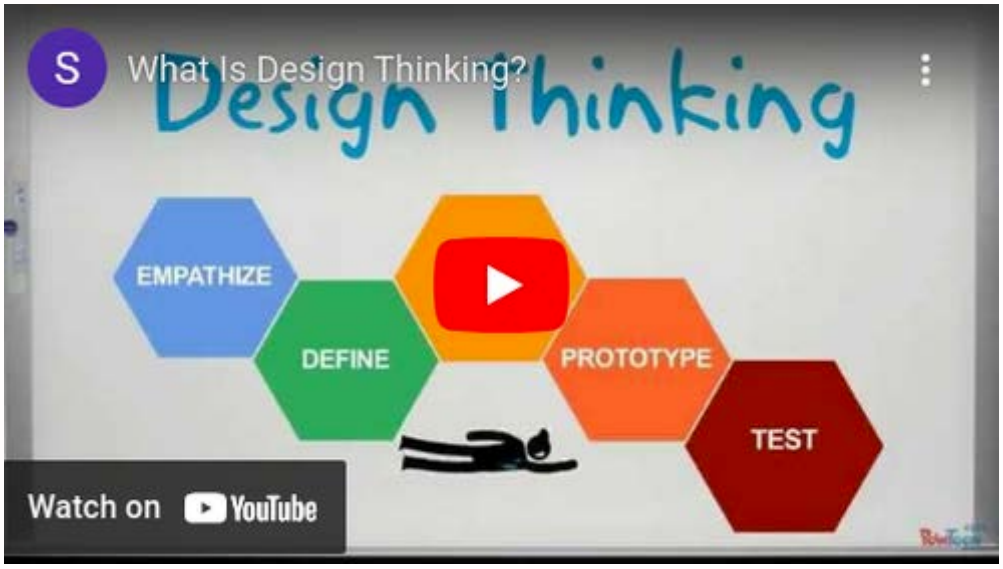
Additional Teacher Tips

- Adaptation: If students struggle with fashion-related examples, allow them to reference more familiar projects (e.g., a school event) before guiding them back to the space project.
- Subject Integration: You don’t need to be a fashion expert! Encourage students to think critically, ask questions, and come up with creative ideas. Emphasise skills like communication, problem-solving, and collaboration—which are relevant across subjects.

Further Extensions / Assessment possibilities: If time permits, consider extending the project:
  - Deeper Research: Ask students to research actual stakeholders in the space industry and revise their maps.
  - Pitch Presentation: Have students create a mock pitch to one of their high-interest, high-influence stakeholders, explaining how their project would benefit that group.
  - Participation: Assess students’ engagement during group work and class discussions.
  - Presentation: Use group presentations to assess understanding

MM7 L1 WS: DESIGN THINKING INTRODUCTION

WHAT IS DESIGN THINKING?



https://www.youtube.com/watch?v=a7sEoEvT8l8

Working in pairs google these words (or use a dictionary) to find out what they mean and re-write the definitions in your own words

1. Ergonmic -

2. Context -

3. Culture -

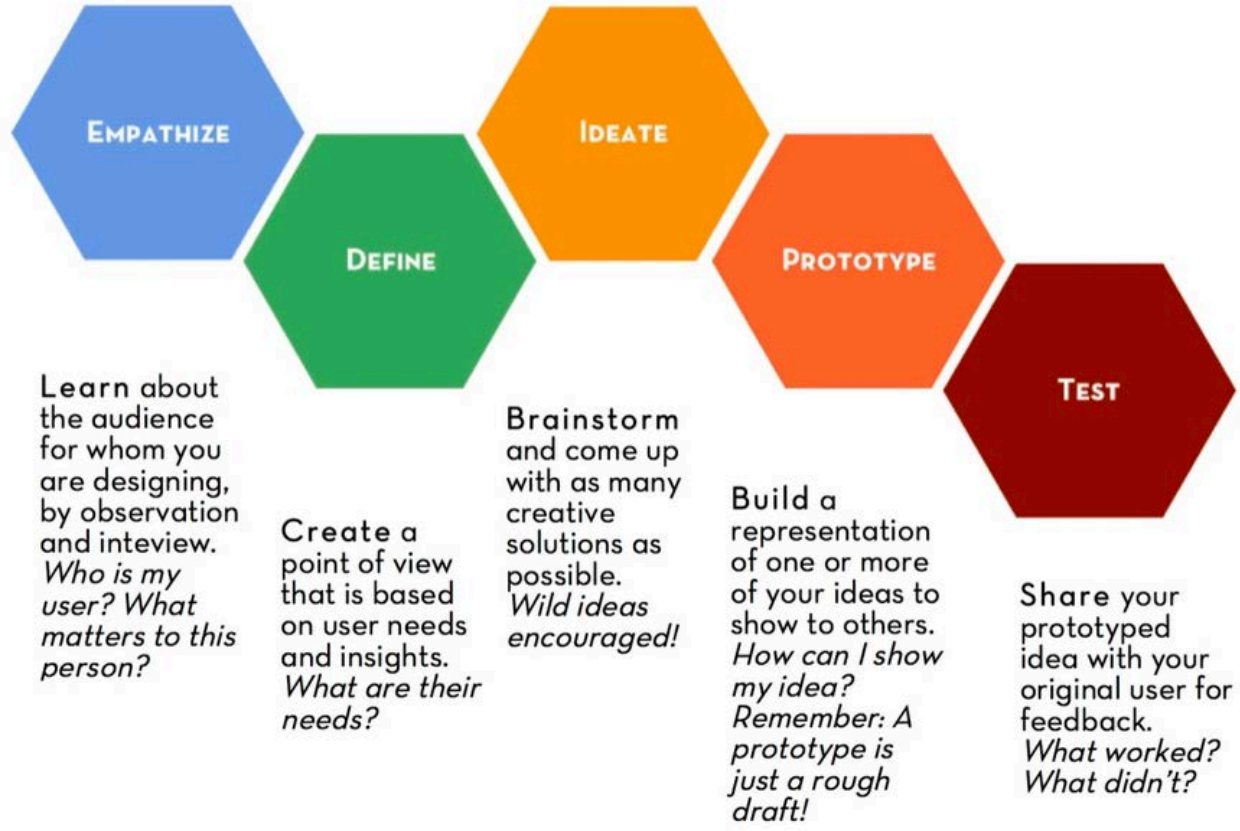
4. Stakeholders -

Your answers will be shared with the class to build a vocabulary list and definitions - this is called a glossary

MM7 L1 WS: DESIGN THINKING INTRODUCTION

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

The 5 stages of Design Thinking:



Before you start to work on your problem or project have a look at each stage and see what you need to think about in any project. You will also have to manage your time as the last three tasks will take more time.

Empathise - Most projects will involve people at some point. What might you need to think about - Discuss with your partner and write down 3 things that might matter to a user / audience member

1.

2.

3.

Define - What's your problem? Often we deal with symptoms - a runny nose, a sore throat but we need to deal with our immune system. In defining your problem you will look at the whole system. Write down 3 problems you know of in your community or the world.

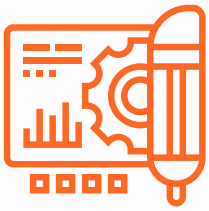
1.
2.
3.

MM7 L1 WS: DESIGN THINKING INTRODUCTION

The 5 stages of Design Thinking:

Ideate - This is the stage in the process to think about as many ideas as possible. For now, write down the 2 worst ideas you can think of - swap them with your partner and try to create three good ideas from each others bad ideas.

Bad Ideas.	Good Ideas
1	1.
2.	2.



Prototype- using only 1 piece of paper build or make one of the good ideas above. You will have to be creative, how will you make the shapes; folding, tearing? If you are to fix it together, how might you do this - links, cutting, what other ways of joining things together can you experriment with?

Remember: There is no right answer this is about experimentation - have fun.

Test - The final stage is testing. In this stage you learn about the product, service or idea you have created . Share your 'good idea' prototype with your partner and they will share with you.

Things to discuss / consider:

Test - The final stage is testing. In this stage you learn about the product, service or idea you have created . Share your 'good idea' prototype with your partner and they will share with you.

Things to discuss / consider and questions to ask:

1. Who might the user be?
2. Look at how it is made - remember there were limits to materials so you are looking at their problem solving and creativity.
3. Is there anything they could try to make it better or improve it using the materials they had?
4. How might you explore the idea further if time and materials were not a limit?

MM7 L1WSB: DESIGN THINKING STAKEHOLDER MAPPING

Stakeholder Mapping

Usually, you will start this by having your decision challenge at the centre of your mapping, in this instance, this will be on one of the Space focused Scenarios below. These challenges align with space exploration with a sustainability focus, and will require careful identification of both space-related and environmentally focused stakeholders.

1. **Launching a Space-Themed Pop-Up Store in a Space Tourism Hub**
   - Imagine you're launching a pop-up store that will be located in a space tourism hub, such as a spaceport or space-themed attraction. This store will sell space-related merchandise, apparel for space travelers, and collectibles celebrating space exploration.
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   - You are organising a sustainable space technology show, focusing on eco-friendly innovations for space exploration. The show will feature local designers and engineers showcasing sustainable spacecraft materials, energy-efficient space habitats, and other green technologies for space missions.
   - Stakeholder mapping for this challenge would include aerospace companies, sustainable technology advocates, space agencies, space startups, environmental organisations, and tech investors.

Once you select your scenario, In small groups or as a class create a list of all the different individuals, groups, or organisations that you can begin to identify and categorise who you might need to discuss or share your project with. Use the questions below to help you .

1. Launching a Space-Themed Pop-Up Store in a Space Tourism Hub to sell space-related merchandise and apparel. Stakeholder Mapping Prompt Questions:

- Who are the primary customers for the pop-up store?
- Are they space tourists, local space enthusiasts, or the general public? What are their expectations for this store?
- Which space tourism companies or organizations are involved in the area?
- Are there partnerships or collaborations with companies like SpaceX, Blue Origin, or Virgin Galactic that could be valuable?
- What regulatory bodies oversee commercial activities in this space tourism hub?
- Are there local, national, or international regulations that you need to consider, such as space commerce laws or licensing?
- What type of support do you need from local authorities or spaceport operators?
- Do you need permissions, space allocations, or security clearances to operate within the hub?

- What suppliers or designers can provide the products for your store?
- Are there partnerships with manufacturers or designers focused on space-related apparel and merchandise?
- What media outlets or influencers focus on space tourism or exploration?
- How can you leverage these outlets to promote your store? Who has influence over the space tourism community?
- Are there any environmental concerns or sustainability requirements to consider?
- How can you ensure that your store adheres to eco-friendly practices, especially given the potential scrutiny of space-related activities?

2. Organising a Sustainable Space Technology Show Featuring Innovative Space Designers
   Stakeholder Mapping Prompt Questions:

- Who are the key designers, engineers, or companies focused on sustainable space technologies?
- Which individuals or organizations are leading the charge in developing green technology for space missions?
- What space agencies or organizations should be involved?
- How can you engage NASA, ESA, or other space agencies to showcase their sustainability efforts or endorse the event?
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- Which environmental or sustainability-focused organizations might want to participate?
- Can you collaborate with organizations advocating for sustainability, even those outside of the space industry?
- What is the role of government or international space organizations in this event?
- Are there regulations or governmental bodies that need to be involved? How do they impact sustainable space initiatives?
- How can the local space-tech community or universities contribute?
- Are there academic researchers or local startup incubators focused on sustainability in space exploration?
- What are the media and public relations opportunities for promoting sustainability in space?
- Which space and environmental media outlets should you target to maximize exposure and public awareness?
- What technologies or materials are most pressing in space sustainability?
- What specific innovations (e.g., recyclable spacecraft materials, solar-powered space stations) should be highlighted to engage stakeholders?

Use the diagram on the next page to think about and organise your list of stakeholders and how you will need to communicate and engage with them, as they will have a wide range of perspectives and use different media for gathering information e.g. print, audio, social media.

MM7 L1WSB: DESIGN THINKING STAKEHOLDER MAPPING

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

SERVICES / PROVIDERS

USERS / BENEFICIARIES

Space Scenario

GOVERNANCE

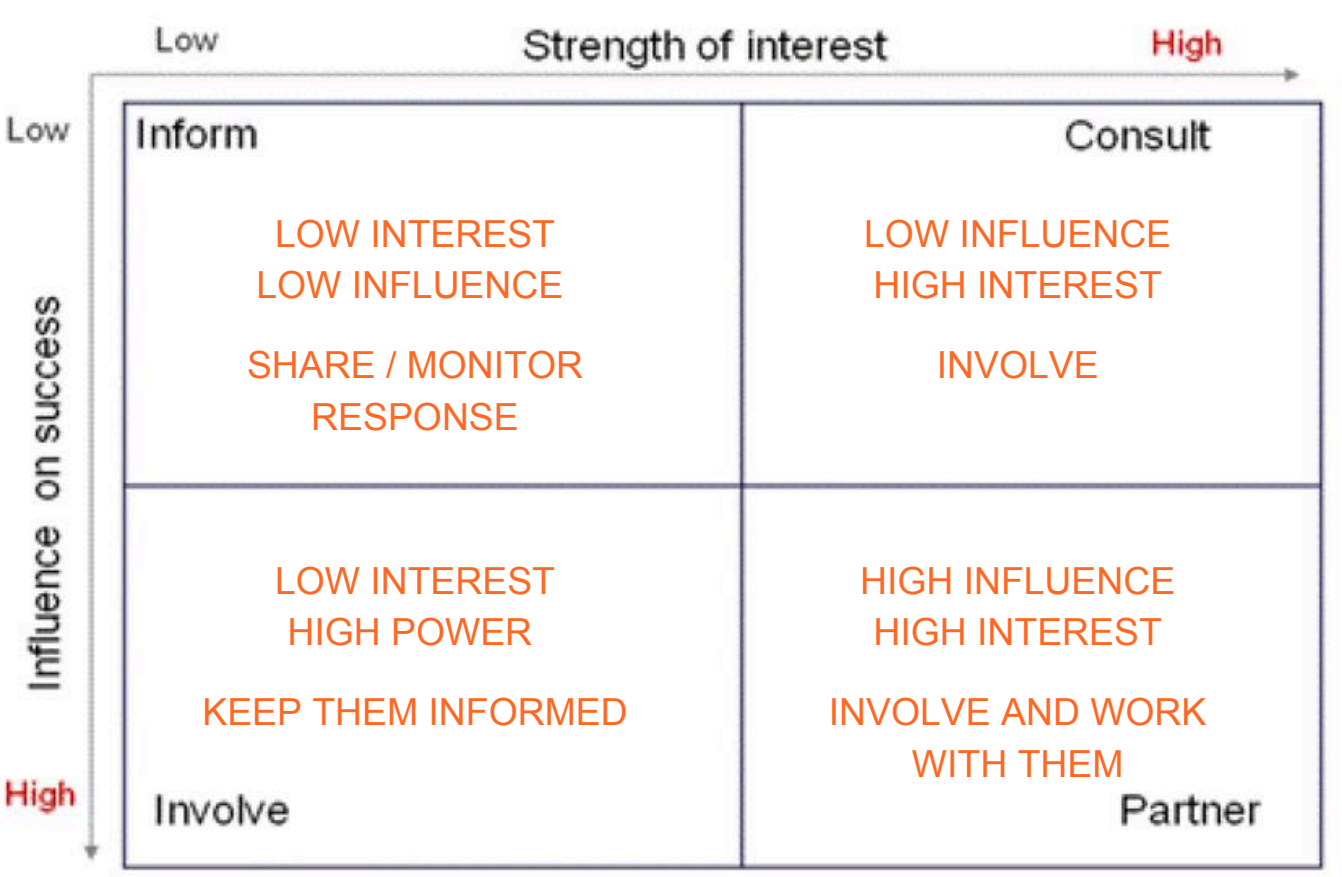
INFLUENCERS

MM7 L1WSB: DESIGN THINKING STAKEHOLDER MAPPING

CREATE STAKEHOLDER INTEREST VS. INFLUENCE MATRIX

You can also use the grid below to organise the stakeholders by their interest and influence on the project:

- High Interest / High Influence: Large buyers, fashion media, or industry regulators. These should be involved closely.
- Low Interest / High Influence: Investors or textile associations. They have power but may need just updates rather than active involvement.
- High Interest / Low Influence: Local designers or sustainable fashion enthusiasts, who may be deeply interested but not significantly influential.
- Low Interest / Low Influence: Broader public or peripheral community members—monitor and engage with them as needed.



Once stakeholders are categorised, tailor your communication and engagement strategies for each group. For example:

- High Influence / High Interest: Collaborate directly with key partners like ethical textile suppliers or media platforms to shape your project's direction.
- Low Influence / Low Interest: Provide updates to stakeholders like local community members or tangential industry organizations through newsletters or passive communication.

By mapping out these relationships, you can prioritise where to focus your efforts for maximum impact in launching and growing your fashion business.

MM7 L1WSFC: FLIPPED CLASSROOM COMPLEXITY

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

Learning about Complexity

Wht are systems complex? https://www.youtube.com/watch?v=3ZpNZbLQ8Ik

What is a Wicked Problem (Rittel, 1973)?

What is a wicked problem https://www.youtube.com/watch?v=lOKpB4KtUZ8

Watch the video and give 4 qualities of a wicked problem.

1.
2.
3.
4.

Climate Change is a Wicked Problem

https://www.youtube.com/watch?v=XRoCxS6n53U

How can Design Thinking help with wicked Problems?

https://www.youtube.com/watch?v=WrdSkqRypsg

Watch both the videos above and give 3 areas you might use Design Thinking to work on an aspect of Sustainable Fashion