A step-by-step guide to solving a complex (wicked) problem using the 5E Design Thinking Framework.

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Developed in support of the 5E Design Thinking Framework

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What is design thinking?

Design thinking is an iterative non-linear process that is used to solve complex (wicked) problems or to develop new products, services, or systems. A wicked problem is a social or cultural problem that is difficult or impossible to solve for as many as four reasons: incomplete or contradictory knowledge, the number of people and opinions involved, the large economic burden, and the interconnected nature of these problems with other problems. Design thinking is a human-centered approach that focuses on understanding the needs, behaviours, and desires of the people who will be using the final product or service. Unlike more traditional problem-solving methods, which typically follow a linear or sequential approach, design thinking allows for greater flexibility and iteration throughout the problem-solving process.

In a linear problem-solving process, there is a clear and defined path from problem identification to solution implementation. Each step in the process builds on the one before it, and the process moves forward in a linear fashion. However, in a non-linear process such as design thinking, the process is more iterative and flexible. The process often starts with empathizing with the users and understanding their needs and pain points. This leads to a clearly defined problem statement that guides the ideation process. During the ideation process, there may be a need to revisit the empathy stage to gain further insights or adjust the problem statement. Similarly, during the prototyping stage, it may be necessary to go back to the ideation stage to generate new ideas or refine existing ones.

The 5E Design Thinking Framework

The 5E Design Thinking Framework was developed by Stephan Hitchins and offers the following five stages - **Engage, Evaluate, Explore, Expand, and Execute.** The nature of design thinking and the 5E Design Thinking Framework, allows for greater exploration, experimentation, and iteration throughout the problem-solving process. It is a flexible non-linear approach that allows for multiple solutions to be explored, tested, and refined before arriving at a final solution. This process can be messy and unpredictable, but it allows for greater creativity and innovation, leading to better solutions and outcomes.

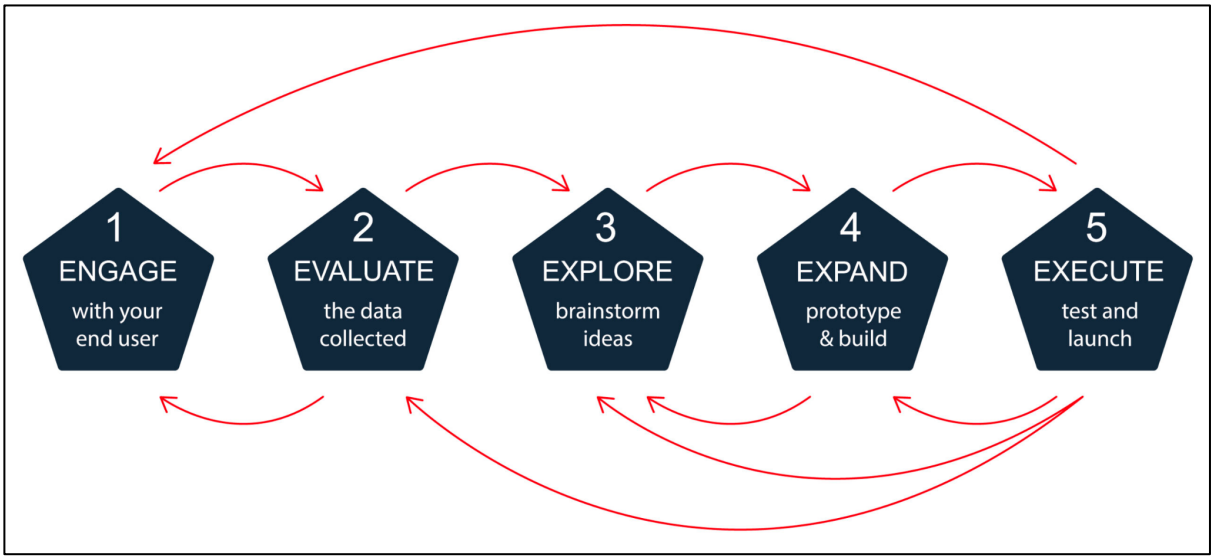


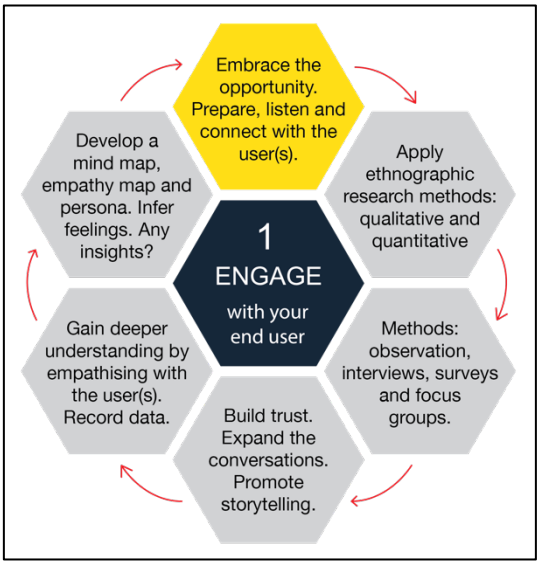
Figure 1. The 5E Design Thinking Framework (Source: https://www.stephanhitchins.com.au/)

Consider the five steps.

https://www.stephanhitchins.com.au/5e-framework/

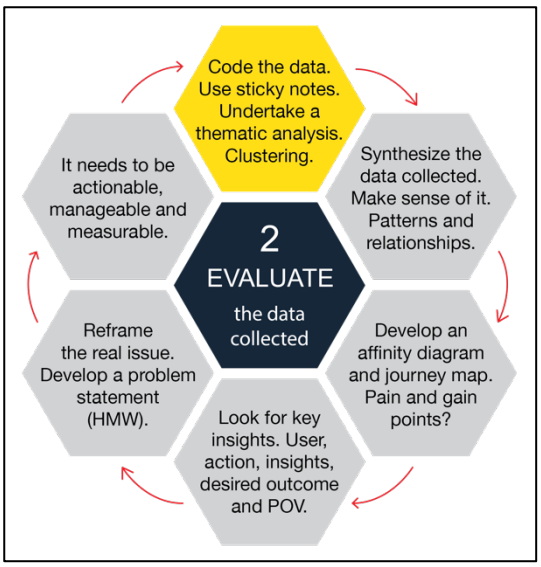
ENGAGE

In this first step, the focus is on **understanding the needs and desires** of the users. This means having empathy. Empathy is the capacity to understand or feel what another person is experiencing from within the other person's frame of reference, i.e., the capacity to place oneself in another's position. There are many definitions for empathy that encompass a broad range of emotional states. This step involves conducting research and observing the users to gain a deeper understanding of their needs, wants, and pain points. Having identified a potential problem, you need to engage with the target user(s). The aim is to gain a deeper understanding and insight into their needs. Undertaking secondary and primary research. Use ethnographic methods to collect your new data.



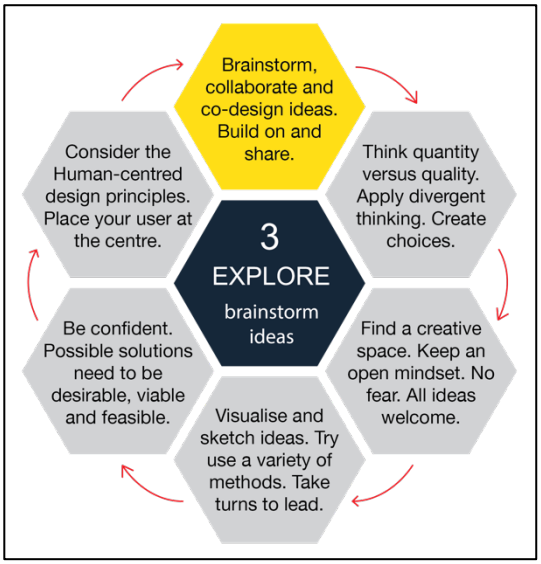
EVALUATE

In this step, the information gathered in the first stage is used to **define the problem**. This is perhaps the most challenging part of the design thinking process, as the definition of a problem (also called a design challenge) will require you to synthesise your observations about your users from the first stage in the design thinking process. This involves synthesizing the research data to create a clear and concise problem statement that guides the rest of the design process. You are required to evaluate the data (make sense of it), look for themes, patterns, and natural relationships. Then reframe (define) the initial problem into an actionable, manageable, and measurable problem statement (POV) i.e., the real problem. We often use the "How might we ..." statement tool to achieve this.



EXPLORE

In this step, the focus is on **generating as many creative choices / ideas** as possible to solve the problem identified in the previous steps. Having defined the real problem it is now time to explore / get creative and think of possible solutions that might be desirable, viable and feasible. Do these using tools / techniques such as brainstorming, brain writing, visualization, and storyboarding. This is the creative process of generating, developing, and communicating new ideas, where an idea is understood as a basic element of thought that can be either visual, concrete, or abstract. Ideation comprises all stages of a thought cycle, from innovation to development and actualization.

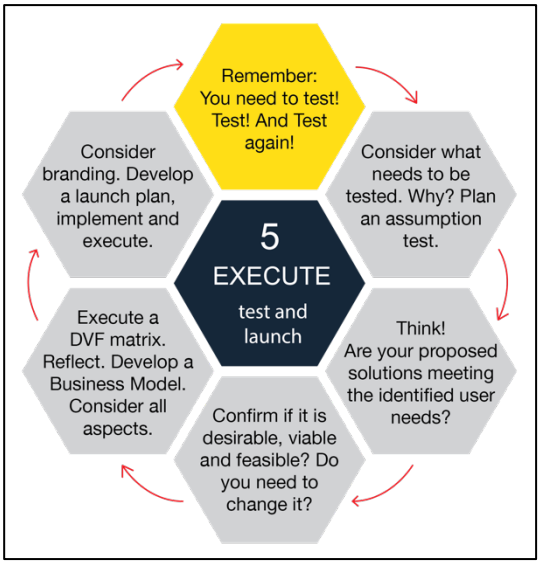


EXPAND

In this step, the ideas generated in the previous ideation stage are brought to life through the creation of **prototypes**. Prototypes can take many forms, from simple sketches to functional models, and are used to test and refine the solutions. A prototype is an early sample, model, or release of a product or service built to test a concept or to act as a thing to be replicated or learned from. It is a term used in a variety of contexts, including semantics, design, electronics, and software programming. Prototyping is an integral part of design thinking because it allows us to test our ideas quickly and improve on them in an equally timely fashion. Consider the fidelity versus resolution required plus what, why and how you are going to develop your prototypes.

EXECUTE

In this 5th step, the focus is on **testing** the prototypes created in the previous stage to see how well they meet the needs of the users. We need to test our hypothesis. From this we gather feedback from users and use that to refine the prototypes until a final solution is reached. So, we introduce our prototypes to users (show them) and start a conversation. Get feedback, reflect, refine, and reiterate. Testing is one of the most critical parts in design thinking. A major reason is that we must demonstrate an experience even though we don't have a fully functioning product but only a prototype. So, presentation is the key. It must focus on the user experience.



Let's Get Started

If we apply the analogy of Design thinking as a journey, then having good travel partners is important if you wish to arrive at your desired destination safely and successfully. The process of Design thinking is such an event. It takes you into ambiguous, unknown, and sometimes uncomfortable territory. Yet it provides the opportunities to explore, delve deeper, discover unknown or hidden skills. Members of a design thinking team need to be open minded, curious, collaborative and allow their assumptions to be challenged, ready for change, and be adaptable. They need to be able to deal with ambiguity, the unknown, challenges around social impact and teamwork. Yes, that's a lot, but it's worth the effort.

The collaboration around design thinking creates a great team spirit, work ethic and in the end provides a set of skills that can be applied to solving complex problems. This may lead to successful innovation and competitive advantage. Everyone thinks, feels, and experiences things differently. Differences are what we need. In most cases team members are chosen based on a specific need or skill the team believes it needs and therefore are not experts in the chosen topic. So, the goal of the first step of the process is for all members of the team to 'become an expert'. This means, all team members try to gather as much information about the topic as possible. This is achieved through secondary research. Get to understand the topic.

Required action or activity.

	Description	Done?
1	**Create a team.** Find 4 - 6 members. Think of diversity. Having identified individuals you then need to swap relevant and appropriate contact details so that you may stay in touch with each other. Doing so allows for successful collaboration on the project. Discuss expectations, work commitments etc.	
2	**Considered using a Team Charter?** A team charter is a document that defines your goals, assets, and obstacles. Essentially, it's like a product roadmap, except it's for a single team. It focuses only on their deliverables and how to best map them out over time. A team charter clearly defines the roles and responsibilities of everyone involved. Avoids conflict later.	
3	**Identify the initial issue.**	

	If you have not been provided with a list of wicked problems (issues), then write down the initial problem, the hunch or issue you suspect is out there. The team will later need to agree on a single topic / area to investigate? I suggest you undertake initial research on all the topics before deciding on one. Gather as much information about the topic as possible. This is what we refer to as the 'understanding' phase. You have not started the ENGAGE (empathy) stage yet, but rather getting an overall viewpoint of the environment. Think about it as the aerial view.	
4	**Do an online search.** A quick online search may indicate many conversations about the topic, or none. All team members must have an equal opportunity to voice their opinions or concerns. It's a good idea to write a paragraph that introduces the design challenge, briefly explains the situation and what you plan to solve. This provides clarity around the direction you may be heading off in. This may be what you think you need to solve. It sets the stage for others to understand the project - before moving on to the ENGAGE step.	
5	**Develop a design brief.** Often a client may provide you with a design brief or ask you to develop one for their consideration. Think about a compass and how this allows you to view and set the direction you will be travelling in. This is the Design Brief. An invaluable document for a project developed by a person or team (the 'designer' or 'design team') in consultation with the 'client'. It creates a solid framework for exactly what direction to take, what to do, and the constraints to work within. This document is fluid and changes over time as the project scope evolves. Often, the brief is 'signed off' by the client and designer at set stages in the project.	
6	**Create a project timeline.** A Gantt chart (or similar) is a visual timing schedule that is used as a project management tool to illustrate how the project will run across a set period. It allows you to view individual tasks, their durations, and the sequencing of these tasks.	

STEP 1: ENGAGE

ENGAGE is the first step in the **5E Design Thinking Framework.** This step requires you to empathise with the user(s). Get to know them better. Discover what is happening. Empathy is a skill that allows us to understand and share the same feelings / experience that others feel. Don't confuse sympathy with empathy. Through empathy, we can put ourselves in other people's shoes and connect with how they might be feeling when they experience our product or service in a particular circumstance, or situation. Remember in many cases the user is the only entity that experiences your product or service completely. From start to finish.

Empathy is crucial to a human-centred design process such as design thinking, and empathy helps design thinkers to set aside his or her own assumptions about the world to gain insight into their users and their needs. In Design thinking, empathy is a "deep understanding of the problems and realities of the people you are designing for". It involves learning about the difficulties people face, as well as uncovering their latent needs and desires to explain their behaviours. To do so, we need to understand the people's environment, as well as their roles in and interactions with their environment. Empathy involves both secondary and primary research by the team.

Secondary Research

The first step in getting to know our user better is done via secondary research – often referred to as desktop research. This involves the collection, summary, collation, and synthesis of existing information / data / research. Secondary data is known to be readily available. Secondary research is contrasted with primary research in that primary research involves the generation of new data, whereas secondary research uses existing research sources as a source of data for analysis. You can only access, analyse and evaluate secondary data. You cannot change it. Sources can include books, personal sources, academic journals, newspaper articles, websites, government records, documentaries, previously recorded interviews etc. The idea is to get the widest understanding of the current environment, activities, efforts, failures etc relative to the issue. You need to research and read extensively. No guessing allowed.

Required action or activity.

	Description	Done?
1	**Undertake desktop research.** You need information from several viewpoints and sources. People often try to skip over this preparation part but that is a mistake. Knowing what already exists in the industry is critical and vital to identifying gaps (filled by primary research - your own research later). How can you 'argue' for your possible solution without	

	having a greater understanding of the past efforts? History supports future innovation. Think what has been done? By whom? What has worked or failed? It is important that you get a deeper understanding of the topic. Are there any gaps that you need to research? What statistics have you found? What technology is currently being used? What exists and is there anything that you could improve upon or apply to your solution? Remember secondary data is what someone else has already done.	
2	**Create a mind map.** Having undertaken secondary research, you now develop a mind map. This is an easy way to brainstorm thoughts organically (visually) without worrying about order and structure. A mind map is a diagram used to visually organize information into a hierarchy, showing relationships among pieces of the whole. It allows you to visually structure your ideas to help with analysis and recall. It represents tasks, words, concepts, or items linked to and arranged around a central concept or subject using a non-linear graphical layout that allows the user to build an intuitive framework around a central concept. A mind map can turn a long list of monotonous information into a colourful, memorable, and highly organized diagram that works in line with your brain's natural way of doing things. Normally you would develop more than one mind map.	
3	**Identify possible users.** The secondary research and mind map allows you to identify various users or user groups. This is important as these users will be your interviewees during the primary research exercise. But how do you go about identifying or finding these possible users? Let's consider an example. If you were looking into healthcare - possible users or user groups could be the patient, family, carers, hospital administration, the landlord, doctors, nurses, ambulance staff, visitors, the insurance company etc. Each of these will have a different point-of-view (POV) around the same topic or issue. The POV is important when we define and reframe the problem statement, often referred to or associated with the phrase ‘How might we’. We do this in Step 2 - EVALUATE.	
4	**Look for gaps.**	

	Knowing what already exists in the industry is critical and vital to identifying gaps (filled by <u>primary</u> research - your own research later).	

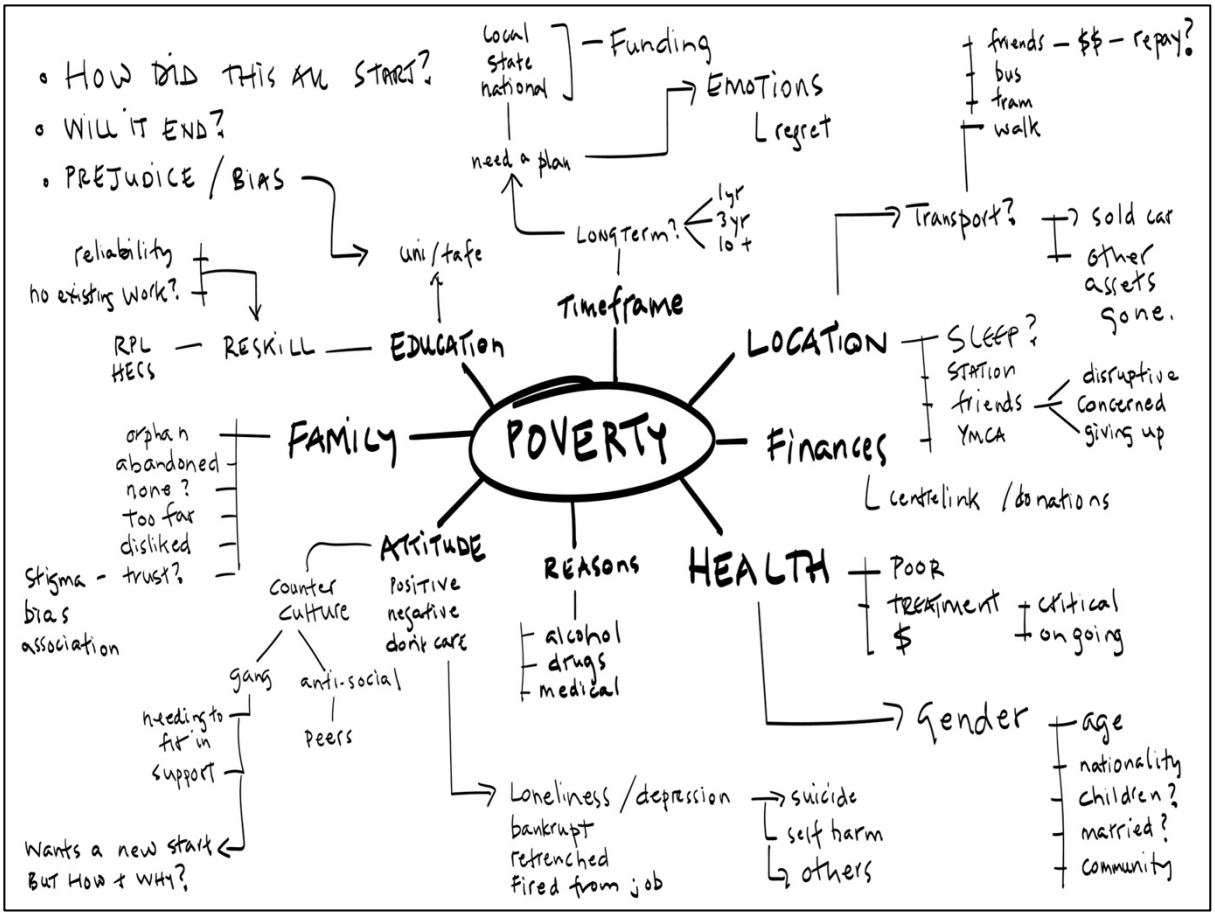


Figure 2. Example of a mind map. Created by Stephan Hitchins

Primary Research

Having undertaken secondary research, you would have identified gaps in the data. This is the starting point for your primary research. These gaps enable you to conduct your own research (primary) and add to the body of knowledge. This is any type of research that you collect yourself - <u>new</u> data. Examples include surveys, interviews, observations (ethnographic research), focus groups and data analysis. The greatest advantage of primary research is that it allows the researcher to obtain original data that is current and highly specific to their needs. Primary research gives you more control about how to collect the data and how you will use it later to nurture the response you want. Primary research is undertaken via ethnographic research techniques. This includes all or some of the following methods: Interviews (semi-structured or structured), contextual observation, focus groups and surveys (electronic or traditional).

Required action or activity.

	Description	Done?
1	**Identify the user(s) - the sample.** Who are you going to interview? Consider why you have made this choice? What new information do you believe they may be able to add? Propose a sample size. Where are they based? Demographics? You need to plan.	
2	**Plan and prepare to collect data.** Decide on the best method for collecting data: interview, survey, focus group or observation. Develop a possible list of questions for the interview and / or survey. How will you record the data should you do interviews? Via audio, video, photography, or a combination? Do you need ethics approval? How and when will you reach out to the users to get permission to interview them. Provide the sample question ahead of time. Build trust. Hopefully this process will provide quality findings, insights, identify specific needs and user desires. These will assist you in understanding the action(s) required to improve the user experience.	
3	**Did you undertake a survey?** Describe in detail any survey(s) you undertook, provide feedback on the data collected. Discuss the importance of the data, highlight any specifics, report what you discovered and how it will be valuable to your project.	
4	**Did you undertake an interview?** Describe in detail any interview(s) you undertook, provide feedback on the data collected. Discuss the importance of the data, highlight any specifics, report what you discovered and how it will be valuable to your project.	
5	**Did you undertake any observation?** Describe in detail any observation(s) you undertook, provide feedback on the data collected. Discuss the importance of the data, highlight any specifics, report what you discovered and how it will be valuable to your project.	

6	**Did you undertake any analysis?** Describe in detail any analysis you undertook, provide feedback on the data collected. Discuss the importance of the data, highlight any specifics, report what you discovered and how it will be valuable to your project.	
7	**Create an empathy map.** Having undertaken your primary research, you now create an empathy map. An empathy map is a collaborative visualization used to articulate what we know about a particular type of user. It externalizes knowledge about users to create a shared understanding of user needs, and aid in decision making. Empathy maps provide a glance into who a user is as a whole and are not chronological or sequential. Empathy maps can capture one user or can reflect an aggregation of multiple users. Both the process of making an empathy map and the finished artefact have important benefits for the organization: it captures who a user or persona is. The empathy mapping process helps distil and categorize your knowledge of the user into one place. A sparse empathy map indicates that more research needs to be done. Traditional empathy maps are split into 4 quadrants (Says, Thinks, Does, and Feels), with the user or persona in the middle. Essentially, an empathy map is a square divided into four quadrants with the user in the middle. Each of the four quadrants comprises a category that helps us delve into the mind of the user.	
8	**Develop a user experience journey map.** A journey map, or sometimes called a customer experience map, is a visual representation of the step-by-step process a customer goes through to achieve a goal with your company, product, or service. With the help of a customer journey map, you can get a sense of your customers' motivations -- their needs and pain points. Journey mapping helps you visualize how customers they feel along the way. Customer journey mapping makes intangible customer experiences visible and facilitates a common and empathic understanding between all team members. It includes experiences and interactions beyond the reach of an organization, puts the customer perspective at the centre and connects it to the organization’s view. Journey maps help you zoom out and understand why and identify moments of opportunity and intervention. You can create a journey map from	

	the perspective of your customers, employees, or external stakeholders.	
9	**Develop a persona + archetype.** Personas are fictional characters, which you create based upon your research to represent the different user types that might use your service, product, site, or brand in a similar way. Creating personas will help you to understand your users' needs, experiences, behaviours, and goals. Creating personas help you to recognise that different people have different needs and expectations, and it can also help you to identify with the user you're designing for. Personas make the design task at hand less complex, they guide your ideation processes, and they can help you to achieve the goal of creating a good user experience for your target user group. A persona, is a fictional character created to represent a user type that might use a site, brand, or product in a similar way.	
10	**Create a stakeholder map.** Potential stakeholders could be customers, users, industries, markets, suppliers, and investors. Stakeholder mapping is the visual process of laying out all the stakeholders of a product, project, or idea on one map. The main benefit of a stakeholder map is to get a visual representation of all the people who can influence your project and how they are connected. Sometimes, people confuse stakeholders with shareholders. While shareholders own a part of a public company (through shares of stock) and are interested in the company's performance, it doesn't mean they should be stakeholders of each project or product launched by the company. It's good to have a detailed stakeholder map and know how to involve the right people when you plan to launch a major project or product. When building a new product from scratch you'll need to know the stakeholders for different groups. The number and the roles of stakeholders may vary depending on the type of product you are working on.	
11	**Consider the insights gained?** What needs / desires / actions / insights have you gained?	

STEP 2: EVALUATE

In the **second step** of the 5E Design Thinking Framework, **EVALUATE** (define or reframe), you will organize the information you have gathered during the ENGAGE stage. This is the part of the process where you make sense of the data collected and through a process of synthesis arrive at a point where you can now visualise / articulate the real problem. You'll analyse your observations to define the core problems you have identified up to this point. Defining the issue and developing the problem statement. This must be done in a human-centered manner. The problem statement is often constructed using the phrase 'How might we'. The EVALUATE stage will help the design team collect great ideas to establish features, functions, and other elements to solve the problem at hand—or, at the very least, allow real users to resolve issues themselves with minimal difficulty. To define (find the real problem) or reframe is a way to solve problems by looking at the problem with a new outlook or from a different point of view.

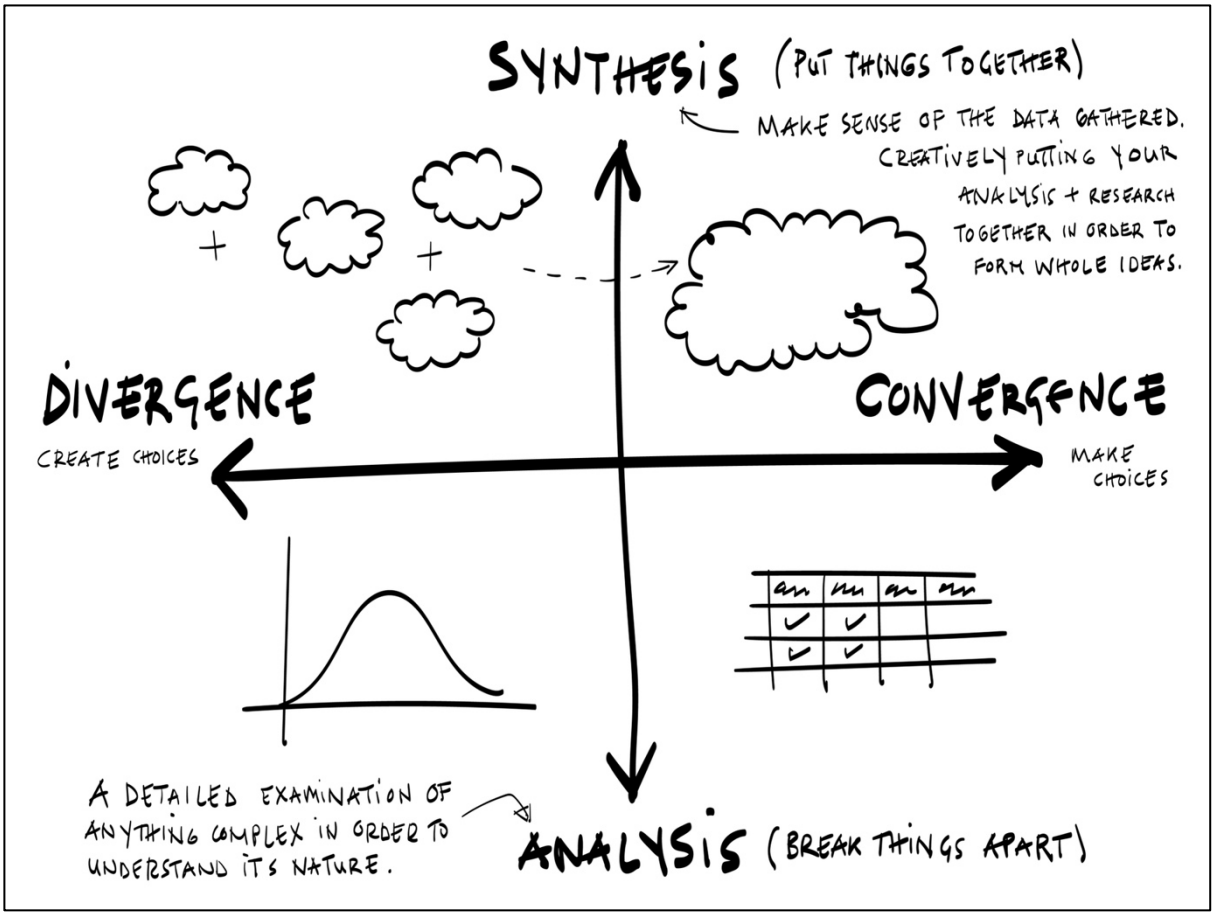


Figure 3. Created by Stephan Hitchins

Reframing is used in businesses to spark innovation and creativity - if you solve every problem the same way, chances are there will be no new ideas or innovation. This is perhaps the most challenging part of the design thinking process, as the definition of a problem (also called a design challenge) will require you to synthesise your observations about your users from the first stage in the design thinking process. A problem statement identifies the gap

between the current state (i.e., the problem) and the desired state (i.e., the goal) of a process or product. Within the design context, you can think of the user problem as an unmet need.

Affinity Diagram

An affinity diagram is a visual brainstorming tool that allows teams to organize ideas according to their natural relationships. We've all participated in brainstorming sessions that seemed to go nowhere, and with so many people sharing many ideas and perspectives, it can be difficult to distil these conversations into a coherent takeaway. This is where an affinity diagram comes in handy. You can use an affinity diagram to generate, organize, and consolidate information that comes out of a brainstorming session. Whether you're building a product, working through a complex problem, establishing a process, or piecing apart an issue, an affinity diagram is a useful and simple framework. Follow the following steps to create your own affinity Diagram.

Required action or activity.

	Description	Done?
1	**Step 1 - record your data onto sticky notes.** The first step of the process is to start recording the ideas that you'd like to sort into categories. Get everyone in the team involved and ask them to put forward a few ideas. Record each idea with a marking pen on a separate sticky note or card (during a brainstorming session, write directly onto sticky notes or cards if you suspect you will be following the brainstorm with an affinity diagram). Randomly spread notes on a large work surface so all notes are visible to everyone. The entire team gathers around the notes and participates in the next steps. **Tips**: Use markers so words can be read clearly even from a distance. With regular pens, it is hard to read ideas from any distance. Written ideas should be between three and seven words long. Incorporate everyone's perspective. An affinity diagram gives each team member the opportunity to share their thoughts and ideas about the topic. By collecting everyone's brainstorming ideas, an affinity diagram functions as a visual representation of a brainstorm that everyone can add to.	
2	**Step 2 – concepts, connections, patterns, clusters.** Next, examine the ideas and try to find related concepts. Tips: It is very important that no one talks during this step. The focus should be on looking for and grouping related ideas. Then, discuss with the	

	group and start to tentatively draw connections between ideas. You will be looking for themes. Invite team members to add sticky notes sharing their perspective. When you notice related concepts, group them together. Repeat this step until you've grouped all the concepts. You are looking to create clusters by looking for patterns, themes and naturally occurring relationships. Find connections between ideas. Affinity diagrams are also a great way to discover novel connections between various components of a project. Synthesizing ideas into a simple visual framework allows teams to develop new solutions that they might otherwise miss.	
3	**Step 3 – groups, categories, themes, headings** Repeat the previous step until you've grouped all the concepts. It's okay if there are concepts that seem to defy a grouping. You can return to those later. Discuss with your team and make sure everyone is on the same page. Do you agree with the groups? How should you label them? Do you need to make any changes? From these relationships, attempt to define categories and create summary or header cards for each grouping or category. Finally, combine these groups into "supergroups", to synthesize ideas into a more cohesive whole. The completed affinity diagram can be used to enhance future project management and inform decision making. An affinity diagram is a valuable tool of organization that divides a project into various discrete components and allows you to dive deeper into each individual component. Organizing thoughts in this way can help you break up tasks and delegate responsibility.	
4	**Considerations** List any gaps that you believe need further research? Once you have completed this you look at the overall map and consider the following: What natural relationships have you identified? Have you identified any patterns or trends? Have you identified any areas of opportunity? Have you identified any themes? Are there any obvious gaps in the information? Do you need to undertake further primary or secondary research?	

Problem Statement (How might we)

In the EVALUATE stage you need to 'make sense of' or synthesise your observations from the first stage i.e., empathy. The goal is to develop a meaningful and actionable problem statement. This is an integral part of the Design thinking process. A good problem statement

will guide you and your team's work and kick start the ideation process (third stage) in the right direction. Remember, the five stages are not always sequential, and they do not have to follow any specific order. They can often occur in parallel and be repeated iteratively. As such, the stages should be understood as different modes that contribute to a project, rather than sequential steps.

A good problem statement has the following traits. It should be human centred. This requires you to frame your problem statement according to specific users, their needs, and the insights that your team has gained in the ENGAGE phase. It should be broad enough for creative freedom. This means that the problem statement should not focus too narrowly on a specific method (no solutions yet) regarding the implementation of the solution. It should be narrow enough to make it manageable. On the other hand, a problem statement such as, "Improve the human condition," is too broad and will likely cause team members to easily feel daunted.

A Point-of-View (POV) is a meaningful and actionable problem statement, which will allow you to ideate in a goal-oriented manner. Your POV captures your design vision by defining the RIGHT challenge to address in the ideation sessions. A POV involves reframing a design challenge into an actionable problem statement. You articulate a POV by combining your knowledge about the user you are designing for, his or her needs and the insights which you've come to know in your research or Empathise mode. Your POV should be an actionable problem statement that will drive the rest of your design work. When you've defined your design challenge in a POV, you can start to generate ideas to solve your design challenge. You can start using your POV by asking a specific question starting with: "How Might We" or "in what ways might we". The format you could follow is shown below.

How might we *(what is the intended action - use a verb)*

what *(reflect on the need or insight identified)*

for whom *(primary user / stakeholder)*

POV *(consider this)*

when *(time / place / duration / event)*

in order to *(desired effect or change)*

outcome *(benefit we want to see)*

Figure 4. 'How might we' problem statement format

How Might We (HMW) questions are questions that have the potential to spark ideation sessions such as brainstorms. They should be broad enough for a wide range of solutions but narrow enough that specific solutions can be created for them. “How Might We” questions should be based on the observations you’ve gathered in the Empathise stage of the Design thinking process. Create a second statement. Maybe even a third statement. Discuss these with the team, come to an agreement and write down the final problem statement. Only when the team is completely satisfied that they have the best problem statement should they proceed to the next stage of the Design thinking process i.e., ideation. Include the user, action and insight / need you identified. Generally, you will need to do this several times before being successful. Remember the final problem statement is the one you will use in the EXPLORE phase to brainstorm and develop ideas.

Required action or activity.

	Description	Done?
1	**What action is required?** List the possible action(s) - 'things' your solution needs to be able to provide or do - to meet those needs? What 'action' would make your solution successful? Consider action words (verbs). For example - improve, extend, engage, modify, switch etc. Remember you will need to measure the change brought about by your solution later. For example, if you say that your proposed solution will ‘improve’ communication - then ask yourself, what does improvement mean, how are you defining communication, by how much, from what starting base and how will you measure it (assumption testing).	
2	**What insight(s) have you found?** What need or insight(s) have you gained? Is there a main one that stands out? This could be something like ‘gain confidence’, ‘build trust’ or ‘improve communication’.	
3	**Who is the main user?** Describe the main user you identified. Be specific. For example, we would like to improve living conditions for women aged 30 - 55 living in rural settlements. We don’t say ‘all women’. Remember our problem statement needs to be actionable, manageable, and measurable. Another example of what <u>not</u> to do would be to say ‘We are going to solve world poverty in 12 months’ but rather ‘how might the company provide a daily meal for the 12 families living in sector one for the next 3 months. This is actionable, manageable, and	

	measurable. Think POV. Remember the health example I presented earlier. Let me remind you: If you were looking into healthcare - possible users or user groups could be the patient, family, carers, hospital administration, the landlord, doctors, nurses, ambulance staff, visitors, the insurance company etc. Each of these will have a different point-of-view (POV) around the same topic or issue. The POV is important when we define and reframe the problem statement.	
4	**What is the desired outcome?** Give careful thought to this. Is it an action, event, or emotion?	

STEP 3: EXPLORE

During the third stage of the 5E Design Thinking Framework designers are ready to generate ideas. We call this the **EXPLORE** stage. You've grown to understand your users and their needs in the first stage (Engage), and you've analysed your data in the previous stage (Evaluate) to create a user centric problem statement - the 'How might we'. With this solid background, you and your team members can start to look at the problem from different perspectives and ideate possible solutions around the REAL issue.

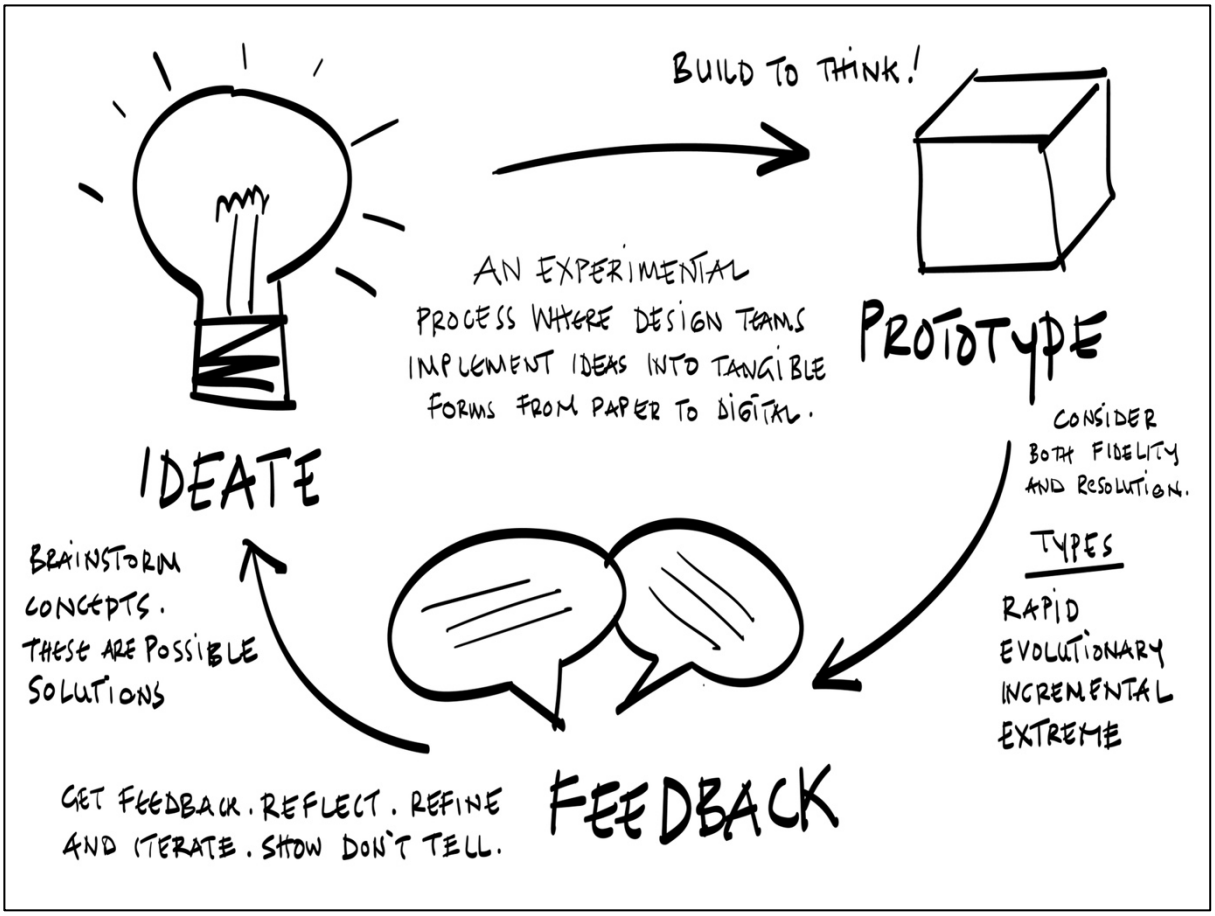
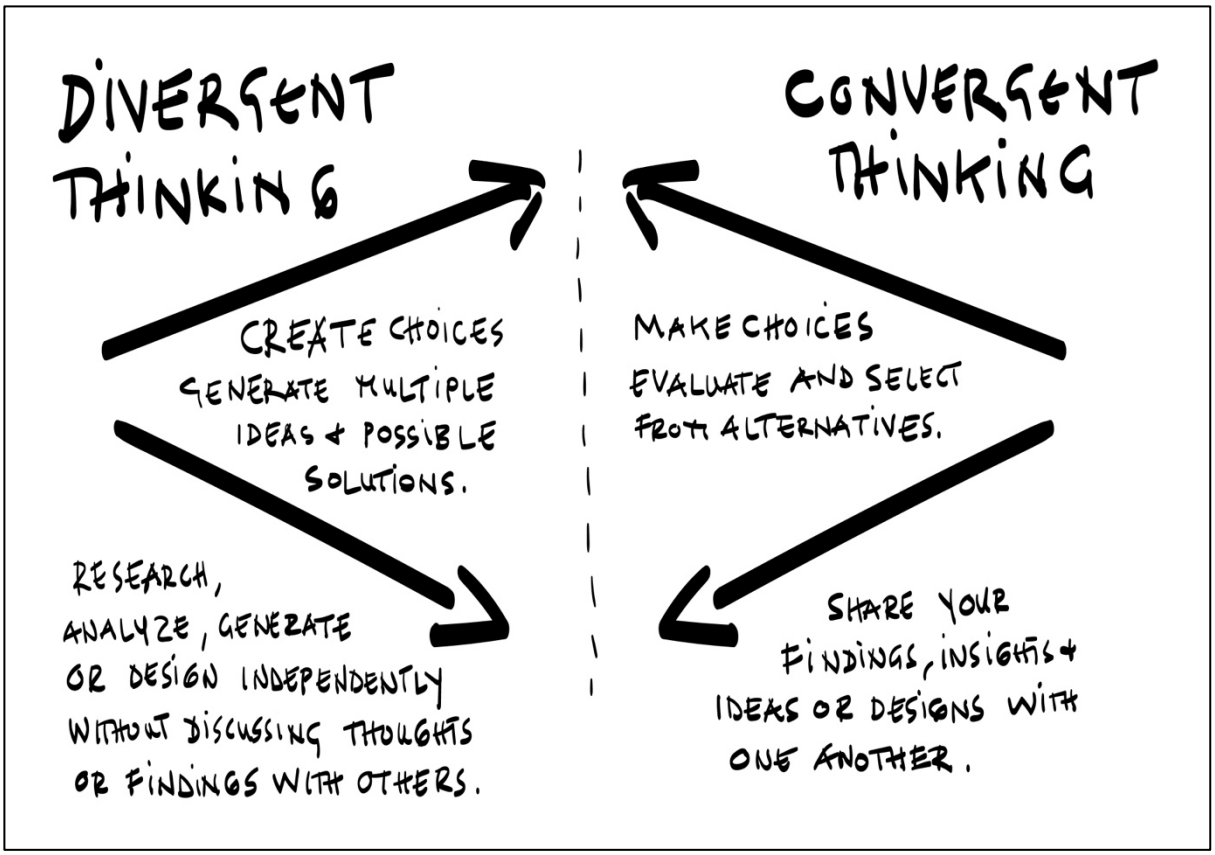


Figure 5. Created by Stephan Hitchins

Ideation is the creative process of generating, developing, and communicating new ideas, where an idea is understood as a basic element of thought that can be either visual, concrete, or abstract. Ideation comprises all stages of a thought cycle, from innovation, to development, to actualization. In the Ideation stage, design thinkers spark off ideas - in the form of questions and solutions - through creative and curious activities such as Brainstorms and Worst Possible Idea. When facilitated in a successful way, Ideation is an exciting process. The goal is to generate many ideas - ideas that potentially inspire newer, better ideas - that the team can then cut down into the best, most practical, and innovative ones. "Ideation is the mode of the design process in which you concentrate on idea generation. Mentally it represents a process of "going wide" in terms of concepts and outcomes.



Ideation provides both the fuel and the source material for building prototypes and getting innovative solutions into the hands of your users". The main aim of the Ideation stage is to use creativity and innovation to develop solutions. By expanding the solution space, the design team will be able to look beyond the usual methods of solving problems to find better, more elegant, and satisfying solutions to problems that affect a user's experience of a product. Ideation will help you: Ask the right questions and innovate. Step beyond the obvious solutions and therefore increase the innovation potential of your solution. Bring together perspectives and strengths of team members. Uncover unexpected areas of innovation. Create volume and variety in your innovation options. Get obvious solutions out of your heads and drive your team beyond them.

Divergent Thinking

Divergent thinking is a key component of design thinking that involves generating a broad range of ideas and possibilities in response to a specific problem or challenge. This is the phase where you are creating choices. It is the process of exploring multiple options and perspectives to identify potential solutions to a problem. In design thinking, divergent thinking is used during the EXPLORE (ideation) stage, where teams aim to generate as many ideas as possible. Divergent thinking is encouraged by creating a non-judgmental and inclusive environment where all team members feel comfortable sharing their ideas. The goal of divergent thinking is to explore different possibilities, challenge assumptions, and break down mental barriers. It allows teams to think beyond traditional solutions and come up with creative and innovative solutions to complex problems.

Required action or activity.

	Description	Done?
1	**Create choices - workshop ideas.** Workshopping ideas is an essential part of the creative process. It involves presenting your ideas to a group of people who can provide feedback and suggestions for improvement. Workshopping ideas can be done in a variety of settings, including writing groups, brainstorming sessions, and design studios. By workshopping ideas, you can gain valuable insights into how your ideas are perceived by others and receive constructive criticism on how to refine and develop them. This can help you identify weaknesses and blind spots in your thinking, as well as generate new perspectives and approaches to your work. Moreover, workshopping ideas allows you to collaborate with others, which can lead to innovative solutions and breakthroughs. By sharing and discussing your ideas with a group of like-minded individuals, you can tap into the collective intelligence of the group and leverage their diverse perspectives and expertise to create something truly unique and valuable. In this stage we need to aim for quantity first, then consider quality.	
2	**Build on the ideas of others.** Building on the ideas of others is a crucial component of design thinking. It involves leveraging the perspectives and expertise of team members to generate better ideas and solutions. To build on the ideas of others in design thinking, it's important to create a collaborative and supportive environment where everyone feels comfortable sharing their ideas. Team members should actively listen to each other and be open to feedback and critique. One technique for building on the ideas of others is to use "Yes, and" instead of "Yes, but." "Yes, and" is a technique used in improvisation that involves accepting and building upon the ideas of others rather than dismissing them. This technique can help teams build on each other's ideas and generate more creative and innovative solutions.	N/A
3	**Brainstorm (an ideation technique)** Brainstorming is a creative problem-solving technique that involves generating many ideas in a short amount of time. The goal of	

	brainstorming is to encourage free-flowing, non-judgmental thinking to come up with as many ideas as possible. Brainstorming can be done individually or in a group setting. In a group setting, it's important to create a supportive and non-judgmental environment where everyone feels comfortable sharing their ideas. The benefits of brainstorming are numerous. It can help generate new and innovative ideas, break down mental barriers, and increase creativity. It can also help identify potential solutions to complex problems and promote team collaboration and communication. Brainstorming is a valuable tool for anyone looking to come up with fresh ideas and solve problems creatively.	
4	**Brainwriting (an ideation technique)** Brainwriting is a creative technique that builds on the principles of brainstorming. Rather than verbally sharing ideas in a group setting, brainwriting involves individuals writing down their ideas on paper or sticky notes. In a brainwriting session, each person writes down their ideas on a piece of paper or sticky note and then passes it on to the next person, who reads the ideas and adds their own. This process continues until everyone has had a chance to contribute to each other's ideas. Brainwriting can be a more efficient and effective way to generate ideas than traditional brainstorming because it allows everyone to have an equal opportunity to contribute without fear of judgment or interruption. It also encourages more thoughtful and detailed idea development, as individuals have time to reflect and build on the ideas of others. Brainwriting can be a valuable tool for teams looking to maximize creativity and collaboration.	
5	**S.C.A.M.P.E.R. (an ideation technique)** SCAMPER is an acronym for a creative thinking technique that stands for Substitute, Combine, Adapt, Modify, Put to another use, Eliminate, and Rearrange. It encourages individuals to generate fresh ideas by examining and adapting existing products, processes, or services. Each letter of the acronym represents a question that prompts you to consider a different aspect of the problem or challenge you're trying to solve. For example, "S" prompts you to consider substituting one element for another, while "R" encourages you to think about rearranging the current elements. By answering these questions, you can develop innovative ideas that can help you solve problems, improve processes, or create new products.	

6	**Jobs to be Done (an ideation technique)** The Jobs-to-be-Done (JTBD) is an ideation technique that helps companies identify customer needs by focusing on the job that the customer is trying to accomplish. The concept behind JTBD is that customers "hire" products or services to do a specific job in their lives. By understanding what job, the customer is trying to accomplish, companies can create solutions that better meet the customer's needs. This technique involves identifying the customer's goal, the situation in which the job is performed, and the obstacles the customer faces in accomplishing the job. By considering these factors, companies can develop innovative solutions that help customers get the job done better and more effectively than the competition.	
7	**Crazy 8s (an ideation technique)** There are many tools and techniques that can be used during the EXPAND (ideation) phase of the design thinking process. Crazy 8s is but one. It is a fast-paced ideation technique that involves generating eight ideas in eight minutes. It's a popular technique in design thinking and is often used to quickly generate many ideas for a specific problem or challenge. The process involves folding a piece of paper into eight sections and then setting a timer for eight minutes. Participants then must sketch out one idea per section, aiming to fill all eight sections within the time limit. The fast-paced nature of Crazy 8s encourages participants to think quickly and not get bogged down in details. It's a fun and engaging way to generate many ideas quickly and can be a valuable tool for teams looking to jumpstart their creative process.	
8	**Use the Creative Matrix (an ideation tool)** The Creative Matrix is a brainstorming tool that encourages the development of creative solutions to a problem or challenge. It is a structured approach that allows individuals or teams to generate a variety of ideas by combining two or more elements in a matrix. The matrix consists of two or more categories, such as products, services, customer segments, or geographic locations. Each category is then broken down into subcategories or attributes. For example, in the case of customer segments, attributes might include demographics, psychographics, and behaviour. Once the categories and attributes have been defined, individuals or teams can begin to combine them	

	in various ways to generate new ideas. For example, by combining two customer segments, such as millennials and baby boomers, with a product attribute such as sustainability, the team might come up with the idea of a sustainable fashion line targeted at both generations. By using the Creative Matrix, individuals or teams can generate many ideas quickly and efficiently. It encourages creative thinking, collaboration, and the exploration of new and innovative solutions. The tool can be used in a variety of contexts, from product development to marketing strategy to organizational change.	
9	**Sketching / Visualisation** Visualization of ideas is a technique used in design thinking to help teams visualize and communicate complex ideas and concepts. It involves creating visual representations of ideas and information through sketches, diagrams, and other visual aids. The process of visualizing ideas can help teams better understand and analyse information, identify patterns and connections, and generate new ideas. It can also help teams communicate their ideas more effectively to stakeholders and collaborators. Visualization techniques include mind mapping, sketching, storyboarding, and creating diagrams and models. These techniques help to make complex information and ideas more accessible and can lead to more creative and innovative solutions. Visualization of ideas is a valuable tool for design thinking teams looking to communicate complex ideas and collaborate effectively.	

Convergent Thinking

Convergent thinking is a cognitive process that involves narrowing down a broad range of ideas to a single, optimal solution. It is the process of evaluating and analysing ideas to determine the best course of action. Think of it as the phase where you ‘make choices. In design thinking, convergent thinking is generally used during the ideation (at the end), prototyping, and testing stage, where teams aim to further develop and refine their ideas. Convergent thinking involves evaluating and selecting the most promising ideas and solutions based on specific criteria such as feasibility, desirability, and viability. The goal of convergent thinking is to arrive at a final solution that meets the needs of the user, is technically feasible, and is economically viable. It involves making trade-offs and refining ideas to create the best possible outcome.

Required action or activity.

	Description	Done?
1	**Makes choices (concept selection).** There are various ways of 'selecting the best' or 'making choices. One such method is using a Decision Matrix. The decision-matrix method, also known as the Pugh method or Pugh Concept Selection, invented by Stuart Pugh, is a qualitative technique used to rank the multi-dimensional options of an option set. The evaluation process of conceptual design alternatives is a critical point for companies which operate in fast-growing markets due to its influence on all subsequent phases regarding cost, quality, and performance of the end-product. A matrix used to display how well different alternatives meet the list of product or process specifications or requirements. The concept scoring method uses a scoring matrix to evaluate concept alternatives. A reference design should be selected as the datum. Selection criteria are generated based on design requirements, which include the customers' requirements and designers' intentions.	
2	**Get feedback. Reflect and Iterate** How to progress from here? You have developed several ideas / created choices (divergent thinking), undertaken a process of concept selection / made choices (convergent thinking), obtained quality feedback from users and now should have one or two ideas to develop further. This is termed 'iteration'. Building on or improving your ideas. Revise your concepts or add additional new ones based on the feedback you received. Present these to your user again and gain further valuable feedback. If required, re-do the concept selection process, and decide on a final design to take into the prototyping stage. Now move into the EXPAND (prototyping) stage.	

STEP 4: EXPAND

Step four of the 5E Design Thinking Framework is called **EXPAND**. This is an experimental phase. The aim is to identify the best possible solution for each of the problems identified during the first three stages. The solutions are implemented within the prototypes and, one by one, they are investigated and then accepted, improved, or rejected based on the users' experiences. The design team will now produce several inexpensive, scaled down versions of the product (or specific features found within the product) to investigate the key solutions generated in the explore phase.

These rapid prototypes can be shared and tested within the team itself, in other departments or on a small group of people outside the design team. By the end of the EXPAND stage, the design team will have a better idea of the product's limitations and the problems it faces. They'll also have a clearer view of how real users would behave, think, and feel when they interact with the product or service.

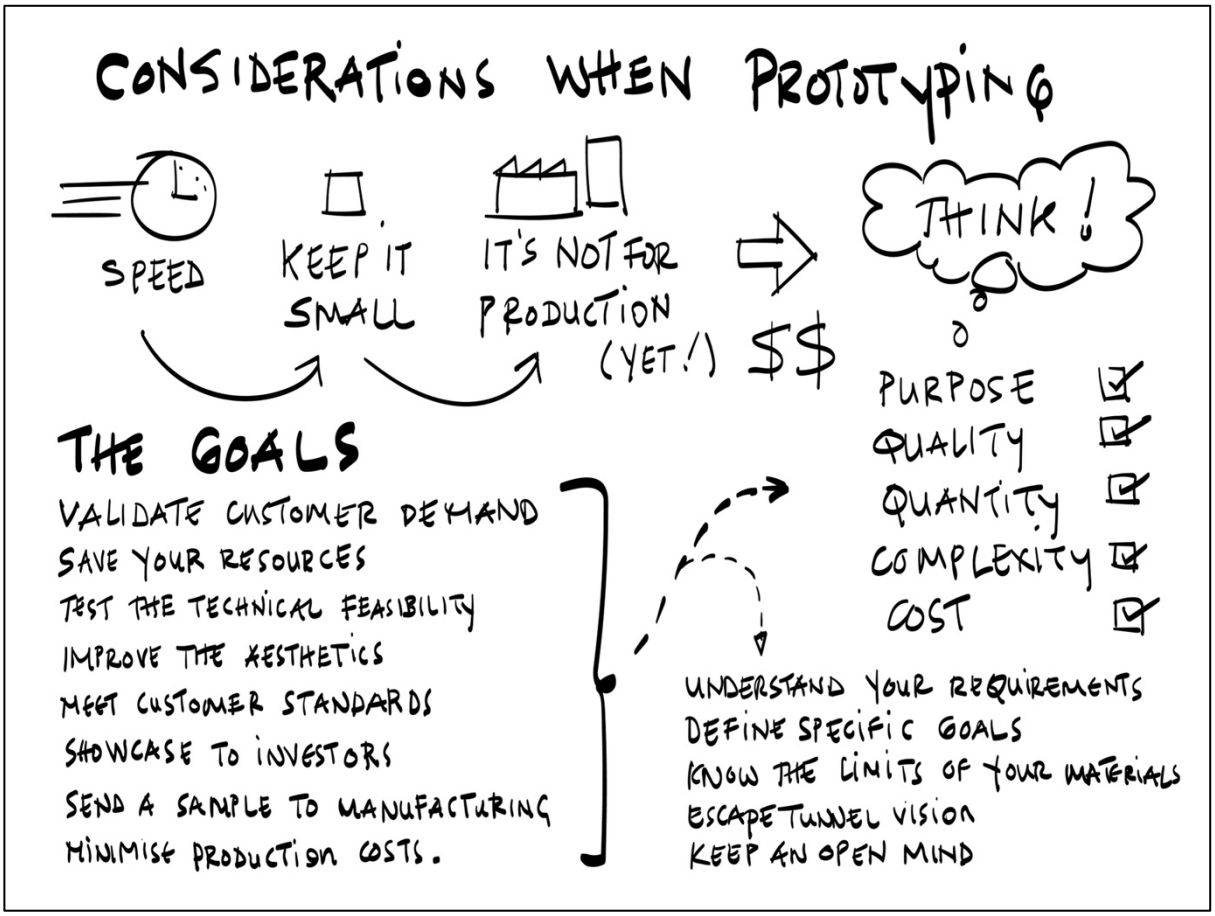


Figure 6. Considerations when prototyping. Created by Stephan Hitchins.

Required action or activity.

	Description	Done?
1	**Build (prototype) your idea.** Prototyping is an integral part of Design thinking because it allows us to test our ideas quickly and improve on them in an equally timely fashion. Design thinking encourages a “bias towards action”, where building and testing is valued over thinking and meeting. However, why is prototyping so important in the design process? Moreover, how does it help you create human-centred design solutions? Any finished product is just that - at the finishing line of a journey, a design journey involving a prototype or two (or more). A prototype is a simple experimental model of a proposed solution used to test or validate ideas, design assumptions and other aspects of its conceptualization quickly and cheaply, so that the designer/s involved can make appropriate refinements or possible changes in direction.	
2	**Consider resolution versus fidelity.** Before undertaking rapid prototyping, you need to consider the concepts of resolution and fidelity. Resolution refers to the level of detail in a prototype, while fidelity refers to how closely the prototype resembles the final product. A high-fidelity prototype may look and function like the final product, while a low-fidelity prototype may have less detail and functionality. The level of resolution and fidelity should be determined based on the specific needs and goals of the prototyping stage. Prototypes can take many forms, and just about the only thing in common the various forms have is that they are all tangible forms of your ideas. They don’t have to be primitive versions of a product, either - far from it. Simple sketches or storyboards used to illustrate a proposed experiential solution, rough paper prototypes of digital interfaces, and even role-playing to act out a service offering an idea are examples of prototypes. In fact, prototypes do not need to be full products: you can prototype a part of a solution (like a proposed grip handle of a wheelchair) to test that specific part of your solution. Prototypes can be quick and rough - useful for early-stage testing and learning - and can also be fully formed and detailed - usually for testing or pilot trials near the end of the project. Prototyping is about bringing conceptual or theoretical ideas to life and exploring their real-world impact before finally executing them. All too often,	N/A

	design teams arrive at ideas without enough research or validation and expedite them to final execution before there is any certainty about their viability or possible effect on the target group.	
3	**Evaluate your ideas (an ideation technique)** The Rose, Thorn, Bud tool is a simple, yet effective ideation technique used to evaluate a particular idea, project, or situation. It is used to identify the positive aspects of the idea (the "rose"), the negative aspects or challenges (the "thorn"), and the potential opportunities for growth or improvement (the "bud"). The "rose" represents the positive aspects of the idea. This includes everything that is going well, what is good about the situation, and what is working effectively. The "thorn" represents the negative aspects or challenges that need to be addressed. This includes everything that is not working, what is going wrong, and what obstacles need to be overcome. The "bud" represents potential opportunities for growth or improvement. This includes everything that has the potential to be developed, what is missing, and what could be added to improve the situation. By using the Rose, Thorn, Bud tool, individuals or teams can gain a more holistic view of the situation, evaluate its strengths and weaknesses, and identify potential opportunities for growth or improvement. This can help individuals or teams make informed decisions and develop actionable plans to address challenges and achieve their goals.	
4	**Undertake a DVF Matrix** Having thought of an idea and made a prototype you need to consider the following - is your solution desirable, viable and feasible? A DVF (Desirability, Viability, Feasibility) matrix is a design thinking tool that helps teams prioritize design requirements based on three main criteria: desirability, viability, and feasibility. The matrix is divided into three sections, with each section representing one of the criteria. Desirability refers to the user's needs, preferences, and expectations. The team evaluates the design requirements and ensures they meet the user's needs and are aligned with their goals and desires. Viability refers to the financial and business requirements of the project. The team evaluates the design requirements to ensure they are financially feasible and viable for the business to implement. Feasibility refers to the technical and operational requirements of the project. The team evaluates the design requirements to ensure they are technically feasible and	

	operationally achievable. Using the DVF matrix, teams can prioritize design requirements based on the specific needs of the user, the business, and the technology. This helps to ensure that the final solution is not only desirable to the user but also viable and feasible for the business to implement.	
5	**Get feedback. Reflect and re-iterate.** Share a prototype with your users. Let them experience it. Observe how they interact with it. Take notes. Maybe record? What insights are you gaining? Are they interacting in the way you designed it? Have you misunderstood something? How to progress from here? Revise your prototypes or add additional new ones based on the feedback you received. Present these to your user again and gain further valuable feedback. If required, re-do the concept selection process, and decide on another idea to take into the prototyping stage. Once completed, move onto the EXECUTE (test and launch) stage.	

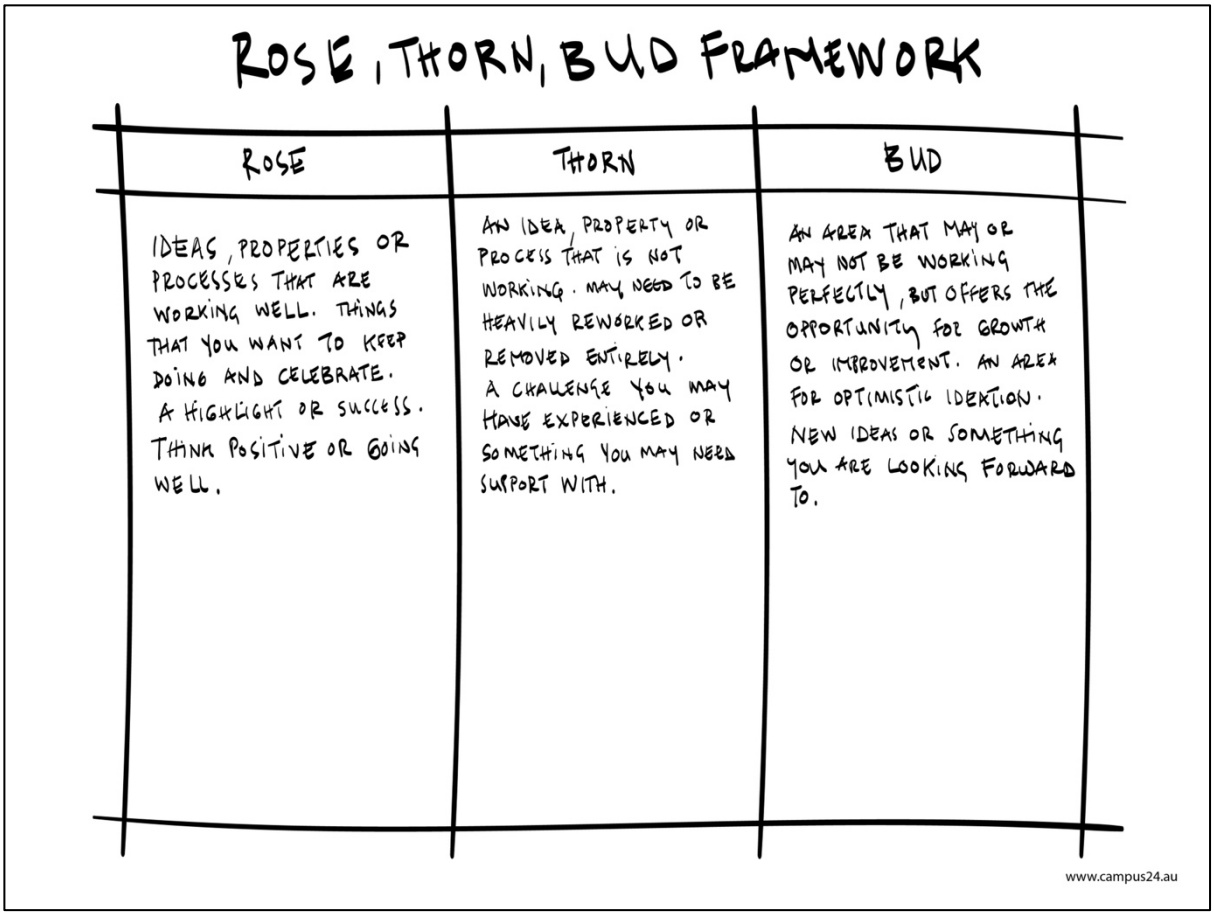


Figure 7. Example of the Rose Thorn Bud idea evaluation process

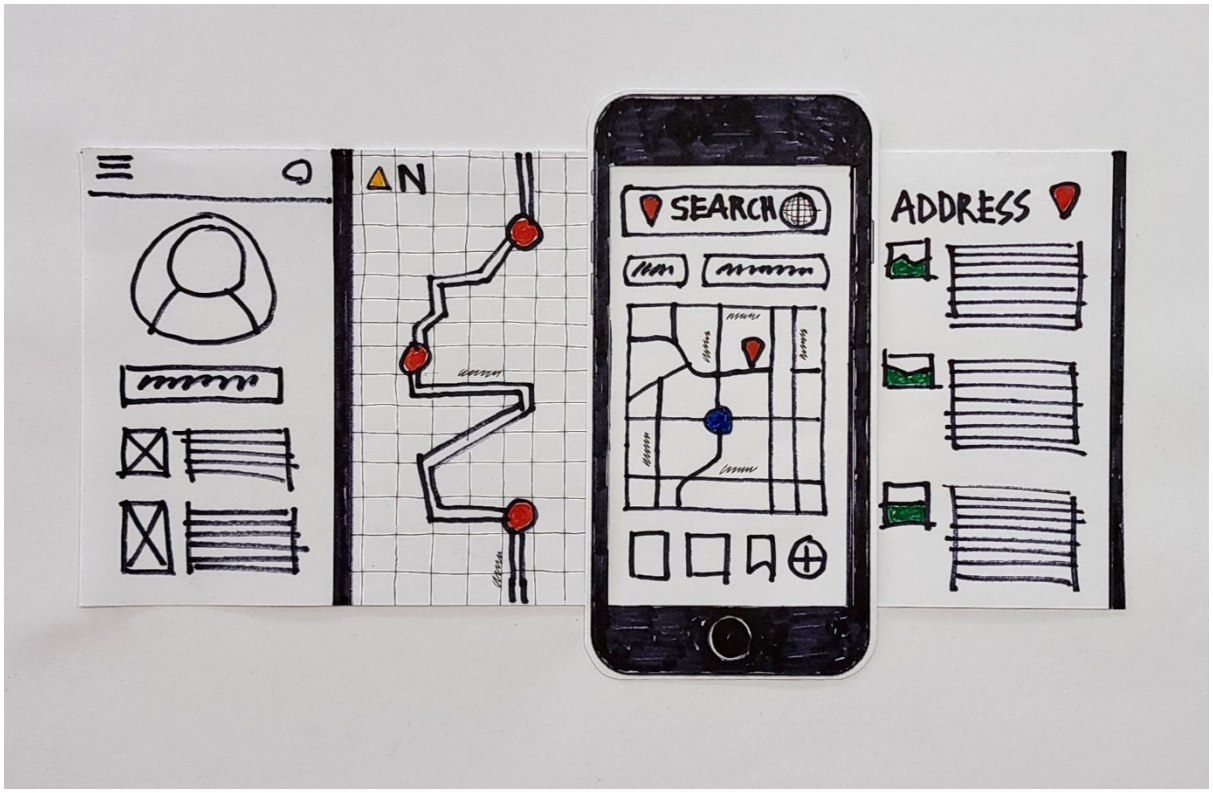


Figure 8. Low Fidelity / Low Resolution prototype example. Created by Stephan Hitchins

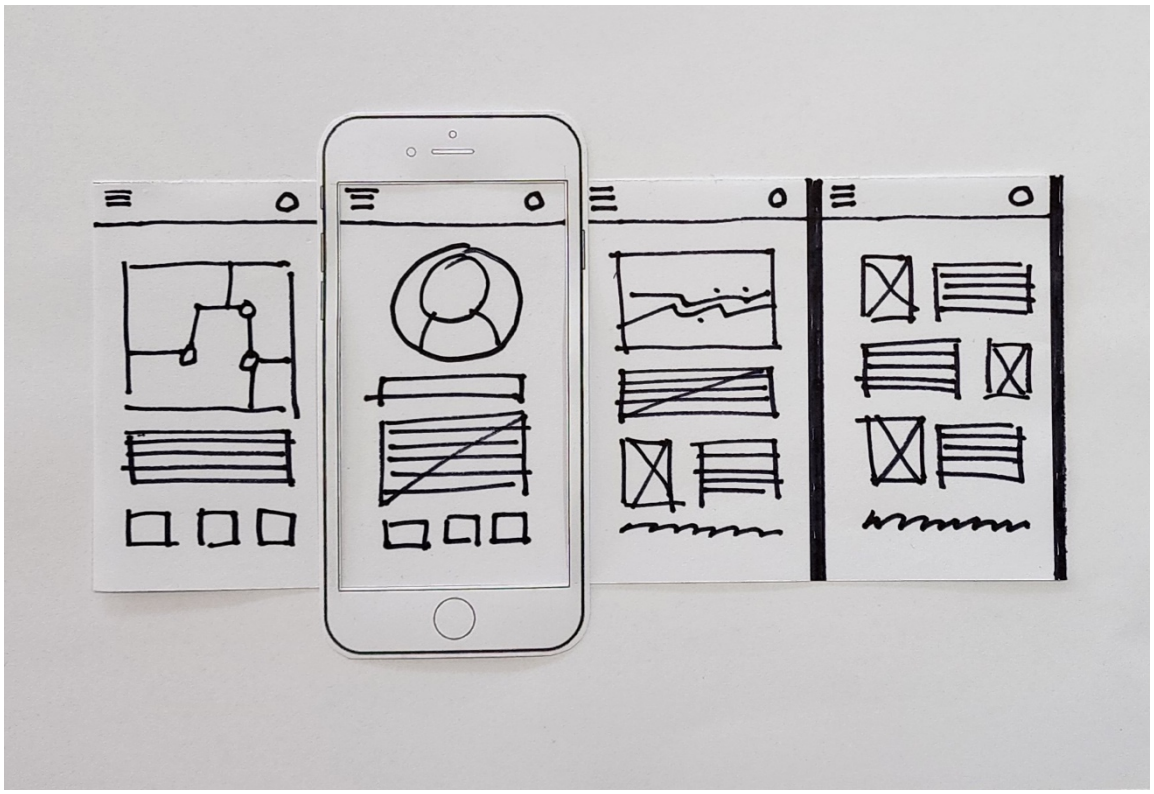


Figure 9. Low Fidelity / Low Resolution prototype example. Created by Stephan Hitchins

STEP 5: EXECUTE

Designers or evaluators rigorously test the complete product or service using the best solutions identified (concept selection) in the **EXECUTE** stage. This is the final stage of the 5E Design Thinking Framework problem-solving model. In an iterative process such as design thinking, the results generated are often used to redefine one or more further problems. This increased level of understanding may help you investigate the conditions of use and how people think, behave, and feel towards the product, and even lead you to loop back to a previous stage in the design thinking process. Remember design thinking is not a linear process. You can then proceed with further iterations and make alterations and refinements to rule out alternative solutions. The goal is to get as deep an understanding of the product and its users as possible.

Required action or activity.

	Description	Done?
1	**Assumption Testing** Assumption testing focuses on identifying the assumptions underlying the attractiveness of a new business idea and using available data to assess the likelihood that these assumptions will turn out to be true. Does your solution meet the identified need(s) of the user? Designers or evaluators rigorously test the complete product using the best solutions identified during the prototyping phase. This is the final stage of the 5 stage-model, but in an iterative process, the results generated during the testing phase are often used to redefine one or more problems and inform the understanding of the users, the conditions of use, how people think, behave, and feel, and to empathise.	N/A
2	**Conduct experiments.** Assumptions are tested through thought experiments, followed by field experiments. Once you have determined which assumptions are most critical to the potential attractiveness of your new concept, identify the data that allows you to conclusively test key assumptions. Here, we are identifying the information we need and then figuring out how to get it. Sort the data you need into one of the following three categories: what you know, what you don't know and can't know, and what you don't know but could. The third category is for the creation of thought experiments. Identify what it would take to get the data quickly, then design your thought	

	experiment, paying special attention to the data that could prove you wrong.	
3	**Feedback** What insights are you gaining? Have you misunderstood something? How to progress from here? You may need to revise your prototypes or add additional new ones based on the feedback you received. Even during this phase, alterations and refinements are made to rule out problem solutions and derive as deep an understanding of the product and its users as possible. Then test again! Finally, you may be ready to plan and prepare for a market launch.	
4	**Communicate your ideas.** The Napkin Pitch Tool, developed by Jeanne Liedtka, is a simple and effective tool for entrepreneurs to communicate their business ideas in a clear and concise manner. The tool is called "napkin pitch" because it is designed to be communicated in the space of a napkin, or approximately 30 seconds. The Napkin Pitch Tool has four elements: the customer, the problem, the solution, and the benefit. The customer element defines the target audience for the product or service, while the problem element identifies the specific challenge or pain point that the customer is facing. The solution element outlines the entrepreneur's proposed solution to the problem, and the benefit element highlights the value that the solution delivers to the customer. By using the Napkin Pitch Tool, entrepreneurs can effectively communicate their ideas to potential investors, partners, and customers. The tool forces entrepreneurs to distil their ideas down to their essence and focus on the most important aspects of their business. This helps entrepreneurs to better understand and articulate their value proposition, and to make a more compelling case for why their business is worth investing in or buying from.	
5	**Think about your business model.** The Business Model Canvas (BMC) tool by Strategyzer is a visual tool that helps entrepreneurs and business owners to evaluate and develop their business model. It consists of nine building blocks that can be filled in to create a comprehensive and holistic overview of the business. The nine building blocks are customer segments, value proposition, channels, customer relationships, revenue streams, key resources, key activities, key partnerships, and cost structure. Each	

	building block represents a critical aspect of the business and can be used to identify opportunities for growth, streamline processes, and make informed decisions. The BMC is a versatile tool that can be used by businesses of all sizes and in any industry. It encourages creativity, collaboration, and strategic thinking, and helps businesses to align their resources and activities with their goals and objectives. By using the BMC, businesses can gain a deeper understanding of their customers, identify areas for improvement, and develop strategies to increase revenue and profitability. It also allows businesses to evaluate and refine their business model as they grow and adapt to changing market conditions.	

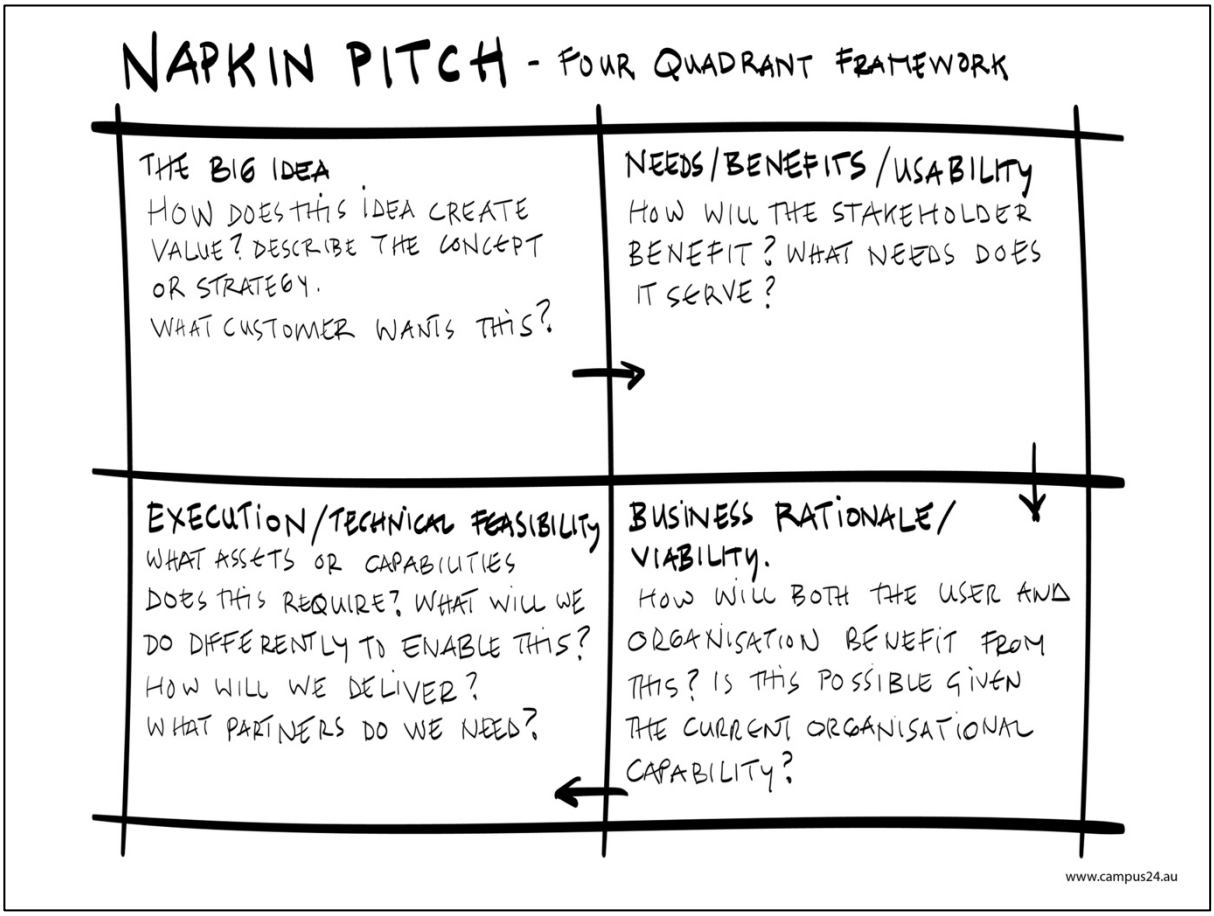


Figure 10. The Napkin Pitch developed by Jeanne Liedtka

The End.