What is UI?

♦ UI stands for User Interface or User Interface Design. It's also sometimes known as user interface engineering.

♦ UI is the design of user interfaces for machines: how a product looks and feels, not how it functions.

♦ UI Design is the process of making the user's interaction as simple and efficient as possible, in terms of accomplishing their goals (also known as user-centered design).

UI design is the merger of user needs and visual design. The result of UI design is a set of high-resolution wireframes (a visual representation of a product).

What is UX?

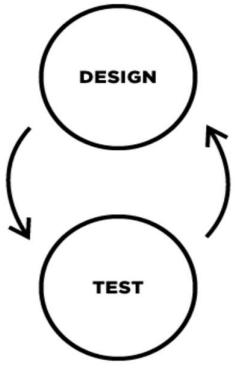
♦ UX stands for user experience or user experience design. It's also sometimes abbreviated as UXD, UED or XD.

♦ UX is the naked experience of a product: how a product functions, not how it looks.

♦ UX Design is the process of enhancing user satisfaction of a product through increased usability, accessibility, and pleasure provided in the interaction with the product. User experience design encompasses note only traditional human–computer interaction design, but also all aspects of a product or service as perceived by users.

UX design is the merger of user needs, business vision and technological feasibility. The result of UX design is a set of low-resolution wireframes (a basic visual guide for how a product will function) that are deeply connected with user research.

What is the process of UI?

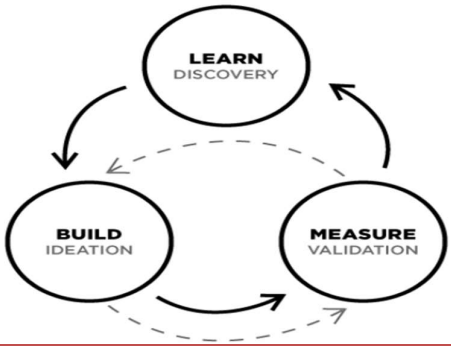


UI design is the creation of the finished interface; its focus is on the visual and emotional feel of the product. UI design establishes the layout, colors, typography and interactivity to visually communicate the flow of the screens in an intuitive manner. The UI design process must balance technical functionality and visual elements to create a system that is not only operational but also usable and adaptable to changing user needs.

What is the process of UX?

UX has 3 key phases:

1.Discovery, 2.Ideation, and 3. Validation.



UX design is cyclical and you will often need to repeat certain steps and even the entire process multiple times.

1.Discover

UX always starts with discovery—interviewing potential customers to understand what the target audience needs and talking to stakeholders to understand their goals and competitive analysis. Discovery is all about WHY - xxx. During discovery you will validate your problem (your product is there to solve that problem), identify your end users, and determine project goals.

Methods:

- ♦ User Research (Interviews, Ethnography)
- ♦ Empathy Mapping
- ♦ Task Analysis
- ♦ Stakeholder Mapping
- ♦ Service Blueprints
- ♦ Analytics and Heuristics
- ♦ Competitive

Analysis Outcome: Problem Validation, User Personas, Project Goals The final outcome will be a set of low-resolution wireframes: a draft of the function and structure of a product.

2.Ideate

Next comes ideation—using a variety of tools to imagine a solution that solves the user problem, while aligning with the company goals within technological possibility. Ideation is the process of finding out HOW.

How will you create a solution that solves the users deepest needs in a delightful manner?

Designers will implement a variety of tools to figure out how to solve the user problems. This process is very much like a funnel, where the solution is very wide at the beginning, and the goal of the process is to quickly, envision and test products with target customers in order to pivot and define. During ideation you will organize your discovery, explore options, and develop wireframes and prototypes.

Methods:

- ♦ Sketching
- ♦ Wireframes
- ♦ Information Architecture
- ♦ Journey Mapping / Page Flows
- ♦ User Journey Writing
- ♦ Paper Prototypes
- ♦ Interaction Design

Outcome: Solution Exploration

3.Validate (Test, Prototype)

The UX process ends with validation—the testing of wireframes and prototypes to iterate on the interface until it's intuitive and delightful.

Validation is when we finally know WHAT we're building. During this phase, designers will create wireframes or prototypes, and test them with users during a process called usability testing to evaluate how an actual user will react to the product.

The designer observes, asks open-ended questions and iterates on the wireframes based on this feedback.

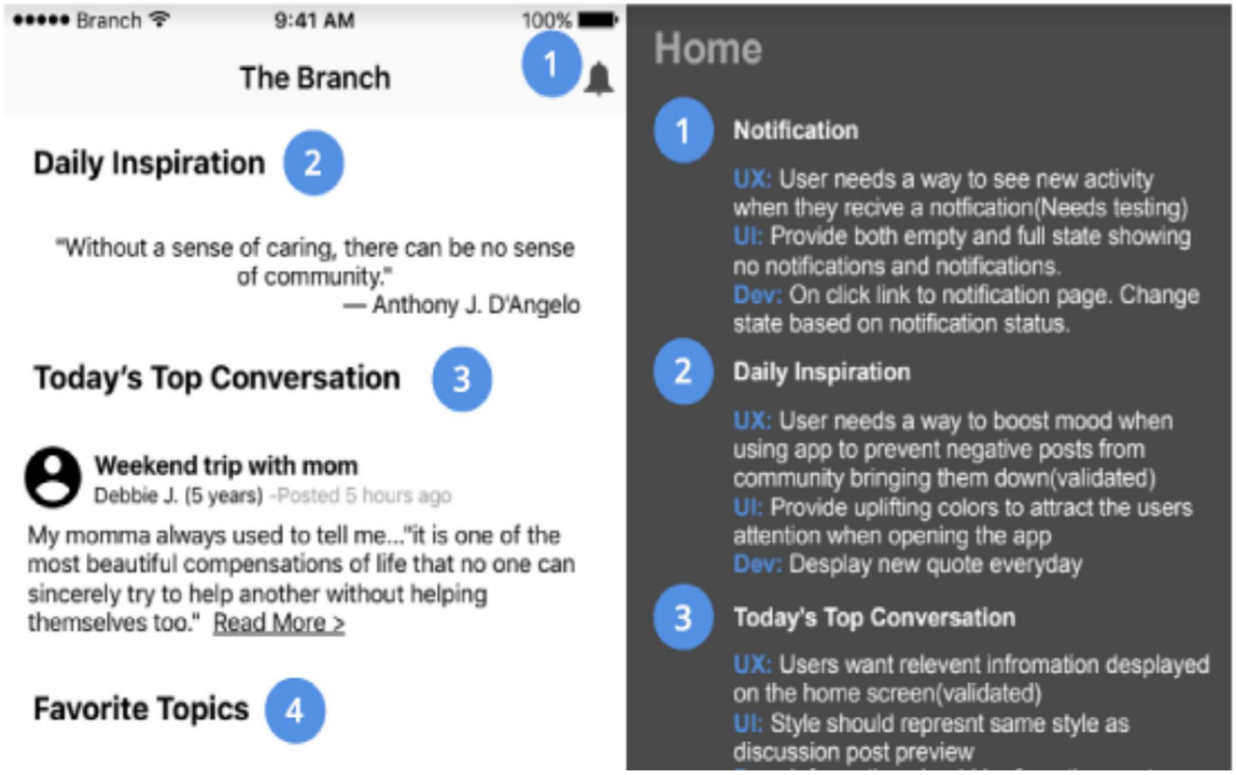
Validation testing is giving those wireframes or prototypes to real users. You're tracking actual interaction with the prototype here as well as confirming previously held assumptions.

The results of validation testing should be changes in flow and layout, though likely not scope anymore. During validation you will validate your ideas, learn, and plan for the next iteration.

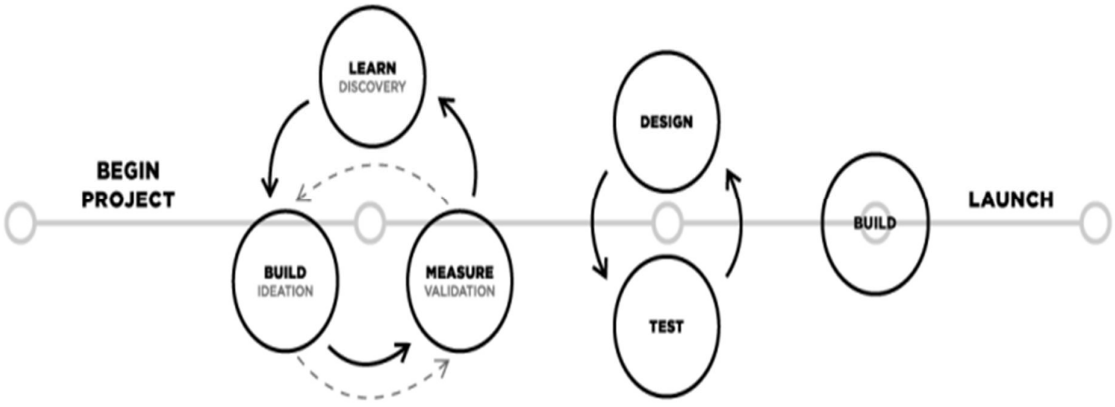
Methods:

- ♦ Accessibility
- ♦ Usability Testing
- ♦ Feedback integration
- ♦ Interactive Design
- ♦ Retrospectives
- ♦ Release

Outcome: Solution Scalability, Low-Res Wireframes



How Do UI and UX Fit Together?



The processes of UX Design and UI Design are flexible and there is no "right" way of bringing them together for one project. Typically, a project will need UX Design first and then UI Design. However, for existing products, either process may be used alone to improve either UX or UI.

II DESIGN :

"Most people make the mistake of thinking design is what it looks like. People think it's this veneer – that the designers are handed this box and told, 'Make it look good!' That's not what we think design is. It's not just what it looks like and feels like. Design is how it works."

WHAT IS A GOOD DESIGN?

A solution that serves the users and satisfies the client

1. Does what the users need and want
2. Natural to use
3. Helps them avoid trouble

USER CENTERED DESIGN

Puts the end user at the center of the universe and defines the system from that perspective. So, who or what is a user?

Three Steps

1. Identify who the users are
2. Identify what they want to accomplish
3. Constantly assess (1) and (2)

Design Start With Paper Prototypes. Simple Paper Prototypes are Easy to Create and Change. after Paper, next is Wireframes

Why is design thinking important?

Design thinking concept was formalized to help creative professionals understand business better, and to help businessmen leverage the creative process better.

The design thinking methodology allows to answer the daily questions like

'how to develop a unique business concept?',
'what solution is the best for my new business partner?',
'how to develop my MVP in the shortest terms?',
'how to cut on the estimation time?',
'how to accelerate the development process?'

History of Design thinking :

Design thinking is a methodology that designers use to brainstorm and solve complex problems related to designing and design engineering. It is also beneficial for designers to find innovative, desirable and never-though before solutions for customer and clients.

Design thinking is used extensively in the area of healthcare and wellness, agriculture, food security, education, financial services, and environmental sustainability, to name a few design thinking has helped in the digital space, contributed to the development physical products, spurred social innovation projects and much more.

The iterative design process helps the designers to involve clients and customers in meaningful ways. It is not just a strategy to come up with feasible solutions to a problem, but also a method to think of unimaginable solutions feasible, but also viable.

Design thinking is a blend of logic, powerful imagination, systematic reasoning and intuition to bring to the table the ideas that promise to sol desirable outcomes. It helps to bring creativity with business insights.

Phases of design thinking :

UX and UI are driven by Design Thinking, which refers to creative strategies designers use during the process of designing. This approach is also useful to resolve issues outside of professional design practice, such as in business, social, or personal contexts.

Design Thinking is not a designer-only endeavour. It's a method in which various stakeholders and users are collaborative partners, even co-designers.

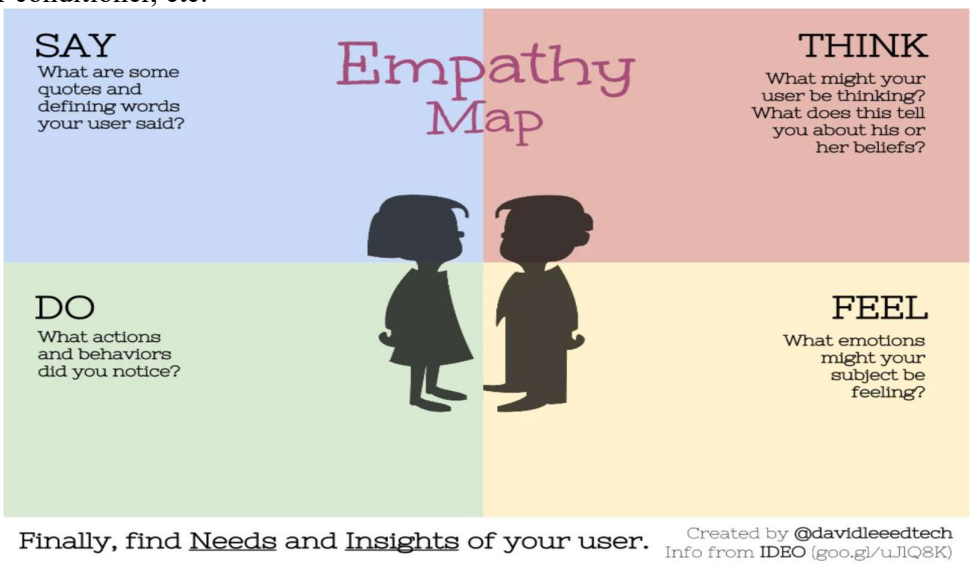
Fig: Phases of design thinking

There are five steps to Design Thinking:

1. Empathize

When you design, you're not primarily doing it for yourself. You're doing it with other people's needs and desires in mind. Focus on the person or problem that you are serving. Find ways to serve them better. Help their loves be better each day. Empathize first.

You can of empathy as the ability to stick your eyes to any subject or person. For example, if you were the driver, empathizing would mean seeing the world as if you were a passenger, wheel, car radio, seat, air conditioner, etc.



You'll move away from your own assumptions and start understanding the user and concentrating on their experiences, especially emotional ones.

The other crucial aspect of the empathy phase is to find your user and get (find/receive) as much data as possible.

The following hints will help you instantly get closer to your users:

1.In-depth interviews – talk to a target audience representative in an informal atmosphere. Encourage stories, ask open-ended questions, ask 'why?', dig for emotions.

2.Observe people in their natural environment. Open or hidden, keep in mind, when people don't know they're being observed, they calmly play and behave as usual. You can apply 'one day of life' observation method. Long story short, you ask a person to record every hour everything that happens to him/her.

3.Diving in their environment to try experience yourself. For example, how we talk about how we buy products and how we actually behave in a supermarket are different things:

Guided tour: Literally intrude into user's life and take observe his/her home or workplace (or another environment) of the person you're designing for can reveal true user behavior, habits and values.

Service safari: People are asked to go out 'into the wild' and explore examples of what they think good and bad service experiences are.

Walk in their shoes: Try your end-user experience by yourself, eat where they eat, spent what they spent, live how they. Use limits they are experiencing. Record all the data with a photo or video camera.

2. Define the Problem

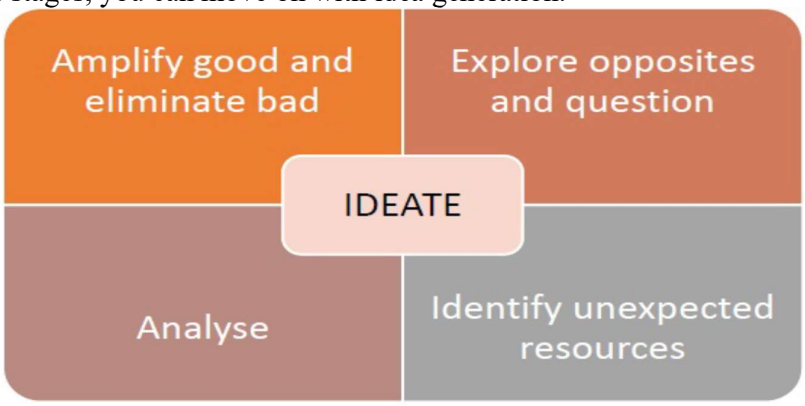
he next stage of Design Thinking is 'Define the problem'. You need to collect and process all the information you have received in the previous step. It's time to analyze all the data collected from observations and interviews.
Try to narrow down your problem to the root cause. Seek to understand before you are understood.
The main value of this stage is to form questions (challenge).
There are three types of needs: 1.Explicit needs, 2.Implicit needs, 3.Needs' meaning.
In order to identify the problem correctly, it is necessary to process the received information in the following order:

- Write down all the problems on the stickers. One sticker – one problem which was announced by your user (hang everything on the wall or on the board).
- After identifying all the problems it is necessary to group it by a similar symptom (insight), provide a title for each group and figure out the connections between them.
- Identify critical problems, 'pain points' as room for improvement.
- Vote to identify the problems will try to solve.

Create a POV (Point of View)using a simple formula:
3 key elements of a POV: user, need, and insight.
Advantages:

- Human-centred
- Broad enough to keep it creative
- Narrow enough to make it manageable

3. Ideate
After two previous stages, you can move on with idea generation.



This is the phase where we switch from learning about users and problems to generating solutions for them.

The following tools can help you move forward in this stage: Brainwriting, Worst Possible Idea, and SCAMPER. We're gonna use Brainstorming (ed. mostly because the article author loves this method the most).

Before starting with this methodology, you need to remember the following rules:

- Say 'No' to judgment (DONT KILL AN IDEA).
- Say 'Yes' to the wildest ideas.
- Build your idea over ideas of other (Yes, and…)
- Go for quantity.
- Make one conversation at the time.
- Don't forget to visualize each idea.

- Ditch obvious, generic and obvious ideas.

Start with group generation (20-30 min). Put all the ideas on the stickers. Take 10-15 min to do individual work. Make participants use this time to generate 2 maybe 3 more ideas. See more: IDEO.org's Brainstorms Rules.
At a certain point our brain can stop distinguishing good ideas from bad. So it's time to use the collective mind.

Once you're done with idea generation (meaning: neither you or your team will be able to invent at least one more, even at gunpoint) it's time to choose the one to process during next steps. To identify viable ideas, they need to be filtered, so the best way is to allow everyone to vote (each member of the team must have 3 votes).

4. Prototype
A simple prototype can do so much.

Why do you need it? Think of this as of MVP for MVP. Fail fast and learn quickly. There is no need to spend a lot of time and money on the implementation, just to discover that your assumptions don't work. Don't postpone the process until it's too late and too expensive to fail. Follow the rule – 'five minutes and a few cents'. You're learning fastest by doing.

In order to create an interface prototype you can use:

- paper to a wireframe by hand;
- live prototype using additional programs (axure or others);
- vector prototype using the Sketch.
- Here's another rule of thumb – your prototype should not need a software developer.

Moreover, your creative process is not limited at all. You can also use many other materials:

- cardboard or paper model;
- storyboard (draw a step-by-step usage scenario).

5. Test
This is the last step, and the best solution is to test your prototype on the same people you have interviewed in the Empathy phase.
It's crucial that you collect the feedback from real people who are using or are going to use your solution. And adequately react to it (which isn't that easy, if you're not a robot).

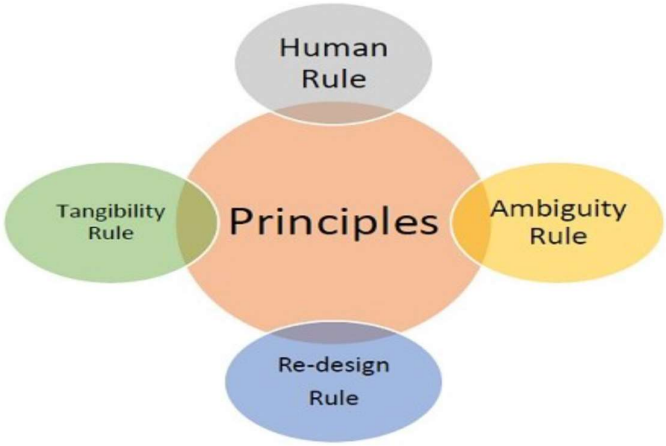
The feedback perception rules are as follows:

- don't sell
- don't defend
- ask 'why?'
- notice everything.

You can try to give the users a task or simply show them a prototype and follow their actions.
The main task is to understand if there is something that really affects a person and if so, you can start with MVP implementation.
Once the first version is ready you can start over with a more detailed and deeper testing. Still, you need to understand (and be mentally ready:) this step can bring you back to the idea' generation phase if your MVP wasn't really helpful enough to your users.

Iterations are the basis of good UX design. Therefore, you'll probably need to repeat the entire design thinking process or its individual stages.

Design Thinking - Attributes
The Principles of Design Thinking
According to Christoph Meinel and Larry Leifer, there are four principles to design thinking,
Figure



The Human Rule − This rule states that all kinds of design activity are ultimately social in nature.
The Ambiguity Rule − This rule requires all design thinkers to preserve ambiguity in the process design thinking.
The Re-design Rule − The re-design rule states that all designs are basically examples of re-design.
The Tangibility Rule − The tangibility rule states that making ideas tangible always facilitates communication between design thinkers.

Importance of Design thinking:

Design thinking is a blend of logic, powerful imagination, systematic reasoning and intuition to bring to the table the ideas that promise to solve the problems of the clients with desirable outcomes. It helps to bring creativity with business insights.

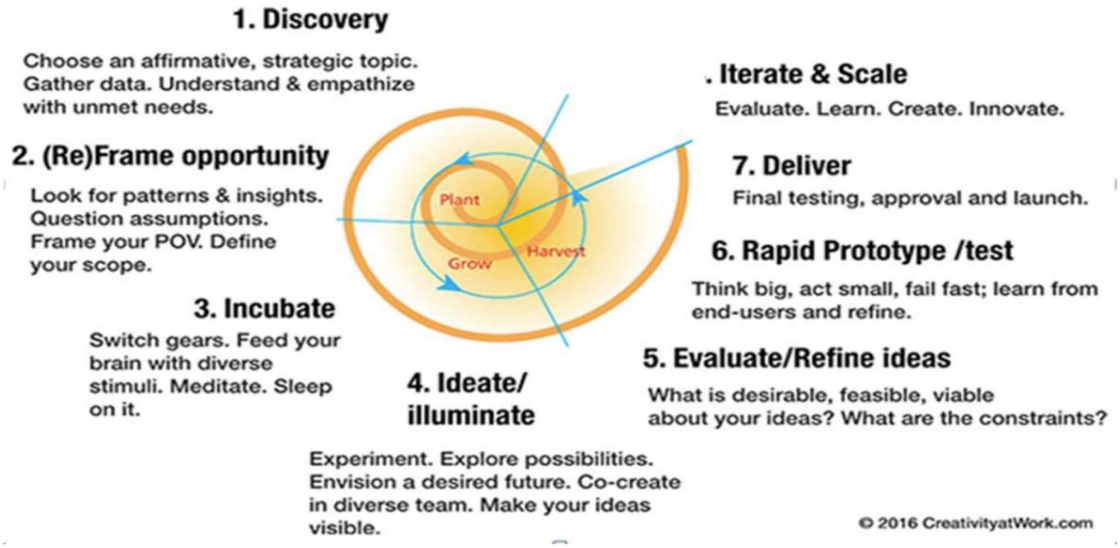


Fig: Importance of design thinking

Features of Design Thinking :

Such problems require multidimensional solutions. Design thinking helps in this regard. It not only assists a professional to come up with a solution, but it also helps the organization to gain a competitive edge over its rivals. Following are the benefits conferred by design thinking. These are incidentally also the distinguishing features of design thinking, Figure.

- Finding simplicity in complexities.
- Having a beautiful and aesthetically appealing product.
- Improving clients' and end user's quality of experience.

- Creating innovative, feasible, and viable solutions to real world problems.
- Addressing the actual requirements of the end users.

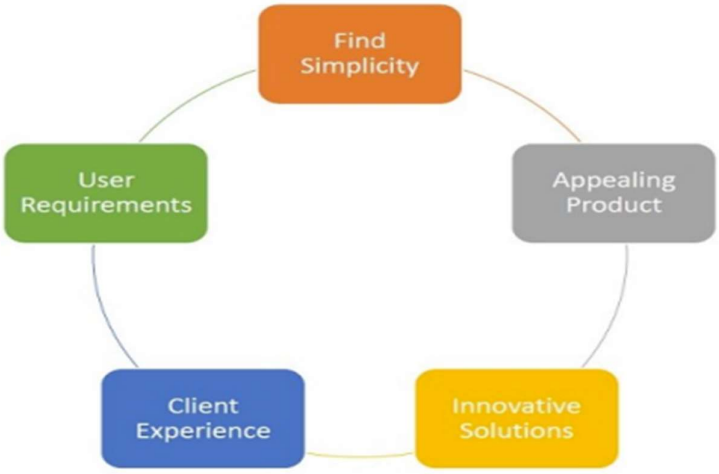


Fig : Features of design thinking

Most of the challenges in the world do not get solved because people trying to address those problems focus too much on the problem statement. At other times, the problem statement is overlooked and there is too much stress to find a solution.

Design thinking helps to gain a balance between the problem statement and the solution developed. A design-oriented mindset is not problem focused, but solution focused and action oriented. It has to involve both analysis and imagination. Design thinking is the way of resolving issues and dissolving problematic situations by the help of design.

Use of Design Thinking :

The basic principle of design thinking is that innovation can be disciplined. Innovation is not an elusive entity that only a few genius people can experience. It is, rather, a practice that can be systematically approached by a set of practical and meticulous tools, methodologies, and frameworks. Design thinking helps you learn the following.

- How to optimize the ability to innovate?
- How to develop a variety of concepts, products, services, processes, etc. for endusers?
- How to leverage the diverse ideas of innovation?
- How to convert useful data, individual insights and vague ideas into feasible reality?
- How to connect with the customers and end-users by targeting their actual requirements?
- How to use the different tools used by designers in their profession for solving your customers' problems?

Design thinking helps, people of every profession to arrive at solutions in a planned, organized, and systematic manner. The step-by-step process helps to create solutions with both the problem statement and the required solution in mind.

Design Thinking - Applications :

Design Thinking is Helpful in Many Areas: It is used in project management; it is used to define the scope and architecture of the project.

It is used for business management. It used to focus on the features which have more value in the actual world.

It helps to allocate the goal so that we can go towards the exact direction with more clear views. In this way, it is helpful in the development field.

For most of the team works, It allows us to work in a more effective manner and according to users' requirements.

Design thinking finds its application across a variety of professions. From sports, education and research to business, management and design, design thinking is widely used by professionals around the globe.

Design thinking is halfway between analytical thinking and intuitive thinking. Analytical thinking involves purely deductive reasoning and inductive logical reasoning that utilize quantitative methodologies to come to conclusions. However, intuitive thinking refers to knowing something without any kind of reasoning.

These are two extreme kinds of thinking. Design thinking makes use of both the extremes in an optimum manner. The intuitive thinking helps in invention for the future, whereas analytical thinking to create something creative in the present, which is replicable. The willingness to use these futuristic solutions is what is called abductive logic.

Business

Design thinking helps in businesses by optimizing the process of product creation, marketing, and renewal of contracts. All these processes require a companywide focus on the customer and hence, design thinking helps in these processes immensely. Design thinking helps the design thinkers to develop deep empathy for their customers and to create solutions that match their needs exactly. The solutions are not delivered just for the sake of technology.

Information Technology

The IT industry makes a lot of products that require trials and proof of concepts. The industry needs to empathize with its users and not simply deploy technologies. IT is not only about technology or products, but also its processes. The developers, analysts, consultants, and managers have to brainstorm on possible ideas for solving the problems of the clients. This is where design thinking helps a lot.

Education

The education sector can make the best use of design thinking by taking feedback from students on their requirements, goals and challenges they are facing in the classroom. By 15 working on their feedback, the instructors can come up with solutions to address their challenges. For example, Michael Schurr, a 2nd grade instructor from New York, realized that his students would be more comfortable with bulletin boards lowered. He also found the idea of creating comfortable semi-private space for working students as it provided them space to study. As a result, his students became more engaged and felt free to move.

Healthcare

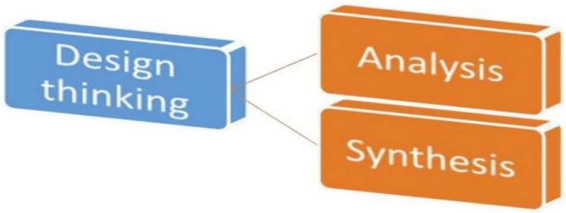
Design thinking helps in healthcare as well. The expenditure on healthcare by the government and the cost of healthcare facilities is growing by the day. Experts worldwide are concerned about how to bring quality healthcare to people at low cost.

Venice Family Clinic in Venice, California has come up with innovative solutions to the challenge of opening a low-cost children's clinic to serve the low-income families. Problems of finance, transportation, and language barriers had to be solved. And all this had to be done at low cost for the poor kids. Fostering good health along with profits was a challenge, as it does not sound sustainable. Using design thinking, the inefficiencies in the system and the perennial crises were addressed.

Analysis + Synthesis = Design Thinking

Analysis and synthesis, thus, form the two fundamental tasks Figure 1.15 to be done in design thinking. Design thinking process starts with reductionism, where the problem statement is broken down into

smaller fragments. Each fragment is brainstormed over by the team of thinkers, and the different smaller solutions are then put together to form a coherent final solution. Let us take a look at an example.



Analysis

Analysis is derived from the Greek word 'analusis', which translates into 'breaking up' in English. Analysis is older than the times of great philosophers like Aristotle and Plato. As discussed in the previous section, analysis is the process of breaking down a big single entity 16 into multiple fragments. It is a deduction where a bigger concept is broken down to smaller ones. This breaking down into smaller fragments is necessary for improved understanding.

So, how does analysis help in design thinking? During analysis, design thinkers are required to break down the problem statement into smaller parts and study each one of them separately. The different smaller components of the problem statement are to be solved oneby-one, if possible. Then, solutions are thought for each of the small problems. Brainstorming is done over each of the solutions.

Later, a feasibility check is done to include the feasible and viable solutions. The solutions that don't stand firm on the grounds of feasibility and viability are excluded from the set of solutions to be considered.

Design thinkers are, then, encouraged to connect with the diverse ideas and examine the way each idea was composed. This process of breaking down the bigger problem statement at hand into multiple smaller problem statements and examining each as a separate entity is called analysis.

Synthesis

Synthesis refers to the process of combining the fragmented parts into an aggregated whole. It is an activity that is done at the end of the scientific or creative inquiry. This process leads to creation of a coherent bigger entity, which is something new and fresh. How does synthesis come into picture in design thinking?

Once the design thinkers have excluded the non-feasible and non-viable solutions and have zeroed-in on the set of feasible and viable solutions, it is time for the thinkers to put together their solutions.

Out of 10 available solutions, around 2-3 solutions may need to be excluded since they may not fit into the larger picture, i.e. the actual solution. This is where synthesis helps.

The design thinkers start from a big entity called the problem statement and then end up with another bigger entity, i.e. the solution. The solution is completely different from the problem statement. During synthesis, it is ensured that the different ideas are in sync with each other and do not lead to conflicts.

CONVERGENT AND DIVERGENT THINKING

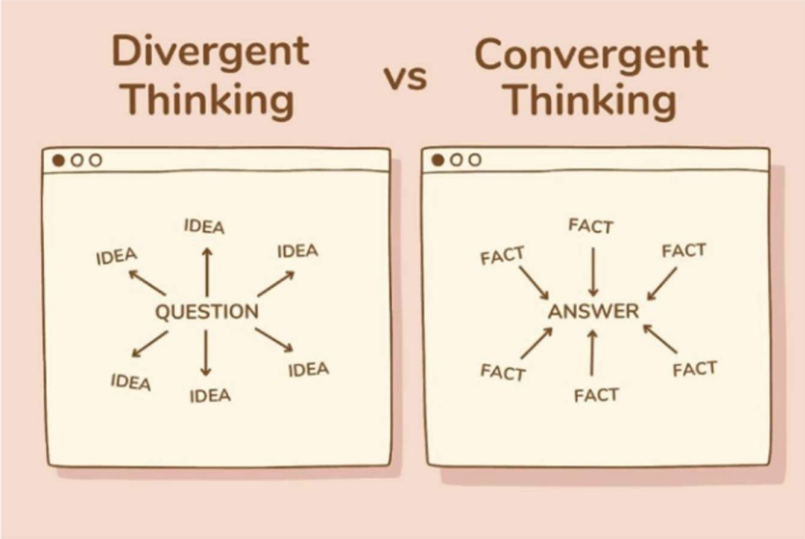
Convergent thinking is a type of thinking that involves **finding the most effective answer to a problem.**

In other words, this type of thinking involves a **single and well-established answer** – usually, the most correct answer.

Therefore, there is no room for ambiguity. Convergent thinking **involves accuracy, speed, and logic**. It is most effective in situations where a problem already has an answer, which needs to be recalled or determined **through decision-making strategies**.

Divergent thinking is a type of thinking that involves **generating creative ideas to explore many possible solutions.** It involves **opening your mind in various directions and trying different solutions for a problem**.

Moreover, divergent thinking is **spontaneous, free-flowing, and non-linear** and produces many unique and original ideas. It involves many possible solutions or ideas in a short amount of time. Unlike convergent thinking, you cannot use divergent thinking for multiple-choice tests or quizzes that involve questions having a single answer. This is because there is no right or wrong answer in divergent thinking.



The main difference between convergent and divergent thinking is that convergent thinking produces a single effective solution while divergent thinking produces multiple creative solutions. In brief, these are two opposite ways of thinking. The two terms convergent thinking and divergent thinking were coined by the psychologist Joy Paul Guilford in 1956. Convergent thinking involves finding the most effective answer to a problem, while divergent involves generating creative ideas to explore many possible solutions.

Relationship Between Convergent and Divergent Thinking

Most of us use both these thinking methods to find solutions to our problems. We can use divergent thinking to come up with different solutions to a problem and then use convergent thinking to narrow down the best possible solution.

Difference Between Convergent and Divergent Thinking.

1.Definition

Convergent thinking is a type of thinking that involves finding the most effective answer to a problem, divergent thinking is a type of thinking that involves generating creative ideas to explore many possible solutions.

2.Solution

In convergent thinking, there is only one right solution, but in divergent thinking, there can be multiple solutions.

3.Reasoning

While convergent thinking uses deductive reasoning, divergent thinking uses inductive reasoning.

4.Features

Convergent thinking is accurate, speedy, and logical, while divergent thinking is spontaneous, free-flowing, and non-linear.

5.Time Taken

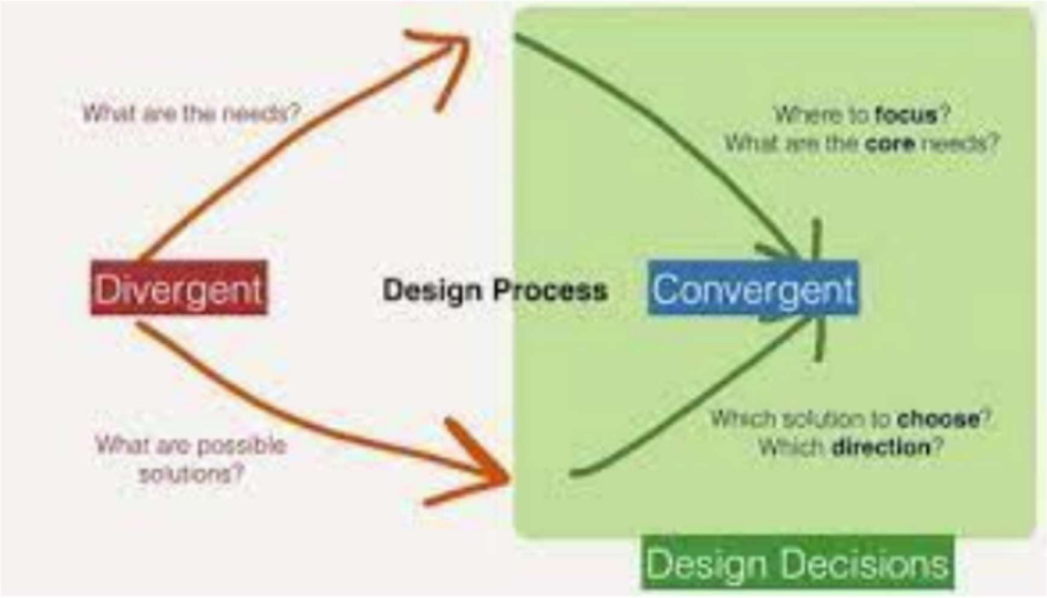
Convergent thinking takes less time than divergent thinking

The main difference between Convergent and Divergent

1. Convergent and divergent thinking is that convergent thinking produces a single effective solution. Divergent thinking produces multiple creative solutions.
2. Convergent thinking is accurate, speedy, and logical, divergent thinking is spontaneous, free-flowing, and non-linear.

Generally, these two thinking methods can be used in conjunction to come up with an effective solution to a problem.

CONVERGENT THINKING	DIVERGENT THINKING
Convergent thinking is a type of thinking that involves finding the most effective answer to a problem	Divergent thinking is a type of thinking that involves generating creative ideas to explore many possible solutions
There is only one right solution	There can be multiple solutions
Uses deductive reasoning	Uses inductive reasoning
Accurate, speedy, and logical	Spontaneous, free-flowing, and non-linear
Takes less time	Takes more time



Ideation is the third phase of the Design Thinking process, and it's all about generating ideas.
Before we explore ideation in more detail, let's briefly recap on the five stages of Design Thinking: Empathise, Define, Ideate, Prototype, and Test.

Design Thinking – Convergent

Convergent thinking is exactly opposite of what divergent thinking is. The term 'Convergent Thinking' was coined by Joy Paul Guilford in 1956. The concept of convergent thinking requires the design thinker to go through all the possible solutions thought during divergent thinking and come up with a correct solution. This convergence on a single solution or a mix of limited number of solutions is the essence of convergence thinking.
Convergent thinking is the type of thinking in which a thinker is generally supposed to come up with a single well-established best-possible solution to a problem. This step delivers the best and a concrete solution to a problem statement, taking into account all the factors and requirements specified in the problem statement.

Convergent thinking requires speed, accuracy, efficiency, logical reasoning, and techniques. A thinker is supposed to recognize the patterns, reapply a few techniques, and accumulate and organize the stored information.

Aspects of Convergent Thinking

The principle aspect of convergent thinking is that it should help us arrive at a singlebest answer without any room for ambiguity. The ideas thought of in the process of divergent thinking are either considered to be possible or impossible in convergent thinking phase.

Another important aspect of convergent thinking is that judgment is an important part of this process. Divergent thinking requires thinkers to suspend judgment. Convergent thinking encourages thinkers to apply the power of judgment.

Let's look at the exercise of divergent thinking and start applying convergent thinking on it
We got the following ideas in the divergent thinking exercise.

- Elimination of knowledge transfer program.
- Having a single instructor for knowledge transfer program in a classroom session.
- Preparing a document for knowledge transfer program.
- Making it mandatory for employees to search for knowledge resources online.
- Hiring only those employees who are experienced enough and who don't need knowledge transfer.

Now, looking at the five ideas, it can be easily said that option 1 is not feasible. Every employee does not have an idea of a company's tools and techniques and hence, cannot be expected to survive without knowledge transfer.

For the same reason, option 5 is also not acceptable. The best practices of a company are seldom known to new employees and taking an assumption about an employee's knowledge level is a huge mistake. It is considered to be a good HR practice to have knowledge transfer session for new employees.

If we go by option 4, we are not assured of the pace at which learning will happen for the new employees. Each employee can take variable amount of time to grasp the concepts. The time taken to search materials online and read them is an overhead in itself and it cannot be monitored.

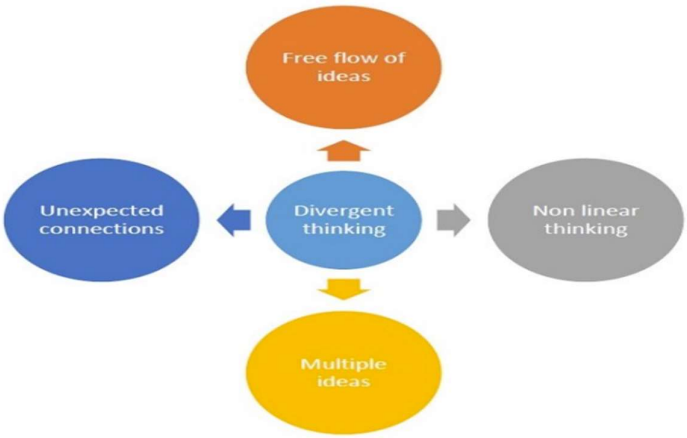
Hence, the two better options that remain are option 2 and option 3. However, one cannot correctly estimate the effectiveness of a document for knowledge transfer. It is similar to reading materials online. Hence, the best option available is to have an instructor teaching employees in a classroom program.

Although, the employees won't get personal attention at times, yet by maintaining a fine balance between the strength of the batch and the length of class, this can be the best option to reduce cost and overhead. The reduction in the number of instructors will lead to less expenditure for DT and at the same time, the effectiveness of a paid instructor will remain, making the process of knowledge transfer as effective as before.
This is how convergent thinking comes into picture.

Design Thinking – Divergent

Divergent thinking is the process of devising more than one solution for a problem statement. It refers to the thought process of generating creative solutions.
The main features of divergent thinking are –

- It is a free flowing chain of ideas.
- It happens in a non-linear manner, i.e. it does not follow any particular sequence of thinking. Moreover, multiple ideas can emerge at the same time, rather than one idea coming up only after the other has occurred.
- Non-linearity also means that multiple solutions are thought of and explored at the same time. This happens in a very short amount of time and unexpected connections are developed between the ideas.



The Free Association Theory of Creativity says that concepts are connected inside our brains as semantic networks. Psychologists have claimed that the difference in creativity levels of people is dependent on the type of semantic networks of concepts inside the human mind. Following are the two types of connections –

- Flat
- Steep

The design thinkers with flat networks are those with numerous loose conceptual connections. They are more creative. The people with steep networks are more logical, because of the linear associations between the nodes. Because divergent thinking proceeds in a non-linear fashion, a person with flat associative network will be more successful in divergent thinking.

Case Study

Problem Statement − The process of knowledge transfer is a huge problem for the organization. Let's call our organization 'DT'. DT wants to eliminate the overhead of shelling out extra money and investing time for transferring knowledge to its new employees. The problem statement at hand is "Knowledge transfer adds to the cost of the company". Let's think of ways to eliminate or at least, reduce the cost to the company.

Solution − Following can be some of the possible and even not-so-possible solutions.

- DT can eliminate the process of knowledge transfer.
- DT can conduct classroom sessions for knowledge transfer, where a large number of new employees can be seated and just one instructor can deliver sessions to many employees at once. This will reduce the cost as the number of paid instructors required will be less.
- DT can come up with a document for knowledge transfer and can mail it to every new employee. The employees can go through the document and hence, can selfhelp for knowledge transfer.
- DT can ask the employees to search for material online to gain knowledge of new tools and processes, which are currently in use in the industry.
- DT can hire only those employees who have adequate knowhow of tools and techniques that DT works on. This will eliminate the need of knowledge transfer.

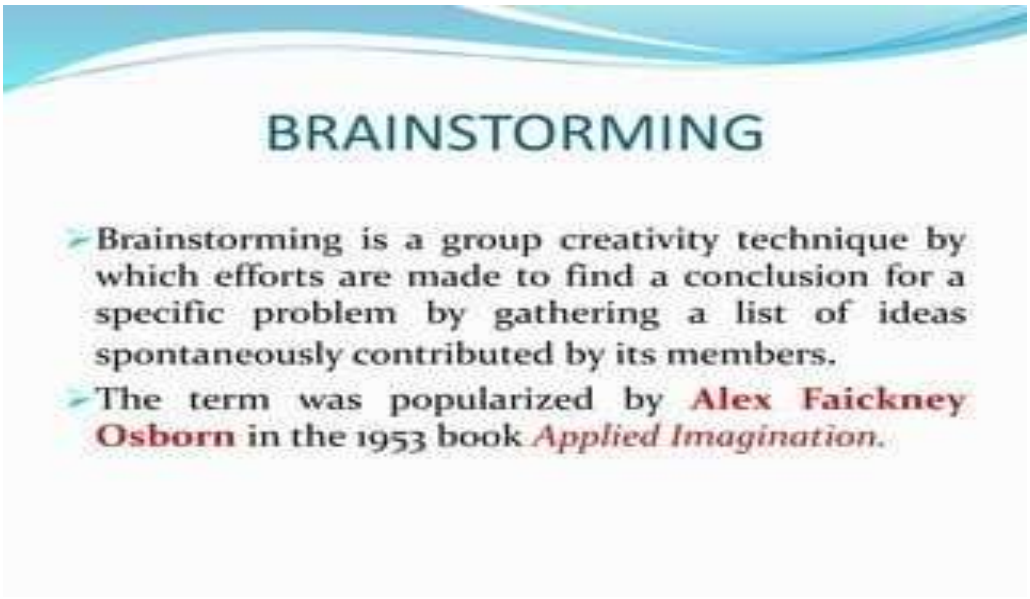
Brainstorming

Brainstorming is one of the oldest tricks in the book when it comes to generating new ideas as a group. In a brainstorming session, you verbally bounce ideas off of each other in the hopes of finding a blended solution.

Brainstorming is a method design teams use to generate ideas to solve clearly defined design problems. In controlled conditions and a free-thinking environment, teams approach a problem by such means as “How Might We” questions.

Brainstorming is a creative process that is used as an early step in generating possible solutions to a problem.

Judgment is withheld to create a long list of ideas, including ones more creative or daring than those initially considered.



Rules for Brainstorming

- Only one conversation is allowed at a time. No other person must intervene when an idea is being given.
- Focus must be on the quantity and not on quality. In this step, the group must have large number of ideas with them.
- Think out of the blue. Wild ideas must be encouraged even if they invoke plain humor or seem impossible.
- The group leader must defer judgment. The fellow thinkers also need to suspend judgment. Judgmental attitude leads to an obstruction for the thinkers.
- Visualization is important. The design thinkers must create a visual picture of the problem statement and then try to see a visual image of their ideas as well.
- Build on each other’s ideas. Support other ideas and build on them through group discussions and healthy debates.

Following is one of the techniques to brainstorm for ideas.

Mind Maps

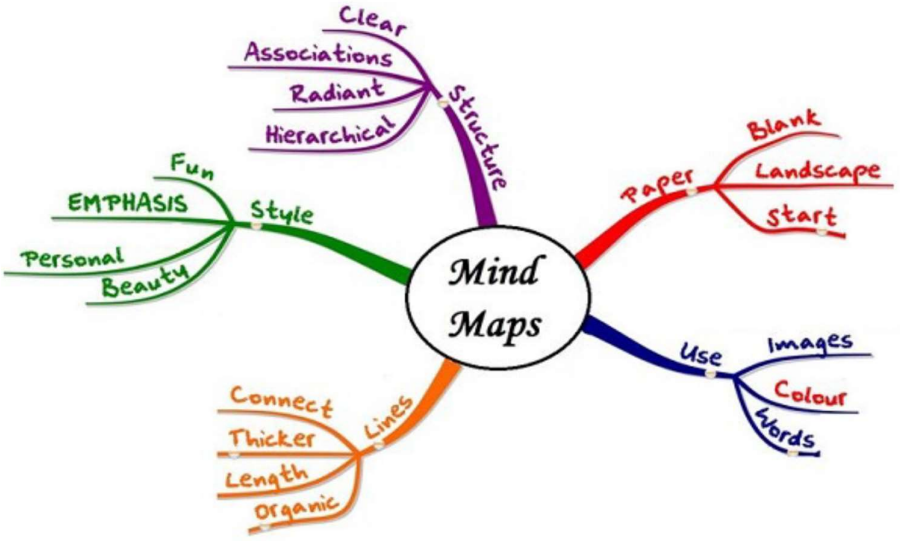
Mind map is a diagram that helps to observe and study information in a visual manner. Mind map is created around a single problem statement and all the ideas to solve the problem are written around it. The problem statement usually is written at the center of a blank page as a hub and branches shoot out in all directions representing the solutions.

The ideas can be represented as text, images, trees, and even smaller mind maps. The entire map looks like a top view of a tree, with the problem statement as the trunk and the solutions as branches. It is also known by the name of spider diagram.

However, mind map is not a mere haphazard diagram. It is a well-structured organized diagram meant to aid the thinking process and to streamline the analysis and synthesis process. The guidelines to create a mind map are as follows.

Guidelines to Create Mind Maps

 Begin with the problem statement at the center of a blank white page.
 Use images, different colors, symbols, caricatures, abbreviations and codes to depict your ideas. Text can be boring, but different depictions can add an altogether different charm to your mind map.
 Keywords must replace long statements. The mind map must give a hint to the design thinker about an idea quickly. Reading a long statement is waste of time.
 Each and every word written in the mind map Figure 1.20 must be connected to the central hub by some or other line or set of lines.
 Use multiple colors for visual stimulation.
 Use radial hierarchy and make use of emphasis, italics, and underlines to stress on a point.



There are teams in corporate organizations which have large whiteboards and they paste their ideas on it using sticky notes. Different categories of ideas are represented in sticky notes of different colors and this helps in segregation of ideas.

The main idea behind the ideate step in design thinking process is to generate ideas and try to segregate them into categories. This helps in brainstorming without judgment, helps in bringing all the ideas to the table and helps proceed to the next step called ‘Prototyping’, where the ideas are checked for their feasibility and value.

Ideation Techniques:
Creative pause, Cheatstorming, Crowdstorming, Daydreaming, Provocation, Forced, relationships,Roleplay,Visualization,Wishing,Sketching and sketchstorming,Synectics

Brainstorming may seem to lack constraints, but everyone must observe eight house rules and have someone acting as facilitator.

1. **Set a time limit** – Depending on the problem's complexity, 15–60 minutes is normal.
2. **Begin with a target problem/brief** – Members should approach this sharply defined question, plan or goal and *stay* on topic.
3. **Refrain from judgment/criticism** – No-one should be negative (including via body language) about any idea.
4. **Encourage weird and wacky ideas** – Further to the ban on killer phrases like "too expensive", keep the floodgates open so everyone feels *free* to blurt out ideas (provided they're on topic).
5. **Aim for quantity** – Remember, "quantity breeds quality". The sifting-and-sorting process comes later.
6. **Build on others' ideas** – It's a process of *association* where members expand on others' notions and reach new insights, allowing these ideas to trigger their own. Say "and"—rather than discourage with "but"—to get ideas closer to the problem.
7. **Stay visual** – Diagrams and Post-Its help bring ideas to life and help others see things in different ways.
8. **Allow one conversation at a time** – To arrive at concrete results, it's essential to keep on track this way and show respect for everyone's ideas.

There are several distinct types of brainstorming:

Reverse Brainstorming
A creative problem-solving technique in which the problem is turned around and considered from a different point of view to spur new and different solutions.

Stop-and-Go Brainstorming
A problem-solving technique in which a group alternately engages in brainstorming solutions without evaluation for ten minutes then engages in a short period of evaluation. The group continues alternating between brainstorming and evaluation.
Phillips 66 Brainstorming
A problem-solving technique in which a group of six people brainstorms for six minutes and then a spokesman for each group presents either the best ideas or all ideas to the larger group.
Brainwriting
A problem-solving technique in which participants individually brainstorm ideas and document them, then share them with a group to further push their thinking.

Uses of Brainstorming:
- Discover new ideas thoughts and responses very quickly.
- Written documents and articles.
- Investment decisions.
- Management methods

Advantages of Brainstorming:

- Leads to a very animated and energizing session.
- More reserved participants feel free to contribute.

Disadvantages of Brainstorming:

- It takes time particularly if it is a large group.
- May consume a lot of material. Eg: flipchart or writing materials.
- Require high level facilitation skills.

Gamestorming

Gamestorming is a set of practices for facilitating innovation in the business world. A facilitator leads a group towards some goal by way of a game, a structured activity that provides scope for thinking freely, even playfully.

Object of Play

The object of this game is to create an organizational map of your stakeholders. In some cases this may look like your org chart. In other cases situation and context will dictate a unique shape — likely familiar but undocumented. In addition to mapping stakeholders' organizational relationships, you'll also analyze their contextual disposition regarding your initiative.

Number of Players
5 – 15

Invite players from across your project's organizational spectrum to ensure thorough stakeholder mapping. Colleagues with experience from similar projects or relationships with suspected stakeholders may provide valuable information. Invite them, too!

Duration of Play
30-60 minutes

Material Required

Organizational Design Analysis works best on a whiteboard. Substitute a flip chart (or two) if necessary. To run a good session, you will need:

- Dry-erase markers, we recommend using at least three colors (black, green, red)
- Dry-erase marker eraser (or paper towels)
- Sticky notes
- Camera to capture the results

How to Play

Step 1: Map organizational structure

1. Invite your players to a five minute stakeholder brainstorm, ask: Who are our project stakeholders? Ask them to consider teams and individuals both inside and outside your org or company. Have players write one stakeholder per sticky note.
2. Once the brainstorm ends, have each player present their stakeholders by placing their sticky notes on a wall and provide to the group a brief description of their thinking.
3. With all the sticky notes on the wall, ask the group to organize them into a rough org chart. This needs only to be an imprecise draft.
4. With the sticky note draft org chart as your guide, create a cleaner version of the org using a whiteboard and dry-erase markers. Ask for a scribe to map the organisation top to bottom. When the scope is quite big (for example, you are mapping a large enterprise), map the parts of the org structure that are less relevant to the analysis with less detail, and vice versa.
5. To help with navigation, label all stakeholders.

6. Denote future parts of the organizations (ones that are missing at the moment but are important to be considered for potential impact).
7. Draw a border around the areas that are affected by the change/initiative or are in the focus of the analysis.
8. Your whiteboard map could now look something like these:

Drawing considerations:

- Avoid using prepared artifacts like your company's official org chart. Create on-the-go with full engagement of the group.
- Draw people. Draw a person as a circle and the upside down letter 'U'. A group of people could be just three persons put close to each other; avoid drawing departments and teams as boxes.
- Many organizations are matrices of different kinds. Introducing an extra dimension might create visual clutter. Try to avoid that by either using a different style of a line (dotted or dashed lines) or a different color for a weaker organizational component.

Step 2: Add insight

1. Begin a group discussion with the goal of mapping stakeholder disposition and level of support regarding your initiative.
2. Discuss each stakeholder one-by-one, try to uncover:
    1. Disposition towards the initiative: are they for, neutral or against? To what degree? Why?
    2. Level of impact: how much influence will this stakeholder have? High, medium or low?
    3. Relationship strength between stakeholders: who do they influence? who influences them? To what degree?
    4. Participation energy level: high, medium or low?
    5. If you are having difficulty dispositioning a particular stakeholder, move to the next one. Additional conversation may help you get unstuck and you can circle back to the troublemaker.
3. As you near consensus, draw your findings using tokens or icons. Discover what works best for you, some examples:
    1. A green smiley face for a supportive stakeholder
    2. A battery with one out of three bars charged for a low-energy stakeholder
    3. A cloud overhead signals a confused stakeholder

Use tokens and text to label different dimensions of stakeholder dynamics

Strategy

Org charts are quite unambiguous and offer little room for opinion. This exercise's value comes from mapping less obvious things like stakeholder influence, disposition and decision making

power in relation to the initiative. Defined structures are rarely challenged but a necessary foundation. What is interesting is something that lies beyond the official org chart – people's attitude to the topic of discussion, their real power and influence. Players will share their opinions openly — and surprisingly!–in a safe, structured and collaborative setting.

Difference between UI Design and UX Design below:

UX Design	UI Design
Focuses on the holistic experience of the user	Focuses on the specific visual touchpoints of the user
Centers on strategy, structure and interaction design	Centers on surface-level aspects of design, including visuals
Involves studying the user's journey and designing information architecture	Involves designing the tangible elements of the experience such as visual style, e.g., color palettes, typography and layout
Outputs include personas, user journey maps, wireframes, prototypes	Outputs include mockups, high-fidelity layouts, animations and imagery

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