

Introduction:-

Design thinking has become an integral part of corporate strategy and planning these days.

This Course is meant for designers, engineers, planners, managers, strategists, economists, teachers & many other professions.

This designed framework will be useful for anyone who works in an industry that deals with addressing the needs of customers or works for external clients.

It will be helpful for the professionals from diverse spheres of profession to find innovative solutions to the problems that they or their departments are facing.

Introduction to elements & principles of Design

The Elements of Design :- (Materials) ^(or) Building blocks

The elements of design are the materials that define the visuals, the tools & components that a person uses to create a composition. (or) art

In other words they represent the base of graphic design.

The principles of design :- (Methods/Techniques)

on the other hand, the principles of design are all about the methods/techniques, that a person

adopted for the graphic elements to create a display ^{an effective/ attractive} and convey a message.

The elements of design are discussed as follows:-

1. Dot
2. Line
3. Form (3D)
4. Shape.
5. Size
6. Space
7. Value
8. Texture
9. Color

1. Dot:- Dot is most important element of a graphic design.

→ The images, films are all represented by a combination of dots of different colors

2. Line:- The distance b/w two points












(or).
Lines are combination of dots

function of lines:- Lines are mainly used for.

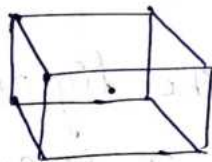
1. Division.
2. Direction.

• Eg:- Newspaper.

Types of lines:- Lines are of various types.

1. Straight 
2. Curve 
3. Irregular 
4. Dotted 
5. parallel & perpendicular 
6. waveline 
7. Zigzag 
8. Spiral 
9. Horizontal 
10. Vertical 
11. Diagonal 

3. Form :- The 3D element is known as Form.



4. Shape :- shape is the very important element of design.

→ It is a combination of lines

→ when some actual or implied lines combine & surround an area then a shape is created.

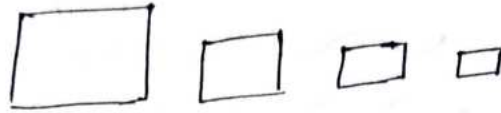
Shapes are of 2D & 3D. types - 1. Geometric

Eg:- Circle, Δ , \square , \square

2. Organic

3. Abstract (combination of Geometric & organic)

5. Size:- Variation (or) Comparison b/w two or more objects (or) shapes is called size.



6. The function of size in designing is

1. Attraction.
2. organises elements
3. Justifies functions

6. Space:- Space is an empty or open area b/w around, above, below or within the objects.

7. Value:- Value is the lightness or darkness of any object, area or color.

8. Texture:- The feeling of any surface is referred as texture such as rough, smooth, silky.

The texture are of 2 types. 1. Pattern Texture
2. Image Texture

Eg: Grass, Sand flowers → organic textures.

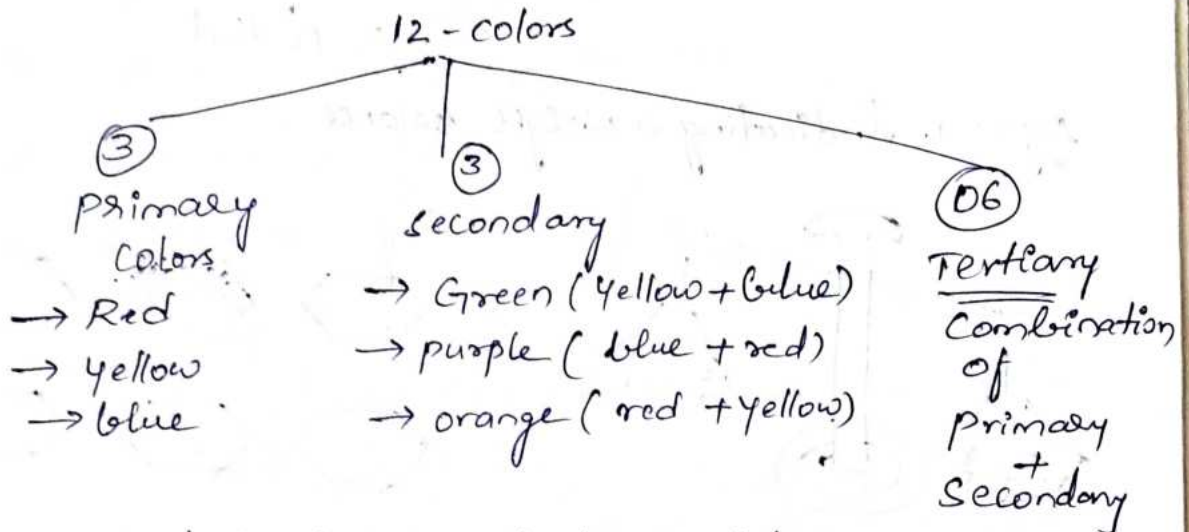
Cement, tyre, bricks → Non-organic textures.

9. Color :- Graphic designing is incomplete without a color.

"color is the sensation of light"

The color wheel is discovered by Newton in 17th century. which have 12 colors known as "Hue".

There are 12 colours in the color wheel



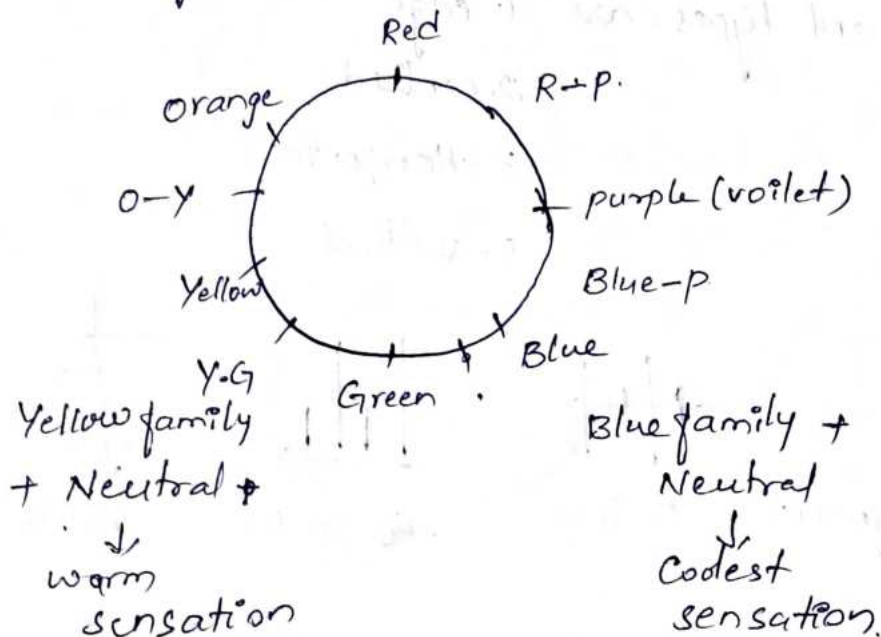
→ Neutral colors → Black & white

→ Warm colors

→ Red
→ Yellow
→ Orange } sunlight

Cool colors

→ Blue
→ Green
→ Purple } plants & water



Principles of Design:-

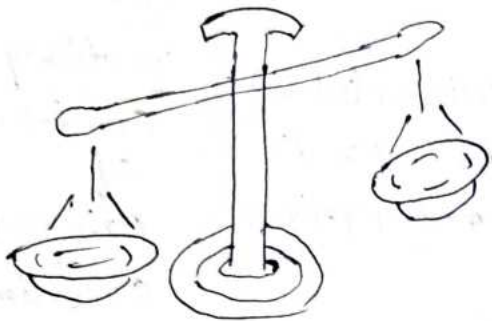
The following are the principles of design explained in detail.

1. Balance:- "Equal distribution of 'Visual Weight'"

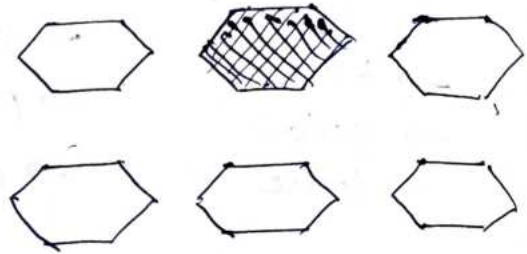
Balance are of three types

1. Symmetrical
2. Asymmetrical
3. Radial.

Eg:- 1. Indicating a weight balance.



2.



2. Alignment:- Arrangement of elements of design within a straight line

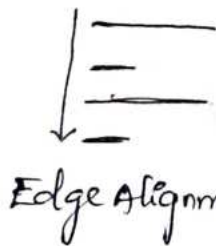
Eg:- Car parking, school Assembly

Alignment types are 1. edge

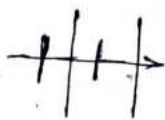
2. centred

3. Horizontal

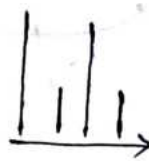
4. Vertical



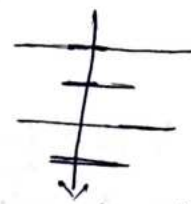
Edge Alignment



Centred



Horizontal



Vertical

3. Repetition:-

using same element in a design, again & again

Eg:- In a book, the page numbers are repeated at a same place, so that it would be easy to navigate the pages.

4. Contrast:-

Arranging ^{opposite} elements together.

Eg:- 1. Dark Vs light

2. large Vs small

3. Rough Vs smooth

Contrast can be classified by size, shape, value, color, direction,

In our daily life, example of contrast is dressing.

5. Emphasis:-

Area or object within the design that draws attention, & becomes a focal point.

Eg:-



Unity:- Arrangement of design elements in such a way that combined together, they give feeling of a whole.

Eg:- The building is an example of unity which will be considered as a whole.

Movement:- Eye travelling.

Pattern:- The regular repetition of design elements results to a pattern.

Eg:- Design patterns are mostly used in decoration.

Rhythm:- Repetition of design elements in a specific pattern with certain gaps or intervals.

Eg:- ECG is a best example of rhythm.

Introduction to Design Thinking:

Design thinking is a process for deliberately creating a product to meet a set of needs.

→ It is an iterative & non-linear process to understand the users requirements, challenges assumptions, redefine problems & create innovative solutions to prototype & test.

→ It encourages organisations to focus on creating best product for which leads to technologically

feasible & economically viable.

Design thinking was developed by Stanford professor 'David Kelley' who is also the founder of the design agency IDEO.

Definition of Design Thinking:-

Design thinking is a human-centric,
iterative,
solution-based,
problem solving framework.

Design thinking is a

1. A problem solving approach: It is a methodology that is ideal for tackling complex problems that are ill-defined or unknown. This is because a design thinking helps us define a problem, challenge any assumptions & thus reframe it in a way that will help us come up with solutions that may potentially solve it.
2. Human centric:- In design thinking, we seek to understand the user. This is why the user - (the person for whom we are designing our product or services) for, is considered at each stage of design thinking process.

Iterative :- This means that in the different stages of design process, you will use the results to review, question and improve any initial assumptions, understandings & outcomes. This makes the design thinking approach a non-linear one.

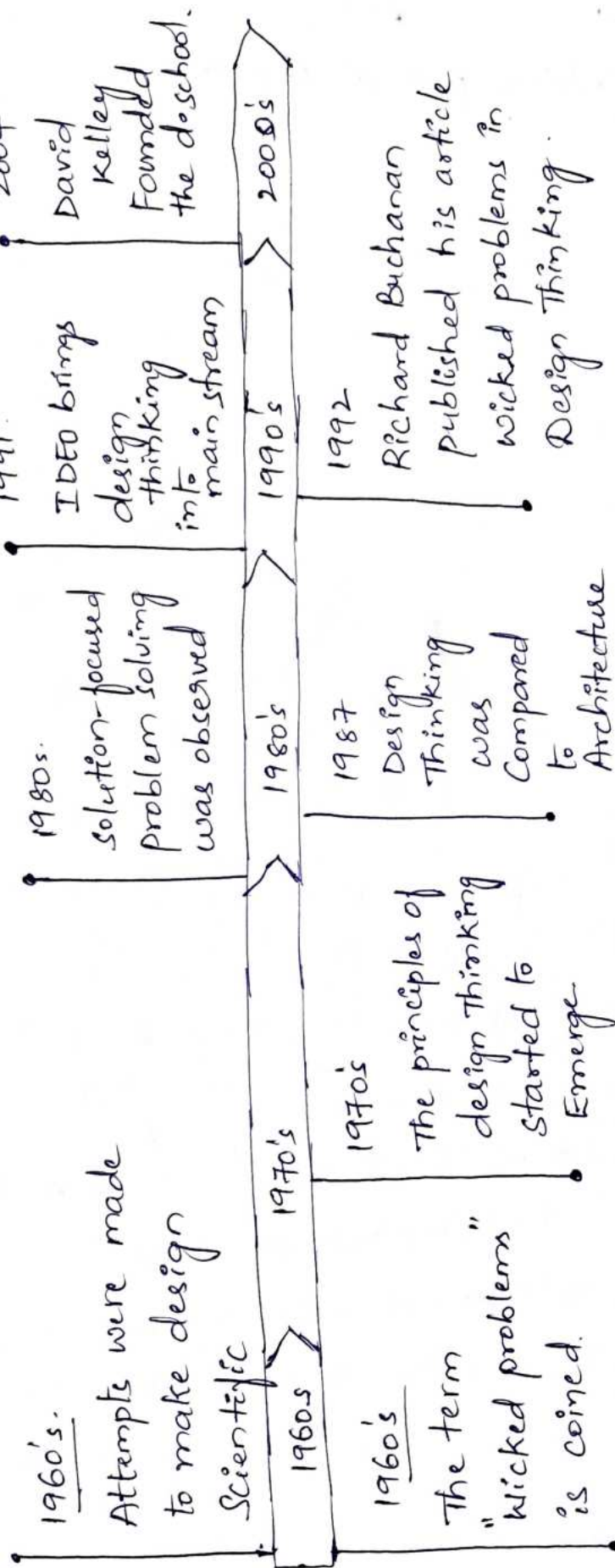
Solution based :- The design thinking process provides a very hands-on approach to problem-solving. You will formulate several potential problem-solving approaches, prototype them & test them in the context of the problem being solved. Due to the iterative nature of design thinking you will be able to re-shape & optimise these approaches until an optimal solution is chosen.

Characteristics of design-thinking :-

1. Better understand the needs of the people (customers, clients, students, users etc).
2. Reduce the risk associated with launching new ideas, products & services.
3. Generates innovative solutions - rather than adding more to existing ones.
4. Helps organisations learn faster.

History of design Thinking.

Design Thinking process timeline.



UNIT-1

Introduction to elements and principles of Design, basics of design-dot, line, shape, form as fundamental design components

The Elements of Design are essentially building blocks that the designer uses to create effects, define and segment spaces, convey emotions or states of being, and/or convey ideas. Line, value, shape, colour, and texture are a few of these in particular. As opposed to this, the Principles of Design are broad ideas and phenomena that come about as a result of the efficient use and manipulation of the aforementioned Design Elements. The following are just a few of these: emphasis, balance, and alignment; contrast; repetition; proportion; movement; harmony; form; depth; etc. Basically, the fundamental parts used to create a design are known as the "elements of design." The components are the instruments that will aid you in creating your design. There are eight components to the design. In contrast, the design principles are the guidelines you should adhere to for the best results. You should take into account each concept throughout their approach to create a fantastic design.

What are the design principles

To make sure a project looks good and provides the right visual experience, designers must abide by the principles of design. Design principles can make whatever you're creating more pleasant to look at in addition to enhancing the composition's or page's aesthetic appeal. For example, concepts like "balance" and "white space" make sure the eye isn't overloaded and becomes visually fatigued. Instead, variety and emphasis help to direct the viewer's focus in the right directions. Although the various design principles we'll discuss below are frequently referred to separately by designers, they typically function as a cohesive whole. To produce a particular effect, each principle or "element" complements, strengthens, and adds to the others.

Terminologies

The given table describes the major terminologies used to define principles of design

Term	Description
Pattern	Pattern are a regular arrangement of elements (shapes, lines, colors) or motifs that are alternated or repeated.
Contrast	The contrasting of various design elements (such as rough and smooth textures, dark and light values, etc.) in order to draw attention to their differences or to establish a focal point.
Emphasis	One component of an artwork is given extra consideration or importance. The use of placement, contrast, color, size, and repetition can all be used to create emphasis. Connects to the focal point.
Balance	When design elements are arranged symmetrically or asymmetrically to give the impression of equal weight or importance, a sense of balance is produced.
Proportion/ Scale	The link between items in terms of their dimensions, numbers, and other factors. comprising the connection between a whole's component pieces.
Harmony	The placement of elements to convey to the observer that the piece's various components work together to create a cohesive whole.
Rhythm/ Movement	Using repeating themes to guide the viewer's eye around the artwork Random, regular, alternating, progressive, and flowing are the five different types of rhythm. The arrangement of the pieces to draw attention to the focal point. For instance, movement can be controlled using shape, color, and edges.

What is the Meaning of Elements of Design

The fundamental components that designers use to construct their designs are known as “design elements.” The parts, the components that can be isolated and defined in any visual design, are the work’s structure, the elements that can be arranged and used as a part of any composition. Regardless of talent, taste, or style, design elements are present and have an impact on how a piece of work is interpreted, executed, and used. In one way or another, everything has a form. Form is not the same as form’s substance when we discuss it. Line, colour, shape, form, value, space, and texture are the primary elements. If you have a firm understanding of these concepts, you can comprehend design elements and others that may appear. It will be possible to examine a design in detail and learn about the creative process.

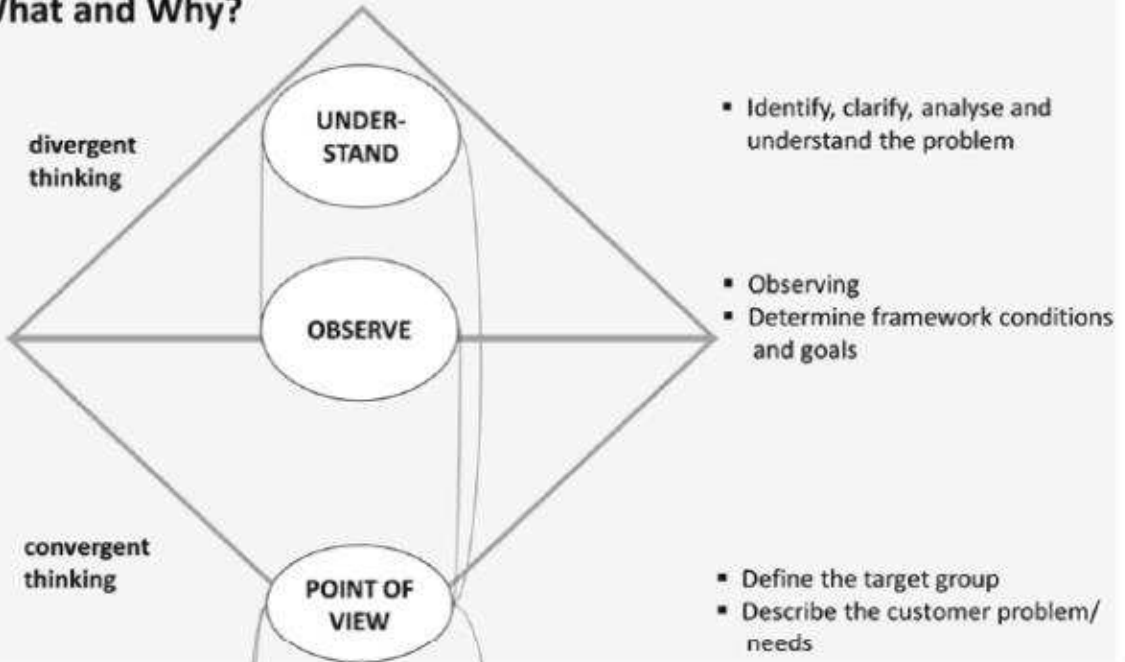
Terminologies

The given table illustrates the major terms used to define the elements of design

Term	Description
Line	Vertical, horizontal, and diagonal angular, dotted, fractured, straight hefty, thin
Shape	Two-dimensional and flat Geometric (square, circle, oval, triangle) (square, circle, oval, triangle) Organic (all other shapes) (all other shapes)
Form	3D (three dimensional) (three dimensional) Geometric (cube, sphere, cone) (cube, sphere, cone) Organic (all other forms such as: people, animals, tables, chairs, etc.) (all other forms such as: people, animals, tables, chairs, etc.)
Colour	Relates to the light’s wavelengths refers to the names of hue, value (lightness/darkness), intensity (amount of pigment saturated), and temperature (warm and cool) relates to shade, tone, and tint
Texture	The way a surface feels, looks, is thick, or is sticky (for example: smooth, rough, silky, furry)
Space	The region surrounding, enclosing, or separating images or portions of images has to do with perspective Positivity and opacity

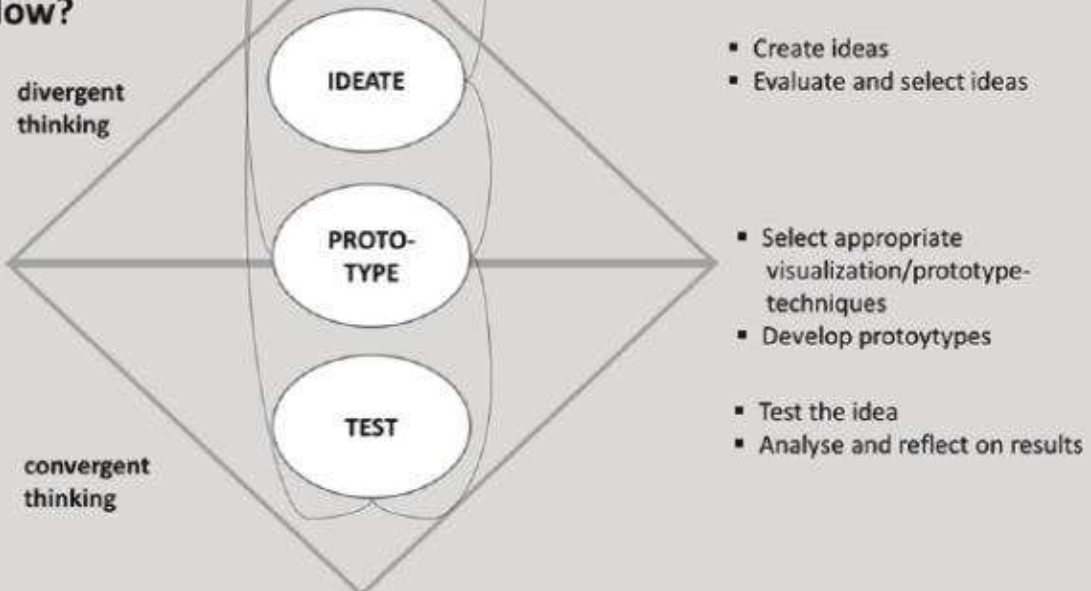
problem space

➤ What and Why?



solution space

➤ How?



Principles of Design

The principles of design are the rules you must follow to create an effective and attractive design composition. The fundamental principles of design are: Emphasis, Balance and Alignment, Contrast, Repetition, Proportion, Movement and White Space.

Design differs from art in that it has to have a purpose. Visually, this functionality is interpreted by making sure an image has a center of attention, a point of focus. Maybe you're thinking, 'But wait! I thought design was all about creativity?' If you're a business owner, marketer or designer who's just starting out, you might be tempted to go wild and combine the first five typefaces and colors that catch your eye, believing you're creating something fresh and new. You will probably find yourself with a design that is muddled, unfinished, or well, just plain ugly.

Graphic design, like any discipline, adheres to strict rules that work beneath the surface to make the work stable and balanced. If the design is missing that balance, it will be weak and ineffective.

- Emphasis
- Balance and alignment
- Contrast
- Repetition
- Proportion
- Movement
- White space

1. Emphasis

The first of the 7 design principles is emphasis, referring to the focal point of a design and the order of importance of each element within a design. Say you're creating a poster for a concert. You should ask yourself: what is the first piece of information my audience needs to know? Is it the band? Or the concert venue? What about the day and the cost of attending?

Make a mental outline. Let your brain organize the information and then lay out your design in a way that communicates that order. If the band's name is the most essential information, place it in the center or make it the biggest element on the poster. Or you could put it in the strongest, boldest type. Learn about color theory and use strong color combinations to make the band name pop.

2. Balance and alignment

Never forget that every element you place on a page has a weight. The weight can come from color, size, or texture. Just like you wouldn't put all your furniture in one corner of a room, you can't crowd all your heavy elements in one area of your composition. Without balance, your audience will feel as if their eye is sliding off the page.

Symmetrical design creates balance through equally weighted elements aligned on either side of a center line. On the other hand, asymmetrical design uses opposite weights (like contrasting one large element with several smaller elements) to create a composition that is not even, but still has equilibrium.

3. Contrast

Contrast is what people mean when they say a design "pops." It comes away from the page and sticks in your memory. Contrast creates space and difference between elements in your design. Your background needs to be significantly different from the color of your elements so they work harmoniously together and are readable.

If you plan to work with type, understanding contrast is incredibly essential because it means the weight and size of your type are balanced. How will your audience know what is most important if everything is in bold?

As you seek out examples of really strong, effective design, you'll notice most designs only feature one or two typefaces. That's because contrast can be effectively achieved with two strong fonts (or even one strong typeface in different weights). As you add fonts, you dilute and confuse the purpose of your design.

4. Repetition

If you limit yourself to two strong typefaces or three strong colors, you'll soon find you'll have to repeat some things. That's ok! It's often said that repetition unifies and strengthens a design. If only one thing on your band poster is in blue italic sans-serif, it can read like an error. If three things are in blue italic sans-serif, you've created a motif and are back in control of your design.

Repetition can be important beyond one printed product. Anyone thinking about a startup knows one of the first things you need is a strong logo to feature on your website, business cards, social media and more. Brand identity? Another term for repetition.

5. Proportion

Proportion is the visual size and weight of elements in a composition and how they relate to each other. It often helps to approach your design in sections, instead of as a whole.

Grouping related items can give them importance at a smaller size—think of a box at the bottom of your poster for ticket information or a sidebar on a website for a search bar. Proportion can be achieved only if all elements of your design are well-sized and thoughtfully placed. Once you master alignment, balance, and contrast, proportion should emerge organically.

6. Movement

Going back to our concert poster. If you decided the band was the most important piece of information on the page and the venue was the second, how would you communicate that with your audience?

Movement is controlling the elements in a composition so that the eye is led to move from one to the next and the information is properly communicated to your audience. Movement creates the story or the narrative of your work: a band is playing, it's at this location, it's at this time, here's how you get tickets. The elements above—especially balance, alignment, and contrast—will work towards that goal, but without proper movement, your design will be DOA.

If you look at your design and feel your eye get “stuck” anywhere on it—an element is too big, too bold, slightly off-center, not a complimentary color—go back and adjust until everything is in harmony.

7. White space

All of the other principles of design deal with what you add to your design. White space (or negative space) is the only one that specifically deals with what you *don't* add. White space is exactly that—the empty page around the elements in your composition. For beginning designers it can be a perilous zone. Often simply giving a composition more room to breathe can upgrade it from mediocre to successful.

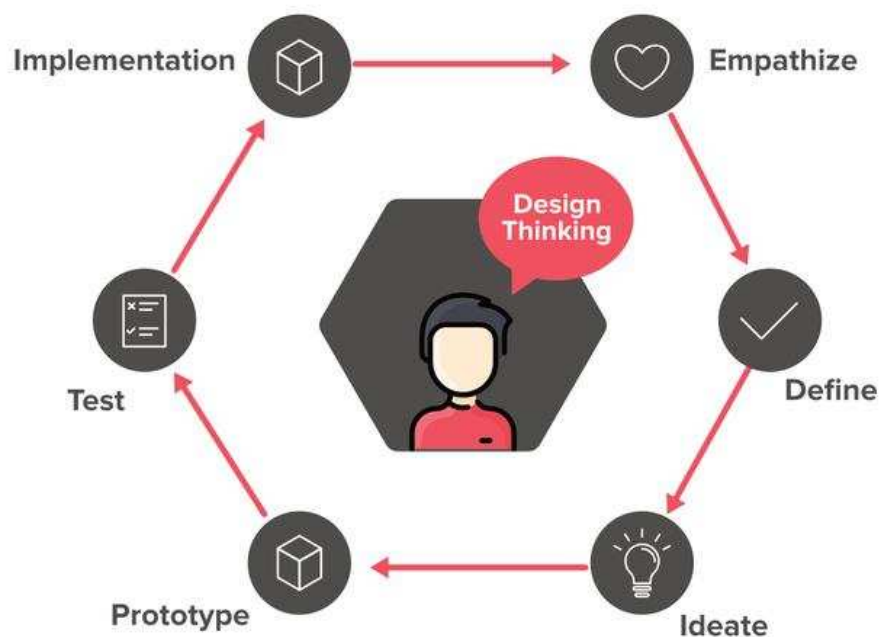
White space isn't sitting there doing nothing—it's creating hierarchy and organization. Our brains naturally associate ample white space around an element with importance and luxury. It's telling our eyes that objects in one region are grouped separately from objects elsewhere.

Even more exciting, it can communicate an entirely different image or idea from your main design that will reward your audience for engaging with it. The logo above uses active negative space to communicate multiple ideas in one fun, creative design.

Introduction to design thinking

Design Thinking is a methodology basically used for Problem Solving. It concentrates on the human point of view and the customer's usage area. The Design Thinking approach specially used in business, marketing, and design fields. The main motive of the methodology is to take the User into consideration initially and then take the remaining considerations. This is done only by finding needs, creating a solution for a product that is really helpful.

Design Thinking Concept is Divided into 6 Phases as Shown:



1. Empathize: This phase is basically the Information Gathering phase. Business-related information gathered by searching and understanding the customer's views. It is done by interviews, group discussions, and most of the observations. Along with this the questions related to What, How, Why take into consideration.

2. Define: In this phase, we focus on the collection and classification of the information from the empathize phase. The information gets categorized according to ideal customers, their problems, the solution to their problems and needs, and fears of users that we have to consider.

3. Ideate: In this phase, we give an optimized and real-time solution to the problems. No irrespective and illogical thinking accepted. These solutions are raised by Sketching and Prototyping.

4. Prototype: In the prototyping phase, the basic implementation of the design thinking solution is used to verify the solution in real life. During prototyping it finally takes our idea in real life. The prototype must be less expensive and the very first version of the ideal solution.

5. Test: After the above phases finally, it is time to verify the product in real life. Customers are able to use it and give feedback for their personal experience. Also, the designer can ask questions on how to improve such products for better usage.

6. Implementation: This is a final phase of design thinking where all collected information gets converted into the final product. The implementation phase takes about a month to develop our new system. Both frontend and backend developers work to implement the requirements.

Design Thinking is Helpful in Many Areas:

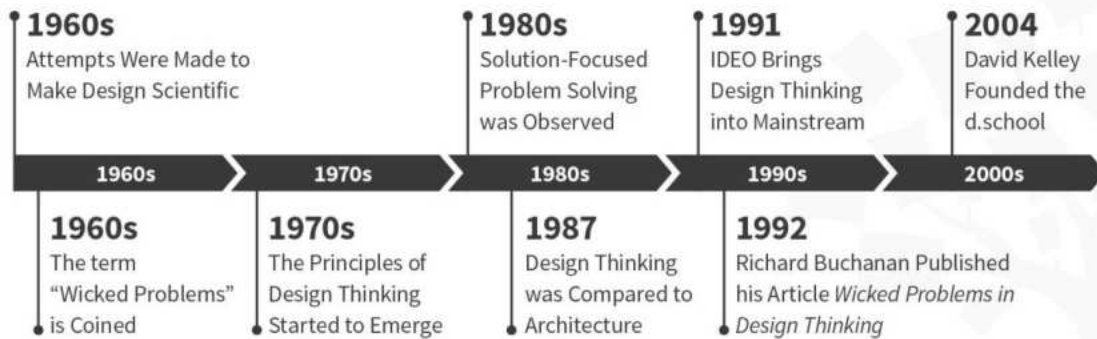
- It is used in project management, it is used to define the scope and architecture of the project.
- It is used for business management. It used to focus on the features which have more value in the actual world.
- It helps to allocate the goal so that we can go towards the exact direction with more 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.

History of Design Thinking:

It's virtually impossible to list all of the influential factors that led to the contemporary understanding of design theory, process and practice. Business analysts, engineers, scientists and creative individuals have studied the methods and processes behind innovation for decades. **Early glimpses of design thinking date back to the 1950s and 1960s**, although these references were more within the context of architecture and engineering — fields which struggled to grapple with the rapidly changing environment of that era.

World War II did have a profound effect on strategic thinking, however, and we have looked for new ways to solve complex problems ever since. In fact, we can say this huge world event fundamentally changed the way we apply ourselves to management, production and [industrial design](#) in the modern world. Let's take a look at the history of design thinking, decade by decade, and see how the story unfolds from this point onwards.

Design Thinking Process Timeline



INTERACTION DESIGN
FOUNDATION

interaction-design.org

The 1960s: Attempts Were Made to Make Design Scientific

In the '60s, people applied scientific methodology and processes in an attempt to understand every aspect of design.

The struggle continued throughout the decade as further attempts were made to bring the field within the objective of rational sciences and, ultimately, make design *scientific*.

The term "Wicked Problems" is Coined

In the mid-1960s, Horst Rittel wrote and spoke extensively on the subject of problem-solving in design... so much so that he's known as the design theorist who coined the term "wicked problem" to describe problems which are multidimensional and extremely complex.

The 1970s: The Principles of Design Thinking Started to Emerge

Cognitive scientist and Nobel Prize laureate **Herbert A. Simon** was the first to mention design as a way of thinking in his 1969 book, *The Sciences of the Artificial*. He then went on to contribute many ideas throughout the 1970s which are now regarded as principles of design thinking.

The 1980s: Solution-Focused Problem-Solving was Observed

Bryan Lawson, Emeritus Professor at the School of Architecture, University of Sheffield, UK, also discussed the insights he'd gathered from a series of interesting tests. The main goal of the tests was to compare the methods used by scientists and architects when they attempted to solve the same ambiguous problem.

1987: Design Thinking was Compared to Architecture Once Again

Peter Rowe, then Director of Urban Design Programs at Harvard, published his book *Design Thinking* in 1987. It focuses on the way architectural designers approach their tasks through an inquisitive lens.

The 1990s to the Present

1991

It is widely accepted that IDEO is one of the companies that brought design thinking into the mainstream. They developed their own customer-friendly terminology, steps and toolkits over the years, and made the process more [accessible](#) to those not schooled in design methodology.

1992

Richard Buchanan, then Head of Design at Carnegie Mellon University, published his article “Wicked Problems in Design Thinking”, which discussed the origins of design thinking.

2004

David Kelley founded the Hasso Plattner Institute of Design at Stanford—commonly known as the d.school. The d.school has made the development, teaching and implementation of design thinking one of its central goals since inception, and it serves as a source of huge inspiration to design thinkers across the world, including us here at the Interaction Design Foundation.

Present Day

At present, the **design thinking movement is rapidly gaining ground**—with pioneers like IDEO and the d.school paving out a path for others to follow. Other prestigious universities, business schools and forward-thinking companies have adopted the design thinking methodology

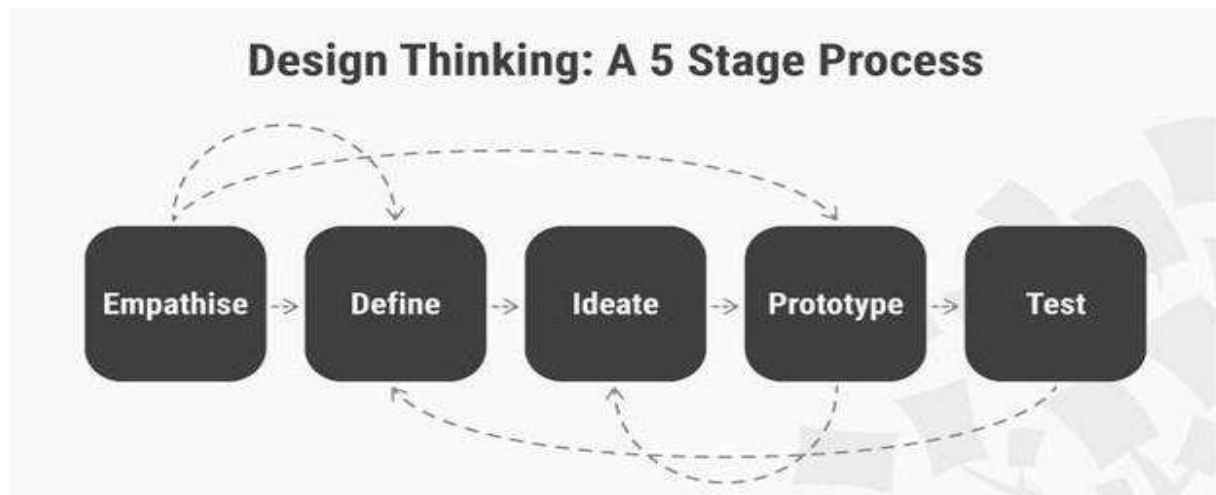
UNIT-II

Design thinking process:

Introduction:

Design Thinking is a design methodology that provides a solution-based approach to solving problems. It's extremely useful in tackling complex problems that are ill-defined or unknown, by understanding the human needs involved, by re-framing the problem in human-centric ways, by creating many ideas in brainstorming sessions, and by adopting a hands-on approach in prototyping and testing. Understanding these five stages of Design Thinking will empower anyone to apply the Design Thinking methods in order to solve complex problems that occur around us — in our companies, in our countries, and even on the scale of our planet.

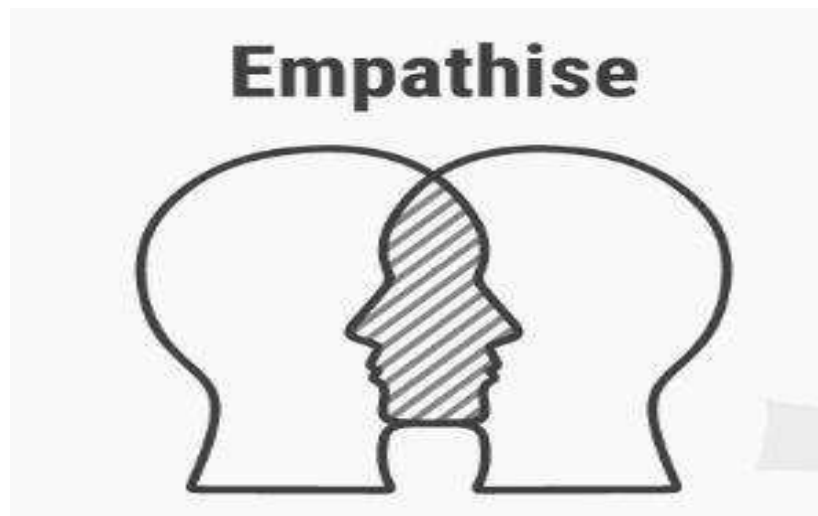
We will focus on the five-stage Design Thinking model proposed by the Hasso-Plattner Institute of Design at Stanford (d.school). d.school is the leading university when it comes to teaching Design Thinking. The five stages of Design Thinking, according to d.school, are as follows: Empathise, Define (the problem), Ideate, Prototype, and Test. Let's take a closer look at the five different stages of Design Thinking.



1. Empathise

The first stage of the Design Thinking process is to gain an empathic understanding of the problem you are trying to solve. This involves consulting experts to find out more about the area of concern through observing, engaging and empathizing with people to understand their experiences and motivations, as well as immersing yourself in the physical environment so you can gain a deeper personal understanding of the issues involved. Empathy is crucial to a human-centered design process such as Design Thinking, and empathy allows design thinkers to set aside their own assumptions about the world in order to gain insight into users and their needs.

Depending on time constraints, a substantial amount of information is gathered at this stage to use during the next stage and to develop the best possible understanding of the users, their needs, and the problems that underlie the development of that particular product.

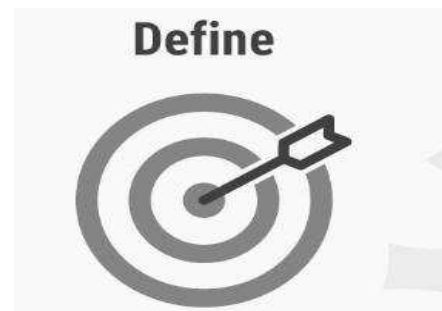


1. Define (the Problem)

During the Define stage, you put together the information you have created and gathered during the Empathise stage. This is where you will analyse your observations and synthesise them in order to define the core problems that you and your team have identified up to this point. You should seek to define the problem as a problem statement in a human-centred manner.

To illustrate, instead of defining the problem as your own wish or a need of the company such as, -We need to increase our food-product market share among young teenage girls by 5%, a much better way to define the problem would be, -Teenage girls need to eat nutritious food in order to thrive, be healthy and grow.

The Define stage will help the designers in your team gather great ideas to establish features, functions, and any other elements that will allow them to solve the problems or, at the very least, allow users to resolve issues themselves with the minimum of difficulty. In the Define stage you will start to progress to the third stage, Ideate, by asking questions which can help you look for ideas for solutions by asking: -How might we... encourage teenage girls to perform an action that benefits them and also involves your company's food-product or service?



2. Ideate

During the third stage of the Design Thinking process, designers are ready to start generating ideas. You've grown to understand your users and their needs in the Empathise stage, and you've analysed and synthesised your observations in the Define stage, and ended up with a human-centered problem statement. With this solid background, you and your team members can start to "think outside the box" to identify new solutions to the problem statement you've created, and you can start to look for alternative ways of viewing the problem.

There are hundreds of Ideation techniques such as Brainstorm, Brainwrite, Worst Possible Idea, and SCAMPER. Brainstorm and Worst Possible Idea sessions are typically used to stimulate free thinking and to expand the problem space.

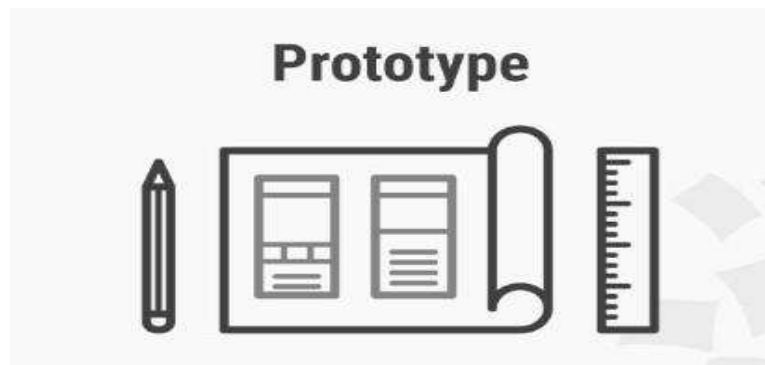
It is important to get as many ideas or problem solutions as possible at the beginning of the Ideation phase. You should pick some other Ideation techniques by the end of the Ideation phase to help you investigate and test your ideas so you can find the best way to either solve a problem or provide the elements required to circumvent it.



3. Prototype

The design team will now produce a number of inexpensive, scaled down versions of the product or specific features found within the product, so they can investigate the problem solutions generated in the previous stage. Prototypes may be shared and tested within the team itself, in other departments, or on a small group of people outside the design team. This is an experimental phase, and the aim is to identify the best possible solution for each of the problems identified during the first three stages.

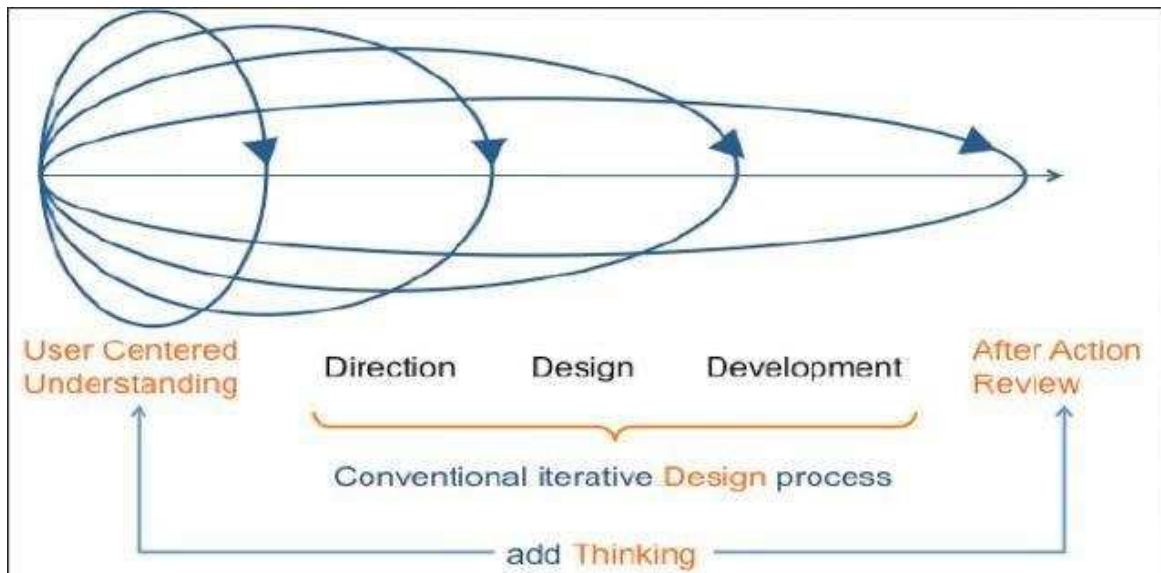
The solutions are implemented within the prototypes, and, one by one, they are investigated and either accepted, improved and re-examined, or rejected on the basis of the users' experiences. By the end of this stage, the design team will have a better idea of the constraints inherent to the product and the problems that are present, and have a clearer view of how real users would behave, think, and feel when interacting with the end product.



What makes up the design thinking process to help innovators?

Managing New Product Development (NPD) can be a daunting challenge and so it is critical to focus on what is important. Design thinking becomes a highly useful and effective collaborative strategy to identify and solve problems creatively. As it is a non-linear, iterative approach that focuses on user needs, articulating frameworks, and formulating a strategy its constantly addressing the direction, design, and development and encourages a -fast acting-learning cycle.

Recognizing that the direction, design, and development needs are constantly looping back to validate against the user needs is central to design thinking. The earlier you involve design thinkers, and specifically in contributing to any product brief, the more you can provide valuable support in the NPD process.



A series of excellent posts by Peterson, such as -Design Thinking - What Is It in Practice,|| Or -How to Manage Innovation With Design Thinking,|| raise the importance of the value of design thinking within the innovation development process.

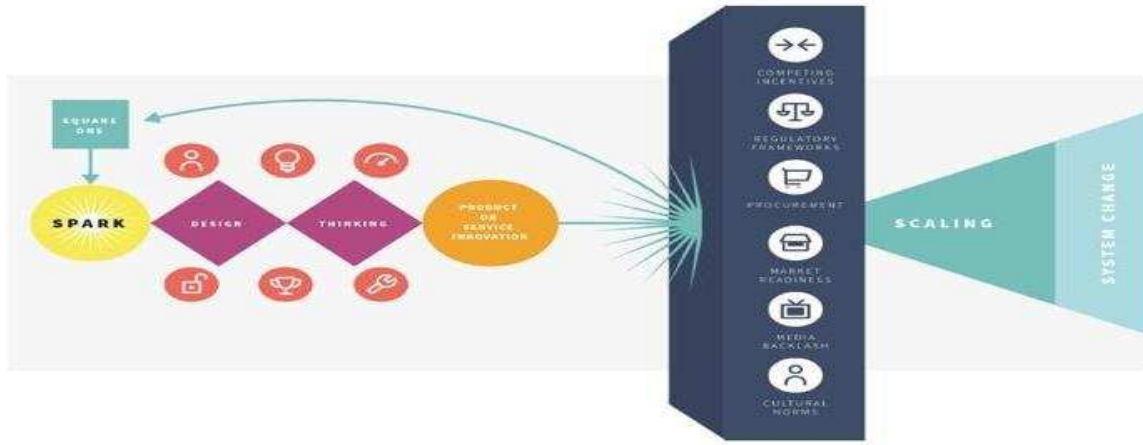
The value of design thinking hinges on how involved it becomes within any new development thinking

Establishing an inspirational design brief early on can help guide the process. Having part of any brief include the design strategy can assist in facilitating innovation strategy, diagnosis, formulation, and implementation.

Design thinking does have its limitations applied to innovation work.

Design thinking's primary use, to date, has been in developing incremental innovation or help resolve specific problems or challenges. There are often recognized needs established or can be quickly found out, but if the requirement has a more open brief then design thinking needs to shift from a tactical part to play into a more strategically designed one, where problem definition, placing it in the appropriate context sometimes becomes as complex to understand as the thinking that goes into achieving the potential solutions. There can be a lot of 'push back' if the problem has not been fully framed, as the solution might only have many unintended consequences.

Figure 6: The system immune response



22. Ibid.
From Design Thinking to System Change

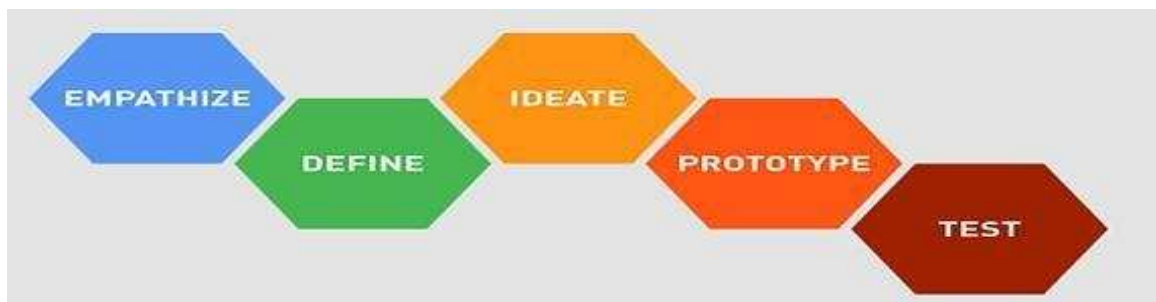
The critical point is that design thinking is human-centered

It stands in service of creating positive outcomes for people, then its value is through a series of activities to inspire the essential elements of creativity, to be able to take an abstract idea and create something with it. It helps you to actualize your concepts and results, to drive increased adoption, help design the behavioral change and ease in ongoing use. So, it becomes the tool to engage with people, find the purpose that 'it' is meaningful and as a result, it should generate positive cash flow. Value, meaning, and profit.

The five phases of design thinking, according to d.school, are as follows:

- Empathize – with your users
- Define – your users' needs, their problem, and your insights
- Ideate – by challenging assumptions and creating ideas for innovative solutions
- Prototype – to [start creating solutions](#)
- Test – solutions

It is important to note that the five phases, stages, or modes are not always sequential.



Design thinking with services in mind

Design thinking is not just for products; it can help across services, and in designing new business models. As we combine product and service far more then design thinking is focusing

even further on meeting the user's and customer's needs for that service. Service design needs to feed into creating those great customer experiences.

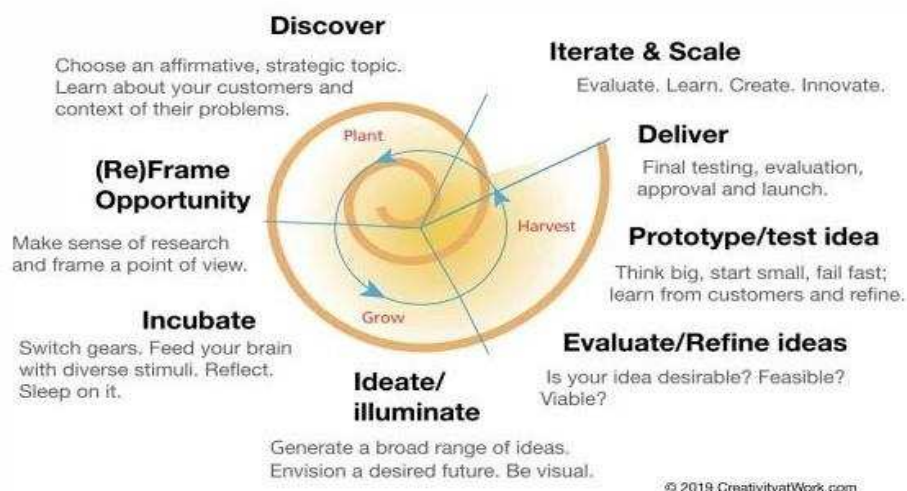
Today many organizations, capitalizing on technology are looking to build a comprehensive customer journey map, covering all the touch-points that a customer has with the organization. Each of these becomes a potential engagement point, but so often organizations struggle as they lack a complete understanding.

Design thinking can help and become as valuable to be part of any process, organizational information, and technology (re-)design. One of its critical roles to play is to keep the organization clear it is not internal design needs; it is customer needs as central. Often customer journey understandings become component-by-component built by the specific team engaged in that touch-point (customer service, spare or replacement part, billing) but the total delivery of any service-oriented solution needs a holistic approach, and design thinking can greatly help in this.

Service design tends to have a higher planning and organizing level. The focus is on understanding infrastructure, communications, and material components increases. The service design has a higher -quality, time, and interaction emphasis for the response outcomes.

A constant questioning with any design thinking process revolves around -is it useful, usable, desirable, efficient, and effective? The more you involve the customer, the more you design the solutions to match these requirements.

Frame work of Design Thinking:



1. Discovery

Choose a strategic topic to focus on and learn about. Design thinking starts with an end goal, a desired future, and approaches to how you can make it happen. The topic should be one you find compelling and motivating. Research your topic for insights. What do you need to understand? What are the opportunities embedded in problems? Ask -why? questions to dig deeper.

Leverage stories to discover insights. What stories are your customers telling about their experiences? What are the hopes, fears, and goals that motivate them? What insights can you draw from their problems and aspirations?

2. Frame and reframe

Framing the right problem is the only way to create the right solution. Make sense of research by seeing patterns, themes, and larger relationships between the pieces of information. Uncover customer insights to reframe problem areas into opportunities.

3. Incubate

Creativity comes from a blend of individual and group ideation. Give people time to reflect on ideas and incubate on their own before running a group ideation session.

4. Ideate

Now that you have some deep insights about your customers or users, generate ideas for offerings that will deliver value to your customers. Build on ideas by asking -What else? The goal is to push beyond the obvious and generate a set of really good options for consideration.

5. Decide

Display your ideas on a wall and look for ideas that have "wow" power. This will save you from draining everyone's energy by [debating every single idea](#). Vote for the best options based on criteria such as desirability, technical feasibility, and business viability. The team can then choose one to three ideas to prototype and test.

6. Prototype

Combine, expand, and refine ideas in the form of rough models or sketches. Invite users to test out and respond to your prototype. How do they feel about your ideas? What feedback do they have? Their responses will inform whether you move forward or kill your idea before investing additional resources.

7. Deliver

The prototypes you have tested, built and launched will have a better chance of succeeding in the marketplace.

8. Iterate

Design is not a linear. It is an iterative process. Use feedback to improve on your ideas and keep iterating until there is nothing more to add or subtract.

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Distinctions Between Design and Design Thinking:

Steve Jobs famously said, –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.¶5

Tim Brown, CEO of IDEO, the design company that popularised the term design thinking, says –Design thinking can be described as a discipline that uses the designer's sensibility and methods to match people's needs with what is technologically feasible and what a viable business strategy can convert into customer value and market opportunity.¶6

Thinking like a designer brings together what is desirable from a human point of view with what is technologically feasible and economically viable. It also allows people who aren't trained as designers to use creative tools to address a vast range of challenges.

Design thinking draws on logic, imagination, intuition and systemic reasoning to explore the possibilities of what could be and to create desired outcomes that benefit the end user (the customer).

Design thinking is our best tool for sense-making, meaning making, simplifying processes, and improving customer experiences. Additionally, design thinking minimises risk, reduces costs, improves speed, and energises employees. Design thinking provides leaders with a framework for addressing complex human-centred challenges and making the best possible decisions concerning:

- Redefining value
- Re-inventing business models
- Shifting markets and behaviours
- Organisational culture change
- Complex societal challenges such as health, education, food, water and climate change

Problems affecting diverse stakeholders and multiple systems

Implementing the process in driving inventions

Implementing a process to drive innovation involves creating a structured framework that encourages the generation, development, and implementation of creative ideas. Here's a step-by-step guide to implementing an innovation process within an organization:

1. Establish a Culture of Innovation:

- Foster an environment that values creativity, experimentation, and risk-taking. Encourage open communication, diverse perspectives, and a willingness to challenge the status quo.

2. Define Clear Objectives and Goals:

- Determine the specific areas or aspects of the organization where innovation is most needed. Clearly articulate the goals and outcomes you hope to achieve through the innovation process.

3. Identify Innovation Champions:

- Appoint individuals or teams responsible for driving the innovation process. These champions should be passionate about innovation and have the skills to facilitate creative thinking.

4. Understand Customer Needs and Market Trends:

- Conduct market research and engage with customers to understand their pain points, preferences, and emerging trends. This insight will guide the direction of your innovation efforts.

5. Idea Generation:

- Encourage employees at all levels to contribute ideas. Provide platforms for brainstorming sessions, idea contests, suggestion boxes, and collaborative workshops. Emphasize diversity of thought.

6. Idea Evaluation and Prioritization:

- Establish criteria for evaluating and prioritizing ideas. Consider factors such as feasibility, market potential, alignment with organizational goals, and resource requirements.

7. Prototype and Testing:

- Develop prototypes or proofs of concept for selected ideas. This allows for practical testing and refinement before full-scale implementation.

8. Allocate Resources:

- Provide the necessary resources, including funding, time, and expertise, to support the development and implementation of innovative ideas.

9. Create Cross-Functional Teams:

- Form multidisciplinary teams that bring together individuals with diverse skills and expertise. This promotes a holistic approach to problem-solving and innovation.

10. Encourage Collaboration and Knowledge Sharing:

- Foster a collaborative work environment where employees freely exchange ideas and insights. Use platforms like intranets, team meetings, and collaboration tools to facilitate communication.

11. Pilot Projects:

- Test innovations on a small scale before full-scale implementation. This allows for adjustments based on real-world feedback and minimizes potential risks.

12. Measure and Evaluate Progress:

- Establish key performance indicators (KPIs) to track the impact of innovations. Monitor progress towards achieving the defined objectives and make adjustments as needed.

13. Celebrate Success and Learn from Failures:

- Recognize and celebrate successful innovations to reinforce a culture of creativity. Additionally, view failures as learning opportunities and use them to refine future innovation efforts.

14. Feedback and Iteration:

- Solicit feedback from stakeholders, including employees, customers, and partners. Use this feedback to refine and improve the innovation process for ongoing success.

15. Institutionalize Innovation:

- Integrate innovation into the organization's core values, strategic plans, and day-to-day operations. Ensure that it becomes a natural part of how the organization operates.

Design thinking in social innovations:

1. Empathy and co-creation

2. Systems thinking and impact measurement

3. Diversity and inclusion

4. Ethics and responsibility

5. Learning and adaptation

1. Empathy and co-creation

One of the key principles of design thinking is empathy, which means understanding the needs, emotions, and perspectives of the users and stakeholders. Empathy helps to identify the root causes of the problem and the opportunities for improvement. Co-creation is another important aspect of design thinking, which means involving the users and stakeholders in the design process and empowering them to contribute their ideas, feedback, and insights. Co-creation fosters trust, ownership, and participation, and leads to more relevant and sustainable solutions.

2. Systems thinking and impact measurement

Another trend in design thinking for social innovation is systems thinking, which means looking at the problem and the solution in the context of the larger system and the interrelated factors that influence it. Systems thinking helps to avoid unintended consequences, identify leverage points, and create systemic change. Impact measurement is also crucial for design thinking for social innovation, as it helps to evaluate the effectiveness, efficiency, and scalability of the solution, and to learn from the results and improve the design. Impact measurement can be done using various methods and tools, such as logic models, theory of change, indicators, surveys, interviews, and stories.

3. Diversity and inclusion

A challenge for design thinking for social innovation is diversity and inclusion, which means ensuring that the design process and the solution are respectful, accessible, and beneficial for all the users and stakeholders, especially those who are marginalized, excluded, or vulnerable. Diversity and inclusion require awareness, sensitivity, and action, and can be fostered by engaging diverse voices, perspectives, and experiences, addressing biases and stereotypes, and designing for equity and justice.

4. Ethics and responsibility

Another challenge for design thinking for social innovation is ethics and responsibility, which means considering the ethical implications, risks, and trade-offs of the problem and the solution, and taking responsibility for the impact and consequences of the design. Ethics and responsibility require reflection, dialogue, and accountability, and can be guided by ethical principles, frameworks, and codes of conduct, such as human rights, social justice, and sustainability.

Tools of design thinking - person, customer, journey map, brainstorming, product development

Journey Maps

In recent years [empathy maps](#) and [journey maps](#) have gained popularity due to the fact they are an upgrade and extension of [personas](#). Personas are too empathy maps, what the internet is to our intellect. We have a base set of knowledge that we can store by default, but with the advent of the internet — and smartphones — we now treat the internet as a more detailed extension of our intellect. We may not know the exact answer, but we know how to find it, yet the intellect would be rendered useless without our intellect as we would no longer be able to use it in the slightest. That is the relationship personas have with empathy and journey maps. They are not a replacement and they serve no purpose without the personas in place.

Brainstorming

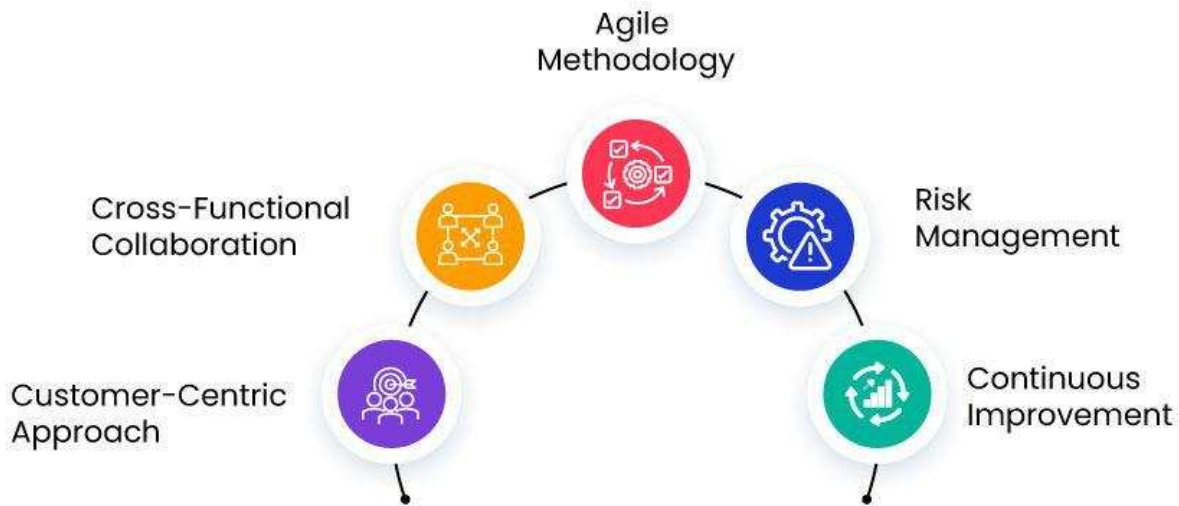
Brainstorming is a process where you want to make sure that no idea is off-limits. Perhaps you're thinking, "This idea can't be executed, the technology just isn't there yet!" or "We definitely don't have the budget for this".

While these are both valid concerns, *write it down anyway*. You never know what it may inspire. Perhaps after hearing your idea someone thinks of a way to tweak it so that it is feasible. Maybe someone is able to think of a way to water down the solution and make it executable. Never discount what human creativity and ingenuity can accomplish. *Just share it.*

Product Development:

Product development is a process of developing new product or service to market, from idea generation to launch. It constitute various activities, market research, product design, development, testing and launch. The primary objective of the Product Development is to create a product that meets customer needs and business objective.

Key Principles of Product Development:



Key Principles of Product Development



To ensure a successful product development process, several key principles should be followed:

1. Customer-Centric Approach:

It's critical to understand and satisfy customer needs and wants. Regular customer feedback and market research are essential for creating products that resonate with the target audience.

2. Cross-Functional Collaboration:

Effective product development involves close collaboration between various departments, including marketing, engineering, design, and quality assurance. A multidisciplinary team can bring diverse perspectives and skills to the project.

3. Agile Methodology:

Using agile development methodologies can help adapt to changing market conditions and customer feedback. Agile emphasizes flexibility, iterative development, and rapid response to change.

4. Risk Management:

Identifying and mitigating risks at each stage is crucial. This includes technical, market, and financial risks. Effective risk management helps prevent costly setbacks.

5. Continuous Improvement:

Product development is an ongoing process. Regularly revisiting and improving products is essential for staying competitive and addressing changing customer needs.

Steps Involved in Product Development

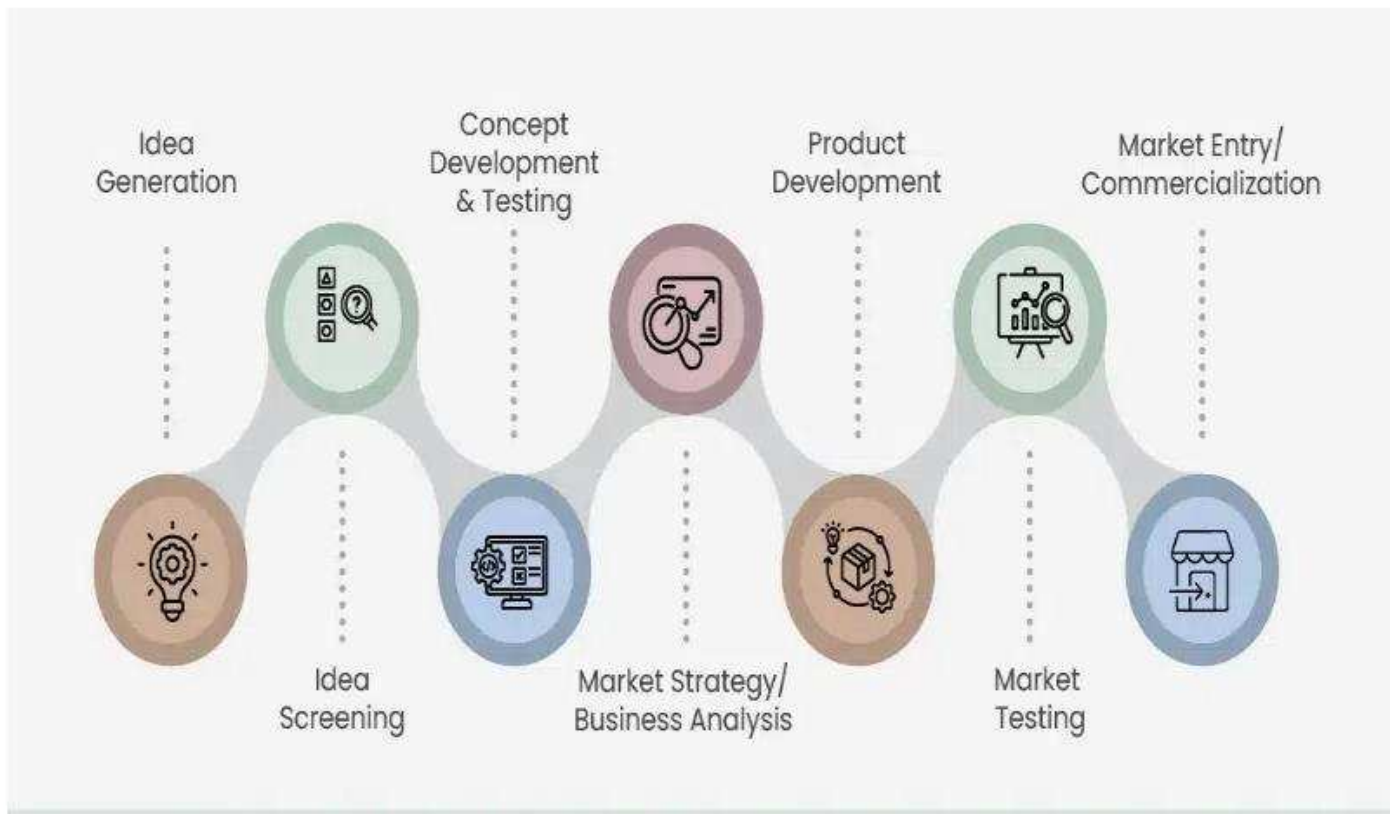
Some of the major steps that are involved in product development are as follows:

1. **Idea**: This is where you come up with the concept for your new product. It's the initial spark of creativity.
2. **Plan**: After you have an idea, you need a detailed plan that outlines how you'll create the product. This includes design, materials, and how to put it together.
3. **Build**: Creating a prototype, which is like a test version of the product, helps you see if your idea can work in the real world.
4. **Test**: This step involves checking if the product functions as expected. Any issues or problems are identified and fixed.
5. **Make**: Once you're sure the product works well, you can start producing it on a larger scale.
6. **Sell**: Finally, you introduce the product to the market so that people can buy and use it.

The Stages of Product Development

Product development typically involves a series of stages, each with its own set of tasks and challenges.

While these stages can vary in complexity and duration, they generally include:



Stages of Product Development

1. Idea Generation:

This is the first phase in which concepts for fresh products are created. Ideas can come from various sources, including customer feedback, market research, internal brainstorming, or industry trends.

2. Conceptualization:

After being chosen, an idea is developed into a concept. This stage involves defining the product's purpose, target market, and unique selling points. It helps shape the product's initial vision.

3. Design and Planning:

This phase involves creating detailed product specifications, design blueprints, and project plans. It also includes selecting materials, technology, and manufacturing methods.

4. Prototype Development:

A prototype or a minimum viable product (MVP) is created to test the concept's feasibility. This stage helps identify potential issues, refine the design, and make necessary adjustments.

5. Testing and Evaluation:

The product is rigorously tested for performance, safety, quality, and user satisfaction. Feedback from testing is used to make further improvements.

6. Manufacturing or Development:

The product design enters the production stage when it is complete. For software or digital products, this stage involves coding and development.

7. Marketing and Commercialization:

Preparing the product for market launch involves developing marketing strategies, setting pricing, and creating promotional materials. It also includes planning the distribution and sales channels.

8. Launch:

The product is introduced to the market. A successful launch involves managing supply chains, monitoring customer feedback, and addressing any post-launch issues.

9. Post-launch Support:

Product development doesn't end at the launch. Ongoing support, updates, and improvements are critical to maintaining the product's competitiveness and customer satisfaction.