UNIT-I
Design thinking

Design thinking is a term used to represent a set of cognitive, strategic and practical processes by which design concepts (proposals for products, buildings, machines, communications, etc.) are developed. Many of the key concepts and aspects of design thinking have been identified through studies, across different design domains, of design cognition and design activity in both laboratory and natural contexts.

Design thinking is also associated with prescriptions for the innovation of products and services within business and social contexts.Some of these prescriptions have been criticized for oversimplifying the design process and trivializing the role of technical knowledge and skills.

The Elements and Principles of Design

DESIGN THEORY

With some minor alterations according to the design discipline to which we are referring to, we can make a global reference to the elements and principles of design. We will divide this article into its two main categories: Elements and Principles and briefly discuss its components; and then we will see some examples on how these elements and principles of design can be combined.

Elements

The elements of design, are the building blocks used by the designers to create the designs. They are the parts, the components that can be isolated and defined in any visual design, they are the structure of the work, the objects to be arranged and used as part of any composition. Although without referring to a specific design (editorial, web, etc.) we can say that the general Design Elements are composed by:

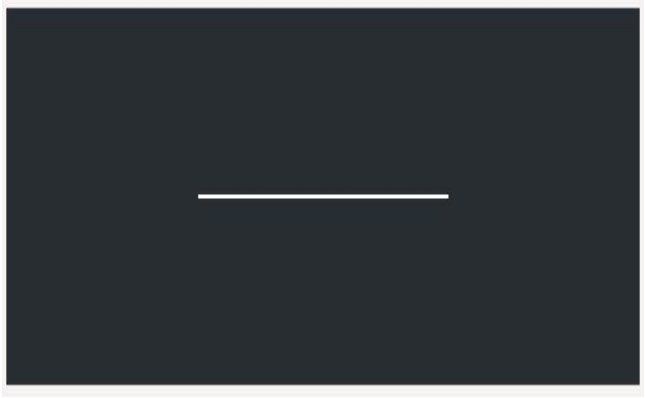
Point

A point is the smallest and most basic element of design and it can be used alone or as a unit in a group (forming a line or a shape). It has position, but no extension, it is a single mark in a space with a precise and limited location and it provides a powerful relation between positive and negative space.

Line

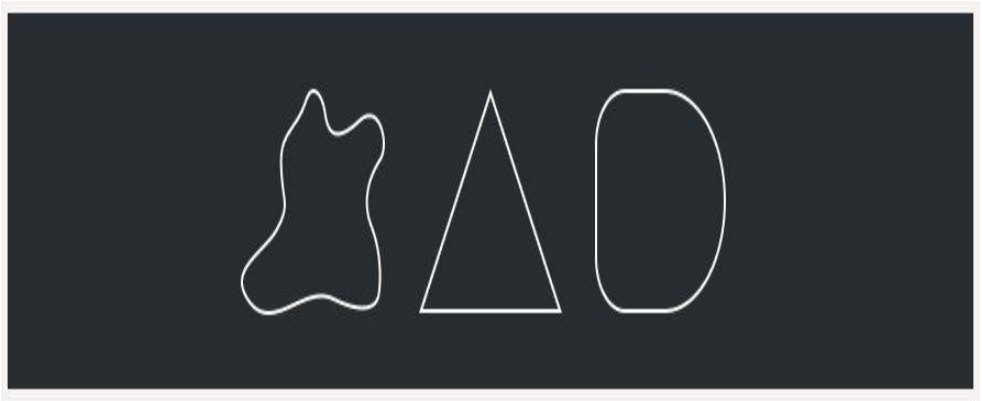
If we place many points one next to the other we obtain a line, which can have length and direction, but no depth. Lines, besides to be used to create a shape, can be used to create

perspective and dominant directional lines (which create a sense of continuance in a composition). Also, they can be grouped to create a sense of value, density or texture.



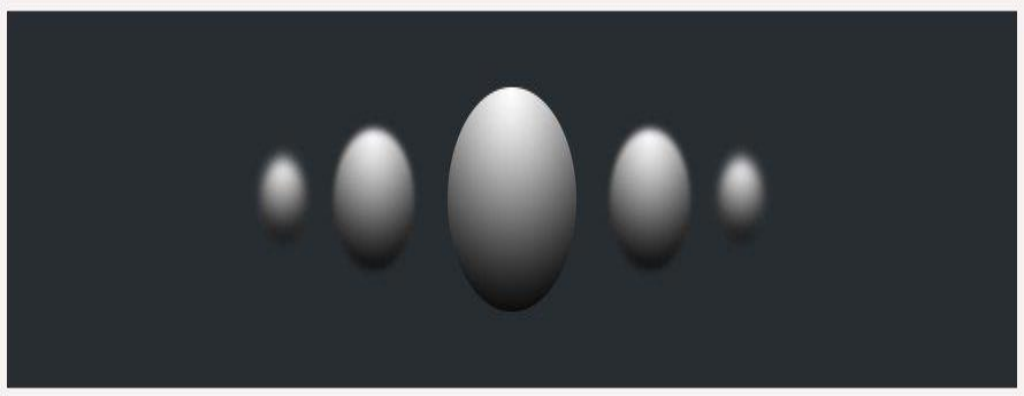
Shape

Shape is an element defined by its perimeter, a closed contour. It is the area that is contained within implied line and it has have two dimensions: height and width. A shape can be geometric (triangle, square, circle, etc.), realistic (animal, human, etc.) or abstract (icons, stylizations, etc.).



Form

The Form is derived from the combination of point, line and shape. A form describe volume, the 3D aspect of an object that take up space and it can be viewed from any angle (a cube, a sphere, etc.), it has width, height and depth.

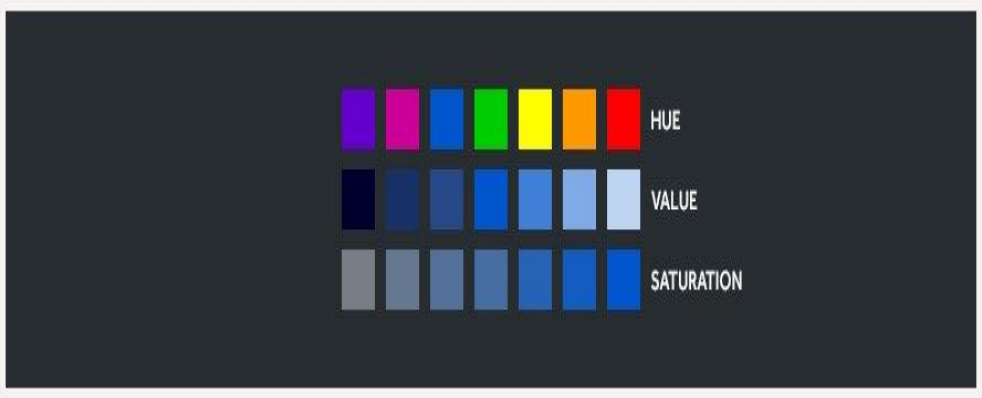


Color

The color is the response of the eye to differing wavelengths of radiation within the visible spectrum. Colors are used to generate emotions, define hierarchy, create interest, etc. There are many different kinds of color systems and theories but we will focus on the 3 properties: Hue, Value and Saturation.

- Hue: is the color name.

- Value: it refers to the lightness or darkness, to how close to black or white the Hue is.
- Saturation: It refers to the intensity of a hue, the less gray a color has in it, the more Chroma it has.

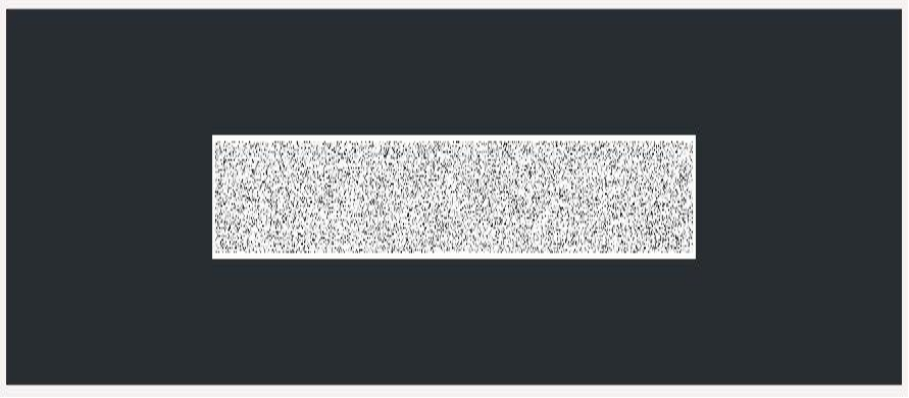


Value

Is defined as the relative lightness or darkness, which suggests the depth or volume of a particular object or area, it is the degree of light and dark in a design, the contrast between black and white and all the tones in between.

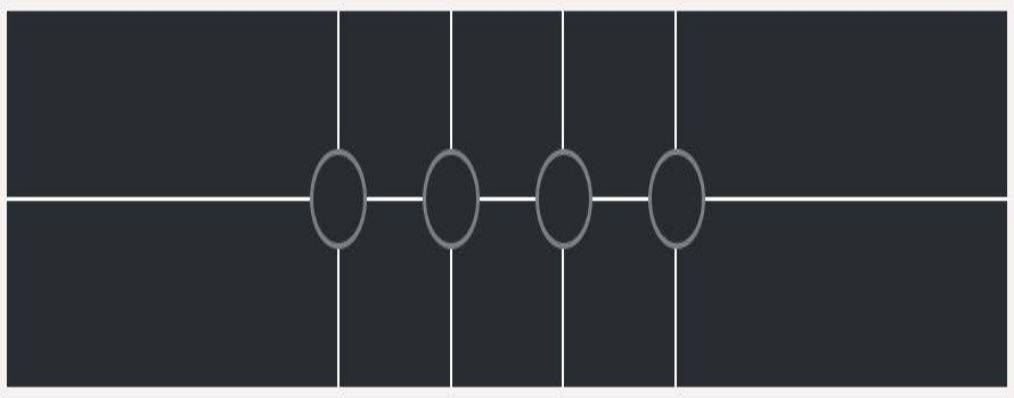
Texture

Texture is the surface quality (simulated and/or actual) that can be seen and felt, can be rough or smooth, soft or hard, etc. It exists as a surface we can feel, but also as a surface we can see and imagine the sensation we might have if we touch it, is both a tactile and a visual phenomenon.



Space

Is the area between and around objects (negative space) but it also refers to variations in the perspective and proportions of objects, lines or shapes and it is used for the comparative relation between different objects or areas. The real space is three dimensional, but in Design when we create the feeling of depth we call it space.

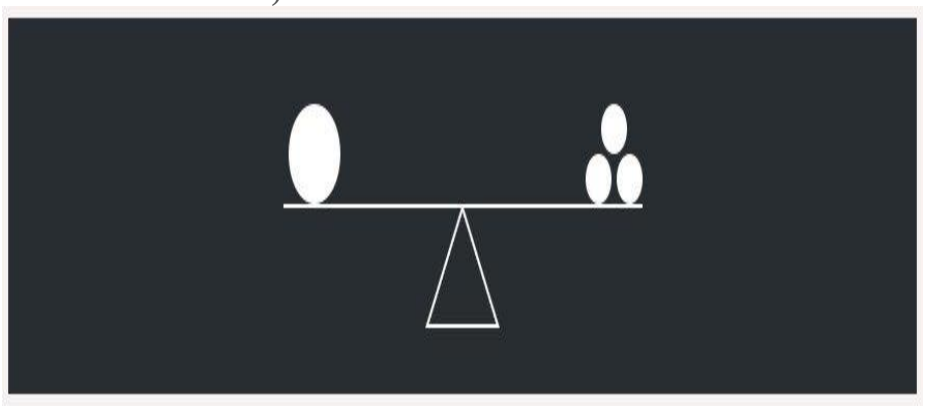


Principles

The principles of design combine the elements to create a composition, they are the guidelines used to arrange the elements. Each principle is a concept used to organize or arrange the structural elements of a design and it applies to each element of a composition and to the composition as a whole. Again, without turning to a specific discipline, we can say that the basic Design Principles are composed by:

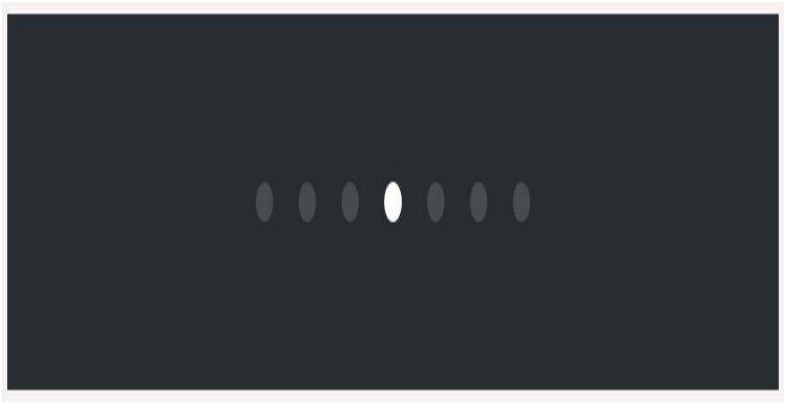
Balance

Balance is the concept of visual equilibrium of similar, opposing, or contrasting elements that together create a unified whole. It refers to the appropriate arrangement of the objects in a design to create the impression of equality in weight or importance. It comes in 2 forms: **Symmetrical** (when the weight of a composition is evenly distributed around a central vertical or horizontal axis) and **Asymmetrical** (when the weight of a composition is not evenly distributed around a central axis).



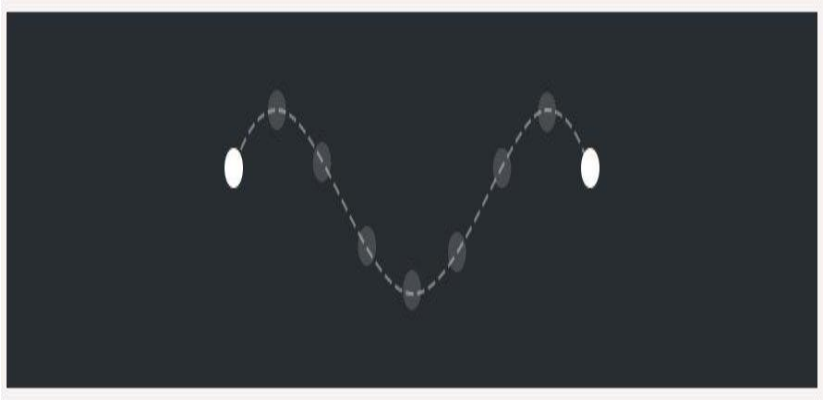
Emphasis(prominence, importance,value,strees)

It marks the location in a composition which most strongly draw the viewer attention, it is also referred as the focal point. It is the most important area or object when compared to the other objects or areas in a composition. There are three stages of emphasis, related to the weight of a particular object within a composition: **Dominant** (the object with the most visual weight), **Sub-dominant** (the object or element of secondary emphasis) and **Subordinate** (the object with the least visual weight, which is usually the background).



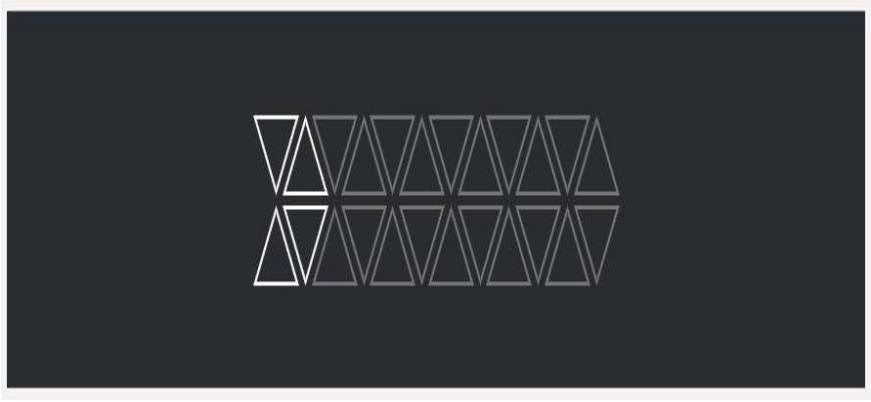
Movement

Is the visual flow through the composition, where (depending on the elements placement) the designer can direct the viewer´s eye over the surface of the design. The movement can be directed along edges, shapes, lines, color, etc and the purpose of movement is to create unity with eye travel. By arranging the composition elements in a certain way, a designer can control and force the movement of the viewer's eyes in and around the composition.



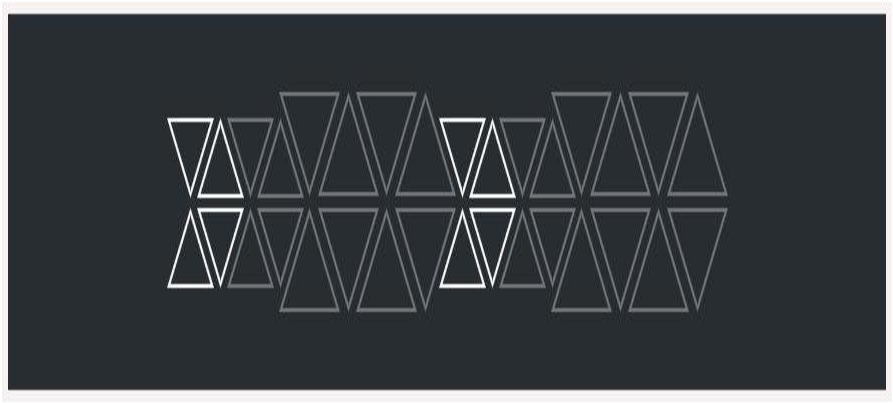
Pattern

An object or symbol that repeats in the design is a pattern. It can be a pattern with a precise and regular repetition or an alternate pattern, which uses more than a single object or form of repetition. We can say that is simply keeping your design in a certain format.



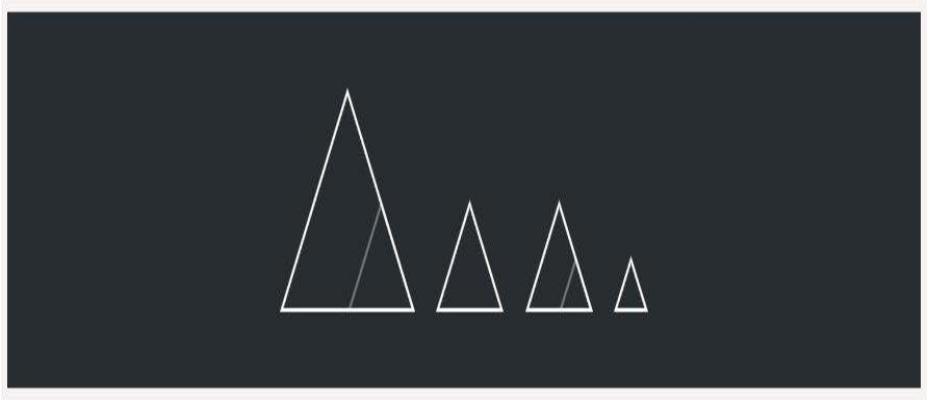
Repetition

Repetition creates unity and consistency in the composition; it is the reuse of the same, similar or different objects throughout the design. The repetition can be irregular, regular, uneven or even and can be in the form of Radiation (where the repeated elements spread out from a central point) or Gradation (where the repeated elements become smaller or larger). It often works with a pattern to make it seem active and along with the Rhythm helps to create different types of it.



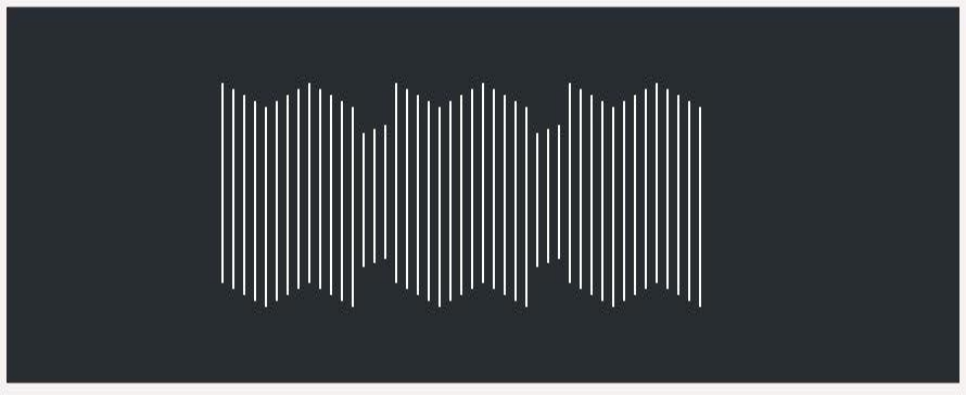
Proportion

Proportion is the comparative relationship in between two or more elements in a composition with respect to size, color, quantity, degree, etc, or between a whole object and one of its parts. The purpose of the proportion principle is to create a sense that has order between the elements used and to have a visual construction; and it can occur in two ways: Harmonious (when the elements are in proportion) or Unbalanced (when the disproportion is forced).



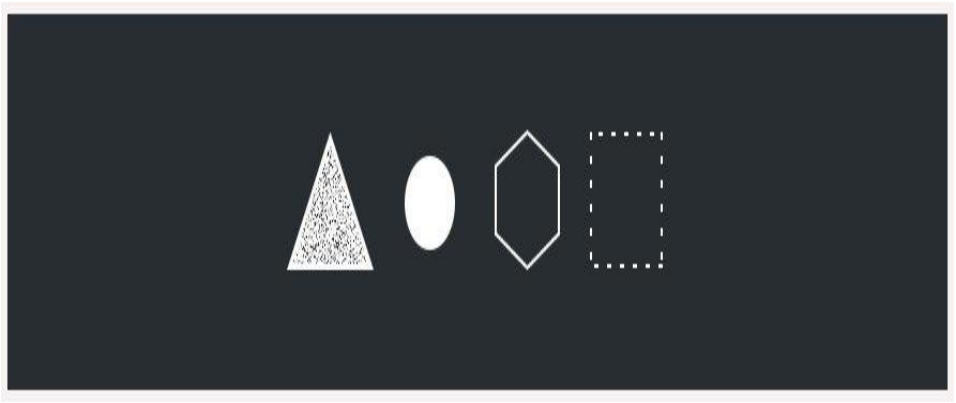
Rhythm

Rhythm is the alternation or repetition of elements with defined intervals between them, it creates a sense of movement and it is used to establish a pattern and/or a texture. There can be 3 different types of rhythm: Regular, Flowing or Progressive. The Regular rhythm occurs when the intervals between elements are similar, the Flowing rhythm gives a sense of movement while the Progressive rhythm shows a sequence of forms through a progression of steps.



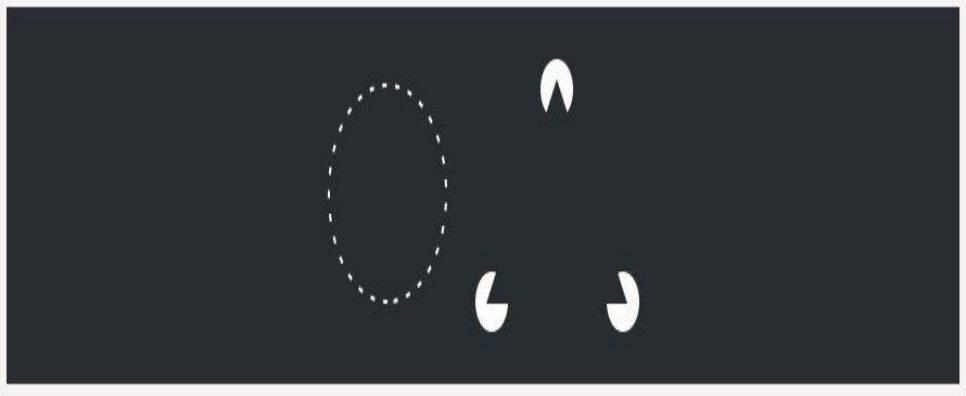
Variety

Variety is the principle that refers to the combination of elements in an intricate and complex relationship using different values, lines, textures, shapes, hues, etc. It is complementary to unity and often needed to create visual interest or to call the attention to a specific area in the composition.



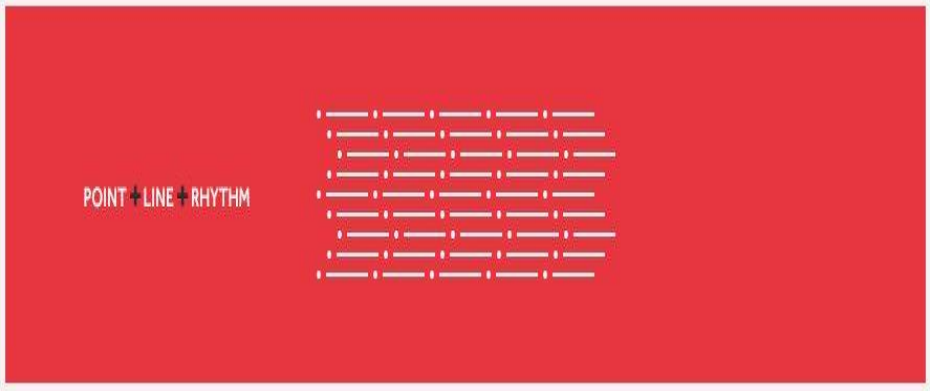
Unity

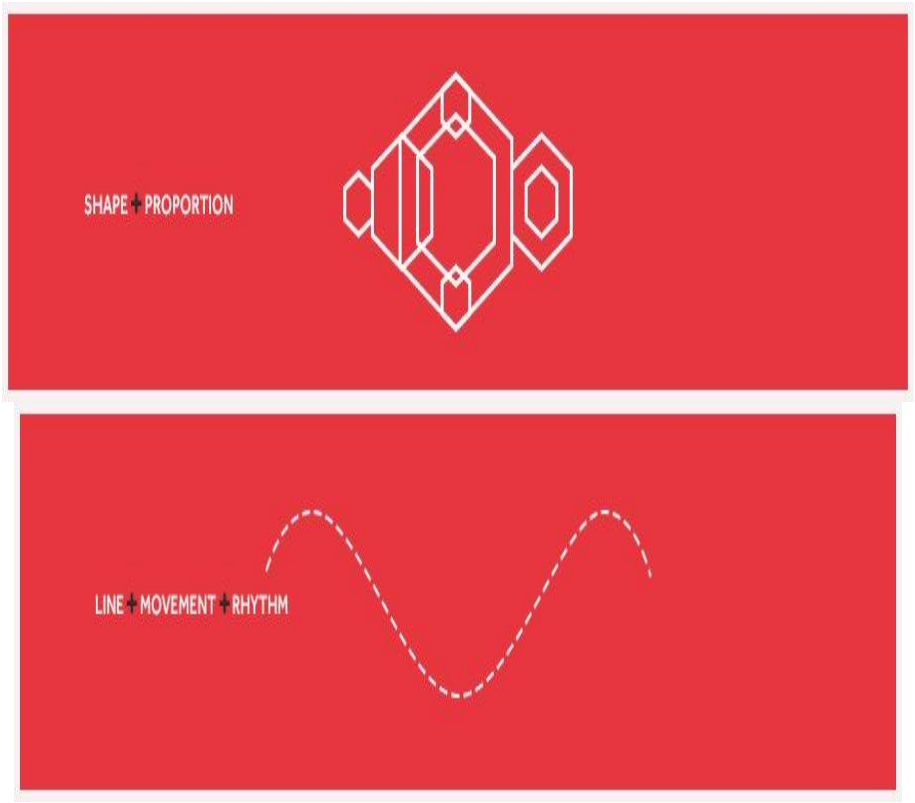
Unity it is used to describe the relationship between the individual elements and the whole of a composition (which creates a sense of completeness, that all of the parts belong together) and it is a concept that comes from the Gestalt theory of visual perception and psychology. Three of the most well-known concepts of this theory are the Closure (is the idea that the brain tends to fill in missing information when it perceives an object is missing some of its pieces), Continuance (is the idea that once you begin looking in one direction, you will continue to do so until something more significant catches your attention) and Similarity, Proximity and Alignment (is the idea that elements of similar size, shape and color tend to be grouped together by the brain).



Examples

In the following quick examples, you may notice how the Elements and Principles of Design are combined. The following examples do not pretend to be a complex explanation of the multiple possible combinations, but to serve as an easy visual example of how the elements and principles work together.





History

Drawing on psychological studies of creativity from the 1940s, such as Max Wertheimer's "Productive Thinking" (1945), new creativity techniques in the 1950s and design methods in the 1960s led to the idea of design thinking as a particular approach to creatively solving problems. Among the first authors to write about design thinking were John E. Arnold in "Creative Engineering" (1959) and L. Bruce Archer in "Systematic Method for Designers" (1965).

In his book "Creative Engineering" (1959) Arnold distinguishes four areas of design thinking:

(1) novel functionality, i.e. solutions that satisfy a novel need or solutions that satisfy an old need in an entirely new way

(2) higher performance levels of a solution

(3) lower production costs or

(4) increased salability.

Arnold recommended a balanced approach - product developers should seek opportunities in all four areas of design thinking: "It is rather interesting to look over the developmental history of any product or family of products and try to classify the changes into one of the four areas ... Your group, too, might have gotten into a rut and is inadvertently(with out intention or accidently) doing all of your *design thinking* in one area and is missing good bets in other areas.

Although L. Bruce Archer's "Systematic Method for Designers" (1965) was concerned primarily with a systematic process of designing, it also expressed a need to broaden the scope of conventional design: "Ways have had to be found to incorporate knowledge of ergonomics (the study of working environment) cybernetics(the scientific study and mathematical modelling of regulation),study of, marketing and management science into *design thinking*". Archer was also developing the relationship of design thinking with management: "The time is rapidly approaching when design decision making and management decision making techniques will have so much in common that the one will become no more than the extension of the other".

Arnold initiated a long history of design thinking at Stanford University, extending through many others such as Robert McKim and Rolfe Faste, who taught "design thinking as a method of creative

action" and continuing with the shift from creative engineering to innovation management in the 2000s. Design thinking was adapted for business purposes by Faste's Stanford colleague David M. Kelley, who founded the design consultancy IDEO in 1991.

Bryan Lawson's 1980 book *How Designers Think*, primarily addressing design in architecture, began a process of generalising the concept of design thinking. A 1982 article by Nigel Cross, "Designerly Ways of Knowing", established some of the intrinsic qualities and abilities of design thinking that also made it relevant in general education and thus for wider audiences. Peter Rowe's 1987 book *Design Thinking*, which described methods and approaches used by architects and urban planners, was a significant early usage of the term in the design research literature. An international series of research symposia in design thinking began at Delft University of Technology in 1991.Richard Buchanan's 1992 article "Wicked Problems in Design Thinking" expressed a broader view of design thinking as addressing intractable human concerns through design.

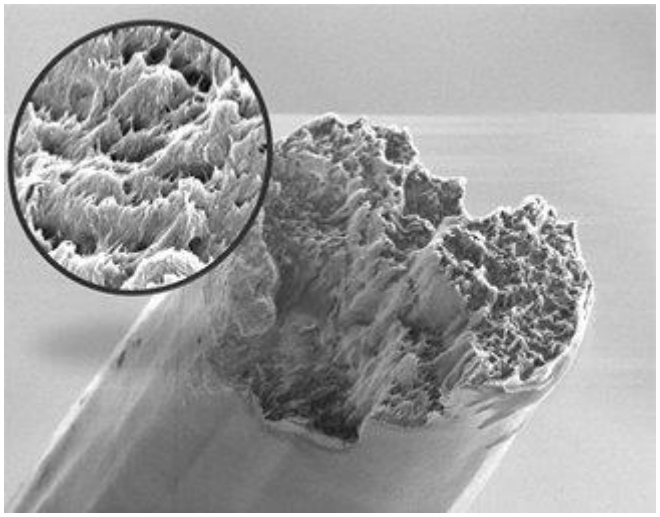
New materials in Industry

Manufacturing companies prefer to use tried-and-true materials for their products—these materials are already validated and their chemical and mechanical properties well-studied. However, product performance and functionality can often be improved with new materials that, once tested and approved, deliver highly specific engineered properties that enhance product performance and create product design options that were not available before. Below are some innovative materials that could transform manufacturing in the not-too-distant future.

1. Titanium Fluoride Phosphate

Skoltech Center for Energy Science and Technology researchers in Moscow have created a titanium fluoride phosphate material to serve as a new cathode material. Its strong electrochemical potential and stability at high charge/discharge currents outperform the standard cathode materials of lithium and cobalt, which are expensive and of diminished supply.

2. Cellulose Nanofibers



SEM image of the cross-section of the fiber, showing the aligned nanofibrils. Photo: KTH

The KTH Royal Institute of Technology in Sweden has developed a super-strong, biodegradable material using cellulose nanofibers from wood. The unique nanostructure of the material provides a tensile stiffness of 86 gigapascals and a tensile strength of 1.57 gigapascals—eight times stiffer than

spider silk, considered the strongest biomaterial, and stronger than steel on a weight basis. This lightweight material could be an eco-friendly substitute for plastic.

3. Self-Healing Gel

A gel material made from aminopropyl methacrylamide (APMA) polymer, glucose, glucose oxidase, and chloroplasts continuously reacts with carbon dioxide from the air to expand and become stronger over time. It is the first carbon-fixing material to exist outside of biological beings. “Making a material that can access the abundant carbon all around us is a significant opportunity for materials science,” said lead researcher Michael Strano, professor of chemical engineering at MIT.

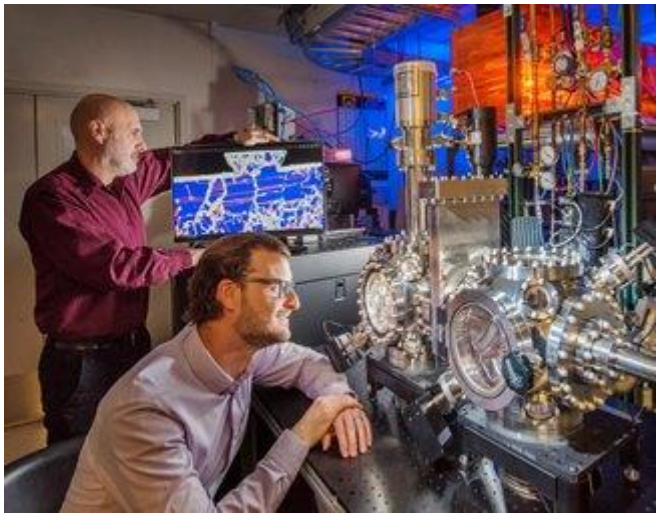
4. Platinum-Gold Alloy

Researchers at Sandia National Laboratories have created a gold-platinum alloy that is 100 times more abrasion(scratch, cut,erosion) resistant than high-strength steel, even at high temperatures. The material’s excellent thermal stability is achieved by changing the grain boundary energies. Under stress, the alloy produces its own diamond-like carbon, which can act as a lubricant.

5. Composite Metal Foams

Composite metal foams (CMF) consist of hollow, metallic spheres, made from materials such as steel or titanium, which are embedded in a metallic matrix, typically made from steel or aluminum. Testing has shown that "steel-steel" CMF, so-called because both the spheres and matrix are made of steel, is much more fire-resistant than a solid steel plate. In addition, the steel-steel CMF panel is only one-third the weight of the solid steel plate. Therefore, CMFs are considered to be a promising material for protecting heat-sensitive materials during transportation and storage, such as explosives.

6. Spider Silk



Sandia National Laboratories researchers Michael Chandross (left) and Nic Argibay show a computer simulation used to predict the unprecedented wear resistance of their platinum-gold alloy, and an environmental tribometer used to demonstrate it. Photo: Randy Montoya, SNL

Spider silk is already regarded as one of the strongest materials in the world. Now scientists have discovered another unique mechanical feature: above a certain level of humidity in the air, the spider silk fibers suddenly contract and twist. This process—called super-contraction—exerts enough torsional force to possibly compete with other materials for use as actuators or other types of control

devices.

7. Shrilk

Inspired by insect exoskeletons, researchers at Harvard University's Wyss Institute for Biologically Inspired Engineering have created "shrilk," a biodegradable "plastic." Composed of chitosan, a component in shrimp shells, and a silk protein called fibroin, shrilk is as strong as aluminum and 50 percent lighter. Its biocompatibility, flexibility, and strength make it an attractive material for implantable medical devices and tissue engineering.

8. Carbon Concrete

Researchers are studying how to reinforce concrete with carbon fiber to enhance strength and durability. A big advantage of carbon is that it does not oxidize. In contrast to steel-reinforced concrete, which can rust and degrade the structure, no thick concrete layers are required to protect the carbon. Adding carbon to concrete increases its loadbearing capacity by five or six times compared to traditional steel-reinforced concrete, is four times lighter, and has a significantly longer service life.

9. Aerogel

This synthetic porous ultralight material is 99.8 percent empty space. The end product of the supercritical drying of liquid gels, such as alumina, chromia, tin oxide, or carbon, the material is strong enough to carry 20,000 times its own weight. Aerogels are open-porous (the gas in the aerogel is not trapped inside solid pockets) and have pores in the range of <1 to 100 nanometers in diameter. The extremely low thermal conductivity also makes it a highly effective insulation material.

Max Wertheimer (1880-1943), a pioneer of 20th-century psychology, had a major influence on the development of cognitive psychology, especially the psychology of perception and of productive thinking. His work "Productive Thinking" (1945), written in New York, is regarded as a milestone in creativity research. Consisting of many examples of creative thought processes - from geometric tasks to socio-psychologically relevant conflict resolutions to the development of Einstein's theory of relativity - the book leads the reader through a multi-faceted body of thought in the psychology of thinking. Detailed historical commentary by Viktor Sarris. Only a few texts in psychology have remained significant even after a period of three quarters of a century - Max Wertheimer's Productive Thinking is such an exception. This book, which also presents an exposition of Gestalt psychology, highlights the "productive" (insightful) versus automatic (unreflected) thought processes for many areas of life. In addition to examples from school teaching, the chapter on the emergence of Albert Einstein's theory of relativity is of lasting interest to today's generation of psychologists, pedagogues, brain researchers, neuroinformatics scientists/researchers and philosophers. Wertheimer had the unique opportunity to analyze Einstein's thinking in direct conversation. An introductory commentary by Viktor Sarris for this new edition of the first publication of Productive Thinking in 1945 offers a detailed account of the genesis and reception of Wertheimer's work.

cognitive psychology is the study of how human mind works ,including how people think ,learn and make decisions.

Gestalt psychology is a school of thought that seeks to understand how the human brain perceives experiences. It suggests that structures, perceived as a whole, have specific properties that are different from the sum of their individual parts.

Gestalt principles

Proximity: People tend to perceive objects that are close together as belonging together.

Similarity: People tend to perceive similar elements as a group, even if they are separated.

Continuity: People tend to follow paths and group elements that are aligned with each other.

Closure: People tend to see an incomplete stimulus as though it were whole. For example, people tend to complete a triangle or square that has a gap in one of its sides.

Figure-ground: People tend to perceive objects as either being in the foreground or the background.

Common fate: People tend to see elements that move together as a group.

Common region: People tend to perceive items within a boundary as a group.

Gestalt psychology

Gestalt psychology was established in 1912 by Max Wertheimer in Germany.

Gestalt psychologists believe that people learn about a thing or concept as a whole, not in parts. This is also known as the idea of "wholeness" or "complete"

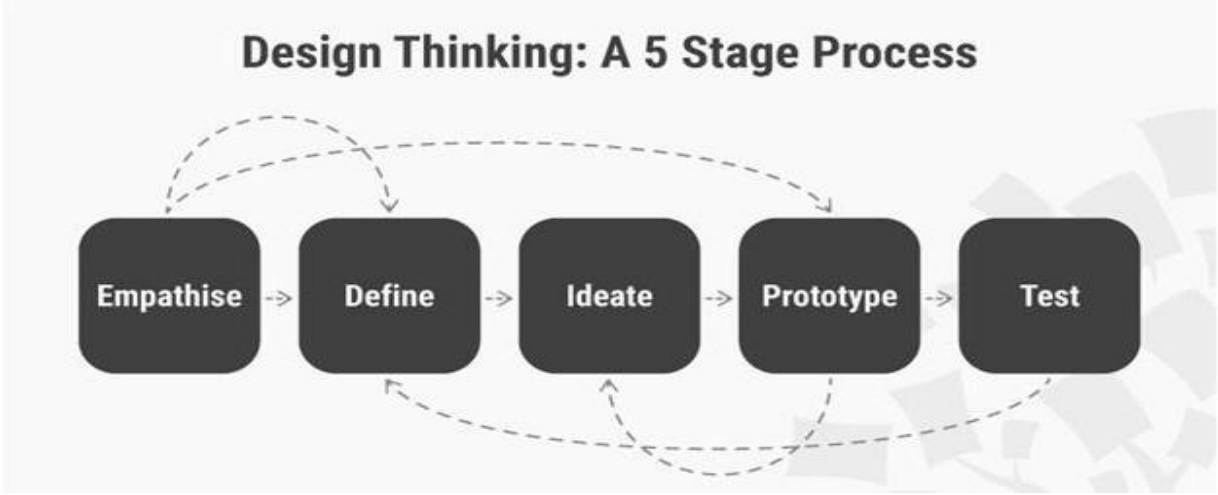
UNIT-II

DESIGN THINKING

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.

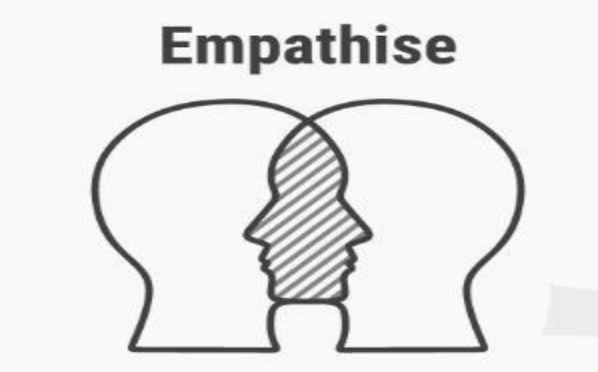
We will focus on the five-stage Design Thinking model proposed by the Hasso-Plattner Institute of Design at Stanford (d.school). d.school is the leading university when it comes to teaching Design Thinking. The five stages of Design Thinking, according to d.school, are as follows: Empathise, Define (the 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.

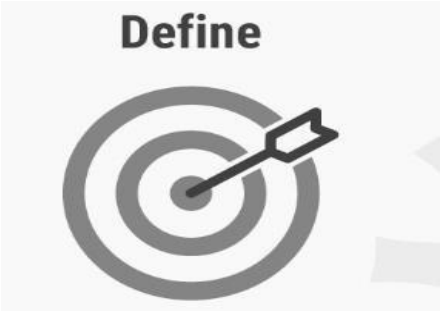


2. Define (the Problem)

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?"



3. 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.

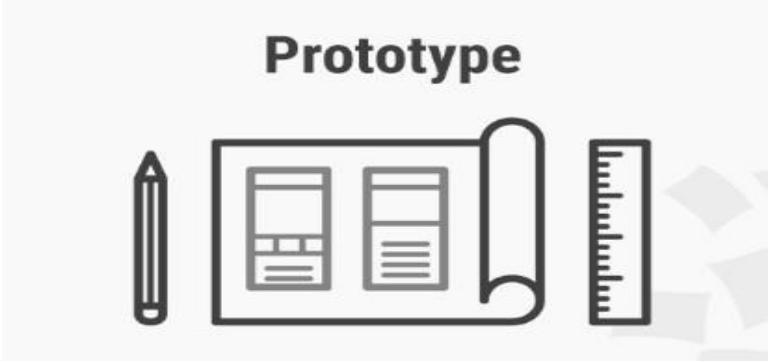
There are hundreds of Ideation techniques such as Brainstorm, Brainwrite, Worst Possible Idea, and SCAMPER. Brainstorm and Worst Possible Idea sessions are typically used to stimulate free thinking and to expand the problem space.

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.

4. 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.



5. TEST:

Designers or evaluators rigorously test the complete product using the best solutions identified during the prototyping phase. This is the final stage of the 5 stage-model, but in an iterative process, the results generated during the testing phase are often used to redefine one or more problems and inform the understanding of the users, the conditions of use, how people

think, behave, and feel, and to empathise. Even during this phase, alterations and refinements are made in order to rule out problem solutions and derive as deep an understanding of the product and its users as possible.

Design thinking, according to Naiman, informs human-centered innovation. "Human- centered innovation begins with developing an understanding of customers' or users' unmet or unarticulated needs," Naiman wrote in an article for the International Association of Business Communicators. Naiman points out that large corporations are using design thinking to evolve the way they innovate. "The focus of innovation has shifted from being engineering-driven to design-driven, from product-centric to customer-centric, and marketing-focused to user-experience-focused," Naiman writes.

For the innovator, the design thinking approach looks to minimize the uncertainty and risk of innovation by using collective intelligence through a series of lenses to grow their understanding of customer needs. By also engaging with customers or users actively throughout the process using a series of prototypes to learn, test and refine concepts, you end up far closer to customer understanding through this dialoguing, exchanging and growing intimacy to help uncover their needs. Design thinkers rely on customer insights gained from real-world experiments and direct engagement not just historical data or market research.

Implementing Design Thinking in Organization

Here are four actionable steps to implement design thinking and bring its benefits to your organization:

1. Focus on the problem

Companies often fail at effectively solving problems or meeting goals because they don't correctly identify the user or problem initially. Here are a few tips for identifying your problem:

- **Listen.** Put yourself in users' shoes and think through their lenses.
- **Ask questions.** Who encounters this problem and why? Why did past attempts fail to solve the problem at hand?
- **Have collaborative conversations.** Working in silos is an easy trap to fall into. Engage with everyone, not just those on your team.

- **Stay unbiased.** Don’t assume you immediately understand the problem, nor the solution. By being open-minded you might find something else you weren’t expecting.

2. Develop design thinking skills on your team

Traditionally, the ideation phase of the design thinking process was saved for project managers or engineers, but that doesn’t mean it can only be used by that department or function. Since design thinking is the mindset of asking questions, understanding, and testing, everyone can and should participate in this practice. Here are a few tips for developing your team’s design thinking skills:

- **Practice the mindset.** Start implementing the process in your role whenever you can. For example, if you oversee onboarding, think about ways you can test a new approach or understand the new employee mentality by gathering feedback through a survey. Remain open to new outcomes.
- **Foster interests in design thinking**. If you have team members who want to take initiative and expand their skill sets, make sure to nurture that interest, whether it is encouraging experimentation or reimbursing costs for design thinking classes.

3. Have (or start having) more debriefs

It’s important to understand that design thinking is continuous. It’s a process of iterating on previous experiments so that the product or outcome can improve and become better. However, learnings can’t be implemented if there’s no feedback process. Here are a few tips for creating a learning culture through gathering feedback:

- **Be open about what went wrong.** Set an example by demonstrating that failure is an expected part of design thinking. Openly discuss what tests failed and why.
- **View failure as learning.** Trying and failing a new approach serves the crucial function of narrowing down the list of possible processes. This gets you and your team closer to the approach that will work best. Encourage failure!

4. Embrace the feedback loop

The goal of design thinking isn’t perfection, but the best answer possible. And the best answer likely won’t be the first answer. Thus, a constant feedback loop is essential. Here are some tips for implementing a feedback loop:

- **Test and iterate as much as possible.** Find new ways and angles to test your assumptions, you might come across something you would’ve never thought of otherwise.
- **Have feedback sessions often.** When you embrace feedback, not only does it create a safe space to innovate but it also prevents the same mistakes from happening again.

Design thinking can help you and your team identify and solve meaningful problems for your organization. The process is like a muscle that you need to build and use. With a design thinking mindset, you can spend time effectively solving the right problems and building processes that will impact your organization's success.

DESIGN THINKING FOR SOCIAL INNOVATION

Design thinking is a creative problem-solving method based on a human-centered approach. It ensures that products, services and processes are rooted in the needs of people, communities and/or end users. When using design thinking, three main dimensions are addressed – what is desirable from a human point of view with what is technologically feasible and economically viable.

On the other hand, social innovation is a process of developing and deploying effective solutions to pressing global issues, while putting people and the planet first. The concept of social innovation puts emphasis on solutions creating social and environmental value. The process enables collaborative efforts among CSOs, academia, public authorities, businesses, citizens, and other key stakeholders.

The process includes three steps with a sequence of feedbacks in each phase until a creative sustainable solution emerges.

1. **Empathy**

Taking into consideration the needs of the community and people for whom you are creating, and defining the problem.

2. **Ideation**

Generating, prioritising ideas and defining prototype.

3. **Experimentation**
Creating, testing and implementing of the prototype and getting feedback from end users.

Tools of Design Thinking

1. Visualization is about using images. It's not about drawing; it's about visual thinking. It pushes us beyond using words or language alone. It is a way of unlocking a different part of our brains that allows us to think nonverbally and that managers might not normally use.

2. Journey mapping (or experience mapping) is an ethnographic research method that focuses on tracing the customer's "journey" as he or she interacts with an organization while in the process of receiving a service, with special attention to emotional highs and lows. Experience mapping is used with the objective of identifying needs that customers are often unable to articulate.

3. Value chain analysis examines how an organization interacts with value chain partners to produce, market, and distribute new offerings. Analysis of the value chain offers ways to create better value for customers along the chain and uncovers important clues about partners' capabilities and intentions.

4. Mind mapping is used to represent how ideas or other items are linked to a central idea and to each other. Mind maps are used to generate, visualize, structure, and classify ideas to look for patterns and insights that provide key design criteria.

5. Rapid concept development assists us in generating hypotheses about potential new business opportunities.

6. Assumption testing focuses on identifying assumptions underlying the attractiveness of a new business idea and using available data to assess the likelihood that these assumptions will turn out to be true. These assumptions are then tested through thought experiments, followed by field experiments, which subject new concepts to four tests: value creation, execution, scalability, and defensibility.

7. Prototyping techniques allow us to make abstract new ideas tangible to potential partners and customers. These include storyboarding, user scenarios, experience journeys, and business concept illustrations — all of which encourage deep involvement by important stakeholders to provide feedback.

8. Customer co-creation incorporates techniques that allow managers to engage a customer while in the process of generating and developing new business ideas of mutual interest. They are among the most value-enhancing, risk-reducing approaches to growth and innovation.

9. Learning launches are designed to test the key underlying value-generating assumptions of a potential new-growth initiative in the marketplace. In contrast to a full new-product rollout, a learning launch is a learning experiment conducted quickly and inexpensively to gather market-driven data.

10. Storytelling is exactly how it sounds: weaving together a story rather than just making a series of points. It is a close relative of visualization—another way to make new ideas feel real and compelling. Visual storytelling is actually the most compelling type of story. All good presentations—whether analytical or design-oriented — tell a persuasive story.

UNIT – 3

INNOVATION

Innovation can be simply defined as a "new idea, creative thoughts, and new imaginations in form of device or method". However, innovation is often also viewed as the application of better solutions that meet new requirements, silent needs, or existing market needs.

Such innovation takes place through the provision of moreeffective products, processes, services, technologies, or business models that are made available to markets, governments and society. The term "innovation" can be defined as something original and more effective that "breaks into" the market or society.

Innovation is related to, but not the same as, invention, as innovation is more apt to involve the practical implementation of an invention (i.e. new/improved ability) to make a meaningful impact in the market or society.

All organizations can innovate, including hospitals, universities, and local governments. Innovation processes usually involve: identifying customer needs, macro and micro trends, developing competences, and finding financial support for new inventions and at last practically applying those inventions for better solutions.

Innovation is:

- New stuff
- That adds value
- For various stakeholders
- Can be monetized
- Creates a competitive advantage
- And is sustainable
- Until the advantage deteriorate

IMPORTANCE OF INNOVATION

- Solving problems
- Adapting to change
- Maximizing on globalization
- Facing up the competition
- Evolving workplace dynamics
- Customers' changing tastes and preferences

Difference Between Creativity and Innovation

Change is the basic law, that governs the entire nature. In this fast-paced world, technology is changing rapidly, i.e. nobody can assure you that the world is going to be same, five years later, as everything changes with the blink of an eye.

So, if one wants to go along with the world, then the only requirement is to be creative and innovative. While **Creativity is related to 'imagination', but innovation is related to 'implementation'**.

Comparison Chart

BASIS FOR COMPARISON	CREATIVITY	INNOVATION
Meaning	Creativity is an act of creating new ideas, imaginations and possibilities.	Innovation is the introduction of something new and effective into the market.
Process	Imaginative	Productive
Quantifiable	No	Yes
Related to	Thinking something new	Introducing something new
Money Consumption	No	Yes
Risk	No	Yes

Key Differences Between Creativity and Innovation

The following are the major differences between Creativity and Innovation:

1. The quality of thinking new ideas and putting them into reality is creativity. The act of executing the creative ideas into practice is innovation.
2. Creativity is an imaginative process as opposed to innovation is a productive process.
3. Creativity can never be measured, but Innovation can be measured.
4. Creativity is related to the generation of ideas which are new and unique. Conversely, Innovation is related to introduce something better into the market.
5. Creativity does not require money. On the other hand, innovation requires money.
6. There is no risk involved in creativity, whereas the risk is always attached to innovation.

Example

The invention of the motorcycle was the biggest innovation over scooters. In early centuries, people used to travel with scooters, for which they have to make lots of efforts to start it like they need to strike the kick and knee down from either side if it doesn't start.

So, years and years passed away, and nobody even thought for the invention of bikes. The invention of the motorcycle make them realize that they can also ride bikes without making any extra efforts, they just have to click the switch and its starts automatically.

In this example, the thought of creation of a new traveling motorcycle is creativity, but the actual invention of it is innovation.

Role of innovation and creativity Industry and organizations

Innovation is the process of creating and implementing a new idea. It is the process of taking useful ideas and converting them into useful products; services or processes or methods of operation. These useful ideas are the result of creativity, which is the prerequisite for innovation. Creativity in the ability to combine ideas in a unique way or to make useful association among ideas. Creativity provides new ideas for quality

improvement in organizations and innovation puts these ideas into action.

Depending on the nature of your business, you might already have a strong idea of how creativity and innovation benefit your company. If you're anything like TruScribe, the line is direct: our creative output benefits our clients, which benefits us. However, maybe your company's product isn't as directly tied to creativity as ours. You've likely heard that increasing creative and innovative work can give your business a serious boost. Let's explore how creativity and innovation can enhance business growth and development, no matter what industry you're in.

Creativity and innovation lead to higher overall success in organizations, even more so than raw intelligence. Traditional companies and educational institutions tend to prize intelligence as the most important factor in problem solving. However, this preference might have been born out of ease rather than best practices.

After all, it is "easier to measure and manage" intelligence over creativity, which can be harder to identify. When creative thinking is prioritized, positive feedback is received, and encouragement is given to solve problems creatively, the company will see improvement.

Creativity and innovation within a well-run companies have always been recognized as a sure path to success. Stimulating creativity and exploring completely new and unknown before territories lead as result to increasing the productivity of the organisation. Encouraging the employees to think outside of the box and giving them time and resources to explore new areas for innovative ideas is the key to cost-effective business solutions.

Creativity improves the process of solving problems. It doesn't matter if we're talking about developing a new strategy or an innovative way to stay ahead of the competition. Creative problem solving gives that competitive edge that any business is striving to achieve.

Strategic Importance of Innovation:

For both established organisations as well as new organisations, innovation and change become important in a dynamic, changing environment. When a company fails to innovate and change as needed, its customers, employees and the community at large can all suffer. The ability to manage innovation and change is an essential part of a manager's competencies.

Creative ideas and innovative approaches can come from almost anywhere- from your partners, customers, target groups, employees. They can bring you fresh perspectives and ideas, so show them that you're listening and open to their feedback. That's why it is important an open exchange of ideas to be supported and encouraged by the company.

Types of Innovation:

(i) Technical,

(ii) Process and

(iii) Administrative.

Technical innovation involves creation of new goods and services. Many technical innovations occur through research and development efforts intended to satisfy demanding customers who are always seeking, new, better, faster and/or cheaper products.

Process innovation involves creating a new way of producing, selling or distributing an existing good or service.

Administrative innovation occurs when creation of a new organisation design better supports the creation, production and delivery of goods and services.

The various types of innovation often go hand in hand. For example, the rapid development of business-to-business e-commerce represents process innovation. But this new process requires many technical innovations in computer hardware and software. Also, as firms began to use business to business e-commerce, administrative innovation soon followed. Further, implementation of process innovations necessitated

organisational change. “Doing something new means doing something differently”. Thus, innovation and organisational change go hand in hand.

Create a Creative Workplace

Creative thinking can also lead to innovation that will grow your business through increased productivity. When you “focus on what things you can streamline and what things you need to cut out” while keeping the systems that perform well, you’ll build a simpler, more efficient workplace. Creative thinking lets you come up with ideas that will excite and motivate your team.

Reach New Heights

Creativity and innovation can be the pathways for your business to reach new heights of product value, process improvement, productivity, marketing success, and internal harmony. The creative process can lead to novel ideas and concepts. This is especially true when the divergent thinking it requires is complemented by conventional convergent thought,

When a diverse, cross-functional team looks to innovate through implementation of creative ideas, they’ll work more effectively, flexibly, and with a greater sense of unity. From product designs that are miles ahead of the competition to minor office changes, any new improvement to your business is an innovation. This process doesn’t happen just once, either.

CREATIVITY TO INNOVATION

"Creativity" and "innovation" are two words that are constantly thrown around in brainstorming sessions, corporate meetings and company mission statements. There's no question that these values are highly prized in the fast-paced modern workplace, but do leaders who use the terms truly know the difference between them?

What is creativity?

That most human of qualities, creativity evidences itself in our ability to solve challenges or problems with novel solutions ideas. Shawn Hunter, author of Out Think: How Innovative Leaders Drive Exceptional Outcomes (Wiley, 2013), defines creativity as "the capability or act of conceiving something original or unusual."

The key factor is that creativity remains a great idea alone, not reality yet. Interestingly, creativity is very specific to people; animals have no way to communicate complex ideas, and much of what they do transfer is assumed by instinct or by example.

Types of creativity

Arne Dietrich, Associate Professor of Psychology and Chair of the Department of Social and Behavioral Sciences at the American University of Beirut, Lebanon, conducted research into creativity that segments it into four types: deliberate and emotional, deliberate and cognitive, spontaneous and emotional and spontaneous and cognitive.

People can experience each of the four types of creativity. Especially true for knowledge workers like researchers, lawyers or doctors, deliberate and cognitive creativity may manifest while on the job, but spontaneous and emotional creativity may show itself during an artistic pursuit.

Deliberate and cognitive creativities use focused attention and formed connections between information stored in the brain and rely on the prefrontal cortex, while emotional and spontaneous creativities stem from the amygdala.

What is innovation?

Hunter weighs in with his own definition of this also: "Innovation is the implementation or creation of something new that has realized value to others." Innovation is realized most vividly in the form of a tool, physical benefit, or aid that solves a problem or creates an advantage. These tools are not limited to humans – for example, according to the Science Times, birds and monkeys use sticks to pull food out of tight locations. So, innovation is far more possible for different species under different conditions and environments.

Types of innovation

Doblin, a global innovation firm that helps leading organizations find human-centered solutions to business problems, created the Ten Types of Innovation Framework as a way to identify transformational opportunities, specifically in business. Based on research of over 2000 successful innovations, Doblin outlined three broad categories: business model, product and marketing.

- **Business model:** Internally focused, these configuration innovations analyze how an organization operates and creates revenue. These can be higher-risk as they sometimes change fundamental decisions on which businesses are built. Business model innovations are best pursued when owners and operators identify oversaturated markets, low customer satisfaction or outdated technology.

- **Product:** Nearly always tangible, product innovations make existing material goods better in some way or are the creation of an entirely new product. It's the most common form of innovation; famous examples include smartphones, fidget spinners, wireless headphones or foot-massaging insoles.

- **Marketing:** Marketing innovation creates new markets or increases existing market share. Marketing innovations are new, positively-disruptive ways for brands to talk to and engage with their consumers. Not only can marketing innovation introduce a new way of connecting with publics, but it can be as simple as promoting an existing product for a different use than what was first intended.

The Responsibilities of the 'Dream team'

The objectives and specific roles of the 'innovation dream team' depend on the type, size, and industry of the company. In the typical case, companies need a driving force from within — a solid team that naturally diffuses the innovation thinking and introduces the right technologies and best practices regarding innovation and creative thinking. The Dream Team ensures that the overall innovation program is in alignment with the strategy of the organization and in harmony with the ongoing business; it manages the noise and the risk of (internal) disruption coming from ambitious innovation activities and programs.

The 'dream team' of innovation must be strategic, tactical, agile and fast

Depending on the innovation readiness of the company, the responsibility areas of the 'dream team' may include the following:

1. Set the strategy, define success

A clear strategy and a roadmap towards the desired innovation-driven mode are critical. The 'innovation team' needs to define what innovation is in the context of the company, and how to 'get there'. It must identify the milestones and define the metrics and success criteria across the innovation transformation journey.

To properly set the innovation strategy, the team must demonstrate a deep understanding of the current state of the company, the challenges, along with the business opportunities. The dream

team must be capable of capturing and interpreting market and competition insights, trends, and predictions; they must clearly articulate and communicate the vision and the strategy to redefine your company as an innovation-driven organization.

2. Provide a framework for innovation

The ‘dream team’ must identify and provide the right enabling technologies to facilitate day-to-day innovation activities and also to speed up the adoption of the innovation culture. For instance, the team needs to select, adapt, and provide ideation, innovation management, and brainstorming tools, platforms to set up programming and ideation challenges like hackathons, ideas processing pipelines, information sharing applications, etc.

3. Innovate by example

Innovation is an exciting and inspiring topic, but if you don’t deliver concrete examples of applied innovation — ideally through success stories — its power will quickly fade out.

The ‘innovation dream team’ must have creative members, engineers, and technologists to showcase real innovation, at pace; the team needs to clearly connect the theoretical, abstract notions of innovation with the commercial context of your company; it must demonstrate how innovation can bring concrete commercial results, fast. This is the best way to inspire people and drive high levels of engagement with the overall innovation initiative.

4. Communicate, Inspire, Diffuse

Communication in this context is critical: no matter how innovative your team or how efficient the innovation framework is, if the communication is not effective, the innovation initiative is at risk. Proper communication is the way to spread the innovation message and inspire people to join the ‘new way of working’; to prove that innovation creates value for the company, the employees, for the customers, and possibly for the society; to diffuse great ideas and change how products are conceived, designed and built.

5. Measure Innovation, Improve continually

The ‘innovation team’ needs to systematically measure and evaluate the progress towards each next milestone of the innovation transformation program. In case of gaps or ‘surprises’, the team needs to quickly review the assumptions, the involved models and processes, and make the right decisions in an agile manner- to ensure alignment with the overall strategic innovation plan.

6. Handle the noise, Avoid disruption

Innovation can generate noise and become disruptive (not to the market, but ironically, to the company). The ‘innovation dream team’ must prevent the situation where the standard KPIs of the company are exposed to risk due to aggressive, over-ambitious innovation programs or, for example, due to unexpected response to a ‘call to innovate’. The team must handle the noise and be very effective in identifying the signals, that is, the real business opportunities. It must be able to prioritize wisely and communicate in a smooth and effective way.

The Synthesis of the Team

The size and exact synthesis of the team heavily depends on the industry, the domain of expertise, and the size of the corporation. In any case, the ‘innovation team’ needs to be multidisciplinary with the right balance of strategy, execution, and communication experts. In the typical case, the team will have some of the following profiles.

Strategists

Planning the innovation transformation journey requires strategic thinking. You need strategists with extensive exposure to innovation programs and a deep understanding of your industry, the competitors, the market dynamics, and the state of the art in reference to your domain.

Product experts

The Innovation transformation program must be supported by well-defined problems worth solving, business opportunities, innovation themes, and focus areas. The dream team must be able to ‘think of products’ and spot related opportunities in the market - coming from the rapidly changing consumer demand patterns. The team must develop a deep understanding of the competition and the global developments - to identify gaps, overlaps, and opportunities that link up to commercial aspects of your business. The team must think as a user and identify how innovation can bring value impact.

Technologists

These are experts combining deep technical knowledge, best practices, and understanding of product architecture, the product development lifecycle, and product innovation methodologies. They drive initiatives such as the transition to agile engineering practices and modern product development techniques with a focus on experimentation and data-driven decision-making. In a software context, these could be Senior Architects or Engineers with extensive prototyping and/or agile product development experience.

Program Managers

Program managers are senior members specialized in ‘making things happen’ - they drive programs, lead multiple initiatives, and manage projects to enable the innovation transformation.

IP experts

Even if intellectual property is not part of your objectives, great opportunities might appear — ones that you cannot afford to miss: as teams ideate, collaborate, and experiment with ideas, they might produce novel, high-potential and patentable solutions. The team needs good reflexes in spotting patentability and potential competitive advantages**.**

Real Innovators

The ultimate objective of the ‘innovation transformation program’, is to change the typical employee into a real innovator, leading to an innovation-led organization that creates more value for customers and stakeholders through novel ideas. The best way to achieve this is by example: you will need to form a team of innovators to reset the baseline in terms of mentality, behavior, best practices, and most importantly, in terms of outcomes.

A multidisciplinary team able to experiment in a rapid mode - to define, build and validate prototypes in no time.

The dream team needs creative people, passionate about delivering novel solutions to challenging problems; risk-takers, self-starters, and ambitious professionals with both technical and commercial acumen.

Innovation Advocates

To introduce and establish the innovation mindset, you need a clever and effective communication plan - one that presents the innovation program itself, along with the activities, outcomes, and especially the success stories of innovation. This effort must be led by passionate and effective communicators who are responsible for diffusing the innovation message, communicate progress, achievements, top performers, and innovation stories.

Innovation Specialists

These are the experts in innovation management, methodologies, and related tools. Their role is to educate the organization regarding experimentation, idea management, design thinking, agile frameworks, and related methodologies and practices. They typically facilitate and drive workshops, ideation sessions, and the practical aspects of day-to-day innovation.

Guest innovators

The dream team must be flexible enough to allow employees outside the core to join for a certain period of time, based on a rotation scheme. This increases the flows of information and expertise and ensures a smoother transition to the innovation-driven mode. It is a great way to minimize the risk of isolating the innovation team from the rest of the company.

The structure of the innovation team should be flexible and flat: there should be three lines of reference — the strategic, the practical innovation and the communication — all aligned but also with clear separation of concerns and well-defined, independent work streams and programs.

MEASURING THE IMPACT AND VALUE OF CREATIVITY

Measuring Creativity In light of what Jenkins calls the "Participation Gap" and what the Adobe Systems benchmark study dubbed as the "Creativity Gap", schools, nonprofits, and corporations are developing new initiatives and approaches to fostering creativity. As these programs and curricula are introduced, leaders are concurrently challenged with measuring their impact. Researchers have developed several approaches to measuring creativity - provisionally defined here as "the type of creativity that makes people adapt to the constantly changing environment, reformulate problems, and take risks to try new approaches to problems".9

These approaches include: Measuring how creative work is

;• Measuring how creative a person is;

or• Measuring the social or economic value of creative work.

10• Measurement occurs at aggregate and individual levels, with researchers attempting to examine creativity levels in societies, governments, educational systems, and among individuals.

11 Measurement of creativity in societies and governments often focuses on understanding environmental conditions believed to contribute to creativity, such as tolerance, heterogeneity, and levels of educational attainment.

12 At the global level, tools such as the Global Creativity

Measuring creativity is a complex process because it is so subjective. While trying to work out the ROI of different media channels has become increasingly possible due to advances in methods such as econometrics, working out if a creative idea will have an impact (and the impact a marketer intends) remains difficult.

Yet marketers are trying to add some science to the art. According to an exclusive survey of more than 400 brand marketers conducted by Marketing Week, almost two-thirds (61.8%) are measuring the effectiveness of their creative.

This compares to 76.5% who are measuring the effectiveness of media. However, more than one in 10 (11.7%) still don't measure either.

When it comes to measuring creative, post-launch measurement is the most common, conducted by 90.3% of those who measure some form of creative effectiveness. Two-fifths (40.6%) claim to pre-test creativity in order to diagnose creative and see how to improve it, while 35.2% pre-test to decide whether to run creative or not.

The number of marketers doing more than one type of testing are lower still. Just 20% use all three types of testing, 1% do both types of pre-testing, 10% measure pre-launch to make a diagnosis and post-launch and 13.9% measure pre-launch to diagnose and post-launch.

Almost half, 43.5%, just measure creative post-launch, 4.8% just measure pre-launch to diagnose and 3.5% just pre-launch to make a creative decision.

While it might seem that marketers aren't using all the tools at their disposal to ensure a creative idea is a success, Eve Sleep's CMO Cheryl Calverley warns that marketers can become too reliant on data when experience and gut instinct should play a role.

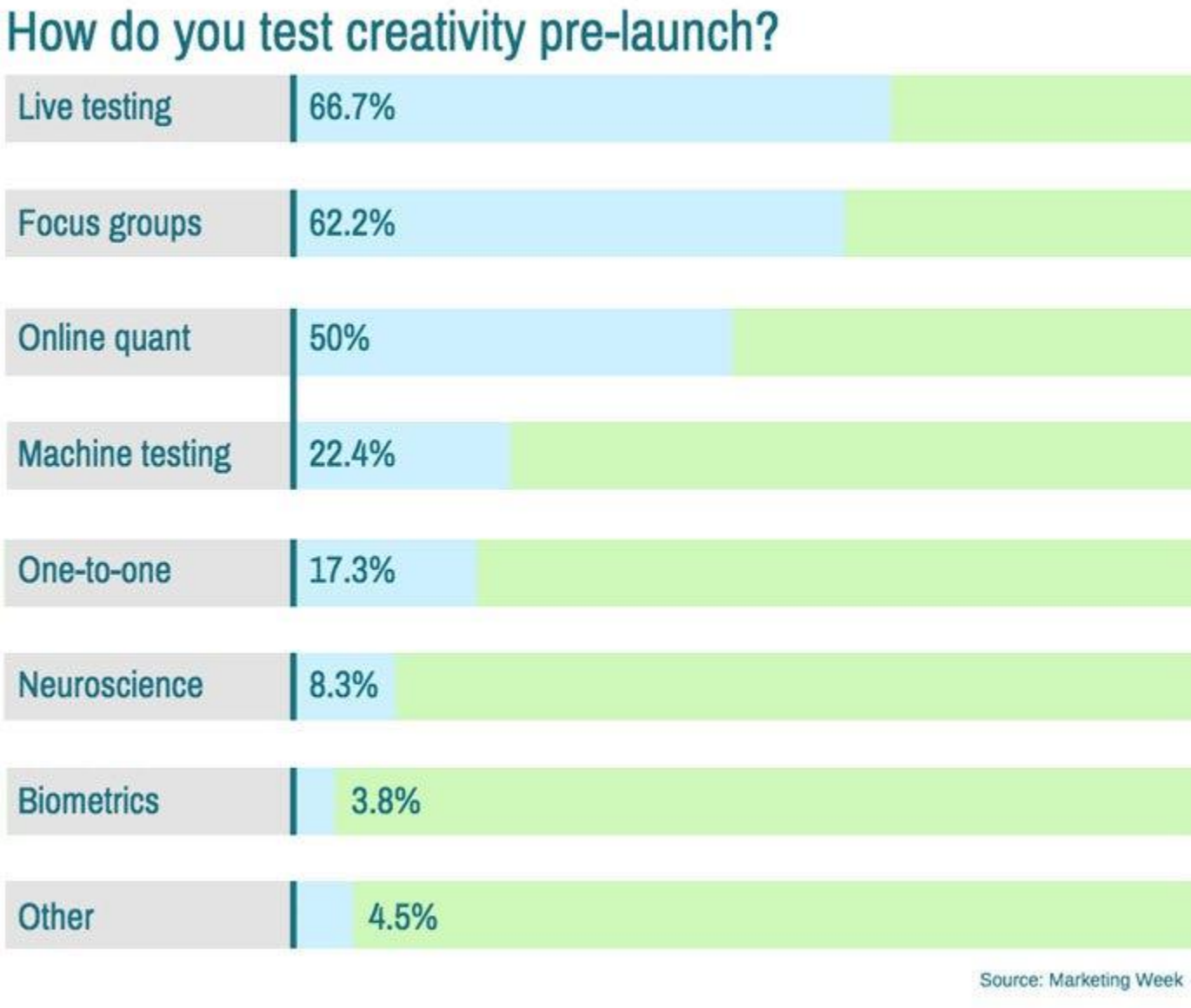
"There is a level of having experience, of living in the industry. To be able to know what's good you have to absolutely love creative and spend your days reading, watching, seeing stuff people do, having opinions on it, talking about it down the pub," she explains. "Then when you see something that is good, it just does something to you.

"There is then a whole load of very logical planning and strategy. You have to ask if it has legs, if it will be stretchy, if it will work in lots of channels, if it is differentiated. But most important is does it give you a feeling? If it makes you feel something as a marketer it will work. If it doesn't, no amount of rationalising will make it work."

How to measure creativity

The methods used to measure creativity are also evolving. Marketing Week's research finds that while marketers are still reliant on more traditional research methodologies, those that adopt new techniques are seeing the benefits.

Live testing, focus groups and online quantitative surveys remain the most popular methodologies, used by 66.7%, 62.2% and 50% of respondents respectively. Just 8.3% are using neuroscience and 3.8% biometrics.



Yet when asked which methodology is ‘most useful’, neuroscience tops the table, just ahead of focus groups in second and live testing in third. The data suggests that while newer methodologies such as neuroscience are used less often, where they are used they deliver better results.

Brands including O2, Disney and Birds Eye have all recently started using neuroscience. For Birds Eye marketing director Steve Challouma, while it doesn’t directly measure creativity he uses the data as a proxy for emotional connection. And the company has found that creative that sparks an emotional connection is more likely to lead to action.

He believes these newer methodologies have the ability to change how marketers think about and measure creativity because it enables them to measure subconscious responses – small changes in brain activity or pupil dilation – rather than explicit responses.

We understand what that shiver down your spine actually is and there are methodologies and techniques that test that.

Cheryl Calverley, Eve Sleep

“I’m seeing those [more rational methodologies] starting to die a death a little bit because of the limitations, the new thinking around system one and system two and the ways consumers make decisions around brands. That bank of thinking has transformed the way we as marketers think about how consumers respond to creative,” he says.

Eve Sleep’s Calverley agrees: “Methodologies have moved on dramatically now. You don’t have to do things as blunt as pre-testing and we do understand system one and system two [thinking]. We understand what that shiver down your spine actually is and there are methodologies and techniques that test that.”

Driving effectiveness through creativity

In terms of the impact of creativity, marketers are looking for a range of outcomes. Most popular is brand linkage, cited by 51.9% of respondents to Marketing Week’s survey, followed by sales intent on 49%, likeability on 45.6% and attention/salience on 44%.

Of those, sales intent was selected as ‘most important’ by 29.3%, ahead of brand linkage on 15.4%, attention/salience on 11.7% and likeability on 10.1%.

There are numerous examples of brands where a focus on creativity and a great creative idea has paid off. Calverley cites the examples of John Lewis, Cadbury’s ‘Gorilla’ ad and Comparethemarket’s meerkats campaign. What ties them all together, she says, is they get the human brain to make a creative leap that helps a brand move down the purchase funnel.

“The human brain is great at making new connections, it is literally designed to do that and it is where we get our kicks. So the human brain is always seeking to make creative leaps. When a brand does something like meerkats, that makes the brain feel good – having that experience of that creative leap,” she says.

She says another example is the work she did at The AA: “The big shift in The AA was to get from a slightly rational, ‘we are a very good breakdown service’, to a much more emotional, ‘be with us and everything will be fine’ space.

“That is a space that lingers so when someone comes to renew their breakdown in six or nine or 12 months, you have the effect. That fundamentally is the long and the short of it, and the effectiveness curve.”

UNIT-IV
PRODUCT DESIN

PRODUCT DEVELOPMENT PROCESS

1. Ideation

Many aspiring entrepreneurs get stuck on ideation, often because they're waiting for a stroke of genius to reveal the perfect product they should sell. While building something fundamentally "new" can be creatively fulfilling, many of the best ideas are the result of iterating upon on an existing product.

The SCAMPER model is a useful tool for quickly coming up with product ideas by asking questions about existing products. Each letter stands for a prompt:

- Substitute (e.g. fur in faux fur)
- Combine (e.g. a phone case and a battery pack)
- Modify (e.g. an electric toothbrush with a sleeker design)
- Put to another use (e.g. memory foam dog beds)
- Eliminate (e.g. the middleman to sell sunglasses and pass the savings on to consumers)
- Reverse/Rearrange (e.g. a duffle bag so that it doesn't wrinkle your suits)

By asking these questions, you can come up with novel ways to transform existing ideas or even adapt them for a new target audience or problem. If you're still looking for your "aha!" moment, we also put together a list of sources for coming up with your own product ideas, from analyzing online marketplaces for inspiration to reinventing historical trends.

2. Research

With your product idea in mind, you may feel inclined to leapfrog ahead to production, but that can become a misstep if you fail to validate your idea first. Product validation ensures

you're creating a product people will pay for and that you won't waste time, money, and effort on an idea that won't sell. There are several ways you can validate your product ideas, including:

- Talking about your idea with family and friends
- Sending out an online survey to get feedback
- Starting a crowdfunding campaign
- Asking for feedback on forums like Reddit
- Researching online demand using Google Trends
- Launching a "coming soon" page to gauge interest via email opt-ins or pre-orders

However you decide to go about validating your idea, it is important to get feedback from a substantial and unbiased audience as to whether they would buy your product. Be wary of overvaluing feedback from people who "definitely would buy" if you were to create your theoretical product—until money changes hands, you can't count someone as a customer. Validation research will also inevitably involve competitive analysis. If your idea or niche has the potential to take off, there are likely competitors already operating in that space.

Visiting your competitors' website and signing up for their email list will allow you to understand how they attract customers and make sales. Asking your own potential customers what they like or dislike about your competitors will also be important in defining your own competitive advantage. The information compiled from doing product validation and market research will allow you to gauge the demand for your product and also the level of competition that exists before you start planning.

3. Planning/Develop

Since product development can quickly become complicated, it's important to take the time to plan before you begin to build your prototype. When you eventually approach manufacturers or start looking for materials, if you don't have a concrete idea of what you want your product to look like and how it will function, it's easy to get lost in the subsequent steps.

The best place to begin planning is with a hand-drawn sketch of what your product will look like. The sketch should be as detailed as possible, with labels explaining the various features and functions. You don't need a professional quality drawing since you won't be submitting it to a manufacturer at this stage. However, if you are not confident that you can produce a legible diagram that will make sense of your product, it is easy to find illustrators for hire on Dribbble, UpWork, or Minty.

Try to use your diagram to create a list of the different components or materials you will need in order to bring the product to life. The list does not need to be inclusive of all potential components, but it should allow you to begin planning what you will need in order to create the product. For example, a drawing of a purse design could be accompanied by this list:

- Zippers (large and small)
- Silver clasps
- Leather straps
- Protection pouch
- Embossed label

- Interior wallet

Along with the components, you should also begin to consider the retail price or category your product will fall into. Will the product be an everyday item or for special occasions? Will it use premium materials or be environmentally friendly? These are all questions to consider in the planning phase since they will help guide you through not only your product development process but also your brand positioning and marketing strategy.

The packaging, labels, and overall quality of your materials should be considered as well before you continue to the sourcing and costing stages. These will have an effect on how you market your product to your target customer, so it's important to take these aspects of your product into consideration during the planning phase too.

4. Prototyping/Testing

The goal of the prototyping phase during product development is to create a finished product to use as a sample for mass production. It's unlikely you will get to your finished product in a single attempt—prototyping usually involves experimenting with several versions of your product, slowly eliminating options and making improvements until you feel satisfied with a final sample.

Prototyping also differs significantly depending on the type of product you are developing. The least expensive and simplest cases are products you can prototype yourself, such as food recipes and some cosmetic products. This do-it-yourself prototyping can also extend to fashion, pottery, design and other verticals, if you are lucky enough to be trained in these disciplines.

However, more often than not, entrepreneurs will work with a third party to prototype their product. In the fashion and apparel industry, this usually involves working with a local seamstress (for clothing and accessories), cobbler (for shoes) or pattern maker (for clothing). These services can usually be found online by Goggling local services in the industry.

Most large cities also have art, design or fashion schools where students are trained in these techniques. Administrators from these university or college programs can usually grant you access to their internal job board where you can create a request for prototyping help.

For objects like toys, household accessories, electronics, and many other hard-exterior objects, you may require a 3D rendering in order to make a prototype. Artists or engineers who are trained in computer-aided design and drafting (CAD) software can be contracted to do this, using Up Work or Freelancer. There are also user-friendly online tools such as SketchUp, Tinker Cad and Vectary, for founders who want to learn how to create 3D models for themselves.

5. Sourcing/Analysis

Once you have a product prototype you're satisfied with, it is time to start gathering the materials and securing the partners needed for production. This is also referred to as building your supply chain: the vendors, activities, and resources that are needed to create a product and get it into a customers' hands.

While this phase will mainly involve looking for manufacturing-related services, you may also factor in storage, shipping, and warehousing into your choices at this stage. In Shoe Dog, a memoir by Nike founder Phil Knight, the importance of diversifying your supply chain is a theme that is emphasized throughout the story. Finding multiple suppliers for the different materials you will need, as well as different potential manufacturers, will allow you to compare costs. It also has an added benefit of creating a backup option if one of your suppliers or manufacturers doesn't work out. Sourcing several options is an important part of safeguarding your business for the long-term.

When looking for suppliers, there are plenty of resources both online and in person. While it may seem old-fashioned, many business owners choose to attend trade shows dedicated to sourcing. Trade shows like Magic in Las Vegas, provide the opportunity to see hundreds of vendors at once—to see, touch, and discuss materials and build a personal relationship with suppliers, which can be valuable when it comes time to negotiate prices.

During the sourcing phase, you will inevitably come across the decision of whether to produce your product locally or overseas. It is a good idea to compare the two options, as they each have their own advantages and disadvantages.

The most commonly used sourcing platform for overseas production is Alibaba. Alibaba is marketplace for Chinese suppliers and factories, where you can browse listings for finished goods, or raw materials. A popular way of using Alibaba to find a manufacturer is to look for listings with similar products to your own, and then contact the factory to see if they can produce your specific design.

6. Costing/Into

After research, planning, prototyping, and sourcing is done, you should have a clearer picture of what it will cost to produce your product. Costing is the process of taking all of the information gathered thus far, and adding up what your cost of goods sold (COGS) will be, so that you can determine a retail price and gross margin.

Begin by creating a spreadsheet with each additional cost broken out as a separate line item. This should include all of your raw materials, factory set up costs, manufacturing costs, and shipping costs. It is important to factor in shipping, import fees, and any duties you will need to pay in order to get your final product into the customers hands, as these fees can have a significant impact on your COGS depending on where you are producing the product.

PRODUCT PLANNING:

A product is a bundle of utilities consisting of various product-features and accompanying services expected to yield satisfaction or benefits to the buyer. The word goods is also used frequently to mean product.

It is said that nothing happens in our economy unless there is sale or purchase of a product. Product is the soul of all our marketing activities. Without a product, marketing cannot be imagined. Product is a tool in the hands of the management through which it gives life to a marketing programme. So, the main responsibility of the management should be to know its product well.

In short, the importance of the product can be judged from the following facts:

1. Product is the central point for all Marketing Activities

Product is the pivot and all marketing activities revolve around it. Marketing activities, selling, purchasing, advertisement, distribution, sale promotion are all useless if there is no product. It is a basic tool by which profitability of the firm is bargained.

2. Product is the starting point of planning

No marketing programme shall be prepared if there is no product because planning for all marketing activities price, distribution, sales promotion, advertising, etc., is done on the basis of the-nature, quality and the demand of the product. Product policies decide the other policies.

3. Product is an End

The main objective of all marketing activities is to satisfy the customers. Various policy decisions are to provide the customers benefits, utilities and satisfaction through a product. Thus, product is an end (satisfaction of customers) and the producer, therefore, must insist on the quality, size, etc., of the product so that it may satisfy the customers' needs. Though low-quality products are available, their life will be very short as they fail in satisfying the customers' needs. **Elements of Product Planning**

1. Research prior to production

Before making a decision to manufacture a new product, market research should be carried out extensively. The company must know beforehand what should be produced and for whom? It must decide on the characteristics of the product that can meet the requirements of the people.

2. Possibility of production method

What kind of production method would be followed and is it practicable to develop exactly what the consumer wants? This possibility should also Ъe examined before taking a decision of producing a new product.

3. Modification in existing lines

The existing producing lines should also be diagnosed to ascertain whether they can be improved upon to meet the new requirements of the consumer or a new product to be developed. If it is possible to modify the existing line, then to what extent it should be done?

4. Elimination in the product

Product planning involves the decision of elimination of unprofitable product line so that the resources may be used to some products profitably.

5. Improvement in the product

Product planning includes decision regarding the improvement of existing product in terms of quality, packing etc., taking into consideration the competitors' strategies in the market.

6. Price Determination

Determining the price of the product is one of the main elements of the planning. Would the price be fixed based on the basis of the prices of competitors for the same product or on the basis of cost of productioп or on the basis of the forces of its demand and supply in the market? This is an important decision to be taken by the management concerning product planning.

7. Commercialization of product

Product planning includes products commercialization and sale of product which can earn a good profit for the company on one hand and satisfy the needs of the consumers on the other. It also provides for the attractive introduction of new products in the market.

8. Coordination

Product planning also attempts to coordinate the various products and their efforts so that the company can maintain or improve its competitive position. It can be achieved by taking timely decisions from time to time. Thus, it is clear from the study of various elements of product planning that every decision from the start of an idea of producing to its execution from the product line forms the part of the product planning.

Importance of Product Planning

1. Starting Point for Marketing Programme

All the decisions made of an enterprise are directly or indirectly affected by product planning. For example, if a marketing programme is prepared without considering product planning, it cannot be expected to be successful. Therefore, it is necessary that product planning must be completed before preparing marketing programmes.

2. Symbol of Managerial ability

Product planning is a process which embraces allthe other efforts of an enterprise to forecast different aspects of product planning such as:

- Can the product satisfy the needs and wants of consumers?

- Can the product face competition?
- Can the consumers pay the price for the product?
- Can the enterprise earn desired profit?

If the reply to all the above questions is affirmative, a decision is taken to produce it, or else, it is decided otherwise. Therefore, the process of planning is considered a symbol of managerial ability. If an enterprise does not undertake the process of product planning, it implies managerial bankruptcy(is a legal process that allows individuals or entities who cannot repay their debts to seek relief from some or all of their financial obligations. It typically involves filing a petition in court, where the debtor's outstanding debts are assessed and managed.) in the organization.

3. To meet Social Responsibilities

It is true that the ultimate objective of every business and industrial enterprise is to earn maximum possible profits but at the same time it is also true that this cannot be the sole objective of an enterprise. Every business bears a great deal of responsibility of meeting and fulfilling the social requirements and expectations. Moreover, the objective of earning maximum profits can also be achieved only by fulfilling these social expectations. Such a fulfillment is possible only through product planning because the process planning decides upon the nature and characteristics of products that may fulfill these expectations. Thus, it can be said that product planning is a tool of meeting social responsibility.

4. Helpful in facing the Competition

Product planning is regarded as a competitive weapon because the success of marketing efforts of an enterprise depends upon the extent to which its products can face stiff completion in the market. Many decisions are taken in the process of product planning for improvements and changes in products so that the challenges in competitive situations may be met successfully.

5. Wide Scope

Product planning is important because many decisions are taken in the process of product planning. These decisions are — development of a new product, expansion or contraction of product mix, improvement in the product, determination of brand, label, packing, color, design, size and price, etc. Thus, the scope of product planning is very wide.

The above discussion makes it clear that product planning is of great importance for an enterprise and the success of all the marketing efforts of the enterprise depends upon it. Therefore, it can be concluded that product planning is the foundation of the production and marketing programmes.

INNOVATION IN PRODUCT DEVELOPMENT

Sometimes in business, certain terms become so ubiquitous that we forget what they mean or why they even matter in the first place. In the daily scramble to keep pace with change, the most basic concepts can get lost to the trends, buzzwords, and disruptions that capture our increasingly scattered attention.

If new product innovation has become a little murky or meaningless to you, then you might need a reset. So let's remedy that.

According to Business Dictionary, "product innovation" is defined as "the development and market introduction of a new, redesigned, or substantially improved good or service." It's not only about developing something new and original, it's also about taking what's already there and making it much better. In other words, not everyone has to be the first to invent driverless cars, but someone has to be the first to make them better.

Unit-V

DESIGN THINKING IN BUSINESS

5.0. Design Thinking applied in Business & Strategic Innovation,

- Innovation in the 21st century identifying the right questions and developing suitable solutions. These must be suitable to address challenges such as dynamism, complexity and uncertainty.
- Reflections on human-centred development as well as design processes and methods provide valuable insights for the design of services, products and organizational forms- on a scale from start-ups to large companies
- Designing is more than creating products and services; it can be applied to systems, procedures, protocols and customer experiences.
- A Design mindset is not problem-focused, it is solution-focused and action-oriented. It involves both analysis and imagination.
- People need their interactions with technologies and other complex systems to be simple, intuitive, and pleasurable.
- Human-centred design enhances the user experience at every touch point and fuels the creation of products and services that deeply resonate with customers.
- Design Thinking Consists of a collection of methods that are common in engineering, ethnologic and anthropologic research, industrial design and Business Economics.
- Design Thinking is a systematic approach to innovation that can produce new products, services and business models.
- Design Thinking is way of solving complex Business problems using empathy, ideation and prototyping or experimentation.
- Its methodology has helped businesses ranging from start-ups to larger organizations tap into their target markets by acting on changes in behaviour and environment
- Successful applications of design Thinking in such diverse areas as politics, diplomacy, leadership, business, health, law and writing.
- Design Thinking has been recognized as an important means to innovate in the context of Developing new products and technologies
- Design Thinking be applied to Business-related challenges such as Devising entrepreneurial practice models, Expanding Professional Services, operations, and even setting fees or pricing plans.
- The value and power of design Thinking in the corporate world have been widely published but are primarily focused on teams –especially managers collaborating with Designers

- According to Michael Tardif (expert Designer) quoted “strategic plan as a jigsaw Puzzle”

- In design thinking process for business challenges the following points helps in analysis of problem.
    - Every problem has a solution, not a perfect solution, but an optimum solution (always trade-off)
    - The information needed to solve any problem is not available when designer start working on the problem.
    - Designers have to begin developing solutions before they have all the information their need to arrive at an optimum solution.
    - The design process may lead to one or more dead ends, which may require to rethink the original assumptions.

5.0.1. Design thinking in Business process modelling:

- Business process management is very important for any organization. It facilitates to improve merits in operational procedures in daily business of organizations by providing concepts and methods to capture process and analysis.
- It has evolved as organisational approach to structure and understands work procedures with more clarity to drive the daily business operations with the goal of improving them.
- e.g. an insurance company processing of insurance claims. If five minutes time is saved on an average in the processing time of a single claim, considerable resources can be saved on a large number of cases that an insurance company deals with daily.
- From business process management perspective, information about the persons, conditions of insurance to be gathered to perform the tasks for processing a claim. The process can reveal flaws and improvements for fast analysis and efficient processing.
- Design thinking can be used to capture and validate end-users needs and envision new products and services for building prototypes. In the absence of design Thinking such tangible prototypes are not feasible for complex software systems with multiple users.

- In design thinking the first step is to get the requirements of a system for users, customers and other stakeholders.
- Process models facilitate communication between different stakeholders such as business analysts, process participants and software architects.
- These models provide a shared understanding to enable all stakeholders to contribute to knowledge.
- Obtaining information and making process knowledge explicit is the function of business process modelling.
- The models are captured as visual diagrams.
- Process models provide information on roles, tasks, decisions, and information used.
- These models form the basis for discussions between the stake holders, such as process assistants that who process in claims in an insurance company, managers to ensure claim processing quality, the top management looking for optimization and software architects supporting work of the employees by providing adequate software systems.

*****Everything has changed, is changing and will continue to change*****

- In 1960 MIT professor, mathematician, and Meteorologist Edward Lorenz formulated a model of the way air moves around the atmosphere, measuring changes in temperature, pressure, and velocity.
- By Modelling Weather, Lorenz discovered not only the fundamental mechanism of deterministic Chaos – the sensitive dependence on initial conditions or the "butterfly effect"-but also that long term weather forecasting was impossible.
- Similarly, much of what do in business strategy and planning is an attempt to predict the future based on the present and past.
- Whether it is Business or any other systems-level organizational challenges, design thinking helps to appreciate and make sense of the complex connections between people, places, objects, events and ideas.
- Design Thinking is most powerful driver of innovation, and guides long-range strategic planning.
- Design thinking shapes business decisions that have to be based on future opportunities rather than past events.
- Innovation management is about more than just planning new products, services, brand extensions, technological inventions or novelties.
- Design Thinking powers strategic innovation.it can be used to begin at the beginning of an idea or used to unlock hidden value in existing products, services, technologies, and assets.

- Changing Management PARADIGMS

20th century	→	21st century
Scale and scope		Speed and Fluidity
Predictability		Agility
Rigid organization Boundaries		Fluid Organization Boundaries
Command and Control		Creative Empowerment
Reactive and Risk Averse		Intrapreneur
Strategic intent		Profit and purpose
Competitive Advantage		Comparative Advantage
Data and Analytics		Synthesizing Big Data

- Design Thinking is a way to get Business people to think like designers and designers to think like business people.
- Design Thinking is the search for a magical balance between business and art, structure and Chaos, intuition and logic, concept and execution, playfulness and formality, and control and empowerment.
- Design Thinking is about cognitive flexibility, the ability to a adapt the process to the challenges
- Design Thinking is not an experiment; it empowers and encourages to experiment.
- Design thinking is popular among educators and social entrepreneurs for social innovation because it approaches problem solving from the point of view of the end user and calls for creative solutions

*****The illiterate of the 21st century will not be those who cannot Read and write, but those who cannot Learn, unlearn and Relearn. —Alvin Toffler*******

- Applying Design Thinking to business problems empowers organizations and individuals within them to better understand their competitive and operational environment.
- Strategy planning is predicated on the availability of information.
- In the past there were not enough data to support meaningful analysis. today, it is the opposite thanks to big data.
- What are big data? Typically describe in terms of three key things-
  - The volume of information (the amount from all the sources)
  - The variety of information (the nature of the information in all formats)
  - The velocity of the information (the speed at which data are collected)

- Big data might be helping some companies with making smarter strategic decisions, but they are also leading those companies down the quantitative path that has made it so hard for them to design for humans in the first place.
- Management tools, and techniques such as total quality management, enterprise resource planning, six sigma, lean startup, and agile systems.
- These tools are valuable for keeping an enterprise running smoothly.
- Companies such as Apple, Amazon.com, Netflix, Samsung, Burberry, And BMW are winning by design and the thinking behind that design.
- "Management is the least efficient activity in organization". It can make strategic management efficient only if make it clearer. Sometimes, that clarity comes only from the inside.
- Applied design thinking in Business problem solving incorporates mental models, tools, processes, and techniques such as design, engineering, economics, the humanities and the social sciences to identify, define and address business challenges in strategic planning, product development, innovation, corporate social responsibility, and beyond.

5.1. Design Thinking principles that redefine business:

- Humankind has survived thus far because design can work well together, communicate, empathize, anticipate, understand, and exchange. Design thinking is a reflection of these abilities.
- The culture behind its practices, principles, and process is potentially more empathetic, human-centered, and courageous than business management.
- A multifunctional and multi perspective approach to solving problems has influenced many of the principles inherent in design thinking.

The Ten Design Thinking principles that redefine business or business management are:

1. Action -Oriented:
   - It proposes a cross-disciplinary learning-by-doing approach to problem solving.
   - It allows designers to accommodate varied interests and abilities through hands-on and applied learning experiences between individuals.
   - A big part of design thinking is design doing.

2. Comfortable with change:
    - It is disruptive and provocative by nature because it promotes new ways of looking at problems.
    - A large part of the design thinking process is stepping out of conventional roles and escaping from existing dogmasto explore new approaches to problem solving.

3. Human-centric:
    - It is always focused on the customer or end user's needs, including unarticulated, unmet, and unknown needs.
    - Design Thinking employs various observational and listening-based research techniques to systematically learn about the needs, tasks, steps, and milestones of person's process.

4. Integrates foresight:
    - Foresight opens up the future and invites designers to explore uncertainties.
    - It encourages designers to be comfortable with working with unknowns and expects designers to cope with inadequate information in the process of discovering and creating a tangible outcome.

5. A Dynamic Constructive Process:
    - It is iterative
    - It requires ongoing definition, redefinition, representation, assessment, and visualization.
    - It is a continuous learning experience arising out of a need to obtain and apply insights to shifting goals.
    - Prototyping, creating of tangible sharable artifacts, become an important piece of the design thinking tool.

6. Promotes Empathy:
    - design Thinking encourages the use of tools to help designers communicate with people in order to better understand their behaviours, exceptions, values, motivations and the needs that drive them and will improve their lives.
    - designers use these insights to develop new knowledge through creative learning and experimentation.

7. Reduces Risk:
    - Whether it is developing and launching a new product or service, there are many benefits in learning from small and smart failures.
    - this is will always happen, but applied design thinking practices help reduces risk by considering all factors in development ecosystem, including technology, the market, competitors, customers, and supply chain.

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8. Create Meaning:
    - Creating meaning is the hardest part of the design process, and the communication tools used in design thinking-maps, models, sketches and stories -help capture and express the information required to form and socialize meaning.
    - Arriving this takes time and emerges through multiple iterations and conversations.

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9. Bring Enterprise creativity to next level:
    - Design thinking fosters a culture that embraces questioning, inspire frequent reflection in action, celebrates creativity, embraces ambiguity, and creates visual sense making through interactions with visualizations, physical objects and people.
    - Design thinking organization creates strong 'inspirationalization" and sensibility to give tangibility to the emotional contract that employees have with organizations.

10.
11. New Competitive Logic of Business Strategy:
    - Design thinking is the most complementary practice that can be applied side by side with Michael porter's theory of competitive strategy.
    - It allows companies to create new products, experiences, processes and business models beyond simply what works.
    - It turns designers into desirable products, which is a truly sustainable competitive advantage through innovation.

5.2. Various business challenges are:

- Growth

- Predictability

- Change

- Maintaining Relevance

- Extreme competition

-

- Standardization.

- Creative culture

- Strategy and organization

5.2.1. Business Challenge 01: Growth

- Growth is at the forefront of every business leader's mind.
- The process of redefining the boundaries of business and making explicit decisions regarding who it will and will not serve often sparks intense debates around any growth strategy.
- Most organizations, however, aspire to grow in order to prosper, not just survive
- Growth means different things to different organizations.
- There are many dimensions a company can select to measure its growth
- Although the ultimate goal of most companies is profit, other financial data may be used as indications of growth.
- Growth is also the very essence of entrepreneurship, including corporate entrepreneurship
- Most businesses develop specific plans that, over time, will move their business to a level that meets the goals of the executive team, the shareholders, and the investment community.
- GROWTH NEEDS A STRATEGY, AND EVERY STRATEGY NEEDS A STORY
- Growth means creating a clear and compelling vision of the future.
- Your vision needs to be very clear in terms of what you want from your business
- The questions
    - How do we plan to attach an adjacency?
    - How do we become the market leader?
    - How about expanding to multiple geographies?
    - And what's in it for managers and employees?
    - Ultimately, the most meaningful yardstick is one that shows progress with respect to an organization's stated goals, whatever they are.
    - So how do you develop your organization's stated goals?
    - How do you develop the vision of where you want the organization to be in the future?

Design Thinking Approach for Business Challenge (Growth)

- People who most successfully practice design thinking are curious, imaginative, and filled with wonder
- Stories reveal the hopes, dreams, and aspirations of authors, readers, populations, and cultures. They can also reveal the hopes, dreams, and aspirations of large organizations

- Every time a large-scale change effort fails, it's because management fail to connect with mid-level executives and employees in a meaningful way.
- Good storytelling is a technique where a leader is tasked with reframing an organization's past, present, future, problems, needs, desires, and hopes using a narrative built on salient metaphors to help people understand and connect with the company, its values, and its purpose
- Storytelling is a technique to harmonize the company's vision and translate the key elements of a strategy into a compelling and accessible narrative that connects the past with the present and the future in a cohesive way.
- How to tell a story:

  Make it collaborative:

  Whether you engage multiple stakeholders in shaping the narrative and its presentation through some form of crowdsourcing or co-creation or you simply gather input from employees at every level through informal conversations, it's important to ensure that elements of what you are about to tell resonate with the audience

  Make it engaging:

  Consider the simple power of videos, the tangibility of beautiful print, or out-of-office immersions in spaces or places that will inspire people through new
  experience.

  Make it structured:

  storyteller and the audience know this structure, they are able to focus on the content of the story

  Make it performative:

  A storyteller engages an audience through an oratory recounting of a narrative. An effective storyteller does not simply speak the words but rather brings them to life by leveraging dramatic techniques such as body language, tone, tempo, and timing.

  Make it tangible:

  To help illustrate intentions and what the future might look like, consider how technology demonstrations, prototypes, and other see able and touchable artifacts can signal the strategic intentions of the organization and articulate how to move, grow, and transform in a particular direction

Make it fun:

Build interactive narratives in the form of games or simulations that enable the audience to encounter stories in a holistic, self-guided, interactive way

Make it real:

Fictiveness refers to how true a story may be. The fictiveness of a story is related to its plausibility, its applicability, and its potential to explain something.

Interpretation of design thinking to Growth challenge:

- These frameworks allow people to benefit from empathetic role-play and explore the goals, choices, decisions, motivations, actions, and successes and failures in a more intuitive way
- Paths toward organizational transformation and growth can be communicated effectively through the development of characters, personas, artifacts, and future-oriented archetypes that sit within familiar narrative structures
- Stakeholders can easily identify, engage, debate, or learn by exploring their choices, actions, and experiences within a variety of contexts and situations
- Narratives tie the past, present, and future of an organization together

5.2.2. Business Challenge 02: Predictability

- Business strategy is about finding the balance between two things: predictability and malleability
- Malleability is the extent to which the external environment can be influenced and shaped by the actions of companies or industries
- Predictability is the extent to which the future of the external environment can be forecast or predicted, which depends on the degree of complexity and speed of change.
- strategic planning "has always been about analysis, breaking down a goal or set of intentions into steps, formalizing those steps so that they can be implemented . . . and articulating the anticipated consequences or results of each step.
- strategic thinking is about synthesis
- intuition and creativity are the tools that shape a vision of where an organization can or should be going.
- "The best way to predict the future is to create it" Peter F. Drucker

- Most organizations strive to achieve a value-adding level of predictability by implementing measurable, repeatable, familiar business processes.
- predictability allows companies to improve efficiency, effectiveness, and productivity while gradually reducing costs.
- The only true way to maintain a useful level of predictability is to actively engage in the shaping of the organization's future
- By studying, developing, and visualizing forward-looking scenarios,an organization can equip and prepare itself for tomorrow

Design Thinking Approach for Business Challenge (Predictability)

- Strategic Foresight
- To face the unknown, businesses must adopt a different approach to predictability. The ability to manage the uncertainties of the future is critical to planning for growth or survival.
- Because of the rise of the innovation society, new technologies, and a rapidly globalizing economy, business leaders are forced to deal with not only the speed of change but also massive new complexity, uncertainty, and paradox on a global scale
- Most managers appreciate and understand the value of strategic foresight but don't know how to make it tangible enough or integrate it into business strategy
- Strategic foresight is not "planning"; it's one of the many inputs for planning
- Strategic planning needs to consider a multitude of factors in the present competitive and operational environment and then extrapolate the data into a possible future that is based on a rigorous reading of weak signals.
- Strategic foresight is a deliberate and systematic process concerned with establishing well-informed future-oriented perspectives that help guide and inspire innovation, planning, and decision making
- WHY DOES BUSINESS NEED STRATEGIC FORESIGHT?
  - To help to prevent or prepare for surprises.
  - To help to establish and maintain competitive advantage.
  - To positively influence and support innovation.
  - To empower and engage.
- Foresight is an iterative and cumulative learning process that employs the design thinking tool kit, which includes environmental scanning, context mapping, archetype creation, and scenario development.

- To help organizations win that race there are many foresight tools, processes, and methods that can be employed, most of which begin with weak signals.
- In the 1970s, Igor Ansoff, an applied mathematician, business manager, and the father of strategic management, noticed that failures in strategic management were causally linked to organizations overlooking vague, anomalous, ambiguous, yet critical information.
- To rectify that, he developed the weak signal theory
- For him, weak signals represented change or the potential for it.
- These signals are not facts or trends. Rather, as signs of new and emerging capabilities that could disrupt or transform existing norms, they represent subtle changes in reality that will manifest in individual or organizational behaviours, needs, desires, or values.
- Weak signal study
    - Weak Signal Scanning
    - Weak Signal Processing
    - Weak Signal Amplification
    - Context Mapping
    - Scenario Development

Interpretation of design thinking to Predictability challenge:

- Technology scanning looks beyond popular tech-media and out into the labs, start-ups, universities, and garages of inventors to collect, analyse, and interpret the functional characteristics of emerging technologies.
- These technologies and the potential they carry may someday transform or disrupt existing models, behaviours, and relationships.
- The strategic planning approach in most corporations is still heavily biased toward single point forecasting.
- The existence of this mind-set will not benefit from multipoint forecasting and scenarios and likely cause more confusion and disbelief.
- They need to be ready to accept that there is no definitive scenario and to review each scenario to determine the optimal setting for each strategy component

5.2.3. Business Challenge 03: Change

- Change is the heart of leadership, and leaders must understand its context before designing and implementing any change program.
- Organizations need to plan for change. At a minimum, they should be able to effectively react to problems as they arise
- Simply stated, an organization that not only is prepared for but expects change is one that can overcome challenges.
- where change is reshaping industries and categories. Whether it's the bursting economic bubbles of the past decade, shifts in regulations, competition from emerging markets, new consumer expectations, or the impact of consumer conversations on the role, value, and legitimacy of brands
- The research and literature on change indicate that the number one reason for the success or failure of a change initiative hinges on the leadership skills, level of energy, and knowledge of the individuals responsible for leading the change.
- For many companies, this resistance to change is the beginning of a slow and continuous decline. Products become obsolete. Brands become irrelevant. Organizations become complacent.
- Organizational change ultimately comes down to dealing with three components
  - Discrepancy
  - Appropriateness
  - Efficacy

Design Thinking Approach for Business Challenge (Change)

- Sense making is a required capability for developing change competency.
- A plan is needed—not just as a reaction to change, but also in anticipation of it.
- It is important to realize that you will need to apply other design thinking tools and techniques to change as well.
- Sense making can be a one-time or continuous effort to understand connections and insights in any particular context in order to anticipate their impacts and then act effectively on them
- sense making takes an obscure situation that is clouded inuncertainty and complexity and makes it more understandable for decision makers
- Here, neither the frame nor the data are locked into place

- The frame informs the data, and the data, in turn, inform the frame. Sense making is more than just a process; it's a mind-set that is instrumental in the commitment to understanding, learning, and improvement.
- In business contexts, the design thinking approach to sense making tends to lean toward the qualitative, rather than the quantitative
- Design thinking employs sense-making techniques to understand, question, and confront change so that businesses can actively construct, rather than be passive victims, of the imminent
- Sense making is the process by which design thinkers understand experience
- Sense making is as much about pattern recognition as it is about anomaly detection.
- Through sense making, organizations can get a better sense of the timing required to design and launch a new product or service
- how does an organization redesign itself in order to incorporate an internal sense making capability?
    - Improve the senses to increase agility
    - Collect the real data
    - Building sensing capabilities
    - Cultivate sensing networks.
    - Leverage social media

Interpretation of design thinking to change challenge:

- Sense making involves the process of creating mental models or mental maps that serve as memory representations with a salient visual imagery component expressed in terms of concepts, ideas, and knowledge.
- Every organization needs to find visual, interactive, and "movable" ways to organize the raw inputs of sense making that, well, make sense to it
- Sense making is not a linear exercise, and it is not a process that turns information into insight
- Sense making doesn't always have clear starting and ending points
- Visualization is often used interchangeably with sense making, but visualization is not just a shared image with intent;
- Visualization is central to sense making.

5.2.4. Business Challenge 04: Maintaining Relevance

- All brands need to establish visibility, purpose, meaning, and credibility to be considered relevant in a category
- Relevance is felt deeper and can create a clear divide between brands.
- Over time, brands must rethink and redefine the value that they bring to consumers
- The expectations of consumers are rising at the same time that many brands are becoming more resourceful and savvier at gaining attention and tailoring their unique selling propositions and reasons to believe to fit the market.
- But customers are becoming more demanding of companies to stay relevant to their ever-changing lifestyles.
- Relevance is extremely difficult to maintain long term.

Design Thinking Approach for Business Challenge (Maintaining Relevance)

- ~~Value redefinition is a design approach that helps~~ develop a new voice and meaning that will not only resonate with consumers but also sideswipe the competition
- Design thinking seeks relevance by promoting harmony with the identities, aspirations, attitudes, beliefs, needs, and desires that shape the ways people perceive and define value
- It aspires to develop greater empathy among people, brands, and business by observing, engaging with, and listening closely to people
- The design thinking approach to redefining value begins with people, not products
- It seeks to locate the functional, emotional, social, and cultural values that already exist within or can be designed into a brand's DNA and align those with the current and emerging values of consumers
- value is associated with a product, service, system, artifact, or relationship that provides a means to a desired end.
- Customer value is at the core of any competitive strategy and is often least managed, often resulting in individual marketing, brand, product development, and pricing decisions being made rather than a conscious strategic and design exercise being undertaken.
- starting point to clarify how customers perceive and define the value of your brand or business:
    - Identify the functional, social, cultural, and historical reasons that have driven value for your brand, product, or business.
    - Determine how your key customers rate you versus competitors on these value drivers

- Define and articulate each of these value drivers in the context of the users.
- Identify the rate of change on each of these dimensions and look for signals to confirm which ones are slowing down and which ones are accelerating.
- Conduct a workshop to identify opportunities to redefine value
- Design and conduct a participative design session in which you invite customers to talk about these dimensions to validate
- Analyse the results and conduct a value-mapping workshop to explore how to redefine value to change the competitive landscape.
- The success of Ikea, Netflix, Zipcar, Nintendo, Amazon.com, Salesforce .com, Zappos, and EasyJet are all classic examples of companies that have been successful in redefining customer value to change the game.

Interpretation of design thinking to Maintaining Relevance challenge:

- The following non exhaustive attributes when thinking about customer value.
- How can you solve my problem quickly?
- How can you solve my problem the way I want it?
- How can you solve my problem anytime, anyplace?
- How can you solve a problem for me that I don't want to know about?
- How can you solve a problem that I don't even know I have?

5.2.5. Business Challenge 05: Extreme competition

- Traditional competitive strategy often leads to further commoditization.
- If business decisions and their tactical approaches were made through purely logical and analytical means, our world would look very different
- Competition would be reduced down to highly predictable shifts
- Today, navigating those paths is more challenging than ever, thanks, in large part, to over commoditization.
- Although some products and brands stand apart from the crowd because of key factors such as craftsmanship, quality, heritage, and long-standing semiotics of value

- Innovating through experience design offers companies a high degree of differentiation in some of the most ubiquitous product and service categories.

Design Thinking Approach for Business Challenge (Extreme competition)

- Experience design is a holistic and multidisciplinary approach to creating meaningful contexts of interaction and exchange among users and products, services, systems, and spaces
- It considers the sensation of interactions with a product or service on physical and cognitive levels.
- Experience design is an established set of design thinking practices that, when performed properly, can enchant customers and create a sense of loyalty that will keep them keep coming back to you every time.
- Experience design highlights the importance of developing a clear understanding of consumer needs, cultures, expectations, assumptions, and capacities
- Design thinkers critically observe and evaluate the various experiences they encounter throughout their day and reflect on how one may differ from another by asking, what makes a better experience, and why?
- Design thinking seeks to explore the wiggle room between brands like these and transform it into a competitive chasm
- All experiences are functional, social, cultural, and personal
- They are important, relevant, and meaningful to people. They have a past, present, and even a future subject to reflection and reflexivity
- UNDERSTANDING THE FOUR KEY DIMENSIONS OF EXPERIENCE DESIGN
    - Determine the scope of the experience
    - Understand the intensity of experience
    - Identify the key experience triggers.
    - Deepen the customer's engagement to evoke meanings

Interpretation of design thinking to Extreme competition challenge:

- Every company provides a customer experience.
- The implicit problem is knowing what will work or not work in terms of emotional engagement and economic and operational feasibility.
- It begins with using customer journey mapping to visually illustrate an individual customer's needs and goals, the series of interactions and information necessary to fulfil those needs, and the resulting emotional states a customer experiences throughout the entire process.

- Customer journey mapping succeeds when these exercises are based on ethnographic research and contextual inquiry that allow researchers to experience and perceive the emotions of customers, thereby making it possible for managers to convey more than just anecdotal quotations.
- The outcome of the exercise shows how customers feel throughout their journey, and customer journey maps invite stakeholders to enter the world of customers and share in their experience.
- In turn, stakeholders are better able to convey their story to management and frontline employees.

5.2.6. Business Challenge 06: Standardization

- Standardization is a necessary cost driver for every company.
- It is a means to achieve operational, cost, and performance efficiencies by streamlining activities, leveraging technologies, and maintaining employee workflow to reduce operating costs
- But standardizing practices can mean losing the personal touch, reducing the choices customers have, and disconnecting employees
- To streamline operations and be as profitably productive as possible, every company seeks to better leverage the powers of enterprise technology, design rule-driven workflows, and automate repetitive tasks.
- It makes sense not to reinvent the wheel every time you need to go for a drive
- Like companies, many people prefer efficiency to inefficiency. We like reliability. We like consistency.
- When a company's primary focus is on making standardization its priority, it can lose sight of the emotional quotient of its brand and alienate consumers.
- Like people, companies are complex creatures, each with its own history, qualities, and characteristics that, when it comes to innovation
- Standardization can make internal processes more efficient and effective.
- It can clearly establish common goals of performance that every employee must meet
- It can provide common platforms that make a supply chain run faster and cheaper
- In some cases, the standardization of legacy manufacturing poses a big challenge to innovation.
- when the client's market research department has such a fixed and highly rigid way of approaching, thinking about, and talking about customers and how it identifies their so-called needs using words such as target, segment,

actionable, and the worst ever, reason to believe, standardization becomes the enemy of innovation

Design Thinking Approach for Business Challenge (Standardization)

- Design thinkers are sensitive to the human touch points that encourage and foster such emotions as profound moments of attachment to a product, service, or brand.
- The lack of humanization in experiences is not always purposeful but rather naturally occurs as standardization takes hold.
- Design thinkers remind businesses that they are ultimately responding to human values, beliefs, and needs
- They understand that efficiency and standardization will always have a place in business processes but recognize that it's the human touch points that resonate most in real-life customer experience to give products, services, and brands true value and meaning
- Understanding culture means unpacking all the social meanings (and emotions) that define a particular customer's experience
- Design thinkers unpack each coffee context in search of humanization opportunities
- Humanization doesn't just come from culture; it is also produced from within cultures
- Designers, like the businesses they work for, are people who impart social values and beliefs on the things they produce.
- Design thinkers seek to understand the cultures not only of others but also of themselves, recognizing that their own emotions, practices, and belief systems inform what, how, and why they do what they do.
- If all businesses are human enterprises that produce things made for human beings, it's time to start humanizing the business narrative
- Design thinking seeks to reinsert human-centered qualities that can introduce new meaning
- This means using real talk about the personal histories, dreams, and desires that define each worker, team, business unit, and office to produce human narratives of company culture that resonate worldwide

Interpretation of design thinking to Standardization challenge:

- One route to greater humanization is reassessing how your organization does research on consumers and talks about or represents them
- On the research front, consider hiring people who are specialists in human culture: sociologists, anthropologists, and other social scientists who specialize in understanding us without putting us in focus group facilities and looking at tracking studies.

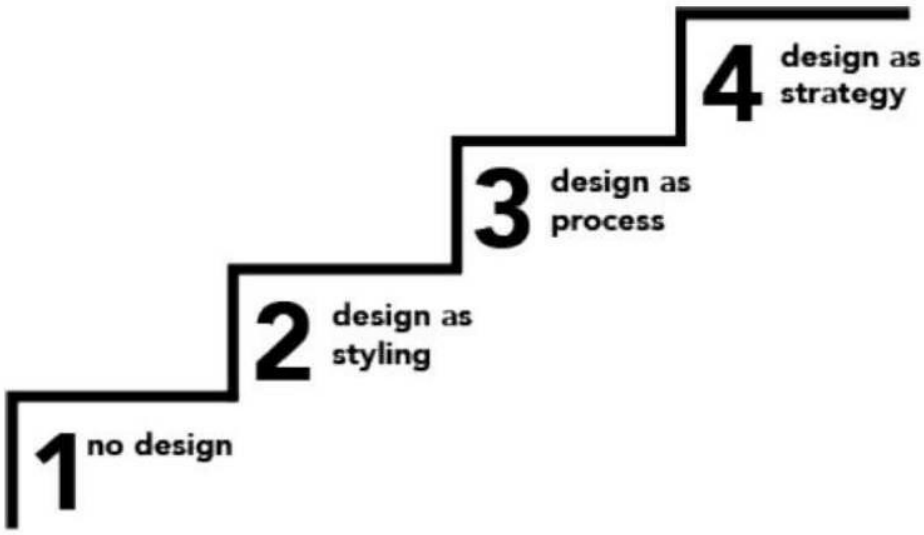
- Humanization can be leveraged by usability, human factors, customer experience design, and brand storytelling
- Brands that have been humanized attract and sustain communities of real live people and make customers more forgiving when organizations make mistakes.

Business challenges	Design thinking solutions
Growth	Story telling
Predictability	Strategic foresight
change	sensing
relevance	Value redefinition
Extreme competition	Experience Design
Standardization	Humanization
Creative culture	Prototyping
Strategy and organization	Business model design

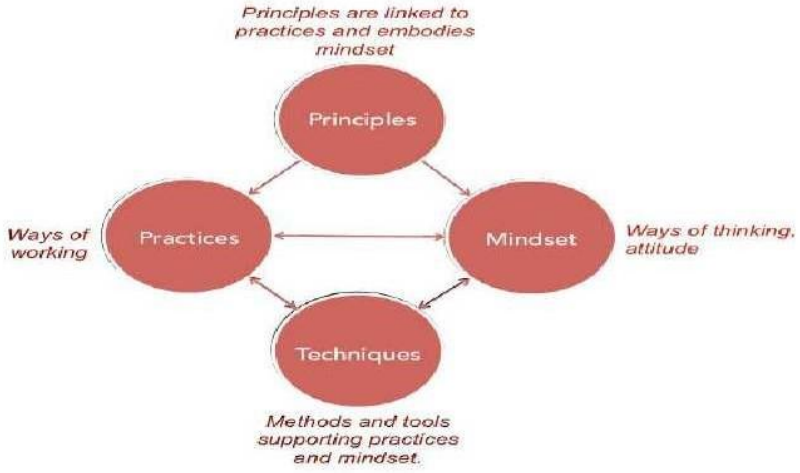
5.3. Design thinking for start-ups:

- Design thinking has been introduced as an innovation approach that brings creativity and user-centeredness to businesses.
- Companies are facing increasing pressure to differentiate their services and products to adapt to a rapidly changing economy
- The digital age has not only changed the way people do business but it has also changed the role of customers, who are transitioning from passive consumers to active influencers and trendsetters, emerging as makers and innovators themselves
- Due to advancements in technology, the barriers to start new ventures are now lower than ever before
- However, increasing global competition and changing customer behaviour brings new challenges to startups.
- Studies show that one of the reasons that startups perform worse is because they fail to use enough time on customer
- Businesses have begun to recognize the need for innovation as the key strategy that can help them gain and sustain a competitive advantage over their competitors.
- In this regard user-centered approaches to innovation, business have shown an increasing interest in the design thinking
- Design thinking's ability to solve complex problems and its human- centered focus can give start-ups the customer understanding that is critical for their success.

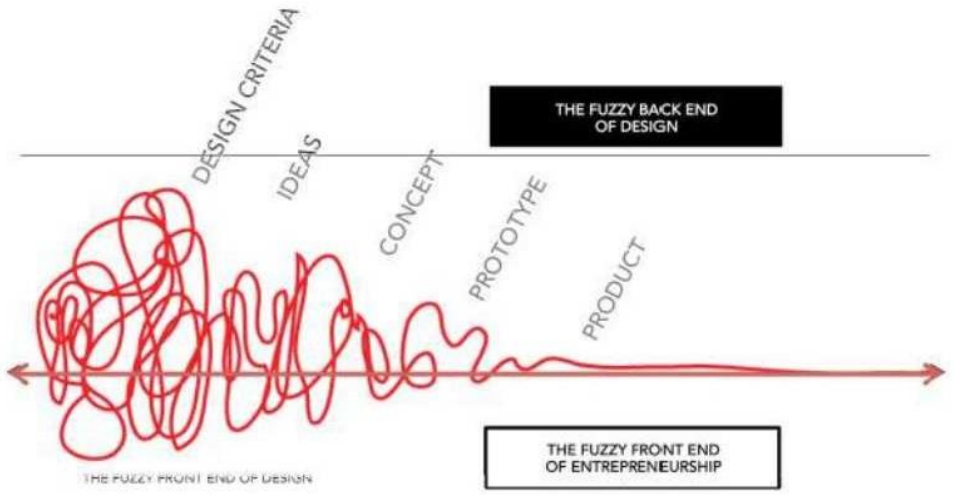
- There are considerable differences between large organizations and startups
- The differences between startups and large organizations means that the uses and challenges of design thinking applied to startups will be different too.
- They might face barriers such as limited capital and human resources and less formal product development and innovation processes that characterize small- and medium-sized firms
- The Design Ladder, developed by Danish Design Centre, is a scale developed to measure the level of design activities in businesses
- The Design Ladder that measures how the design is used in organizations



- At the first level, there are non-design companies, which rarely use design or design has no role in the organization at all.
- On the next level, design is used purely for styling and other aesthetic purposes in the organization. Another characteristic is that design is often applied as an add-on. These companies are typically product-oriented companies.
- Level three categorizes companies where design is integrated in the organization's processes, and includes design and designers from the start in new processes
- On the highest level, design is a strategy and part of the management
- The discussion of design thinking has been mostly associated with the design activities on the top, at level 3, design as a process and level 4, design as a strategy.
- The design ladder model is useful for understanding the distinctions between the different conceptions of design and showing how design thinking is related to design
- The conceptual model of design thinking adapted from Carlgren, Rauth and Elmquist



- This conceptual model aims to build an understanding of design thinking in practice and theory (Carlgren et al., 2016). to identify use of design thinking in the startups
- By collecting data from a survey of companies about the use design thinking and experts' interviews, across multiple industries and different organizations. It gives a picture of the current state of use of design thinking by looking at aspects of design thinking in practice.
- Ample evidence shows that startups are inherently different from large organizations, which leads to a different impact of design thinking.
- Design has strong focussed the front end where ideas are explored and created whereas entrepreneurship are mainly interested processes that transforms ideas into opportunities.
- The fuzzy front end of entrepreneurship and the fuzzy back end of design. Redrawn based on Nielsen and Christensen's depiction



- According to Blank startups as defined as "human institution designed to create a new product or service under conditions of extreme uncertainty",
- A startup is a young company founded by one or more entrepreneurs to develop a unique product or service and bring it to market

- Design thinking was applied to various contexts where the purpose was to explore opportunities
- But the two most mentioned were discovering business models and new product development
- However, new product development is the most usual. Particular for the design thinking program cases, which entailed design thinking projects with innovation in a new product development context.
- As a human-centered approach design thinking was used to understand the problems that designers are trying to solve and the stakeholders that are involved
- To acquire this insight, the startups had to get input from the users, which could be gathered by seeking out potential users, organize workshops where users were invited to participate or observe them.
- One of the most important applications of design thinking in startup was testing of assumptions.
- It was often prototyping that was used for testing assumptions and hypothesis that were defined beforehand.
- Implementations of design thinking will be described through processes and methods used in the startups
- The cases are structured in the three different design thinking contexts, startups in design thinking programs, startups with design founders and startups with external designers
- The aim of startups in design thinking programs was to introduce companies to a more systematic and methodological process to the discovery and innovation process and connect professional design competence from start of the process.
- The purpose of the programs is to test out design driven and design thinking approaches practice and use the experience from the projects to inspire other to also start using it.
- Design thinking founded companies: When the company was founded, the user-research started immediately, which called empathy, followed by a longer ideation stage prototype development of the product and website.
- The overall concept of the service/product under development are evolving in the beta phase, going through big iterations.
- Startups who use external designers: startup that hire external designer for their design processes
- The startup use external designers to cover design competence and services that the company lacks internally
- India is gradually moving towards the startup ecosystem. Therefore, in order to boost entrepreneurship, the government has created an entire ministry dedicated to helping new businesses.

- Startup India Initiative

- The Prime Minister of India launched the Startup India Initiative in the year 2016.
- It changed the definition of a startup in terms of the scale and the horizon. The idea is to increase wealth and employability by giving wings to the entrepreneurial spirit

5.4. Design thinking to meet corporate needs:

- Design thinking has become a pet phrase for many successful businesses today but its impacts are very circumstantial and differ for each industry
- It helps brands stay ahead of the curve by driving innovation in a business environment.
- A human-centric approach towards problem-solving makes it an effective bridge between brands and customers.
- Experts use it for enhancing both physical and digital experiences of products and services.
- Companies resorting to design thinking consider design much more than a phase or a department – in fact, it shapes the entire thought behind business goals.
- Building a design-optimised company culture will certainly drive more innovation and customer satisfaction.
- If designers are wondering how different industries benefit from design thinking, have compiled a list of case studies to help designers to understand how it can be applied in each context.

Defining and testing Business Models and Business Cases:

we wanted to understand the impact/uses of the design thinking method on the implementation and development of a business model in entrepreneurship learning. In Patton's (1990) view, all types of sampling in qualitative research may be encompassed as purposeful sampling. To realize our research goal, we adopted a qualitative multiple-case study approach. Partners in this study ("Respondents") represent the concept of design thinking in entrepreneurship learning in many different interpretations. We collected data from 43 college students of the franchise learning of the study program in Company Management of Parahyangan Catholic University, Bandung, Indonesia. Students were assigned a team project to create a business model. In this research, the gender of the respondents .Gender of Respondents In this research, the age of the respondents Age of Respondents (Years) The results of the assignments from college students are several business fields, mainly in the food, beverage, and fashion sectors Business Field of Respondents Content Validation Steps The process of content validation involves the following steps (Pandey and Chawla, 2016): 1. Reviewing of the background literature to identify existing construct dimensions and definitions of design thinking and entrepreneurship learning as well. 2. Conducting semi-structured and focus group discussions with members of the franchise students, entrepreneurship lecturer, franchisor and franchisee. 3. Coding, operationalization of constructs, and identification of design thinking and entrepreneurship learning items. To ensure that all relevant facets of a participant's constructed reality were explored, the researchers made sure that the following main questions were addressed at some point during the interview, without disrupting its flow: Q1 : What are the benefits and uses of the Stanford Design Thinking increating business model in entrepreneurship learning, especially in franchise leaning? Q2 : What are the benefits and uses of “Empathizing” in creating business model in entrepreneurship learning, especially in franchise leaning? Q3 : What are the benefits and uses of “Defining” in creating business model in entrepreneurship learning, especially in franchise leaning? Q4 : What are the benefits and uses of “Ideating” in creating business model in entrepreneurship learning, especially in franchise leaning? Q5 : What are the benefits and uses of “Prototyping” in creating business model in entrepreneurship learning, especially in franchise leaning? Q6 : What are the benefits, and uses of “Testing” in creating business model inentrepreneurship learning, especially in franchise leaning? The design thinking phase is used to guide the collection of exploration data during entrepreneurship learning, especially the Franchise learning for half a semester. FINDINGS Design Thinking Findings are presented according to each of the design thinking phases presented above in the Stanford Design Thinking Model: empathizing, defining, ideating, prototyping, and testing. The results presented herein, therefore, reflect a general order of events during the half-semester of the project. Design thinking is a methodology for creative problem-solving. The lecturers used it to inform their own teaching practice or a framework for real-world projects to the college students in class. This gives educators interested in teaching Design Thinking the first taste

of challenges they might run. Prior to the Stanford Design Thinking Model, students will usually do business directly focused on creating products first without finding out what consumers really need for the product to be created. All respondents have agreed that the Design Thinking concepts are essential and valuable in starting a business model in entrepreneurship learning, especially in the Franchise course. The benefits can be seen in :40.0% 35.0% 30.0% 25.0% 20.0% 37.2% 15.0% 10.0% 23.3 5.0% % 0.0% 2.3%2.3%7.0 % 7.0 % 4.9 % 9.3 % 2.3% 2.3% .The Uses of Stanford Design Thinking in Entrepreneurship Learning Phase 1: Emphasize As for the first step, college students have to acquire an empathic understanding of the problem they wish to solve. At this stage, an approach is taken to their customers to find out exactly what they want. The intent during this phase is to observe, listen and engage with the context or problem of interest. During this phase, we collected data using the satisfaction of the Design Thinking topic for a business model in entrepreneurship learning, especially in the Franchise course by questionnaire and the indepth interview protocol: a. Empathizing is a complex affective and cognitive response to other people's emotional distress. Empathy includes the ability to feel the emotional state of others, feel sympathetic and try to solve problems, and take the perspective of others. b. At this stage, students create a questionnaire and conduct interviews with prospective customers to find out "Needs" or "Expectations." Information that has been collected during the Empathizing phase both from questionnaires and interviews is analyzed and verified to determine the core problems to be identified. This defining phase will be beneficial to the process of resolving customer problems because the problem has been defined. The one-hour interviews were conducted a minimum of two times each based on an open-ended structure. Among the questions that the college students asked were: "Describe your business," "What are the customer wants/needs/ expectations of the product offered by the college students' business?" The uses of "Empathizing" from Stanford's Design Thinking in entrepreneurship learning, especially in the Franchise subject, shows Uses of "Empathizing" in Entrepreneurship Learning Phase 2: Define The second phase involves framing the problem by synthesizing what is understood and observed during stage 1. This phase also concludes/reconciles the problem by synthesizing observations of (prospective) consumer needs by carrying out data collection on Questionnaire and Interviews (up to in-depth interviews). Detailed data collection can be in the form of a pie chart or another table. This defining phase will be helpful to solve consumer problems because the problem has already been determined. The uses of "Defining" derived from Stanford's Design Thinking in entrepreneurship learning (especially in the Franchise subject) can be seen .The Uses of "Defining" in Entrepreneurship Learning Phase 3: Ideate The third phase involves developing a solution that will be tested based on the conclusions of the (prospective) consumer's needs at the "defining" stage before. All ideas will be accommodated to the process of resolving the problems that have been set. This Ideating Stage may not be the same as the initial idea of the business you want because it has considered the results of evaluating the needs of consumers, even though this could be a new idea or joint idea. The uses of "Ideating" from Stanford's Design Thinking in entrepreneurship learning especially in the Franchise subject .The Uses of "Ideating" in Entrepreneurship Learning Paper Assignment : college students applied a business analysis observation protocol to identify

behaviors, attitudes and stories that they observed among the consumers. Presentation : college students explored the ideas as a method to identify strengths and weaknesses in business model ideas. Coaching activity : each college student as a coachee will be accompanied by a coach to explore the potential of business people, not to direct their business model ideas. Mentoring activity : the mentor inspires college students in planning and guiding the ideas of business model. Phase 4: Prototype At this stage, some product versions will be produced (both goods and services) or special features found in the product so that they can investigate the solution to the problem arising at the previous stage. This prototype can be tested on its own, on the mentor/coach, or on several other people. When there are input, necessary improvements/repairs are made on this prototype so that an excellent final prototype is produced.The Uses of "Prototyping" in Entrepreneurship Learning Phase 5: Test Conducting testing and evaluation of products among the public/prospective consumers/mentors/ lecturers, which results will lead to changes and improvements to get rid of standard solutions to the problem and arrive at a deep understanding of the products and users. The Uses of "Testing" in Entrepreneurship Learning Design Thinking is not only suitable for the goods or services involving a product, but may also suit systems. This research might involve a change in curriculum, teaching methods, use of knowledge, teaching style, teacher-student relations, and assessment.

DISCUSSION :The research outcome has shown that design thinking has been extremely beneficial in creating innovative ideas and creativity, especially in creating a structured and well-planned business model within entrepreneurship learning in the franchise course. Thus, students were able to solve the problem in entrepreneurship learning. The main benefit of the empathize stage is that franchise course students no longer design business models based on what they like/wish but on what consumers need and want through the in-depth interview so that they were able to identify consumers' characteristics and market opportunities. Supported by the define stage, the benefits garnered is to create a point of view based on the empathize stage result, especially in summing up the majority of consumer needs and interests. The ideate process in design thinking within franchise learning is usually different from initial ideas generated by students. These new ideas are felt to be able to solve the problem and be more creative and innovative. The prototype, an implementation of the ideate stage, helps identify the strengths and weaknesses of a product, both goods, and services through trial and error. Product evaluation is conducted within the test stage implemented to lecturers/mentors/potential customers to improve product value after receiving positive and negative feedback. Most of student stated that learning Design Thinking in entrepreneurship learning on campus could be easily understood because it makes use of examples that have been practiced so that we can understand them properly. Suggestions from college students can be found below: 1. Spend more time so that business ideas can be more mature and ready to be realized; 2. Mentors who accompany must be able to understand more about the business; 3. Make groups (2-3 people) to save more time. Besides, if someone was forced because of value, she/he can enjoy a bonus/incentive for working overtime and enjoying doing business. The Benefits and Importance Ranking of the Business model Creation Process in Entrepreneurship Benefits and Importance Ranking of the Business model Creation Process in Entrepreneurship Learning Item Useful/ Useless Aim Rank Design

Developing & testing prototypes.

- Prototype testing is the process of testing your prototype with real users to validate design decisions before development starts. The goal is to identify problems and areas of improvement early so you can make the necessary changes prior to development and build a product that meets users' needs and expectations.
- Prototype testing is an essential part of the design and product development process. The way you go about testing your prototype depends on the type of product, where you are in the development process, your goals, and the resources available.
- Before you build your prototype and start testing, you should have a clear idea of what you want to validate. This will help you define the kind of prototype you need. Prototypes can vary in complexity, from low-fidelity sketches to fully functional and interactive prototypes. While low-fidelity prototypes are used for testing out concepts, high-fidelity prototypes are great for testing usability and identifying issues in the workflow.
- Once the prototype is ready, it's time to get it in front of your users. When you run the test, try to recruit participants that are representative of your target audience. By watching how users interact with your prototype and listening to their feedback.The insights gathered will allow you to iterate and create a better product.

Benefits of testing a prototype?

There are many benefits to prototype testing, including launching a product confidently, knowing your design works and has been validated with real users before release, and finding and fixing major usability issues at the design stage. Let's look at the five main benefits of testing your prototype.

1. Find issues in your design

Imagine launching a product and then realizing that people take a lot of time finding the "confirm" button. That's going to be a headache to solve when it's already live and coded. By testing your prototype, you can find these "black holes" in your design before it goes live and patch them up.

For instance, Yuna Akazawa, Product Designer at Braze, tested two versions of a prototype with users which helped her determine the best user flow and placement of a "Media upload" preview on the page.

2. Test your hypotheses

By testing your prototype with real people, you get to examine and refine your ideas early in the product development process and launch confidently.

3. Get invaluable customer feedback early

If your customers' experience with your product isn't great, you will be met with negative feedback sooner or later. By getting input from real people before you release, you can avoid negative user experiences and feedback when you launch your product. Caitlin shares why early feedback is so valuable:

4. Save a whole lot of $$$

It’s cheaper to fix a design in the prototype stage than when you’ve coded the product and it’s already launched. In fact, it can be 100 times more costly if you have to fix the problem post-launch. Furthermore, you can save up to 50% of rework time if you have a solid prototype testing regime in place.

5. Get stakeholder buy-in

Say the marketing department isn’t keen on a redesign, but the PM backs up the idea all the way. By testing a prototype with users, you can use quantitative and qualitative user research to get buy-in and back up decisions with data at the design stage.

TYPES OF PROTOTYPING TESTING:

Low- to medium-fidelity prototype testing

The sooner you get your users to view your design work, the better. Lo-fi prototype testing happens at the earliest stages of the design process with a paper prototype or basic wireframe.

With a low-fidelity prototype, you can test:

- If the layout of the design makes sense to other people
- Experiments in your initial design—you might have two or more design ideas, test them out here
- The hierarchy of your information architecture
- Basic interactions with the design. You can mimic these manually or through a prototype testing tool.

As you move onto your medium-fidelity designs, you should be taking all the user feedback onboard, polishing your design up, and begin to add some early-stage copy. You want to really validate your concepts here—test early and test often.

High-fidelity prototyping

After you’ve made your changes in the prototyping tool based upon the findings of your low- to medium-fidelity tests—it’s time to get user feedback on your hi-fi design.

At this stage, you should be pretty confident with your design—any big issues should have been solved during earlier tests. You shouldn’t be looking for huge UX flaws, instead, this hi-fi prototype test should be a final step in your design testing process to truly validate your final iteration and to uncover any hidden usability issues before handing over the designs to the development team.

With a hi-fi prototype, you can get insights on:

- The overall design direction of a new product or feature
- The copy: does it add value to the user experience?
- The user flows: can people find their way when completing user tasks?
- UI components, e.g., accordions, drop-down menus
- Graphical elements e.g., image quality, text readability

prototype: step-by-step

1. Know exactly what you're testing

Clarity is key here. What exactly are you looking to test? Avoid being vague with your end goal to ensure you get those key results that will be actionable at the end of the testing.

2. Create the prototype

An obvious one here—without a prototype there will be no prototype testing.. If you’re doing lo-fi prototype testing, it might be on paper or be online in its most basic form(a mockup or wireframe), whereas if you’re at the hi-fi

prototype stage, you'll be using a tool like Figma or Sketch to create an interactive prototype that's as close to the real product as possible.

3. Choose the right audience

If you're launching a fitness tracking app, it would make sense to only include test participants who work out at least twice a week.

Similarly, if you were launching a product that helps undergrad students manage their workload, you'd want to limit the age to under 25. In other words, you need to test with the right target audience.

4. Choose your usability testing method

If you have a tangible product, it makes sense to invite users into the office to try things out as IKEA does to test their chairs. But this is a costly way of testing. For those of us in the digital world, it might be quicker to use an online testing tool that allows us to get insights from users around the world.

5. Give people a clear objective

Set a clear task for users to achieve. To encourage action, tell a story about your scenario that broadens their mind.

6. Pick the right questions to ask users

Throughout your prototype testing, you have the chance to ask usability questions that will give you even more insight. Make sure you pick the right ones to get effective feedback.

7. Launch your test

The time has come—it's prototype testing day. Consider a trial run with a colleague or friend if you're going to be doing the testing in-house, or set up a pilot test in your remote testing app so that you're 110% prepared before doing a real-world test.

8. Share the results

After you go through your responses and analyze the test results—it's time to share them with all key stakeholders. Whether it's good—cue the beers—or not so great, you now know what you need to improve the user interface and experience and iterate on to get to the next stage of your product launch process.