SCHOOL OF BUILDING AND ENVIRONMENT
DEPARTMENT OF ARCHITECTURE

SDE1301 – CREATIVE THINKING PROCESS AND METHODS

UNIT - 1

CREATIVE THINKING PROCESS AND METHODS

**Subject Name:** Creative Thinking Process and Methods   **Code:** SDE 1301

UNIT – I – INTRODUCTION TO DESIGN

Definition of Design, Understanding of Design, Purpose and nature of good design, evaluation of design, types of Design, classification, role of designer, Context for Architectural design problems, design process, stages in the design processes, from different considerations - Broadbent, Christopher Alexander, Wade.

DEFINITIONS OF DESIGN:

- A plan for arranging elements in such a way as to best accomplish a particular purpose.

- Design is a process of problem solving through **innovation**

- **Design** is the practice of conceiving and planning what doesn't exist. It is a broad term that can be applied to **creating structures, environments, interfaces, products, services,** features and processes.

- Design is a profession that is concerned with the **creation of products, systems, communications and services** that satisfy **human needs,** improve people's lives and do all of this with respect for the welfare of the natural environment. - - Charles Owen

(2004)
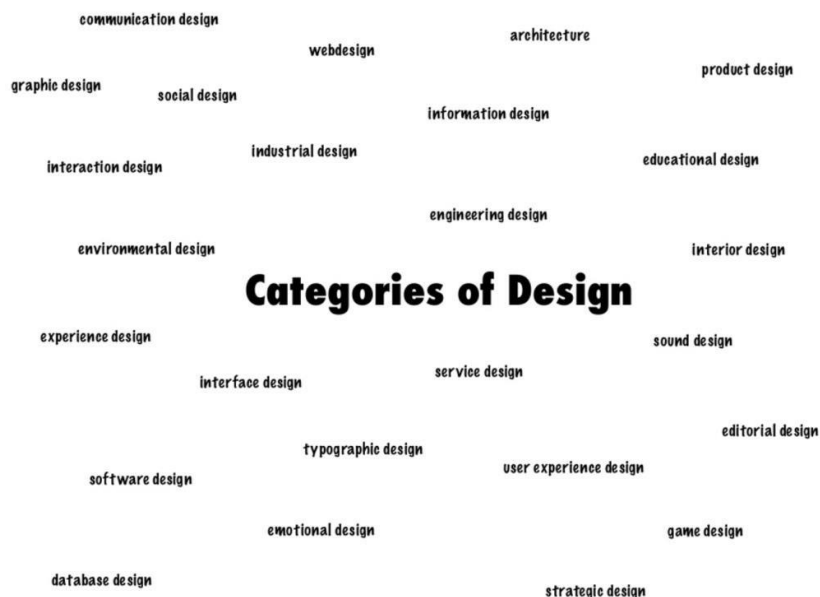
Categories of Design

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WHAT IS THE PURPOSE OF DESIGN?

- Design is the output of Creativity & Innovation

- Transformation of Ideas to useful design products / design solutions

- Creative person with good visual literacy and design thinking can create good design

- Should all designs be beautiful?

- Design – combination of Art & Science

- Can design solutions / products be without any purpose?

- Human communicates through many ways whereas a product communicates through Design.

- The presentation which we are looking at has a specific reason for being composed in such a way so that its legible and grabs your attention.

- Your mobile, computer is designed in a way that it might be able to attract and hold your attention. Readability and usability is a part of the purpose of design.

- The purpose of design is not to make everything beautiful.

- The purpose of design is much more closely linked to function than aesthetics hence it should be a perfect combination of Art & Science.

- Design is the process of intentionally creating something while simultaneously considering its **objective (purpose), function, economics, sociocultural factors, and aesthetics.**

- Design at times may not be beautiful but will serve the purpose but thoroughly.

- Design when thought about creatively with application it always serves the purpose.

- Design is the creation of the **products and the services that people use**.

- Design makes **technology usable for people.**

- Design **connects people with technology**

- While traditional strategy calls for rigorous analysis and critical thinking, design thinking espouses ‗thinking by doing'. The key is to find the sweet spot between the two approaches. -Kingshuk Das

Design solves the problems that people have, focusing on:

- Usability, Ergonomics and Aesthetics

- Materials and Manufacturing Processes

- Science, Engineering and Technology Manages Innovation

- Sustainability

Importance of Materials used through ages - and based on the materials manufacturing

processes also varied meeting the needs of people

Sustainable design principles include the ability to:

- optimize site potential;

- minimize non-renewable energy consumption;

- use environmentally preferable products;

- protect and conserve water;

- enhance indoor environmental quality; and

- Optimize operational and maintenance practices.

Sustainable Design

- Sustainable design seeks to **reduce negative impacts on the environment, and the health and comfort of building occupants**, thereby improving building performance.

- The basic objectives of sustainability are to **reduce consumption of non-renewable resources, minimize waste, and create healthy, productive environments.**

- Utilizing a **sustainable design philosophy encourages decisions at each phase** of the design process that will increase the usability without compromising the bottom line.

- Such an integrated approach positively impacts all phases of a building's life-cycle, **including design, construction, operation and decommissioning**

How do you know when a design is good or bad?

- When a design is **GOOD** does it means its good looking, or it satisfies the users need, or is it a combination of both?

- When a design is is **BAD** does it means its ugly, doesn't satisfy the need, of its economically bad?

- How can we come to a conclusion without collecting and understanding the feedback about the design without EVALUATING it?

- Evaluating design quality can be subjective, and the criteria can change depending on the type or purpose of the design itself.

- But at the end of the day, designs are created to communicate a message and achieve specific outcomes.

- Aesthetics and looks are an important factor in this, but they alone won't tell you if the design is effective. In order to know whether your design is a winner, you need to understand the elements of good visual communication and judge the design against those rather than abstract, gut feelings.

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EVALUATION OF A DESIGN

Evaluation is a process that critically examines a program **(Design).** It involves collecting and analyzing information about a program's activities **(user needs),** characteristics, and outcomes. Its purpose is to make judgments about a program **(design),** to improve its effectiveness, and/or to inform programming decisions (Patton, 1987).

IMPROVE PROGRAM DESIGN AND IMPLEMENTATION.

- It is important to periodically assess and adapt your activities to ensure they are as effective as they can be.

- Evaluation can help you identify areas for improvement and ultimately help you realize your goals more efficiently.

- Additionally, when you share your results about what was more and less effective, you help advance the design solutions.

DEMONSTRATE PROGRAM IMPACT.

- Evaluation enables you to demonstrate your design's success or progress.

- The information you collect allows you to better communicate your design's impact to others, which is critical for public relations, staff morale, and attracting and retaining support from current and potential funders.

PURPOSE

- If it's a **LOGO** design, it needs to represent and communicate a brand's name. If it's a **PRODUCT** design it should make the activity easier for which it is been designed.

- Design is all about solving problems with **visual solutions**—that's why you need to make sure it presents all of the relevant information to communicate the message .

- Content is still dominates, but you've got to strike the right balance between educating your audience about your brand and not overwhelming them with too much information in one design.

- For example, the purpose of the **coffee mug design** should be functionally efficient and should create brand awareness.

- It includes **aesthetics, material choice, handle design** with the **most visual emphasis on capturing users attention**.

- It's simple, effective, and solves the need.

- If a design **achieves its most basic goal**, then it's an effective one.

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EASY TO UNDERSTAND

- A great design will ensure your **DESIGN** is instantly understandable by guiding your **audience's senses through the content.**

- Good designs have a **focal point** such as a unique design, attractive concept, material to attract viewer's eye and grab their attention.

- The **visual hierarchy** of a design determines which elements they should be **looking at in what order.**

- When determining about our design **whether it is easy to understand,** we need to keep mind the need to balance **form with function in a design.**

- The design should look good, but it won't be effective **if form distracts from the purpose** and complicated to **understand and appreciate.**

AESTHETICALLY PLEASING

- Aesthetics in Design is the **most subjective part** of evaluating any design and design related product.

- What is appealing to one person might be hideously not convincing design solution / product to another.

- Designer generally wants our designs to look beautiful because this will help them make **more professional and create a credible impression** on the users / clients /customers.

- Any design which stands out significantly is probably because design principles have been used effectively.

- Any design grabs our attention with emphasis on a high contrast, **a balanced and symmetrical composition**, great use of colors and all **design principles** which grabs our attention.

- Good design should be _**Timeless'**

APPROPRIATE FOR USERS

- A Designer doesn't always **DESIGN** for himself.

- The design created by a designer will **appeal to a specific category** of users.

- They won't always be able to explain **why a design resonates with them**, but they'll have certain **expectations** for how **a design should look.**

- **Bright color** may not be suitable for a hospital design whereas for a recreation zone color scheme plays a vital role.

- Therefore, a more conservative and well thought design solution is more appropriate.

ORIGINAL DESIGN

- ―Originality‖ also means trying to include a little bit of creativity in a design, like a clever concept that evokes your brand's services.

- The meaning of ―originality‖ depends on the type of design you're dealing with.

- If it's a logo design, you better make sure it's as unique as possible because you need to be able to trademark it.

- It's difficult to create a brilliantly simple and distinct logo design that doesn't look similar to any other existing designs because so many ideas have already been taken and registered as trademarks.

- If a designer creates a logo that looks similar to an existing design, it's not necessarily because they copied it—it's because **there are some logo concepts that are really common** and possible to arrive at independently of seeing those designs.

- Some would argue that true **originality doesn't exist and that everything is a remix**, but it's important to at least try to strive for a design that's **as creative and original as possible** in order to add that element of **delight to a design or stand out from the competition**.

Evaluations fall into one of two broad categories:

FORMATIVE AND SUMMATIVE

- **Formative evaluations** are conducted during **design development and implementation** and are useful if we want direction on how to best achieve our goals or improve **design and design ideas.**

- **Summative evaluations** should be completed once the design / products are well established and will help us to understand to what extent the **design is achieving its goals.**
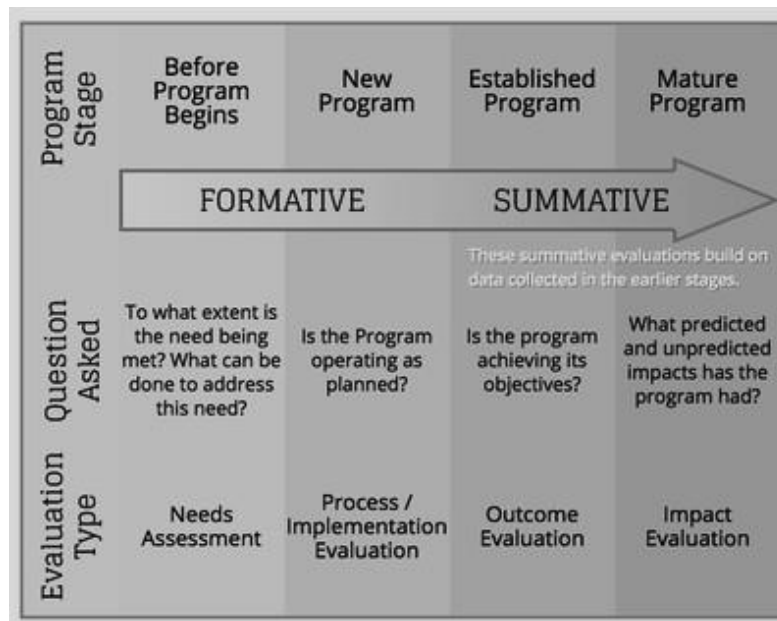
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- Within the categories of formative and summative, **there are different types of evaluation.**

- Which of these evaluations is most appropriate depends on the stage of the **design need to be identified and applied.**

- A well-planned and carefully executed evaluation will reap more benefits for all stakeholders than an evaluation that is thrown together hastily and retrospectively.

- Though we may feel that we lack the time, resources, and expertise to carry out an evaluation, learning about evaluation early-on and planning carefully will help to navigate the process.

GOOD EVALUATION

- Good evaluation is tailored to your program and builds on existing evaluation knowledge and resources.

- Good evaluation is inclusive.

- Good evaluation is honest.

- Good evaluation is replicable and its methods are as rigorous as circumstances allow.

EVALUATION AS AN INTEGRAL PART OF DESIGN:

- Making evaluation an integral part of the design program means evaluation is a part of everything we do.

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- The design program needs to be framed with evaluation in mind, need to collect data on an on-going basis, and use these data to continuously improve the design and design ideas.

Developing and implementing such an evaluation system has many benefits including:

- Better understand target audiences' needs and how to meet these needs.

- design objectives that are more achievable and measurable

- monitor progress toward objectives more effectively and efficiently

- Architecture
- Engineering
- Landscape design
- Urban design
- Interior design
- Furniture design
- Product design

- Graphic design
- Packaging design
- Web design
- Multimedia Design
- Mechanical design

- Fashion design
- Jewellery design
- Game design
- Software design
- Course design

- Costume design
- Lighting design
- Sound design
- Automotive design
- Set design
- Robotics design

TYPES OF DESIGN

Architecture:

Designing and engineering buildings and structures

Interior Design:

Designing interior and exterior physical environments that are used by people

Landscape Architecture:

The integration of nature and architecture to create things such as parks & gardens.

Industrial Design:

Designing products for mass production

Fashion Design:

Designing clothing and accessories

Engineering Design:

A broad category of design that applies to engineered structures, infrastructure, technology and machines.

Software Design

Outlining the structures, components, objects and methods that solve a problem with software.

User Interface Design:

Designing interfaces that people use to control and interact with technology.

Graphic Design:

Designing and engaging through virtual world

Sound Design:

Designing sound environments and productions.

User Experience Design:

Looking at end – to –end experiences from the perspective of customers including things like products, services, environments and interactions.
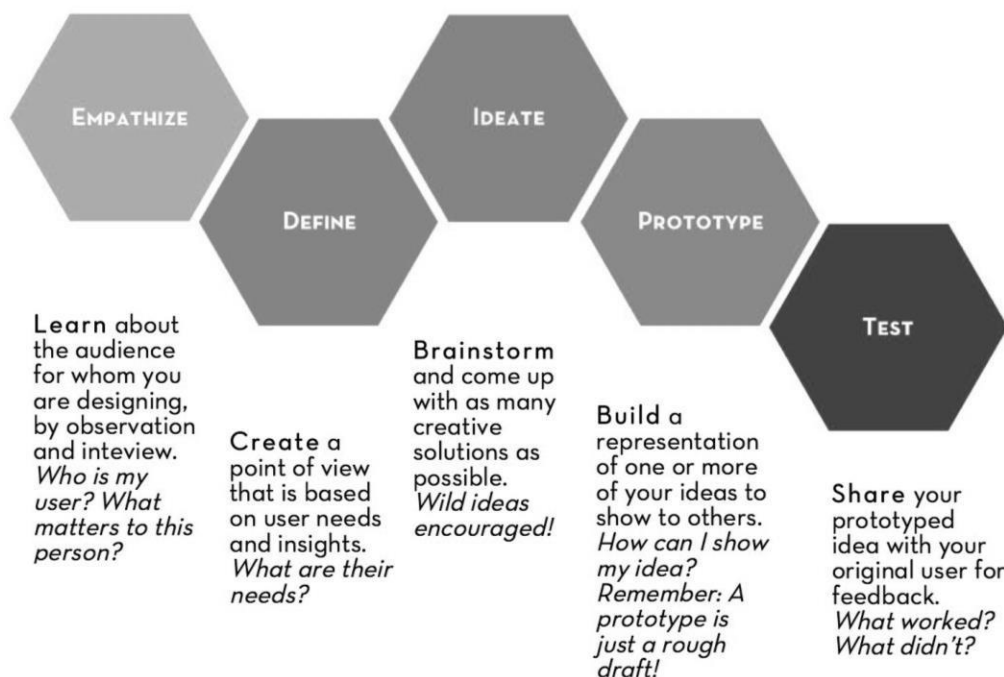
Set Design:

The creation of scenes on a stage, set or in post- production for film, entertainment, media and theatrical performances.

Lighting Design:

Designing light environments for night day & night architecture, interiors, theatre and film

ROLE OF A DESIGNER

We are all DESIGNERS!

EMPATHIZE — Learn about the audience for whom you are designing, by observation and inteview. *Who is my user? What matters to this person?*

DEFINE — Create a point of view that is based on user needs and insights. *What are their needs?*

IDEATE — Brainstorm and come up with as many creative solutions as possible. *Wild ideas encouraged!*

PROTOTYPE — Build a representation of one or more of your ideas to show to others. *How can I show my idea? Remember: A prototype is just a rough draft!*

TEST — Share your prototyped idea with your original user for feedback. *What worked? What didn't?*

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WEB DESIGNER

A web designer, also sometimes referred to as **an interactive designer,** is a person who creates **web interfaces** and **website pages** for the internet. Whether you need a blog template, a simple **web page or a complete website or mobile app design**, web designer does it. A **good designer** will have **strong knowledge** of the **design tools and technologies** and may also have some web development experience.

GRAPHIC DESIGNER

A graphic designer is someone who creates visuals, images and other visually-appealing elements, for conveying an idea. The works covered by a graphic designer include logos, brochures, leaflets, business cards, invitations, packaging, and more. They use colors, images, shapes, and words to create attractive graphic designs to be used in various places. The most common use of graphic designing is in game development and for creating marketing products. A visually appealing design can inspire customers to read about a new product or service.

ANIMATION DESIGNER

An animation designer creates animations. These are the creators behind many animated movies like Frozen and Toy Story etc. Video games are another great example of animations. Animators are responsible for bringing life to these still characters of the cinema through special effects and the technology. Some of the most sought-after animation designing skills are – Maya, 3ds Max, Cinema 4D, Blender, Photoshop, Flash, and After Effects

ARCHITECT & INTERIOR DESIGNER

The person who designs the various aspects of a house/office/building, preferably according to the behavior of the people who are supposed to use these spaces. Interior designing requires a lot of creativity to satisfy human needs and develop a design both functionally and aesthetically pleasing. A designer must be able to analyze people's behavior and create suitable designs accordingly. An architect is a person who creates plans for buildings, houses, and other places. He is different from any other designer since he is responsible for bringing out the concepts and developing it as a habitable space.

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PRODUCT DESIGNER

A product designer is very different from the ones we were talking about earlier, but again, there is one common thing, creativity. Industrial designers, or product designers, are responsible for creating designs for various physical products like consumer electronics, automobile, etc. while considering the function and form of the actual products.

FASHON DESIGNER

A **fashion designer** is someone who makes use of the existing **fashion trends, materials,** and his/her own creativity to introduce **new designs and product ideas.** Fashion designing is a very important and a **completely separate industry.** In order to create right clothes, growing with new trends, and adopting new fashion a Fashion Designer works to satisfy the clients needs.

ARCHITECTURAL DESIGN PROCESS

• The Design Process is an approach for **breaking down a large project into manageable smaller units.**

• **Architects, engineers, scientists,** and other thinkers use the design process to solve a variety of problems.

• The following process will help us **to define the steps needed to handle each project,** and all the ideas and sketches throughout the process need to be recorded and documented for reference.

• The ARCHITECTURAL DESIGN process will be different from project to project, and from designer to designer.

• The stages discussed below are a guide to the process, but each architectural designer will have their own approach, and will develop a design in a diverse set of ways. As the design process is carried out over and again, it will become more natural, and clearer.

The process of design is cyclical and iterative, which can be defined as a six part process. The architecture design process can be approached in a number of ways by different designers, but generally it will follow a very similar pattern. The designer will continuously review and develop ideas, improving the solutions and moving forward with the design.

RESEARCH & DATA COLLECTION:

- Research forms the basis for any design project. The type and scope of research can vary, be it a meeting with a client, a site analysis or a desktop study about the history of the site. Either way, the collection of data, discussions with the client or site visit, will all be the basis to forming a starting point for design.

These early stages of research are crucial to developing the character of the project.

- The goal of the early stage of design, **is to gather data that will present the problems associated with the task,** and the research process will effectively continue throughout the architecture design process.

- A **thorough site analysis** will start to form a picture of the context of the site, its limitations, its merits, problems, and allow the designer to focus on developing a response to these issues.

- **Discussion with the client,** and developing a brief will lead to valued data about the **end use of the building**, its users and overall goals of the project.

- **Discovering historical data** relating to the site and surrounding context can lead to developing a concept that perhaps reflects some of this history.

- Research can **take the form of data collection, discussions, studies** but also **model making and sketching** to discover as much as possible about the site and proposed project.

PROPOSAL:

- After the research phase of the architecture design process, the designer has collected enough information to begin to establish ideas and concepts, and prepare to develop solutions to the problems that have been identified.

- The initial **research and proposal stages may weave into one another** as data is collected and responses are made to that data.

- As the proposal phase continues, more **definite ideas will emerge**, and a wide array of tools will be used to convey these early ideas. **Sketches and models will be used in plans, elevations and section to develop proposals,** along with 3d discoveries to imagine a contextual approach to the design.

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- The **sketchy nature of this stage of design allows for fast moving ideas**, with the exploration of many solutions in quick succession.

ANALYSIS OF PROPOSAL:

- The development of initial proposals, these ideas must be analyzed and critiqued in order to establish the feasibility of the proposals.

- It is important to establish the criteria that the proposals will be measured against, **the client needs, performance of the building, budget, aesthetics and so on.**

- The criteria are often diverse, and there will be varying factors to **evaluate at different stages of the architecture design process.**

- The established proposals need to be analyzed for various aspects, and different users.

- In a professional setting, the initial discussions may be with the **client or user,** engaging in a dialogue **to ensure the criteria is being met**, by these early proposals.

REVIEW & DEVELOPMENT

- The final stage of this process is a broad stage. The review and development stage of design happens multiple times, and the design process is **iterative, which is repetitive or even cyclical.**

- Design is not a linear process, and can skip around in a random series of responses as it address issues and reacts to changes.

- After the design has been analyzed, **the designer can then refine the design ideas and begin to develop the scheme.**

- It may be that the analysis has presented issues with the design that require circling back to earlier stages, in order to refine ideas.

- On the other hand, the design may only require fine tuning, and can be developed in more focused detail.

- The refining and development process requires **constant reflection on the initial stages of design**, referring to research and data collected in the early stages, and revisiting early proposals and ideas.

- This cycle will continue until the analysis suggests that the criteria of the project have been met and the design is able to develop.

DESIGN DEVELOPMENT

- There comes a point in the design process **when the client will approve the design** in order for it to be taken to the development phase.

- The design will then be refined in more detail, **factoring in other elements of the scheme.**

- At this stage, **drawings will be developed at scale, with the integration from structural engineers, mechanical engineers and other external team members.**

- The design will begin to consider more detailed elements such as **materials, fixtures and fittings along with finishes**.

- **Cost** will play a more important factor, and **for larger projects a quantity surveyor** may be brought in to manage that aspect of the project.

- The project may need to be prepared for planning applications, and therefore may require **3d models, or visualizations to convey the final design.**

- In some cases, sales and marketing literature will be considered for larger projects as **the client promotes the development.**

- Technical information will be developed to begin to provide a full picture of the design, and how it will be constructed.

- The **finer details of how materials will relate to one another**, connections between elements, will all be considered at this stage, as the design is prepared for construction.

DESIGN THINKING PROCESS – BROADBENT

- Broadbent first investigates what **an architect is as a person**.

- Trying to understand how an architect thinks and what sets him apart from the **other members of a building design team.**

- To achieve this Broadbent makes a study of various **psychological reports** which have been generated **about architects.**

- Although it would seem that the reports are inconclusive about what characterizes an architect. In particular there would seem to be a great difference between the **personality of average and outstanding architects**.

- Characterizations have been made about personality types in general and they include, **creative and non-creative, tolerant and prejudiced, introverted and extroverted**

- One of the less emotionally loaded distinctions is between **cyclothymes and schizothymes.**

- Cyclothymes seem to be **sensitive and sociable people with good verbal reasoning skills.**

- By contrast the schizothymes dissociate **intellectual and emotional aspects of life tending towards self-sufficiency, reserve and intolerance.**

- Some **outstanding designers** have been characterized as the **latter,** whereas some studies would favor the **former characteristics for average architects.**

- A complete design method could find the designer using all the four of this tactics in an ordered and organised way, and then selecting from amongst the solutions produced.

PRAGMATIC	ICONIC	ANALOGICAL	CANONIC

PRAGMATIC DESIGN

It is simply the use of available **materials methods of construction**, generally without innovation, as if selecting from a catalogue.

The designer has a good grasp of **the strengths and weakness** of the traditional and established techniques this method certainly has its uses.

ICONIC DESIGN

This method is more conservative in that effectively calls for the designer to copy existing solutions.

Starting with existing solutions might lead to a greater stability and avoid the commonly found errors. Vernacular designs solved problems although it is possible that such a technique could perpetuate errors.

CANONIC DESIGN

This relies on the use of rules such as **planning grids, proportioning systems .**

The classical Architecture styles Renaissance approach, Vitruvius and later Alberti Le Corbuiser's _modular' can be seen as an attempt to produce Canonical rules that allowed for more ICONOCLASTIC DESIGNS.

ANALOGICAL DESIGN

This design results form the designer using analogies with other fields or contexts to create a new way of structuring the problem.

Techniques such as **brainstorming and synthetics** rely on the assumption that a group of people are not likely to approach the same problem in the same way, and that if the natural variety of the individuals can be harnessed the group may be more productive.

CHRISTOPHER ALEXANDER

What makes a design great?

• The way the carefully chosen colors blend and play off each other?

• A set of pleasing shapes perfectly placed in space?

• A seamless interactive experience that brings joy and pleasure to its users?

• **Architect and design theorist Christopher Alexander** called that spirit, that energy, that … magic a —**quality without a name,‖ or QWAN**.

• Not only did he seek to define it, but he created a movement, whose purpose is to help anyone create meaningful architecture.

• His 1977 book, *A Pattern Language: Towns, Buildings, Construction* (of which Alexander says he's been told is the best-selling architecture book of all time, marked the beginning of the movement and earned him the title of the father of the pattern language movement.

• Though Alexander's *A Pattern Language* is described as a practical architectural system, it's not an Ikea-esque manual **meant to provide the exact directions on how to erect a room, building, or town**.

• It's a simple guide filled with the proven elements **any ordinary person could use** to create a living world that best serves the humans that interact with it.

• The basis of A Pattern Language came from observing medieval cities. All were designed to In 1987, two decades after *A Pattern Language* was published, computer

scientists **Kent Beck and Ward Cunningham started playing around with the idea of using design patterns in programming.**

- Even today, more than 40 years after Alexander's influential book appeared, **developers, programmers, and designers continue to find new ways to apply its revolutionary theories.**

- Some have called Alexander's work ‖a new form of architecture,‖ so it's not surprising that while Alexander created design patterns to help inform the physical world of architecture and construction, digital architects were quick to recognize the application of his theories in their own work.

- As *A Pattern Language* explains —**Each pattern describes a problem which occurs over and over again in our environment**, and then describes the core of the solution to that problem, **in a way that you can use this solution a million times over**, without ever doing it the same way twice.‖

- local regulations but allowed the architect (or artist; or designer; or simply, person) **to adapt each room, level, and building to particular situations.**

- To Alexander, those particular situations are what the human users required to feel comfortable, fulfilled, and have their needs met without the distraction of superfluous features or art for art's sake

- Alexander says, people should build for themselves, and his *A Pattern Language* made widely available the tools to —**allow anyone, and any group of people, to create beautiful, functional, meaningful places.‖**

- Alexander created his language to highlight the **relationships between patterns**, with the whole being greater than the sum of its parts. In today's digital design, that principle looks like this – a logo could be the best ever created, the selected colors a spot-on representation of the brand, and the layout a pleasing landscape of information, **but if the connections between all elements don't have meaning, then nothing does.**

- Following in the footsteps of **Greek philosophers** like Pythagoras, Empedocles, and Plato, **Alexander** looked to **nature for clues and inspiration for how the first-created and most-tested patterns evolve**.

- From that, he acknowledged a —**step-wise sequence**‖ that re-uses what has come before – a continuous transformation of elements.

- This phenomenon is what Alexander sees as the next frontier of design.

- It's not about new technologies, or advanced mediums to create art, **but rather using what has come before and adapting it to satisfy current human behavior and desires.**

- Alexander says this practice is what gives designs that —**quality without a name,**‖ **and that is what makes a design great.**

REFERENCES:

- https://www.slideshare.net/Leursism/design-theory-lecture01
- https://www.designsystems.com/
- https://api.semanticscholar.org/CorpusID:56715610
- https://www.rdaep.com/
- https://www.firstinarchitecture.co.uk/
- https://e10arch.com/architectural-services/
- https://discoverdesign.org/
- https://blog.sagipl.com/
- https://blog.ml.cmu.edu/wp-content/uploads/2019/05/illustration-970x438.png
- http://meera.snre.umich.edu/evaluation-what-it-and-why-do-it#what

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SCHOOL OF BUILDING AND ENVIRONMENT

DEPARTMENT OF ARCHITECTURE

SDE1301 – CREATIVE THINKING PROCESS AND METHODS

UNIT - 2

Subject Name: Creative Thinking Process and Methods   **Code:** SDE 1301

UNIT 2   DESIGN PROBLEMS AND DIRECTIONS

Context for the rise of the Design Methodology Movement, Different approaches in design, problem solving or intuitive, formulation of problems, nature of creative design problems, goals in design, different types of designs and the thrust given to the various solutions.

"WHAT IS A PROCESS?"

• A process may be defined as

• "a series of steps, actions, or operations used in making something or bringing about a desired result: a manufacturing process".

• A DESIGN PROCESS can be defined

• as a sequence of creative problem finding, analyzing, and solving steps used by the designer to develop an appropriate design solution for the given client, which is an organizational framework used by designers during the process of design.

• Design activities are complicated and interlocking.

• There must be clear steps to plan and integrate, and the whole process should be rationally arranged according to scientific laws, so as to achieve the final design goals clearly

SUITABLE PROCESS – RESULT - PRODUCTIVITY

• Suitable design procedures and methods will **lead to twice the result** with half the work.

• Good products need a **good beginning in the design process.**

• The **design procedure** is the basis for guiding the **steps of design** process, while **the design method** is the guarantee for effectively developing the design process **and improving its quality.**

• A **clear and reasonable process** can lead to **a simple and smooth way in design**, while the proper use of **creating techniques can let the designer find a better way** to solve the problems in a wider range, so as to develop and design a **good product.**

DESIGN MOVEMENTS

1.   Impressionism

2.   Arts and Crafts

3.   Art Nouveau

4.   Cubism

5.   Futurism

6.   Constructivism

7.   Bauhaus

8.   Art Deco

9.   Surrealism

10.   Abstract Expressionism

11.   Swiss Design/ ITS

12.   Pop Art

13.   Minimalism

14.   Postmodernism

15.   Memphis

As a designer, inspiration can come from anywhere. But sometimes influences, attitudes and approaches converge to form a coherent movement that has a knock-on effect around the world.

There have been hundreds of art and design movements of different sizes and significance over the centuries – some centred on the style or approach of a particular collective of artists in a particular place, others spanning many creative disciplines, and much more organic in terms of interpretation.

Whether they happened 150 years ago or 30 years ago, the impact of many of these is still felt today – you may even have felt their influence without knowing it. These things often move in cycles, particularly with the contemporary trend for retro aesthetics.

THE MOST INFLUENTIAL ART AND DESIGN MOVEMENTS OF THE 20TH CENTURY.

Developing primarily in France during the late 19th century, Impressionism was a fine art movement in which a small group of painters eschewed the then-traditional emphasis

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on historical or mythological subject matter in favour of depicting visual reality, and particularly the transient nature of light, colour and texture.

Seven painters were at the core of this hugely influential movement: Claude Monet, Pierre Auguste Renoir, Camille Pissarro, Alfred Sisley, Berthe Morisot, Armand Guillaumin and Frédéric Bazille – and worked and exhibited together.

The Impressionists abandoned the established palette of muted greens, browns and greys for their landscapes in favour of a much brighter, expressive range of colours in an attempt to depict conditions such as dappled sunlight, and reflections on rippled water. Instead of greys and blacks for shadows, they used a whole range of complementary colours – and objects were depicted using dabs of paint rather than defined with a hard outline.

Post-Impressionism embraced many of the tenets of its predecessor movement, whilst also rejecting some of its limitations. Painters such as Paul Cézanne, Georges Seurat, Paul Gauguin, Vincent van Gogh and Henri de Toulouse-Lautrec used similarly pure, brilliant color palettes and expressive, short brush strokes, but also sought to elevate the work to something less transient and experimental.

Rather than ever-changing conditions of natural light and its effect on color, Cezanne and the other Post-Impressionists focussed more on solid, permanent objects, with still-life paintings – such as Cezanne's Pitcher and Fruit, and van Gogh's Sunflowers – emblematic of the movement.

1. Arts and Crafts

As a reaction to the rise of mass production (and corresponding decline of artisan craftsmanship) during the Industrial Revolution, there was a resurgence of interest in decorative arts across Europe in the second half of the 19th century – fittingly known as the Arts and Crafts movement.

At the vanguard of this new movement was reformer, poet and designer William Morris, who formed a collective of collaborators in the 1860s to try to reawaken the handcrafted quality of the medieval period. They produced beautiful metalwork, jewelry, wallpaper, textiles and books.

By 1875, this collective became known as Morris and Company, and by the 1880s the attitude and techniques they practiced had inspired a whole new generation of designers, and the Arts and Crafts movement was born.

While many criticized the practicality of such intricate handicrafts in the modern, industrialized world, the influence of the movement endures to this day.

2.   Art Nouveau

Following on from the Arts and Crafts movement, Art Nouveau was a primarily ornamental movement in both Europe and the USA. One distinctive characteristic of the style is the use of organic, asymmetrical line work instead of solid, uniform shapes – applied across architecture, interiors and jewelry, as well as posters and illustration.

Intricate ironwork, stained glass, ceramics and ornamental brickwork were used expressively, with freeform lines taking precedence over any pictorial elements in the designs, which were often inspired by delicate forms found in nature, such as flower stems, vines, creepers, tendrils and insect wings.

Scottish architect and designer Charles Rennie Mackintosh was a leading exponent of the Art Nouveau movement, as well as Czech graphic artist Alphonse Mucha, and iconic Spanish architect and sculptor Antonio Gaudí – whose magnum opus, Barcelona's La Sagrada Família, has famously been under construction for more than 130 years.

Mucha's stunning artworks, many of which were commercial commissions for advertising clients, combined the flowing organic lines and natural motifs of the Art Nouveau style with sensual portraits of women.

While the decorative style fell out of fashion after 1910, it saw a resurgence in the 1960s thanks to a series of major exhibitions in London, Paris and New York, which retrospectively helped elevate a style once seen as a passing fad to the status of an international movement that influenced fashion, music design and advertising.

3.   Cubism

Two artists were instrumental in founding the Cubist movement: Pablo Picasso and Georges Braque. Unlike the expressive attempts to capture natural conditions in Impressionism and Post-Impressionism, Cubism was about flat, two-dimensional, distorted objects – sacrificing accurate perspective in favor of surreal fragmentation.

The name came from a disparaging remark by art critic Louis Vauxcelles, who described Braque's 1908 work Houses at L'Estaque as being "composed of cubes". But it was Picasso's Les Demoiselles d'Avignon, painted the previous year that set the wheels in motion, depicting five female nudes as fractured, angular shapes.

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As Braque and Picasso continued to explore how abstract shapes could be used to define familiar objects, the period from 1910-1912 is often referred to as Analytical Cubism. A distinctive palette of tan, brown, grey, cream, green and blue prevailed, and common subjects included musical instruments, bottles, newspapers, and the human body.

Post-1912 this evolved into Synthetic Cubism, where multiple forms are combined within the increasingly colorful artworks, which made use of collage techniques to explore texture. The visual language defined by Braque and Picasso was later embraced by many other painters, and also influenced sculptors and architects such as Le Corbusier.

4.   Futurism

Founded in Italy in the early 20th century, Futurism attempted to capture the pace, vitality and restlessness of modern life through highly expressive artwork that ultimately glorified war, Fascism and the machine age. The aesthetic style would later spread across Europe, and notably into Russia.

The movement was officially announced in 1909 when Parisian newspaper Le Figaro published a manifesto by Italian poet Filippo Tommaso Marinetti, who coined the term to describe how his work celebrated social progress and cultural innovation.

Cutting-edge technology such as the automobile was put on a pedestal, while traditional values – and historical institutions such as museums and libraries – were aggressively repudiated.

Two of the leading proponents of Futurism, Umberto Boccioni and Antonio Sant'Elia, were killed in combat in 1916. However, the aesthetic would go on to be expressed in modern architecture, as visions of mechanized cities defined by towering skyscrapers became a reality, while artists such as Tullio Crali kept the style going into the 1930s.

5.   Constructivism

Strongly influenced by both Cubism and Futurism, Constructivism was an artistic and architectural movement initiated by Soviet painter and architect Vladimir Tatlin, who co-authored the so-called 'Realist Manifesto' in 1920 with sculptors Antoine Pevsner and Naum Gabo.

Similar to Futurism, Constructivism glorifies technological and industrial progress, with a radical aesthetic that places function over form. As the name implies, the aesthetic is

literally about 'constructing' art from a kit of component parts, like a machine. Its distinctive style was widely used for Soviet propaganda posters.

Leading figures in Constructivism included graphic designer, photographer and sculptor Alexander Rodchenko and artist, designer and architect El Lissitzky. While Tatlin and Rodchenko remained in the Soviet Union, Gabo and Pevsner helped spread the Constructivist aesthetic to Germany, France and later England and the US.

Meanwhile, Lissitzky influenced the artists and architects of the Berlin-based de Stijl movement, as well as Hungarian painter and photographer László Moholy-Nagy, a professor at the Bauhaus.

6.   Bauhaus

Founded by the architect Walter Gropius, the hugely influential Bauhaus school of design, architecture, and applied arts ran in Germany from 1919-1933, when it was shut down by the Nazi regime.

The school sought to bridge the gap between art and technical craft – not unlike the goal of the Arts and Crafts movement, although the Bauhaus favored modern mass-production over individual artisan methods.

Students took a six-month preliminary course, where tutors including Johannes Itten, Lyonel Feininger, Josef Albers, Herbert Bayer and László Moholy-Nagy gave them a rigorous education in both the craft and theory of everything from carpentry and metalwork to textiles, graphics and typography.

While the resulting works were hugely diverse, the prevailing style associated with the Bauhaus is that of simple, elegant geometric shapes, combined with bold primary colors – an aesthetic that spread across graphic design, products and architecture long after the school was closed down.

7.   Art Deco

A major international movement across western Europe and the US, Art Decotakes many of its cues from Art Nouveau, as well as elements of Bauhaus and Cubism. It originated in Paris, where the 1925 Exposition Internationale des Arts Décoratifs et Industriels Modernes gave it its name.

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Style, elegance and sophistication are the order of the day in an Art Deco design, communicated through simple, streamlined shapes; stylized, often geometric ornamentation and elaborate use of expensive materials, both natural and synthetic.

Spanning architecture, furniture, fashion, sculpture and more, Art Deco encapsulates the decadent spirit of the 1930s – and the Rockefeller Centre, Chrysler Building and Empire State Building were all designed in the style.

Although Art Deco fell out of fashion somewhat during World War II, it saw resurgence from the late 1960s onwards, and continues to inspire decorative arts, fashion and jewelry to this day.

8.   Surrealism

Like Art Deco, Surrealism flourished in the interim period between the World Wars. It grew out of the 'anti art' Dada movement in the early 20th century, but in place of Dada's often nonsensical, satirical vibe – a negative reaction to the horror and futility of war – it brought a much more positive creative expression.

In his 1924 Surrealist Manifesto, poet and critic André Breton argued that Surrealism was about reuniting conscious and unconscious experience; bridging the gap between a fantastical dream world and rational reality.

Leading Surrealist painters included Jean Arp, Max Ernst, André Masson, René Magritte, Yves Tanguy, Salvador Dalí, Pierre Roy, Paul Delvaux and Joan Miró – all of whom had a uniquely personal twist on the movement, and how art could express the sometimes bizarre, sometimes deeply unsettling depths of the unconscious mind.

Unlike the relatively rigid visual language of contemporary Cubist art, Surrealist art was much more organic and freeform, putting the emphasis on symbolism and content rather than form.

9.   Abstract Expressionism

Beginning in the 1940s, the Abstract Expressionism movement fueled the development of modern art as we know it during the following decade. New York was the hub, and prominent artists such as Jackson Pollock, Willem de Kooning, Franz Kline and Mark Rothko led the way.

Often filling huge canvases with dynamic, powerful applications of paint that evoke everything from violence to sensuality and everything in between, Abstract Expressionist

artists SATHYABAMA drew
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influence from various avant-garde artists who had arrived in the US in the late 1930s and early 1940s, fleeing Nazi-occupied Europe.

In contrast to Pollock's chaotic, energetic style, Mark Rothko's works – such as White Cloud Over Purple (1957) – are calmer and more structured, but no less expressive

Unlike its predecessors Expressionism and Post-Expressionism, Abstract Expressionism didn't attempt to depict the observable world with any degree of realism, but rather convey an emotional response. While the free, spontaneous, totally abstract nature of the work is a common factor, however, the movement incorporated a broad range of styles and techniques.

Known as action painting, one variation – demonstrated by Jackson Pollock – is particularly loose and dynamic, defined by aggressive, sweeping brushstrokes or partly random splashes and drips of viscous paint. At the other end of the scale, painters such as Mark Rothko worked with much thinner mixtures of paint to create large, soft-edged rectangles of flat color.

10.   International Typographic Style.

These beautifully simple, graphic posters by Josef Müller-Brockmann embody the essence of Modernism

Although Modernism in its broadest sense encapsulates many of the avant-garde movements on this list that broke the boundaries of traditional artistic expression, the peak of Modernist art and literature occurred in the years between the First and Second World Wars. Following World War II (1945), graphic designers in Switzerland and Germany developed a cohesive, unified Modernist movement that became known as Swiss Design, or the International Typographic Style. Building on the rational approach of the Bauhaus, this movement – still embraced by many graphic designers – is all about functionality and universality.

Logical, modular grid systems provided a structured framework to align different elements, something now considered essential for most forms of graphic design. The unbiased, graphic accuracy of photography was preferred over more expressive illustration, alongside neutral sans-serif typefaces such as Helvetica.

One leading figure was Josef Müller-Brockmann, whose designs for posters, publications and advertisements helped define the Swiss Design aesthetic – particularly through his long series

concert posters, which combined geometric forms, bold colors and clean, sans-serif type.

As the 20th century progressed, many multinational corporations adopted the clean uniformity of the International Typographic Style to create brand guidelines for trademarks, colors and typefaces, and help ensure consistent application across all media.

11.   Pop Art

Primarily a British and American cultural phenomenon that gained traction in the late 1950s and 1960s, Pop Art was so named by art critic Lawrence Alloway because of the way it glorified popular culture and elevated commonplace, often unremarkable objects to iconic status – such as soup cans, road signs and hamburgers.

Sources of inspiration ranged from television to comic books to advertising, rejecting the pretensions of 'high art' as well as the expressive, subjective nature of Abstract Expressionism in favor of bold, graphic printmaking.

Although many contemporary art critics derided Pop Art as vulgar and sensationalist, its inclusive, accessible and democratic nature was praised by others – and it also drew a certain amount of influence from the 1920s Dada movement that ridiculed European high art in the wake of the First World War.

Roy Lichtenstein's print reproductions of comic book scenes were a particularly striking example of the Pop Art aesthetic, as were Andy Warhol's repeated silk-screen prints of everything from soap cartons to celebrities.

These American artists' work was stark and graphic, compared to their British Pop Art counterparts such as David Hockney and Peter Blake, who took a more subjective, almost romanticized view of pop culture from across the pond.

12.   Minimalism

Characterized by extreme simplicity of form and a very literal, objective approach, Minimalism originated in New York in the late 1960s, driven by dissatisfaction with the spontaneous, messy subjectivity of Action Painting in Abstract Expressionism.

For the Minimalists, this style was too insubstantial and personal – they believed art should be clean and self-contained, without external references. Hard edges, simple forms and clean lines dominated in primarily two-dimensional graphic artworks.

Abstract Expressionism still had its share of influence on the movement, but primarily the calmer, more organized color-field works of painters such as Mark Rothko, Barnett Newman and Ad Reinhardt.

Ultimately, Minimalism was about exploring the essential elements of an art form, stripping away extraneous detail and emotional expression in favor of objective, purely visual elements that were open to interpretation.

In its broadest sense, Minimalism has enjoyed a significant resurgence in fields such as branding, UI design and packaging – due in no small part to influential global companies such as Apple and Google prioritizing a clean, pared-back aesthetic above ornament and decoration.

13. Postmodernism

Modernism celebrated social progress, and the idealistic pursuit of utopia. Whether religious or scientific, it was about how universal principles could make sense of the world, and Modernist artists put more emphasis on form, technique and process than on the subjects of their work.

Postmodernism was a reaction against this attitude. In place of idealism and reason was skepticism, suspicion and a denial of the existence of universal truths that can describe the world around us. Postmodernist artists advocated complex individual experience and interpretation over the simple clarity of abstract principles, and the resulting aesthetic was multi-layered and often contradictory.

By the late 1970s, many designers working in the Modernist tradition felt it had lost its innovative spirit, and that it had become stale and academic. Questioning the rigid 'form follows function' philosophy of the International Typographic Style, they were inspired to rip up the rule book and break grids, challenge expectations and introduce decorative, subversive, and at times eccentric design elements.

April Greiman was a particularly acclaimed Postmodernist designer, often collaborating with photographer Jayme Odgers on colorful montages and innovative typographical experiments. Their WET magazine cover, for instance, collages color photocopies with textured papers and airbrushed color.

Another leading exponent of the style was William Longhauser, who worked with dynamic, geometric patterns to create stylized typographic arrangements. In one particular

last name of Postmodernist architect Michael Graves out of geometric forms that allude to the shapes, patterns and textures found in Graves' buildings.

Since the late 1990s, Postmodernism has fallen out of fashion to some extent, although a subversive 'anti design' aesthetic does enjoy popularity in some areas, such as music and indie publishing. However, despite various attempts to define the period since – including post-postmodernism, trans-postmodernism, post-millennialism, pseudo-modernism and metamodernism – none have gained mainstream traction.

14.   Memphis

Drawing on many of the tenets of Postmodernism, the Memphis design aesthetic challenged the neutral, understated, functional Modernism that preceded it. With its roots in furniture design, the Memphis Group collective was founded by Italian designer Ettore Sottsass in the 1980s, and existed for just six years.

Colourful, garish furniture was at the heart of the movement, but the aesthetic went on to influence fashion, graphic design and more. Simple geometric shapes; flat colors combined in bold, contrasting palettes; stylized graphic patterns with black-and-white stripes and abstract squiggles – these are the ingredients of Memphis-inspired design, influenced by earlier movements such as Pop Art and Art Deco.

Many of the movements on this list enjoyed considerable longevity in their heyday, and influenced millions of creative across many different disciplines. Many led to new movements, either complementary or contradictory, as new attitudes and approaches took hold.

Memphis is one of the most niche examples of all: a handful of Italian designers who created a series of bizarre, kitsch products 30 years ago are influencing a whole new generation of designers today.

DESIGN THINKING & APPROACHES

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

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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.

The five-stage Design Thinking model was pro Source:

posed 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.

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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
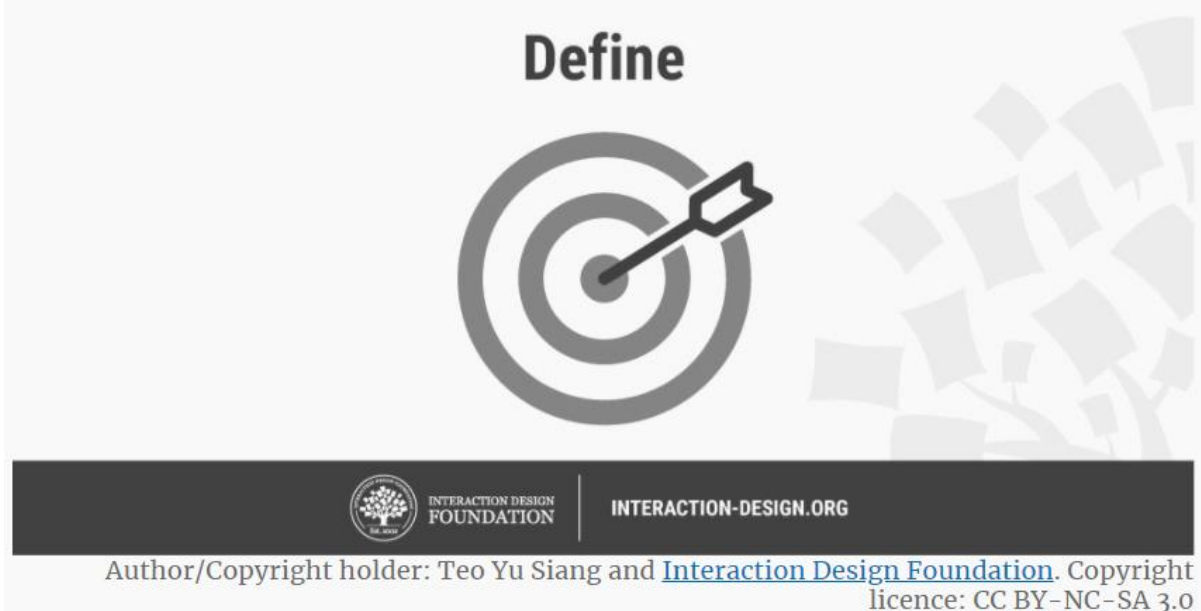
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2. Define (the Problem)

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understanding of the users, their needs, and the problems that underlie the development of that particular product.

ng 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

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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, and Worst Possible Idea. 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.
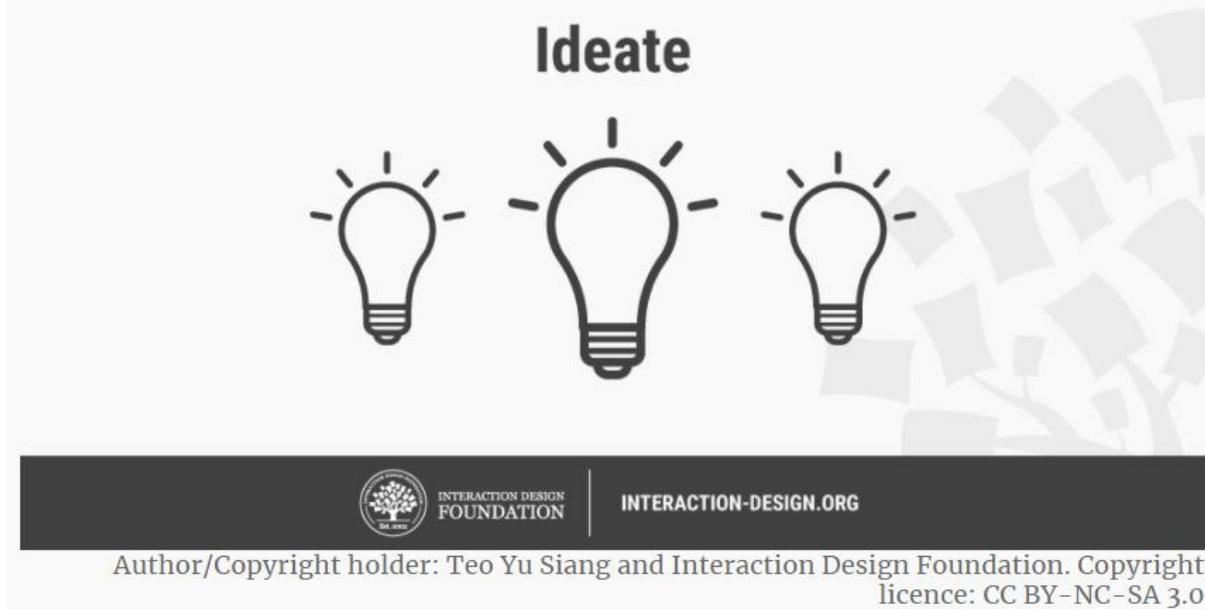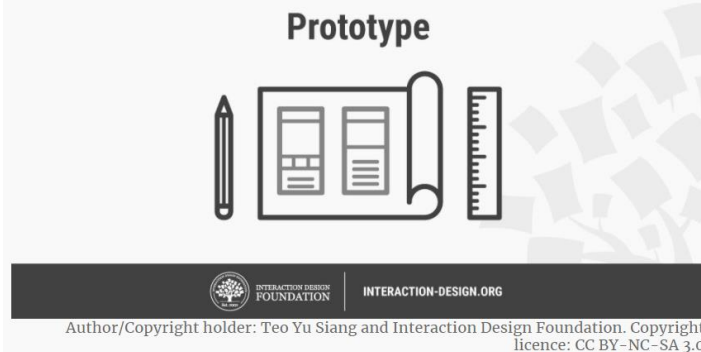
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4. Prototype

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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

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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.

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DESIGN APPROACH – Antonio Catalani

THE REASON-CENTRIC PERSPECTIVE

Designers optimize goals mediating between constraints and opportunities, the design process follows a methodology, and the design process is based on a discrete sequence of stages. Analyse the problem Observe Early prototypes Alternative options Final design.

1. Critically analyse the problem
2. Observe the environment in which the product will operate
3. Analyse the solutions already on the market
4. Generate alternative options
5. Evaluate early prototypes
6. Identify the best solution
7. Finalize the project

THE ACTION-CENTRIC PERSPECTIVE

Designers use fantasy and emotion to generate solutions, the design process is synthetic, analysis; design and sketching are co temporal and inextricably linked.

1. The designer has his own style and his own vision
2. Immersion in the project (company, market, technology)
3. Analysis of the previous solutions
4. Intuition of the concept (analogical process)
5. Exploration of possible solutions
6. Finalize the project

REASON-CENTRIC

- Design as problem solving
- Team-based
- Start with analysis of user's needs and practices
- Balance between form and function
- Designer mediator between environment and company

ACTION-CENTRIC

- Design as expression
- Individual

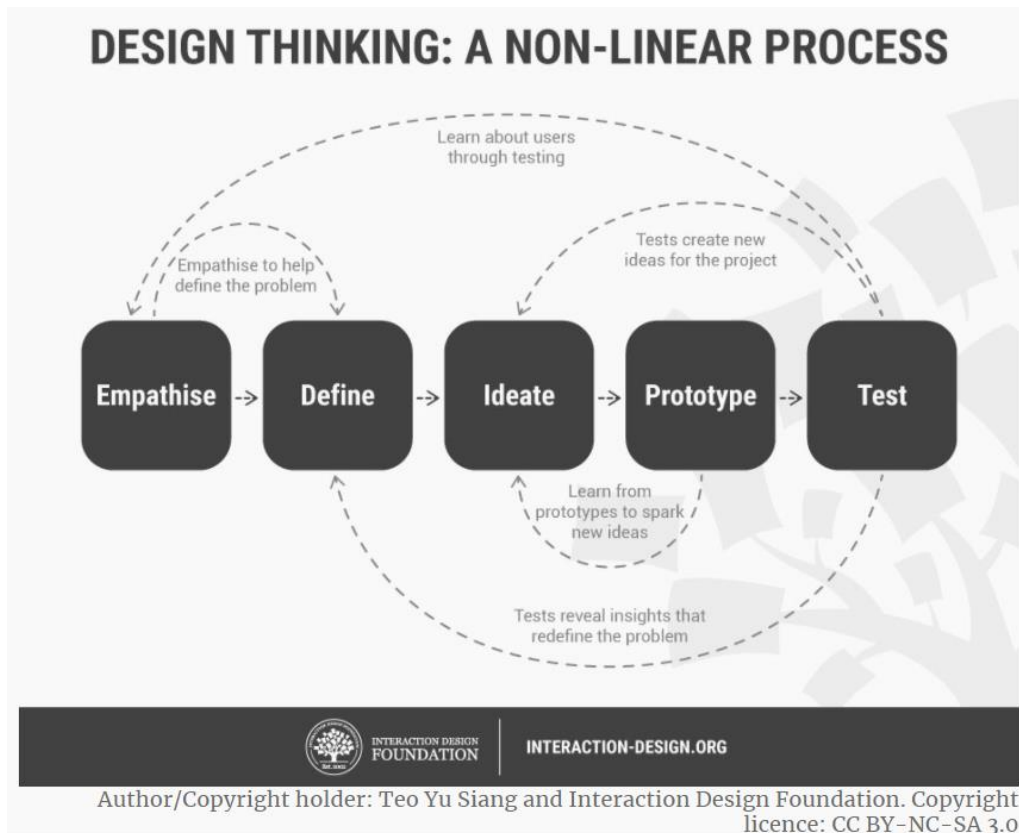![Sathyabama Institute of Science and Technology logo]
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- Start with the designer's dream and vision

- Emphasis on form

- Designer mediator of languages

DESIGN THINKING – A NON – LINEAR PROCESS

Linear Design Thinking process is the process in which one stage seemingly leads to the next with a logical conclusion at user testing. However, in practice, the process is carried out in a more flexible and non-linear fashion. For example, different groups within the design team may conduct more than one stage concurrently, or the designers may collect information and prototype during the entire project so as to enable them to bring their ideas to life and visualise the problem solutions. Also, results from the testing phase may reveal some insights about users, which in turn may lead to another brainstorming session (Ideate) or the development of new prototypes (Prototype).

It is important to note that the five stages are not always sequential — they do not have to follow any specific order and they can often occur in parallel and be repeated iteratively. As such, the stages should be understood as different modes that contribute to a project, rather than sequential steps. However, the amazing thing about the five-stage Design Thinking model is that it systematises and identifies the 5 stages/modes you would expect to carry out in a design project – and in any innovative problem-solving project. Every project will involve activities specific to the product under development, but the central idea behind each stage remains the same.

Design Thinking should not be seen as a concrete and inflexible approach to design; the component stages identified in the illustration above serve as a guide to the activities that you would typically carry out. In order to gain the purest and most informative insights for your particular project, these stages might be switched, conducted concurrently and repeated several times in order to expand the solution space, and zero in on the best possible solutions.

DESIGN THINKING: A NON-LINEAR PROCESS

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As you will note from the illustration above, one of the main benefits of the five-stage model is the way in which knowledge acquired at the later stages can feedback to earlier stages. Information is continually used both to inform the understanding of the problem and solution spaces, and to redefine the problem(s). This creates a perpetual loop, in which the designers continue to gain new insights, develop new ways of viewing the product and its possible uses, and develop a far more profound understanding of the users and the problems they face.

THE ORIGIN OF THE 5-STAGE MODEL

In his 1969 seminal text on design methods, "The Sciences of the Artificial," Nobel Prize laureate Herbert Simon outlined one of the first formal models of the Design Thinking process. Simon's model consists of seven major stages, each with component stages and activities, and was largely influential in shaping some of the most widely used Design Thinking process models today. There are many variants of the Design Thinking process in use in the 21st century, and while they may have different numbers of stages ranging from three to seven, they are all based upon the same principles featured in Simon's 1969 model.

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We focus on the five-stage Design Thinking model proposed by the Hasso-Plattner Institute of Design at Stanford (d.school).

Design Thinking tackles complex problems by:

1. Empathising: Understanding the human needs involved.

2. Defining: Re-framing and defining the problem in human-centric ways.

3. Ideating: Creating many ideas in ideation sessions.

4. Prototyping: Adopting a hands-on approach in prototyping.

5. Testing: Developing a prototype/solution to the problem.

DESIGN APPROACHES TO START A NEW CREATIVE PROJECT

– Masaki Iwabuchi

People expect that design plays the role of **more socio-technical interventions** such as experiences, services, and social innovations.

1. FORECASTING APPROACH

Think about the future from the past and the present.

Design Thinking

User-centric and bottom-up approach**.** Empathize with specific users and extract their needs/pains, and create many ideas and prototypes to try to solve their issues smartly.

Systems Thinking

A system-centric and macro approach**.** Rather than a specific user, it often starts with a big problem such as a declining birth-rate, an aging population, sluggish sales, etc., and analyses the root cause systematically and creates a new system by decomposing and patterning changes, components, and dependencies.

Design-Driven Innovation

Inside-out approach proposed by Roberto Verganti instead of outside-in approach such as Design Thinking. It means focusing on the meaning of things in the world we live in, and he explains that creating new meanings leads to innovation. Therefore, rather than listening to the user's voice, it is crucial to listen to your inner voice, produce products from the desire of changing the world, and grow the product with receiving constructive criticism.

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2. BACKCASTING APPROACH

Think about what we should do now from the future.

Speculative Design

Problem proposing approach. It captures driving forces that may change the world, such as future signals and advanced technologies. And from these inputs, it exhibits radical worldviews through tangible products to encourage audiences to speculate the possible future together. It is often introduced as a design for proposing problems, not a design for solving problems. The purpose of this type of design is to evoke the debate about what we should live/think/do now. Strictly speaking, Speculative Design proposes the future, but it doesn't propose to-do actions of the present. To think about them and take actions are up to audiences.

Transition Design

A system-centric and macro-level back casting approach**.** It envisions a sustainable and ideal lifestyle where "wicked problems" no longer exist, and returns back to a feasible project proposal to bridge to that long-term future.

3. PARTICIPATORY DESIGN APPROACH

– Participatory Design

– Inclusive Design

– Co-Design

These concepts are considered as an organization of the project rather than a design process/approach. So these are placed in the above diagram as the infrastructure for the design project.

Is there a universal approach?

Deciding an approach and taking a stance means abandoning something, so I think there is no single, universal approach. For this reason**,** Designers need to have various design approaches in drawers, and use appropriate one or combine multiple approaches according to the project's situation and phase.

You can flexibly design the process just by asking simple two questions at the beginning:

1. Think from the present (forecasting) or the future (back casting)?

2. View from the micro (individual layer) or macro (system layer)?

Scenario making is a universal skill for designers

The ability to envision a future scenario and visualize it is the common designer's capability regardless of which design approach is applied. Input information varies project by project. However, designers need to convey how people's experiences and values change with a lively resolution. I think this capability will continue to be a core skill that will not change even if the definition of the design is expanded.

PROBLEM STATEMENT – DEFINING A PROBLEM

Problem statements are concise descriptions of design problems. Design teams use them to define the current and ideal states, to freely find user-centered solutions. Then, they use these statements—also called points of view (POVs)—as reference points throughout a project to measure the relevance of ideas they produce.

"If I had an hour to solve a problem, I'd spend 55 minutes thinking about the problem and 5 minutes thinking about solutions." — *Albert Einstein*

Problem Statements are like Compasses in the Wilderness of Ideation

Well-constructed, valid problem statements are vital for your design team to navigate the entire design process. Essential to design thinking, problem statements are what teams produce in the Define stage. To find the best solutions, your team must know what the exact problems are—i.e., you first need to define a problem statement. The goal is to **articulate** the problem so everyone can see its dimensions and feel inspired to systematically hunt for suitable solutions. When you unite around a problem statement, your team will have a common view of how users see what they must tackle. From there, all your team will know exactly what to look for and what to avoid.

Therefore, you should make your problem statements:

- Human-centered: Frame problem statements from insights about users and their needs.
- Have the right scope:
- Broad enough to permit creative freedom, so you don't concentrate too narrowly on specific methods for implementing solutions or describing technical needs; but
- Narrow enough to be practicable, so you can eventually find specific solutions.
- Based on an action-oriented verb (e.g., "create" or "adapt").
- Fully developed and assumption-free.

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Design teams sometimes refer to a problem statement as a "point of view" (POV) because they should word problem statements from the users' perspective and not let bias influence
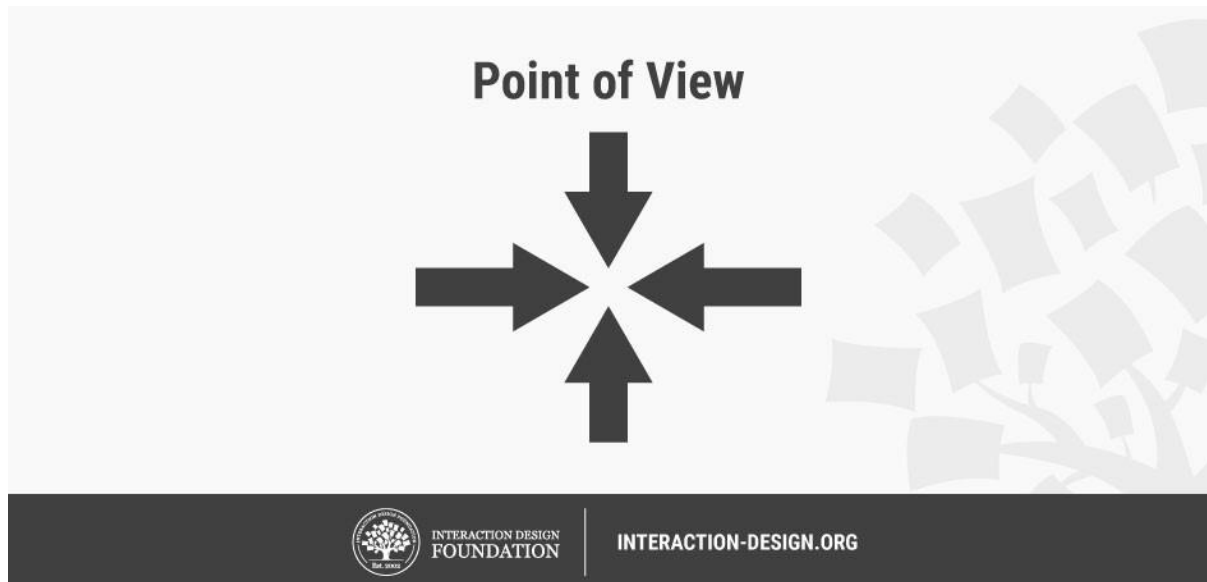
them. Your team will have a POV when it comes up with a narrowly focused definition of the right challenge to pursue in the next stage of the design process. With an effective POV, your team can approach the right problem in the right way. Therefore, you'll be able to seek the solutions your users want.

To define a problem statement, your team must first examine recorded observations about users. You must capture your users' exact profile in the problem statement or POV. So, you need to synthesize research results and produce insights that form solid foundations. From these, you can discover what those specific users really require and desire—and therefore ideate effectively. Teams typically use a POV to reframe the challenge meaningfully into an actionable problem statement. The POV madlib is a framework you use to place the user, need and insight in the best way. This is the format to follow: [User… (descriptive)] needs [need … (verb)] because [insight… (compelling).]

Point of View Template – Example

User	Need	Insight
An adult person who lives in a city	To use a car for 10-60 minute trips 1-4 times per week	The user would not want to own his own car as it would be too expensive compared to his needs. He would like to share a car with others who have similar needs, however, there are no easy and affordable solutions for him. It's important for the user to think and live green and to not own more than he truly needs.

With a valid problem statement, your team can explore the framed "why" questions with "how"-oriented ones. That's how you proceed to find potential solutions. You'll know you have a good problem statement if team members:

- **Feel inspired**.
- **Have the criteria** to **evaluate ideas**.
- **Can use** it to **guide innovation efforts**.
- **Can't find** a **cause** or a **proposed solution** in it (which would otherwise get in the way of proper ideation).

When your team has a good problem statement, everyone can compare ideas, which is vital in brainstorming and other ideation sessions. It also means everyone can keep on the right track. Problem statements are powerful aids because they encourage well-channeled divergent thinking. Rather than rush toward solutions that look impressive but aren't effective, your team can work imaginatively to find the right ones. Once you've discovered what's causing problems, you can give users the best solutions in designs they like using.

PROBLEM SOLVING

The term "Design Thinking" dates back to the 1987 book by Peter Rowe; "Design Thinking." In that book he describes the way that architects and urban planners would

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approach design problems. However, the idea that there was a specific pattern of problem solving in "design thought" came much earlier in Herbert A Simon's book, "The Science of the Artificial" which was published in 1969. The concept was popularized in the early 1990s by Richard Buchanan in his article "Wicked Problems in Design Thinking".

Ralph Caplan, the design consultant, sums up the need for design thinking with; "Thinking about design is hard, but not thinking about it can be disastrous."

PROBLEM-SOLVING AND TWO SCHOOLS OF THOUGHT

Design thinking is concerned with solving problems through design. The idea being that the future output of the process will provide a better answer than the one already available or if nothing is available – something entirely new.

It is an unconstrained methodology where it is possible that the designer (or design team) will work on many possible solutions at once. It enables designers to consider the problem in many different ways and speculate on both the past and future of the problem too.

This is in contrast to the scientific method of problem solving which requires a highly-defined problem which focuses on delivering a single solution.

This difference was first noted by Brian Lawson, a psychologist, in 1972. He conducted an experiment in which scientists and architects were asked to build a structure from colored blocks. He provided some basic rules for the project and observed how they approached it. The scientists looked to move through a simple series of solutions based on the outcome and entire rule set. The architects, in contrast, simply focused on the desired end-state and then tested to see if the solution they had found met the rules.

This led to the idea that scientists solve problems by a process of analysis, whilst designers solve problems by synthesis. However, later evidence suggests that designers apply both forms of problem solving to attain "design thinking".

They do this via a process of divergent thinking. A designer will examine as many possible solutions at the beginning of a process as they can think of – then they will apply the scientific side (convergent thinking) to narrow these solutions down to the best output.

Design thinking can be as simple or as complex as the business and users require. This IDEO process can be seen as a 3 part process or a 9 part process.

The Design Thinking Process

Design thinking is essentially a process which moves from problem to solution via some clear intermediate points. The classic approach, as proposed by Herbert A Simon, is offered here:

- **Definition** – where the problem is defined as best as possible prior to solving it

- **Research** – where the designers examine as much data as they feel necessary to be able to fully contribute to the problem solving process

- **Ideation** – where the designer commences creating possible solutions without examining their practicality until a large number of solutions has been proposed. Once this is done, impractical solutions are eliminated or played with until they become practical.

- **Prototyping** – where the best ideas are simulated in some means so that their value can be explored with users

- **Choosing** – where the best idea is selected from the multiple prototypes

- **Implementing** – where that idea is built and delivered as a product

- **Testing** – where the product is tested with the user in order to ensure that it solves the original problem in an effective manner

There are many other design thinking processes outlined in literature – most of which are a truncated version of the above process combining or skipping stages.

Here we see a more complex interpretation of the design thinking process and how it fits into the larger business sphere.

The Principles of Design Thinking

In the book, Design thinking: Understand, Improve Apply, Plattner and Meinel offer four underlying principles for design thinking:

- Human – all design is of a social nature

- Ambiguity – design thinking preserves and embraces ambiguity

- Re-design – all design processes are in fact re-design of existing processes

- Tangibility – the design process to make something tangible will facilitate communication of that design

It is also worth noting that design thinking functions independently of the design methods employed in any given design process. Design methods are the tools employed (such as interviews, user research, prototypes, etc.) and the assumption is that there are many paths that may be used (e.g. different sets of methods applied) to reach the same "best" result.

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Visuals and Design Thinking

Firstly, it is important to acknowledge that design thinking is not about graphic design per se. However, designers are often used to communicating their thinking visually and drawings, sketches, prototypes, etc. are often used to convey the ideas created within a design thinking process.

In fact, ideas which are hard to express easily in words are often given shape in the form of visual metaphors. Design thinking thus easily incorporates abstract thought processes – something that scientific thinking may find more challenging to accommodate.

Design thinking is a process by which designers approach problem solving. It incorporates analytical, synthetic, divergent and convergent thinking to create a wide number of potential solutions and then narrow these down to a "best fit" solution. There are many ways to use a design thinking process to incorporate different methodologies to still reach the same end point. Designers must solve problems in order to add value through design.

CREATIVE PROBLEM SOLVING

Creative problem solving (CPS) is a way of solving problems or identifying opportunities when conventional thinking has failed. It encourages you to find fresh perspectives and come up with innovative solutions, so that you can formulate a plan to overcome obstacles and reach your goals.

About Creative Problem Solving

Alex Osborn, founder of the Creative Education Foundation, first developed creative problem solving in the 1940s, along with the term "brainstorming." And, together with Sid Parnes, he developed the Osborn-Parnes Creative Problem Solving Process. Despite its age, this model remains a valuable approach to problem solving.

The early Osborn-Parnes model inspired a number of other tools. One of these is the 2011 CPS Learner's Model, also from the Creative Education Foundation, developed by Dr Gerard J. Puccio, Marie Mance, and co-workers. In this article, we'll use this modern four-step model to explore how you can use CPS to generate innovative, effective solutions.

Why Use Creative Problem Solving?

Dealing with obstacles and challenges is a regular part of working life, and overcoming them isn't always easy. To improve your products, services, communications, and

interpersonal skills, and for you and your organization to excel, you need to encourage creative thinking and find innovative solutions that work.

CPS asks you to separate your "divergent" and "convergent" thinking as a way to do this. Divergent thinking is the process of generating lots of potential solutions and possibilities, otherwise known as brainstorming. And convergent thinking involves evaluating those options and choosing the most promising one. Often, we use a combination of the two to develop new ideas or solutions. However, using them simultaneously can result in unbalanced or biased decisions and can stifle idea generation.

CORE PRINCIPLES OF CREATIVE PROBLEM SOLVING

CPS has four core principles. Let's explore each one in more detail:

- Divergent and convergent thinking must be balanced. The key to creativity is learning how to identify and balance divergent and convergent thinking (done separately), and knowing when to practice each one.
- Ask problems as questions. When you rephrase problems and challenges as open-ended questions with multiple possibilities, it's easier to come up with solutions. Asking these types of questions generates lots of rich information, while asking closed questions tends to elicit short answers, such as confirmations or disagreements. Problem statements tend to generate limited responses or none at all.
- Defer or suspend judgment. As Alex Osborn learned from his work on brainstorming, judging solutions early on tends to shut down idea generation. Instead, there's an appropriate and necessary time to judge ideas during the convergence stage.
- Focus on "Yes, and," rather than "No, but." Language matters when you're generating information and ideas. "Yes, and" encourages people to expand their thoughts, which is necessary during certain stages of CPS. Using the word "but" – preceded by "yes" or "no" – ends conversation, and often negates what's come before it.

How to Use the Tool

Let's explore how you can use each of the four steps of the CPS Learner's Model (shown in figure 1, below) to generate innovative ideas and solutions.
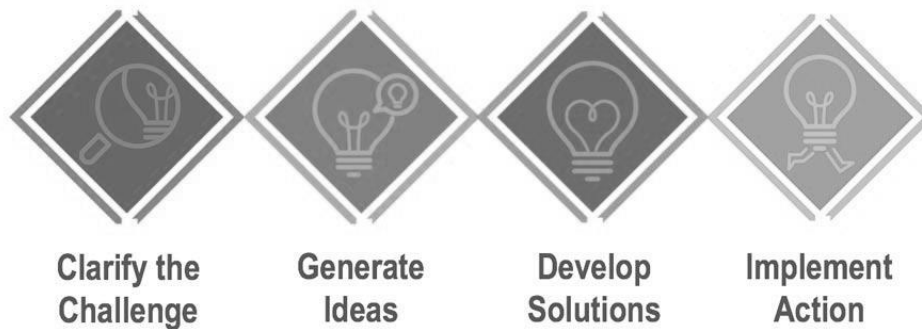
Stages in Creative Thinking and Creative Preferences

Clarify the Challenge   Generate Ideas   Develop Solutions   Implement Action

Source: Foursight

CPS Learner's Model

From The CPS Process and Learner's Model by the Creative Education Foundation, based on the work of Alex Osborn and Sid Parnes. Adapted by G.J. Puccio, M. Mance, M.C. Murdock, B. Miller, J. Vehar, R. Firestien, S. Thurber, and D. Nielsen (2011). Reproduced with permission.

1. Clarify

Explore the Vision

Identify your goal, desire or challenge. This is a crucial first step because it's easy to assume, incorrectly, that you know what the problem is. However, you may have missed something or have failed to understand the issue fully, and defining your objective can provide clarity.

Gather Data

Once you've identified and understood the problem, you can collect information about it and develop a clear understanding of it. Make a note of details such as whom and what is involved, all the relevant facts, and everyone's feelings and opinions.

Formulate Questions

When you've increased your awareness of the challenge or problem you've identified, ask questions that will generate solutions. Think about the obstacles you might face and the opportunities they could present.

2. Ideate

Explore Ideas

Generate ideas that answer the challenge questions you identified in step 1. It can be tempting to consider solutions that you've tried before, as our minds tend to return to habitual thinking patterns that stop us from producing new ideas. However, this is a chance to use your creativity. Brainstorming and Mind Maps are great ways to explore ideas during this divergent stage of CPS.

3. Develop

Formulate Solutions

This is the convergent stage of CPS, where you begin to focus on evaluating all of your possible options and come up with solutions. Analyze whether potential solutions meet your needs and criteria, and decide whether you can implement them successfully. Next, consider how you can strengthen them and determine which ones are the best "fit."

4. Implement

Formulate a Plan

Once you've chosen the best solution, it's time to develop a plan of action. Start by identifying resources and actions that will allow you to implement your chosen solution. Next, communicate your plan and make sure that everyone involved understands and accepts it.

GOALS IN DESIGN

Design goals are targets for design work. These are typically agreed upon by stakeholders as the criteria for comparing design alternatives and evaluating design outcomes. The following are illustrative examples of design goals.

Usability

Usability goals such as a target for the percentage of users who rate a user interface as easy to use.

Customer Experience

Customer experience measures such as a theme park attraction with a goal to be rated as magical, thrilling or comforting b customers.

Visual Appeal

An aesthetic goal such as a furniture design initiative with a goal to produce a product that is visually perceived as modern study, high quality and stylish.

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Look and Feel

Look and feel is a term for the aesthetics of an interactive and explorable environment that isn't as static as something you look at such as a painting. For example, a mobile device that users describe as comfortable after accomplishing common tasks with the product.

Sensory Experience

Goals related to multisensory experiences such as a product you see, feel, smell and taste. For example, a product design goal to develop donuts that don't feel oily or messy to the touch.

Brand Image

A goal to achieve brand image through design. For example, a target to design restaurant decor that aligns to the brand image of a restaurant chain that is a highly social venue for young professionals.

Cohesion

Consistency with other designs such as a new page on a bank's website that needs to fit in well with the structure and look and feel of the site.

Compatibility

Targets for forward and backward compatibility. For example, a kitchen knife design that has to be compatible with a knife holder sold by the brand.

Customer Needs

Meeting customer needs such as an social media service that allows customers to quickly liberate their data.

Customer Perceptions

How customers feel as opposed to the physical realities of a design. For example, if customers feel that a packaging design is luxurious then it is luxurious regardless of its cost.

User Perceptions

In some cases there is a difference between the customer and the user. For example, you may sell automated banking machines to a bank that is the customer with the users being people who actually use the machine to perform transactions. In this case, the user perceptions can include areas such as speed, ease of use and security.

Stakeholder Perceptions

A design may have goals to satisfy a stakeholder who is neither the customer nor the user. For example, a business unit tha perceives pop-up messages that are difficult to dismiss as a

wonderful tool to improve conversion rates. In this case, stakeholders perceptions may be overwhelmingly positive for a design that customers and users intensely dislike.

Engagement

User engagement goals such as a video game with a design goal to keep players playing for an average of 30 minutes a day

Figure of Merit

A figure of merit is a measurement that customers commonly use to compare products and services. For example, a 0-60 mph target for a sports car design.

Positioning

Goals for the value of a design relative to the competition. For example, a goal to design an electronic piano that is widely perceived as the highest quality on the market with a less price.

Performance

The performance of a design such as a goal for the load time of a website.

Durability

The durability of a design such as a chair that should last for ten years under normal conditions. This can be validated with accelerated life testing.

Reliability

A design that remains useful in a wide range of situations such as a bicycle tire design that performs well in severe weathe and road conditions.

Fit for Purpose

Fit for purpose is the idea that a design achieves its useful functions without any unnecessary additions to quality. For example, a can opener that opens cans well without any additional goals such as being entertaining or high-tech.

Technology

Technology driven goals such as a goal to make a toaster "smart." Designers typically understand this to be a mistake as customer needs are a better driver of design goals. Nevertheless, technology driven design goals are common as business units simply want to incorporate trendy technologies into things without having much of a reason.

Cost

Targets for a unit cost or operating cost. Design as a primary goal is known as design-to-cost.

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Maintainability

Ease and cost of maintenance such as a bicycle designed such that any part can be easily swapped in and out.

Accessibility

Avoiding assumptions about the user to create things that are usable for as many people as possible. For example, a transit system improvement project with a goal that trains be easy for almost everyone to board without assistance including people with disabilities, seniors and parents with small children.

Human Factors

Goals related to the characteristics of people. For example, an airline seat that is designed to be comfortable for people of diverse shapes and sizes.

Productivity

Targets for the productivity of the user. For example, a scientific calculator designs initiative that seeks a faster and more intuitive way for students to solve multivariable equations.

Learnability

A goal that a user interface be easy to learn such as an app that feels immediately intuitive without any on boarding process such as a tutorial.

Discoverability

The ease with which users find what they are seeking in an environment. For example, a hotel lobby that feels easy to navigate such that guests typically can sense where restaurants, elevators and other facilities are located.

Transparency

The extent to which a design gets out of the way. For example, a camera that doesn't feel like a camera but more of a direc creative experience.

Efficiency

Reducing the amount of resources consumed by a design such as an engineering design for an aircraft with a target to reduce energy consumption by 18%.

Convenience

Making things easier for the customer. For example, a design goal to automate a bathtub such that it can be filled to a present level and temperature without any hassle such as installing an app.

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Comfort

Comfort related goals such as soundproofing targets for a hotel renovation.

Privacy

Goals to avoid collecting and processing customer data. For example, a smart appliance that is smart enough without connecting to the internet for anything but firmware updates.

Information Security

Information security related design initiatives such as a goal to detect and block suspicious banking transactions.

Safety

Safety goals such as a requirement that an aircraft remain safe when critical sensors fail.

Latent Human Error

A requirement that a design that does not allow human error to have serious repercussions. For example, an aircraft that will not allow a pilot to enter an air temperature that's almost certainly wrong given the aircraft's awareness of temperature and weather conditions.

Health

Health related goals such as a requirement that a design not use any materials that can in anyway be perceived as unhealthy

Reusability

Goals related to reuse of a product such as an electric car with a battery that is designed for reuse at the vehicle's end of life. For example, batteries that can be integrated with solar power systems.

Sustainability

Goals related to a design's impact on people and planet such as a goal to design a biodegradable drinking straw to reduce ocean plastic.

Refinement

Goals related to perfecting a design such that it stands out as extremely high quality. For example, a design of a grand pian that has a goal to impress people who know pianos. This can be measured by engaging lead users.

Design is the practice of conceiving and planning what doesn't exist. It is a broad term that can be applied to creating structures, environments, interfaces, products, services, features and processes.

REFERENCES:

- Richard Buchanan's original article "Wicked Problems in Design Thinking," was published in Design Issues, vol. 8, no. 2, Spring 1992.
- Peter Rowe's book from 1987 Design Thinking was published by Cambridge: The MIT Press. ISBN 978-0-262-68067-7.
- Herbert A Simon's book from 1969 The Sciences of the Artificial. Was published by Cambridge: MIT Press.
- Plattner, Hasso; Meinel, Christoph; Leifer, Larry J., eds. (2011). Design thinking: understand, improve, apply. Understanding innovation. Berlin; Heidelberg: Springer-Verlag. pp. xiv–xvi.doi:10.1007/978-3-642-13757-0. ISBN 3642137563.
- This fascinating case study looks at how IBM plans to bring design thinking to large scale businesses - http://www.wired.com/2016/01/ibms-got-a-plan-to-bring-design-thinking-to-big-business/
- https://www.interaction-design.org/courses/design-thinking-the-beginner-s-guide
- Herbert Simon, The Sciences of the Artificial (3rd Edition), https://monoskop.org/images/9/9c/Simon_Herbert_A_The_Sciences_of_the_Artificial_3rd_ed.pdf
- GerdWaloszek, Introduction to DesignThinking,   https://experience.sap.com/skillup/introduction-to-design-thinking/
- https://dschool-old.stanford.edu/groups/k12/wiki/41a18/POV_Statements.html
- Explore Toptal's example-rich examination of problem statements https://www.toptal.com/designers/product-design/design-problem-statement
- This piece exposes practicalities of problem statements for startups: https://generalassemb.ly/blog/create-problem-statement-startup/
- Here's a thought-provoking approach to problem statements: https://uxdesign.cc/how-to-write-a-memorable-problem-statement-1948ea19cb66
- Herbert Simon, The Sciences of the Artificial, https://monoskop.org/images/9/9c/Simon_Herbert_A_The_Sciences_of_the_Artificial_3rd_ed.pdf
- Deloitte, Deep diving for innovation, 2011- http://globalblogs.deloitte.com/deloitteperspectives/2011/10/deep-diving-for-innovation.html
- d.school, The Design Thinking Process: http://dschool.stanford.edu/redesigningtheater/the-design-thinking-process/
- Tim Brown, Design Thinking for Social Innovation, - https://ssir.org/articles/entry/design_thinking_for_social_innovation
- IDEO, Method Cards: https://www.ideo.com/post/method-cards
- IDEO, Design Kit: The Human-Centered Design Toolkit: https://www.ideo.com/post/design-kit
- Design Council of UK, Eleven lessons: managing design in eleven global brands: http://www.designcouncil.org.uk/sites/default/files/asset/document/ElevenLessons_Design_Council%20(2).pdf
- Jeanne Liedtka and Tim Ogilvie, Designing for Growth: A Design Thinking Tool Kit for Managers, 2011: http://www.designingforgrowthbook.com/
- LUMA Institute's Design Thinking modes: https://www.luma-institute.com/story
- Hero Image: Author/Copyright holder: Paris-Est d.school at Ecole des Ponts. Copyright terms and licence: CC BY-SA 4.0
- https://www.mindtools.com/pages/article/creative-problem-solving.htm

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SDE1301 – CREATIVE THINKING PROCESS AND METHODS

UNIT - 3

CREATIVE THINKING PROCESS AND METHODS

Subject Name: Creative Thinking Process and Methods　　　　**Code:** SDE 1301

UNIT – III – DESIGN THINKING

Understanding the terms creativity, imagination etc. - Theories on thinking, convergent & divergent thinking, lateral & vertical thinking, six hat thinking by Edward de Buno. Creative techniques like checklists, brainstorming etc., design puzzles & traps, blocks in creative thinking. Introduction to various theories in Design such as aesthetic theory, proxemics theory. Theory related to human behaviour and environmental design.

A creative process is an approach to developing a creative output. This includes traditional areas of creativity such as music, art, architecture, design and media. Creative processes can also be applied to developing a mission, goal, strategy, plan or product and to make decisions and solve problems. Creative process usually starts by allowing ideas to flow in an optimistic and unrestricted fashion. This is followed by a more pessimistic screening of ideas and cycles of experimentation, implementation and refinement.

A creative process is an approach to producing things is are new and original. This can apply to areas such as design, communications, media and innovation that require fresh ideas to inspire customers or solve problems.

CONVERGETN & DIVERGENT THINKING:

Although there does not appear to be a clear definition of the character of an architect, some interesting distinctions between broad types of thinkers can be identified.

One classification is between convergent and divergent thinkers.

Convergent Thinkers:

- Convergent thinkers are generally associated with the sciences, and will work effectively towards one correct answer to a given problem.
- Convergent thinkers prefer precise problem definitions avoiding "messy" situations.
- Convergent thinkers seek to find an abstract perfection, through precise logical arguments.

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Divergent Thinkers:

- Divergent thinkers respond well to open-ended questions, taking pleasure from the task of proposing many alternatives to a given problem.

- Divergent thinkers seem to enjoy ambiguity in a problem and are happy to work in this situation.

- Divergent thinkers mistrust precise logical arguments.

Although all architects will fall somewhere between these two extremes, as with all the polarizations presented, there are examples of successful architects who show tendencies to either one of these types of thinking. It has been suggested that successful designing requires both types of thinking. The creative process described in simple terms relies upon the creation of a set of possible solutions and a critical selection process to choose the most suitable. Divergent thinking works best at producing alternatives, and convergent thinking works best at selecting the best solution from a given set. The divergent thinker works within a vague framework, while the convergent thinker works within the well-defined set of possibilities presented.

SIX HAT THINKING BY EDWARD DE BONO

Six Thinking Hats or Edward de Bono**'s Six Hats** is a good decision making technique and method for group discussions and individual thinking. Combined with the parallel thinking process, this technique helps groups think more effectively. It is a means to organize thinking processes in a detailed and cohesive manner.

Edward de Bono is the founding father of this six thinking hats technique and wrote a book about this called the *Six Thinking Hats* in 1985. A thinking hat is a metaphor for a certain way of thinking. By mentally wearing different thinking hats people are forced to look at a problem from different perspectives. Thus a one-sided way of thinking is excluded and new insights are created.

He distinguishes six different frames of mind in which the brain can become sensitive. Each of these frames of mind can be found in the brain and create conscious thoughts for certain aspects of the issues that are being discussed, (e.g. gut feeling, pessimistic views, neutral facts).

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De Bono's Six Thinking Hats is a powerful technique for looking at decision making from different points of view. It allows emotion and skepticism to be brought into what might normally be a purely rational process, and it opens up the opportunity for creativity within decision making. Decisions made using the Six Thinking Hats technique can be sounder and more resilient than would otherwise be the case. It can also help you to avoid possible pitfalls before you have committed to a decision.

A variant of this technique is to look at problems from the point of view of different professionals (for example, doctors, architects or sales directors) or different customers.

Hat	Definition	Examples
Blue Hat	Manages the thinking process by timekeeping, moderating, and ensuring the Thinking Hat guidelines are observed.	• "We will discuss this matter for one hour." • "Time to Yellow Hat this idea. Everything else aside, what are the benefits of this plan?" • "Let's set aside emotional responses for the moment; we'll come to them when it is time to put on the Red Hat."
White Hat	Calls for and provides facts and data that are known or needed.	• "What does it cost us to manufacture one unit?" • "Revenue was up 8.5% last quarter." • "There are estimated to be 75 million people that are 18-34 years of age in the US, as of last year."
Green Hat	Focuses on alternatives, new perceptions, or fresh ideas.	• "Instead of manufacturing in China, we could refurbish a plant in Detroit." • "This is a difficult position. Let's brainstorm some potential solutions to address the Black Hat problems." • Are there other options?"

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Yellow Hat	Finds the value and benefits of ideas and supporting concepts.	• "Can we curtail heating or air conditioning to save on energy costs?" • "Our sales staff already has a lot of experience selling widgets." • "Pushing into a new market segment would open up a lot of room for growth."
Red Hat	Acknowledges feelings like fear, disappointment, enthusiasm, and expresses intuitions or hunches.	• "That suggestion makes me angry." • "I really love this project! I'm excited to work more on it!" • "There is no White Hat data to support it, but my gut says customers are afraid we'll cut legacy support down the road."
Black Hat	Spots problems and tries to make the best argument against an idea.	• "We don't have the production capacity to expand that fast." • "I'm pretty sure that would be illegal." • "That idea has a lot of Yellow Hat benefits, what problems can we find with it?"

Advantages of Six thinking Hats:

- Maximize productive collaboration and minimize counterproductive interaction/behaviour

- Consider issues, problems, decisions, and opportunities systematically

- Use Parallel Thinking as a group or team to generate more, better ideas and solutions

- Make meetings much shorter and more productive

- Reduce conflict among team members or meeting participants

- Stimulate innovation by generating more and better ideas quickly

- Create dynamic, results oriented meetings that make people want to participate

- Go beyond the obvious to discover effective alternate solutions

- Spot opportunities where others see only problems

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- Think clearly and objectively

- View problems from new and unusual angles

- Make thorough evaluations

- See all sides of a situation

- Keep egos and "turf protection" in check

- Achieve significant and meaningful results in a less time

Significant Applications for the Parallel Thinking Process of Six Thinking Hats

- Leadership Development

- Team Productivity, Alignment and Communication

- Creative and innovative thinking

- Meeting leadership and decision making

- Product and Process Improvement, and Project Management

- Critical, Analytical Thinking and Problem-Solving

- Organizational Change/Performance

- Wherever High Performance Thinking and Action is needed

LATERAL THINKING

- Lateral thinking is solving problems through an indirect and creative approach, using reasoning that is not immediately obvious and involving ideas that may not be obtainable by using only traditional step-by-step logic.

- Lateral thinking: - about reasoning that is not immediately obvious - about ideas that may not be obtainable - seeks the solution to difficult problems through untraditional methods

CHARACTERISTICS

- Generative nature of publishing ideas, it aims to find alternatives to target.

- Are interested in finding a variety of possibilities. Interested in making the assessment or decision.

- Do not like to defend the idea even though it is true. This idea is proved correct assume still be improved.

- Interested in finding such a good idea to be able to create a better idea.

- Lateral thinking is directly related to the information handling behavior of the mind.

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- Concerned with changing patterns or breaking out of the concept prisons of old ideas and generation of new ideas and insights.
- Closely related to creativity. Though creativity is too often the descriptions of a result, lateral thinking is the description of the process.

VERTICAL THINKING

- Vertical thinking is a selective, move only if there is a direction in which to move, and **also in sequential.**
- Vertical thinking is: - a method of thinking in **very liner, selective pathways**.
- Each step is precise, necessary and must be correct.
- The way of thinking by exact and logical reasoning of the situation. - **solve the problem in direct ways.**

CHARACTERISTICS:

- Reactive thinking.
- Structured: encourages a sequential approach.
- Takes a logical approach.
- Follows the most likely path.
- Analysis on ideas.
- Must be correct at every step.
- Concentrate and excludes what is irrelevant.
- Good in made analysis but hard to accept the opinion.
- May look for different approaches until one finds a promising one.

Principles to guide your design activity

1. Start with needs

Service design starts with identifying user needs. If you don't know what the user needs are, you won't build the right thing. Do research, analyse data, talk to users. Don't make assumptions. Have empathy for users, and should remember that what they ask for isn't always what they need.

2. Do less

If we've found a way of doing something that works, we should make it reusable and shareable instead of reinventing the wheel every time. This means building platforms and

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registers others can build upon, providing resources (like APIs) that others can use, and linking to the work of others. We should concentrate on the irreducible core.

3. Design with data

In most cases, we can learn from real world behaviour by looking at how existing services are used. Let data drive decision-making, not hunches or guesswork. Keep doing that after taking your service live, prototyping and testing with users then iterating in response. Analytics should be built-in, always on and easy to read. They're an essential tool.

4. Do the hard work to make it simple

Making something look simple is easy. Making something simple to use is much harder — especially when the underlying systems are complex — but that's what we should be doing. Don't take "It's always been that way" for an answer. It's usually more and harder work to make things simple, but it's the right thing to do.

5. Iterate. Then iterate again.

The best way to build good services is to start small and iterate wildly. Release Minimum Viable Products early, test them with actual users, move from Alpha to Beta to Live adding features, deleting things that don't work and making refinements based on feedback. Iteration reduces risk. It makes big failures unlikely and turns small failures into lessons. If a prototype isn't working, don't be afraid to scrap it and start again.

6. This is for everyone

Accessible design is good design. Everything we build should be as inclusive, legible and readable as possible. If we have to sacrifice elegance — so be it. We're building for needs, not audiences. We're designing for the whole country, not just the ones who are used to using the web. The people who most need our services are often the people who find them hardest to use. Let's think about those people from the start.

7. Understand context

We're not designing for a screen, we're designing for people. We need to think hard about the context in which they're using our services. Are they in a library? Are they on a phone? Are they only really familiar with Facebook? Have they never used the web before?

8. Build digital services, not websites

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A service is something that helps people to do something. Our job is to uncover user needs, and build the service that meets those needs. Of course much of that will be pages on the web, but we're not here to build websites. The digital world has to connect to the real world, so we have to think about all aspects of a service, and make sure they add up to something that meets user needs.

9. Be consistent, not uniform

We should use the same language and the same design patterns wherever possible. This helps people get familiar with our services, but when this isn't possible we should make sure our approach is consistent.

This isn't a straitjacket or a rule book. Every circumstance is different. When we find patterns that work we should share them, and talk about why we use them. But that shouldn't stop us from improving or changing them in the future when we find better ways of doing things or the needs of users change.

10. Make things open: it makes things better

We should share what we're doing whenever we can. With colleagues, with users, with the world. Share code, share designs, share ideas, share intentions, share failures. The more eyes there are on a service the better it gets — howlers are spotted, better alternatives are pointed out, the bar is raised. Much of what we're doing is only possible because of open source code and the generosity of the web design community. We should pay that back.

BRAINSTROMING

Brainstorming is a great way to generate a lot of ideas that you would not be able to generate by just sitting down with a pen and paper. The intention of brainstorming is to leverage the collective thinking of the group, by engaging with each other, listening, and building on other ideas. Conducting a brainstorm also creates a distinct segment of time when you intentionally turn up the generative part of your brain and turn down the evaluative part. You can use brainstorming throughout any design or work process, of course, to generate ideas for design solutions, but also any time you are trying to generate ideas, such as planning where to do empathy work, or thinking about product and services related to your project.

Brainstorming (or just 'brainstorm', for short) has remained the cornerstone of the creative industry for decades and has evolved over the years as experience and learning developed

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from its variety of applications. Brainstorming essentially relies on a group of people coming together with their prior knowledge and research in order to gather ideas for solving the stated problem. It evokes images of exploration, experimental thinking, and wild ideas. However, all too often it takes the form of controlled sessions where dominant figures assert themselves over others and creativity ends up getting stifled. Or, in other cases, the facilitator does not succeed in helping the team steer towards the goal by keeping the user, the user's need and the team's insights about them in a problem statement – also called Point of View – at the front of the team's minds

Best Practice Rules for Effective Brainstorming

Brainstorm

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

1. Set a time limit – Depending on the problem's complexity, 15–60 minutes is normal.

2. Begin with a target problem/brief – Members should approach this sharply defined question, plan or goal and stay on topic.

3. Refrain from judgment/criticism – No-one should be negative (including via body language) about any idea.

4. Encourage weird and wacky ideas – Further to the ban on killer phrases like "too expensive", keep the floodgates open so everyone feels free to blurt out ideas (provided they're on topic).

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5. Aim for quantity – Remember, "quantity breeds quality". The sifting-and-sorting process comes later.

6. Build on others' ideas – It's a process of association where members expand on others' notions and reach new insights, allowing these ideas to trigger their own. Say "and"—rather than discourage with "but"—to get ideas closer to the problem.

7. Stay visual – Diagrams and Post-Its help bring ideas to life and help others see things in different ways.

8. Allow one conversation at a time – To arrive at concrete results, it's essential to keep on track this way and show respect for everyone's ideas.

Design theory involves the fundamentals and principles of creating visual communication and all types of art. It deals with how we see and perceive visual information, and separates ideas of style, taste and trend from the universal principles of aesthetics that are common to every person. It is foundational to the pursuit of design, photography, illustration and visual arts in general. This common visual language connects designers and image makers from history to current day and continent to continent.

Design theory involves an understanding of the tangible elements including form, space, proportion, color, scale, texture, structure (grid), composition, line, shape and volume and how to arrange them to achieve balance, rhythm, pattern, hierarchy, emphasis, and unity. Design theory, blended with a purpose or problem to solve, results in effective design solutions.

Design theory creates value for clients and causes.

The value of designers to their clients and causes is the thinking and the ability to combine *form* (design principles) and *function* (the purpose of the design) to achieve an effective and pleasing result. Form and function as universally applied design concepts were first defined and formalized at the Bauhaus, and have been the basis for good design ever since. Software has changed the design process and the way we work with design elements, but it has not changed the elements themselves.

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The reason it is essential to learn design theory is so that you can be a *designer* and not simply a *technician*. When you understand principles of balance, order, hierarchy, composition, structures, color, value, shape, space, scale, texture, etc,. you will have the foundation to create good (meaning effective, appropriate and appealing) design and be far more valuable to your clients than a "wrist" could ever be. And, if you want to be a designer, why not strive to be an excellent one? Excellence in working with the visual forms, a solid process and sound design thinking are what make you valuable to your clients.

Simply knowing how to use software does not mean you are a designer. Stop and think for a moment – designers have been around for millennia, creating excellent and effective work long before software came along. The design principles we work with have not changed. You are a designer whether you use pencil and paper or Adobe Creative Cloud. The tool doesn't matter. If you cannot design using pencil and paint, you will not be able to using Illustrator and Photoshop.

Where this applies to clients is in the quality of the work they receive. In written communication, a wrong word or a mark out of place hurts the message. This also happens in the visual language. Clients should seek designers who understand how to combine the forms and principles of design to communicate their messages well.

The best means of learning design theory is a combination of study, application and evaluation.

The best means of learning design theory is a combination of study, application and evaluation. Schools are great for this all-around approach. Any degree or certificate program in design, illustration or photography will include courses in design theory and color theory. Choose courses where you actually have to apply your learning to projects that are critiqued. The more opportunity there is for experience and feedback, the more you will benefit.

When there is no opportunity for formal schooling, look for a design mentor or an internship with a designer who regularly uses design theory and can explain their thinking. You can certainly observe the design process and read texts, but it is in the hand-on attempts at creating design that you make the theory your own.

How does design affect our daily life?

Whether we're aware of it or not, design surrounds us, and can be found in the tiniest of places and items. Take a look at the book sitting beside you, the phone in your hand, the

the sign outside your window, the website you are browsing. All of these items have been carefully and thoughtfully executed by designers. Design helps us engage, it keeps us connected to the world, it helps us navigate our way through physical and digital spaces. Design is used to communicate, depending on who we are – it can be influential by understanding our behaviour and demographics. It has the power to persuade and empower our decision making process.

Wherever we encounter language in written form, we are seeing the work of font and typography designers that subtly (or not) affects your perception of what you read. Graphic design influences and reinforces our brand loyalty to the products we buy, the places we shop and eat. The visual language, tone of voice, imagery and colours have all been carefully crafted so that it reaches you, the reader, in a specific order.

From industrial, automotive to communication design, good designers have all understood the need to connect their creation back to the basics of human engagements. If it does not enhance our physical world or engage with us emotionally, then it is nothing but ideas…

Design impact

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Here are a few examples of things that design has changed in the world forever, and for the better:

Design is progressive, constantly striving for perfection....

Cognitive abilities are foundational types of thinking. These can be cultivated and improved with practice.

An analogy is a thought process or expression that transfers meaning from one subject to another. It is considered a basic cognitive process. For example, humans tend to understand a new thing but comparing it to a familiar thing. Analogies are commonly used to simplify complex or obscure ideas by drawing lines to simple and familiar concepts. In this capacity they may be used to make decisions, learn and solve problems. Analogies also have potential to make communication clear, memorable and persuasive. The following are common types of analogy:

Metaphors

Suggesting that two unrelated things are the same for rhetorical effect. The effect generated by a metaphor may provide clarity or be designed to persuade. Metaphors are also a common tool of humor and may be used to make language more colorful, interesting and memorable. Example: Time is a thief.

Dead Metaphor

A dead metaphor is an overused metaphor that no longer generates much of an effect because it has become a figure of speech. Example: Falling in love.

Mixed Metaphor

A mixed metaphor is a sentence that jams two metaphors together, often without completing both. Example: "If we can hit that bull's-eye then the rest of the dominoes will fall like a house of cards... Checkmate." ~ Zapp Brannigan, Futurama

Allegories

Allegories are extended metaphors that keep their true subject secret. Commonly found in art, literature and film. The term allegory implies complexity and it's common for an entire book or series of books to be considered an allegory. Example: Animal Farm by George Orwell is an allegory of the Russian Revolution of 1917.

Comparisons

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Straightforward comparisons can be considered an analogy if they are intended to transfer meaning from one thing to the next. Example: A heart is a pump.

Similes

A simile is like a metaphor except that it uses more explicit language to define the comparison such as the word "like." Example: That is like comparing apples and oranges.

Exemplification

Something typical or representative of a class or type. That grass is more green than green.

Rational vs. Logical thinking

Rational thought is a state of being reasonable that can only be judged by other humans. That is to say that it differs from logic that can be shown to be correct with a mathematical proof. It is widely accepted that humans aren't logic processing machines and that human judgements differ from logic. It can be argued that illogical thought is the basic for social success, artistic achievement and other foundations of human culture that have great value. Pure logic is often perceived as cold and calculated. Rational thought is often somewhat logical but includes factors such as emotion, imagination, culture, language and social conventions.

Introspection

Introspection is the examination of your own thoughts, emotions, motivations, behavior and character. This is a fundamental type of intelligence that allows a person to improve their mental processes over time.

Counterfactual Thinking

Counterfactual thinking is a common type of thought pattern that goes back in time to evaluate choices and actions that weren't made. It is typified by questions like "what if I had ..." As a time horizon passes, choices that were once available may become impossible. Counterfactual thinking is the practice of examining the impossible to extract insights that can be applied elsewhere. In other words, evaluating past possibilities can have value in improving future decision making or solving a problem.

Behaviourist Theory

Behaviorism, also known as behavioral psychology, is a theory of learning which states all behaviors are learned through interaction with the environment through a process called conditioning. Thus, behavior is simply a response to environmental stimuli.

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Behaviorism is only concerned with observable stimulus-response behaviors, as they can be studied in a systematic and observable manner.

Paradigm & Perspective:

The design field was originally a field of practice, where the task of designing was to develop a new product. The research around design has evolved from studying the practical methods, tools and techniques towards studying a way of thinking. In one of the research design thinking is defined as a development philosophy, i.e. a way of thinking that directs and enhances development activities towards certain values, equal to production philosophies such as lean, which directs and enhances production activities towards certain values. The

Paradigm of design thinking		
Wicked Problems Complex, indeterminate and ill-defined problems.	**Abductive** Propositions of potential futures which are tested empirically.	**Contextual Meaning** Evaluating if a design makes sense in the context.

Methods of design thinking		
Reflective Practise Reflection in action and reflection on action (process reflection).	**Tangible Synthesis** Visual language drives the process on more levels and between people.	**Value Probing** Search for understanding instead of looking for specifications.
Framing Reflecting and challenging solution and problem through rephrasing.	**Explorative Learning** An iterative learning process where the proposed problem and solution are tested through feedback.	**Holistic Alignment** Integrative thinking, taking the perspective of the user, the system and other perspectives.

philosophy of design thinking is described in three levels, the paradigm, the methods and the tools and technique.

Cognitive Theory

Cognitive theory is an approach to psychology that attempts to explain human behavior by understanding your thought processes

Cognitive psychology became of great importance in the mid-1950s. Several factors were important in this:

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1. Dissatisfaction with the behaviourist approach in its simple emphasis on external behaviour rather than internal processes.

2. The development of better experimental methods.

3. Comparison between human and computer processing of information.

Constructivist theory:

Constructivism is a learning theory that emphasizes self-guided exploration, reflection, and evaluation. A constructivist approach recognizes that there is often more than one correct answer and that many points of view are valid. Knowledge is constructed by the learner as they reconcile new information with past experiences, analyze various source materials, and work collaboratively with others.

Benefits to constructivist design:

1. It's active.

2. It develops advanced skills such as critical thinking, analysis, evaluation, and creation.

3. It promotes diverse viewpoints.

4. It encourages to reflect, evaluate their work, and identify intermediary skills to acquire based on their needs.

5. It reflects our modern world's vast access to content.

Humanist theory

Humanistic, humanism and humanist are terms in psychology relating to an approach which studies the whole person, and the uniqueness of each individual. Essentially, these terms refer to the same approach in psychology.

The humanistic approach in psychology developed as a rebellion against what some psychologists saw as the limitations of the behaviorist and psychodynamic psychology.

The humanistic approach is thus often called the "third force" in psychology after psychoanalysis and behaviorism (Maslow, 1968).

Humanism rejected the assumptions of the behaviorist perspective which is characterized as deterministic, focused on reinforcement of stimulus-response behavior and heavily dependent on animal research.

Humanistic psychology expanded its influence throughout the 1970s and the 1980s. Its impact can be understood in terms of three major areas:

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1) It offered a new set of values for approaching an understanding of human nature and the human condition.

2) It offered an expanded horizon of methods of inquiry in the study of human behavior.

3) It offered a broader range of more effective methods in the professional practice of psychotherapy.

How the environment can impact you

1. The environment can facilitate or discourage interactions among people (and the subsequent benefits of social support). For example, an inviting space with comfortable chairs and privacy can encourage a family to stay and visit with a patient.

2. The environment can influence peoples' behavior and motivation to act. For example, a dingy corridor filled with extra hospital equipment will invite staff to leave another item in the hall, whereas a clean corridor and adequate storage will encourage staff to take the time to put the item away.

3. The environment can influence mood. For example, the results of several research studies reveal that rooms with bright light, both natural and artificial, can improve health outcomes such as depression, agitation, and sleep.

REFERENCES:

- https://www.designsystems.com/
- https://api.semanticscholar.org/CorpusID:56715610
- https://www.rdaep.com/
- https://www.firstinarchitecture.co.uk/
- https://e10arch.com/architectural-services/
- https://www.smartsparrow.com/
- https://sites.google.com/site/cognitiveapproachtolearning/
- https://www.simplypsychology.org/

SCHOOL OF BUILDING AND ENVIRONMENT

DEPARTMENT OF ARCHITECTURE

SDE1301 – CREATIVE THINKING PROCESS AND METHODS

UNIT - 4

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CREATIVE THINKING PROCESS AND METHODS

Subject Name: Creative Thinking Process and Methods   **Code:** SDE 1301

UNIT – IV – CHANNELS TO CREATIVITY

Types of concepts, process of creativity, tangible and intangible channels to creativity in Architecture - the obscure, metaphors, transformation, paradox, precedents, nature, association with other arts, literal interpretation, materials, geometry, origami, literature and poetry etc. philosophies of famous architects.

Creativity is the term that has become quite popular in the past few decades. Creativity is one of the most essential traits that every employer desire while hiring an employee. Creativity is important in almost every aspect of life, right from feeding a child to almost every aspect of the business; creativity plays an exceedingly crucial role.

Therefore, it is important to understand what creativity is and what is the psychology behind it? Studying and understanding of creativity is not easy. It is considered one of the most complex topics to study by the psychologists. However, in this article, you will learn about the psychology behind creativity, how it happens, different types of creativity etc.

First of all, let's define the term creativity to get better insights into it. There is no clear consensus on how to define creativity. However, creativity is a way to produce something new and different which has some value or to do the same mundane thing or a new thing in a new way using a new technique which is unique in itself to get better / positive results or simply to get more business. There are basically following two components of creativity.

Main Components of Creativity

1) Originality

The method or idea must be new and unique. It should not be the extension of something, which already exists. However, one can take inspiration from the already existent methods and ideas to fabricate something new and unique.

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2) Functionality

Another important component of creativity is its functionality. A creative idea must work and produce results; otherwise, the whole effort will be in vain.

Most of the times, people wonder how does creativity happen. It has been seen that creativity become another nature of some people whereas others have to spend hours on road or on a mountain to think of a tiny idea. In the following paragraph, you will learn about when does creativity happen and what kind of people called creative?

- People who are thought-provoking, curious and have a variety of uncommon thoughts are known to be creative people. Sometimes these people don't even know what they are doing and how much importance does that innovation holds. Therefore, they usually fabricate new ideas, which leave people flabbergasted.

- People who had important self- discoveries, who view the world with a fresh perspective and have insightful ideas. These people make unique discoveries which they don't share with the outer world.

- People who make great achievements which are known to the world. Inventors and artists fall under this category.

Creative people have numerous traits that influence their creative thinking.

Followings are the few personality traits of creative people.

Qualities of Creative People

1) They are Energetic

Creative people tend to have a great amount of physical as well as mental energy. They utilize their energy to invent new ideas. These people spend a great deal of time in solitude to introspect and think.

2) They are intelligent

It is believed that intelligence plays a key role in creativity. According to a study high IQ is important for creativity. However, not all people with high IQ are creative. To become creative, people should be smart and they should also have a child-like attitude to view things.

3) Discipline

Most of the people have the wrong notion that creativity happens unexpectedly. Therefore, they usually spend their time sitting around and to wait for the creativity to happen to them. Aren Dietrich has classified creativity in four domains using four discrete processing modes such as emotional, cognitive, deliberate and spontaneous. He created a quadrant of creative types using these four characteristics.

4 Types of Creativity

1) Deliberate and Cognitive creativity

People who possess deliberate and cognitive characteristics are purposeful. They have a great amount of knowledge about a particular subject and combine their skills and capabilities to prepare a course of action to achieve something. This type of creativity built when people work for a very long time in a particular area.

People who fall under this type of category of creativity are usually proficient at research, problem- solving, investigation and experimentation. This type of creativity is located in the brain's prefrontal cortex, which is at the front part of the brain. These types of creative people spend a great deal of time every single day testing to develop new solutions.

Thomas Alva Edison is one prominent example of this type of creative people. He ran experiment after experiment before inventing electricity, the light bulb, and telecommunication. Hence, deliberate and cognitive creativity requires a great deal of time, dedication and abundance of knowledge about a particular subject.

2) Deliberate and Emotional Creativity

People who are categorized as deliberate and emotional let their work influenced by their state of emotions. These types of creative people are very emotional and sensitive in nature. These individuals prefer relatively quiet and personal time to reflect and they usually have a habit of diary writing. However, they are equally logical and rational in decision making.

Their creativity is always a balanced product of deliberate emotional thinking and logical actions. This type of creativity is found in the amygdala and cingulate cortex parts of the human brain. Amygdala is responsible for human emotions whereas cingulate cortex helps in learning and information processing. This type of creativity happens to people at

random moments. Those moments are usually referred to as "a-ha!" moments when someone suddenly thinks of a solution to some problem or think of some innovative idea.

For example, there are situations when you feel low and emotional which distracts you from your work. In those kinds of situations, you should take 5 minutes and point out the things which are making you sad and keep them aside and focus on the work in hand. It will help you to get improvised results and you will get work done easily. One should seek "quiet time" for deliberate and emotional creativity to happen to them.

3) Spontaneous and Cognitive creativity

There are times when you spend a long time to crack a problem but can't think of any solution. For example, when you want to make a schedule for a month to get a job done, but you can't seem to think of any possible way and when you are watching television and having your relaxed time and suddenly you think of a solution and everything falls in place. The same case happened with the great scientist Isaac Newton. He got the idea about the law of gravity when an apple hit his head while he was sitting under a tree and relaxing.

This is the "Eureka!" moments for Newton and an excellent example of a spontaneous and cognitive person. This type of creativity happens when one has the knowledge to get a particular job done, but he requires inspiration and a hint to walk towards the right path. This type of creativity usually happens at the most inconvenient time, such as, when you are in bed with your partner or having a shower. Spontaneous and cognitive creativity takes place when the conscious mind stops working and go to relax and unconscious mind gets a chance to work.

Mostly, this type of creative person stops conscious thinking when they need to do "out of the box" thinking. By indulging in different and unrelated activities, the unconscious mind gets a chance to connect information in new ways which provide solutions to the problems. Therefore, to let this type of creativity happen one should take a break from the problem and get away to let conscious mind overtake.

4) Spontaneous And Emotional Creativity

Spontaneous and emotional creativity takes place in the "amygdala" part of the human brain. Amygdala is responsible for all emotional type of thinking in the human brain. Spontaneous ideas and creativity happen when conscious and Prefrontal brain is resting. This type of

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Creativity is mostly found in a great artist such as musicians, painters, and writers etc. This type of creativity is also related to "epiphanies".

Epiphany is a sudden realization of something. Spontaneous and emotional creativity is responsible for a scientific breakthrough, religious and also philosophical discoveries. This allows the enlightened person to look at a problem or situation with a different and deeper viewpoint.

Those moments are defined as rare moments when great discoveries take place. There is no need to have specific knowledge for "spontaneous and emotional" creativity to happen but there should be a skill such as writing, musical or artistic. This type of creativity can't be obtained by working on it.

What Is the Creative Process?

The creative process is the evolution of an idea into its final form through a progression of thoughts and actions. The creative process involves critical thinking and problem-solving skills. From songwriters to television producers, creative individuals generally go through five steps to bring their ideas to fruition—preparation, incubation, illumination, evaluation, and verification. These stages were first articulated by Graham Wallas, a social psychologist and co-founder of the London School of Economics who outlined the primary stages of the creative process in his 1926 book on creativity called *The Art of Thought*.

The 5 Stages of the Creative Process

While all creative people apply unique methods and thought processes to their work, there are five stages that most creators subconsciously follow while pursuing their creative endeavors. The five stages of the creative process each flow logically into the next phase of the process. As you embark on your own creative process, unleash your mind and let your ideas grow through the five stages of creativity.

1.   Preparation stage: As you begin the creative journey, the first stage involves prep work and idea generation. This is when you gather materials and conduct research that could spark an interesting idea. Brainstorm and let your mind wander, or write in a journal to foster divergent thinking; this will help you consider all possible approaches to building out your

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2. idea. In this first part of the process, your brain is using its memory bank to draw on knowledge and past experiences to generate original ideas.

3. Incubation stage: When you have finished actively thinking about your idea, the second stage is where you let it go. Part of creative thinking is taking a step away from your idea before you sit down to flesh it out. You might work on another project or take a break from the creative process altogether—regardless, you are not consciously trying to work on your idea. Walking away from your idea might seem counterproductive, but it's an important stage of the process. During this time, your story or song or problem is incubating in the back of your mind.

4. Illumination stage: Sometimes called the insight stage, illumination is when the "aha" moment happens. The light bulb clicks on as spontaneous new connections are formed and all of that material you've gathered comes together to present the solution to your problem. In this third stage, the answer to your creative quest strikes you. For example, you overcome writer's block by figuring out the ending to your story. It can take you by surprise but after the incubation stage, an idea has emerged.

5. Evaluation stage: During this stage, you consider the validity of your idea and weigh it against alternatives. This is also a time of reflection when you look back at your initial concept or problem to see if your solution aligns with your initial vision. Business professionals might do market research to test the viability of the idea. During this phase, you might go back to the drawing board or you might forge on, confident in what you've come up with.

6. Verification stage: This is the final stage of the creative process. It's when the hard work happens. Your creative product might be a physical object, an advertising campaign, a song, a novel, an architectural design—any item or object that you set out to create, propelled by that initial idea that popped into your head. Now, you finalize your design, bring your idea to life, and share it with the world.

Creative thinking is the process of thinking in a flexible, flowing and original way. It is considered an important element of strategy, problem solving and decision making that allows for a great breadth of possible solutions. The following are common types of creating thinking.

Abundance Mentality

Supporting, extending and connecting the ideas of other people as opposed to a rivalrous approach to solving a problem.

Divergent Thinking

Challenging accepted assumptions and ideas.

Conjecture

Making guesses where there is missing information or uncertainty.

Brainstorming

Allowing ideas to quickly flow without validation.

Preserving Ambiguity

Delaying the imposition of assumptions and constraints until the last possible moment.

Creativity of Constraints

Imposing constraints that are designed to spark creativity. For example, ruling out obvious solutions to a problem.

Design Thinking

Viewing all strategy, problem solving and decision making as a process of design. That is to say, a process of creating something.

Counterfactual Thinking

Thinking about how the world would be different if historical facts were changed. For example, considering what the world would be like if the airplane hadn't been invented or gravity didn't exist.

Abstraction

Thinking in concepts that differ from concrete reality.

Analogy

Reducing complex things to simpler analogies.

Thought Experiment

Supporting, refuting or validating ideas with thought experiments.

Storytelling

Wrapping ideas in stories. Many inventions that exist today first appeared in fiction.

Creative thinking is the production of non-obvious ideas that are valuable and actionable. The following are common examples of creative thinking techniques.

Brainstorming

The process of spitting out ideas without much thought. Prevents the common tendency for people to hold back their bravest ideas for fear of criticism.

Reverse Brainstorming

Reverse brainstorming is same process as brainstorming but in response to a negative question such as "how can this plan fail?"

Conjecture

The basic process of making educated guesses where information is missing. For example, a coach that predicts what the opposing team may do next in order to compose a creative response.

Big Picture Thinking

The practice of forgetting about details to look at overall strategy. For example, a marketing team that is always focused on optimizing monthly revenue that looks at their overall customer experience to find why the competition is outperforming.

Preserving Ambiguity

Preserving ambiguity is the principle that you delay any assumptions as long as possible because they tend to prevent creativity. For example, a shoe designer who explores designs without starting with a target market such that the shoe may end up being anything.

Storytelling

Wrapping your proposals in storytelling as opposed to bland specifications. For example, design proposals for a clock that need to be wrapped in a fictional story of how the design changed someone's life.

Challenging Assumptions

The process of identifying the things that everyone has assumed and challenging these things. For example, an urban planner who challenges the assumption that road is for cars.

Counterfactual Thinking

Counterfactual thinking is the process of imaging how things could have been different in the past. For example, a train company that imagines how trains might have developed if aircraft

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had never been invented.

Creativity of Constraints

Creativity of constraints is the idea that constraints can force you to be more creative. For example, a team designing a bicycle helmet that is given the constraints that it must be safer than all other models on the market and cost less.

Daydreaming

Allowing your imagination to work in an unrestricted way.

Optimism

Optimism is the practice of focusing on the positive potential in everyone and everything. This is a critical mode of thinking for creative processes.

Defensive Pessimism

Defensive pessimism is the practice of validating your bravest ideas with negative criticism. This is often used to prune ideas that originate with optimistic processes such as brainstorming.

Idealism

Idealism is the theory that the world is a product of the mind and not the other way around. This may or may not be true but is a useful perspective for invention.

Pragmatism

Pragmatism is the process of being flexible to recognize the real complexities of a problem. This is another approach for making brave and optimistic ideas actionable. For example, an urban designer who produces a play street that is also usable by cars at low speed.

Design Thinking

Design thinking is the process of applying design to any domain, problem or decision. For example, a carpenter who designs a work process to increase their productivity.

Systems Thinking

Systems thinking are the process of considering the end-to-end impact of change to complex systems. For example, a government that is considering taxing plastic to reduce pollution that attempts to identify potential unintended consequences of this policy in order to mitigate them.

Charrette

A charrette is an intense period of teamwork in the same space. For example, working on a problem for several days straight in the same room with long hours each day.

Abstract thinking is thinking that extends beyond concrete realities.

The following are illustrative examples.

Concepts

All concepts that don't have a physical form are abstract. For example, thinking about freedom and respect is abstract thinking because these are ideas don't exist as a physical thing.

Theories

Developing theories to explain observations. For example, a farmer who develops a theory that artichokes aren't growing well in a particular field because the soil is too acidic. This may be based on concrete data but the theory itself is conjecture and can therefore be considered abstract.

Organization

Organizing things into abstract categories. For example, the cultural convention of organizing days into weekdays and weekends. These are both abstract concepts that can't be tied back to anything physical.

Divergent Thinking

Divergent thinking is the process of using the imagination to create novel solutions to problems such as a farmer who identifies a companion planting that allows artichokes to thrive in acidic soil.

Thought Experiment

Developing an analogy that simplifies a complex problem. For example, Galileo's Ship is a thought experiment that says that if you drop a cannon ball from the mast of a moving ship, it should fall directly below where it was dropped and that this location is not influenced by the speed or direction of the ship. This was developed by Galileo Galilei in 1632 to counter the prevailing argument at the time that if the Earth where really rotating an object dropped from a high location would not fall directly beneath where it was dropped because the Earth would have moved. It is now known that the Earth does rotate and that the principle of relativity validates the predictions of the Galileo's Ship thought experiment.

Emotions

Emotions are mental states that color all thinking. The ability to think about the emotional impact of things is a type of abstract thinking. For example, a public speaker who is able to craft and deliver a message that builds feelings of trust, anticipation, joy and astonishment in an audience.

Culture

Elements of culture such as norms are often social constructs that are completely abstract. It is a mistake to think that because something is abstract that it isn't real. For example, norms can help people to get along as a society and can be both real and valuable.

Prediction

Developing forecasts, estimates and predictions of the future is an abstraction because the future itself doesn't physically exist yet. For example, a hiker who runs into a wild boar on a trail who predicts what might happen if they quietly and slowly walk backwards away from the animal.

Synthesis

Designing things is a process of abstract thinking. For example, a fashion designer who creates a hat from an idea. This is an example of an abstract concept becoming a concrete object.

Aesthetics

Being able to understand why things are visually appealing or unappealing. For example, a hair stylist who is able to develop new styles that fit into a time, place and culture as visually appealing.

Magical Thinking

Abstract thinking is a powerful form of thought that allows you to create value, solve problems and influence people. However, it can also be used for lazy thought processes, motivated thinking and to form biases that paint an inaccurate picture of the world. For example, magical thinking is the process of assigning magical powers to an abstract concept such as a technology that are unrealistic.

Overthinking

In some cases, individuals spend too much time thinking about abstractions that are far detached from the practical realities of a situation such that they miss opportunities to make a quick decisions that would benefit them. For example, a student who spends endless hours thinking about their fear of public speaking as opposed to taking practical steps towards gaining speaking experiences that begin to defeat this fear.

Optimism

Optimism is the practice of being hopeful by focusing on the potential and positives in a situation. This can be a character trait whereby an individual has an enduring tendency to be optimistic. Optimism can also be a habit, deliberate effort or mood.

Paradox

A paradox is a seemingly contradictory statement, situation or calculation that is nonetheless possible. In some cases, paradoxes are known to be true despite violating common sense. Paradoxes can also be open questions that are arguably true or that have instances of being true. Other paradoxes are neither true nor false and are believed to have no answer.

Design Philosophies - A brief

A designer's philosophy defines what they wish to accomplish in design, and which principles of design they will use to do so. Identifying your design philosophy is an important part of the design process, and directly impacts how users will respond to the end product.

A design philosophy is a theoretical basis or driving force behind the work of a designer. They can apply to aesthetics, methods or the impact of a design on society, individuals or the planet. In many cases, pursuit of a design philosophy drives a career forward as accomplished designers typically strongly embrace a set of ideals.

Creative Process – Famous Architects

The Architectural realm has always been torn between artistic and rational cosmos. During our architectural studies, we are rarely given one specific methodology with which we can approach a project, resulting in diverse outcomes and methods of designing. However, in order for us to discover our personal stand, we must look back at the logic and philosophy of the great pioneers who influenced architecture before us.

Le Corbusier, Mies van der Rohe, Frank Lloyd Wright, and Louis Kahn are four of the most notable architects to date. The creative process of these four leaders of the modern era, are inspiring and we can understand why their projects and practices are still influential to our modern times.

Le Corbusier and the Program

Le Corbusier, perhaps the most famous modernist architect, once said: "A house is a machine for living in". The architect had a very scientific and rational approach when it came to initiating his creative process. With no prior influence by the teachings of his time, the self-taught architect always started with a similar method: he reflected on the program of the project.

The Swiss-French architect believed that "to create architecture is to put in order. Put what in order? Function and objects." In fact, Le Corbusier tried to distinguish and define what he called "organs", or functions in other terms. These singular entities came together to eventually compose the plan.

Moreover, his process didn't stop there. He also determined the circulation and structure as elements. The site, according to him, was part of the whole program. Wherever the project was or whatever the final result might have been, Le Corbusier always started his logical reasoning by discerning the 3 main entities being the organs, the structure, and the circulation.

Later on, the reasoning of the architect grew drastically with the introduction of his famous 5 points of architecture. "Modern life demands, and is waiting for, a new kind of plan", said Le Corbusier. The bearing walls fell apart and were replaced by pilotis, liberating the ground floor and landscape. This move ensured high flexibility in the interior, offering never-ending options for the composition of the space, and the envelope consequently. A roof-garden replaced the so-called lost space on the ground level. Finally, also because of the liberation from the supporting walls, windows on the façade were widened and grew horizontally, insuring abundant daylight. According to Le Corbusier, "light creates ambiance and feel of a place, as well as the expression of a structure."

Mies van der Rohe and the Constant Search for the Truth

Ludwig Mies van der Rohe influenced the masses. The German-American architect had a long fruitful life where he was able to experience with opinions and architecture. He changed his design approach at least 5 times throughout his career, resulting in different types of architecture.

While he started at an early age by defending standardization, he went through periods of minimalism, eras of glorification of the matter as the core of the architectural project, and ended with a very spiritual and philosophical method. The only consistency is his continuous search for the question or the problem of his time. He was always trying to tackle the current problems and find solutions in what he called the truth of the epoch. "Architecture is the will of an epoch translated into space," said the architect. This relentless alteration in his reflection is rooted in his endless quest for the truth. Times changed, issues changed and the questioning of the architect changed. For the veteran, the answers to the residing problem of the period can be achieved through architecture.

Stripping down architecture to its purest form, Mies van der Rohe observed from afar, the bigger contextual picture. Although very rational, he affirmed that it is a matter of a philosophical concept, related to the timing context. "It is not an architectural achievement that makes the structures of earlier times seem to us so full of significance but the circumstance that antique temples, Roman basilicas, and even the cathedrals of the Middle Ages are not the works of single personalities but creations of entire epochs," he admitted.

Architecture is achieved through a whole and not only through a plan, meaning that structure and form are interlinked pieces. Finally, his theoretical approach was about linking the elements of the composition, "Architecture starts when you carefully put two bricks together. There is begins": authenticity of the form, value of the function, essence of the material.

Frank Lloyd Wright and the Space-Time Integration

With an interview with Mike Wallace in 1957, Frank Lloyd Wright explained his vision and stated that "the answer is within you. Within the nature of the thing that you yourself represent, as yourself. And Jesus said it, I think when he said, "The kingdom of God is within you. That's why architecture lies, that's where humanity lies, and that's where the future we are going to have lies." Organic architecture was first introduced with him.

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Deriving from the natural world, it was a reinterpretation and not an imitation through the acquisition of the logic that drove the natural space.

According to the architect, organic architecture is a structure that has specific rationality behind its development, connected to its space and time. Just like a system, it has all of its parts connected to each other, in other words, the building and the site are intersect entities with an unbreakable spatial continuity, that can only crumble when one entity is removed from the composition.

For the one that "believes in God, but spells it Nature", architecture should be integrated into its site just like a living organism, and a building should be integrated into its era, whatever that era is, in order for it to be convenient for the human being occupying the space. This is only achievable through the creation of a bond with the site.

The creative method of Wright dictates basically an organic approach to any project. "A good plan is the beginning and the end because every good plan is organic. That means that its development in all directions is inherent inevitable", meaning that there is no process outside of the organic architecture. The edifice, therefore, acts like an organism part of the environment, that can only exist in specific circumstances, and that cannot be dismantled or reassembled anywhere else, diverging totally from the earlier know-how of his century, and from the standardization philosophy.

Louis Kahn and the Spiritual Value

After being focused on his academic path and researches for most of his life, Louis Kahn started his career relatively late. His early studies of architecture were dictated by a French professor, which enabled him to master the concepts of the Beaux-Arts. His architectural upbringing encouraged him to find inspiration in history. While some consider him to be the last of the modernists, others saw him as the first postmodernist. Nevertheless, Kahn reinterpreted the past and did not copy it.

The Kahn method consists of drawing conclusions to propose a new architecture that makes "sense", based on the teachings of the past. He always used the material as is and as honest as can be. The Architect always started with a square as a base for his conceptual creation. He explained that "I use the square to begin my solutions because the square is a non-choice, really. In the course of development, I search for the forces that would disprove

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the square...". His architectural process was therefore triggered by the square, and when in doubt, also managed to reactivate his creativity.

In fact, Louis Kahn's progression's course can be translated through a choice of a simple form, an authentic material, a methodical succession of spaces, and modeling with the natural light. In order to generate spaces with very specific characteristics, Kahn introduced architectonics systems, volumes in the center of the composition. Finally, for Kahn, architecture is a composition of simple elements, reacting together, existing through their reflection of light.

On another hand, Kahn explained that the room is "the beginning of architecture. It is the place of the mind. You in the room with its dimensions, its structure, its light responds to its character, its spiritual aura, recognizing that whatever the human proposes and makes becomes a life. The structure of a room must be evident in the room itself. Structure I believe is the giver of light. A square room asks for its own light to read the square. It would expect the light either from above or from its four sides as windows or entrances." This spiritual value that space seemed to have in Kahn's approach was the determining factor for the materials used, the openings created, the colors chosen, the distances between elements, the ratio, etc. It was a question of value and quality of the function.

REFERENCES:

- https://simplicable.com
- https://www.marketing91.com/4-types-of-creativity/#2-Main-Components-of-Creativity
- https://www.masterclass.com/
- https://www.archdaily.com/925464/the-creative-process-of-the-four-pioneers-of-modern-architecture