

# **VEMU INSTITUTE OF TECHNOLOGY:: P.KOTHAKOTA**

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## **Department of CSE**



# **Jawaharlal Nehru Technological University Anantapur**

*(Established by Govt. of A.P., Act. No. 30 of 2008)*

**Ananthapuramu–515 002 (A.P) India**

**II Year B.Tech R19 Regulations**

# **DESIGN THINKING**

# **DESIGN THINKING (19A99304)**

## **SYLLUBUS COPY**

### **II –I SEM**

## **JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

**B.Tech – II-I Sem**

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### **19A99304 DESIGN THINKING**

(Common to CSE & IT)

Preamble: Design is a realization of a concept or idea into a configuration, drawing or a product. Design thinking is cognitive and practical processes by which design concepts are developed by designers. Innovation is a new idea or a new concept. Product development is the creation of a new or different product that offers new benefits to the end user. This course introduces the design thinking in product innovation.

#### **Course Objectives:**

- To familiarize product design process
- To introduce the basics of design thinking
- To bring awareness on idea generation
- To familiarize the role of design thinking in services design

#### **Unit -I**

Introduction to design, characteristics of successful product development, product development process, identification of opportunities product planning, Innovation in product development.

#### **Unit –II**

Design thinking: Introduction, Principles, the process, Innovation in design thinking, benefits of Design thinking, design thinking and innovation, case studies.

#### **Unit-III**

Idea generation: Introduction, techniques, Conventional methods, Intuitive methods, Brainstorming, Gallery method, Delphi method, Synectics, etc Select ideas from ideation methods, case studies.

## **Unit-IV**

Design Thinking in Information Technology, Design thinking in Business process model, Design thinking for agile software development, virtual collaboration, multi user and multi account interaction, need for communication, TILES toolkit, Cloud implementation.

## **Unit V**

Design thinking for service design: How to design a service, Principles of service design, Benefits of service design, Service blueprint, Design strategy, organization, principles for information design, principles of technology for service design.

### **Course Outcomes:**

Student should be able to

- Generate and develop different design ideas.
- Appreciate the innovation and benefits of design thinking.
- Experience the design thinking process in IT and agile software development.
- Understand design techniques related to variety of software services

### **Reference Books:**

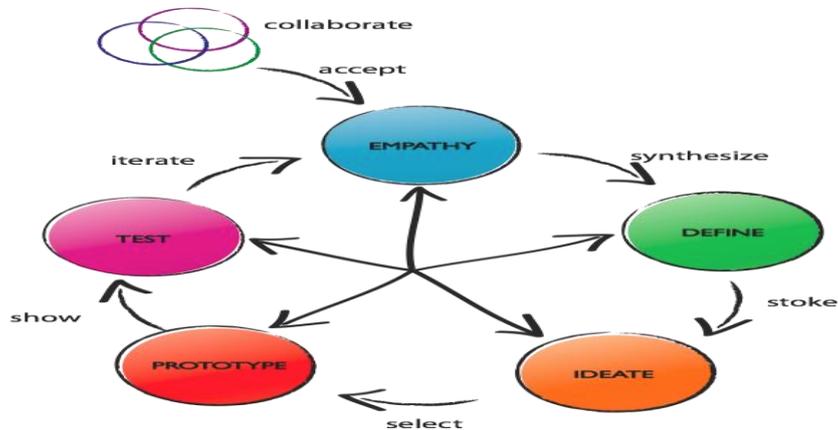
1. Christoph Meinel and Larry Leifer, “Design Thinking”, Springer, 2011
2. Aders Riise Maehlum, “Extending the TILES Toolkit” from Ideation to Prototyping
3. <http://www.algarytm.com/it-executives-guide-to-design-thinking:e-book>.
4. Marc stickdorn and Jacob Schneider, “This is Service Design Thinking”, Wiely, 2011
5. Pahl and Vietz, “Engineering Design”, Springer, 2007.

# UNIT-I

## 1 Introduction

### 1.1 Introduction to Design

Depending on the industry we are talking about, design can have many different definitions. Most generally, “design” is a process for deliberately creating a product to meet a set of needs. Mobile app development requires both engineering design and product design. Engineering design focuses on physics, such as speed, mass and other performance measures while product design also considers user and consumers by asking what the user wants in a product. Thus, Design is a realization of a concept or idea into a configuration, drawing or a product.



### 1.2 Characteristics of successful product development

A product is something sold by an enterprise to its customers or a product is a set of attributes offered to customers to fulfill their needs or requirements. It is obtained by conversion of raw material. The product is an entity for which clear



idea of its design and development is known. The purpose of the product should be clearly visible.

## Product Design & Development (PDD)

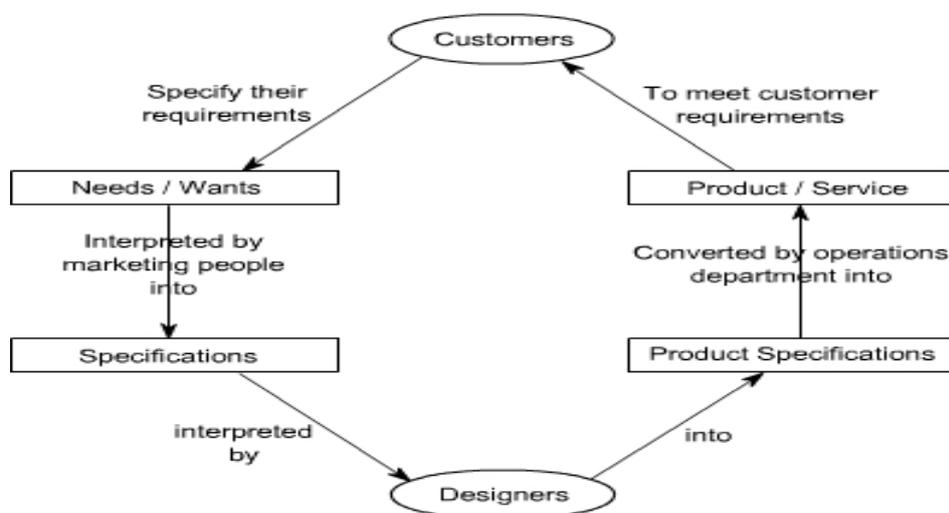
- Basic need of every manufacturing company
- Consumers want and expect new and better products
- Not to innovate approach is becoming increasingly risky
- Innovating new product is expensive and risky

### What is product development?

- Product Development is the set of activities, beginning with the perception of a market opportunity and ending in the production, sales and delivery of a product.
- The goal of the subject is to present a clear and detailed way a set of product development methods while focusing together the marketing, Design and manufacturing functions of the organization.



### 1.3 Product Development Process



Product development is an interdisciplinary activity requiring contribution from the following three functions.

### **Marketing**



### **Design**



### **Manufacturing**



**Marketing:** The marketing function mediates the interactions between the firm and its customers. Marketing also typically arranges for communication between the firm and its customers, sets target prices and oversees the launch and promotion of the product.

**Design:** The design function plays the lead role in defining the physical form of the product to best meet customer needs. In this context, the design function includes engineering design (mechanical, electrical, software etc.) and industrial design (aesthetics, ergonomics, user interfaces).

**Manufacturing:** The manufacturing function is primarily responsible for designing and operating the production system in order to produce the product. Broadly defined, the manufacturing function also often includes purchasing, distribution and installation. This collection of activities is sometimes called the supply chain.

## Elements of a Product Development Team

### Project team

Few products are developed by a single individual. The collection of individuals developing a product forms the project team. This team usually has a single team leader who could be drawn from any of functions of the firm. The team can be thought of as consisting of a core team and an extended team.

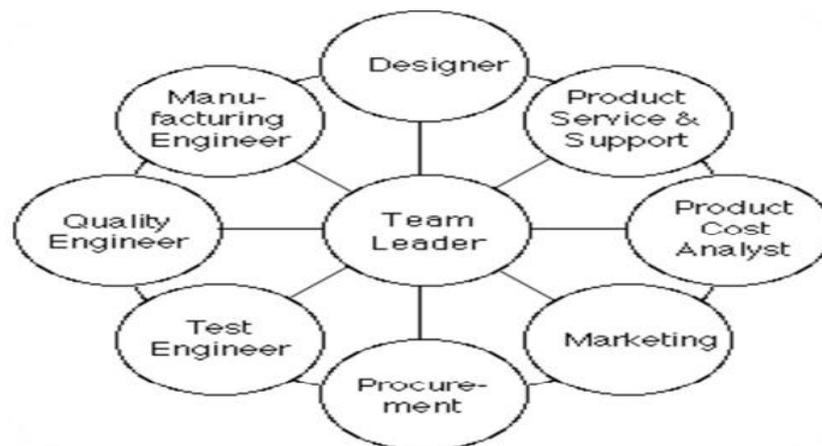
### Core team

In order to work together effectively, the core team usually remains small enough to meet in a conference room.

### Extended team

While the extended team may consist of dozens, hundreds or even thousands of other members.

### Development Team



### Reasons for expensive and risky:

- Most of the product ideas which go to product development stage never reach the market due to non availability of money, technology, manpower or due to change in demand.

- Many products that do reach the market are not successful mainly due to inferior quality, high product cost, poor functionality, poor marketing skills or change in demand.
- Successful products tend to have a shorter life due to change in demand, stiff competition or rapid technological changes.

Thus, management finds itself in a dilemma, it must development new product, yet the odds weight heavily against their success.

### **Product identification related factors:**

- Gap in demand i.e. Demand > Supply
- Under-utilized resources-contract manufacturing– lending of facilities
- Diversification- limited customer base
- New product ideas- friends, co-workers, environment.

### **Product Analysis**

- Performed before actual design starts
- It is based on the information collected about the customer's requirements and the level of competition.
- Its objective should be to satisfy as many functions as possible.
- Its objective should be to keep the product cost as low as possible.
- It is a trade off b/w product cost and functionality.
- It focuses on multiple product concepts

### **Why Product Analysis is So Imp.?**

- Design modifications are more expensive at later stage of product life.
- Design modifications are unwelcomed, once the product is launched
- Design modifications at later stage also delay the launch of a new product.

### **Several aspects are considered for product analysis:**

- Functionality aspect
- Operational aspect
- Quality aspect
- Reliability aspect
- Durability aspect
- Maintainability aspect
- Aesthetic aspect

### **Factors to study for PDD**

- **Marketing related factors**
- Prestige of the company
- Technologically sound products
- Customer's requirements
- Market potential
- Product life
- Competition

### **Stages in Product life Cycle**

- Introduction
- Growth
- Maturity
- Decline

### **Legal Factors**

- Environment pollution
- Import restriction on capital goods
- Restriction on finance

### **Finance related factors**

- Capital investment-manufacturing resources, plant and machinery
- Cash generation
  - Govt. support
  - Shares
  - Fixed Deposits

### **Manufacturing related factors**

- Availability of technological know-how- its cost, related equipments
- Cost of Manufacturing facilities
- Quality of manufactured products – customer requirement
- Rate of production – market demand

### **Distribution related factors**

- Availability of distributors- reputation, facilities and manpower
- Availability of ware houses- space requirement, cost and facilities
- After sale service- maintenance, repair, spares, cost
- Sales personnel – marketing skills, implementation of sale promotional schemes etc.

### **Organization related factors**

- Skill requirement both workers and managers
- Availability of manager, labor etc.
- Salary and wages of workers – cost implications

### **Characteristics**

Successful product development means “Development of a product that can be produced and sold profitably.(Very difficult to achieve quickly and directly).Generally there are five specific dimensions used to measure the performance of product development effort.

**1. Product Quality:** Product quality is ultimately reflected in market share and the price that customers are willing to pay.

- How good is the product resulting from the development effort team.
- Does it satisfy customer needs?
- Is it robust and reliable?

## **2. Product Cost:**

- Product cost determines how much profit accrues to the firm for a particular sales volume and a particular sales price.
- Capital equipment + Tooling + Incremental cost

## **3. Development Time:**

- How quickly did the team complete the development effort .
- It determines how responsive the firm can be to competitive forces and to technological development

## **4. Development Cost:**

- It is usually a fraction of investment required to achieve profit.

## **5. Development Capability:**

- Development capability is an asset the firm can use to develop products more effectively and economically in the future.
- Future Scope

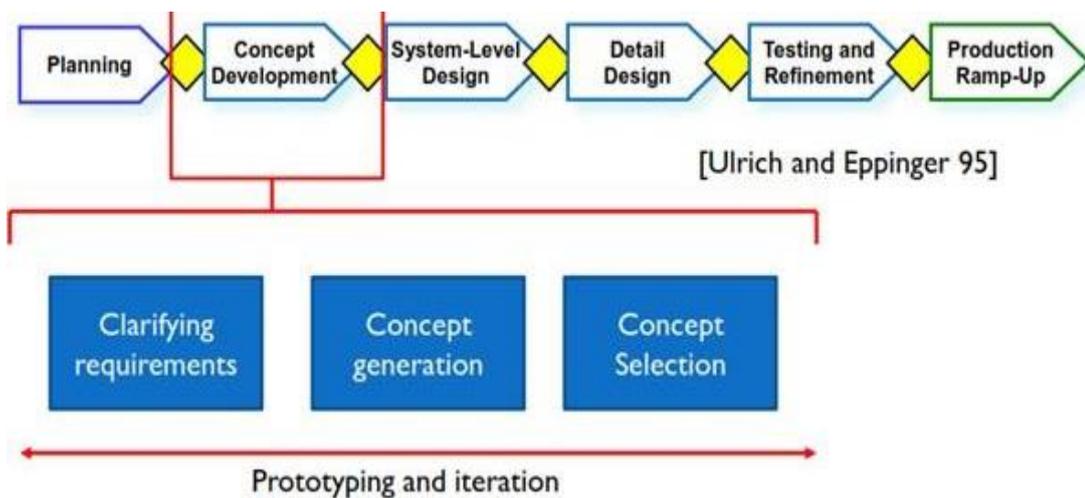
## **3. Product development process**

Product development is the process of creating a new product to be sold by a business or enterprise to its customers. Development refers collectively to the entire process of identifying a market opportunity, creating a product to appeal to the identified market, and finally, testing, modifying and refining the product until it is ready for production.

A development process can be understood as a risk management system .In the early phase of product development, various risks are identified. As the process progresses, risks are reduced as the key uncertainties are eliminated and the functions of the product are validated . When the process is completed, the team should have

substantial confidence that the product will work correctly and be well received by the market.

The initial concept development process is important because a better design process leads to a better design outcome. Decisions made during the early stages of design tightly constrain future options. It is estimated that 70% cost of a product is determined in the first 30% of the design cycle.



### **Planning:**

- This is also called as the “zero phase” since it precedes the project approval and launch of the actual product development process.
- The output of this phase is the project mission statement, which specifies the target market for the product, business goals, key assumptions, and constraints.

### **Concept development:**

- Good concept development is crucial, during this stage the needs of the target market are identified, competitive products are reviewed, product specifications are defined, a product concept is elected, an economic analysis is done, and the development project is outlined.
- This stage provides the foundation for the development effort, and if poorly done can undermine the entire effort.

### **System level design:**

- Includes the definition of the product architecture and the decomposition of the product into subsystem and components.
- The o/p of this phase usually includes a geometric layout of the product, a functional specification of each of the products subsystem and preliminary process flow diagram for final assembly process.

### **Detail design:**

- Detail design, or design-for-manufacture, is the stage wherein the necessary engineering is done for every component of the product.
- During this phase, each part is identified and engineered. Tolerances, materials, and finishes and specification of standard parts to be purchased from suppliers are defined, and the design is documented with drawings or computer files.
- Process plan and tooling for each part is The output of this phase is the control documentation for the product.

### **Testing and refinement:**

- During the testing and refinement stage, a number of prototypes are built and tested. Early alpha prototypes are built with prodn.
- Intent parts but not necessarily fabricated with actual processes. It is necessary to determine whether the performance of the product matches the specifications, and to uncover design shortfalls and gain in-the-field experience with the product in use.
- Later, beta prototypes are built from the first production components received from suppliers.

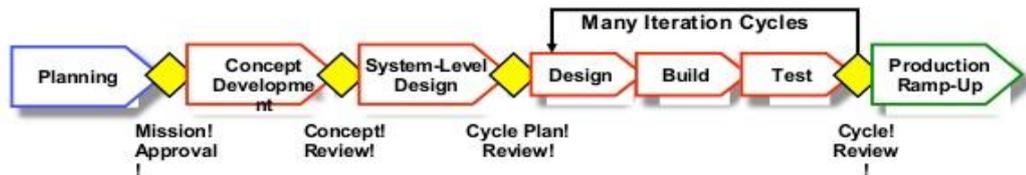
### **Production ramp-up:**

- During production ramp-up, the work force is trained as the first products are being assembled.
- The comparatively slow product build provides time to work out any remaining problems with supplier components, fabrication, and assembly procedures.

- The staff and supervisory team is organized, beginning with a core team, and line workers are trained by assembling production units.

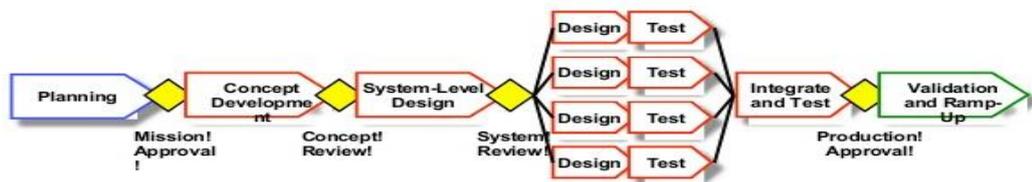
## ELOPMENT PROCESS PHASES A GENERIC DEV

# Rapid Iteration/spiral PD Process



## A GENERIC DEVELOPMENT PROCESS PHASES

# Complex System PD Process



### 1.4 Identification of opportunities

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.

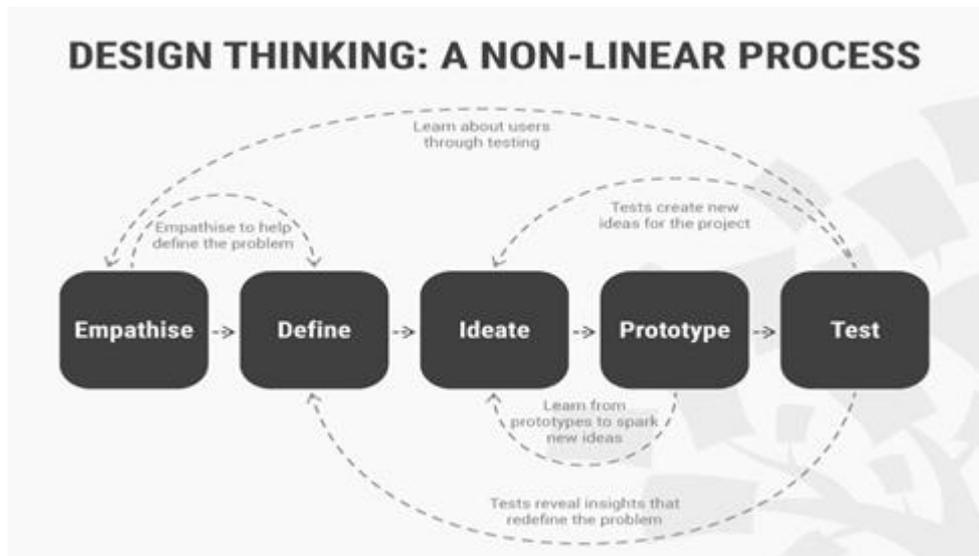
**Empathizing:** Understanding the human needs involved.

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

**Ideating:** Creating many ideas in ideation sessions.

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

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



### **Empathizing:**

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.

### **Defining:**

During the Define stage, you put together the information you have created and gathered during the Empathize stage. This is where you will analyze your observations and synthesize 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 - centered manner.

### **Ideating:**

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 Empathize stage, and you've analyzed and synthesized 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.

### **Prototyping:**

- 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.

### **Testing:**

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 empathize.

## **1.5 PRODUCT PLANNING**

### **1. Developing the product concept:**

- The first phase of product planning is developing the product concept. Marketing managers usually create ideas for new products by identifying certain problems that consumers face or various customers need.

### **2. Studying the market:**

- The next step in the product planning process is studying the competition. Secondary research usually provides details on key competitors and their market share, which is the percent of total sales that they hold in the marketplace.
- The business can then determine places in which it has an advantage over the

competition to identify areas of opportunity. Market research is a complex task. It must include an analysis of products that are indirect competitors products manufactured by the company observed.

### **3. Market research:**

- A small company should consider doing both **qualitative** and **quantitative marketing research** for its new product. **Focus groups** are an example of qualitative information. Focus groups allow companies to ask their consumers about their likes and dislike of a product in small groups.
- A focus group allows the company to tweak the product concept before testing it through phone surveys a more quantitative marketing research function.
- Market research is the one stage of product planning and it can be regarded as the way to accomplish the activity though designing questions, preparing the samples, collecting data and analyzing.
- Market researchers always use quantitative and qualitative research to differentiate the methods of investigation into those which are cared about getting an understanding of a subject and those which are involved in measuring things.
- Quantitative research is about understanding aspects of a market or what kinds of customers making up the market. And it can be split into soft and hard parts. Soft part means phenomena like customer attitudes and hard part is market size, brand shares and so on.
- The differences between quantitative and qualitative research can be summarized that qualitative research is always open-ended, more flexible, gives consumers more creativity, pays more attention to deeper understanding so that they can get deeper data and richer ideas and quantitative research are usually statistical and numerical measurement and people will be divided into groups to get sampling or comparisons.

### **4. Product introduction:**

- If the survey results prove favorable, the company may decide to sell the new product on a small scale or regional basis.
- During this time, the company will distribute the products in one or more cities.

- The company will run advertisements and sales promotions for the product, tracking sales results to determine the products potential success.
- If sales figures are favorable, the company will then expand distribution even further. Eventually, the company may be able to sell the product on a national basis.

## **5. Product life cycle:**

- Product planning must also include managing the product through various stages of its [product life cycle](#).
- These stages include the introduction, growth, maturity and decline stages. Sales are usually strong during the growth phase, while competition is low.
- The first stage is introduction which means it is time for a company or brand to promote its new products.
- The goal of introduction is to attract customers' attention as much as possible and confirm the products' initial distribution, the company does not need to worry about the competition generally as the products are new.
- In this stage, there will have the first communication between marketers and customers as it will be the first time for consumers to know about the new products.
- In addition, the cost of the things will be high like research, testing and development and the sales are low as the new products' market is small.
- The second stage is growth. In this stage, the new products have been accepted in the market and their sales and profits has begun to increase, the competition has happened so that the company will promote their quality to stay competitive.
- The products also have basic consumers' attention and can develop their loyal customers. There will have second communication as marketers can start to receive customers' feedback and then make improvements.
- The third stage is maturity where the sales and profit have grown slowly and will reach their peak.
- The competitions between companies and brands will be fierce so that the companies will go out of their ways like providing higher quality products with a lower price or thinking about any improvements to survive in the competitions and

make profits maximum.

- The last one is decline which means the product is going to end and be discontinued.
- The sales of product will decrease until it is no longer in demand as it has become saturated, all the customers who want to buy this product has already got that.
- Then the company or brand will cut down the old products and pays attention to designing and developing the new products to gain back the customer base, stay in the markets and make profits.

### **Product Planning**

**Product planning** is a process that involves all the activities, right from the conception of the product idea to the introduction of the product in the market.

It includes product engineering and product design. Product planning basically represents the core of the process of manufacturing.

Its main purpose is to organize resources in such a manner so as to manage costs, time, staff, and other resources.

Any manufacturing process reaches its full potential if the product planning operation is efficient at its best.

#### **Product Planning may take either of the two forms:**

A. Creating an entirely new product or adding an existing product line.

B. Modifying an existing product suitable to latest changes.

Development of new products is important to meet the ever-changing 'needs and wants' of consumers. Businesses may also introduce new products or update existing versions if products have reached the end of their lifecycle.

Product planning is also important to counter competitors and environmental changes that the company wishes to capitalize on. Once a decision is made to undertake product planning, the following steps are followed:

#### **1.Idea Generation:**

- The process of product planning typically commences with idea generation.
- A brainstorming session may be held to decide on types of products that need to

be manufactured.

- Product concepts are devised to fill the void in the marketplace or to meet customer expectations.
- For this reason, it is important to undertake market research, SWOT (Strength, Weaknesses, Opportunities and Threat) analysis of the company, and analysis of competitors' products, while encouraging product ideas from employees and partners.

## **2. Idea Screening:**

- This stage is crucial as it helps to eliminate ideas that are not feasible.
- Ideas are short-listed and finally, the most preferred product is zeroed in on. Idea screening is an essential process of filtering.
- Factors like return on investment, market potential, company objectives, and affordability are taken into consideration while selecting the final idea.
- These factors are considered carefully, so as to avoid product failure down the line.

## **3. Concept Development:**

- Customers are regarded as central to any business.
- Hence, it is important that their feedback is taken into consideration. It helps to develop a better understanding of customer needs and to identify the marketing message of the product.
- Businesses may also hire external market research teams to conduct surveys via the internet, phone or mail.
- These professionals conduct surveys and the information is then tabulated into bar graphs, pie diagrams, line bars, and other analytical tools for the ease of understanding.

## **4. Product Development:**

- Once the product concept gets a go-ahead, it is then passed to the marketing stage for the creation of a limited production model in which companies develop their products on a small scale in the beginning to see if the response is favorable.

- This helps to reduce costs in case the product fails to take off. Companies also run advertisements and sales promotions, while tracking sales to determine the potential for success.

## **5. Product Lifecycle:**

- Product planning does not stop with the introduction of the product.
- It also includes managing the product at various stages in the lifecycle. In the initial phase, sales may show a steady increase.
- Over time, competitors will introduce similar products that will result in a decrease in sales or a diminished market share.
- At this stage, various strategies need to be implemented, such as reduction of product prices, mass production, promotions and offers, product modifications, and the formulation of different marketing and distribution approaches.
- The process of **product planning** should be seen as a form of continuous development, with limitless opportunities.
- Though it requires heavy commitment of technology, finance and staff, it helps in preventing a product failure.

## **1.6 Innovation in Product Development**

### **Product Innovation: Product Planning in a Nutshell:**

- Innovate or die is the stark message for businesses, but it is no less true, as no business can sell the same product in its existing form for an indefinite period.
- Along with dynamic changes in the business environment, businesses need to respond to these changes through their products and services.
- If products offered are not tailored according to the needs and requirements of consumers, they will switch to competitor products.
- This in turn would reduce sales and profits. Hence, product innovation means product planning is a crucial function in any business.

# UNIT-1

## 2 marks questions

1. Explain Design Thinking.
2. Define Product and Product Development.
3. Write a short note on design.
4. Explain Why Product Analysis is so important ?

## 10 marks question:

1. Explain Product Development in detail.
2. Discuss phases of a generic development process.
3. Discuss Prototyping and Testing in detail.

## UNIT-2

### 2 INTRODUCTION

#### 2.1 What is design thinking?

Design Thinking is a comprehensive customer-oriented innovation approach that aims to generate and develop creative business ideas or entire business models. Essentially, Design Thinking attempts to project designers' approaches and methods onto business processes.

The approach is ultimately applicable to all kinds of business ideas, whether they have a product or service character. The first mouse for the Macintosh computer was created after a similar approach, or the first toothbrush with a wider ergonomic shaft.

**Features of Design Thinking can be summarized as follows:**

**1.Design Thinking is an integrative approach:** This means that for problem solving, the process of problem solving is considered together with its framework conditions. The problem analysis and solution development are considered systematically and holistically in the form of a process (see below). The various experts necessary for problem analysis and solution development (see below) are involved and enter into exchange with each other.

**2.The working environment for this process is designed to promote creativity.** One also speaks here of the three Ps of Design Thinking, People (the human being), Process (the problem solving process) and Place (the working spaces) must be considered for a successful idea development. A fourth P can be Partnerships, since a large number of partners must be involved in the development and implementation of ideas.

**3.focuses on early customer orientation:** Design Thinking starts with people and not with a technology or a business goal. Ultimately, the customer should have a decisive influence on the "go/stop" decisions in the process. It is no longer sufficient to question customers about the classic market research instruments. Traditional

methods of (testing) market research often only deliver disappointing results in the search for innovations.

**4.emphasizes Empathy:** The central element is to put oneself in the position of the customer/user and to observe him in detail. Empathy can create distance to the innovator's own person on the one hand and proximity to the customer on the other. In other words, this approach creates customer orientation. Developments can thus be better aligned with the customers and, if necessary, prioritized to what extent they can satisfy the needs and wishes of these customers.

**5.strives to make ideas tangible at an early stage:** Prototypes must be created as quickly as possible this also applies to immaterial services. It is not a question of testing a quasi-finished (perfect) product, but quite the opposite: individual functions/features/characteristics or activities of the product/service offer are to be checked by the customer. The maxim when creating or selecting a prototype is: as simple as possible, as meaningful as necessary. consists of frequent **iteration loops** between the development phases. The return to a previous phase is not a mistake, but shows the learning success in this process. Failure is an integral part of this approach and should be tolerated, accepted and even expected by all participants. The motto is: "**Fail fast to succeed sooner**".

6. Pay attention to the **diversity of the participants**. Design Thinking combines interdisciplinary breadth and technical depth: The knowledge, experience and perspectives of a team of engineers, natural scientists, humanists, social scientists and economists, etc., who have the ability for multidisciplinary cooperation, are put to good use.

Furthermore, differences in age, gender, affiliation to the company (long-time/for the time being short in the company), experience with the topic (intensive, little, not at all) and/or personality type (introverted, extroverted, etc.) should be taken into account.

7.creates **team-oriented, creative working spaces**: "Me"-spaces (for individual work) and "We"-spaces (for group work) are flexible and inspiring to equip for individual, group and plenary work. It can be advisable to choose different locations, rooms or furniture arrangements for the different Design Thinking phases in order to create new atmospheres (suitable for the respective work) again and again.

8.combines **analytical phases** (collecting, organizing, evaluating information) and **synthetic phases** (developing, testing, improving solutions). In the first part, the problem is analysed in detail (so-called **problem space**), where the focus is on what? and why? (what is the problem? why is it a problem?). Only in the second part concrete solutions are developed and tested (so- called **solution space**): Here the question is asked about the "how (something can be solved)".

In addition, one can differentiate between **divergent phases**, which lead to an expansion of the perspective by collecting information or generating ideas, and **convergent phases**, which lead to a focusing of the field of vision by making decisions between alternatives.

These divergent and convergent phases alternate, so that the Design Thinking process is framed by a **double diamond** .

## 2.2 Principles of Design thinking

When carrying out the Design Thinking process described below, the following principles must be observed, quasi the "**Ten Commandments of Design Thinking**":

### 1. Leave titles at the door!

There is no hierarchy during a Design Thinking workshop. Chef and other rolls are hung on the coat hook.

### 2.Encourage wild ideas!

Let your imagination run wild. Any (supposedly) crazy idea and every idea should be treated equally.

### 3.O Go for quantity!

Quantity before quality. Selected, analyzed and evaluated later.

### 4. Build on Ideas of others!

There is no copyright. Ideas from others should be taken up, supplemented or changed.

### 5. Think human centered!

Design Thinking is first and foremost thinking about people and not about technology or business goals.

## **6.Be visual and make it tangible!**

Use drawings, illustrations, photos, videos, prototypes, etc.

## **7.Avoid criticism!**

Idea generation and evaluation must be strictly separated.

## **8.Fail early and often!**

Failure means learning. Often failure means that you have learned a lot.

## **9.Stay focused!**

Set yourself limits, stick to the concrete tasks in the Design Thinking process\*\*.

## **10. Let`s have fun!**

Developing new ideas in a team should be fun. Creativity needs this fun.

The rule "Stay focused! appears at first contradictory to the rule "Encourage wild ideas! Experience with creative processes has shown, however, that setting clear boundaries or limitations, in which the imagination should be given free rein, is a target-oriented approach for the idea generation and, in particular, development phase ("necessity makes invention!"). Such limits may include, but are not limited to, the broad direction set by the vision and corporate strategy, specific time and cost objectives (e.g. product/service offering to be launched within X months), a specific regional focus, number of new features, compliance with regulatory constraints or limited resources available. speak here aptly of "Thinking Inside the Box" in order to add a counterpoint to the "Thinking Out of the Box" mainstream approach .

In individual cases, a balance must be struck between, on the one hand, the danger of stifling unconventional ideas with potential and, on the other, pursuing utopian spinning.

Staying focused also refers to the Design Thinking process described below. Limits here can mean setting clear time budgets for the individual phases or specifying for whom, how and where the solution is to be used. Used to the right extent and communicated in a challenging way, these limitations can promote creativity and have a motivating and inspiring effect on the Design Thinking team.

## 2.3 The process of Design Thinking

*“Some people think design means how it looks. But of course, if you dig deeper, it's really how it works.”- Steve Jobs, Apple*

Design Thinking process consists of six process steps with iteration loops: Understanding, observing, defining problems, finding ideas, developing prototypes and testing. The initial three phases, the so-called **problem space**, describe the problem and its causes (what is the problem and why is the problem there?). The subsequent three phases, the so-called **solution space**, describe which solutions there can be and how these can be implemented. The process steps are described briefly below and then explained in more detail step by step.

Even if the following process representation is shown sequentially, the process is strongly iterative, i.e. there are numerous feedbacks to the previous phases in each phase. The individual process steps should be completed quickly in order to learn fast through iteration loops according to the "**fail early and often**" principle or, if necessary, to be able to terminate the process completely. It is helpful to define concrete time budgets for the individual phases (in agile project management, this is referred to as Timeboxing, see chapter 8.5).

### **Phase 1 “Understand“ (Understanding the Problem):**

In the first phase it is first about developing an understanding for the challenge/the problem/the need or the requirement (problem understanding). It must be clarified who has to be integrated into the process and, in particular, which technical perspective (process organisation) is necessary. Finally, it must be clarified how the question can best be formulated so that the customer need/problem is defined in concrete terms.

### **Phase 2 “Observe“:**

In this phase, detailed research and on-site observations are carried out on the customer's need/problem. Numerous methods can be used for this, such as interviews, written surveys, observations with recordings through photos or even videos. The results are the clarification of the general conditions, the exact definition of the target group and a comprehensive understanding of the customer and his needs and behaviour.

### **Phase 3 “Point-of-View“ (Define the problem):**

After the observations, the findings should next be condensed to a single prototypical user whose problem/need is to be summarized in a clearly defined question.

### **Phase 4 “Ideate“ (Finding and selecting ideas):**

It is only in this phase that the actual brainstorming process takes place. Here the creativity techniques can be used. Strictly separated from this, the ideas can then be analysed in a customer-oriented manner in order to identify weak points, and a selection decision can be made on the basis of an idea evaluation.

### **Phase 5 „Prototype“ (Develop the prototype):**

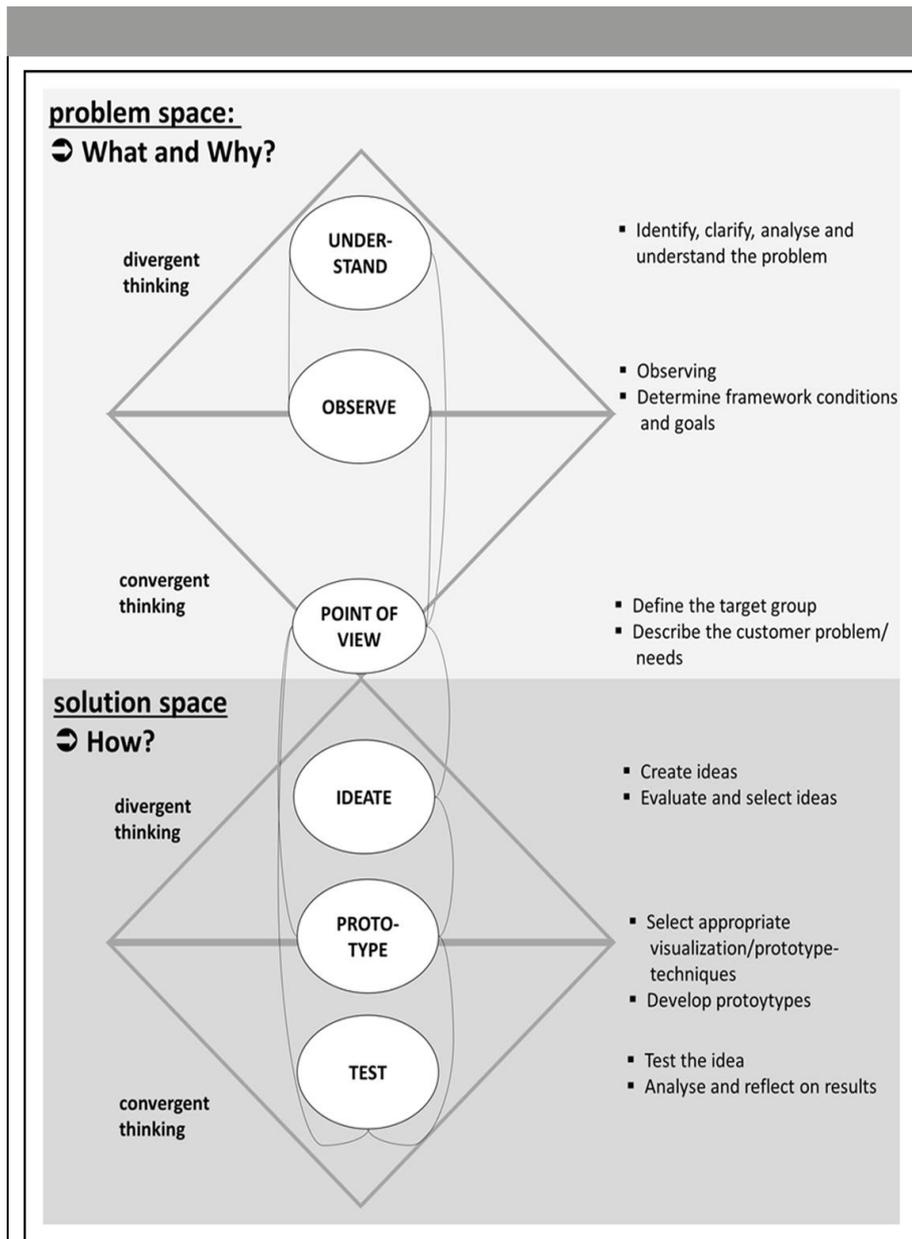
In this very important phase, ideas should be visualized as quickly as possible, made tangible, sketched, designed, modelled/simulated, etc. Following the technical field one can speak here of "Rapid Prototyping", whereby the prototype development applies decidedly not only to products, but also to services. A variety of methods for prototype development are available for this purpose.

### **Phase 6 “Test“:**

In this final phase, the ideas are to be further developed and tested through further experiments and customer feedback. In addition, important development, production and market issues have to be clarified.

In the process flow presented here, the actual implementation phase with the development of the idea to a marketable product/service would only follow afterwards.

## Process of Design Thinking supplemented with the Double-Diamond model



## 2.4 Innovation in design thinking

Design thinking provides a consistent approach to defining challenges.

### Employing Design Thinking:

- **Inspiration:** during which the problem that motivates solution-finding is identified.
- **Ideation:** the process of generating and developing ideas.
- **Implementation:** the activities that enable a creative idea to move from the drawing board to the marketplace.

### Module 1:

- **Idea Generation** In this module we will explore various approaches to innovative thinking and techniques for idea generation from a range of sources.
- In addition to Nominal Group Technique, Round Robin, and Creative Matrix, we will cover the Systematic Inventive Thinking (SIT) approach and its tools. (SIT is a rigorous approach to problem solving that evolved from the TRIZ engineering tradition.)

### Module 2:

- **Concept Development** This module will focus on the critical role that prototyping, experimenting, and iteration play in the development of ideas.
- From the designer's perspective, failure - when designed to occur early and cheaply - can be a rich source of learning that often reveals new options and nearly always leads to a better final outcome.

### Module 3:

- **Implementation** Until an idea is implemented, it remains just that-an idea.
- This module will focus on tools and approaches for thinking creatively (and strategically) about implementing ideas and bringing innovative ideas to the marketplace.

## **2.5 BENEFITS OF DESIGN THINKING**

### **Reduced Risk of Launching New Ideas:**

- Design Thinking focuses on showing prototypes to sponsor users early and often.
- This ensures that new ideas stay on a course that will actually meet user needs, while eliminating the churn and cost of bad ideas.
- The end result is product launches backed by more data and imbued with more confidence.

### **Innovative Solutions and Offerings :**

- Too often, businesses fall into the trap of internally creating ideas that are just incremental improvements on existing products and services.
- Incremental improvements are fine, but they can leave a business at risk of being disrupted from the outside.
- Design Thinking engages creativity through a process designed to surface truly innovative ideas and then test them quickly. The results can provide far greater upside.

### **Faster Pace of Learning :**

- The Design Thinking process is designed to get multiple people from multiple departments (plus sponsor users) in a room at once to generate a high quantity of ideas.
- Then, because everything is a prototype, you can stage and test ideas quickly, allowing you to pursue further where you have traction and move on when you don't. The result is a faster pace of learning and solutioning.

### **Happier Users:**

- When you actually listen to users and give them input about what you're building, they are happier with the end result. This may seem like an obvious thought, but Design Thinking seems to be one of the best tools for actually breaking down the wall between company leaders and actual users.

## More Revenue and Returns :

- A recent McKinsey study identified significant financial benefits of a human-centered design approach: 32% more revenue and 56% higher total returns.
- This extensive study goes to show that there can be a significant financial, measurable outcomes and ROI that result from a consistent Design Thinking approach to business.

## 2.6 Design thinking and innovation, case studies.

The Design Thinking process is particularly useful because it generates a unique and specific outcome: knowledge.

This methodology has a [wider scope of use](#), but for the purpose of this Design Thinking Case Study, we will focus only on one specific field - Software Product Development.

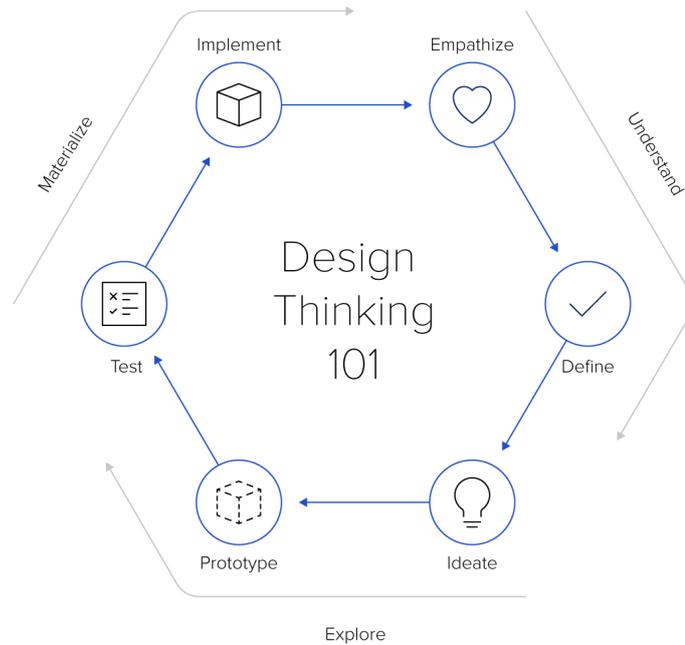
### The Theory of Design Thinking

Before we delve into the practical applications of the Design Thinking ,let's take a deeper look at the Design Thinking process.

Design Thinking is a methodology that provides a solution-based approach to solve problems. It focuses on understanding the user perspective, with a human-centered point of view. The power of this methodology is the possibility to test quickly if an idea, solution or enhancement can bring real results to our customers. Integrating different methodologies, tools, and techniques coming from different fields (marketing, psychology, design, business), the purpose of Design Thinking is to put the user on the very center of the problem we have to solve.

The goal of the methodology is to “find the user itself and define its needs” and by finding those needs, create a solution or a product that can be really useful. To achieve this goal, the whole concept is split into six design thinking phases.

**1. Empathize:** The goal of this phase is to understand your customer, by searching and gathering information about their business. During this phase, we can use several different tools, such as interviews, focus groups, observations, and surveys



**2. Define:** In this phase, we collect and categorize information from the Empathize phase. It's here where we define User Personas and User Journeys.

**3. Ideate:** Using the above information, here the team ideates solutions. There are no silly or wrong ideas! Everything must be expressed and documented.

**4. Prototype:** During this phase, something tangible is created, that will allow you to verify your idea in real life. Don't overcomplicate and create this MVP as quickly as possible.

**5. Test:** Verify your idea in real life with actual users. Get feedback. Ask questions on how to improve it.

**6. Implement:** This is the phase where all the collected knowledge gets translated into a final product.

If after reading this you may be thinking: "This is great but how is this going to help to quickly make my app a reality." In order to make this more tangible, I will go over a case study from my personal experience which benefited from the design thinking process.

## Design Thinking Applied - A Real-life Case Study

### Intro: Project X

Some time ago, I found myself at a meeting with an entrepreneur, a few managers, and many ideas flying around the room. Their direct competitor had recently released a new application and the tension was palpable. The company wanted to go out with something new on the market, to avoid losing ground to their competitor.

They prepared a document with some requirements, a vague idea of what the product should look like, and how much should it cost.

“We have to follow what others have done, with a lower price,” the Marketing Director said. “We have to create a more usable system, which simplifies the user journey,” added another manager. “We have to change the way we collect information, simplify it and integrate our processes with third parties,” said another. “It will take us months,” the technical manager shook his head, who mentally translated all those requests into hundreds of hours of code to be implemented.

While I can’t disclose all of the project details, I can disclose that the product was hub communication software. This piece of software managed different channels (email to SMS, fax to VoIP) and it was created for the web and mobile platforms. The product was originally created a few years before, but its usability was poor. At the time of the launch, the competitor was far ahead in terms of user experience. Moreover, they had an excellent mobile app, which was gaining ground in the mobile app store.

Company X was a traditional process driven company, familiar with traditional projects. It had run a few [Agile projects](#) in the past, but it was new to the idea of creating an MVP and testing it on the market. More notably, they feared the unknown. What if the new MVP would have an undesirable or unpredictable effect on their customer user base? This lack of control didn’t inspire confidence.

The meeting described above and the following ones did not lead to a clear definition of what the product to be achieved actually was. We only knew that we had to hit the target as soon as possible.

However as the project progressed and a competitor was beginning to gain traction, consent from the company was solidifying. Most agreed with the idea that: “We

cannot afford to launch a half-finished product, we need a product that is working from the start.”

Despite some initial perplexity and fear, this was an opportunity to learn what would bring real value to their user base and potentially attract more users by making a streamlined lightweight product.

This prompted the company to look for approaches that they haven’t tried before, in order to have a complete product built on time even if it’s going to have only essential features at its launch. We decided to use the Design Thinking process and focus on the things that would really bring value to the end user and thus, beat the competition by bringing only what’s necessary to the customer.

### Stage 1 - Empathize

Empathizing Phase: *The goal of this phase is to understand your customer, by searching and gathering information about their business. During this phase, we can use several different tools, such as interviews, focus groups, observations, and surveys.*



In the most literal sense, empathy is the ability to understand and share the emotions of others. In design thinking, empathy is a “deep understanding of the problems and realities of the people you are designing for.”

Our first step was to ensure that the Highest Paid Person’s Opinion (otherwise known as HiPPO) was not ruling over everyone else’s. Therefore, together with managers and the founder, we have compiled a list of possible stakeholders to be involved in the decision-making process.

In a day-long meeting, we compiled the first list of 30 names (between employees, functional managers, and customers) that could be contacted directly and then we also picked a target audience of 4000 customers (about 10% of their recurring customer user base).

We tried to “normalize” our target customer base as much as possible, by including diversity in terms of gender distribution, industry, and other data points. To add an additional level of complexity, the physical location of the sample to be interviewed were all divided into different cities and in some cases countries. We now had points of contacts to carry out interviews and questionnaires.

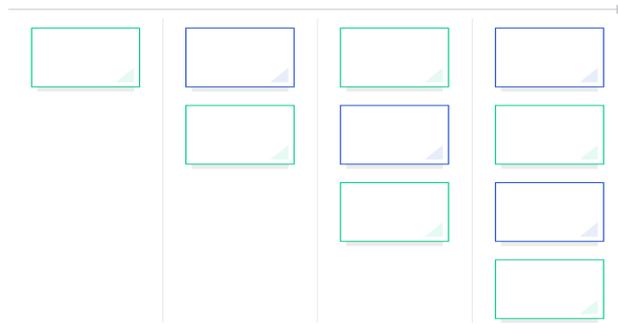
The group was organized to carry out the interviews remotely, following a scripted set of questions and some basic rules:

- During the interview, try to use the “[5 Whys](#)” technique.
- Try to understand the main “What, How, Why” behind every behavior.
- Make sure the interviewee used a webcam and that there was sufficient distance from the camera to be able to at least partially include the body language.
- Record all interviews, in case they need to be seen in the future.

We prepared our interview questions with the intention of understanding which main features should be enhanced or eliminated, such that we could quickly build a new version that responded to the needs of our users.

For the second group of users, we prepared a series of questions in a Google form. We opted for multiple-choice questions, with some formulated open-ended questions to facilitate more interaction from the users, including a question requiring the user to try the new version of the product just available in closed beta.

To organize the entire information gathering process, we used remote tools that allowed the team to collect information more easily, including Skype, Zoom, Google Forms, and a digital Kanban Board where we put all of our activities and tracked their status.



The first results of the interviews were encouraging, as the interviewees were open to providing feedback on the weaknesses and the strengths of the system.

However, the first batch of questionnaire answers was much less exciting: out of all 300 emails sent, only 5 people completed their questionnaires.

Disappointed by this result, we were ready to try new ways to involve the user base, when one of the sales managers came to us with an idea:

“I do not think they will answer any emails, they are not used to interacting with us. But, if we communicate with all those who have an expiring renewal and give them a small incentive, I am sure they will give us a hand.”

The idea was simple but exceptional. In a few hours, we had a new list of users (3800), which maintained the same division between the mainstream and extremes. However, these users would be “forced” to interact with the system, due to the proximity of their renewal.

This time around, they were asked to answer a series of questions, participate in the beta and in return, get a discount on renewal. The adhesion was complete and at the first delivery of this new model, over 70% of users replied and completed the questionnaire.

After iterating and changing some of the questions, and thanks to some users willing to interview more than once, we were ready to define our user base more clearly.

## **Stage 2 - Define**

*Defining Stage: In this phase, we collect and categorize information from the Empathize phase. It's here where we define User Personas and User Journeys.*



During the definition phase, we tried to transform a generic definition of a problem like, “We need a product that will increase our sales by 10%,” into a more specific solution like: “Men and adult women, between 35 and 45 years that are working in an office need to receive communications that have a legal validity to be sure that the sender is actually who they say they are.”

At this point in the project process, we had completed brainstorming sessions around our users, hypothesized solutions, and kept an open mind to every possible innovation. “The only stupid idea is the one never expressed” was the mantra.

In a short time, bearing in mind who our subjects were, we had a clear view of what was useful to our users, along with what needs and fears we should address along the customer journey.

We then engaged in building a “User Story Map,” which allowed us to categorize the process of users, mapping up to themes. For each of the personas, we defined the set of activities, stories, and tasks that we assumed they must complete during the journey. In doing so, we could quickly test our idea and understand if it met the core needs. If it did, we could bring it into the market faster than everyone else which was essential as our competitor was becoming more successful every day.

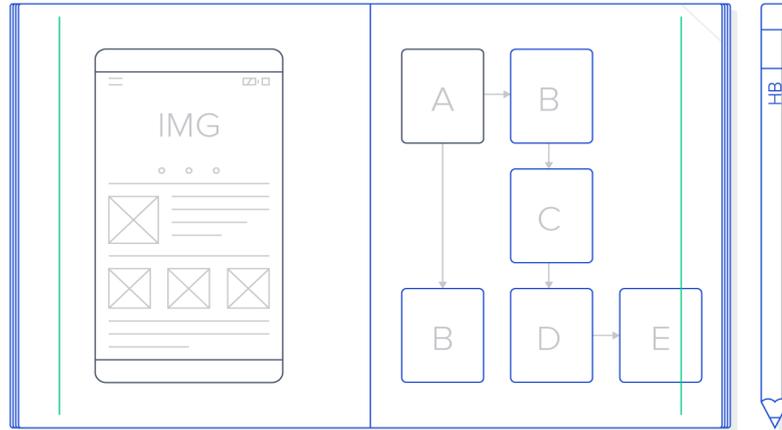
### **Stage 3 - Ideate**

*Ideation Phase: Using the above information, here the team ideates solutions. There are no silly or wrong ideas! Everything must be expressed and documented.*

One step further from the definition is the Ideation phase, where the key is forming real concepts and solution, not just abstract definitions.

In design thinking terms, ideation is “the process where you generate ideas and solutions through sessions such as Sketching, Prototyping, Brainstorming, Brainwriting, Worst Possible Idea, and a wealth of other ideation techniques.”

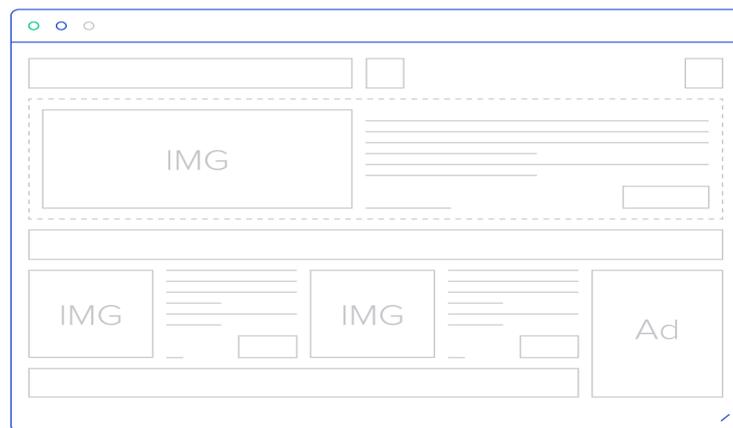
Our team was completely remote so we decided to proceed to work in a Lean way when producing materials and reviewing them. For example, designers and other members of the team have agreed that to be as fast as possible, the best solution would be to start with drawings on paper and to share photos of them in the group. Only then we would produce the most interesting designs in Balsamiq or Axure.



For each sketch that was produced, we gathered information from users, we defined a set of solutions and we came back to those users (whenever it was possible and as often as it was possible) to test with them the process and the result.

#### Stage 4 - Prototype

**Prototyping Phase:** During this phase, something tangible is created, that will allow you to verify your idea in real life. Don't overcomplicate and create this MVP as quickly as possible. \_



During the prototype phase, it was finally time to make our definitions and ideas come to life. A prototype is the first, original model of a proposed product, and this is exactly what we set out to build. By design thinking standards, the prototype stage is where you create an inexpensive, scaled down versions of the real product to investigate solutions from the previous stages.

After almost 10 days from the beginning of our journey, we arrived at the crucial moment, a meeting with a developer team where we had a chance to check our assumptions and estimations. After a session of consultation and definition with the

team of developers, we weighed the stories and understood that the major effort of the development work will be in the development of the back-end system and interfacing with the legacy systems currently in place. Alongside this, we also realized that creating the front-end systems will be a much shorter exercise. Thus, we decided to create a front-end prototype using the components which already existed in the system to save time.

We had a time limit of 3 days to have a first version of the prototype ready. This prototype had to reflect the product as much as possible and maintain the necessary functionality.

After 3 days we had our first version of the prototype ready. It had “fake” data which reflected the behavior of the software we were aiming to create. Some accessory elements were missing, but the software in that state visually represented a good percentage of total content planned.

At the end of two weeks of work, we had software that we could try and test with actual users. We used user experience monitoring software to analyze heat maps and user attention, while they were navigating our prototype.

### **Stage 5 - Test**

*Testing Phase - Verify your idea in real life with actual users. Get feedback. Ask questions on how to improve it.*

After a definition, ideation and a prototype phases it was finally time to see if our product actually worked in real life. In design thinking terms, testing means putting the complete product to trial using the best solutions created in the prototyping phase.

In our case, the testing phase did not only take place at the end, but it was a constant loop of feedback and iteration whenever it was possible. At the end of each accomplished step, we tried to get feedback from users or customers, before convincing ourselves to move on to the next phase.

Once the prototype was completed, it was time to test it with the widest possible audience and check with them how effectively it met their needs, understand their perception, and understand if it accomplished their goals.

The testing phase specifically included a walkthrough prototype where users were able to see the new workflow and perform actions, along with a few sessions where

the team directly observed users, while tracking their responses. A simple questionnaire was used to collect conversion rates across specific features in the platform, where users were asked to score the process from 1-10.

The testing phase was later extended to the whole team and even to some individuals outside the organization (customers and users) who during the earlier sessions, had willingly consented to give their feedback on the implementation of the system.

The results of this testing were encouraging. The stakeholders of the Company X were able not only to see the mockups but to try out and “touch” the product for the very first time. The extended team had the opportunity to test and verify their assumptions and correct them over time within the period of two weeks.

Now the final test was waiting: opening it to users and understanding what would happen next.

## **Stage 6 - Implement**

Implementation Phase: *This is the phase where all the collected knowledge gets translated into a final product.*

We had data, ideas, personas, and our first tangible prototype. It was time to roll up our sleeves and start developing. We had a month and a half to implement our new system.

We defined a set of rules to get our MVP implemented in a short period of time:

- We will build only what we had defined, without adding new features.
- We will keep ourselves focus on the main business goal.
- We will use agile methodologies within teams to manage the workload.

To complete the project in time we have brought on a few new team members who had not been involved in the project since the very early stages of the discovery phase.

We added frontend developers, backend developers, and designers. The new members of the team were working remotely and it was not possible to bring them all in the same room for the period of the project, so we made sure that we have the right tools for keeping the communication going.

The process put in place to manage the work was an Agile one. We divided the remaining time into several short sprints, with remote meetings every day and updates

via Slack during the day to exchange the ideas and to help each other to solve problems.

We didn't have a full documentation stored somewhere, but mentally we all had a comprehensive set of actions, a common shared vision, and goals amongst the team. We all started to perceive the User Personas to be a real user, with his own needs and problems. Once our team started to have an aligned vision, we moved onto defining what needed to be done and when in order to finish the project on time.

The activities were outlined within a User Story Map, to maintain the original evidence of the personas and the flow we want to give to the product.

The [User Story maps](#) were created via three clear steps: identifying the activities, identifying the steps required to complete the activity, and the list of stories/tasks associated with each. We sorted the stories according to priority (Must, Should, Could), which dictated what components made it into the product.

The team was able to proceed in a fast pace since the very beginning of the implementation, thanks to a clear vision shared by the team, and by the method we employed which enabled the team to stay on track without direct steering from the management above. Everyone working in the project had questions from the Design Thinking stages in mind:

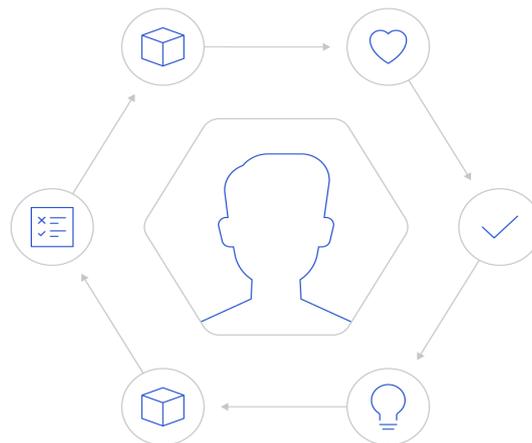
- What action each user inside our platform should perform and what were they trying to achieve?
- Which steps those users should take to reach the final goal?
- Which pain points they had before and how should we avoid them?

This allowed our team to make their own micro-decisions, and steer the product towards its final goal.

We made two reviews of the work in progress at the end of each sprint and one final release review at the end of the path, before the product was finally put into production. We used the last sprint to prepare the infrastructure needed to run and launch the product.

Finally, the users who have used our old product were invited again to try out the new version. Our product was released into production two months after the meeting in

## Conclusion



Throughout this case study, we have shown how Design Thinking methodology can be applied to a real-life problem with a limited time and budget.

Instead of using more traditional approaches and producing things in sequential steps, we have chosen to iterate through the six design thinking stages. Empathize. Define. Ideate. Prototype. Test. Implement. This became our mantra and allowed us to produce a very well received product.

Using Design Thinking has led so to save time, and in turn, save costs spent on the project. We were not working on millions of different features, but only on few, well thought through actions that were clear to everybody in the team. Most importantly, we were able to deliver the product and value that users needed.

Using Design Thinking process helped us in many different areas:

- From the project management perspective, it enabled us to clearly define the scope of the project and prevent scope creep.
- From the business perspective, it allowed us to pick the features which bring the real value to the business.
- From the development perspective, it helped us see the clear goal of what we have to build before we even started building it.
- From the team perspective, it involved all team members and allowed them to effectively work together and have their opinion heard in every part of the process.

When we started Design Thinking process was met with skepticism by the client, but when we finished and got the feedback from our customers, it was immediately clear that the steps we have laid out have helped us to achieve something that would have been very hard or impossible otherwise. This was valued by the client and became their internal a flagship project for the future challenges ahead. which the idea to make it was expressed. The product worked, users started using it, and we progressively sent more new users to this tool instead of the old one. A/B testing showed us that they preferred the new product, and the project was accepted in the company as a great success.

More importantly, a Design Thinking methodology was finally accepted. We believe this will have a good and long-lasting impact and will allow them to build better products in the future.

## **UNIT-2**

### **2 marks questions**

- 1.Explain Faster Pace of Learning.
- 2.Discuss the Key Design Thinking principles ?
3. Define Iterative and Human-Centric.

### **10 marks questions:**

1. Explain Design Thinking principles in detail.
2. Discuss about benefits of Design Thinking .

## UNIT-3

### 3 INTRODUCTION

#### 3.1 IDEA GENERATION

- Ideation is the process where you generate **ideas** and solutions through sessions such as Sketching, Prototyping, Brainstorming, Brain writing, Worst Possible **Idea**, and a wealth of other ideation techniques.
- Ideation is also the third stage in the **Design Thinking** process.

#### **Ideation Will Help You:**

• Ask the right questions and innovate with a strong focus on your users, their needs, and your insights about them. Step beyond the obvious solutions and therefore increase the [innovation](#) potential of your solution. Bring together perspectives and strengths of your team members. Uncover unexpected areas of innovation. Create volume and variety in your innovation options. Get obvious solutions out of your heads, and drive your team beyond them.

#### **Why do We Need Ideation in Design Thinking?**

- “You ideate in order to transition from identifying problems to creating solutions for your users”
- Ideation is your chance to combine the understanding you have of the problem space and people you are designing for with your imagination to generate solution concepts.
- Particularly early in a design project, ideation is about pushing for a widest possible range of ideas from which you can select, not simply finding a single, best solution.”

#### **Get Started in Applying Ideation Methods:**

##### **Empathizing:**

- 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.

### **Defining:**

- During the Define stage, you put together the information you have created and gathered during the Empathize stage. This is where you will analyze your observations and synthesize 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 - centered manner.

### **Ideating:**

- 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 Empathize stage, and you've analyzed and synthesized 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.

### **Prototyping:**

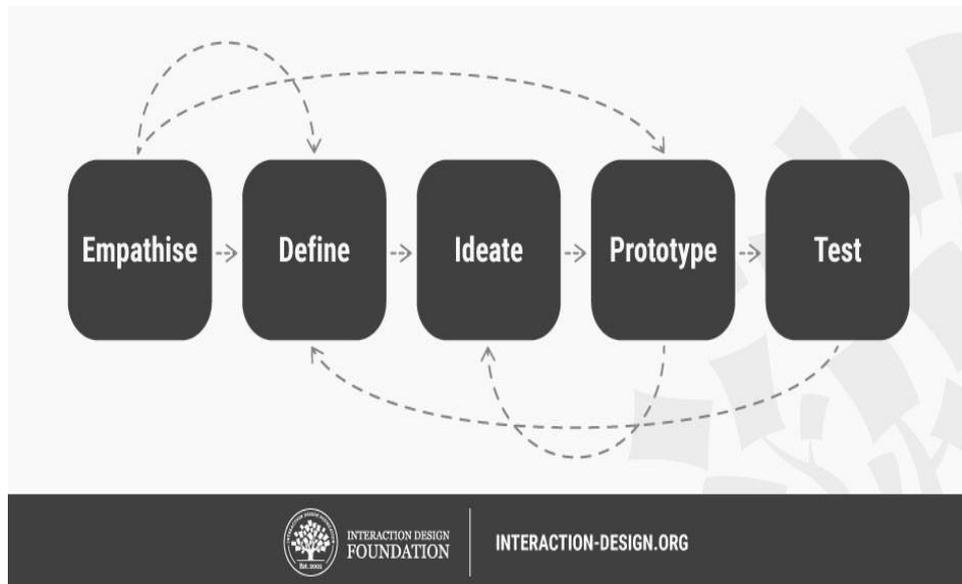
- The design team will now produce a number of inexpensive, scaled down versions of the product or specific features found within the product, so they can investigate the problem solutions generated in the previous stage. Prototypes may be shared and tested within the team itself, in other departments, 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.

### **Testing:**

- 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 empathize.



### Characteristics Required for Successful Ideation:

- **Adapting:** Be able to switch how you see, understand, and extend thinking as new input gets generated.
- **Connecting:** Be able to connect seemingly unrelated concepts, attributes or themes in order to create new possibilities.
- **Disrupting:** Be able to overturn commonly held beliefs, assumptions or norms in order to re-think conventional approaches.
- **Flipping:** Turn dead-ends or deadlocks into opportunities by flipping them over or rapidly changing direction towards greater [viability](#).
- **Recognize Patterns:** Seek to spot common threads of meaning, and ways of seeing, doing and behaving; be able to recognize attributes or shared values across a spectrum of influence and input; and finally be able to utilize these commonalities to build solutions.
- **Curiosity:** Be willing to ask uncomfortable, silly or even crazy questions. Be willing to explore and experience, in order to understand and learn something

new and different.

## 3.2 TECHNIQUES

### The Most Essential Ideation Techniques:

#### 1. Brainstorm:

- During a Brainstorm session, you leverage the synergy of the group to reach new ideas by building on others' ideas.
- Participants should be able to discuss their ideas freely without fear of criticism.
- You should create an environment where all participants embrace wild ideas and misunderstanding, and which will allow you to reach further than you could by simply thinking logically about a problem.

#### 2. Brain dump:

- Brain dump is very similar to Brainstorm, however it's done individually. The participants write down their ideas on post-it notes and share their ideas later with the group.

#### 3. Brain write:

- Brain writing is also very similar to a Brainstorm session. However, the participants write down their ideas on paper and, after a few minutes, they pass on their own piece of paper to another participant who'll then elaborate on the first person's ideas and so forth.
- Another few minutes later, the individual participants will again pass their papers on to someone else and so the process continues.

#### 4. Brain walk:

- Brain walk is similar to Brain writing. However, instead of passing around the paper, the participants walk around in the room and continuously find new "ideation stations" where they can elaborate on other participants' ideas.

#### 5. Worst Possible Idea:

- Worst Possible Idea is a highly effective method that you can use to get the creative juices flowing and help those who are not so confident in expressing themselves by flipping the brainstorm on its head.

- It's a lot of fun too. Instead of going for good ideas and putting the pressure on, call for the worst possible ideas your team can come up with.
- Doing this relieves any anxiety and self-confidence issues and allows people to be more playful and adventurous, as they know their ideas are most certainly not going to be scrutinized for missing the mark.

## **6. Challenge Assumptions**

- Take a step back from the challenge you're tackling and ask some important questions about the [assumptions](#) you have about the product, service, or situation where you're trying to innovate.
- It is particularly effective to [challenge assumptions](#) when you are stuck in current thinking paradigms or have run out of ideas.
- Therefore, it is good for re-booting a flagging session.

## **7. Mind map:**

- Mind mapping is a graphical technique in which participants build a web of relationships.
- To get started with the simplest form of mind mapping, the participants write a [problem statement](#) or key phrase in the middle of the page.
- Then, they write solutions and ideas that comes to their mind on the very same page.
- After that, participants connect their solutions and ideas by curves or lines to its minor or major (previous or following) fact or idea.
- They can help you create abundant ideas without worrying about their quality.

## **8. Sketch or Sketch storm:**

- Throughout ideation sessions, a valuable exercise is to express ideas and potential solutions in the form of diagrams and rough sketches instead of merely in words.
- Visuals have a way of provoking further ideas and providing a wider lens of thinking. The idea with sketching out ideas is not to develop beautiful drawings worthy of framing and mounting on the wall.
- The sketches should be as simple and rough as possible with just enough detail

to convey meaning.

- More particularly, sketches can assist you in the design process by helping you to think more openly and creatively about your ideas.

### **9. Analogies:**

- Storytellers, journalists, artists, leaders and all kinds of other creative professions have relied on creating [analogies](#) as a powerful tool for communicating and sparking ideas.
- An analogy is a comparison between two things for instance a comparison of a heart and a pump. We communicate using analogies all the time as they allow us to express our idea or to explain complex matters in an understandable and motivating way.

### **10. SCAMPER:**

- SCAMPER is a lateral ideation technique that utilizes action verbs as stimuli. It helps us ask seven kinds of questions to come up with ideas either for improvements of existing products or for making a new product.

## **3.3 CONVENTIONAL METHODS**

### **Idea Generation: Methods**

#### **1. Mind mapping:**

A traditional mind map is one of many fantastic idea generation techniques. It is a way to lay out all the critical information surrounding your [innovation challenge](#), and can help you start to combine ideas in new and useful ways.

#### **2. First Principles Design:**

When you strip your area of investigation back to its first principles, you can bypass traditional solutions in order to reach exciting new conclusions. It's all about not simply doing things the same way because that's how other people have been doing it.

Start by making a list of all the things you think you know about your subject. Then, for each entry, ask yourself how and why you *know* this piece of information. Were you told it? Did you experience it for yourself? What is the evidence that supports this idea?

### 3. Collaborative Innovation

- No two people ever look at the same problem in exactly the same way, thanks to our different backgrounds, knowledge-bases, skill sets and experiences.
- That's why collaboration is so essential when it comes to generating ideas. By combining different insights, you can reach conclusions that address a wide variety of different priorities and points of view.
- This will always lead to a stronger and more inclusive solution.
- However, it's often not enough to collaborate with the people around you. To uncover innovative ideas, you need to get out of your comfort zone and [work together](#) with people from a broad range of different backgrounds.

### 4. Blue-Sky Thinking

- If there were absolutely no limits, no judgments and no consequences, where could your imagination take you? That's the question behind [blue-sky thinking](#).
- In this type of brainstorming, you're going wherever your imagination takes you, by creating a space where any and all ideas are welcome, no matter how crazy, silly or unlikely they may initially seem.

### The 5W's and the H:

- Who, what, where, why, when and how: the five questions that any good journalist needs to answer in their opening paragraph.
- It might sound simple, but answering these five questions when faced with any challenge can be one of the easiest ways to define your parameters, in order to generate a solution that actually deals with the practical realities of the situation.

### Social Listening:

- Your team is your greatest untapped resource, and their ideas – as people who are closest to your product or service every day – are usually the most valuable. Part of this is because they are in constant communication with your customers, so are able to “listen in” to their reactions in the moment.

- With this in mind, it's always worth seeking out wider set of opinions: both from the people who use your products and services, and also those who don't. Beyond standing on the shop floor, there are plenty of ways you can access the discussion around your field.

### **Idea Capture**

- Sometimes, finding inspiration is like catching fish; all you can do is sit quietly and wait.
- However, you still need to be ready when inspiration finally strikes. That's why it's important to have a means of [recording ideas](#) with you at all times.

## **3.4 INTUITIVE METHODS**

### **1 .Synectics:**

- The Synectics process emphasizes the need for creative and divergent thinking throughout the process.
- There is an emphasis on reserving judgment of ideas and letting the mind freely explore associations.
- In an ideation session, metaphors related to potential solutions are generated by the group, and solutions are effectively built on those metaphors.
- Uniqueness and novelty are highly valued, though this goes against the norm, as it has been shown that in general, unique ideas are generally less likely to be explored .
- categorized Synectics as an intuitive approach to design, developed for nontechnical problems but applicable to creative idea development.

### **2 Design Thinking :**

- IDEO's approach to innovative consulting takes the phrase of “design thinking,” and Tim Brown supports the idea that “human-centered design” can be applied to all walks of life.
- They highlight the value of being immersed in creative spaces and creative cultures, so that diverse teams can effectively generate original ideas.
- Their process highlights the need for empathetic feeling, observing, and

experience as much as possible about the problem.

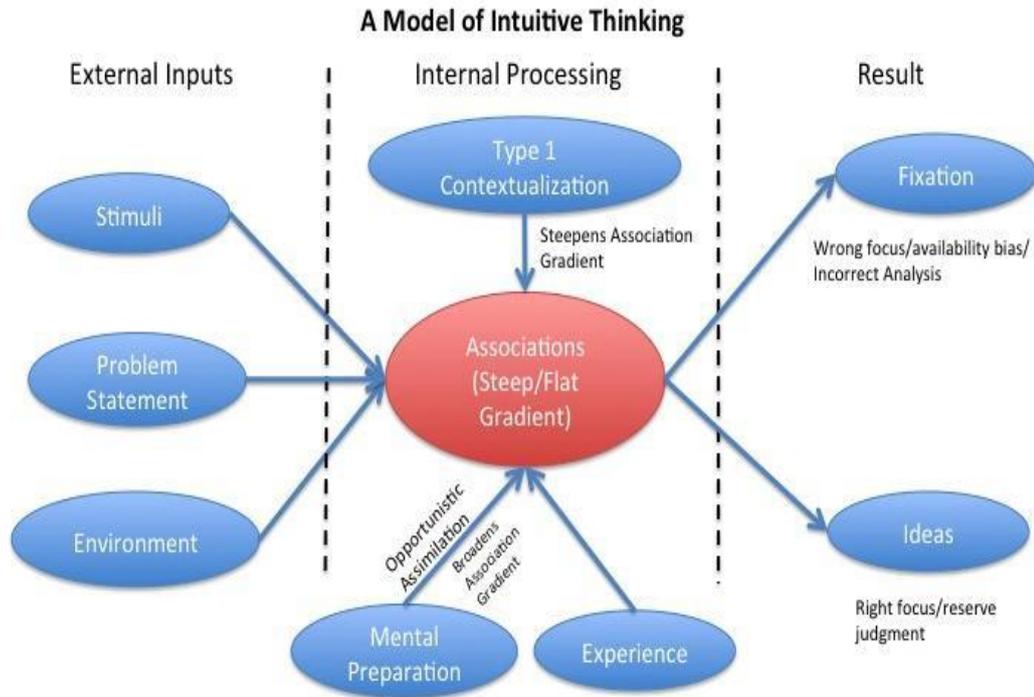
- Like Synectics, design thinking takes advantage of convergent and divergent thinking. The large number of ideas produced through divergent thinking drives quality in the convergent phase of the process .

### **3 .The Stochastic Model of Creativity and Conscious Impulses:**

- Simonton's model indirectly supports the efficacy of these approaches to creative thinking. Based on Donald Campbell's model of blind variation and selective retention in creative thought, three key conditions to creativity are identified:
  - A mechanism for introducing variation
  - A consistent selection process
  - A mechanism for preserving and reproducing the selected variations
- With these three components, as preinventive forms are explored in the subconscious, new associations are made and the most useful associations rise to the conscious surface .

### **4 .Unifying Trends:**

- In the preceding three sections, one sees a heavy dependence on remote associations born out of stochastic and divergent thinking that direct individuals in creative and unexpected directions.
- Contrary to engineering design there is little rational deduction involved, but at the same time there is a high amount of creative value in the Synectics and design thinking methods.



### 3.5 BRAINSTORMING

**Definition:** Brainstorming is a creative group approach to developing ideas and originating solutions during the ideate stage.

**Brainstorming rules:**

**Do not criticize:** this is the most important rule. Criticism prevents people from making suggestions and voicing options. Any idea is valid in brainstorming.

**Keep the process manager-free:** the presence of line managers may inhibit the flow of ideas.

**Avoid resolve:** do not start working up or resolving an idea that looks like a possible leader during the session. Instead, carry on generating ideas during the allotted time. Ideas can be resolved following the evaluation stage.

**Work to a target:** a numerical target helps idea generation as participants move away from standard thinking on the subject in order to achieve it. Focus on quantity not quality.

**Clock watch:** set a time by which the session should end. This helps to keep the pressure on, forcing more ideas to be generated.

**Let go:** participants must not be afraid of offering odd, wacky or wild ideas, although

this does not mean participants should not take the session seriously.

**Be inclusive:** the session chairperson should prevent any group members from dominating the session and should encourage all members to contribute.

**Additional brainstorming methods:** Brainstorming is the unfettered generation of ideas, but it needs to be employed in a structured way in order to maximize its value and to ensure that useful ideas will be generated. The following steps steer the brainstorming process towards producing ideas that can be developed further.

**Visualization:** Quick visual aids can be produced to aid brainstorming and focus attention, although this should not slow the proceedings down or amount to resolve. Visualization aims to provide feedback with which to stimulate further creativity and build upon suggested ideas and themes.

**Groups and voting:** The brainstorming participants can be split into smaller groups, each of which is tasked with finding solutions to particular concerns or challenges. For example, one group may address aesthetics while another looks at cost reduction. Groups can vote on which ideas generated by the other groups are to be taken forward.

**Scribble, say, slap:** Use of sticky notes allows participants to quickly write down their ideas, shout them out, and put them up rather than having to wait for their turn under standard brainstorming. This method also helps people to relax, lowers their inhibitions and allows more timid group members to express their ideas.

**Scribble:** Session participants write their ideas on sticky notes...

**Say** then shout their ideas out...

**Slap** and finally stick their written notes on to the board.

**Assessment criteria:** Finally, to assess the ideas generated requires the need for criteria against which they can be assessed. Criteria can include cost, resources required, necessary resources available, time factors and fitness for purpose.

### **3.6 GALLERY METHOD**

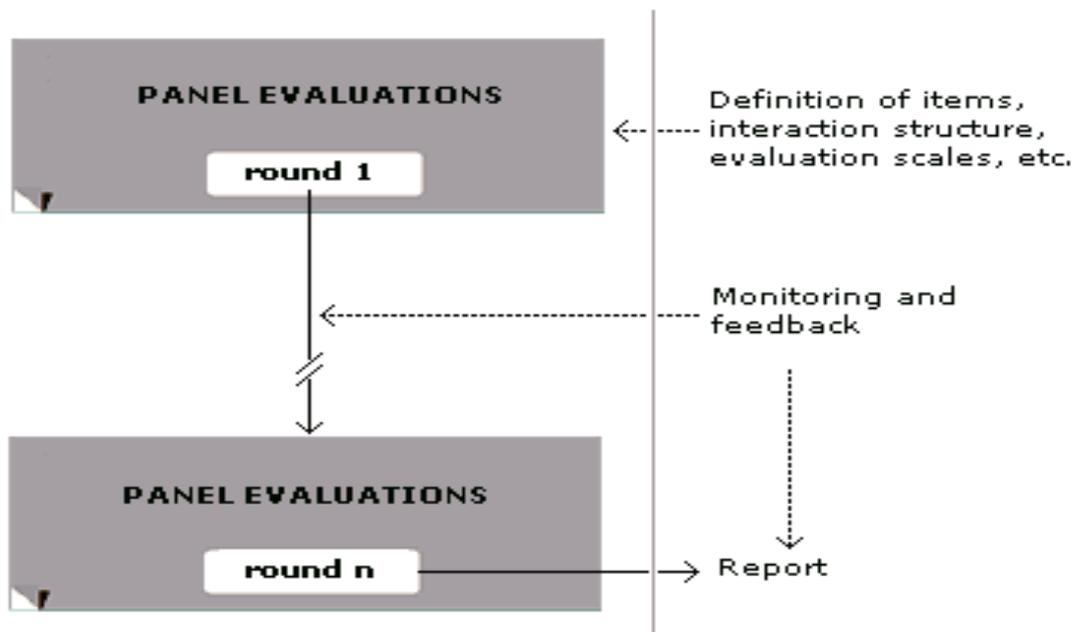
**Definition:** The **gallery method** is a group ideation process which allows individuals to first generate **ideas** individually, followed by pooling of **ideas** to conduct group ideation. **Design** engineers are often encouraged to work in groups to generate

concepts and solutions for **design** problems.

- In the gallery method, individuals of a group begin sketching their ideas silently on sheets of paper.
- This is referred to as the phase of individual ideation. After a set amount of time, individuals display their sketches as a gallery and discuss their ideas.
- During the group discussion, the members of the group (a) present their ideas to the group; (b) critically evaluate each other's ideas and (c) modify/eliminate/generate ideas as a group.
- A hybrid ideation is an improved group ideation process that first allows individual idea generation followed by group ideation .
- Linsey and colleagues suggest that group members gain a significant number of ideas by looking at other member's ideas during the idea generation process.
- Both individual and group interactions are important in idea generation process.
- “the average person can think up to twice as many ideas when working with a group than when working alone”.
- The gallery method can be used to effectively harness the merits of individual and group ideation.
- Some of the most commonly used ground rules of gallery method :
  1. Defer judgment
  2. Build on ideas of others
  3. One conversation at a time
  4. Stay focused on topic
  5. Encourage wild or creative or novel ideas
  6. Take notes if required
  7. “Do not interrupt others, wait for your turn”

### 3.7 DELPHI METHOD

- **Definition:** The **Delphi method** or **Delphi technique**; also known as Estimate-Talk-Estimate or ETE) is a structured communication technique or method, originally developed as a systematic, interactive [forecasting](#) method which relies on a panel of experts.
- Delphi has been widely used for business forecasting and has certain advantages over another structured forecasting approach, [prediction markets](#).
- Delphi is based on the principle that forecasts (or decisions) from a structured group of individuals are more accurate than those from unstructured groups.
- The experts answer questionnaires in two or more rounds. After each round, a [facilitator](#) or change agent provides an anonymised summary of the experts' forecasts from the previous round as well as the reasons they provided for their judgments.
- Thus, experts are encouraged to revise their earlier answers in light of the replies of other members of their panel.
- It is believed that during this process the range of the answers will decrease and the group will converge towards the "correct" answer.
- Finally, the process is stopped after a predefined stop criterion (e.g., number of rounds, achievement of consensus, stability of results), and the [mean](#) or [median](#) scores of the final rounds determine the results.



### **Key characteristics:**

#### **Anonymity of the participants:**

- Usually all participants remain anonymous.
- Their identity is not revealed, even after the completion of the final report. This prevents the authority, personality, or reputation of some participants from dominating others in the process.

#### **Structuring of information flow:**

- The initial contributions from the experts are collected in the form of answers to questionnaires and their comments to these answers.
- The panel director controls the interactions among the participants by processing the information and filtering out irrelevant content.

#### **Regular feedback:**

- The Delphi Method allows participants to comment on the responses of others, the progress of the panel as a whole, and to revise their own forecasts and opinions in real time.

**Role of the facilitator:**

The person coordinating the Delphi method is usually known as a *facilitator* or Leader, and facilitates the responses of their *panel of experts*, who are selected for a reason, usually that they hold knowledge on an opinion or view.

The facilitator sends out questionnaires, surveys etc. and if the panel of experts accept, they follow instructions and present their views.

Responses are collected and analyzed, then common and conflicting viewpoints are identified.

If consensus is not reached, the process continues through thesis and antithesis, to gradually work towards synthesis, and building consensus.

### 3.8 SYNECTICS

**Synectics:**

The Synectics process emphasizes the need for creative and divergent thinking throughout the process.

- There is an emphasis on reserving judgment of ideas and letting the mind freely explore associations.
- In an ideation session, metaphors related to potential solutions are generated by the group, and solutions are effectively built on those metaphors.
- Uniqueness and novelty are highly valued, though this goes against the norm, as it has been shown that in general, unique ideas are generally less likely to be explored .
- categorized Synectics as an intuitive approach to design, developed for nontechnical problems but applicable to creative idea development.
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## **UNIT-3**

### **2 marks questions**

- 1.Explain Mind Mapping.
2. Write a short note on BrainStroming.
- 3.Define Gallery Method.
4. Define Delphi Method and its characteristics.

### **10 marks questions**

- 1.Explain Most Essential Ideation Techniques.
- 2.Discuss BrainStroming in detail .
- 3.Explain Conventional Methods.

## UNIT-4

### 4 DESIGN THINKING IN INFORMATION TECHNOLOGY

#### 4.1 Introduction:

The Information Technology (IT) industry has been booming across the world since a few decades. The industry employs a large number of people across the globe and is the hub for innovation every day. The IT industry is now working mostly on **Agile methodology**, which is a technique of project management.

- Agile is **an iterative or incremental method** of managing development and design. Each day, the engineers have a set of tasks at hand, which they are required to complete in a day or two.
- Moreover, the complex problems shot by the customers to the engineers are required to be solved quickly.
- In such a scenario, design thinking helps to solve the problems and address the exact needs of the customer.
- The IT engineers today are supposed to understand the problem statement in the exact manner as felt by the client.
- Otherwise, both the solution and the time invested will fail. Once requirements have been gathered, only then can the developers start thinking of programmatic solutions.
- The solutions that are developed are sent for the client's experience. The feedback given by the client helps the designers and developers to iterate the process of software development.

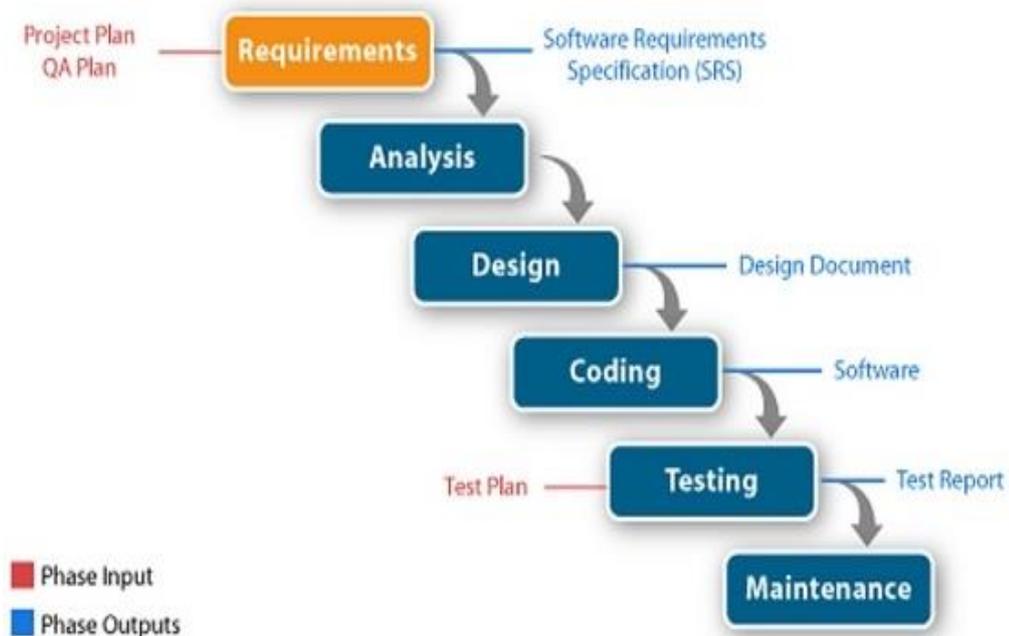
**advantages of using design thinking in IT industry** for software development are as follows:

- The solutions are prototyped.
- The results are verified.
- The best solutions are accepted.
- The solutions are experienced by the client before approval.
- Short iterations are possible to improve the user experience.

- Small cross-functional teams.
- Incremental delivery is possible.
- Fast feedback helps the designers and developers.
- Continuous improvement is possible.

The use of design thinking principles have grown so much in the IT industry that nowadays world-renowned companies like Infosys have made it mandatory for its employees across the globe to undergo design thinking courses and get certified as a design thinker.

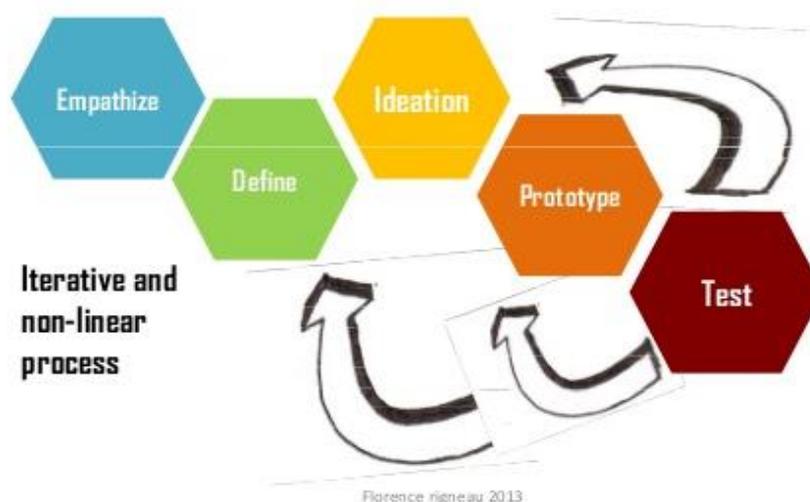
The concept of design thinking is central to the process of developing software solutions, which target the exact needs of the customer and have the flexibility of getting modified in an iteration process based on the feedback given by the client.



- Business process management is at the heart of organizations.
- It provides concepts and methods to capture, analyze and improve operational procedures in the daily business of organizations.
- The elicitation of process models is the first step in any process improvement project.

- Process models mediate communication between the different stakeholders involved, such as, for instance, business analysts, process participants, and software architects. Process models provide a shared understanding, so that everyone can contribute knowledge.
- Based on design thinking principles, this we can develop a method that aims at improving business process modeling.
- Based on design thinking principles, this we can develop a method that aims at improving business process modeling.
- To achieve this goal, we introduce physical building blocks and methodological guidance to fundamentally change the way people interact with process models.
- Tangible prototypes have been successfully used in design thinking, and initial experiments show that a tangible toolset is a promising approach to improve business process modeling and comprehension.
- The focus is on the insights we got during the cooperative research project, i.e., the research path we took.

## Design thinking process

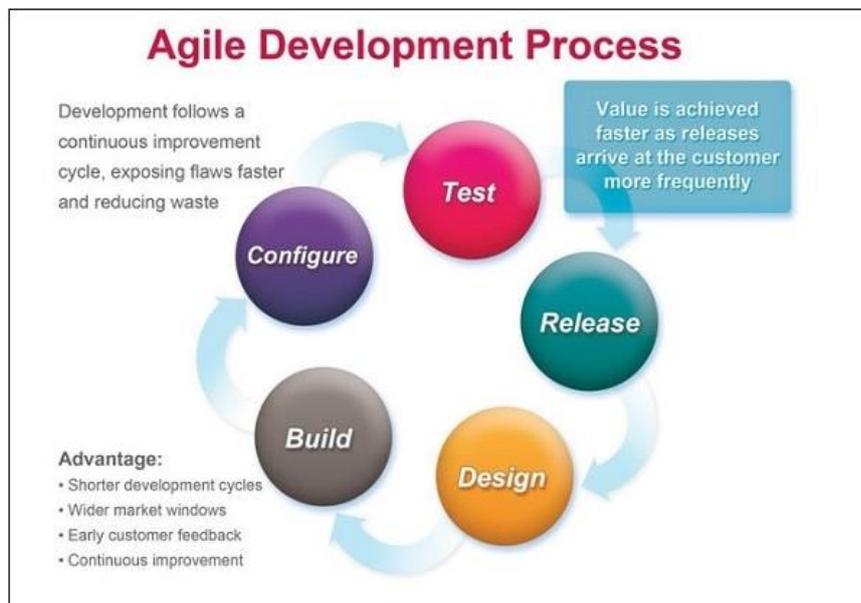


## 4.3 DESIGN THINKING FOR AGILE SOFTWARE DEVELOPMENT

### What is agile?

Agile is an iterative or incremental method of managing development and design. The complex problems shot by the customers to the engineers are required to be solved quickly. In such a scenario, design thinking helps to solve the problems and address the exact needs of the customer.

Agile software development refers to software development methodologies centered round the idea of iterative development, where requirements and solutions evolve through collaboration between self-organizing cross-functional teams.



30-35% of IT projects fail according to research by IDC. Other research shows a higher figure of 50%. Most firms turn to Agile methodologies such as Scrum to solve this issue. Agile improves success rates by almost double by promoting better collaboration and communication.

However, Agile only provides a way to solve problems. How does one decide which the right problem to solve? This is where design thinking plays a vital role. Combining design thinking and Agile methodology is no easy task.

It requires a culture shift. You have to get accustomed to a new way of thinking and doing. Once accustomed, teams experience improved productivity. Agile and Design thinking value people over processes.

## Agile methodologies:

### Scrum:

SCRUM is an agile development method which concentrates specifically on how to manage tasks within a team-based development environment.

Basically, Scrum is derived from activity that occurs during a rugby match. Scrum believes in empowering the development team and advocates working in small teams (say- 7 to 9 members).

It consists of three roles, and their responsibilities are explained as follows:



### Scrum Master:

Master is responsible for setting up the team, sprint meeting and removes obstacles to progress.

### Product owner:

The Product Owner creates product backlog, prioritizes the backlog and is responsible for the delivery of the functionality at each iteration.

### Scrum Team:

Team manages its own work and organizes the work to complete the sprint or cycle.

## 4.4 VIRTUAL COLLABORATION

### what is virtual collaboration ?

Virtual collaboration is the method of collaboration between virtual team members that is carried out via technology-mediated communication. Virtual collaboration follows the same process as collaboration, but the parties involved in

virtual collaboration do not physically interact and communicate exclusively through technological channels. Distributed teams use virtual collaboration to simulate the information transfer present in face-to-face meetings, communicating virtually through verbal, visual, written, and digital means.

Virtual collaboration is commonly used by globally distributed business and scientific teams. Ideally, virtual collaboration is most effective when it can simulate face-to-face interaction between team members through the transfer of contextual information, but technological limits in sharing certain types of information prevent virtual collaboration from being as effective as face-to-face interaction.

### **Characteristics:**

**Sharing of information:** Collaboration, by definition, is a process of assembling knowledge from different parties towards a common goal.

- Virtual collaboration is meant to enable the sharing of knowledge between parties who cannot exchange information due to physical separation.
- Virtual collaboration platforms allow the transfer of different types of information between collaborators to work towards a common goal.

**Dispersed Collaborators:** Collaborators within virtual collaboration are physically separated from each other and can only interact virtually.

- Being able to physically interact with a team member affords many benefits that virtual collaboration cannot provide, and eliminates any need for virtual meetings.
- Collaborators can meet physically, but interaction outside of the virtual platform may change the dynamics of the collaboration and classify it as non-virtual.

**Technology-mediated:** Because virtual collaborators cannot interact physically they use technology to share information over several mediums.

- Most virtual collaboration platforms are carried out via the internet, for example email, video conferencing, and virtual workspaces.

## **Types:**

**1- Synchronous:** Collaboration occurs when team members are able to share information and ideas instantaneously. Examples of synchronous virtual collaboration include instant messaging, chat rooms, and video or audio conferencing.

**2- Asynchronous:** Collaboration occurs when team members communicate without the ability to instantly respond to messages or ideas. Examples of asynchronous virtual collaboration include e-mail, discussion boards, applications or shared databases.

## **4.5 MULTI USER AND MULTI ACCOUNT INTERACTION**

Combining support for single display collaboration with support for asynchronous and remote collaboration in one groupware challenges some basic assumptions of application design and brings up new requirements for application platforms.

An application featuring multi-user single-screen interaction requires special support in the application's platform such as handling the events from multiple, similar input devices independently from each other.

In addition, if multiple remote users should be able to work in same way as local users, and if UI actions should be linked to the users, an adequate concept representing the users and their actions is needed.

### **A. Using Hands to Represent User Input:**

Morphic is a completely object-oriented GUI framework. First implemented for the Self programming language, it was later adopted by Squeak Smalltalk.

- In applications implemented with Morhic, every visible element on the screen is represented by an object in the code, even the mouse pointer.
- These objects used by Morhic are called Morphs, according to this the object representing the mouse pointer is called Hand Morph.
- The concept of hands allows having multiple hands that can be controlled by different sources.
- Every hand object is responsible for communication with the respective input source and generates corresponding UI framework events.

- Hand objects are also able to determine the UI element (the Morph) that is currently focused (keyboard event) or that is directly below the mouse pointer.

### **B. Controlling Hands via Multiple Input Devices or VNC:**

- When multiple users interact with a single-screen, it is usually desired that they can work with the application independently.
- This is comparable to a physical whiteboard, where multiple users can draw at the same time.
- This requirement can be achieved by using the concept of hands. Hand objects obtain their event data from the corresponding input stream autonomously.
- By using this concept, additional input streams can be integrated; multiple hands, that is, mouse pointers and cursors, can be controlled by different input sources.
- Common operating systems can activate multiple input devices, but support only one system cursor. Input events from these different devices are merged into one input event stream.
- Screen sharing or terminal server technologies, such as VNC or the Remote Desktop Protocol (RDP), also support only one cursor per session over all participants.
- The applications and underlying protocols expect only one input stream of one user.
- In addition, the host user and the remote user share control over the application using a single mouse pointer and cursor.
- We extended Squeak's VNC implementation, so that client-side input events of different hands are transmitted to the server in separate conceptual event streams.

### **C. Impersonating Hands:**

- Until now multiple local or remote users can interact with the application simultaneously and independently, because users have their own hands.
- However, there is no relation between the user and a cursor on the screen, that

is, the application does not have any information about the source of events.

- To provide this link between users and their hand, we suggest to impersonate hands. We argue that every event processing should be performed on behalf of the corresponding users.
- As we describe below, hand objects are therefore required to manage digital identities of acting users.
- According to the suggested concept, hand objects have to manage user credentials. When, for example, a new input device is attached, a corresponding hand is created, not yet providing any credentials.
- When the applications requires credentials of the acting user, it has to ask the acting hand for this information.
- Based on that request, the hand object opens a dialog asking the user to provide username and password.
- When remote users connected via VNC also work with the Squeak platform, their credentials stored in the their local hand can be reused in the replicated hand.
- The hand morphs replicating a remote user's hand subtype the standard hand morphs.

## **4.6 NEED FOR COMMUNICATION**

### **Importance of communication in Design Thinking:**

Where do communication skills play a role and how important is it for Design Thinking? To answer this question, we need to look at the various phases in a typical process and understand the role of communication in that phase.

#### **1. Define Phase**

Accepting the existence of a problem which needs to be resolved is the core of Design Thinking and this happens only through open communication. Getting the feedback from the market or the field and being open to such feedback is very important.

The challenge in this phase lies not only in identifying the problem and defining the scope, but also convincing the members of the Design Thinking team that this is the topic which needs to be focus on. The team needs to be motivated and driven to address the issue which has been defined as the scope.

## **2. Observe Phase**

External communication or communicating with stakeholders who are not part of your organization is a tricky skill. If you are talking to existing customer who are using your product, it is important to have an open mind and not a defensive one (especially if the customers are critical about the product). Easier said than done.

Also, the questions which are asked during the direct interactions with end users defines the information you can get out of them.

## **3. Define point-of-view:**

The clarity and depth required in a “How might we..” statement can only be achieved if you have a good grasp of the language combined with the deep knowledge gathered from the observe phase.

## **4. Ideate Phase**

Selling ideas is an interesting topic. The clarity with which the idea is expressed brings out the clarity of thought of the ideator. Ideas can be appreciated and build upon by others only if they are understood the way it was intended to be.

Even though it is not good to be possessive about your own ideas, the ability to force others to think in the same or similar way in which your mind thought about it in the first place is an achievement which requires extremely good communication skills.

## **5. Prototype Phase**

Converting idea(s) into something which is feasible and which can be demonstrated to an end user sounds easy to do. It is easy if you have mastered the art of working with a team. Note that the team members had their own ideas during the previous phase and the elements of their ideas may or may not be part of the prototype. It will be tough for a team member to work on an idea which has no element of his/her original idea (we are humans after all and not machines).

The ability to make the team work together on a prototype without being biased and judgmental requires excellent coordination skills.

## 6. Test Phase:

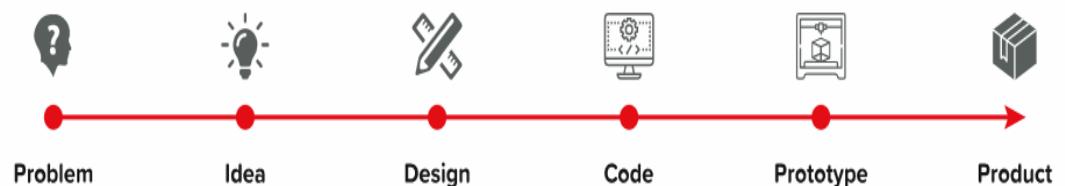
The ability to convince the end user that this is an unbiased validation of an idea in the form of a prototype so that the end user does not think about the future implications of the feedback given (any user will be reluctant to change) is very important.

The ability to get the right feedback from a user without a push or pull from both sides leverages heavily on good communication skills.

## 4.7 TILES TOOL KIT

Tiles Toolkit is a research project at the Norwegian University of Science and Technology. Tiles IoT Cards can be downloaded under MIT License.

Product development for the Internet of Things (IoT) is often pushed by advances in technology rather than human needs. We want to keep human drives at the center of IoT development by involving end-users into creative ideation and prototyping of novel products.



The Tiles project develops a methodology and a set of tools to accelerate collaborative learning, ideation and prototyping for the IoT.

## UNIT-4

### 2 marks questions

1. Define Agile.
2. Explain Technology-Mediation and its Types.
3. Discuss virtual collaboration.
4. Define Scrum Team and Product Owner

### 10 marks questions:

1. Explain virtual collaboration and its characteristics in detail.
2. Discuss about the Importance of communication in Decision Thinking.

## UNIT-5

### 5 Design thinking for service design

#### 1.1 How To Design a Service

Service design is all about taking a service and making it meet the user's and customer's needs for that service. It can be used to improve an existing service or to create a new service from scratch. In order to adapt to service design, a UX designer will need to understand the basic principles of service design thinking and be able to focus on them when creating services. When it comes to service design - it can help to remember that "A design isn't finished until somebody is using it." Brenda Laurel, designer at MIT.

##### Step 1: Align Vision and Goal

- This step is the starting point of a service design process. It decides how the service fits into the strategy of the company.
- A project may run too far ahead of the company due to ambitious working and innovations, and comparing them with the company's vision statement and core goals can help the project team realign the service with the company's desired outcomes.
- Here is how you can align a service with the company's image and values: Situate a product or service in the overall vision statement of the company.
- Think of ways how designing a service supports the company's goals in the best possible manner.

##### Step 2: Brainstorm

- The next step is to place a creative and hard working team to sustain this vision and provide it a common space to work together, brainstorm and share ideas.
- Coming with ideas is easy and hundreds of ideas can be generated in very little time; however, execution tests the practicality of an idea. Solid, workable, and practical ideas tend to get buried under the rubble of the mediocre ones.

### **Step 3: Conduct a Market Analysis**

- Before a new service is launched or an improvement is being made in the existing one, extensive research needs to be done to situate the service in a context.

### **Step 4: Identify Barriers and Limitations**

This is one of important steps of the service design process as it helps you put your ambitious ideas into the realistic realm.

Allow all team members to critically evaluate their own ideas and of others and identify weaknesses and kinks and iron them out.

### **Step 5: Establish a User Profile/Personas**

Develop different types of fictitious personas or user profiles of your users.

Think about what your users do; where do they live; what do they do, etc; and endow them character traits accordingly.

### **Step 6: Prototype and Test**

You can test prototypes of a service on your employees as well as engage a few real users. Here is how you should go about it: Create mockups to create something as close as possible to the real environment. Define the contact points at which the users will come across your service. Develop a stepwise procedure of how they will interact with your service.

### **Step 7: Evaluate Users' Experience**

. Gather insights from the users about the service features that made the users happy and created moments of delight for them.

Inquire the users about the service features, which they found off putting.

### **Step 8: Get Feedback, Improve the Service, & Evolve**

The Evolution step is the final phase of the service design process that is from conceptualization towards recommendation. Service Design is a cyclic process and means gathering feedback and feeding it forward.

## **5.2 PRINCIPLES OF SERVICE DESIGN**

**The general principles of service design are:**

- Services should be designed based on a genuine comprehension of the purpose of the service, the demand for the service and the ability of the service provider to deliver that service.
- Services should be designed based on customer needs rather than the internal needs of the business.
- Services should be designed to deliver a unified and efficient system rather than component-by-component which can lead to poor overall service performance.
- Services should be designed based on creating value for users and customers and to be as efficient as possible.
- Services should be designed on the understanding that special events (those that cause variation in general processes) will be treated as common events (and processes designed to accommodate them)
- Services should always be designed with input from the users of the service.
- Services can and should be prototyped before being developed in full.
- Services must be designed in conjunction with a clear business case and model.
- Services should be developed as a minimum viable service (MVS) and then deployed. They can then be iterated and improved to add additional value based on user/customer feedback.
- Services should be designed and delivered in collaboration with all relevant stakeholders .

## **5.3 BENEFITS OF SERVICE DESIGN**

Service Design ensures that the service actually gets used by users in the intended way and creates positive experiences, thus minimizing the need for costly and lengthy customer services. Engaging in a service design process benefits an organization in several ways:

**1. Improves Sales:** The application of the service design structure helps a business to understand the customers' needs, demands and expectations, and create solutions in accordance to them. Customers' positive interaction with the product or service means their retention and ultimately greater success and profitability for the business.

**2.creates Loyalty:** The ultimate challenge for businesses in today's competition driven era is not just attracting new clients but also retaining them in the long run. With availability of a wide range of service options, customers can switch services and brands very easily and thus are spoilt for choice. So enterprises have to look for ways to make their service or product distinct from their competition. Service design allows businesses to understand what customers are looking for and expecting from a service. They can then make their offerings adaptable and better suited to those needs. This vintage point can help them stand apart from their competition and retain their customers' loyalty.

#### **Strengthen the Brand and Identity:**

The service design approach allows enterprises to strengthen their brand. The service design process helps service managers to progress from the known to the unknown. It consists of the basic and yet critical evaluation of how the new envisaged product or service fits into the overall image and objectives of the company.

Thus, the process helps an organization to stay true to its image and reaffirm its brand and stop it from steering away from its core values and objectives while offering a new service. Service design puts a brand to work, unlock its hidden potentials, and create and deliver value to the customers.

#### **Reduce Redundancies:**

Envisioning the whole cycle of the service design process allows companies to take a bird's eye view of their service and remove duplicative segments. It helps managers pinpoint where services might be converging or overlapping and it can help them straighten them out before hand.

This way inconsistencies and ambiguities can be discovered within the process on and can be rectified. The process of elimination of redundancies conserves energy, improves staff's efficiency and reduces costs.

### **Improve Efficiency:**

Creative and imaginative steps involved in the service design process help firms improving the efficiency of their employees and procedures. It helps in elimination of wastage and allows team members to pinpoint areas where there is a resource drain or a bottleneck.

Service design blueprints help businesses locate problematic areas and potential failure points and rectify them before hand. Engaging teams in the service design procedure allows them to envision the bigger picture and situate their role in it.

It helps them understand why change and innovation is necessary in what they are offering and how they are offering it

## **5.4 SERVICE BLUEPRINT**

### **What is service blue print?**

A service blueprint is an operational planning tool that provides guidance on how a service will be provided, specifying the physical evidence, staff actions, and support systems infrastructure needed to deliver the service across its different channels.

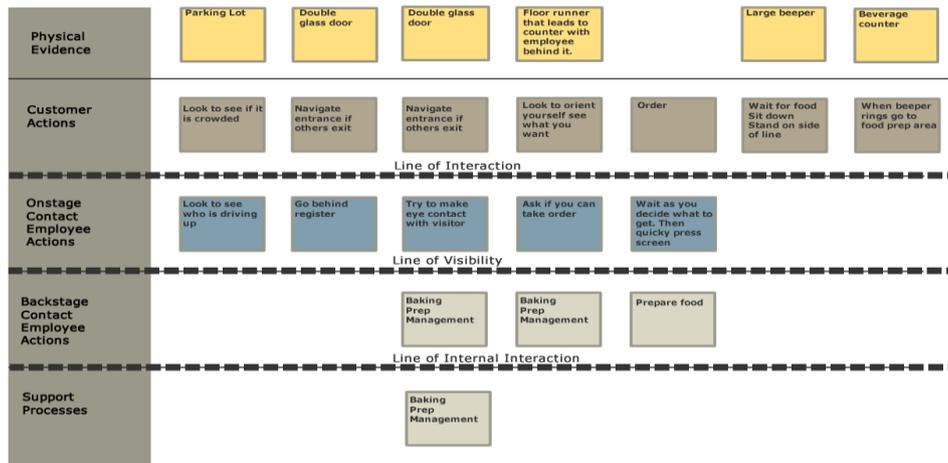
For example, to plan how you will loan devices to users, a service blueprint would help determine how this would happen at a service desk, what kinds of maintenance and support activities were needed behind the scenes, how users would learn about what's available, how it would be checked in and out, and by what means users would be trained on how to use the device.

Service Blueprints may take different forms – some more graphic than others but should show the different means/channels through which services are delivered and show the physical evidence of the service, front line staff actions, behind the scene staff actions, and support systems.

They are completed using an iterative process – taking a first pass that considers findings from personas, journey maps, and location planning and then coming back to the blueprint to refine it over time.

Often blueprints raise questions that cannot be readily answered and so need to be prototyped; for instance by acting out an interaction or mocking up a product.

## Service Blueprint | Panera Bread



## 5.5 DESIGN STRATEGY

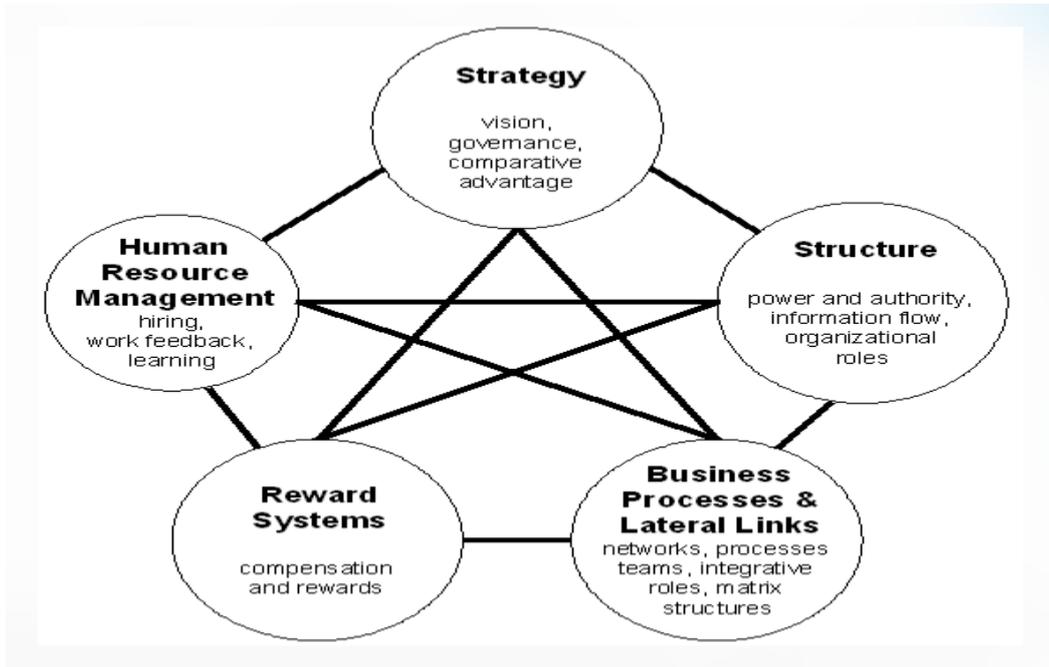
### What is design strategy?

**Design strategy** is the term used to describe the nexus between corporate strategy and design thinking.

**Corporate strategy** is the traditional method that businesses and other similar entities use to identify, plan, and achieve their long term objectives and goals.

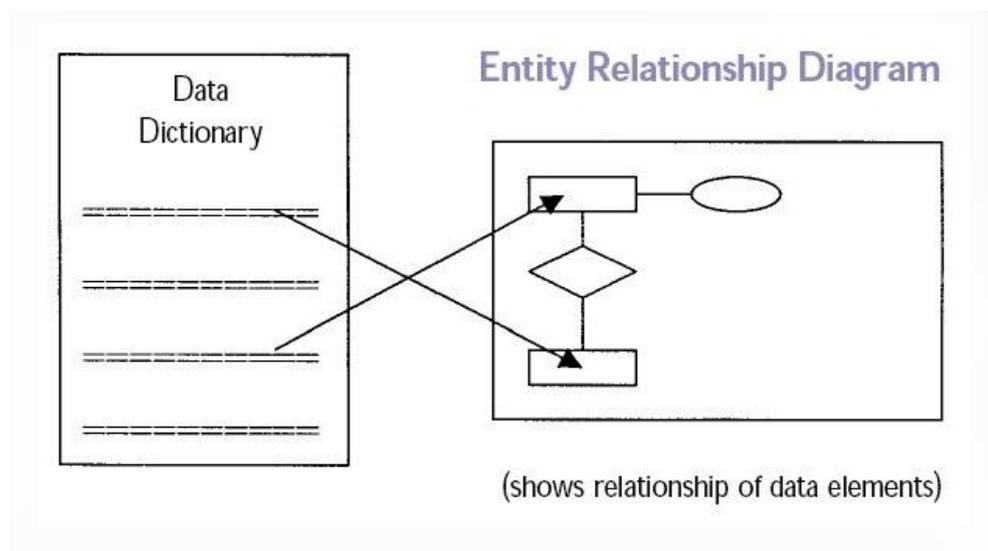
**Design Thinking** is a methodology that provides a solution-based approach to solving problems by engaging the end-users. As in war and business, we need a way to put a strategy into effect, and that requires a methodology, a framework, a roadmap, and a way of thinking.

In order to implement a design strategy, it requires a **strategic thinking mindset**.



## 5.6 PRINCIPLES FOR INFORMATION DESIGN

- Information flow is key to delivering high quality services; if people don't know what they're supposed to and when they're supposed to know it – service suffers. These are simple principles for information design in service design:
- Data shall be normalized between the organization and its customers and within the organization itself.
- Data shall be easy to transfer and be reusable within the organization and within the partner network.



## **5.7 PRINCIPLES OF TECHNOLOGY FOR SERVICE DESIGN**

**Technology design principles are used to support the delivery of service. They include:**

- Technology should always be used to enable a service; it should not be the driver of a service.
- Technology should be pulled into a service design rather than pushed into it.
- Technology design is to be flexible enough and agile enough to allow fast modification in the face of changing customer requirements.

## **UNIT-5**

### **2 marks questions**

1. Write a short note on service Blue Print.
2. Define Improve Efficiency.
3. Discuss Design Strategy in brief.

### **10 marks questions**

1. Explain all the Benefits of Service Design in detail.
2. Discuss how to design a service in detail.