

3. IDEA GENERATION (IDEATION)

3.0 INTRODUCTION

Ideation is the ability to form images of things that either are not physically present or have never been conceived or created by others. It is a design process concentrated on idea generation. Mentally it represents a process of “going wide” in terms of concepts and outcomes. It provides both the fuel and the source material for innovative solutions for building prototypes.

Ideas have been the driving force of humanity. From a simple circular wheel carved from rock back in the stone ages to the first airplanes and telephones, innovative ideas have sparked off revolutionary changes in society. Now in this competitive world, ideas have become more important to us than actions. Companies have begun asking designers to generate solutions that meet the needs and desires of the consumer.

Ideation aims to use creativity and innovation to develop better solutions. By expanding the solution space, the design team will be able to look beyond the conventional methods of solving problems in search of finding better, more elegant, and satisfying solutions to problems that affect a user’s experience of a product.

Idea generation techniques meant anyone could participate in creating new ideas. It allowed people to share and build upon existing solutions, to foresee future problems, and essentially, to think big in terms of design. It brought different specializations together to create a more diverse think-tank that can tackle problems from several perspectives.

There are four types of problems (Drucker, 2008).

- 1. Truly Generic:** Truly generic problems are the most common issues that come up within the work environment a person, for instance, choices on how to maintain inventory lists.
- 2. Generic, but Unique for the individual institution:** Some issues seem unique to an individual but are quite generic.
- 3. Truly exceptional, truly unique:** A problem will be truly unique, as unexpected. For example, way parts of Kerala were flooded during the 2019 rains, bringing life in certain areas to a standstill. It was a truly exceptional situation.

4. **Early manifestation of a new generic problem:** There are unique problems that appear frequently slipping into the generic category, for example, the many issues America has with hurricanes lately.

3.1 IDEATE

Ideate is the mode in which radical design alternatives are generated. Ideation is a process of flaring up for a wide range of concepts and outcomes. The goal of ideation is to explore a wide solution space both in terms of a large quantity and broad diversity of ideas. Prototypes can be built and tested with users from this vast repository of ideas. Ideation is leveraged to:

- i. harness the collective perspectives and strengths of the team.
- ii. step beyond obvious solutions and drive innovation.
- iii. uncover unexpected areas of exploration.
- iv. create fluency (volume) and flexibility (variety) in innovation options.

When ideating, the team needs to fluctuate between times of focus and flare. Idea generation is a moment to go wide while evaluation/selection of ideas is a time for narrowing-in.

3.1.1 Ideation Techniques

The following techniques are used in ideation:

- i. Try multiple ideation methods with the team and see which work best.
- ii. Be aware of the less confident people in the team.
- iii. Ideas come easier when people don't fear criticism.
- iv. Ideation sessions should be short, energetic, and fun.
- v. Take a break and try something else, if ideas start to dry up.

3.2 HOW IDEATION CAN HELP

Ideation can help by the following

- Ask the right questions and innovate
- Step beyond the obvious solutions and therefore increase the innovation potential of your solution.
- Bring together the perspectives and strengths of 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.

With a systematic approach, the designers need not rely on coming up with a good idea at the right moment. Solutions can be systematically elaborated using relevant techniques.

3.3 IDEA GENERATION TECHNIQUES (IDEATION)

There are a large number of ideation methods

3.3.1 Conventional Methods

a) Information Gathering

For designers, access to state-of-the-art information is essential. Designers use a variety of collection techniques. Information and data repositories, along with methods used to search and process the data. The internet enables a more effective and efficient collection of information. The following are sources for information gathering.

- searching the literature
- analyzing trade publications
- surveying the presentations from exhibitions and fairs
- assessing the catalogues of competitors
- exploring patents, etc.

b) Analysis of Natural Systems

- Nature can stimulate the creative imagination of designers in a host of different ways.
- The study of natural forms, structures, organisms, and processes can lead to very useful and novel technical solutions.
- The connections between biology and technology are investigated by bionics and biomechanics.

c) Analysis of Existing Technical Systems

The analysis of existing technical systems is one of the most important means of generating new or improved solution variants in a step-by-step manner.

Existing systems used for analysis might include:

- products or production methods from competing companies
- older products and production methods from one's own company
- similar products or assemblies in which some subfunctions or parts of the function structure correspond to those for which a solution is being sought.

d) Analogies

An analogy is a comparison in which an idea or a thing is compared to another thing that is quite different from it. It aims at explaining that idea or thing by comparing it to something familiar.

Some commonly used analogy examples in everyday conversation are:

- i. Just as a sword is the weapon of a warrior, a pen is the weapon of a writer.
- ii. How a doctor diagnoses diseases is like how a detective investigates crimes.

Besides helping in the search for solutions, analogies are also helpful in the study of the behavior of a system during the early stages of its development using simulation and model techniques, and in the subsequent identification of essential new subsolutions and the introduction of early optimizations.

e) Measurements and Model Tests

Measurements on existing systems are an important source of information. Model tests are conducted by similarity analyses (dimensional analyses) and other experimental studies that give useful information.

In the precision engineering and mass production industries, including those where micromechanisms and electronic products are developed, experimental investigations are an important and established means of arriving at solutions.

3.4 INTUITIVE METHODS

Designers often seek and discover solutions for difficult problems by intuition (i.e.) solutions that come to them in a flash after a period of search and reflection. These solutions suddenly appear as conscious thoughts and often their origins cannot be traced. As Galtung of the International Peace Research Institute in Oslo has put it: "*The good idea is not discovered or undiscovered; it comes, it happens*". It is then developed, modified, and amended until it leads to the solution of the problem.

Good ideas are always scrutinized by the subconscious or preconscious in the light of expert knowledge, experience, and the task in hand.

Often the simple impetus resulting from the association of ideas suffices to force them into consciousness. Many good solutions are born in that way and developed successfully.

Purely intuitive methods have the following disadvantages:

- The right idea does not always come at the right time, since it cannot be forced.
- Current conventions and personal prejudices may inhibit original developments.
- Because of inadequate information, new technologies or procedures may fail to reach the consciousness of the designer.

There are several methods of encouraging intuition and opening new paths by the association of ideas and some of these methods are discussed below.

3.4.1 Brainstorming

Brainstorming can be described as a method of generating a flood of new ideas. A group of open-minded people from as many different spheres of life as possible bring up, without prejudice, any thoughts that occur to them and thus trigger off new ideas in the minds of the other participants. Brainstorming relies strongly on stimulation of the memory and on the association of ideas that have never been considered in the current context or have never been allowed to reach consciousness.

For maximum effect, brainstorming sessions should be run along the following lines:

a) Composition of the Group

- The group should have a leader and consist of a minimum of five and a maximum of 15 people. Fewer than five constitute a spectrum of opinion and experience that is too small and hence produce too few stimuli. With more than 15, close collaboration may decline because of individual passivity and withdrawal.
- The group must not be confined to experts. As many fields and activities as possible must be represented. The involvement of nontechnical members adds a rich new dimension.
- The group should not be hierarchically structured but, if possible, made up of equals to prevent the censoring of such thoughts as might offend superiors or subordinates.

b) Leadership of the Group

- The leader of the group should only take the initiative when dealing with organizational problems (invitation, composition, duration, and evaluation). Before the actual brainstorming session, the leader must outline the problem and, during the session, must see to it that the rules are observed and, in particular, that the atmosphere remains free and easy. To that end, the leader should start the session by expressing a few absurd ideas, or mentioning an example from another brainstorming session, but should never lead in the expression of ideas. On the other hand, the flow of new ideas should be encouraged whenever the productivity of the group slackens. The leader must ensure that no one criticizes the ideas of other participants, and should appoint one or two members to take minutes.

c) Procedure

- All participants must try to shed their intellectual inhibitions; that is, they should avoid rejecting as absurd, false, embarrassing, stupid, well-known, or redundant any ideas expressed spontaneously by themselves or by other members of the group.

No participant should criticize any ideas that are brought up, and everyone must refrain from using such killer phrases as “we’ve heard it all before”, “it can’t be done”, “it will never work” and “this has nothing to do with the problem”.

- New ideas will be taken up by the other participants, who may change and develop them at will. It is also useful to combine several ideas into new proposals.
- All ideas should be written down, sketched out, or recorded.
- All suggestions should be concrete enough to allow the emergence of specific solution ideas.
- The practicability of the suggestions should be ignored at first.
- A session should not generally last for more than 30 to 45 minutes. Experience has shown that longer sessions produce nothing new and lead to unnecessary repetitions. It is better to make a fresh start with new ideas or with other participants later.

d) Evaluation

- The results should be reviewed by experts to find potential solution elements. If possible, these should be classified and graded in the order of feasibility and then developed further.
- The final result should be reviewed with the entire group to avoid possible misunderstandings or one-sided interpretations on the part of the experts. New and more advanced ideas may well be expressed or developed during such a review session.

e) Conditions for brainstorming

- No practical solution principle has been discovered.
- The physical process underlying a possible solution has not yet been identified.
- There is a general feeling that deadlock has been reached.
- A radical departure from the conventional approach is required.

Brainstorming is also useful in the solution of subproblems arising in known or existing systems. It has a beneficial side-effect: all of the participants are supplied with new data, or at least with fresh ideas on possible procedures, applications, materials, combinations, etc. because the group represents a broad spectrum of opinion and expertise (for instance, designers, production engineers, salespersons, materials experts, and end-users). It is astonishing what abundance and range of ideas such a group can generate. The designers will remember the ideas brought up during brainstorming sessions on many future occasions. Brainstorming triggers off new lines of thought, stimulates interest, and represents a break in the normal routine.

However, it is stressed that no miracles to be expected from brainstorming sessions. Most of the ideas expressed may not be technically or economically feasible, and those that may often be familiar to the experts. Brainstorming is meant first of all to trigger off new ideas, but it cannot be expected to produce ready-made solutions because problems are generally too complex and too difficult to be solved by spontaneous ideas alone. However, if a session should produce one or two useful new ideas or even some hints in what direction to go looking for the solution, it will have achieved a great deal.

3.4.2 Method 635

Brainstorming has been developed into Method 635 by Rohrbach. After familiarising themselves with the task, and after careful analysis, each of six participants is asked to write down three rough solutions in the form of keywords. After some time, the solutions are handed to each participant's neighbor who, after reading the previous suggestions, enters three further solutions or developments. This process is continued until each original set of three solutions has been completed or developed through association by the five other participants, hence the name of the method.

Method 635 has the following advantages over Brainstorming:

- A good idea can be developed more systematically.
- It is possible to follow the development of an idea and to determine more or less reliably who originated the successful solution principle, which might prove advisable for legal reasons.

- The problem of group leadership rarely arises.

The method has the following disadvantage:

- Reduced creativity by the individual participants owing to the isolation, and lack of stimulation in the absence of overt group activity.

3.4.3 Gallery Method

The Gallery Method developed by Hell Fritz combines individual work with group work and is particularly suitable for any stage of the design process where resolution proposals can be expressed in the form of sketches or drawings. The organization and team-building are similar to Brainstorming. The method consists of the following steps.

Introduction Step: The group leader presents the problem and explains the context.

Idea Generation Step 1: For 15 minutes the individual group members create solutions intuitively and without prejudice using sketches supported, where necessary, by text.

Association Step: The results from idea generation step 1 are hung on a wall as in an art gallery so that all group members can see and discuss them. The purpose of this 15-minute association step is to find new ideas or to identify complementary or improved proposals through negation and reappraisal.

Idea Generation Step 2: The ideas and insights from the association step are further developed individually by each of the group members.

Selection Step: All ideas generated are reviewed, classified and, if necessary, finalized. Promising solutions are then selected. It is also possible to identify potential solution characteristics that can be developed later using a discursive method.

The Gallery Method has the following advantages:

- Intuitive group working takes place without unduly lengthy discussions.
- An effective exchange of ideas using sketches is possible.
- Individual contributions can be identified.
- Documentary records are easily assessed and stored.

3.4.4 Delphi Method

In this method, experts in a particular field are asked for written opinions.

The requests take the following form:

First Round: What starting points for solving the given problem do you suggest? Please make spontaneous suggestions.

Second Round: Here is a list of various starting points for solving the given problem.

Please go through this list and make what further suggestions occur to you.

Third Round: Here is the final evaluation of the first two rounds. Please go through the list and write down what suggestions you consider most practicable.

This elaborate procedure must be planned very carefully and is usually confined to general problems bearing on fundamental questions or company policy. In the field of engineering design, the Delphi Method should be reserved for fundamental studies of long-term developments.

3.4.5 Synectics

The method was first proposed by Gordon. Synectics is a word derived from Greek and it refers to the activity of combining various and independent concepts. Synectics is comparable to Brainstorming, with the difference that it aims to trigger off fruitful ideas with the help of analogies from non-technical or semi-technical fields.

The synectics study helped to investigate the creative process while it is in progress. It is more systematic than Brainstorming, with its arbitrary flow of ideas. However, both methods call for complete frankness and lack of inhibition or criticism. The three key assumptions associated with synectics research are:

- It is possible to describe and teach the creative process
- Invention process in sciences and the arts are analogous and triggered by the very same “psychic” process
- Group and individual creativity are analogous

A synectics group should consist of no more than seven members, otherwise, the ideas expressed will run away with themselves. The leader of the group has the additional

task of helping the group to develop the proposed analogies by guiding them through the following steps:

- Presentation of the problem.
- Familiarisation with the problem (analysis).
- Grasping the problem.
- Rejection of familiar assumptions with the help of analogies drawn from otherspheres.
- Analysis of one of the analogies.
- Comparison of the analogy with the existing problem.
- Development of a new idea from that comparison.
- Development of a possible solution.

If the result is unsatisfactory, the process may have to be repeated with a different analogy.

3.4.6 SCAMPER

SCAMPER is an idea generation technique that utilizes action verbs as stimuli. It is a well-known kind of checklist developed by Bob Eberle that assists the person in coming up with ideas either for modifications that can be made on an existing product or for making a new product. SCAMPER is an acronym with each letter standing for an action verb which in turn stands for a prompt for creative ideas.

S – Substitute

C – Combine

A – Adapt

M – Modify

P – Put to another use

E – Eliminate

R – Reverse

3.4.7 Mindmapping (Tony Buzan, UK, Use your Head, 1972)

Mindmapping is a graphical technique for imagining connections between various pieces of information or ideas. Each fact or idea is written down and then connected

by curves or lines to its minor or major (previous or following) fact or idea, thus building a web of relationships. Mind mapping is utilized in brainstorming, project planning, problem-solving, and note-taking. As is the case with other mapping methods, the intention behind brain mapping too is to capture attention and to gain and frame information to enable the sharing of concepts and ideas.

To get started with mind-mapping, the participant just has to write a key phrase or word in the middle of the page. Then, he must write anything else that comes to his mind on the very same page. After that, he must try to make connections as mentioned in the previous paragraph.

3.4.8 Daydreaming

Though mostly not met with approval, daydreaming is truly one of the most fundamental ways to trigger great ideas. The word “daydream” itself involuntarily triggers an uninhibited and playful thought process, incorporating the participant’s creativity and resourcefulness to play around with the present problem. It enables a person to establish an emotional connection with the problem, which is beneficial in terms of coming up with a wonderful idea. The focus of productive daydreaming is a particular goal irrespective of whether it seems to be an impractical task. Plenty of famous inventors have engaged in daydreaming in the past, thereby setting off ideas that contributed to life-altering inventions. The airplane is the most notable example of this. If the Wright brothers had not let their imagination run wild thinking about the flight, we would probably still be traveling by ferry.

3.4.9 Attribute Listing and Morphological Analysis

This is an analytical approach to identify new combinations of inventions, services, or structures by identifying methods of improvement. To improve a product the physical attributes of each component within the product are noted down, every function of the component is described and examined to check if changing it will improve or damage the product.

Morphological analysis is similar to forced relationships, allowing combinations not just with the individual components of the product, but with other components from

different products. These techniques have been particularly successful in creating new technologies.

3.4.10 Forced Relationships

It is a simple method of combining unrelated ideas to come up with something new. While it is not a strictly unique solution, it often results in a variety of combinations that are often useful to society. Currently, there are a vast number of products born out of forced relationships. For example a cell phone with a camera, calculator, torch, stopwatch, e-mail, and internet browser; a digital watch which includes a calculator or an mp3 player; the Swiss army knife; birthday cards with musical tunes, etc.

3.4.11 Reverse Thinking

As the term ‘reverse thinking’ itself suggests, instead of adopting the logical, normal manner of looking at a challenge, you reverse it and think about opposite ideas. For example: ‘how can I double my fan base?’ can change into ‘how do I make sure I have no fans at all?’ You may notice that the majority of participants would find it easier to produce ideas for the ‘negative challenge’ simply because it is much more fun. However, don’t spend too much time on the reverse idea-generation. About 10 to 15 wrong ideas are fine. After one session is over, you can either continue in the reverse idea atmosphere with a new challenge or else do the reversal once more to make it stronger. An example of the latter is “I am never going to update any of my social networks” changing into “I am going to always update all of my social networks.”

3.4.12 Brainwriting

Brainwriting is easy. Instead of asking the participants to shout out ideas, they are told to pen down their ideas about a specific problem or question on sheets of paper, for a small number of minutes. After that, each participant can pass their ideas over to someone else. This someone else reads the ideas on the paper and adds some new ones. Following another few minutes, the individual participants are again made to pass their papers to someone else and so on the process continues. After about 15

minutes, you or someone else can collect the sheets from them and post them for instant discussion.

3.4.13 Storyboarding

Storyboarding has to do with developing a visual story to explain or explore. Storyboards can help creative people represent the information they gained during research. Pictures quotes from the user and other pertinent information are fixed on the cork board, or any comparable surface, to stand for a scenario and to assist with comprehending the relationships between various ideas.

3.4.14 Challenging Assumptions

The majority of industries have an orthodoxy – unspoken but deeply-held beliefs that everyone stands by for getting things done. Sadly, they fail to realize that by questioning assumptions at every step of service or product development, they can enable the birth of fresh possibilities and ideas.

Here is one suggestion to go about questioning assumptions: The participants should start by settling on the framework for the creative challenge. After this, they should produce 20 to 30 assumptions (irrespective of whether they are true or false). The next step is to select several assumptions from the many generated, and utilize them as idea triggers and thought starters to engender fresh ideas.

3.5 SELECT IDEAS FROM IDEATION METHODS

Once the Ideation session is complete, the ideas must be collected, categorized, refined, and narrowed down, so that the team can select the best solutions, ideas, and strategies from a shortlist. The following methods can help to select the best idea at the end of an Ideation session

3.5.1 Post-it Voting or Dot Voting

Post-it Voting



Fig. 3.1 Post-it Voting

Source: Teo Yu Siang, Interaction Design Foundation, interaction-design.org

In post-it voting, shown in Fig. 3.1 all members are given a number of votes (three to four) to choose their favorite ideas. Ideas that are generated in the Ideation sessions are written down on individual post-its, and members can vote by using stickers or a marker to make a dot on the post-it note corresponding to the ideas they like. This process allows every member to have an equal say in choosing from the shortlisted ideas. The following are best practices in Post-it Voting.

- Write all the ideas which have been generated in the ideation session down on individual Post-its.
- Give all participants a number of votes (around three to four should do) to choose and write down their favorite ideas.
- Participants vote by using stickers or simply using a marker to make a dot on the ideas they like.
- Use variations in color to let participants vote on which ideas they like the most or which they dislike the most.
- Invent other voting attributes when it makes sense.
- This process allows every member to have an equal say in the shortlisted ideas.

3.5.2 Four Categories Method



Fig. 3.2 Four Categories Method

Source: Teo Yu Siang, Interaction Design Foundation, interaction-design.org

The four categories method is shown in Fig. 3.2 involves dividing ideas according to their relative abstractness, ranging from the most rational choice to the 'long shot' choice. The four categories are the rational choice, the most likely to delight, the darling, and the long shot. Members then decide upon one or two ideas for each of these categories. This method ensures that the team covers all grounds, from the most practical to those ideas with the most potential to deliver innovative solutions.

3.5.3 Bingo Selection



Fig. 3.3 Bingo Selection

Source: Teo Yu Siang, Interaction Design Foundation, interaction-design.org

The Bingo selection method as shown in Fig. 3.3 inspires members to divide ideas. However, in this method, contributors are encouraged to split ideas according to a

variety of form factors, such as their potential application in a physical prototype, a digital prototype, and an experience prototype.

3.5.4 Affinity Diagram

Affinity Diagrams

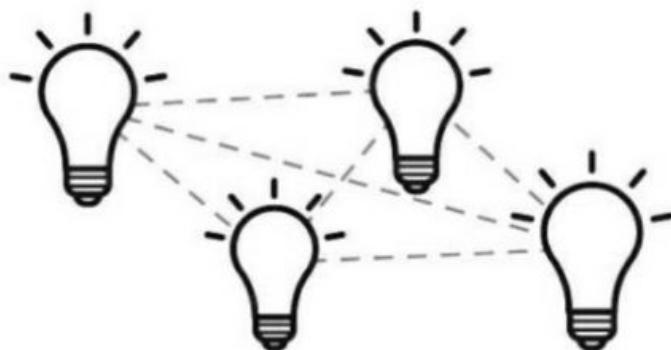


Fig. 3.4 Affinity Diagrams

Source: Teo Yu Siang, Interaction Design Foundation, interaction-design.org

The Affinity Diagram as shown in Fig. 3.4 is a method that can help you gather large amounts of data and organize them into groups or themes based on their relationships. The affinity process is great for grouping data gathered during research or ideas generated during Brainstorms.

The method is also called “Space Saturate and Group”. The term “saturate” relates to the method in which everyone covers or saturates the “space” with images and notes, to create a wall of information, to inform, and start “grouping” the following problem-defining process. Then connections can be drawn between these individual elements to join the dots and develop new and deeper insights. They will help define the problem(s) and develop potential ideas for solutions. In other words, we go from analysis to synthesis.

Affinity Diagrams can help to bundle and cluster large bodies of information, facts, ethnographic research, ideas from brainstorms, user opinions, user needs, insights, design issues, etc. This method will help to name, rank, and understand relations between groups of information. For this reason, this method is also known as “Space Saturate and Group” (d.school). This is a great method that can, create an overview

and synthesise of findings if followed the step-by-step process. It is important that you remember to sum up the major insights, user needs, pain points, gaps, etc. Once it is done, you can focus on translating what is organized and understood and put it into practice.

3.5.5 Now Wow How Matrix

At some point in the ideation sessions, a critical mass of ideas might have been reached, and it will become unproductive to attempt to keep pushing for more. This is referred to as the ‘convergent stage’ where ideas are evaluated, compared, ranked, clustered, and even ignored in an attempt to pull together a few great ideas to act on. Right now, the aim is spotting potential winners, or combinations of winning attributes, from a number of ideas.

The Now Wow How Matrix as shown in Fig. 3.5 will help to apply the idea criteria which are right for the current design challenge. These methods will help to work through the pile of ideas that are generated and select the best ones, to start prototyping and testing.

Best practice: Now Wow How

- The facilitator should encourage the participants to split ideas according to a variety of form factors, such as their potential applications in:
 - **Now:** ideas that can be implemented immediately but which lack novelty.
 - **Wow:** ideas that can be implemented and are innovative.
 - **How:** ideas that could possibly be implemented in the future.
- Now Wow How Matrix (2×2) should contain two axes, with the vertical representing difficulty of implementation and the horizontal axis representing the degree of innovation. On the 2×2 grid formed, the three categories are located at the bottom left (now), bottom right (wow), and top right (how), with the top left block left blank to represent ideas that are impossible to implement. It provides an easy-to-follow formula for evaluating the viability of ideas as well as their innovativeness.

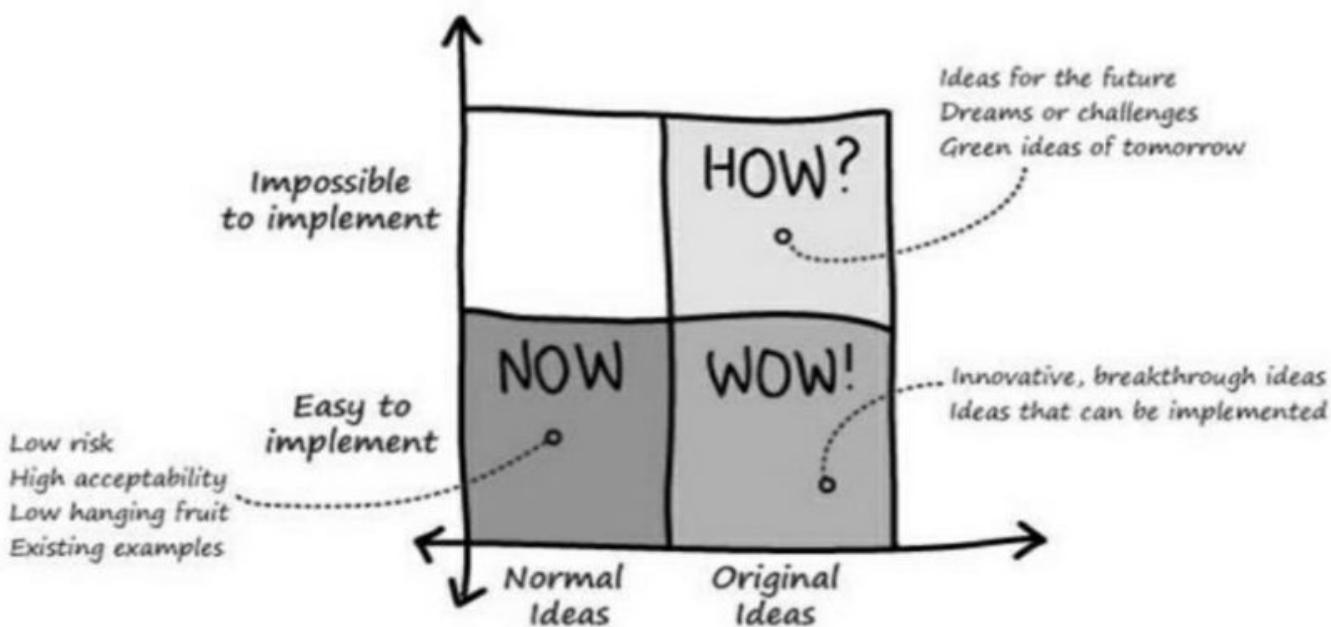


Fig. 3.5 Now Wow How Matrix

Preparation:

1. Draw a 2-by-2 matrix as above. The X-axis denotes the originality of the idea and the Y-axis shows the ease of implementation.
2. Label the quadrants as:
 - i. **Now/Blue Ideas – Normal ideas, easy to implement.** These are typically low-hanging fruit and solutions to fill existing gaps in processes. These normally result in incremental benefits.
 - ii. **How/Yellow Ideas – Original ideas, impossible to implement.** These are breakthrough ideas in terms of impact, but absolutely impossible to implement right now given current technology/budget constraints.
 - iii. **Wow/Green Ideas – Original ideas, easy to implement.** ‘Wow’ ideas are those with potential for orbit-shifting change and possible to implement within current reality.

How to Play:

1. List down the ideas that emerge from the creative ideation phase on large charts of paper stuck around the room.
2. Give each player 3 sticky dots of each color – that is, 3 blue, 3 yellow, 3 green. 9 dots per person is typical, but go ahead and reduce/increase that number based on the time at hand and the number of ideas generated.
3. Ask each player to step forward and vote for 3 best ideas in each category. They need to do this by sticking a colored dot in front of each idea they choose.
4. In the end, count the number of dots under each idea to categorize it. The highest number of dots of a certain color categorizes the idea under that color.
5. In case of a tie:
 - i. If blue dots = green dots, the idea is blue
 - ii. If yellow dots = green dots, the idea is green
6. From the bucket of Now/Green ideas to work on further. Make sure you also collect the low-hanging blue ideas for immediate implementation and the yellow ideas to keep an eye on for the future.

3.5.6 Six Thinking Hats

Six Thinking Hats (Edward de Bono) technique is an extremely useful way to debate an issue, solve a problem or to arrive at an important decision. The technique encourages a group to approach the issue at hand from all possible angles.

About the technique

During a meeting, it is often the case that people use different thinking processes, which can make it difficult for a meaningful discussion to take place. For example, if someone wants to put forward a new idea when someone else is still thinking about the practicalities of the last idea, they will not listen properly to each other.

To resolve this situation, de Bono suggests that everyone thinks about the same issues at the same time, by putting on six different metaphorical hats. Each hat has a different color, and represents a particular type of thought process, as shown below:

1. White Hat



Thought process: Information gathering

The white hat helps a group to think about how information can help them tackle a particular issue.

Questions to ask when using the white hat can include:

- What information do we have about the issue, e.g. reports, feedback, etc?
- What does it tell us?
- What information do we lack?
- What information would we like to have?
- How are we going to get it?

2. Red Hat



Thought process: Feelings, intuition, and emotions

The red hat allows everyone in the group to express their feelings, without having to offer a rational explanation, e.g:

- 'I just don't think that idea will work.'
- 'I have a good feeling about doing it this way.'
- 'I've got a hunch that demand for this product is about to fall.'

Red hat thinking can also be used to encourage the group to think about how others, e.g. customers, might feel about a particular course of action.

3. Black Hat



Thought process: Caution, criticism, and assessing risks

The black hat is the hat of logic and critical judgment (although it should never be seen as the negative hat).

Black hat thinking encourages a group to consider any weak points in an idea or solution and to work out how to avoid or counter them.

While the black hat can be the most useful of the six hats, one hat to be careful against its overuse, as this can kill creative ideas and positive thinking.

4. Yellow Hat



Thought process: Benefits and feasibility

The yellow hat is optimistic but logical. It allows the group to consider the benefits of a new idea or a particular decision, and how feasible this would be.

Yellow hat thinking is useful in helping a group to see the bright side when they are feeling negative or despondent about an issue, and to view any creative ideas in a rational light.

5. Green Hat



Thought process: Creativity, new ideas and possibilities

The green hat is the hat of creativity and is designed to encourage a group to seek new approaches and innovative solutions. Every idea, however ‘way out’ should be heard and not criticized at this stage.

Questions to ask can include:

- Is there a new way we could do this?
- What about approaching the issue from the opposite viewpoint?
- Are there any alternatives we haven't yet considered?

6. Blue Hat



Thought process: Process control

The blue hat represents the whole thinking process. It is normally used by the chairperson or person who has arranged the meeting or discussion. By using the blue hat, the chairperson can organize and control the thinking process to make the discussion as productive as possible.

The chairperson can use the blue hat to direct the group towards another type of thinking. For example, if the group is running out of ideas, they may suggest the group returns to some creative green hat thinking. They may also respond to participants' suggestions to change hats.

Putting the technique into practice

1. When you have an issue or problem to discuss, print out the colored hats (these can be found in Supplementary Resources and attach each to a separate sheet of flipchart paper, then pin them up around the room before your meeting or discussion. Alternatively, you may ask the group to suggest what issue they would like to explore when you meet.
2. Start the session by explaining that the Six Hats technique is designed to encourage everyone to approach a problem or issue from a variety of different perspectives.
3. Starting with the red hat, discuss the issue at hand, by asking the group to move around the room, 'wearing' each hat in order. When the group runs out of ideas and the discussion tails off, move on to the next hat. You may

allow the group to move back and forward between hats if necessary, but it is important to make sure that each hat is used.

4. You or someone else in the group should adopt the blue hat, in order to facilitate the meeting, and ensure that everyone is ‘wearing’ the same hat at the same time. This person should also capture all the group’s ideas and thinking on the appropriate flipchart sheet when ‘wearing’ each different hat.
5. At the end of your session, agree on actions with the group and assign activities as appropriate.

Benefits of the Six Thinking Hats technique

Because the technique allows an issue or problem to be examined from each angle in turn, no single view (or person) is allowed to dominate a meeting or group discussion. Ideas, decisions, and solutions that are reached using the Six Thinking Hats method should, therefore, be more robust and effective than they might otherwise have been. The technique also encourages participants to approach any future issues or problems they encounter more holistically.

Although most commonly used by a group, the Six Thinking Hats technique can also be used effectively by any individual who wishes to take a rounded approach to issues and problems.

3.6 PERSONA

Personas are fictional characters created based upon research in an organization in order to represent the different user types that might use a company service, product, site, or brand in a similar way.

The purpose of creating personas is to have reliable and realistic representations of key audience segments for reference. These representations should be based on qualitative and some quantitative user research and web analytics. Personas are only as good as the research behind them. Personas are vital to the success of a product because they drive design decisions by taking common user needs and bringing them to the forefront of planning before the design has started. Personas provide the team with a shared understanding of users in terms of goals and capabilities.

3.6.1 How to create a Persona?

Step 1: Data observations

In the first step, study the data gathered in user interviews. Note down the most essential insights, primarily problems associated with the stakeholder point of view should also be accounted for when working with a client. A Persona should also reflect business goals. Both, user needs and business interests are crucial in creating a balanced and successful Persona.

When time or money is not available to interview target users, it is possible to create Persona based on the stakeholder insight and competitor analysis. Competitive products may be studied carefully on social media and the kind of people interacting with these products. The most common difficulties faced by many are:

- i. It is hard to define the goals of the product.
- ii. We don't have any process to kick off a new project.
- iii. I tried to conduct research once, but I didn't know where to start.

Step 2: Identify patterns

From data gathered for analysis, it is necessary to identify trends and observe if any overlap emerges naturally. In this process, it is necessary to understand that different groups of people have a novel approach to the problem.

Step 3: Create a Persona

The Persona may consist of the following elements. Depending on the situations elements can be increased:

- i. Photo
- ii. Name
- iii. Description
- iv. Users
- v. Problems

Let us take a closer look at each of them.

- i. *Photo:* Personas have to be named and an image uploaded representing them. It will help to build their virtual identity and will be easily

recognizable by the team. The persona can be emphasizing with different age and outlook attached to this Persona.

- ii. *Name:* Each Persona should have a unique name. It helps to bring Persona to discussion or any other research material.
- iii. *Description:* Personas are described with the background of a fictional character, as well as their current desires. What is the primary motivation for using a service or tool? It should consist of the goals and the desired outcome of the user actions.
- iv. *Problems:* Every Persona represents different problems. Add all of them to this section to have a summary of the personal struggle. Try to fill users' column first.

Step 4: Share

Persona has no value if it is not distributed well within the organization. All team members should be familiar with primary Personas. It will help to update with the main problems for target users and how they differ within disparate groups.

The most important thing to remember when creating Personas is to never box in your user. They are multi-faceted, emotional human beings who believe that you are worthy enough of their time. Treat them as sacred.

3.7 SUPPORT OF INFORMATION SYSTEM FOR DESIGN

Understanding how an information system can provide support in the design process requires a sufficient understanding of how design thinking occurs in this process. The theories in building information system are

- i) the intensive interaction between designer and design context
- ii) the reflective, “learning-while-doing”

In learning-while-doing, designers build up knowledge in direct reference to concrete experiences. This knowledge is often referred to as “a designerly way of knowing.” Designers make design decisions in newly encountered design contexts based on this kind of knowledge. The designers continuously modify or adjust their designerly way of knowing.

3.7.1 Theories of Design Thinking

A number of theories of design thinking exist. The theories that are related to the actual reasoning processes of the designer, and design representations and guiding principles in the design are:

i) Reasoning in Design

Saw differences between the thinking processes of architects (closer to “imagining”) and of engineers (closer to “reasoning”). Reasoning in this case is considered more purposive and directed toward a particular conclusion, whereas imagining is said to draw from an individual’s own experiences, combining material in a relatively unstructured and perhaps aimless way. Lawson considered the control of the delicate balance between rational and imaginative thought as one of the most important skills of a designer.

A second characteristic of reasoning in design is given by Donald Schön. He characterizes design thinking as a sense-making process, in which the designer “must make sense of an uncertain situation that initially makes no sense.” This type of reasoning process can be distinguished from more “traditional” reasoning processes, in which problems are typically represented as well-confined and fixed givens, and one merely has to select the most appropriate method available to get to a solution.

ii) Design Representations and Guiding Principles

Two elements are crucial in the sense-making process of designers:

- a) what designers experience at design time (task environment/target patterns)
- b) what designers have already experienced before (background knowledge/base patterns).

Both elements are also considered central in the notion of a “design problem space.”

iii) A Reasoning- and Principal-Based Design Process

From the investigation of existing theories, a possible outline of the design process can be constructed. As displayed in the outline in Fig. 3.6, the design process proceeds by making analogies between encountered situations in the physical world and guiding principles in the human mind. The resulting analogies can be considered the designer's interpretations of encountered situations. By making an analogy, the designer generates hypotheses and predicts that the rest of the familiar pattern also applies to the encountered situation. In other words, new knowledge is created by the analogy. The designer finally tests the prediction made, thereby creating a new situation or experience that either confirms or refutes the original analogy.

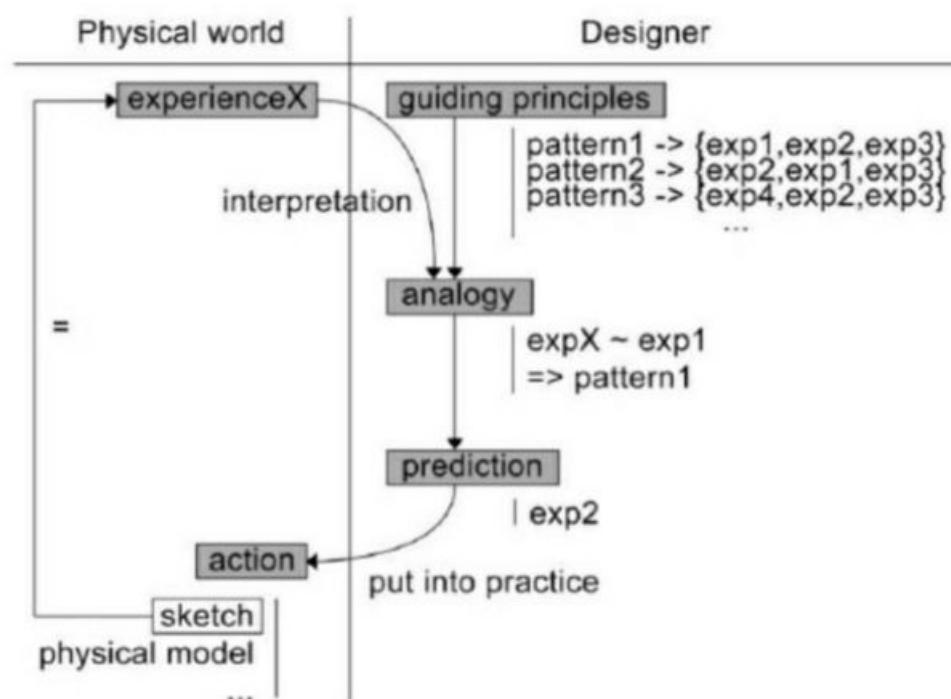


Fig. 3.6 Possible Outline of the Design Process

3.8 ANALYSIS OF INFORMATION SYSTEM SUPPORT FOR DESIGN THINKING

The main causes of the apparent mismatch between information system support and design thinking processes are:

- i) applications as surrogates for reasoning modes
- ii) applications as tools for experimenting

iii) applications as autonomous reasoning agents.

3.8.1 Surrogates of Reasoning Modes

Applications that might be understood as surrogates for the abductive reasoning mode in architectural design thinking are applications that supposedly create useful analogies between descriptions of a given situation and situations in memory. This process is the main driver behind the retrieval phase of case-based reasoning (CBR) applications. In CBR applications, new “cases” are compared with a large collection of “known cases” to find a solution to a problem by analogy. This approach is indeed very similar to the experience-based nature of architectural design thinking. The main issue in realizing such an experience-based retrieval system is the structure used to describe the cases or experiences.

Applications that might be understood as surrogates for the deductive reasoning part of the architectural design thinking process are simulation and calculation environments. As suggested, the application logic of such environments is typically written beforehand and can be considered relatively static. A calculation result is obtained based on this application logic and some user input (e.g., a CAD model).

Applications that might be understood as surrogates for the inductive reasoning part of architectural design thinking— as described are modeling applications. Such applications enable the production of visual design tryouts in far more diverse ways than is traditionally the case.

3.8.2 Tools for Experimenting

An alternate possibility is to consider each of the outlined information systems or applications as nothing more than parts of the physical world with which designers interact. In this approach, applications are similar to other elements in the physical world, and interaction with the applications occurs similarly to the interaction with sketches, diagrams, and drawings.

3.8.3 Autonomous Reasoning Agents

In this application development approach, the information structure is completely dynamic: it evolves step by step through every single observation or experiment made

by the reasoning agent. Combining the diverse reasoning modes in a continuous cyclical process, instead of focusing on each of these reasoning modes separately, theoretically allows for the development of an information system that can make hypotheses, make predictions, devise experiments, and learn—all based on the observations and experiments the system continuously goes through.

This kind of support would be completely different from any traditional kind of support currently provided by information systems. The reasoning system would evolve into an independent agent reasoning about a design situation, and it would thus not directly interfere with the reasoning processes of the human designer. The main support it could give to a human would presumably be similar to the support any designer gives to any other designer, namely, by simple dialogue and discussion of design alternatives, from which both generate their own interpretations and start their own reasoning processes.

3.9 DOODLING

Doodling is to scribble or draw aimlessly and to play or improvise idly. Thinking of the mind in different directions surface thoughts take shape as doodles. Doodling maps the wandering of the mind in planning a new venture, worry about money, etc.

Doodles are spontaneous uncensored thinking scribbled quickly and can take many forms, from abstract patterns or designs to images of concrete objects. These marks are far being the mindless scribbles of a distracted mind. Doodling has cognitive and emotional benefits. Studies have shown doodling is not a sign of a distracted brain. It is a useful tool for a brain that is trying to stay focused. Doodling keeps the brain connected enough to the task at hand.

3.9.1 Benefits of Doodling

i) *Doodling Helps to Concentrate*

Psychologist Jackie Andrade of the University of Plymouth in southern England showed that, after a lecture or a meeting, those who doodled remembered more information than the non-doodlers. In the study, Andrade separated 40 participants into two groups of 20 each. All 40 participants had just finished an unrelated psychological experiment, and they were tired and

wanted to go home. However, they were asked to spend five more minutes on another experiment.

As part of this additional experiment, they were asked to listen to a 2½-minute voicemail in which the speaker rambled on about several different topics, and also spoke about a birthday party and who was invited. The voicemail was extremely boring and monotonous, by design.

Twenty of the experiment participants were asked to quickly shade in some little squares and circles on a piece of paper while they listened. The other 20 did not doodle. All the participants were asked to write down the names of those coming to the party as they listened to the voicemail. This meant that the doodlers were switching between doodling and writing down the names of the guests.

Afterward, the papers were removed and the 40 volunteers were asked to recall the names of the people attending the party, as well as some of the other information included in the voicemail. The doodlers recalled 7.5 pieces of information (out of 16 total) on average, which was 29% more than the average of 5.8 recalled by the non-doodlers. In other words, doodling helps to concentrate.

Andrade theorizes that doodling helps to concentrate because it requires enough cognitive effort to keep from daydreaming, and yet not enough to prevent from paying attention to what is going on around you. In other words, one of the benefits of doodling is that it helps to anchor attention and stay engaged instead of zoning out.

ii) Doodling Can Help Spur Creative Insight

According to Sunni Brown, author of “*The Doodle Revolution: Unlock the Power to Think Differently*”, doodling is thought to stimulate areas of the brain which normally remain dormant when you’re just in linguistic mode. This can help you to analyze information differently.

According to Brown, when you doodle “you are lighting up different networks in the brain” and “engaging different information”. This can lead to “ah-ha”

moments when the solution to a problem you've been struggling with suddenly becomes evident.

Brown's professional work includes training company managers to translate ideas and concepts into doodles—or visual language—in order to spark ideas and improve communication.

Doodling is thinking in pictures. The next time you are stuck on a problem, try expressing the problem as a doodle and notice what ideas pop up into your mind.

iii) Doodling Can Help Process Emotions.

Emerging studies show that art expression may help individuals reconnect thinking and feeling. While journaling is a great way to get in touch with your thoughts and feelings, you can get even better results if you add doodles to your journal entries. After all, doodles can help you to recognize and express your emotions.

iv) Doodling Alleviates Stress.

In a study, all adults are encouraged to get a coloring book. But coloring books aren't just for fun. The stress-busting benefits of coloring books have been proven to calm the amygdala, the part of the brain that controls our fight or flight response.

However, doodling might be even better than coloring books for getting stress under control because of its simplicity.

Psychologist, Christine Selby in his book *Chilling Out: The Psychology of Relaxation* recommends drawing a continuous line across the page that curves and crosses itself many times as a technique to help unwind. Different colors can be used to fill in the blank spaces created by the lines.

The repetitive motion of moving the pen across the page making the same shape over and over again is relaxing. In addition, a lot of stress comes from the fear of making a mistake and drawing a continuous line and shading in wherever the mood strikes you, there are no mistakes.

v) Doodling Can Be A Creative Outlet.

Creativity is proven to boost relaxation, happiness, and even problem-solving skills. However, few of us have a creative outlet that we engage inconsistently. Doodling is the answer to this dilemma. It can be done anywhere and at any time, and all needed is a piece of paper and a pen. While looking for a simple creative outlet without a steep learning curve, start doodling for five minutes a day. Doodling is fun and can be very satisfying.

vi) Doodling Can Help Learn Better

The concepts of focused thinking and diffused thinking are important for effective learning. Focused thinking, as the name implies, it is concentrating on the information that one is trying to learn, analyze, or understand. Diffused thinking, on the other hand, is a more relaxed thinking state after the brain settles into a resting. It allows for the subconscious incubation of ideas and information. After a while of focusing intently on a subject trying to learn, sit back with a pen and paper and relax the mind i.e., enter the diffused mode of thinking: by doodling learning will be better.

In addition, doodling helps to concentrate. If the mind is wandering during a lecture, start doodling in the margins of notes to bring back the mind to the attention sweet-spot to get back to concentration to listen to the lecture, and learn.

vii) Doodling Helps Big-Picture Thinking.

Philosopher, Jesse Prinz, a professor at the City University of New York, explains that too much focus on something makes one overthink. This can lead to a focus on details that aren't particularly important and miss the big picture. Think of the saying, "miss the forest for the trees".

Doodles tend to focus on the overarching ideas and concepts, which is paramount to big-picture thinking. When one feels drowning in details, stop for a moment, and create a doodle that represents the topic working on to regain perspective.

3.9.2 How to Start Doodling?

One of the best things about doodling is how easy it is to do. Doodling can be started known how to draw are stick figures. All the benefits of doodling can be got even if doodles are “ugly”.

Fig. 3.7 shows 12 basic shapes to start doodling as fast as possible. The shapes consist of dots, lines, angles, spirals, and triangles. It’s a visual alphabet, which will allow us to draw anything.



Fig 3.7 Basic shapes for doodling

If there is a difficulty to draw their shapes, stencils can be used. These shapes can be traced and their doodles can be drawn inside or outside the stencil shapes.

3.10 INFORMATION SYSTEM FOR DESIGN

Understanding how an information system can provide support in the design process requires a sufficient understanding of how design thinking occurs in this process. The theories in building information system are

- i. the intensive interaction between designer and design context
- ii. the reflective, “learning-while-doing”. learning-while-doing, designers build up knowledge indirect reference to concrete experiences. This knowledge is often referred to as “a designerly way of knowing.” Designers make design decisions in newly encountered design contexts based on this kind of knowledge. The designers continuously modify or adjust their designerly way of knowing.

3.10.1 Theories of Design Thinking

A number of theories of Design Thinking exist. The theories that are related to the actual reasoning processes of the designer, and to design representations and guiding principles in the design are:

i) Reasoning in Design

Analogical reasoning often occurs between a new design-related experience (e.g., a building, sketch, 3D model, conversation, etc.) and a previous design experience. In the very act of sketching, analogical reasoning is critical because it allows reinterpreting or “seeing as”. In “seeing as,” the designer reinterprets the sketch and adds new and unique meaning to it, thereby generating new ideas. There is a difference between the thinking processes of architects (closer to “imagining”) and of engineers (closer to “reasoning”). Reasoning in this case is considered more purposive and directed toward a particular conclusion, whereas imagining is said to draw from an individual’s own experiences, combining material in a relatively unstructured and perhaps aimless way. The control of the delicate balance between rational and imaginative thought is one of the most important skills of a designer. The second characteristic of reasoning in design thinking is a sense-making process, in which the designer “must make sense of an uncertain situation that initially makes no sense” Donald Schon. This type of reasoning process can be distinguished from more “traditional” reasoning processes, in which problems are typically represented as well-confined and fixed givens, and one merely has to select the most appropriate method available to get to a solution.

ii) Design Representations and Guiding Principles

Two elements are crucial in the sense-making process of designers: (a) what designers experience at the time of design (task environment/ target patterns)? and (b) what designers have already experienced before (background knowledge/base patterns)? Both elements are also considered central in the notion of a “design problem space”.

iii) Reasoning for Point-Based Design (PBD)

Thinking and reasoning in engineering use vocabulary. The three classes of reasoning are (i) deductive, (ii) inductive, and (iii) abductive. What separates these three types of reasoning is

- a) information regarding grounds (design variables, V)
- b) requirements (design knowledge, K)
- c) conclusions (design specification, S)

Specifications are given or derived. Table 3.1 summarises each type of reasoning in terms of V,K, and S.

Table 3.1 Reasoning types in terms of design variables, knowledge, and specifications

	Given	Derived
Deductive	V, K	S
Inductive	V, S	K
Abductive	K, S	V

In general, PBD follows the path of deductive reasoning. The study of the methods and current knowledge leads to design specifications that eventually help in the development of a product. The need to derive S,K, or V to inform design decisions prompts the use of a specific technique Fig. 3.8 explains the steps in Point-Based Design.



Fig. 3.8 Point-Based Design decision making timelines

REVISION QUESTIONS

1. What is an Ideation?
2. What is an Ideate?
3. What are the Ideation techniques?
4. Explain intuitive methods for Idea Generation?
5. How does Brainstorming work?
6. Explain Method 635 of the idea.
7. Discuss Gallery Method.
8. Explain Delphi Method.
9. What is SCAMPER?
10. How does Mind Mapping work?
11. What is Daydreaming? Explain.
12. Explain Brain Writing.
13. What is Story Boarding?
14. What is Dot Voting?
15. Explain Affinity Diagram?
16. What is Now Wow How Matrix? Explain.
17. Explain Six Thinking hats in the selection of ideas.
18. What is Persona?
19. How do you create a Persona?
20. What is Doodling?
21. What are the benefits of Doodling?
22. How an information system can support design?
23. What are the theories of Design Thinking?
24. Describe the surrogate of reasoning modes.
25. What are autonomous agents?

DESIGN PROBLEMS FOR PRACTICE

1. A company makes a widget market. Use brainstorming ideas for specifications, features, and production methods.
(Widget (GUI), a control element in a graphical user interface. An element of interaction, such as a button or scrollbar)
2. A company wants to start a Social-Local-Mobile-Food business in four major cities in India.
Use the reference on the web and make six hats table and create a storyboard to illustrate all roots of business ideas.
3. A company wants to start garments washing business in a metropolitan city in India. Use now Wow How Matrix to get ideas for implementation (www.sessionlab.com)
4. Take the example of Jackie Andrade (Reference Section 3.7.1), identify a group of students, and experiment to make your observations on the benefits of Doodling.
5. A Smart Phone Manufacturing wants to expand its business to India. Empty a Persona to access the market share and develop a business strategy.
6. A company has approached for designing a battery operated bicycle. Gather information, analyze various factors, and come out with a design proposal.

ACTIVITY

1. A city to be planned as a smart city.
 - i) Form the Persona as a team and 15 such teams.
 - ii) Brainstorm various considerations for a smart city and list out as a report
2. For the same activity in the above problem, use 635 methods for Idea Generation and make a report.
3. For the same activity in the problem1, use synectics for Idea Generation and make a report.

4. Identify a problem by the group use the Post-it Voting method to find a solution for the problem.
5. Look at the YouTube, for Now, Wow How matrix. For problem 4 suggest a solution by Now Wow How matrix method.
6. Students have decided to participate in a flycar design competition. Use the Six Thinking Hats method to make your proposal with details in stage 1.
7. Create a Persona for your hostel mess issues and come with a solution to improve the messing.
8. It is proposed to compile information on India's independence. With the aid of Doodling, identify the contents for the information gathering.

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