**Design Thinking Principles for Innovation, NQF Level 4, Credits 1**

**LEARNER GUIDE**

|  |  |
| --- | --- |
| **Module #** | 251201-005-00-KM-12: |
| **NQF Level** | level 4 |
| **Notional hours** | 10 |
| **Credit(s)** | Cr 1 |
| **Occupational Code** | 900101-000-00-00 |
| **SAQA QUAL ID** | SP-220328 |
| **Qualification Title** | Technopreneur |

**CONTACT INFORMATION:**

|  |  |
| --- | --- |
| **Name** |  |
| **Contact Address** |  |
| **Telephone (H)** |  |
| **Telephone (W)** |  |
| **Cellular** |  |

**Note to the learner**

This Learner Guide provides a comprehensive overview of the module. It is designed to improve the skills and knowledge of learners, and thus enabling them to effectively and efficiently complete specific tasks.

**Purpose**

The main focus of the learning in this knowledge module is to acquire mathematical thinking theory for solving problems and acquire basic maths knowledge for use during data analytics

**Topic elements to be covered include**

The learning will enable learners to demonstrate an understanding of:

* KM-12-KT01 Introduction to design thinking
* KM-12-KT02 The human element
* KM-12-KT03 Creativity
* KM-12-KT04 Innovation
* KM-12-KT05 Design
* KM-12-KT06 Design thinking methodology
* KM-12-KT07 Application of design thinking

**Entry Requirements**

NQF 4

**Provider Accreditation Requirements for the Knowledge Module**

**Physical Requirements:**

* The provider must have lesson plans and structured learning material or provide learners with access to structured learning material that addresses all the topics in all the knowledge modules as well as the applied knowledge in the practical skills
* QCTO/ MICT SETA requirements

**Human Resource Requirements:**

* Lecturer/learner ratio of 1:20 (Maximum)
* Qualification of lecturer (SME):
* NQF 6 in industry recognised qualifications with 1 year’s experience in the IT industry
* AI vendor certification (where applicable)
* Assessors and moderators: accredited by the MICT SETA

**Legal Requirements:**

* Legal (product) licences to use the software for learning and training (where applicable)
* OHS compliance certificate
* Ethical clearance (where necessary)

**Exemptions**

* No exemptions, but the module can be achieved in full through a normal RPL process

**Venue, Date and Time:**

Consult your facilitator should there be any changes to the venue, date and/or time.

Refer to your timetable

**Assessments**

The only way to establish whether you are competent and have accomplished the learning outcomes is through continuous assessments. This assessment process involves interpreting evidence about your ability to perform certain tasks. You will be required to perform certain procedures and tasks during the training programmer and will be assessed on them to certify your competence.

This module includes assessments in the form of self-evaluations/activities and exercises. The exercises, activities and self-assessments will be done in pairs, groups or on your own. These exercises/activities or self-assessments (Learner workbook) must be handed to the facilitator. It will be added to your portfolio of evidence, which will be proof signed by your facilitator that you have successfully performed these tasks.

Listen carefully to the instructions of the facilitator and do the given activities in the time given to you.

# SECTION 1: KM-12-KT01 : Introduction to design thinking

**Learning Outcome**

Topic elements to be covered include:

• KT0101 Philosophy

• KT0102 Approach and concepts

• KT0103 Definitions and terminology

• KT0104 History

**• KT0101 Philosophy**

Design thinking is a way of thinking based on thought and philosophy of respect for customers and begins with researching customers without considering business or technological goals.

Introducing design thinking into business is easy and also challenging.

It's like learning a language. Especially in the case of foreign languages with similar words and grammars, people are quick to acquire early despite being a foreign language. However, it is said that foreign language that is easy to learn at first is difficult to speak perfectly. It's not scientifically verified, but I think it's probably due to the precise meaning of the initial learning ease. In other words, when learning a foreign language that is familiar, the learner 's satisfaction of the meaning communication is high, and the learner becomes lazy to the learning which improves the accuracy, and it becomes a habit when it is hardened,

I think the introduction and application of design thinking is similar. The process and methods of design thinking are designed to be customer-oriented, so that people who are new to it feel that it is not too difficult, and some methods are similar to existing social science research methods or ideas, It seems that the ideology and purpose of In the companies that introduced it, there is no accurate delivery of the idea and purpose of design thinking, so the field manager is fostered and the design thinking approach by them becomes a vicious cycle which is not different from existing innovation. If this pattern is repeated, you will have a question about the effect of design thinking in the business.

Typical examples of design thinking being used in the workplace are found in the often frequent design thinking workshops. What do people from business and engineering departments think about workshops? Perhaps the impression of a design thinking workshop is a type of brainstorming idea? It's a very interesting way to go.

Whichever course of the Design Thinking Workshop goes, whatever the format, the beginning of the process should always start with empathy with the customers, especially with the customer's empathy. And that empathy can only be possible after the project team members have achieved the difficult and tough problem of building customer insights. What does it mean to empathize with customers and find out insights through them? This is to emphasize that the design thinking approach, where customer research is not well-understood, that is, the deep understanding of the customer has not been realized, is difficult to achieve true innovation.

So,If a company truly desires to continue its business activities to ensure sustainable and competitive survival through the introduction of design thinking, you should invest enough in design research to deeply research your customers.

The difference in innovation performance through design thinking is not how much creative and competent talent they have, but how well they understand and agree with their customers and how well they are supported.

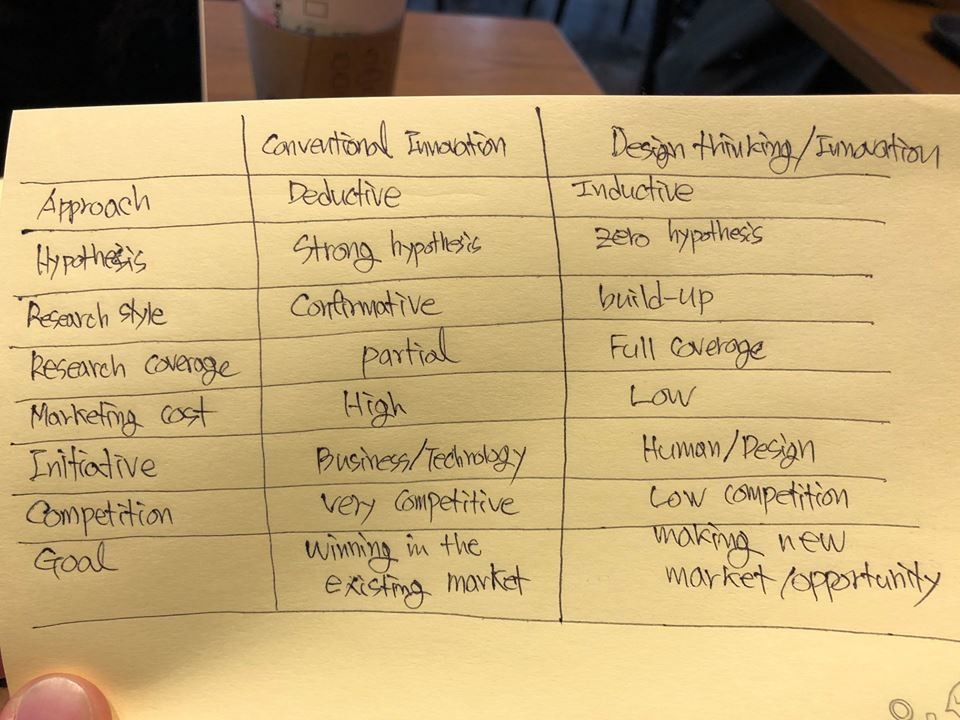


Photo # 1. I have compared the characteristics of a traditional innovation approach with a design thinking approach. From a business point of view, investing in design thinking is even more cost-effective to achieve. One thing to keep in mind is that you should not think that design thinking is absolutely a better way for all innovations. Managers should be able to select and combine traditional approaches and design thinking approaches appropriately based on business objectives and customer characteristics.



Photo # 2. It is a charity marketing campaign. It's like a traditional innovation approach. They are concentrating on persuading the pedestrians with the hypothesis that the contents of the campaign proposed by the group are good for the participants. Of course, as you all know, the participation of passers-by is not high. How about solving this from the perspective of design thinking? If you look at it from the point of view of empathy with those who want to participate in this campaign, what should you design? What value can you provide to increase voluntary participation?



Photo # 3. It's a sophisticated food serving system in a food court. When ordering, handing out the mobile device and tagging this mobile device to the receiver device on the table, the employee finds out where the customer is sitting and serves the ordered food. People who have experienced crowded food courts can think of it as a very good solution. Perhaps this system will cost a lot of psychological costs for your customers to understand and familiarize themselves with. How can you naturally apply this system to your customers' food court use behavior?

+ The introduction of proper design thinking is the way to maximize the cost efficiency of your company. Do not be frugal your investment on that. In comparison to investing in business or technology, only very little capital is invested.

++ Design thinking is a philosophy that leads to innovation in the company based on a thorough understanding of customers. Innovation can not be accomplished without paying attention to your customers.

+++ Your customers have very low endurance. They do not listen to a value statement about your wonderful invention. You have to make a short and strong triggers by design thinking.

**• KT0102 Approach and concepts**

The Design Thinking Process typically comprises 5 parts that are generally done in the following order, where iteration between steps and critiques of step-outputs are implied:

1. **Empathize** with people experiencing the problem, to gain insights
2. **Define** the problem in human-centric ways
3. **Ideate** human-centered solutions
4. **Prototype** potential solutions early and often to learn quickly and gain new understanding
5. **Test** solutions with real customers/users to gain new insights about the solution and the problem

Importantly, the insights gained from Step 5 (testing) naturally lead to restarting the process with Step 1 in a continued cycle where new insights are sought on how well the proposed solution fits into the lives of those for whom it was designed. Those insights eventually result in revisions to the design.

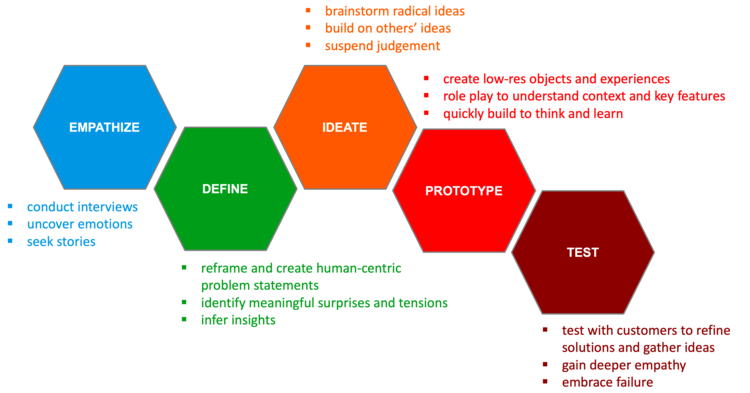


Figure 1: The classic design thinking process graphic, adapted from Stanford’s d.school Executive Education. There is no significance to the shape or the color. Iteration and critique are implied throughout.

**Brief Overview of Design Thinking as Mindset**

While it is useful and easy to imagine Design Thinking as a process with design activities, most people who practice Design Thinking don’t need a specific process or benefit significantly from having one. This is because -- for them -- Design Thinking is a specific mindset, outlook, and pattern of thought that already drives their actions. Those actions are centered on the creation and testing of new objects designed to solve a human-centered problem.

The key elements of the Design Thinking mindset are:

1. **Empathy.** The core Design Thinking principle here is that the designer needs to have more than engineering knowledge, or scientific knowledge to solve the problem. They also need to know about the humans who experience the problem and will eventually benefit from the solution [9]. Developing empathy -- or the ability to understand and share the feelings of others -- is a necessary step in serving real people facing real struggles, rather than the hypothetical subjects and problems that are often presented in design problems. When designers have an empathic mindset, they recognize that their own experiences cannot be blindly projected onto other people. Such designers are aware of the biases they bring to the table and work to minimize the effect of those biases by employing a newcomer attitude, where they train themselves to view a situation as someone who has never experienced it before.   
     
   Developing empathy is most likely to happen when designers interact with stakeholders, either actively (e.g., interview) or passively (e.g., observation) -- without an agenda or preconceived idea about what to expect. Agendas and preconceived ideas often lead to unvalidated assumptions about people’s needs, which are seeds for design failure [10]. Such assumptions are dangerous because they can be completely wrong, despite the designer’s best intentions to simplify the problem through assumptions.
2. **Collaboration.** The core Design Thinking principle behind this element is that design problems are too complex for a single designer to have all the knowledge and insight necessary to solve it. Even if the product itself is simple, the human experience and how the solution fits into and affects society is generally not simple. Therefore Design Thinking requires collaboration between multiple people, each of whom bring important knowledge and experience to the design process.  
     
   Designers who employ a collaborative mindset surround themselves with people who are different than they are so that the problem and solution can be viewed from various perspectives. These different perspectives are used to challenge the problem definition and the suitability of the solution. Importantly, such collaboration links back to empathy since one of the important parts of developing empathy is to choose *who* to engage with. Various perspectives and diversity of thought regarding whom you should engage with will generally produce better understanding of others.
3. **Experimentation.** A core Design Thinking principle is that visual or tangible evidence trumps pondering on the suitability of a solution. People with a Design Thinking mindset constantly seek evidence, and are OK using low resolution simple prototypes made early and often to gather that evidence. These prototypes are used to experiment and gain insights as fast as possible. Effective use of Design Thinking accepts that not all pertinent phenomena can be sufficiently modeled mathematically or pondered on simultaneously in one’s mind. Therefore physical prototyping is an effective path to assessing design quality. Said more thoroughly, traditional decomposition methods, which break down a problem into simpler parts, unfortunately removes complex relationships between parts that often make the difference between a feasible design and an excellent one that people truly value. Physical prototyping allows all complex relationships to remain intact – especially the socio-technical relations.

Whether as a process or a mindset, a powerful truth about Design Thinking, and perhaps a driver of its ubiquity, is that anyone can practice Design Thinking without permission from their supervisor.

**When can Design Thinking be applied?**

Design Thinking is not a good strategy for all problems. For example, there are a large number of engineering problems that can be adequately solved using only engineering knowledge -- knowledge about humans is not needed. In such cases, problem definitions and requirements are assumed to be pre-validated, and seeking insights about the human is not needed. These kinds of problems don’t obviously benefit from Design Thinking.

Design Thinking is, however, particularly good for the following kinds of problems:

* Problems people care about (human-centered problems)
* Problems with high uncertainty. For example where it is not clear that the problem definition is right, or where the available data seems wrong, or there is resistance to use it, such as using historical data to predict the future.
* Problems that have historically resisted solutions
* Problems affecting diverse groups of people
* Problems involving shifting markets and behaviors

The UK’s Design Council says “[Design Thinking] is extremely useful in tackling problems that are ill-defined or unknown, by re-framing the problem in human-centric ways, developing ideas, and adopting a practical approach in prototyping and testing. At its best, it is also an iterative and agile process of ongoing experimentation: sketching, prototyping, testing and trying out concepts and ideas”.

**Where did Design Thinking come from?**

As you decide how much to trust Design Thinking as an approach for your toolbox, it is valuable to know that Design Thinking emerged from watching effective innovators, and trying to understand and describe what they were doing differently.

Design as a way of thinking emerged in the late 1960’s with Herbert Simon’s influential book “The Sciences of the Artificial” and Robert McKin’s keen focus on designing for the whole person (not just for ergonomics). Design Thinking concepts made their way into architecture and education before it became an accepted term popularized by Peter Rowe’s book called *Design Thinking*. Electrical Engineer David Kelley of IDEO adopted it into business innovation and played a major role in popularizing the term. Design Thinking is a major tenet of the *IDEO way* and the curriculum in the Stanford Design School, which Kelley helped establish. Design thinking is now a major strategy used by professionals in nearly all fields including product design, mechanical design, web design, architecture, government and other social sectors.

**Concluding Thoughts (followed by exercises)**

As someone interested in design, it is important for you to know about Design Thinking. With the information provided in this article, you now have a basic understanding of what Design Thinking is, where it came from, and when it can be applied. A fundamental truth about Design Thinking is that it’s not enough to just know about it -- it also needs to be practiced. Without practice, the core concepts remain ethereal, and never sink in and become a way of thinking, which is how Design Thinking is most powerful. To practice Design Thinking, consider doing the exercises below. Understand that for Design Thinking to be practiced effectively, a human needs to be a part of your practice. If you’re shy or hesitant to talk to people about what you’re working on, now is the time to break free from that mindset and embrace Design Thinking principles. Those principles take time and energy, but are very likely to lead to a better outcome highly valued by those who need the solution.

**• KT0103 Definitions and terminology**

Design thinking is a non-linear, iterative process that teams use to understand users, challenge assumptions, redefine problems and create innovative solutions to prototype and test. Involving five phases—Empathize, Define, Ideate, Prototype and Test—it is most useful to tackle problems that are ill-defined or unknown.

Design Thinking is as much a way of working as it is a way of thinking. It is a creative and iterative approach to problem-solving. Being highly user-centric, this methodology focuses on understanding a user's needs and creating solutions to meet those needs.

**Design Thinking Mindset**

Having a "Design Thinking Mindset" empowers innovation and facilitates creating the right solutions for the right problems.

Design Thinking is about:

**• Curiosity**- Being curious and looking at things from a different perspective.

**• Empathy** - Understanding the issues faced by the users by putting oneself in their shoes.

**• Collaboration** - Practising collaboration between team members and stakeholders involved in each project.

**• Logic**- Bringing logic to the creative process. It must be understood that being creative does not mean being unstructured.

**• Intuition** - Listening to one's intuition because, at times, as pragmatic as we are, there are instances where our instinct or intuition is telling us something that may be more valuable.

**• Humility** - Never make assumptions about the user or the intended market for the product. Be humble and approach the process step-by-step.

**• Imagination** - Be creative and imagine what is possible in the future.

**• Reframe** - Continuously reframe the problem and solution to not miss out on anything and ensure that everything is in the right direction.

Design Thinking methodology involves FOUR distinct stages – Discover, Define, Develop and Deliver. Collectively, this is known as the 4D Framework.

**4D Framework**



01. Discovery is primary on the list

The discovery stage is about connecting with the user. Being human-centric remains an integral element of every digital innovation. For example, during the discovery stage, which can be conducted in an interview setting, we gain a better understanding of what the user pain points and needs are.

Discovery is also about understanding the market, competition, and other valuable data necessary to create the right product that addresses the *right* problem.

02. The next step is to Define

This next stage is where the process of identifying the right problems and prioritising them takes place. There will be a host of identified problems, so the key is to recognise the one which offers the most value for the user by being solved.

Data analysis is instrumental here. Firms can utilise Abstraction laddering to expand or narrow down product-related matters. The Bull's eye diagramming can also be used to understand emerging issues, while the Problem tree analysis can be tapped to tackle the hierarchy of things.

03. Development is the third step to be accomplished

The development or ideation stage is where all hands are required on deck to come up with as many potential solutions.

Brainstorming is probably the most common process to date since it allows individuals to get their imaginative or artistic side flowing. Another technique to squeeze out that cognitive approach is Sketching, which taps into visualisation to express ideas during rapid sessions.

Another method in getting everyone up and thinking is the Round-robin approach. It allows group members to develop a thought further until the idea becomes bigger and substantial. Instituting ideas and concept posters are also a vital collaborative effort to solve customer needs.

04. The final step is Delivery

A divergence takes place where the aptest solution is agreed on. Once this is decided, the building of the prototypes begins. Prototypes can be in many forms, such as Wireframing schematics. The intent is to make it easy for the user to understand its purpose, among others.

With prototypes or solutions in place, the process then moves on to the testing stage, where feedback is gathered from users. This helps in identifying the specific solution that eliminates concerns and pain points. The Design Thinking approach has been adopted by many reputable and large organisations, helping them create innovative products and solutions that are human-centric and customer-focused.

**• KT0104 History**

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

In his book "Creative Engineering" (1959) Arnold distinguishes four areas of design thinking: (1) novel functionality, i.e. solutions that satisfy a novel need or solutions that satisfy an old need in an entirely new way, (2) higher performance levels of a solution, (3) lower production costs or (4) increased salability. Arnold recommended a balanced approach - product developers should seek opportunities in all four areas of design thinking: "It is rather interesting to look over the developmental history of any product or family of products and try to classify the changes into one of the four areas ... Your group, too, might have gotten into a rut and is inadvertently doing all of your *design thinking* in one area and is missing good bets in other areas.

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

Arnold initiated a long history of design thinking at Stanford University, extending through many others such as Robert McKim and Rolfe Faste, who taught "design thinking as a method of creative action", and continuing with the shift from creative engineering to innovation management in the 2000s. Design thinking was adapted for business purposes by Faste's Stanford colleague David M. Kelley, who founded the design consultancy IDEO in 1991.

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

***Internal Assessment Criteria and Weight***

• IAC0101 Design thinking methodology is understood

***(Weight 15%)***

# SECTION 2: KM-12-KT02 : The human element 10%

**Learning Outcome**

Topic elements to be covered include:

• KT0201 Human centeredness

• KT0202 Human participation

**• KT0201 Human centeredness**

**Human-centered design** (**HCD**, also **human-centred design**, as used in ISO standards) is an approach to problem-solving commonly used in design, management, and engineering frameworks that develops solutions to problems by involving the human perspective in all steps of the problem-solving process. Human involvement typically takes place in observing the problem within context, brainstorming, conceptualizing, developing, and implementing the solution.

*Human-centered design is an approach to interactive systems development that aims to make systems usable and useful by focusing on the users, their needs and requirements, and by applying human factors/ergonomics, and usability knowledge and techniques. This approach enhances effectiveness and efficiency, improves human well-being, user satisfaction, accessibility and sustainability; and counteracts possible adverse effects of use on human health, safety and performance.* ISO 9241-210:2019(E)

Human-centered design builds upon participatory action research by moving beyond participants' involvement and producing solutions to problems rather than solely documenting them. Initial stages usually revolve around immersion, observing, and contextual framing in which innovators immerse themselves with the problem and community. Subsequent stages may then focus on community brainstorming, modeling and prototyping, and implementation in community spaces. Further, human-centered design typically focuses on integrating technology or other useful tools in order to alleviate problems, especially around issues of health. Once the solution is integrated, human-centered design usually employ system usability scales and community feedback in order to determine the success of the solution.

**• KT0202 Human participation**

Humans who participate in research should be treated with respect and should not be subjected to unnecessary risk. That is obvious. Humans who participate in research should know what their participation will entail, should give voluntary, non-coerced consent, and should have the opportunity to withdraw if they wish to stop participating in the research. These requirements entail the ethical concept of respect.

The research that uses human participants should be designed to bring about the maximum benefits for society while causing minimal risk for subjects and society. This embodies the ethical concept of beneficence.

No identifiable group, such as African Americans, Native Americans, Latinos, women, children, or even Caucasian sophomore males, should be exploited by having only that group bear the risks associated with research that would benefit all. On the other hand, none of these groups should be ignored when choosing potential participants for research. These are the elements that comprise the ethical concept of justice.

While it might seem obvious that respect, beneficence, and justice ought serve as the ethical anchors for the development of research projects, it has been through dramatic violations of these standards that federal and institutional rules and regulations regarding research that involves human participation have developed.

Here are the events most often cited in the development of standards for the ethical use of humans in research:

 **The Nuremberg Code**developed in response to experiments conducted on concentration camp prisoners by German doctors during World War II. The Nuremberg Code established the right and the importance of voluntary participation and informed consent.

 **The Declaration of Helsinki** is a statement of recommendations from the World Medical Association in 1964 (amended in 1975, 1983, 1989, and 1996). The declaration established these principles: human research should be based on successful laboratory and animal experimentation and should have importance that outweighs the risk; the investigators must be competent for the intended task; participants should provide informed consent; protocols should be reviewed by an external body to avoid investigator bias.

 **The National Research Act** was passed in 1974 in response to the Tuskegee Syphilis Study. The 40 year long Tuskegee study monitored, but did not treat, 600 African-American men who were infected with syphilis. The National Research Act created the National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research with the charge of developing ethical guidelines for human research.

 **The Belmont Report** was published by that Commission in 1979 and establishes boundaries between medical practice and biomedical research. It also identified respect, beneficence and justice as the ethical principles that should guide human research, and it established guidelines for the selection and consent process of human participants.

 **The Public Health Services Act** of 1985 established and explained the role of Institutional Review Boards in protecting human participation in research.

 **The Common Rule** was adopted in 1991 to provide uniform regulations used by all federal agencies funding research on humans.

Media attention and increased public awareness of individual rights and societal dependency on high quality, ethical research have resulted in broad public discussion and a need for accountability on the part of researchers and institutions and funders that support them.

New technologies such as Human Genome Research, stem cell research and research on cloning have required knowledgeable public participation in the development of public policy, as well as the need for individuals to make new choices. Human participants in research may be asked to participate in studies in which the research results are ambiguous or diagnostically predictive in asymptomatic individuals. How that information should be interpreted and shown is an example of new ethical questions arising from the development of new technology.

***Internal Assessment Criteria and Weight***

• IAC0201 The principles of design thinking is understood

***(Weight 10%)***

# SECTION 3: KM-12-KT03 : Creativity 20%

**Learning Outcome**

Topic elements to be covered include:

• KT0301 Creativity: is unleashing the potential of the mind to conceive new ideas

• KT0302 Perceiving the world in new ways

• KT0303 Find hidden patterns

• KT0304 Make connections between seemingly unrelated phenomena

• KT0305 Generate solutions

• KT0306 Application in the workplace

**• KT0301 Creativity: is unleashing the potential of the mind to conceive new ideas**

Creativity is about unleashing the potential of the mind to conceive new ideas. Those concepts could manifest themselves in any number of ways, but most often, they become something we can see, hear, smell, touch, or taste. Creativity is a phenomenon whereby something new and somehow valuable is formed.

Creativity and innovation go hand in hand. Creativity unleashes the potential of the mind to conceive new ideas. Innovation is the work required to make that idea viable. Often innovation involves introducing change into relatively stable systems. So first you come up with a great idea. And then you take it to market. We are in an unprecedented time. To withstand new market demands and crushing losses, nearly every industry is having to reinvent.

*alphaspirit | Getty Images*



Here are five ways you can rewire your company's well-worn pathways to jump-start creativity and innovate to become part of the change.

**1. Boost creativity**

When preparing to innovate, creativity comes first. Creativity allows you to brainstorm new ways of thinking and doing. You can boost your brain's creativity with games, playfulness, and — did you know this one? — being around water in nature. Being near water in nature, such as a lake or an ocean, has been shown to lengthen brain waves and put us into a state of resting neocortex. This also happens when we take a break, daydream or find some quiet. These elements are important precursors to creativity. When you're stuck, take a break, enjoy a shower, play a board game. See what insights are sparked when you give your thinking brain a rest.

**2. Find inspiration**

Look at other groups who are innovating. It doesn't have to be in your industry. In fact, watching how other industries solve problems is fascinating research that can spark similar action in yours. Are there research universities in your town publishing new findings? What businesses are currently *opening* around you and what new needs do they serve? Don't be afraid to encourage your teams to let personal creative time inspire, as well. I love to bake, and my daughter has enjoyed learning, as I learned from my mom. When we take the downtime to bake together, I get inspired by new recipes, new dietary parameters that affect ingredients we can use, and the chemistry that shows me where I can push the limits and have to follow the rules. I also get inspired by my teen daughter's developing mind and the joy I feel inventing with her. When I head back to work, I'm invigorated with new ways of thinking, relating and engaging new ideas into existing systems.

**3. Invest in a sprint process**

To help yourself and your company break out of old patterns, invest in a sprint process. Jake Knapp's book *Sprint: How to Solve Big Problems and Test New Ideas in Just Five Days* gives you tools to lead short-burst creativity sessions. The accompanying website supports the process with the tools necessary to run a remote sprint. I encourage you to roll it out in every function in your company. This modality works again and again.

**4. Be willing to fail**

True innovation requires breaking some glass, so give yourself permission to test a few options to find the best ideas. Consider FAIL to mean yourFirst Attempt In Learning.

This may be a challenge since typically we do our best every day to succeed. So try some new things with your company or team and fail together on the way to innovation. Consider challenging each team member to come up with four new ideas, at least three of which will fail. Give the event a set number of weeks and book a conference call at the end of each week to compare efforts and results. Give fun awards for the most spectacular fails and the most creative efforts. Integrate conversations along the way into the innovation process. Watch how the space to try and the space to fail open new ways to think about possibilities.

**• KT0302 Perceiving the world in new ways**

What is your perception about design thinking?

Design thinking is **thinking in variety and in new semantic and material combinations**. To think about the possibilities, the designer needs to liberate himself from routines of perception. This liberation is the basis for all innovative design.

What is new design thinking?

Design Thinking **allows us to adopt a human-centred perspective in creating innovative solutions while also integrating logic and research**. In order to embrace Design Thinking and innovation, we need to ensure that we have the right mindsets, collaborative teams, and conducive environments.

The problems designers, business owners, and engineers face today are in a whole new level of scale compared to the challenges we’ve faced in the past few decades. In a largely globalised world, where the changes in economic and natural resources can be felt halfway around the globe, our challenges are becoming more intertwined with the systems that connect us all. To solve the new wave of problems we face today and in the future, we need a new kind of thinking, a new approach towards innovation. Design Thinking is a large part of that new approach towards innovation, as it allows people, teams, and organisations to have a human-centred perspective, and yet a scientific approach, towards solving a problem. Tim Brown, CEO of the international design consultancy firm IDEO, makes this point in the introduction of his book, *Change by Design*:

*“A purely technocentric view of innovation is less sustainable now than ever, and a management philosophy based only on selecting from existing strategies is likely to be overwhelmed by new developments at home or abroad. What we need are new choices—new products that balance the needs of individuals and of society as a whole; new ideas that tackle the global challenges of health, poverty, and education; new strategies that result in differences that matter and a sense of purpose that engages everyone affected by them. It is hard to imagine a time when the challenges we faced so vastly exceeded the creative resources we have brought to bear on them.”  
– Tim Brown*

**Which Problems Can Design Thinking Help us Solve?**

One of the first questions people ask when hearing about Design Thinking is, "What is Design Thinking best used for?" Design Thinking is suited to addressing a wide range of challenges and is best used for bringing about innovation within the following contexts.

* Redefining value
* Human-centred innovation

**• KT0303 Find hidden patterns**

The first stage (or mode) of the Design Thinking process involves developing a sense of empathy towards the people you are designing for, to gain insights into what they need, what they want, how they behave, feel, and think, and why they demonstrate such behaviors, feelings, and thoughts when interacting with products in a real-world setting.

To gain empathy towards people, we as design thinkers often observe them in their natural environment passively or engage with them in interviews. Also, as design thinkers, we should try to imagine ourselves in these users’ environment, or stepping into their shoes as the saying goes, in order to gain a deeper understanding of their situations. In the following sections, we will outline some methods from d.school Bootcamp Bootleg that will allow you to gain empathy towards your users.

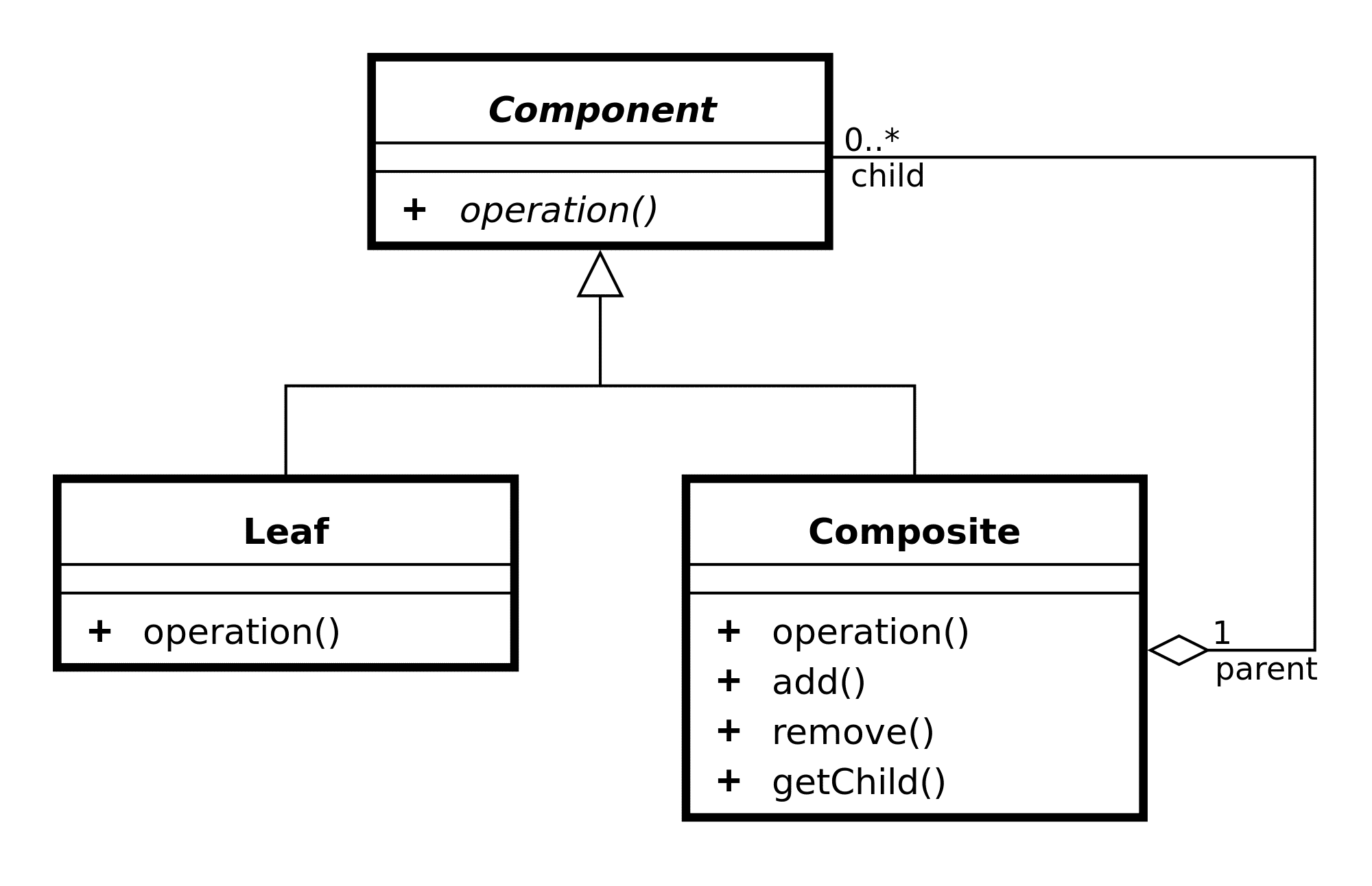
Design is hard work and focusing on solving user and customer problems is the crux of that work. If you can find a tool that keeps that focus whilst eliminating some of the hard work then it’s clearly advantageous to use that tool. That’s where design patterns come in. They save designers from having to reinvent the wheel in their design efforts and allow them to keep focus on solving problems instead.

**What is a Design Pattern?**

A design pattern is simply a reusable idea, design or code structure that has already been optimized for the purpose it is intended for. It is a very common approach in software design and development (though the approach for a software design pattern must be language agnostic and thus implementable on any development project) and in more visual design approaches too (such as UI design or help screen design).

Petrula Vrontikis, the leading designer and design educator says; “Practice safe design: use a concept.” Design patterns are concepts which have been fully fleshed out and are applicable to more than one project.

*Author/Copyright holder: Aaron Rotenberg. Copyright terms and licence: Public Domain.*



*An example of the use of design patterns in software engineering.*

**What Goes Into a Design Pattern?**

How long is a piece of string? It’s one of those questions. Design patterns can be used for so many different applications that there’s no standard for developing a design pattern. In general, the best design patterns act as guides to implementation in any circumstance that the concept may be needed in. That means that software patterns should not be based on code but rather on principles which can be implemented in any language. Graphic design patterns should be detailed enough that they can be quickly adapted to another project but not so detailed that they constrain rapid adaption.

**• KT0304 Make connections between seemingly unrelated phenomena**

**Creativity is characterised by the ability to perceive the world in new ways, to find hidden patterns, to make connections between seemingly unrelated phenomena**, and to generate solutions. Creativity involves two processes: thinking, then producing.

A triumph of human civilization right through the ages, and a key reason for the advances we have made, is they ability to solve problems. In every age however, techniques for problem solving might be a bit different since they are typically based on the body of knowledge, tools and technologies available at that period in time. In the digital age today, one of the problem solving techniques increasingly gaining ground is that of *Design Thinking.*

One way to understand Design Thinking is to consider a few key characteristics that help define it. Many of the characteristics below are well known and in that sense, Design Thinking is not a recent invention but something that has been around for quite some time. Perhaps the digital age is just forcing all of us to re-visit some of these characteristics and best practices, and incorporate them into our day to day problem solving approaches.

**1. Customer / User Context:** Problem Definition & Solution Articulation must necessarily happen in the context of a Customer/User. It's quite surprising how often we struggle to answer the simple questions "Who is our customer?" and "What is the customer's problem?". It is important to leverage tools such as user personas and journey maps for problem definition activities.

**2. Delayed solution articulation:** Avoid getting into solution mode without defining the problem clearly and precisely. I remember a phrase commonly used in the research world: "Defining the problem properly is half the work done". In fact, even in the middle of solution articulation, it often makes sense to spend time to go back and re-define the problem statement.

**3. Focus on practical scenarios and data:** For example, in market sizing, one approach could be to go through analyst reports and try to figure out market size through a secondary research and largely theoretical approach. A better approach would be to identify actual target customers, figure out how many of those would likely be interested in our products or services (e.g. through primary research such as surveys), and size the market accordingly. In a nutshell, practical scenarios and data are to be preferred over historical, theoretical and secondary research.

**4. Speed, "Touch and Feel" and Iterations are of primary importance:** Rapid prototypes, wireframes, working demos, built in an iterative manner are much more important than detailed analysis and long product development cycles. A rough, in-progress, working demo that the customer can 'touch and feel' and provide feedback on, is much more valuable than a full-fledged product that takes five times the duration to reach the customer.

**• KT0305 Generate solutions**

Design thinking promises to provide a realistic, practical, and innovative solutions to problems of organizational concern and gives a **systematic approach to finding solutions**. The distinguishing feature of design thinking is that it encourages solution focused thinking or solution based thinking. The design thinker is supposed to have a clear idea of the goal of the entire process. The design thinkers are not supposed to solve every specific problem, but to start the process with the end goal in mind.

This methodology helps because by focusing on both the present and the future conditions as well as the parameters of the problem statement, alternative solutions can be explored simultaneously.

**Design Thinking vs. Scientific Method**

The design thinking approach is altogether different from the scientific method. The scientific method begins with rigorously defining all the parameters of the problem, so as to arrive at a solution. But a design thinker is supposed to identify both the known and the ambiguous facets of the problem statement along with the current situation. This method of thinking helps to unearth hidden parameters and open alternate paths to reach the solution.

**Iterative approach** − As design thinking is an iterative approach, intermediate solutions in the process of developing the larger solution to achieve the end goal can also act as prospective starting points for chalking out alternative paths. This can, at times, also lead to redefinition of the problem statement.

**Problem Focused vs. Solution Focused**

Where does the difference lie between problem focused solvers and solution focused solvers? The answer to this question was found by **Bryan Lawson**, a psychologist, in 1972.

In one of his experiments, he took two groups of students; one group consisted of final year students in architecture, whereas the other group comprised of post graduate science students. The two groups were asked to create one-layer structures with a set of colored boxes. The perimeter of the structure had to optimize either the red or the blue color; however, there were unspecified rules governing the placement and relationship of some of the blocks.

Lawson found that −

“The scientists adopted a technique of trying out a series of designs which used as many different blocks and combinations of blocks as quickly as possible. Thus they tried to maximize the information available to them about the allowed combinations. If they could discover the rule governing which combinations of blocks were allowed they could then search for an arrangement, which would the required color around the layout. [problem-focused] By contrast, the architects selected their blocks in order to achieve the appropriately colored perimeter.

If this proved not to be an acceptable combination, then the next most favorably colored block combination would be substituted and so on until an acceptable solution was discovered. [solution-focused]”

**Analysis vs. Synthesis**

Analysis refers to the process of breaking down something substantial into multiple fragments or components. Synthesis is the total contrast of analysis. In Synthesis, we combine fragmented elements to form an aggregated and coherent whole.

It is to be noted that analysis and synthesis are complementary to each other and go hand in hand. Design thinkers have to synthesize based on the analysis they have done and the analysis will then follow based on what has been synthesized to verify the results and to measure the parameters.

**Divergent Thinking vs. Convergent Thinking**

Divergent thinking involves finding many possible solutions in the first stance. This is the essence of design thinking process. The design thinkers are required to think of as many solutions as strike their brain, even if some of them don’t look viable.

Convergent thinking is a method of narrowing the available solutions to a final solution. Divergent thinking is the ability to come up with various unique ideas adherent to a single theme. Convergent thinking is the ability to find the correct solution to the given problem. Design thinking delves on divergent thinking in the beginning to ideate many solutions and then resort to convergent thinking to zero-in on the best solution.

**• KT0306 Application in the workplace**

Design thinking finds its application across a variety of professions. From sports, education and research to business, management and design, design thinking is widely used by professionals around the globe.

Design thinking is halfway between **analytical thinking** and **intuitive thinking**. Analytical thinking involves purely **deductive reasoning** and **inductive logical reasoning** that utilize quantitative methodologies to come to conclusions. However, intuitive thinking refers to knowing something without any kind of reasoning.

These are two extreme kinds of thinking. Design thinking makes use of both the extremes in an optimum manner. The intuitive thinking helps in invention for the future, whereas analytical thinking to create something creative in the present, which is replicable. The willingness to use these futuristic solutions is what is called **abductive logic**.

**Business**

Design thinking helps in businesses by optimizing the process of product creation, marketing, and renewal of contracts. All these processes require a companywide focus on the customer and hence, design thinking helps in these processes immensely. Design thinking helps the design thinkers to develop deep empathy for their customers and to create solutions that match their needs exactly. The solutions are not delivered just for the sake of technology.

Information Technology

The IT industry makes a lot of products that require trials and proof of concepts. The industry needs to empathize with its users and not simply deploy technologies. IT is not only about technology or products, but also its processes. The developers, analysts, consultants, and managers have to brainstorm on possible ideas for solving the problems of the clients. This is where design thinking helps a lot.

**Education**

The education sector can make the best use of design thinking by taking feedback from students on their requirements, goals and challenges they are facing in the classroom. By working on their feedback, the instructors can come up with solutions to address their challenges.

For example, Michael Schurr, a 2nd grade instructor from New York, realized that his students would be more comfortable with bulletin boards lowered. He also found the idea of creating comfortable semi-private space for working students as it provided them space to study. As a result, his students became more engaged and felt free to move.

**Healthcare**

Design thinking helps in healthcare as well. The expenditure on healthcare by the government and the cost of healthcare facilities is growing by the day. Experts worldwide are concerned about how to bring quality healthcare to people at low cost.

Venice Family Clinic in Venice, California has come up with innovative solutions to the challenge of opening a low-cost children’s clinic to serve the low-income families. Problems of finance, transportation, and language barriers had to be solved. And all this had to be done at low cost for the poor kids. Fostering good health along with profits was a challenge, as it does not sound sustainable. Using design thinking, the inefficiencies in the system and the perennial crises were addressed.

This was followed by mind-blowing innovations to serve the children. How they solved the various issues will be seen in the later sections of the tutorial.

***Internal Assessment Criteria and Weight***

• IAC0301 Creativity is analysed and possible applications are identified

***(Weight 20%)***

# SECTION 4: KM-12-KT04 : Innovation 20%

Topic elements to be covered include:

• KT0401 Innovation: is the action of putting things into practical reality, despite challenges and resistance  
• KT0402 Different innovations:

* Incremental
* Disruptive
* Architectural
* Radical

• KT0403 Main types of innovation:

* Process innovation
* Product innovation
* Organisational innovation
* Market innovation

• KT0404 What innovation means to business

**• KT0401 Innovation: is the action of putting things into practical reality, despite challenges and resistance**

Once an idea is possible, innovation tends to be an easier challenge for more players to achieve. Creativity is the novel step of being the first to identify that something might be possible in the first place. But innovation is the action of putting things into practical reality, despite challenges and resistance, rather than just contemplating. Both are necessary in business, but only one of them translates to real revenue and profits.

**What is innovation?**

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

**Types of innovation**

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

* **Business model:** Internally focused, these configuration innovations analyze how an organization operates and creates revenue. These can be higher-risk as they sometimes change fundamental decisions on which businesses are built. Business model innovations are best pursued when owners and operators identify oversaturated markets, low customer satisfaction or outdated technology.
* **Product:** Nearly always tangible, product innovations make existing material goods better in some way or are the creation of an entirely new product. It’s the most common form of innovation; famous examples include smartphones, fidget spinners, wireless headphones or foot-massaging insoles.
* **Marketing:** Marketing innovation creates new markets or increases existing market share. Marketing innovations are new, positively-disruptive ways for brands to talk to and engage with their consumers. Not only can marketing innovation introduce a new way of connecting with publics, but it can be as simple as promoting an existing product for a different use than what was first intended.

**• KT0402 Different innovations:**

* **Incremental**
* **Disruptive**
* **Architectural**
* **Radical**

The term “incremental innovation” refers to **a series of small improvements made to a company's existing products or services**. Generally, these low-cost improvements help further differentiate a company from the competition while building on current offerings.

Incremental innovation involves making small scale improvements to add or sustain value to existing products, services and processes. This can be simple as adding a new feature to an existing product or it can be more complex, for example developing a line extension. One of its key elements is that it harnesses existing technology and an existing business model so it’s often easier to execute than breakthrough or radical innovation.

What Is Disruptive Innovation?

Disruptive innovation refers to the innovation that transforms expensive or highly sophisticated products or services—previously accessible to a high-end or more-skilled segment of consumers—to those that are more affordable and accessible to a broader population. This transformation disrupts the market by displacing long-standing, established competitors.

Architectural innovation **occurs when new products or services use existing technology to create new markets and/or new consumers that did not purchase that item before**. For example, the smart watch used existing cell phone technology and was repackaged into a watch.

Architectural innovation means that the architecture of a product can be modified in the way how different components of the system interact or connect with each other. Also, different components of the system can be modified within the new architecture (incrementally), but the key technologies of the **core components** remain unchanged.

Architectural innovation gives businesses the power to expand their customer base or reach new markets without inventing new technologies or products. Every business is innovative in its own way.

While people tend to think that all innovation involves technological breakthroughs and exciting new products, most innovation involves the use of existing technologies. Here is what you should know about architectural innovation.

Radical innovation is **an invention that destroys or supplants an existing business model**. Unlike architectural or incremental innovation, radical innovation blows up the existing system or process and replaces it with something entirely new.

**What is radical innovation?**

**Radical innovation is a type of innovation that combines the power of technology with a new business model.**

It is a concept that changes the relationship between customers and suppliers by displacing current products and services or by making new product categories.

Companies that perform radical innovation transform the industry for the better. They respond to existing problems in completely new ways. This is why radical innovation needs a lot of time and technology to implement.

It also maximizes assets and other fundamental resources of the enterprise to make products and services that displace what the market currently offers.

To implement radical change, a company has to exert effort in reinforcing a culture of innovation in the workplace.

**• KT0403 Main types of innovation:**

* **Process innovation**
* **Product innovation**
* **Organisational innovation**
* **Market innovation**

A process innovation is **the implementation of a new or significantly improved production or delivery method**. This includes significant changes in techniques, equipment and/or software.

What is process innovation and examples?

For example, **the introduction of a completely new sequence to an existing production process that speeds production by 100%, thereby saving the organization money and time**, could be considered a process innovation.

Process innovation is redefining the business landscape, and rightly so as more and more corporations are leveraging it to deliver improved/new products or services and ensure their company’s long-term success.

Innovation is the need of the hour for businesses to meet increasing customer requirements and to stay relevant in the constantly evolving market dynamics. Organizations or individuals must innovate according to their consumers’ needs if they want to be on the leading edge.

This is where process innovation comes into the picture. It is an innovation development process that allows companies to align, redesign, and improve their business processes in a customer-oriented manner by using advanced digital tools and technologies.

This article aims to define process innovation and explain its importance. If you are a visionary – a beginner or professional with a passion for innovation and success, then read on to understand the concept.

Innovation has become such a buzzword it can be hard to remember what it actually means. Depending on who you talk to, the bar for “innovation” might seem incredibly high (“Let’s be the next Netflix!”), or far too low (“Let’s hang up some hammocks in our office!”). There are several different ways a company can innovate; in this article, they are broken down into three general categories: product, process, and business model. By narrowing your focus on a specific type of innovation, you can be a more effective and strategic innovator.

**Product Innovation**

When people think of innovation, often, they’re thinking of product innovation. Product innovation can come in three different forms. 1) The development of a new product, such as the Fitbit or Amazon’s Kindle. 2) An improvement of the performance of the existing product, such as an increase in the digital camera resolution of the iPhone 11. 3) A new feature to an existing product, such as power windows to a car.

Drivers of product innovation might be technological advancements, changes in customer requirements, or outdated product design. Product innovation is generally visible to the customer and should result in a greater demand for a product.

**Process Innovation**

Process innovation is probably the least sexy form of innovation. Process is the combination of facilities, skills, and technologies used to produce, deliver, and support a product or provide a service. Within these broad categories, there are countless ways process can improve.

Process innovation can include changes in the equipment and technology used in manufacturing (including the software used in product design and development), improvement in the tools, techniques, and software solutions used to help in supply chain and delivery system, changes in the tools used to sell and maintain your good, as well as methods used for accounting and customer service.

While product innovation is often visible to your customers, a change in process is typically only seen and valued internally. Speaking generally, changes in process reduce costs of production more often than they drive an increase in revenue. Of the three types of innovation, process is typically the lowest-risk.

**Examples:**

1. One of the most famous and ground-breaking examples of process innovation is Henry Ford’s invention of the world’s first moving assembly line. This process change not only simplified vehicle assembly but shortened the time necessary to produce a single vehicle from 12 hours to 90 minutes.
2. Recently, Differential built a mobile sales dashboard for Grupo Bimbo. The baking company has 65 manufacturing plants and 2.5 million sales centers located in 22 countries, across 3 continents. As a result, the executive team members travel a lot, meeting with their direct reports around the world. Having a mobile sales dashboard gives the team quick access to the sales information and other KPI’s for each country, channel, and brand, cutting out guesswork in sales decisions, and reducing meeting time.

An organisational innovation is the implementation of a new organisational method in the firm’s business practices, workplace organisation or external relations.

In traditionally organized companies, ideation, idea generation and business innovation often fails due to structural problems. These challenges can be mastered through organizational innovation.

Although companies invest time and money to establish an idea management and innovation management system, define innovation processes and measure innovation, structural barriers prevent success.

* Political problems and conflicts within the company,
* destructive criticism, destructive competition and destructive pressure,
* strict control by management,
* an excess of formal structures and procedures,
* precisely defined processes that prescribe what is to be improved by whom and with what methods.

Late Apple founder and longtime CEO Steve Jobs described his greatest fear in this way: “The fear of dinosaurs who build huge empires and act according to antiquated methods.” In this article, you will find examples of how innovation leaders become more agile through organizational innovation.

With the free Innolytics innovation software you can launch organizational innovation immediately. Set up a platform, invite your peers and start developing successful ideas.

A marketing innovation is the implementation of a new marketing method involving significant changes in product design or packaging, product placement, product promotion or pricing.

Marketing innovation is a deployment of new marketing method that is associated with significant changes in the project, product construction or in packaging, distribution, promotion or pricing strategy. The purpose of marketing innovations is to satisfy consumers' need better, to open new trade areas or new positioning of product on the market in order to boost sales.

The element that differentiates marketing innovations from other changes in the area of company's marketing instrumentation is the fact that they consist in an implementation of marketing method which has not been applied hitherto in a particular firm. This method has to be a part of a new conception or marketing strategy, which is a major departure from marketing methods employed heretofore. New marketing method might be elaborated by an organization on its own or adopted from other entities. It can be also deployed for both new and existing products on the market.

**• KT0404 What innovation means to business**

Innovation, as a concept, refers to the process that an individual or organization undertakes to conceptualize brand new products, processes, and ideas, or to approach existing products, processes, and ideas in new ways. In the world of business, there are many different types of innovation that a company might pursue.

Businesses often look for new ways to improve their services or products and appeal to new audiences. Innovation is one way businesses can improve, and it can help them attract new customers and further reinforce loyalty among current customers. Understanding what innovation is, how it works and why businesses use it can help you determine whether there's a need for it in your workplace. In this article, we define business innovation, explore different types and provide examples for reference.

**What is business innovation?**

Business innovation is how a business pioneers a process, product or service in an industry, typically improving upon or completely redesigning the service or product. This can include creating new, more useful or feature-rich products or services, discovering a new material or process or creating better systems for business organization and function. Innovation can occur out of need or because a business wants to further differentiate itself from its competitors, thereby creating a more niche market for its products and services. Innovation may help a business earn more revenue, grow its customer base and earn industry accolades for its efforts.

**Why is business innovation important?**

Business innovation is important for many reasons. It can help a business grow and further cement itself as a prime competitor in an industry and can also encourage the production of new and better products. Innovation also can help improve working conditions and safety measures in some industries, like construction or manufacturing. For example, if a manufacturing company creates a new, safer production method for extracting raw iron ore, the methods might become standard practice in the industry. Innovation often influences legislation and safety regulations, creating better environments for employees and greater accountability for businesses.

**Types of business innovation**

There are many types of business innovation to consider, including:

**Business model innovation**

Business model innovation is when a company pioneers a new business model or type of business. For example, an e-commerce retailer that is one of the first pioneers of the digital ecosystem may have a business model where the company conducts its business via an e-commerce website. The company builds servers, digital infrastructure and physical warehouses, pioneering the retail and e-commerce industries to become one of the largest e-commerce and retail companies in the world. Innovating business models can help change the way business markets its products, earns its revenue and structures its internal operations.

**Products and performance innovation**

Products and performance innovation is when a business pioneers new products or improves the performance of a previous product. Customers often influence this kind of innovation, demanding changes to features or functionality of a product to make it safer, more affordable or reflective of its market price or to meet a specific need. Competition can also influence this kind of innovation, with companies focusing on creating the best possible products to separate themselves from competitors and attract new customers. This kind of innovation is common in business and typically influences much of the competition within an industry.

**Process innovation**

Process innovation is when a company creates or improves processes for producing or delivering products and services or its customer service processes. This kind of innovation typically helps a company save money because it can focus on making certain processes more efficient or quicker. For example, a manufacturer might create a new process for molding plastic, which can save hours of molding time and make some of their products more affordable for customers while saving the company labor hours. Customer demand and company costs are typically the prime influencers of process innovation in a business.

**Network innovation**

Network innovation is when a business changes, improves or creates a completely new method for networking and collaboration. Companies might look for specific partners or customers, creating the need for new or improved networking methods. For example, a company might decide to create a new career website to attract the kind of applicants it requires for certain positions. Changing the way people interact can help a business create more relationships, establish new professional connections in an industry and expand its available list of job candidates and contractors.

**Marketing or sales innovation**

Marketing or sales innovation is when a business pioneers how it markets its products and services. Since marketing is crucial to business operations, the marketing sector of a business is typically always innovating. Finding new ways to reach customers, leads and sales can be a great way for a business to earn extra revenue. For example, a company might create a new marketing technique using artificial intelligence that analyzes a customer's purchase behaviors before showing them ads. This can help the company reach the right customers and limit ads to only relevant ads that might influence a purchase decision.

**Technological innovation**

Technological innovation is when a business creates a new kind of technology or improves or expands on an existing technology. Technological innovations can increase company sales, influence brand loyalty among customers and differentiate a business from its competitors. For example, consider technology companies that helped pioneer the use of home computers, eventually creating product lines that evolved through the years and depended on innovation to meet changing customer needs. Technological innovation can also help a company improve its workplace or processes, creating better, more efficient work environments.

***Internal Assessment Criteria and Weight***

• IAC0401 Innovation is analysed and possible applications are identified

***(Weight 20%)***

# SECTION 5: KM-12-KT05 : Design 10%

**Learning Outcome**

Topic elements to be covered include:

• KT0501 Think outside the box

• KT0502 Push beyond the obvious solutions

• KT0503 Communication through shape and form

**• KT0501 Think outside the box**

**What is Outside the Box Thinking?**

Outside-the-box thinking is an ideation form where designers freely discard common problem-solving methods to find the true nature of users’ problems, falsify old assumptions and be innovative. Vital to the design thinking process, out-of-the-box thinking means reframing problems with a wider grasp of the design space.

**Break Out of the Box to Find Spectacular Solutions**

Traditional approaches to problem-solving can distort design teams’ views of problems. The most innovative solutions—both in product design and service design—usually come from designers who dared to step off the path of linear thinking to ask “Why?”. Design problems are usually complex, with many hard-to-see factors at play between users, the diverse realities they face and solutions they would find most effective, helpful and desirable. To follow a vertical, linear train of thought when addressing these would likely soon cause some big obstacles. With outside-the-box thinking, you can challenge assumptions that would otherwise constrain you, therefore freeing you to sidestep the dangers of meeting a design problem head-on.

**Thinking outside the box can save you and your team the headaches of pursuing a *perceived* problem** and ending up developing uninventive, semi-effectual solutions. So, instead of chasing shadows, you can work your way around the boundaries and explore the bigger picture. Moreover, it's a great way to **discover other resources that might be available to you, spot market gaps** and, indeed, **inspire your design team in the ideation stage of any project**. That’s why thinking out of the box is synonymous with, and integral to design thinking.

“The box” is the *apparent* constraints of the design space and our restrictions in perspective from habitually meeting problems as everyday “if x, then do y to get z” tasks. That clinical, critical line of reasoning we’re used to outside the design space will easily impose its limitations in design ideation. You can’t get a holistic view of the problem unless you start to explore horizontally and find its edges. To get outside the box, it’s important to:

* **Focus on overlooked aspects of a situation/problem**.
* **Challenge assumptions** – about *any* aspect of the problem or users.
* **Seek alternatives** – not just alternative potential solutions, but alternative ways of *thinking about problems*.

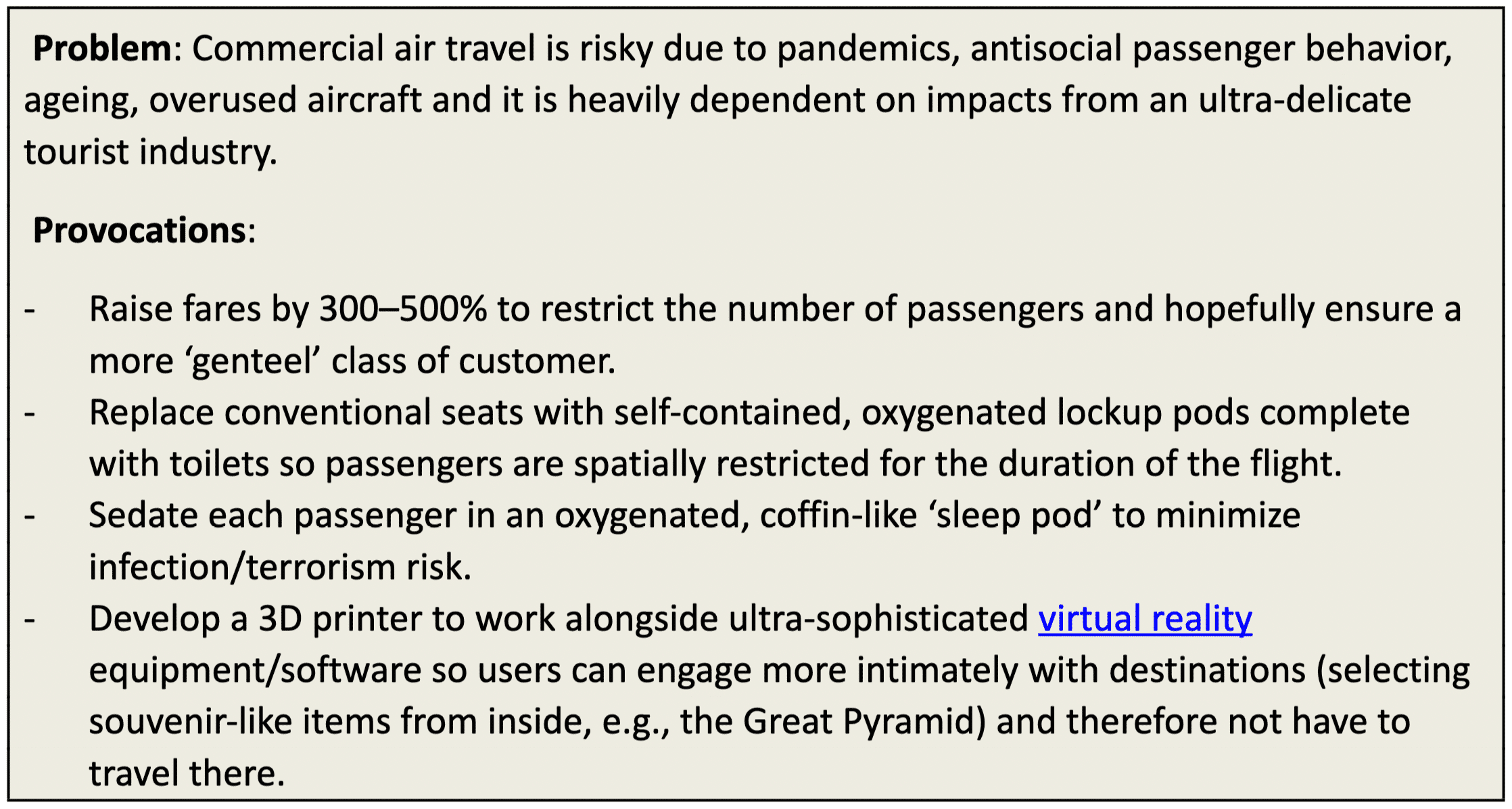
**How to Break Out of Your Design Box**

**Lateral thinking**and**divergent thinking methods can lead to the best results. Early in the ideation stage** is the time to get disruptive and reconnect with a similar sense of wonder to how children challenge the norms which adults grow to accept without question. A persistence with “Why?” is the key, as is a judgement-free atmosphere in your ideation session. You want to ask significant questions that may seem outlandish – the idea being to scrutinize the assumptions everyone else would go along with because they’re “the done thing” and see if they’re actually valid.

Essentially, you want to **reframe the problem** and:

1. **Understand what’s constraining you and why.**
2. **Find new strategies to solutions and places/angles to start exploring.**
3. **Find the apparent edges of your design space and push beyond them – to reveal the bigger picture.**

Of the various methods you can use, a chief one is provocations, where you make deliberately false statements about an aspect of the problem/situation. This could be to question the norms through contradiction, distortion, reversal (i.e., of assumptions), wishful thinking or escapism, for example:



**• KT0502 Push beyond the obvious solutions**

There are hundreds of ideation techniques to help you in your ideation sessions. You want an ideation technique that combines your conscious and unconscious mind—fusing the rational with the creative. It must match the sorts of ideas your team must generate and reflect their nature, needs and experience with ideation. Some crucial ones are:

**Brainstorming** – You build good ideas from each other’s wild ideas.

**Braindumping** – This is like brainstorming, but done individually.

**Brainwriting**– This is like brainstorming, but everyone writes down and passes ideas for others to add to before discussing these.

**Brainwalking** – This is like brainwriting, but members walk about the room, adding to others’ ideas.

**Worst Possible Idea**– You take an inverted brainstorming approach, emboldening more reserved individuals to produce bad ideas and yielding valuable threads.

**Challenging Assumptions** – You overturn established beliefs about problems, revealing fresh perspectives.

**Mindmapping** – You use this graphical technique to connect ideas to problems’ major and minor qualities.

**Sketching/Sketchstorming** – You use rough sketches/diagrams to express ideas/potential solutions and explore the design space.

**Storyboarding** – You develop a visual problem/design/solution-related story to illustrate a situation’s dynamics.

**SCAMPER**– You question problems through action verbs (“Substitute”, “Combine”, “Adapt”, “Modify”, “Put to another use”, “Eliminate”, “Reverse”) to produce solutions.

**Bodystorming** – You use role-playing in scenarios/customer-journey steps to find solutions.

**Analogies** – You draw comparisons to communicate ideas better.

**Provocation** – You use an extreme lateral-thinking technique to challenge established beliefs and explore paths beyond.

**Movement** – You take a “what if?” approach to overcoming obstacles in ideation and finding themes/trends/attributes towards reliable solutions.

**Cheatstorm** – You use previously ideated material as stimuli.

**Crowdstorming** – Your target audiences generate and validate ideas through feedback (e.g., social media) to provide valuable solution insights.

**Creative Pause** – You take time to pull back from obstacles.

Other methods for ideation include co-creation workshops (combining user empathy research, ideation and prototyping), gamestorming (gamification-oriented ideation methods) and prototyping. The beauty of ideation is its unbounded freedom, although *structured environments* are critical. If you get stuck, you have fallbacks: e.g., “breaking the law” (listing constraints to see if you can overcome them), “stealing” ideas (emulating applicable concepts from other industries), inverting the problem and laddering (moving problems between the abstract and the concrete).

**• KT0503 Communication through shape and form**

Shapes are the building blocks of everything we see, and the meaning of shapes speaks fundamentally to how we understand our world. They are so universal most visual artists first learn how to draw through construction, or breaking down images into basic geometry. But shapes are more than just practical, constructive tools: their meanings are what allow designers to communicate visually.

This is sometimes called shape language or shape psychology. Along with the other elements of design, shapes allow designers to convey characteristics and emotions in a nonverbal way. Conversely, failing to understand the meanings of shapes can result in unintended or mixed messages. To make sure your shapes are speaking a language your viewers will understand, we’re going to walk you through how to use the meaning of shapes in design.

**The different types of shapes**

Since all visible matter has a shape, the sheer number of potential shapes and meanings can seem never ending. This is why it is useful to sort shapes into overarching categories that share meanings as groups. We’ll list some of the common types of shapes here, and be sure to note the way in which these categories can overlap:

**Simple vs. compound**: Simple shapes, sometimes called primitives, are the foundational geometric forms such as squares, triangles and circles. This also includes their corresponding 3D forms—cubes, cylinders, cones and spheres. Compound shapes are larger, more complex shapes built out of simple shapes.



* **Organic vs. inorganic**: Organic shapes are those that regularly occur in nature, such as a tree limb or rolling hillside. They tend to be curvier, composed of looser lines and less symmetrical than inorganic shapes—rigid, geometrical forms that are reminiscent of man-made objects such as buildings or machines.
* **Abstract vs. non-abstract**: Abstract shapes, while often geometric and compound, tend to act as a symbolic reference. Most commonly these come in the forms of icons, such as the abstract humanoids used in bathroom signs. Instead of the explicit shapes, the circles and rectangles make up this abstract icon. And we understand the shape to represent a person due to our familiarity with the symbol. In short, abstract shapes depend on prior context or cultural knowledge.



Another concern for designers is how shapes are formed. If everything is a shape, how does one decide where one shape ends and another begins?

In simple drawings, shapes are usually defined by outline or color. In real life, shapes are defined by light and shadow, and painters often use this approach for three-dimensional realism. Even objects that are not explicitly connected can form unified shapes. The most obvious example is text: even if the letters are separate, an entire paragraph can form a unified shape due to the design principles of proximity and contrast (against a neutral background). A justified alignment of text will create paragraph squares whereas a centered alignment will create an organic, free-flowing shape.

***Internal Assessment Criteria and Weight***

• IAC0501 Design is analysed and possible applications are identified

***(Weight 10%)***

# SECTION 6: KM-12-KT06 : Design thinking methodology 10%

**Learning Outcome**

Topic elements to be covered include:

• KT0601 Design thinking phases

• KT0602 Design thinking tools and techniques

**• KT0601 Design thinking phases**

Design thinking is a process concerned with solving complex problems in a highly consumer-centric way. If you work in design or innovation in any capacity, you’ve probably heard of, and even leveraged, design thinking. At the very least, you’ve heard people talk about it so much that in some circles, it’s been relegated to buzz language with little meaning. But what is the real, honest value of design thinking, and in what contexts is it particularly useful?

What’s special (but not radical) about design thinking is that designers—and all creative people for that matter—have been using these methods of creative development intuitively since the beginning of time. Design thinking, in many ways, is simply an articulation and codification of the creative process that drives all human endeavors.

What’s special (and in fact radical) about design thinking is that it puts human beings first; the people we are ultimately solving problems for. In the current landscape of big data and depersonalization, this is a surprisingly radical act. If we decouple the discipline of design from the people it serves, it is nothing but a hollow aesthetic exercise.

Another way that design thinking is still a radical act is that it is rooted in questioning: It questions the problem, questions the assumptions and questions the implications. Consequently, design thinking is a powerful tool in tackling all kinds of challenges that are ill-defined or complex, by reframing the problem in human-centric ways.

**The Five Phases of Design Thinking**

These five phases are not always sequential, in that they do not necessarily need to follow any specific order and can repeat iteratively to hone and refine our solutions through the process. Avoid the perception that phases are innately hierarchical or linear; rather, they are a journey, sometimes with side stops or shortcuts, but with direction and a destination in mind.

The short form of the design thinking process can be articulated in five steps or phases: empathize, define, ideate, prototype and test. Let’s briefly explore each of these phases in relation to a practical design process.

**Phase 1: Empathize – Gather High-Quality Consumer Understanding**

As marketers, we think that we have our finger on the pulse of our business. But often in reality, we are talking to ourselves first, and framing the problem with myriad assumptions that aren’t necessarily true or correct, particularly about our users and consumers. Empathy is the critical starting point for successful design thinking solutions, with the first order of business to know who it is you’re solving a problem for; and despite the importance of strategic business objectives, it isn’t your client. This may sound harsh, but deeply understanding the consumer is the most important input to assuring business success.

Understanding consumer needs, barriers, attitudes and aspirations is the only way to unlock new solutions that identify whitespace and uncover emergent opportunities for brands. This means observing and engaging with human beings to truly to internalize their experience on an emotional and even psychological level. During this phase, every stakeholder must seek to set aside their assumptions and gather real insights that are relevant to the challenge and actionable for the design team. In designing for CPGs, it’s also crucial to consider the culture that our consumer is immersed in—are there seismic culture shifts happening? What does the visual language of our culture or category look like? How are they responding and coping? How can we help them navigate it?

**Phase 2: Define – Create a Brilliant Design Brief for All Stakeholders**

The second stage in the process is about clarity, focus and definition. Gather all the insights you’ve collected— consumer need states and barriers, lifestyle realities and cultural influences—to begin to make sense of the landscape of solutions you’re exploring. What themes or patterns are bubbling to the surface? What unmet needs came out of left field? What unexpected barriers might shift our focus? Are we asking the right questions, and do we need to reassess our assumptions about the task at hand?

A great creative brief, built with both strategic focus and creative inspiration, is the key to unlocking the best solutions and building consensus along the way. Internally, a strong brief allows guidance and actionability for our design teams, but it also brings early thought leadership to the table with clients to gain consensus and build momentum.

Once we’ve formulated the challenge into a clear articulation, we can move into the ideation phase with confidence and inspiration.

**Phase 3: Ideate and Collaborate**

With a deep understanding of your consumer and a focused, well-articulated challenge to solve, it’s time to start developing potential solutions. This phase is where creativity is unleashed on the intelligence—where the rubber meets the road. Prior to the granularity of executional options, a multi-stakeholder team (led by design) must establish the creative or design “pathways” that might offer solutions. Before sketches or computer designs happen, we must align on where the challenge could take us and assess the creative legs and longevity of the opportunities we see in the landscape.

Brainstorming, mind-mapping, landscape mapping and Post-it Notes are all viable tools to fuel this brilliant but messy phase. The key is to create an environment where divergent and provocative options are embraced and assessed, with the eventual goal of converging on a few strongest pathways to pursue. Leverage your intelligence and your defined brief as your yardstick, and do a S.W.O.T. (strengths, weaknesses, opportunities, threats) assessment to build confidence in the strategic viability of all pathways.

**Phase 4: Prototype – Hold Inspirational Rapid-Sketch Sessions or Design Sprints**

The fourth step is all about experimentation: transforming ideas into tangible “artifacts.” These artifacts may be a packaging design system, a retail experience, a new structural innovation or a customer journey. Regardless of the task at hand, rapid iteration and even prototyping is a crucial step in quickly breathing life into the work. Don’t be afraid to bring the solution to life in unexpected ways that consumers will understand. Consumer understanding is key in putting each solution to the test, in order to highlight any gaps, barriers constraints or flaws in the concept.

Throughout this stage, proposed solutions may be improved, redesigned or rejected through a series of reviews and critiques from the broader team. This rapid iterative process does many beneficial things: It allows creatives to be imperfect and detach from their work in healthy ways, it embraces collaboration by “piggybacking” ideas from different sources, and it depersonalizes the delicate process of creativity in a way that empowers teams.

**Phase 5: Test – Get Fast, Productive Feedback From Human Beings**

After your iterative creative development and prototyping, find ways to test fast and organically with consumers. Although design testing is often relegated to quantitative “benchmarks” or eye-tracking, a qualitative sharing session with consumers can go much deeper on the “why” of the feedback. If budgets are tight or clients are uncomfortable with breaking free from their traditional corporate methodologies, engage a “friends and family” approach. It’s important that the consumers you speak with have a vested interest in the problem you’re solving.

Questions to ask should be open-ended and solutions-focused, such as, “What problem could this solve for you?” “How could this solution impact your experience?” or “What might make it an even better solution?” This line of questioning avoids answers that shut down iterative improvement and encourage consumers to build on the concept or solution in productive ways. Avoid yes/no questions or “Which do you like?” and focus on solving the problem at hand the very best way you can. At this point, the stepwise aspect of Design Thinking comes into play—insert your new learning back into the process and optimize your concepts until you’ve solved the problem.

**Design Thinking Is Intuitive and Natural**

Don’t get caught up in the academic dialogue around design thinking; it can be needlessly intimidating and can undermine its own fundamental purpose. Embracing design thinking as a way to codify and organize your creative development and output will create stronger teams, instill deeper collaboration, build confidence of your designers, foster a more resilient design culture, and most importantly, create potentially monumental solutions that improve the lives of other human beings.

**• KT0602 Design thinking tools and techniques**

Since Design Thinking owes its popularity to being customer-centric, the tools used in the process (from creating to delivering products/ services) are also life-sensitive.

Let’s take a look at some of these tools to understand them better.

**1. Immersion**

This is perhaps the first tool that is utilized in any process of design thinking. Just when you begin to think about a problem that needs to be solved or an idea for a product that will change life as we know it-immersion begins to happen.

Immersion includes various sub-processes:

* **Simulation**: A day in the life of a person to understand her/his needs.
* **Research:**  After simulation, exploratory research related to the context surrounding the problem begins. Again, it can be multifaceted depending on the data that is to be collected and used.
* **Brainstorming:**This tool is most crucial when it comes to collaborative brainstorming sessions with a team, stakeholders, or prospective innovators/product managers.
* **Overshadowing:**After the three phases of ideation, overshadowing commences. This tool is used to monitor a client’s interaction with a product over a considerable period to understand preferences and dislikes.

Design Thinking Tools available in the market that can be used for undertaking Immersion are **SessionLab, Stormboard, IdeaFlip, Smaply, Userforge, MakeMyPersona.**

**2. Visualization**

While the debate around what came first (idea/chair or chicken/egg) is unresolved and shall always be likely so, it has come to be generally accepted that visual thinking is an undeniable aspect of design thinking. Not just design thinking, all processes that involve human invention from industrial manufacturing to scientific discovery, everything begins in mind.

In Design Thinking, the visualization tool is crucial. After identifying the problem or lack in Step 1(Immersion), the second step is to visualize how to solve the problem.

In this regard, visual thinking helps designers to imagine/create a niche product that is suitable to the needs of the market it wishes to bring about a change in.

For example, to manufacture a chair, one has to think of a platform that is raised above the ground and can be used to sit upon. This is visualization.

However, visualization cannot be open-ended, meaning unless a designer draws the chair she wants to sell in the market, the entire team will have its perception of what a chair should look like.

This is a problem that many organizations encounter. Although we are all for ‘an idea can come from anywhere, we do not want to be in a situation where the decision to go with any single idea of a chair becomes a hassle.

Tools available in the market for Visualization**: Miro, Conceptboard, Google Jamboard, Mural, Shape.**

**3. Mind Mapping**

Mind Mapping, one of the key tools for designers, helps generate, structure, interlink, and classify ideas to look for patterns around how the final design will come about.

An intermediate phase overlaps through all design thinking processes; the tool relates products to one central idea/product.

Mind Mapping can happen only in a team setup. The customer base can participate by being asked to draw relatable patterns from the data we as an organization present to them.

Then proceed to ask questions like, “Based on what we have learned from data patterns, what features would our design have,” to your team.

Segregation of patterns based on depth to let newer meanings emerge from the information can allow the possibility of developing a product with zero loopholes or an assembly line of products if it is a niche market.

For instance; What is the first thing that comes to mind when someone says, Tesla?

Naturally, after Elon Musk, it is their Electric Vehicles (also known as EV’s).

The reason why we mention Tesla’s Electric Car is that the electric automobile is not an innovation. It has been around for some 200 years. But Tesla’s use of a design thinking tool- mind mapping- helped them identify the challenges around electric cars to now have the most successful and profitable EV fleet in the world.

Design Thinking Tools in the market that can be used for Mind Mapping**: ClickUp, Ayoa, Miro, SmartDraw, MindMeister, Milanote, Microsoft Visio, MindGenius, Lucidchart.**

**4. Rapid Iteration**

As discussed earlier, in the UberEATS program case, the designers from the company also apply the Rapid Iteration tool to test designs quickly in the real world.

But what is so rapid about it?

In the fast-paced world we live in today, where competition is tighter than ever, it is necessary to adapt quickly to sustain your organization.

For instance, in the case of E-commerce platforms or food delivery organizations like Swiggy, all stakes are dependent on the sharp sword of time.

In such scenarios, where coordination between people and objects from the real world cannot be replicated in office spaces, a quick iteration design thinking tool works best.

Therefore, testing designs quickly in the real world,  improving upon them, and re-testing keeps the market open for innovation.

If you have spent too much time solving small logistical problems, the entire chain of operations can be affected.

**5. Assumption Testing**

Assumption Testing is not only part of the curriculum in Management courses but also is an important design thinking tool.

In 2009, two Harvard Business School graduates launched Rent the Runway on the assumption that customers like to rent dresses over the internet.

The founders tested this assumption before proceeding and looked at where the company stands today.

Assumption testing implies identifying assumptions, stereotypes, and prejudices that underlie the attractiveness of any new product and then testing it. It involves thought testing and field experiments.

This design thinking tool uses large amounts of data to classify a) what might work,b) what generally works, c) what should not work and why it works.

If one were to give an example to elaborate further, we would take the case of Fair & Lovely, which is now Glow & Lovely.

Can you think of the kind of assumption testing the beauty brand did to take a step towards a more inclusive brand image that the company now wishes to establish?

**6. Prototyping**

This is the tool that turns your idea into material reality. The idea of the chair *(we have discussed above)* becomes a full-fledged prototype of a chair. This prototype can then be sent across to your stakeholders and partners for feedback.

Prototyping is about minimizing the I of ROI (Return on Investment) to the extent that the cost of your first 2 D prototype is that of a pencil or a piece of bread. Most businesses these days proceed with 2 D prototypes before going on with 3D models. Therefore, prototypes can also include storyboards, images, role-play, skits, etc.

As a design thinking tool, Prototyping can become quite painful for designers, who have clocked in sweat and tears to make their prototype. However, one should let others validate the product rather than explain its features or defend it from criticism.

Tools available in the market for Prototyping are **Boords, Mockingbird, POP-app by Marvel, PowerPoint, Keynote, Lumen5, or Moovly, Proto.io.**

**7. Finding the Value Proposition**

Rather than adding more features to your product, focus on finding value. However minimal that may be, the value should be irreplaceable.

For instance, take Apple. When Steve Jobs left the organization in 1985, Apple changed its product development cycle completely. It launched more and more products, pumped millions into R & D around them, but hardly found success.

When Jobs returned to the company in 1997, he dumped the old product cycle and established a new line of products using design thinking. Yes, he specifically used this ‘value proposition’ tool to launch and fund R & D around very few products that no one but Apple could deliver with the best software and hardware service in the world.

This was a long shot and a big risk but see where it got Apple. In no time, the company became a market leader in smartphones and computers.

According to CompaniesMarketCap, Apple is the world’s most valuable company today, with a total worth of $2.430 trillion.

There are no specific tools in the market for creating a roadmap of the value proposition for your stakeholders or clients but suffice it to say that some basic ones like**Strategyzer’s Value Proposition Canvas, emaze, Canva, and PiktoChart** will do the job.

**8. Learning Launch**

Once your prototype is approved, it goes to the final end-user, your customer. Learning Launch is the tool wherein your test product is launched in the market for a quick experiment.

In contrast to a new product launch, this test is conducted solely for gathering data.

As a design thinking tool, Learning Launch can be difficult to navigate through. After all, liking your product does not mean one will buy it.

Money is dear to all, and the real challenge lies in convincing the customer to part with it *willingly*to buy your product. While one may say that’s the job of advertising and marketing, the first step towards initiating the process of willful buying happens through this stage.

The most critical aspect of this tool is that unlike traditional analysis and case studies that happen over a long period, this approach works for short periods.

Since there is no perfect algorithm to achieve the perfect product, design thinking uses this tool to learn along the way.

For example, post-lockdown, the French government’s initiative to make the country green, sustainable and inclusive translated into making 650-km bicycle lanes throughout the territory. It was an urban planning project that worked along the learning launch process to see what works best.

While there are no specific tools in the market, there are detailed case studies and analytical recommendations that explain this process. The most prominent Darden Research has already been mentioned earlier.

**9. Collaborative Creation**

Ask any product manager: What is the hardest thing about creating a product? Most likely, they will say it is the time when the MVP (Minimum Viable Product) is out in the market for testing.

A crucial component of this testing phase is also data analysis. Besides having the product used by multiple customers and stakeholders, a team is also enrolled in the data collection process around the product’s feedback.

Traditionally, Six Sigma has taught manufacturers to launch their prototypes with all features intact. The producers launch next-to-finish products for testing in the market, get a so-so response and then sulk.

But, with design thinking, the approach to innovation changes.

So what if your MVP is roughly cut and not etched out with perfection? In the fast lives we lead, the quicker a product is rolled out for testing, the better and immediate the response from the customer. Thus, making value-added differentiation possible in a market of infinite products and services.

A tip that always works in this stage is to present the customer with an incomplete product. This makes intuition work and is a good way to engage a buyer’s creativity and intellect. Offering multiple prototypes can make this process even better for zeroing in on your final product.

Tools available in the market for helping co-create: Any data collection tool like **Excel, Tableau, Xplenty, and Digsite.**One can even use **UserTesting** for real-time feedback.

**10. The Art of Selling**

You know they say that the oldest profession in the world is the art of storytelling. Since storytelling has been used in every craft and art practice, including business, this has become a primary production tool. As part of design thinking, this tool, if not used properly, can result in returning to phase 1, Immersion.

After all, without convincing the customer, how do you expect your product to sell? It is where the art of selling and the whole body of professional advertisers and marketers come to play.

The art of selling revolves around creating presentations and storyboards around your product. Narratives that reveal a problem, how we tackle it daily, and how your solution is best in the market because using metaphors, analogies, and data to drive home your product and service is key to nailing the art of selling.

If you see any successful life-cycle of a product or service, notice that how it was introduced in the market made all the difference in bringing about sales and staying in the minds of consumers forever.

Think of the most popular and evergreen slogan from the world of advertising that you have heard. Let’s say: A diamond is forever.

Do you know how old this brand slogan is?

More than 80 years. It has almost become an adage so naturalized in our consciousness that we think this is the most obvious thing to say about any precious gemstone.

Founded in 1888, De Beers Group is a large corporation that specializes in diamond mining operations. It may not get the best press today, but its Forever Diamond campaign in 1939 made the company become a legacy in the jewelry industry.

Do you know the reason why “a diamond is forever” has stood the test of time?

It is so because the slogan so rightly matches with the brand personality and the product besides being catchy.

Since 1948, De Beers has used this tagline on every possible product launch and promotion. Because sometimes, when you get it right, you know that it is going to work.

***Internal Assessment Criteria and Weight***

• IAC0601 Design thinking phases, tools and techniques are understood

***(Weight 10%)***

# SECTION 7: KM-12-KT07 : Application of design thinking 15%

**Learning Outcome**

Topic elements to be covered include:

• KT0701 Application in software development

• KT0702 Application in cyber security

• KT0703 Business innovation

• KT0704 Innovative problem solving

**• KT0701 Application in software development**

Applications software developers **design computer applications, such as word processors and games, for consumers**. They may create custom software for a specific customer or commercial software to be sold to the general public. Some applications software developers create complex databases for organizations.

What applications do software developers use?

**What Tools Do Software Engineers Use?**

* GitHub. GitHub is a web-based hosting service that provides a central place where a worldwide community of developers can share, improve, and discuss software projects. ...
* ProofHub. ...
* Adobe Dreamweaver CC. ...
* LeanKit. ...
* Codenvy. ...
* Crimson Editor. ...
* Code Climate. ...
* Bitbucket.

**What is an application developer?**

An application developer is a professional who designs, creates, deploys and updates programs for a particular device, the web or a specific operating system. Developers typically specialize in one area of development, such as mobile phone applications. They are an important part of a project management or technical team that's responsible for meeting user needs.

Application developers work in almost every industry and are involved in performing routine updates on applications and releasing them to end-users.

**• KT0702 Application in cyber security**

Application security is important because today’s applications are often available over various networks and connected to the cloud, increasing vulnerabilities to security threats and breaches. There is increasing pressure and incentive to not only ensure security at the network level but also within applications themselves. One reason for this is because hackers are going after apps with their attacks more today than in the past. Application security testing can reveal weaknesses at the application level, helping to prevent these attacks.

**Types of application security**

Different types of application security features include authentication, authorization, encryption, logging, and application security testing. Developers can also code applications to reduce security vulnerabilities.

* **Authentication**: When software developers build procedures into an application to ensure that only authorized users gain access to it. Authentication procedures ensure that a user is who they say they are. This can be accomplished by requiring the user to provide a user name and password when logging in to an application. Multi-factor authentication requires more than one form of authentication—the factors might include something you know (a password), something you have (a mobile device), and something you are (a thumb print or facial recognition).
* **Authorization**: After a user has been authenticated, the user may be authorized to access and use the application. The system can validate that a user has permission to access the application by comparing the user’s identity with a list of authorized users. Authentication must happen before authorization so that the application matches only validated user credentials to the authorized user list.
* **Encryption**: After a user has been authenticated and is using the application, other security measures can protect sensitive data from being seen or even used by a cybercriminal. In cloud-based applications, where traffic containing sensitive data travels between the end user and the cloud, that traffic can be encrypted to keep the data safe.
* **Logging**: If there is a security breach in an application, logging can help identify who got access to the data and how. Application log files provide a time-stamped record of which aspects of the application were accessed and by whom.
* **Application security testing**: A necessary process to ensure that all of these security controls work properly.

**Application security in the cloud**

Application security in the cloud poses some extra challenges. Because cloud environments provide shared resources, special care must be taken to ensure that users only have access to the data they are authorized to view in their cloud-based applications. Sensitive data is also more vulnerable in cloud-based applications because that data is transmitted across the Internet from the user to the application and back.

**Mobile application security**

Mobile devices also transmit and receive information across the Internet, as opposed to a private network, making them vulnerable to attack. Enterprises can use virtual private networks (VPNs) to add a layer of mobile application security for employees who log in to applications remotely. IT departments may also decide to vet mobile apps and make sure they conform to company security policies before allowing employees to use them on mobile devices that connect to the corporate network.

**Web application security**

Web application security applies to web applications—apps or services that users access through a browser interface over the Internet. Because web applications live on remote servers, not locally on user machines, information must be transmitted to and from the user over the Internet. Web application security is of special concern to businesses that host web applications or provide web services. These businesses often choose to protect their network from intrusion with a web application firewall. A web application firewall works by inspecting and, if necessary, blocking data packets that are considered harmful.

**What are application security controls?**

Application security controls are techniques to enhance the security of an application at the coding level, making it less vulnerable to threats. Many of these controls deal with how the application responds to unexpected inputs that a cybercriminal might use to exploit a weakness. A programmer can write code for an application in such a way that the programmer has more control over the outcome of these unexpected inputs. Fuzzing is a type of application security testing where developers test the results of unexpected values or inputs to discover which ones cause the application to act in an unexpected way that might open a security hole.

**What is application security testing?**

Application developers perform application security testing as part of the software development process to ensure there are no security vulnerabilities in a new or updated version of a software application. A security audit can make sure the application is in compliance with a specific set of security criteria. After the application passes the audit, developers must ensure that only authorized users can access it. In penetration testing, a developer thinks like a cybercriminal and looks for ways to break into the application. Penetration testing may include social engineering or trying to fool users into allowing unauthorized access. Testers commonly administer both unauthenticated security scans and authenticated security scans (as logged-in users) to detect security vulnerabilities that may not show up in both states.

**• KT0703 Business innovation**

Business innovation is the process of making something new or improved that better serves a business. This can include a new product or service, a workflow improvement, or anything else that improves the business in a new way.

Here are some examples of business innovation, and a list of some of the most innovative countries in the world.

**What Is Business Innovation?**

At its most basic level, innovation is coming up with a new way to do things. When it comes to business innovation, those new ways of doing things are introduced with the goal of earning the business more money.1﻿

Beyond that basic definition, business innovation is a general concept that can apply to many different products, services, efforts, and policies. It can include new products that will better serve customers or a new program that will help employees better communicate about projects they're working on.

Any time you're trying to find new ways to improve a business, you're dabbling in business innovation.

In the business world, innovation is often used as a synonym for research and development (R&D). However, R&D is a fairly limited term that usually refers to the development of new products. Business innovation is a broader term that describes any type of innovation that occurs in a business context.

**How Does Business Innovation Work?**

The Organisation for Economic Co-operation and Development (OECD) outlines four ways that business innovation can manifest: product innovation, process innovation, marketing innovation, and organizational innovation.

**• KT0704 Innovative problem solving**

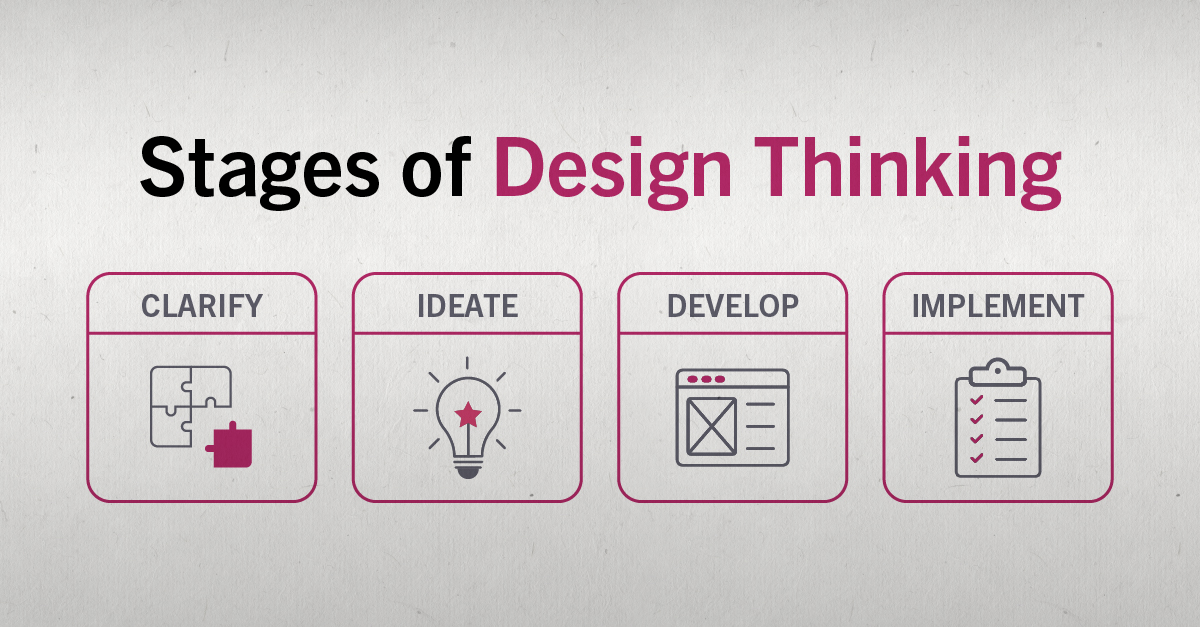
Innovative problem solving is a process that is part of innovating solution stage of social enterprising. The innovative problem solving process has five sub-stages: framing, diagnosis, generating solutions, making choices and taking action.

CREATIVE PROBLEM-SOLVING AND DESIGN THINKING

Whereas creative problem-solving facilitates developing innovative ideas through a less structured workflow, design thinking takes a far more organized approach.

Design thinking is a human-centered, solutions-based process that fosters the ideation and development of solutions. In the online course Design Thinking and Innovation, Harvard Business School Dean Srikant Datar leverages a four-phase framework to explain design thinking.

The four stages are:



* Clarify: The clarification stage allows you to empathize with the user and identify problems. Observations and insights are informed by thorough research. Findings are then reframed as problem statements or questions.
* Ideate: Ideation is the process of coming up with innovative ideas. The divergence of ideas involved with creative problem-solving is a major focus.
* Develop: In the development stage, ideas evolve into experiments and tests. Ideas converge and are explored through prototyping and open critique.
* Implement: Implementation involves continuing to test and experiment to refine the solution and encourage its adoption.

Creative problem-solving primarily operates in the ideate phase of design thinking but can be applied to others. This is because design thinking is an iterative process that moves between the stages as ideas are generated and pursued. This is normal and encouraged, as innovation requires exploring multiple ideas.

CREATIVE PROBLEM-SOLVING TOOLS

While there are many useful tools in the creative problem-solving process, here are three you should know:

Creating a Problem Story

One way to innovate is by creating a story about a problem to understand how it affects users and what solutions best fit their needs. Here are the steps you need to take to use this tool properly.

1. Identify a UDP

Create a problem story to identify the undesired phenomena (UDP). For example, consider a company that produces printers that overheat. In this case, the UDP is "our printers overheat."

2. Move Forward in Time

To move forward in time, ask: “Why is this a problem?” For example, minor damage could be one result of the machines overheating. In more extreme cases, printers may catch fire. Don't be afraid to create multiple problem stories if you think of more than one UDP.

3. Move Backward in Time

To move backward in time, ask: “What caused this UDP?” If you can't identify the root problem, think about what typically causes the UDP to occur. For the overheating printers, overuse could be a cause.

Following the three-step framework above helps illustrate a clear problem story:

* The printer is overused.
* The printer overheats.
* The printer breaks down.

You can extend the problem story in either direction if you think of additional cause-and-effect relationships.

4. Break the Chains

By this point, you’ll have multiple UDP storylines. Take two that are similar and focus on breaking the chains connecting them. This can be accomplished through inversion or neutralization.

* Inversion: Inversion changes the relationship between two UDPs so the cause is the same but the effect is the opposite. For example, if the UDP is "the more X happens, the more likely Y is to happen," inversion changes the equation to "the more X happens, the less likely Y is to happen." Using the printer example, inversion would consider: "What if the more a printer is used, the less likely it’s going to overheat?" Innovation requires an open mind. Just because a solution initially seems unlikely doesn't mean it can't be pursued further or spark additional ideas.
* Neutralization: Neutralization completely eliminates the cause-and-effect relationship between X and Y. This changes the above equation to "the more or less X happens has no effect on Y." In the case of the printers, neutralization would rephrase the relationship to "the more or less a printer is used has no effect on whether it overheats."

Even if creating a problem story doesn't provide a solution, it can offer useful context to users’ problems and additional ideas to be explored. Given that divergence is one of the fundamental practices of creative problem-solving, it’s a good idea to incorporate it into each tool you use.

***Internal Assessment Criteria and Weight***

• IAC0701 Possible design thinking applications are explored and discussed

***(Weight 15%)***