2. What is Design Thinking?

Curio was disappointed at the end of the call with the customer.

His boss seemed to have a plan in mind. He handed over a card to Curio.

Curio was confused.

"Master Gised, Karmic Design Thinking, EAST," he read out loud.

Without warning, a man suddenly appeared in front of Curio. The visitor was portly and middle-aged.

"Master Gised at your service. Did you need help with something?" asked the man.
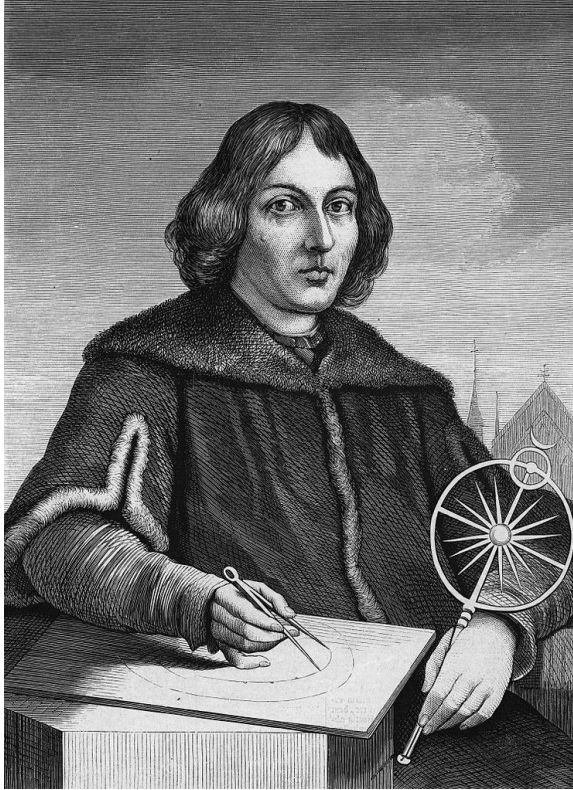
Curio was taken aback. "I have no idea! Do I?"

"Well, let's see. Why don't you tell me about the problem you are facing?"

Curio, still a bit stunned, narrated the customer presentation episode that had left him feeling embarrassed.

"Ah, OK," said Gised. "I now understand why Mr. Piano asked you to contact me. He wants you to learn Design Thinking and apply the principles to the problem that you are investigating."

"Design Thinking? What is Design Thinking?"

"Take a look at this picture," said Gised, pulling out a photograph from his brown satchel. He then proceeded to explain.

Figure 2.1: Portrait of Nicolaus Copernicus, an astronomer and mathematician. He was one of the first European scientists to challenge the prevailing theory that the Earth was the center of the Universe. It is believed that Copernicus shied away from publishing his work on the heliocentricity of the solar system. He did not want to draw too much attention to his belief that Earth was not the center of the universe. Image source: https://ku.m.wikipedia.org/wiki/Wêne: Copernicus.jpg

The man in the picture (Fig. 2.1) is the mathematician and astronomer Nicolaus Copernicus. He proposed that the center of the universe is not Earth but the sun. During his time (the 15th century), in medieval Europe, the general belief was that Earth was the center of the universe. Nicolas Copernicus spent a great deal of time and effort to prove otherwise. The equations used to describe the geocentric model (equations explaining revolution of other planets around planet Earth) were very complex. On the other hand, the equations used to describe a heliocentric model (a model with the sun at the center) were simpler. Thus, Copernicus's efforts provided simpler planetary models for learning (Somervill 2008).

But things didn't turn out to be rosy. Some people disagreed with Copernicus's explanation. They did not see any object moving around them when they were perfectly still. So the entire community of scientists[1] split into two groups—one that supported Copernicus's theory and one that did not[2]. After much debate and cry, it was finally established and accepted that Earth is not the center of the universe.

> In the Design Thinking universe, we consider Earth and its inhabitants to be the center of our product/service universe.

Why do we make such a statement? To design useful products and services, we must adopt the belief that customers or users are the center of the product/service universe. Design Thinking is also referred to as **human-centered design**.

Design Thinking starts with the person, the human. How can we help a specific person?

Design Thinking was introduced as a discipline in the 1970s, when the global design company IDEO[3] popularized the methodology. Researchers at Stanford University[4] and practitioners at IDEO formulated a streamlined process for designers to follow. The process was well structured and included case studies and methods.

To reiterate, the most important guideline in Design Thinking is to make the human the center or focus of every consideration, thought, or action.

Let us discuss the role of Design Thinking in the context of an organization or company. We assume that an organization operates under the premise of generating revenue from products/services, as highlighted in Fig. 2.2.

The figure indicates that in an organization, all ideas, when implemented, create services or products that generate revenue. Although simplistic, this basis is adequate as a context for Design Thinking because our objective is to focus on the big picture.

Ideas do not arise out of vacuum. They are conceived as solutions to a problem or a set of problems. So the link can be expanded as shown in Fig. 2.3.

Where do these problems come from? From challenges that people face. People have numerous problems and may even be unaware of some of these problems. Companies or organizations provide value by unearthing these problems and solving them, as represented in Fig. 2.4.

The figure looks more comprehensive now. However, one component is still missing.
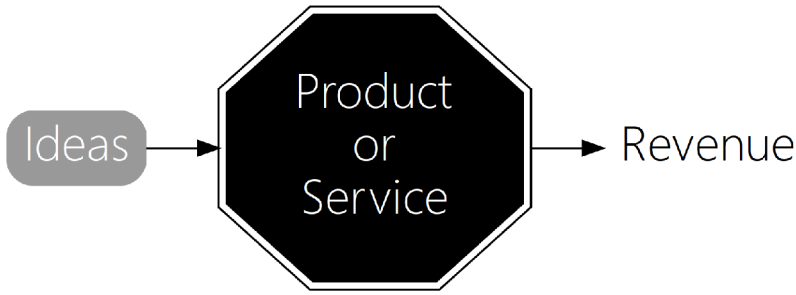
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1. What is the term for a group of scientists? Since I have belonged to such a group, I was curious. This funny article showed up: http://www.mrscienceshow.com/2010/11/what-is-collective-noun-for-group-of.html.
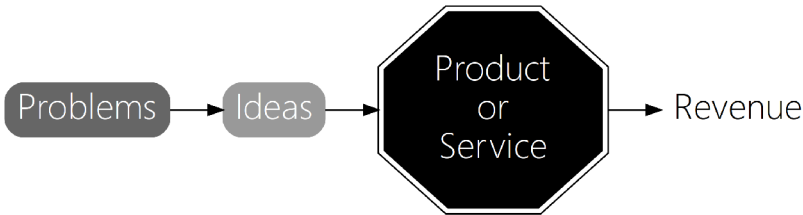2. One of my friends used to joke that there are two types of people in the world—those who watch TV and those who don't. This is a clever (or dumb) way to categorize anything. Substitute "watching TV" with anything else and you would have divided the entire world's population into two categories.
3. Check out https://ideo.com and https://ideo.org for methods and case studies in design thinking.
4. http://dschool.stanford.edu

Product
or
Service

Ideas → **Product or Service** → Revenue

Figure 2.2: Basic premise of a business. This illustration is a simple model of an organization (for-profit, non-profit or academic). Ideas implemented should lead to sales of a product/service, which in turn should generate revenue from the customer.

Problems → Ideas → **Product or Service** → Revenue

Figure 2.3: Basic premise of a business. Ideas need to be implemented in the form of products and services; products and services generate revenue. These ideas are solutions to problems.

Consider the following scenario:

A company creates a brand new car, built especially for you. You are mildly impressed. The salesperson describes all the features of this car (e.g., it can travel at 700 km/h) and all the problems it could solve for you (e.g., it could do the laundry while you take it for a spin). Your interest increases.

Then, the salesperson mentions that this is the first time that a human being is going to sit in this untested prototype, the first car of its kind.
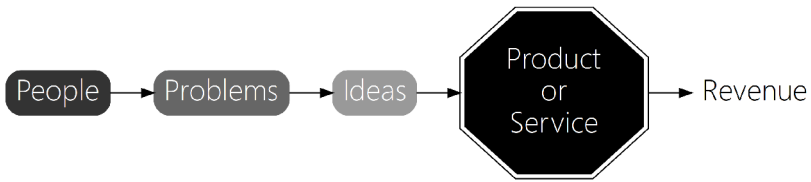
You start backing off mumbling, "I just remembered. I have something to do."

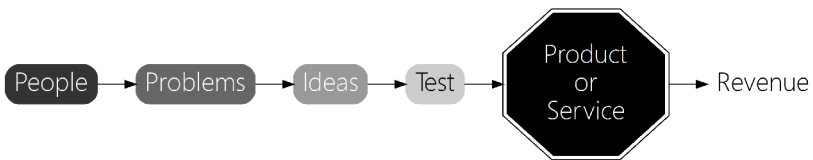The salesperson probes further. You say, "Some pending work at my office."

The salesperson wonders what triggered the wavering of thought. Then he realizes that the car has not been tested before this presentation to the customer. A major step omitted!

Testing is a necessary step between Ideas and Product/Service.

Voilà! We have derived four phases (People, Problems, Ideas, Test) in the creation of a product/service (Fig. 2.5).

Figure 2.4: Basic premise of a business. Problems yield ideas, and these ideas manifest in the form of products/services. These products/services lead to revenue for the company. The important question to ask is–Whose problems? People usually encounter numerous problems that require solutions.

Figure 2.5: Basic premise of a business. People encounter problems; these problems require ideas as solutions. Implemented ideas take the form of products/services, leading to revenue generation. However, people would hesitate to use untested products. Therefore, testing is an integral step before the launch of a service/product.

These four phases are essential in creating a product or service that can generate revenue for a company/organization. These phases constitute key steps in Design Thinking.

Curio interrupted Gised.

"I don't understand. How do you actually execute these four phases in Design Thinking?"

Gised smiled and continued to elaborate.

1. *People*: Observe, talk, interact, and socialize with users/customers. **Empathize** with them.
2. *Problems*: Listen to your customer's problems or unearth hidden problems, and then analyze these problems. **Analyze** to understand unsaid or latent needs.
3. *Ideas*: Reflect on the analysis. **Solve** the analyzed problems.
4. *Test*: Create a prototype solution. **Test** the solution with real people (your users/customers). Record the observations, results, and user experience. The testing results are key to the evolution of the product/service.

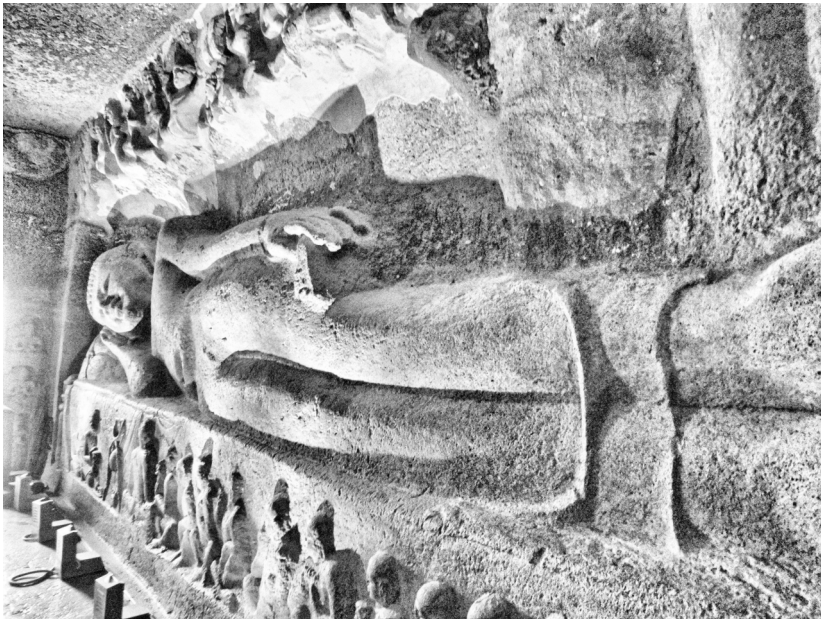Consider the four phases of Design Thinking to be:

1. Empathize
2. Analyze
3. Solve
4. Test

Use the acronym EAST to remember the phases.

In other Design Thinking models, an additional phase called Prototyping is included before the Test phase. In the EAST model, Prototyping is included in the Test phase.

This model seems to be logical and complete. However, is such a model containing these four phases complete and sufficient? Have there been similar attempts at modeling the phases of Design Thinking? If so, how old are these methods?

At the time that I was thinking about these questions, I had planned a trip to Ajanta, the location of some ancient Buddhist caves.

Figure 2.6: Mahaparinirvana or the attaining of Nirvana. In this sculpture (Cave 26 at Ajanta, India), the angels in the top row appear happy, while the people in the bottom row look sad. The angels are happy at the prospect of having Lord Buddha in their midst, while the people on Earth are sad because the Lord is leaving them.

The Ajanta caves in central India are over 2000 years old. These caves were lost to humanity for almost 1000 years before a British soldier rediscovered them during a hunting expedition in 1819.

The soldier, John Smith, left a mark of his identity in one of the caves. This cave is

now referred to as Cave 10; it is a *Chaityagriha* or place of worship. It is possible that he climbed a pile of wood stacked near a pillar and signed his name in this cave at a height of about 7-8 feet.

If you visit these beautiful caves, go to cave 10 and try to spot the mark that John Smith made there. The life of Lord Buddha is depicted in the carvings and paintings at Ajanta. You could also visit cave 26 to see the Mahaparinirvana sculpture (Fig. 2.6).

While studying about the history of the Ajanta caves, I stumbled upon Lord Buddha's teachings, particularly, his first discourse at Sarnath, India, after he had attained enlightenment in Bodh Gaya, India.

Gautama Buddha postulated his four noble truths to five disciples at a deer park in Sarnath. These truths were based on insights that he obtained after 49 days of meditation under a tree.

These four noble truths (Tsering 2010) are:

1. *Dukkha*: Acknowledge that there is suffering. This suffering is caused by disease, old age, rebirth, jealousy, loss of one's favorite possessions, and departure of loved ones. What is the suffering? How does it affect people?
2. *Samudaya*: Find out the reasons for the suffering. Why are people suffering? What are the reasons for this suffering?
3. *Nirodha*: Think of ways to end the suffering. How does one eliminate the reasons for the suffering?
4. *Marga*: Embark on the path to end the suffering once and for all. What is the path that will put an end to the suffering?

My mind lit up when I learned about these noble truths. In my mind, I carried out an exact one-to-one mapping between the four phases in my Design Thinking model and the four noble truths that Buddha had put forward over 2500 years ago. A new realization dawned on me.

Could we establish a correlation between the four noble truths and the four phases of Design Thinking described earlier?

Let us assume that there exists a one-to-one correlation. How can this correlation be explained? What is the mapping?
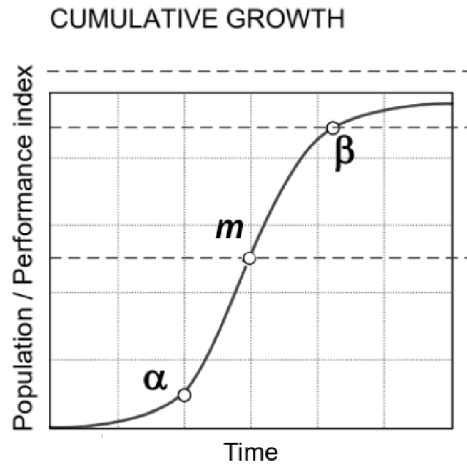
To find out, let us delve into the purpose and scope of Design Thinking.

How could the four noble truths help us design better products or services?

Every product or service alleviates the suffering of the customers.

Every product or service is designed and then redesigned to adapt to all possible needs

and wants of the customer. Every product or service goes through a transformation from birth to death, typically modeled by an S-shaped curve (Fig. 2.7). The "hockey stick" curve was independently discovered in different fields. The adoption of a particular product/service is associated with one S-shaped curve.

CUMULATIVE GROWTH

Figure 2.7: S-curve representing product/service evolution. Representation of an S-curve of a population or a performance metric vs. time. This plot is also called a time-series curve. α represents the point at which the linear growth of the population starts, and β represents the point at which the linear growth ends. The linear growth curve from α to β can be split into two at the mid-point, m, of the curve. Image source: FORMAT Handbook (FORMAT Project 2020).

The S-shaped curve models the different stages in the adoption of the product[5] in the market. There are four phases in an S-shaped curve model.

I. *Incubation*: The first part of the curve—from the start to point α—is the **incubation** phase. From a resource consumption standpoint, the product consumes resources for evolution. In this phase, the adoption is limited to "early adopters" who stand in line for hours to get their hands on this new product line.

2. *Feature addition*: The next phase—from α to the mid-point *m*—is the **feature addition** phase. In this phase, the adoption in the market is better than it was during incubation; however, the product is likely to have problems.

3. *Maturity*: The next phase—from the mid-point *m* to β—is the **maturity** phase. In this phase, the product is well established and the feature additions are minimal. The product ages, and finally, as the product is phased out, the function is transferred to some other product before it finally reaches end of life or end of production. The evolution of the new product follows another S-shaped curve.

4. *Decline*: The last phase—from point β to the end—is the **decline** phase. In this phase, the product is being replaced by another product, and hence, the mature

5. Although this discussion on the S-shaped curve uses the term product, the model is applicable to services as well.

product loses features and also sees a dip in the price point.

This empirical description could be mapped to the life cycle of a real product.

What happens after the maturity phase ends?

To answer this question, let's consider the example of smartphones. Take your favorite one. The name typically includes a number after the brand name, e.g., iPhone 7, Samsung Galaxy S7, Google Pixel 4.

What do these numbers after the brand name indicate?

These numbers signify the number of birth-rebirth cycles of that product. After the launch of the phone, the design and product teams go to the drawing board with feedback from their users/customers. The teams add more features or improve existing features to address what they learned from their users/customers after the launch. This process of continuous improvement repeats for every new generation or version that is launched. The *Karma* or the original set of features and the subsequent additions to the features are present until the end of the last cycle. Once the product reaches maturity, the product attains *liberation*. Liberation is the transfer of features from the current product to the next product/service line.

When the product is in the maturity phase, the substitution of the current product starts. Many candidates—those that could take the place of the current product—are ready. People who are early adopters start lining up in queues for all these candidates. Then, the new product starts getting accepted by a few more adopters. These adopters spread the word. This phenomenon is described by Malcolm Gladwell in his book *The Tipping Point* (Gladwell 2006).

Early adopters have already moved on to try the products in the new S-curve because the trial period has commenced, and the cycle begins again.

Let's summarize the discussion so far. The Design Thinking approach discussed here is inspired by Lord Buddha's four noble truths.

1. **Empathize**: Maps to *Dukkha*. What is the suffering?
2. **Analyze**: Maps to *Samudaya*. What is the root cause of suffering?
3. **Solve**: Maps to *Nirodha*. How can the reasons for the suffering be ended?
4. **Test**: Maps to *Marga*. What is the path to be taken to end the suffering?

Therefore, this approach has been termed Karmic Design Thinking, reflecting the Karma transferred from a past life to the new life (from one product/service S-curve to the next product/service S-curve).

Curio nodded. He reflected on everything that Gised had explained.

"It is always best to learn by doing. You can learn the concepts from a book, a video, or a workshop; however, you will learn most effectively when you go out into the real world

and help real people," advised Gised.

After a short pause, Gised continued, "Now, let me explain the structure of Karmic Design Thinking."

3. Overview of Karmic Design Thinking

The four phases in Karmic Design Thinking are:

I. Empathize

In this phase, we acknowledge that people are facing a problem or challenge, and we find out what they are experiencing.

Let us begin with the people.

Some questions to ask are:

Whom are we trying to help?

What is their suffering?

To find out the answer, examine a particular product or service that you can access. You should be able to observe and talk to real people while they are using the product or service.

What makes them sad?

What makes them furious?

What makes them feel helpless?

Which part of the system needs to be fixed?

We will use some tools of thinking[1] to determine the answers.

II. Analyze

In this phase, use your observations from the Empathize phase for further analysis. Delve deeper into the root cause of the customers' suffering and into the conflict between what you can provide (as Design Thinkers) and what the customers desire.

Why are people suffering?

What are the reasons for this state that people or systems are in?

Tools from TRIZ (Russian acronym for a systematic problem solving technique called Theory of Inventive Problem Solving) will be used for analysis. The root cause of the suffering needs to be determined. Here, the problem solver can choose a method that is suitable for them.

How did the suffering come into being?

What does a world without the suffering look like?

What is the Nirvana or *Nibbana*[2] for such a state of continued suffering?

III. Solve

In this phase, use the analysis of the state of the customers to find solutions. Generate solutions for the problems determined in the Analyze phase.

How can we end the reasons for the suffering?

The examples of the application of human ingenuity for solutions, summarized under the TRIZ theory, can be leveraged in this phase.

IV. Test

It is not enough to have great ideas for the betterment of people or systems around us. We need to build concrete representations of our ideas with which users/customers can interact. Do these representations/solutions solve the problems for our users/customers?

What is the exact path to be taken to end the suffering?

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1. Here, "tools of thinking" typically implies tools of thinking or thought experiments. There are several such thinking tools, for example, Multi-Whys (described in Sec. 12.2). This "tool" suggests that the question "Why" be applied many times on a problem to get to the root cause of the problem. We will use several of these "tools of thinking" throughout the book.
2. *Nibbana* in Pali, the language used by Lord Buddha to communicate his ideas to the world.

Figure 3.1: Flowchart of the Karmic Design Thinking process, inspired by Lord Buddha's Four Noble Truths. About 2500 years ago, Lord Buddha postulated the Four Noble Truths. These truths are Dukkha, Samudaya, Nirodha, and Marga. They have served as the inspiration for the four phases of Karmic Design Thinking–Empathize, Analyze, Solve, and Test. These four phases form the basis of a compassion-led methodology for human-centered product/service development.

Liberation

Several iterations of the Design Thinking process can yield a strong design that liberates your customer from the suffering. This is the ultimate goal of all the products/services/businesses—to help their users or customers attain Nirvana.

Inspiration from Lord Buddha should help the products attain a state of Nirvana as well. The products should leave their goodness behind although they themselves may not exist in their original form.

For example, the need to tell time has existed for many years. Our ancestors used the sun and stars for telling time. Products and services show added value in each generation. Over generations, products that tell time have evolved—the function rested on our wrists (in the form of a wristwatch), and it then moved to the mobile phone. Now, "wearable" gadgets are back. However, these products are close to attaining Nirvana unless they perform a function other than telling time.

A feature here, a form change there, a bug removed, a color added there. In the linear growth phase of the S-curve (logistic growth phase), products gain form, features, and colors. They also lose certain characteristics—bugs, number of components, and number of steps/clicks. Over time, the functionalities of a calculator, a radio, a timer, a data bank, and other devices have been added to the humble watch. During this phase, major changes in cost are not observed. Here, cost implies the resources that the product or service consumes in order to continue to be useful for the users. Then, toward the end of its life, the product or service consumes fewer resources and loses some benefits or features.

This behavior is best illustrated using an equation from the TRIZ world. This equation defines an ideal product or a service[3].

$$IdealFinalResult = \frac{\sum Benefits/Features}{\sum Harm/Negatives/Bugs + \sum Costs}$$

A product or service is ready to enter the next generation if it is mature enough or ready to be absorbed by another product or service in totality.

This end of all the S-curves is equivalent to Liberation or Nirvana or Nibbana.

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3. Ideal Final Result is defined in the book *Insourcing Innovation: How to Transform Business as Usual Into Business as Exceptional* (Silverstein, DeCarlo, and Slocum 2005).