SCHOOL OF COMPUTING
Faculty of Engineering

TECHNOLOGY AND INFORMATION SYSTEM

SEMESTER I 2020/2021

SECP1513-04

DESIGN THINKING REPORT

CHAPTER 10

INFORMATION SYSTEMS

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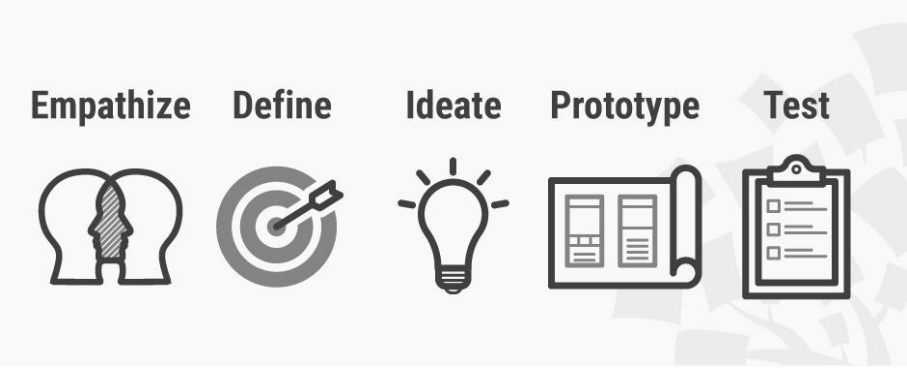
1. Introduction

Razzouk and Shute (2012) point out that Design Thinking is usually described as an analytical and creative process that enables an individual to experiment, build and test models, collect feedback, and redesign. According to Dam and Teo (2020), in order to arrive at a solution, this contrasts with a more empirical approach where the concrete and proven elements are checked. They have stated that Design Thinking is not only for designers, but also for innovative workers, freelancers, and leaders who are seeking to instill design thinking into every level of an company, product, or service to push new business and social alternatives. They mentioned that Hasso-Plattner Institute of Design at Stanford (d.school) proposed five-stage Design Thinking model. They note that the five phases of design thinking are as follows:

- Empathy – with your users
- Define – your users' needs, their problem, and your insights
- Ideate – by challenging assumptions and creating ideas for innovative solutions
- Prototype – to start creating solutions
- Test – solutions

Figure 1

Design Thinking



Note. Design Thinking. Adapted from What is Design Thinking?, by Y. Teo, 2020, https://www.interaction-design.org/literature/topics/design-thinking.

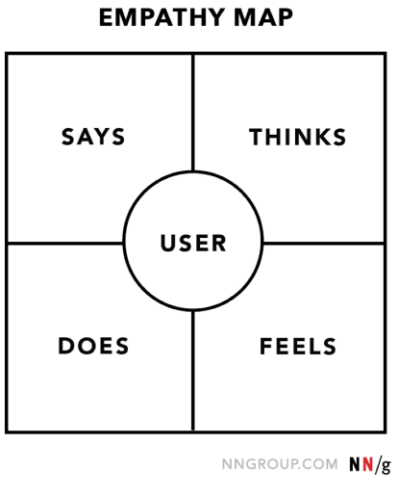
2. Details of Design Thinking process

2.1 Empathy

According to Dam and Teo (2020), the first step of the process of Design Thinking is to develop an empathic understanding of the issue you are trying to solve. They stated this includes interviewing professionals to learn more about the field of interest by studying, communicating and empathizing with individuals to consider their perspectives and motives, as well as immersing yourself in the physical world so that we can develop a deeper personal understanding of the problems involved. According to Stevens (2018), the goal is not to affirm or contradict a preconceived idea, but to uncover as much insight as possible.

Figure 2

Empathy Map



Note. Empathy Map. Adapted from Empathy Mapping: The First Step in Design Thinking, by S. Gibbons, 2018, https://www.nngroup.com/articles/empathy-mapping/.

2.2 Define

According to Stevens (2019), we will describe the user problem that you want to address in the second stage of the Design Thinking process. Stevens mentioned that first from the empathy step, we will collect all of your observations and begin to piece them together. She describes that we will formulate what's known as a problem statement after you've synthesized your results. She notes that the problem statement holds the user in mind, as with everything in the Design Thinking process.

2.3 Ideate

According to Dam and Teo (2020), designers are able to start producing ideas during the third stage of the process of Design Thinking. They stated that in the Empathy phase, you have evolved to understand your users and their needs, and in the Describe phase, you have evaluated and synthesized your insights, and ended up with a problem statement based on humans. They mentioned that we will begin to "think outside the box" with this solid context to find new solutions to the problem statement we have made, and we can start searching for alternate ways to view the problem. They noted that at the beginning of the ideation step, it is necessary to get as many ideas or problem solutions as possible.

2.4 Prototype

According to Stevens (2019), we will turn the ideas from stage three into prototypes in the fourth stage of the Design Thinking process. She mentioned that a prototype, be it a static paper model or a more immersive digital representation, is basically a scaled-down version of a product or function. She stated that the aim of the prototyping process is to turn our thoughts into something concrete that can be evaluated on actual users. She noted that this is vital in maintaining a user-centered strategy that allows us to gather feedback before we go ahead and create the whole product. This guarantees that the final design genuinely addresses the dilemma of the consumer and is a joy to use.

2.5 Test

According to Dam and Teo (2020), using the best ideas found during the prototyping process, designers or evaluators rigorously test the complete product. They mentioned that this is the final stage of the 5 stage-model, but the findings produced during the testing phase are also used in an iterative process to redefine one or more issues and remind users' understanding, the conditions of use, how people think, act, feel, and empathize. They noted that in order to rule out problem solutions and derive as deep an understanding of the product and its users as possible, alterations and refinements are made even during this stage.

3. Detail step and descriptions in design thinking and evidence for each phase

We write a log journal to keep track of our progress. It is shown in Table 1.

Table 1

Log journal

DATE	TIME & ACTIVITIES
2 November 2020	8.30PM – 9.30 PM - We discussed about the assignment and tasks to be carried out by each group member.
3 November 2020	5.00 PM – 6.00 PM - We discussed with other sections' students about what questions to interview the experts to obtain insights. 9.00 PM – 11.00 PM - We interviewed the experts about Information Systems.
8 November 2020	11.15 PM – 11.30 PM - We had a meeting to define problems.
9 November 2020	11.10 PM – 11.25 PM - We had a meeting to ideate.
10 November 2020	8.00 PM – 10.00 PM - Report writing is started. - Prototype making is started.
11 November 2020	8.00 PM – 10.00 PM - Report writing is continued. - Prototype making is continued.
12 November 2020	8.00 PM – 10.00 PM - Report writing is continued. - Prototype making is continued.
13 November 2020	8.00 PM – 10.00 PM

	- Report writing is continued. - Prototype making is continued.
14 November 2020	8.00 PM – 10.00 PM - Report writing is continued. - Testing of prototype.
15 November 2020	8.00 PM – 10.00 PM - Report writing is finalized. - Prototype testing is finalized.

3.1 Empathy

On 3 November 2020, we interviewed Profesor Madya Mohamad Murtadha Bin Mohamad on Webex. He is an Associate Professor in School of Computing, Faculty of Engineering, Universiti Teknologi Malaysia. He is appointed as Deputy Director for Division of Digital Innovation in UTM Digital Services Department. If there is new technology of application development, he must train his team for the newest technology. At the same time, we also interviewed Mr Mohd Farid bin Sarji. His responsibilities are Strategic Department in charge of ICT management. Below is our interview.

Question 1: Have you designed any information systems before? Would you care to give a description of one of them?

Answer: We have designed systems related to information. Yes, I have designed information systems before.

Question 2: How does TPS (Transaction Process System) collect data or information?

Answer: When the user key in the data, the system itself will retrieve the data from the other systems or the existing database. There are many ways to collect data. Some from the existing systems integrated with the specific system or sometimes based on the user's input on the system itself.

Question 3: How is information systems used for targeted customers?

Answer: Our vision in UTM Digital, basically all the usage of information technology facilities is our customers. For example, lecturers and supporting staffs. Obviously, the targeted customers are the students. All the information of students is very important to ask, to see what is the journey of students. They are most of our concern.

Question 4: How computer-based information system help managers to make decision?

Answer: In big data, there are features of analytic, descriptive and many other features. These tools will help the management to make a decision based on analytic. In our organization in university, we have many students from different background of studies, such as social science, science and technology, and engineering. So, we have to predict which courses have the most first-class students after four years of studies. We have data to analyze which course has more first-class students than other courses.

Question 5: How are computer-based information systems linked together?

Answer: Most systems are interconnected. The developers have to find a way for the information systems to connect with each other. For example, API is used in order to allow separate system even though built from different programming language. API is very important in software development.

Question 6: Does information systems has high job opportunity?

Answer: Yes. For the big data, business intelligence, and robotic process automation are highly demanded on the market. Any new technologies and creative related jobs have higher job opportunity than repetitive jobs.

Question 7: Can data on information systems hard to access?

Answer: No, because user is the owner of data. Unless the user forgets the password or procedure, then it will be more difficult.

Figure 3

Pavunraj interviewing Profesor Madya Mohamad Murtadha

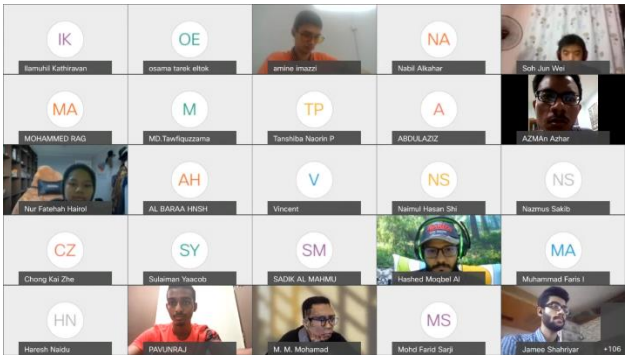


Figure 4

Kabilashwaran interviewing Profesor Madya Mohamad Murtadha

3.2 Define

We had a Google Meet to assemble all the problems from the interview and analyse them to define problems and users' issues. We had also suggested possible problems faced by users not listed in the interview. The problems are listed in Table 2.

Table 2

Define problems

Problems	**Descriptions**
The manager has problem at making decision	The manager does not know what place to store the products has the best results in terms of delivery time and cost.
The profit of company has reduced	The profit of company has reduced every month so the manager is finding ways to increase profit.
Lack of customer feedback	The manager needs feedback from customers so that he can satisfy their needs. Thus, more profit for the company.
Lack of data for analysis	There is not enough data for the manager to make wise decisions for improving profit.

Figure 5

We had a meeting to define problems.

3.3 Ideate

We had a Google Meet to discuss about the solutions and ideas of prototype. The solutions are listed in Table 3.

Table 3

Ideate

Solutions	Descriptions
Create Decision Support System.	Decision Support System can help manager to make decisions.
Use big data.	Big data can be integrated into Decision Support System for analysis.
Create a feedback system from customers.	Feedback system can let customers express their needs.
Decision Support System should be user friendly.	Manager can save time and be more pleasant when using Decision Support System.

Figure 6

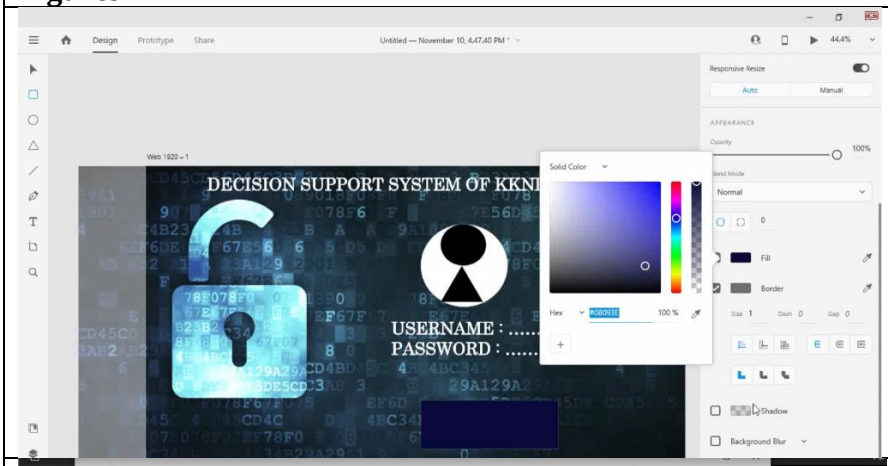
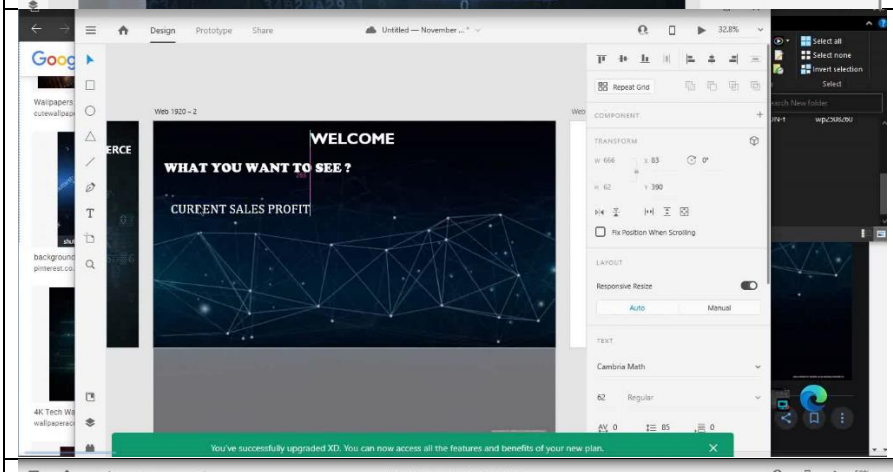
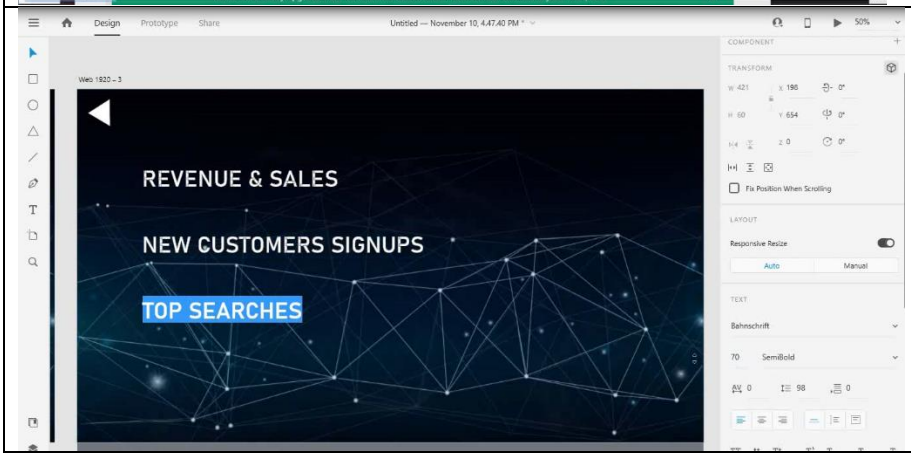
We had a meeting to ideate prototype.

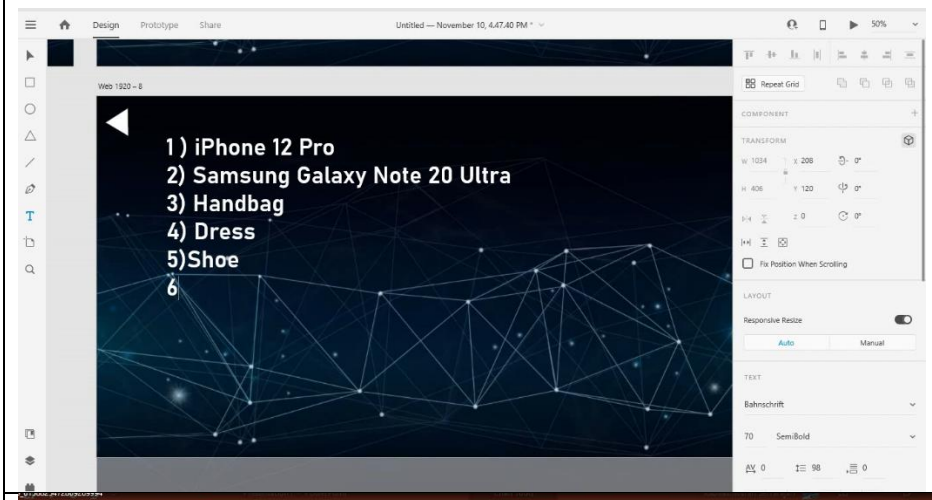
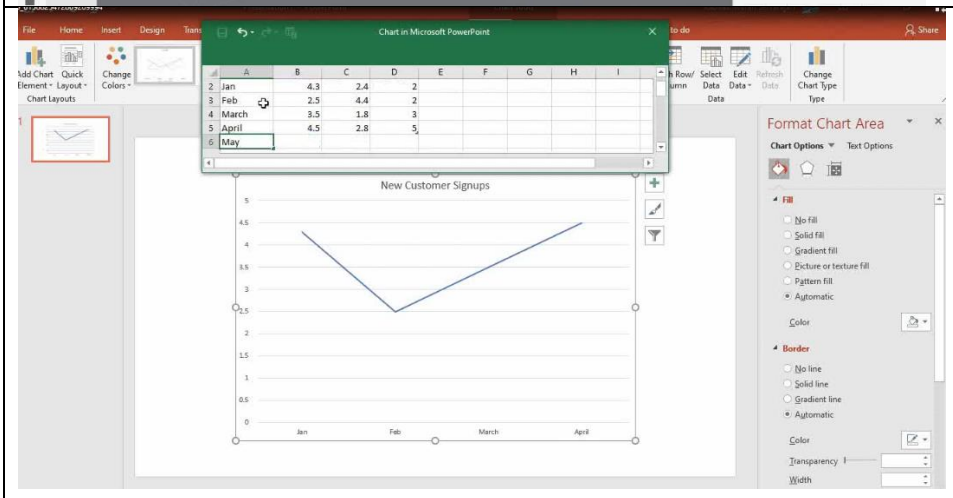
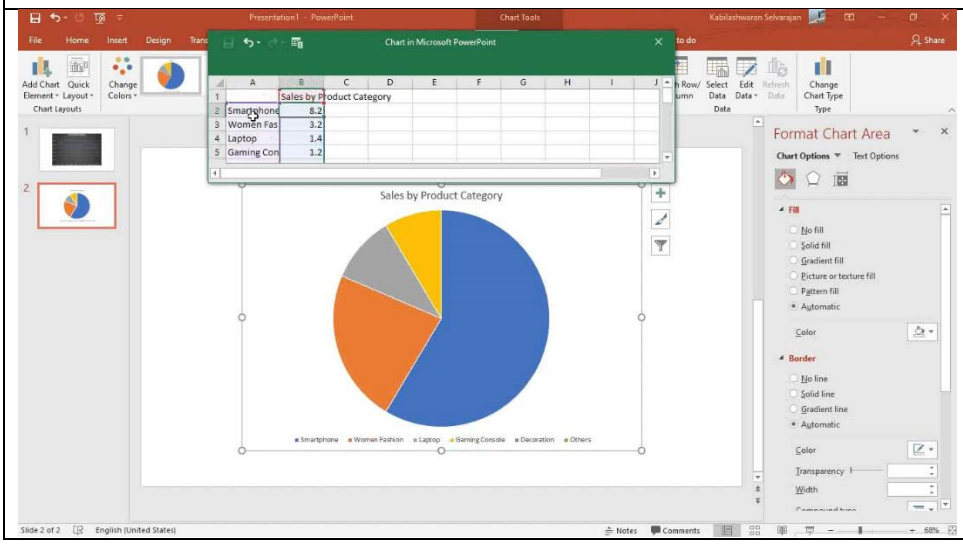
3.4 Prototype

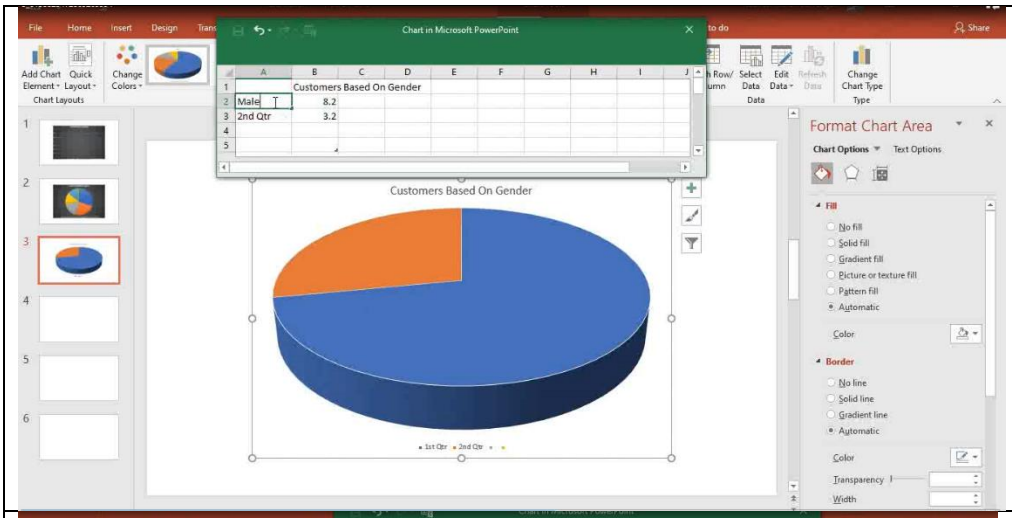
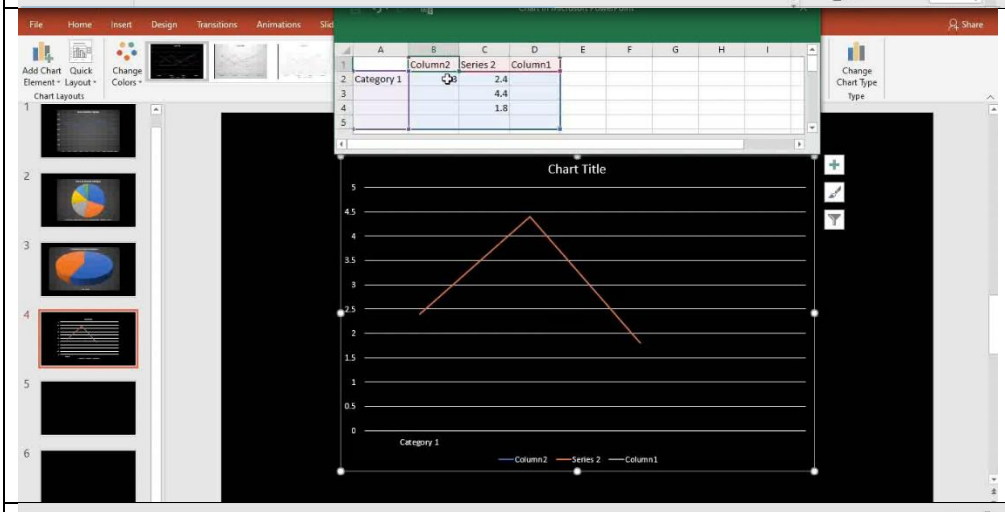
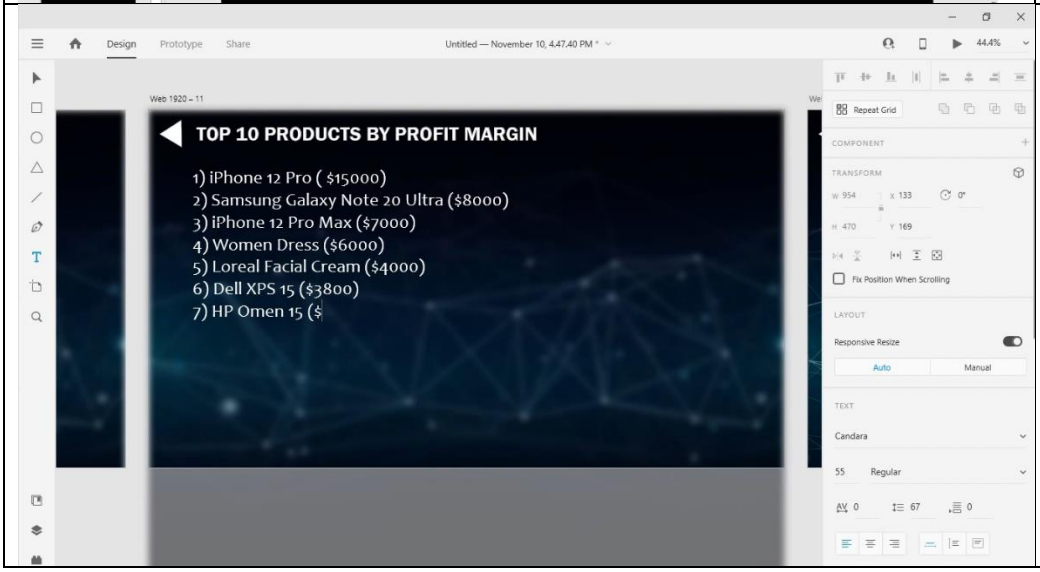
The prototype is made by using Adobe XD and Microsoft Powerpoint. The making process is shown in Table 4.

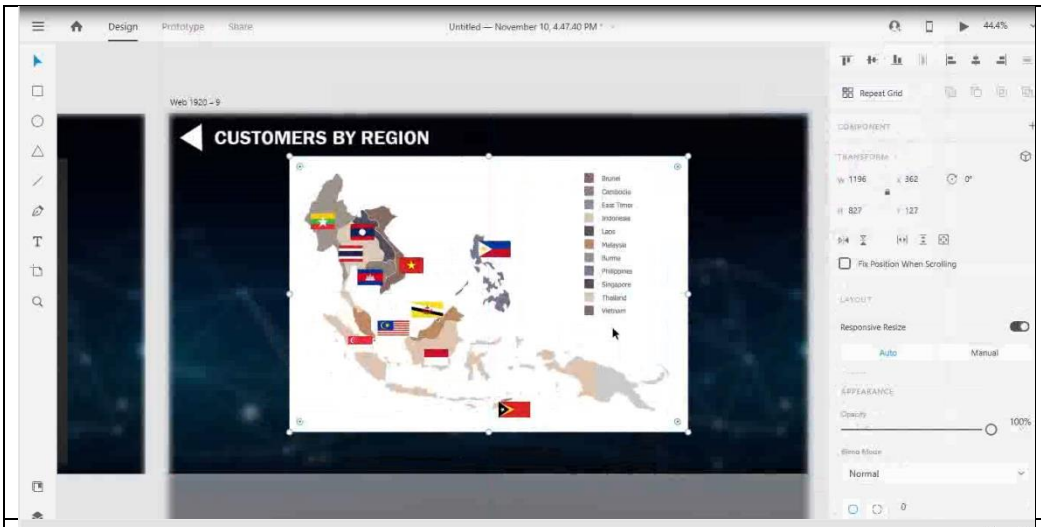
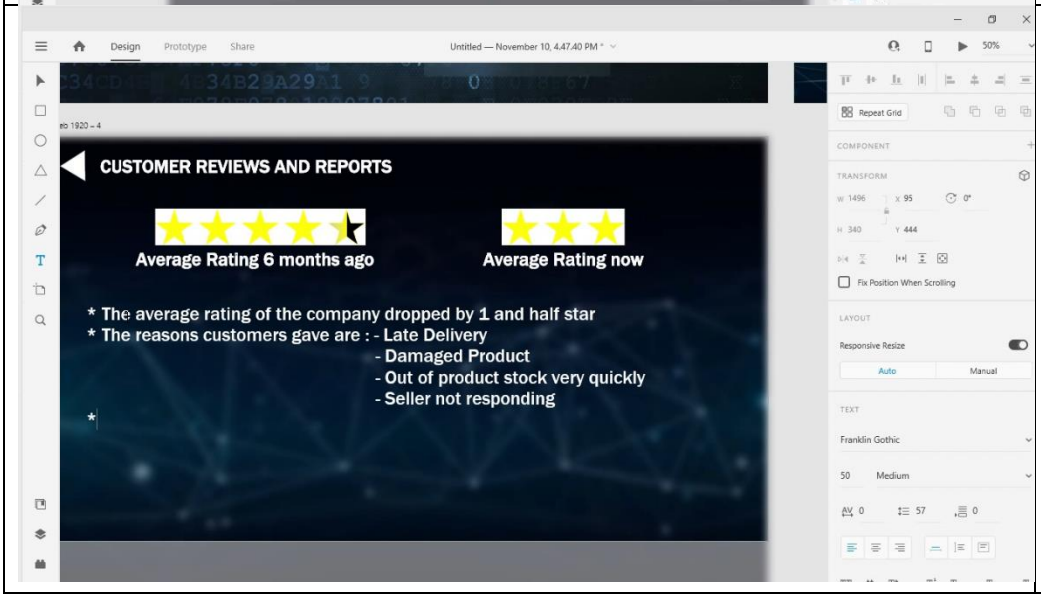
Table 4

Prototype Making

Figures	Descriptions
	The making of login page of Decision Support System.
	The making of Welcome page.
	The making of Current Sales Profit.

	The making of Top Searches.
	The making of New Customer Signups which also included the usage of Microsoft Powerpoint.
	The making of Sales by Product Category.

	The making of Customers Based on Gender.
	The making of Statistic of the Profit.
	The making of Top 10 Products by Profit Margin.

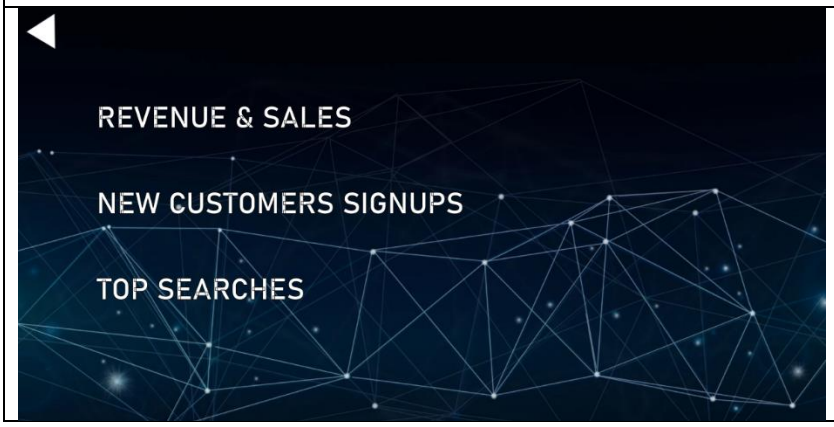
	The making of Customers by Region
	The making of Customer Reviews and Reports

3.5 Test

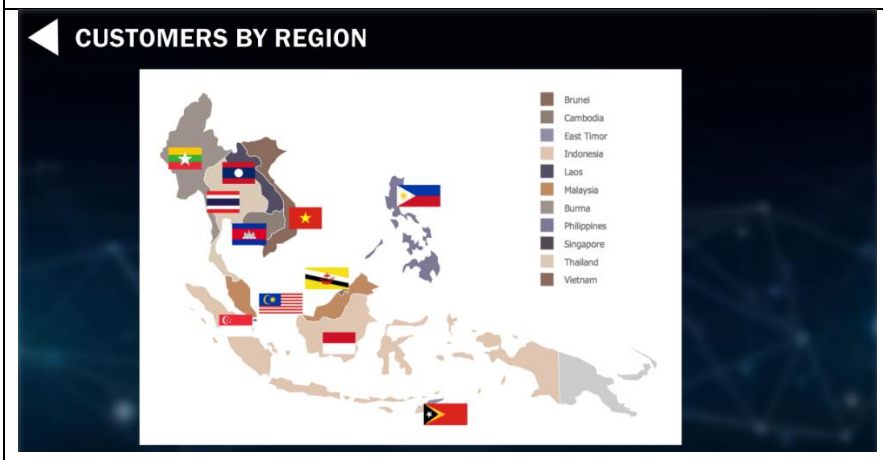
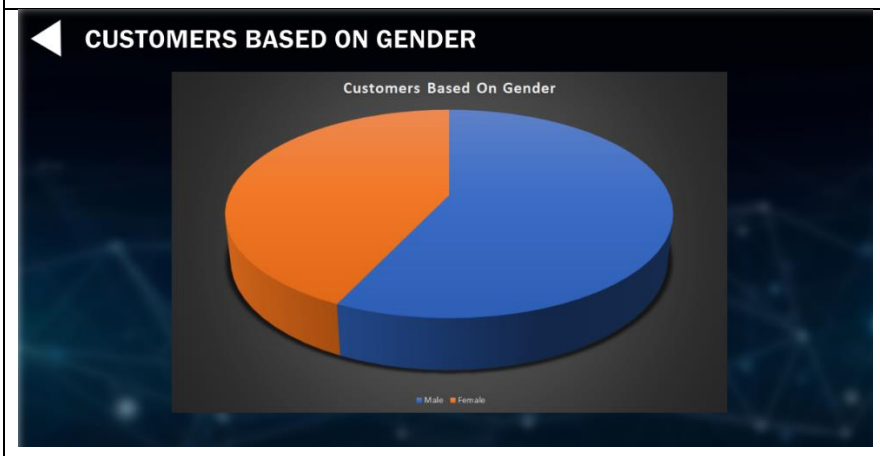
The prototype is tested to the user. The user has positive feedback. The testing will be shown in Table 5.

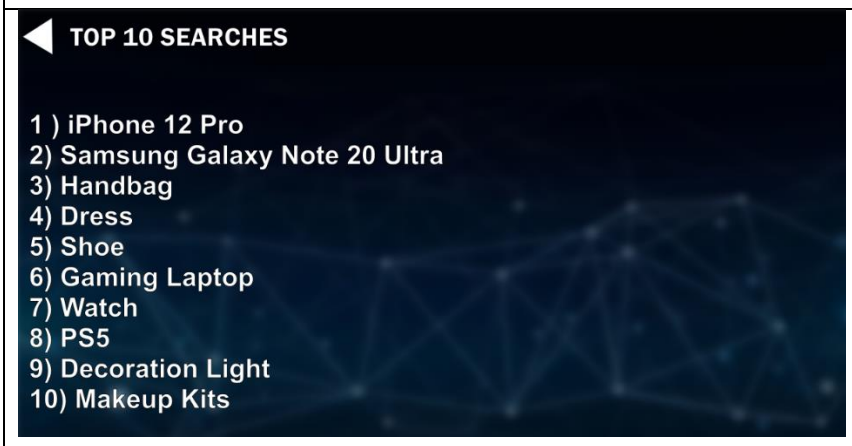
Table 5

Testing prototype

Figures	Descriptions
	The login page of Decision Support System.
	After logging in, the user will see Welcome page.
	The user will see this after clicking on Current Status.

		The user can choose to see different type of statistics after clicking on Revenue & Sales
		The user can see Statistic of the Profit after clicking on “Click to look at the statistic”
		The user can see the most profitable products by clicking on Top 10 Products by Profit Margin

	The user can compare sales of product category by clicking on "Sales by Product Category"
	The user can see customers from which country by clicking on "Customers by Region"
	The user can see which gender spends more by clicking on "Customers Based on Gender"

	The user can see the statistics of new customers by clicking on "New Customer Signups"
	The user can see popular products searched by customers by clicking on "Top 10 Searches"
	The user can read the reviews from customers by clicking on "Customer Reviews and Reports"

<table>
<tr>
<td>

Survey about Online shopping

S.NO	Submit Date	Gender of costumer	How often do you purchase product using online platform	Category of products regularly buy	Expectation on service	Types of payment method preferred
1	09-11-2020	Male	Twice annualy	Electronic device or accessories	Free shipping	No Answer
2	09-11-2020	No Answer	No Answer	No Answer	No Answer	No Answer
3	11-11-2020	Male	Twice annualy	Electronic device or accessories	High quality products	Credit card
4	11-11-2020	Male	Annually	Home application	Fast delivery	Debit card
5	11-11-2020	Male	Quarterly	Electronic device or accessories	Fast delivery	Debit card
6	11-11-2020	Male	Monthly	Sports	Fast delivery	Debit card
7	11-11-2020	Female	Twice annualy	Groceries	Free shipping	Credit card
8	11-11-2020	Male	No Answer	Health&Beauty	Others	Others
9	12-11-2020	Male	Monthly	Electronic device or accessories	High quality products	Debit card
10	12-11-2020	Female	Quarterly	Home application	Free shipping	Credit card
11	12-11-2020	Female	Monthly	Health&Beauty	High quality products	Credit card
12	12-11-2020	Female	Annually	Electronic device or accessories	Free shipping	Debit card
13	12-11-2020	Female	Annually	Electronic device or accessories	Fast delivery	Debit card

</td>
<td>The user can know more about customer by clicking on “Survey Feedbacks”</td>
</tr>
<tr>
<td>

Amir Guest
19 minutes ago
it helps the user to see the statistics clearly

Meera Guest
Nov 14
the interfaces are cool

</td>
<td>User feedback</td>
</tr>
</table>

4. Detailed descriptions include problem, solution and team working

4.1 Group minute meeting for Define Phase

Agenda:

- Define problems for information system

Attendees:

- Ng De Ken
- Kabilashwaran A/L Selvarajan
- Pavunraj a/l Sivakumar
- Muhammad Khalif Arbai

Opening:

- The regular meeting of the Group Chapter 10 was called to order at 11.15pm on 8/11/2020 in Google Meet by Kabilashwaran A/L Selvarajan.

Approval of Agenda

The agenda was unanimously approved as distributed.

Open Issues

- Ng De Ken pointed out that manager has problem at making decision.
- Kabilashwaran A/L Selvarajan expressed concern about the profit of company.
- Pavunraj a/l Sivakumar reminded the lack of customer feedback.
- Muhammad Khalif Arbai complained about the lack of data for analysis.

Agenda for Next Meeting

Ideate prototype

Adjournment:

Meeting was adjourned at 11.30pm by Kabilashwaran A/L Selvarajan. The next general meeting will be at 11.10 pm on 9/11/2020 in Google Meeting.

Minutes submitted by: Ng De Ken

4.2 Group minute meeting for Ideate Phase

Agenda:

- Ideate prototype

Attendees:

- Ng De Ken
- Kabilashwaran A/L Selvarajan
- Pavunraj a/l Sivakumar
- Muhammad Khalif Arbai

Opening:

- The regular meeting of the Group Chapter 10 was called to order at 11.10 pm on 9/11/2020 in Google Meet by Kabilashwaran A/L Selvarajan.

Approval of Agenda

The agenda was unanimously approved as distributed.

Approval of Minutes

The minutes of the previous meeting were unanimously approved as distributed.

New Business

- Ng De Ken pointed out that Decision Support System is needed.
- Kabilashwaran A/L Selvarajan suggested the usage of big data.
- Pavunraj a/l Sivakumar recommended a feedback system from customers.
- Muhammad Khalif Arbai expressed that Decision Support System should be user friendly.

Adjournment:

Meeting was adjourned at 11.25 pm by Kabilashwaran A/L Selvarajan.

Minutes submitted by: Ng De Ken

5. Reflections

5.1 NG DE KEN

My goal with regard to my course is that I hope I can make the Internet safer. When I was young I made my computer caught malwares, so I hope I can get a career that helps to make computer security better. I also hope that this course can prepare me well as future employee.

I get to learn a lot from design thinking. My soft skills have improved by communicating with others. Having better soft skills will make my career advance. Design thinking also makes me learn how to identify problems and craft solutions based on user requirements. I also learn how to make prototypes and test so that employers and customers can know if their requirements are met without spending too much cost so that I can make my final products in higher quality.

To improve my potential in the industry, I plan to do more exercises and projects about my courses. I also will try to practise design thinking more to improve the quality of my products. I will try to be more active to improve my soft skills too.

5.2 MUHAMMAD KHALIF ARBAI

My goal is getting a career related to my course, maybe on the future I'll be a system security or creating a firewall to my program to my company.

Based on my experience after learning design thinking for around one month, this subject a big impact related to my course, because design thinking extremely useful in tackling problems that are ill-defined or unknown.

Maybe I'll increase my skill is like identify the performance/behavior that needs improving, increase my communication skill, increase my soft skill and hard skill also to improve my potential in the industry. And most importantly work harder and harder until I get satisfied with my action or job.

5.3 PAVUNRAJ A/L SIVAKUMAR

After four years of study, definitely I will become a degree holder in network and security course. But the thing is the knowledge is not enough for me to become professional cyber security engineer. Hence, I desire to further my studies in master class to gain more information about the

course. After finishing my masters in security course, I probably will join in any company to gain experience.

From design thinking project, I acquired a lot of benefits especially in gaining knowledge regarding information system. Other than that, I improved my communication skills during interview sessions. Not only that, I also get chance to know more about the problem faced by expert in their field. Furthermore, I also trained to work in a team so that the project will be completed before due date. Moreover, I experienced some leadership skills on how to accomplish the project. These kinds of criteria absolutely will help me in future.

Last but not least, there are some action have to be taken as soon as possible to achieve my goals. A person who likes to solve puzzles are eligible to this course. It is because, nowadays attack from hacker increases gradually because of one main reason which is to steal information. Therefore, I should find solutions for attack and have to respond immediately against emergencies. Moreover, I should improve communication skill so that I can perform well in job. Finally, I hope that my goals will be achieved soon.

5.4 KABILASHWARAN A/L SELVARAJAN

My goal in this course is to make an information system which make people life easier than ever. Being a student who study Technology and Information system, I am so grateful because I got to know tremendous amount knowledge about the Information System. I got to know how the system actually works and applied in real life scenario.

Design thinking allows me to enhance my thinking skills for analyzing problems, ideate solution and create a prototype. By involving in this design thinking I have learned on how to make a prototype by using prototype making software. Not only that, during this pandemic this design thinking couldn’t be done with physically, however our team made video call for meeting and we share our ideas and progress. This substantially increases my soft skill.

I think I need to seek more information to improve my knowledge. I also think it is necessary to try out different types of task, for example since I’ve gain knowledge on doing prototype, the next time I’ll try out other job to make sure I gain as much as possible experience to improve myself.

6. The Task for Each Member

6.1 NG DE KEN

- **Report writing**
- **Define**
- **Ideate**

6.2 MUHAMMAD KHALIF ARBAI

- **Design thinking video editor**
- **Define**
- **Ideate**

6.3 PAVUNRAJ A/L SIVAKUMAR

- **Test**
- **Define**
- **Ideate**
- **Empathy**

6.4 KABILASHWARAN A/L SELVARAJAN

- **Prototype**
- **Define**
- **Ideate**
- **Empathy**

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