THE ADOPTION OF RAPID PROTOTYPING IN WEBSITE DEVELOPMENT IN THAILAND: A CASE STUDY FOCUSING ON A MEDIUM-SIZED WEBSITE DEVELOPMENT COMPANY

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ABSTRACT

This study aims to investigate the scope of application of the rapid prototyping method in website development in Thailand by focusing on a medium - sized company. The project aims to find out if and to what extent rapid prototyping is used in the website development process, and how many iterations are needed for a successful website development process.

For this research I used a qualitative approach by conducting in-depth interviews with Sanook Online Limited. The length of each interview is between 30-45 minutes in a meeting room at Sanook Online Limited. The participants are cross functional and cross hierarchical level including top management, and staff level.

The study showed that it was possible to adopt rapid prototyping in website development in Sanook Company, for both website portal development and website solution for external clients.

KEY WORDS: Rapid prototyping / Website Development / Agency / Web Portal

26 pages

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CHAPTER I
INTRODUCTION

In the 21st century, technology comes fast and goes fast, people spend more time looking at mobile phone screens, tablets, and desktop screens than ever before. We are now moving into a paperless era. Newspapers, magazines, brochures, are dying and are being replaced by websites. It is not only paperless but also more convenient for consumers to browse information through the internet, they can search through websites like Google, Bing, and Yahoo. They do not need to visit libraries to search books for the information they need. That is why websites have become so significant. Websites are composed of information like texts or pictures that are used to fill in the user-interface (UI) that is designed by the designers or creative people. People may be curious, how two websites that serve the same thing can give a very different experience while browsing. This we refer to as the user-experience (UX). Can we adjust the interface of the website? Yes, we can but to do this we need to give feedback to the developers so they will fix it for us, then you can achieve the new experiences you desire from your visit.

In the website development process, there are many steps to cover before the website can be launched to end-users. It all starts with analyzing what the customer problems are and how we can provide the solution for them. After we have the solution, then we go to the designing phase, where we need to create the wireframe and prototype; if it does not work, the designer needs to re-design it until it works. Then we move to the development phase. In this phase we do a lot of coding to finally make the vision become reality. Last but not least, we need to test it before launching. Testers are hired for this process. Finally, the website is ready to be launched. You can see that there are a lot of steps involved and that each phase takes time to complete. Imagine that if the testers think that UX is not right, what do we do? In this case, we would need to go back to the designing phase and wait for the designers to re-design it until it is right, this would of course extend the time to launch the product.

There is one approach that is suitable for improving this situation which is rapid prototyping. Rapid Prototyping (RP) is commonly used in product innovation, and product design because it needs users to test the product before it goes to the production line (Kelley, 2002). The process consists of designing in a 3D Model program and constructing a real product to give to the customers or stakeholders to test it. If they do not like it, the manufacturing is able to re-design it again, and build it, and test it, until it meets the customer's expectations.

In website development, rapid prototyping has also been used but it is not yet very popular especially in Thailand. Certainly, if it is used we are not aware of it. Lyndon Geredo (2010) states that "rapid prototyping is the process of quickly mocking up the website and validating it with a team of users, stakeholders, developers, and designers. It is also mentioned that the keys to successful doing rapid prototyping are revising quickly based on feedback and using the appropriate prototyping approach. Moreover, it guarantees that everyone in the team shares the similar understanding, and reducing risk and avoid missed requirements which lead to a better design faster."

In this study, I want to investigate the adoption of rapid prototyping in website development in Thailand by focusing on the case example of a medium sized website development company. Thereby addressing the following questions 1) to what extent is rapid prototyping used in website development in Thailand? 2) If it is used, do people use it consciously or unconsciously? And 3) to what extent and how many iterations are used for feedback?

The scope of this paper will be limited to website and application development in Thailand. The research domain is focused on rapid prototyping for website development in Thailand, for website or application design, developer, and project manager also included. This research project will be conducted by reviewing the literature of rapid prototyping, website development, and rapid prototyping in website development. Moreover, for the data analysis part, I will use the qualitative method by interviewing employees at Sanook Online Limited Company, from the level of staff to management level. The interviewees consist of testers, website developers, Senior CSS designers, head of creative, Senior Vice President of IT, Vice President of UI & Design, and UI & Design Manager. All of them have a wide range of experience and have worked with this company for over two years.

CHAPTER II
LITERATURE REVIEW

This chapter provides the theoretical background of this paper, and is divided into four parts including a definition of terms, rapid prototyping, website development, and rapid prototyping in website development. The focus topic of this paper is located in the intersection of the literature on rapid prototyping and website development as shown in Figure 2.1. The researcher would like to find out if the rapid prototype approach is applicable in Thailand or not, and if it is helpful to reduce time for the development process and to improve the overall UX.

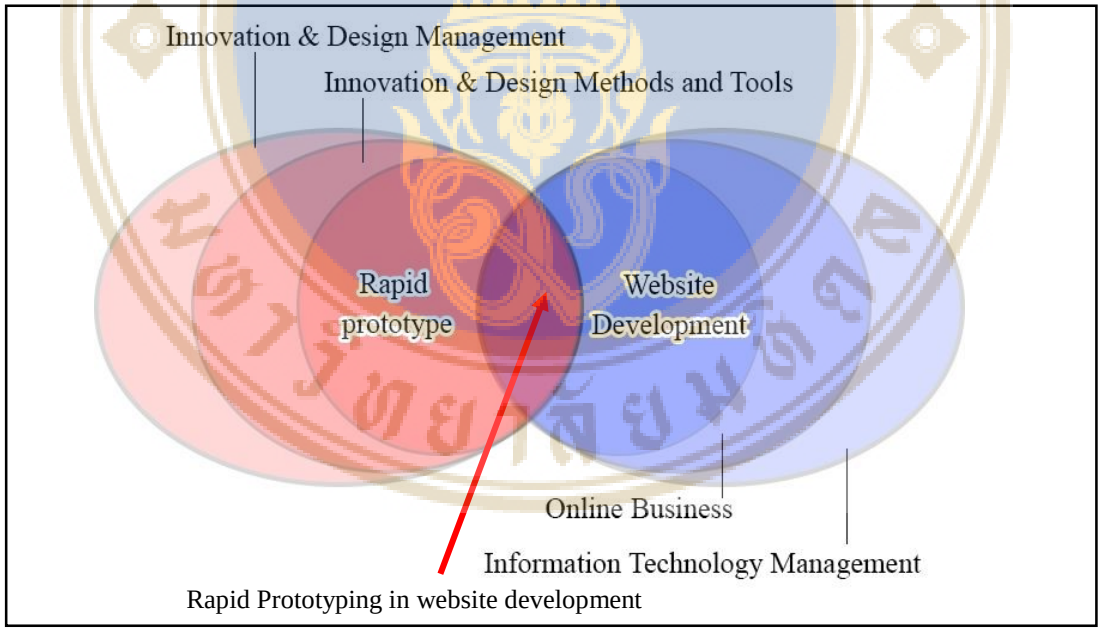

Figure 2.1 Research Focus Area

2.1 Definition of Terms

Before we discuss the literature review, I would like to define some relevant technical terms that we will discuss later on:

- *Responsive design* is the approach that suggests that design and development should respond to the user's behavior and environment based on screen size, platform and orientation. (Kayla Knight, 2011)
- According to Soegaard (2014), A *Mock up* is used by designers mainly to acquire feedback from users about designs and design ideas early in the design process. Mock-ups are 'very early prototypes' made of cardboard or otherwise low-fidelity materials. The user, aided by the designer, may test the mock-up (imagining that it works) and thus provide valuable feedback about functionality/usability/understanding of the basic design idea/etc.
- A *Site map* is a hierarchical diagram of the pages on a Web site, starting with the home page at the top. A site map helps visitors navigate large, complicated sites by showing their entire structure. It is also used as a master diagram of the Web site for Web designers. (PCMag)
- A *Bug* is an error or defect in software or hardware that causes a program to malfunction.

2.2 An Overview of Rapid Prototyping

According to the Cambridge Dictionary, "Rapid prototyping (RP) means a process used to build a physical model from a computer drawing by creating layers of the shape and joining them together. This technology provides a fast way of producing parts for machines." Rapid Prototyping is most widely used in manufacturing, due to the fact that the normal process requires a lot of time to create one product. Sarang S. Pande and S.Kumar. (2006) claim that Rapid Prototyping is used for quick prototyping and manufacture of the product, also to reduce manufacturing lead-time. Rapid Prototyping can be an extremely useful tool. The design process consists of stages where prototypes are created and tested to verify and improve designs (Ulrich &

Eppinger, 2011). Rapid prototyping can also be used in other fields of manufacturing such as rapid tooling. As we have learned from HONGBO LAN∗,†, YUCHENG DING, JUN HONG and DIANLIANG WU (2004), they provided a case study of making an impeller, the steps as shown in Figure 2.2. It illustrated the evolution of a prototype from CAD-design to a simple mock-up to a mold and finally to a final product over 3 rounds of iteration. Following this architecture, it required only 12 working days which saved the time from traditional way by 50% and reduced the time-to-market by 75%. The design process needs to consistent before making a product prototype.

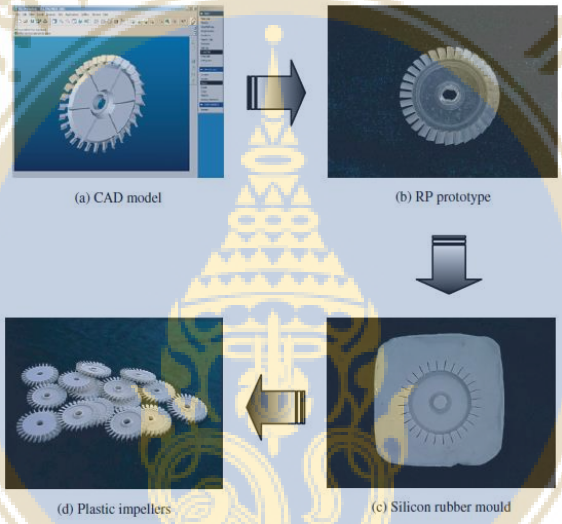

Figure 2.2 Development procedure of the plastic impellers based on the integrated system. A Novel Integrated System for Rapid Product Development

Reis (2009) pointed out the four popular methods of doing rapid prototyping, 1) sketch out the idea by drawing, or photo collage or anything that can communicate your idea, 2) build a simple model or mock-up, made from paper or combining materials together to get feedback and do several iterations until you see the same picture as your customers. 3) Role-play for process improvement or service innovation and 4) build a test-website. Create a test website and wait for feedback then rapidly prototype the website based on the feedback.

Based on Francis E.H.Tay, Yadav P.Khannal, Kwok Kuen Kwong, Kim Cheng Tan (2000), mentioned that rapid prototyping can help to decrease the cycle time for product design and analysis because the traditional prototyping was very slow

and ineffective in resources utilization but for rapid prototyping you can assemble the complex and aesthetically shaped prototype. Zhengyu, Yucheng, and Hong Fun (2004), stated that Rapid Prototyping can convert CAD models into 3D physical solid objects faster than other traditional manufacturing processes. Rapid prototyping is not only helping to decrease time but also helps us to acquire customer requirements, enhance communication, and detect design faults early as Jacobs (1992) mentioned.

Tom Kelley (2002), the industrial design company IDEO mentioned that prototyping is also a tool used for problem solving. According to IDEO's design methodology, they also applied rapid prototyping in step 4, evaluate and refine the prototypes in a series of quick iterations. A case study from IDEO company, according to Brown (2008), gave a case study of building the sinus surgery. As a surgeon described the ideal physical characteristics, one of the designers took a whiteboard marker, a film canister, and a clothespin and taped them together and asked the surgeon "do you mean like this?" from what he did, the surgeon could be sure about what the ultimate design should accomplish. As with IDEO, the innovation teams found a solution by using rapid prototyping. Prototype doesn't have to be complex and expensive but must be tangible. Brown (2008,p.87) also mentioned that *"prototypes should command only as much time, effort, and investment as are needed to generate useful feedback and evolve an idea. The goal of prototyping isn't to finish. It is to learn about the strengths and weaknesses of the idea and to identify new directions that further prototypes might takes."*

Kelley (2010) also mentioned in The Ten Faces of Innovation, that the role of the experimenter is to prototype new ideas, take a concept from words to sketch, to model. They also worked with the stakeholders, colleagues, partners, customers, investors, who have the insights that could improve the prototype better.

2.3 An Overview of Website Development

According to Selene M. Bowlby (2008) points out that there are 6 phases in website development which are as follows;

1. Information Gathering

To consider the goal or purpose for making this website, requirements from customers, what they actually want. In this phase, the designer needs to ask as many questions as possible, so the designer can understand what customers want for the website. As Aaron M. French states, this phase requires graphic designers in order to create an effective layout for the website, to decide how information is to be arranged and navigated through should be discussed in this phase.

2. Planning

In this phase, we need to develop a sitemap, and the designer should point out what technologies should be implemented. Shannon (2009) mentioned that a website requires a navigational structure that allows everyone to find the way through the site.

3. Design

In this phase the designer will use what information is available to develop a mock up from paper or using Photoshop depending on which method is more suitable, and show the team to discuss the look and feel of the website. This allows the developers to quickly create a visual prototype for users to see what the website will look like and make any changes. After the designer has finished the mock up of every page, the project manager will send it to the customer to give feedback on it. If the customer accepts the design then it will go to the development process. In other words, the mock-up is also called the prototype. Prototyping is used to speed up the development and delivery of applications (Kendall and Kendall, 2010). Nowadays, people also surf websites on mobiles, designers need to think more about how to show it on mobiles which requires a more responsive design. Another approach to design for mobile users is called Mobile First, as Marcotte says, “Designing for mobile devices first can enrich the experience for all users.”

4. Development

The design team will generate the template from the mock ups that have already been accepted from the customers and turn the jpg page into a functional one, which can click to see the functional requirements. Then, the coding team will work on the website, make the website more dynamic by using various languages such as php, VB.Net. After the programmer has finished the website we enter the testing phase.

5. Testing and Delivery

At this point, the programmer will demonstrate what they did to the tester, and the tester will find a bug, or some issues that cause the website to not run smoothly. The designer, in this phase, should make sure that all the code is correct. If the tester finds any bugs, it will go back to programmer to fix them, and be delivered to the tester afterwards to retest it again. Once, there are no bugs, then we can deliver this website to the customer and go public.

6. Maintenance

One way to make visitors visit your website often is to provide new content, always have fresh content in your website, or to re-design the website every year, following current trends.

2.4 Rapid Prototyping in Website Development

Gerejo (2010) suggests that "rapid prototyping is the process of quickly mocking up the future state of a system, and validating it with a wider team of users, customer, developers, and designers. Doing this rapidly and iteratively generates feedback early and often in the process, improving the final design and reducing the need for changes during development." Also, mentioned as the key success factor of rapid prototyping is revising quickly based on feedback and using the appropriate prototyping approach. He also provided the rapid prototyping process as shown in Figure 2.3.

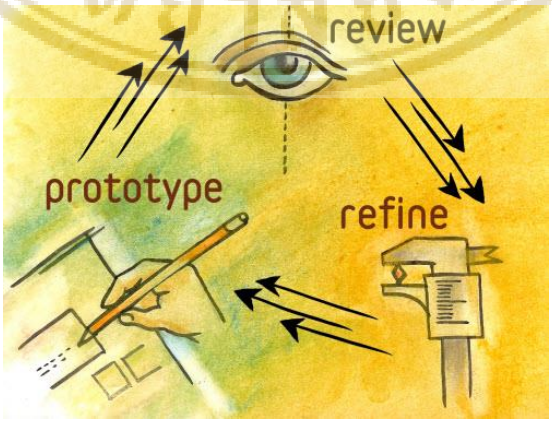

Figure 2.3 The Rapid Prototyping Process

Gerejo (2010) suggest that rapid prototyping follows a three-step process:

1. Prototype: Create mock-ups from user's description and concern about user experience standards and best practices.
2. Review: Share prototype with users and get feedback from them.
3. Refine: Based on feedback, identify areas that need to improve.

Similarly to Tomáš Hujer (2011), he referred to the SDLC (Software Development Life Cycle), the traditional method of application development. It consists of 4 phases as shown in Figure 2.4. He also provides a Rapid Application Development (RAD) that adapted from SDLC as show in Figure 2.5, so the system can develop faster and some of the functionalities can be available to user as soon as possible.

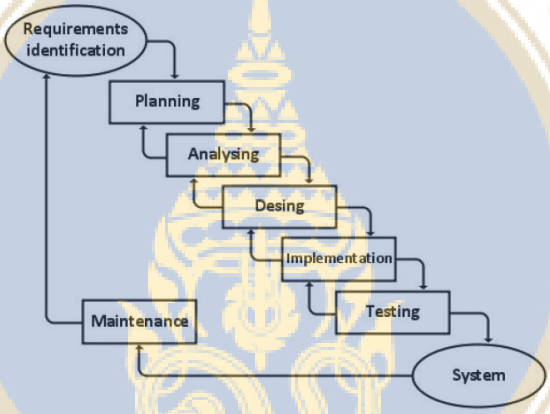

Figure 2.4 Software Development Life Cycle

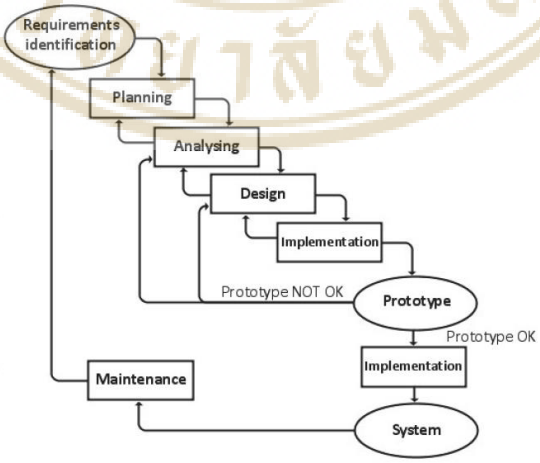

Figure 2.5 Rapid Application Development methodology - Prototyping

The advantages of this approach are increasing the speed of development, decreasing costs and also matching with user's needs. On the other hand, one disadvantage is non-standard procedures of this kind of development such as lacking of documentation, improper use of development.

Frick, Su, and An (n.d.) stated that creating rapid prototypes and making usability evaluations of design prototypes can help to fix problems before publishing a website. The process is 1) contact stakeholders in the website to gather requirements from stakeholders or end-users by interview, 2) rapid prototyping on paper to look at the content that will be used on the website seeking the links between content. In this phase select some of the key stakeholders to evaluate the structure of the website, 3) rapid prototyping on computer to assess design issues, key stakeholders also involved in this phase, and are required to give feedback on what they see then the development team will re-design the prototype based on the feedback they get, 4) building the website, after get the final prototype, move to the next phase to create a website by using the programming language to build it and test the website, and 5) website maintenance.

CHAPTER III
RESEARCH METHODOLOGY

In order to answer the research questions that mentioned in Chapter I, I chose to conduct in-depth interviews to find out the answers. This chapter outlines the research methodology that will be used for data collection. It also provides a background of the company that is used as a case study, and includes the interview guideline questions.

3.1 The In-depth Interview

As we know from Boyce, and Neale (2006), the in-depth interview is a qualitative research method of conducting individual interviews with a small number of interviewees to discover their attitude towards a specific topic. Pereira, Pedrosa, Simon, and Matovelle (n.d.) state that an in-depth interview is an open-ended method, a one-to-one conversation to deeply discover the interviewees' ideas.

The in-depth interview is suitable for this study because I want to perceive the interviewees' points of view, such as what they think about rapid prototyping, as Boyce, and Neale (2006) mentioned that in-depth interview is useful when you want details about a person's thinking and behavior or you want to discover new issues in depth.

The advantage of using in-depth interviews as a research method is that you will get more detailed information from the interviewees than other data collection methods such as surveys, as Boyce, and Neale (2006) point out, because it is an individual conversation, interviewees feel more comfortable to say what they are really thinking about.

Based on Boyce and Neale (May 2006), there are 4 steps of conducting an in-depth interview, as follows;

1. Plan: identify interviewees who will be the participants, data sources – information about the interviewees who have the most relevant knowledge to the interview, who are contrasting.
2. Develop instrument: interview protocol such as what to say to the interviewees to begin the interview, what to do during the interview, interview guideline questions, they should be an open-ended questions and a semi-structured format (Pereira, Pedrosa, Simon, and Matovelle).
3. Data Collection: aim to interpret and clarify what you are hearing while interviewing, and validating the information with interviewees.
4. Analyze Data: transcribe and reviewing data, then look into the overall data and try to find the pattern or themes among the interviewees

3.2 Background of Interview Company

This research investigates the use of rapid prototyping in website portal development industry by focusing on the established company Sanook Online Company Limited. Sanook Online Company Limited was founded in 1998; the achievement that Sanook! received from Truehits award every year is "the Most visited website in Thailand". It is the number one website portal in Thailand. Within the company there are several departments such as IT department, which in lead by Mr. Cherdsak Chokeruamchai, UI & Design Department which is lead by Mr. Aongart Temboonkait and Ms. Piyanate Khaoto as the manager. Sanook runs an agency called "Topspace". Topspace provide website solutions to clients, within Topspace there is a sales team and a creative team which are run by Mr. Tanapat Mongkolrerks, and also a Senior HTML CSS, development team which is run by Mr.Withun Saegue.

3.3 The Study Population and Sample

In order to investigate the research questions, I conducted six in-depth interviews with a cross-functional and cross-hierarchical sample: the population selected as interviewees are members of the IT Department, UI & Design Department,

and Topspace, in management level and staff level. In total, there are 6 interviewees, names as listed below;

1. Mr. Cherdsak Chokruamchai, Senior Vice President – IT
2. Mr. Aongart Temboonkait, Vice President – UI & Design
3. Ms. Piyanate Khaoto, UI & Design Manager
4. Mr. Tanapat Mongkolrerks, Head of Creative
5. Mr. Korakot Suppol, Senior CSS Designer
6. Mr. Sommanut Niningsan, Project Manager

3.4 Data Collection

The in-depth interview and open-ended question method were adopted for this data collection. It was conducted by individual conversation interviews following the 4 steps of the in-depth interview process as mentioned above. During the interview, participants were informed that the interview would be recorded and used for educational purposes.

3.5 Data Analysis

The data analysis included verbatim transcriptions of recorded interviews, to find the pattern in the answers of the research questions. The questions were developed into several parts, 1) background of working process in the company, 2) the knowledge about rapid prototyping, and 3) the possibilities to adopt rapid prototyping in the company.

CHAPTER IV
DATA ANALYSIS AND FINDINGS

This chapter provides the results of data analysis and findings from this study based on the research questions that were specified in Chapter I. The data was collected by interview questions. There were 6 interviewees with cross functional and cross hierarchical level. The sequence of the interview was first, let them explain about the work process in website development at the company, second, ask them about their knowledge of rapid prototyping, and lastly, discuss about the possibility to adopt rapid prototype in Sanook!

4.1 Work Process of Website Development in Sanook!

At Sanook! there are two main products

1) Website portal that is used by external users, it is a website that gathers information and news from various sources and presents it in one place. Users can keep updated on news and current affairs at sanook.com.

2) Website solutions provided by Topspace. Topspace is an online agency company that is owned by Sanook! Website solutions are for external clients or companies that want to have a corporate website or Facebook campaign.

From the interview with the Project Manager of Topspace, we can summarize that the work process of website development at Topspace can be classified into two major phases, which are the pre-production phase or pre-sale, production phase, and the post-production phase. The pre-sale phase is the phase for gathering and analyzing requirements from clients. After discussing with the client, the sales team will give the requirements to the Project Manager and development team including designers, programmers, and testers. After discussing with the team, the sales team will create a scope of work and a quotation. The Project Manager will plan the timeline and resource allocation and go back to the client to sign the

quotation. Then, they will move to the production phase where the designer will create a jpg/png mockup of 1-2 pages to see the mood and tone of the website, and wait for the feedback from client, if client has a minor issue, the team will refine it and send it to the client again and wait for approval. In this phase, the team allows the client only two revisions otherwise the customer may request too many changes and and the team cannot move on to the next phase. After this, the HTML/CSS designer will make the jpg/png file more interactive by creating a HTML, CSS, and JavaScript file then submit it to the programmer to code the website in the next step. After the programmer finishes the website, they move to the testing phase to find any bugs. During this time the tester, programmer and the HTML/CSS designer will work together to fix the bugs, and after the testing phase will submit to client for UAT (User Acceptance Testing). Once, client has no further feedback or comments, then they move to the post production phase. The website will go live, and depending on the agreement for the lifetime maintenance. This work process required at least 1.5 months for one website.

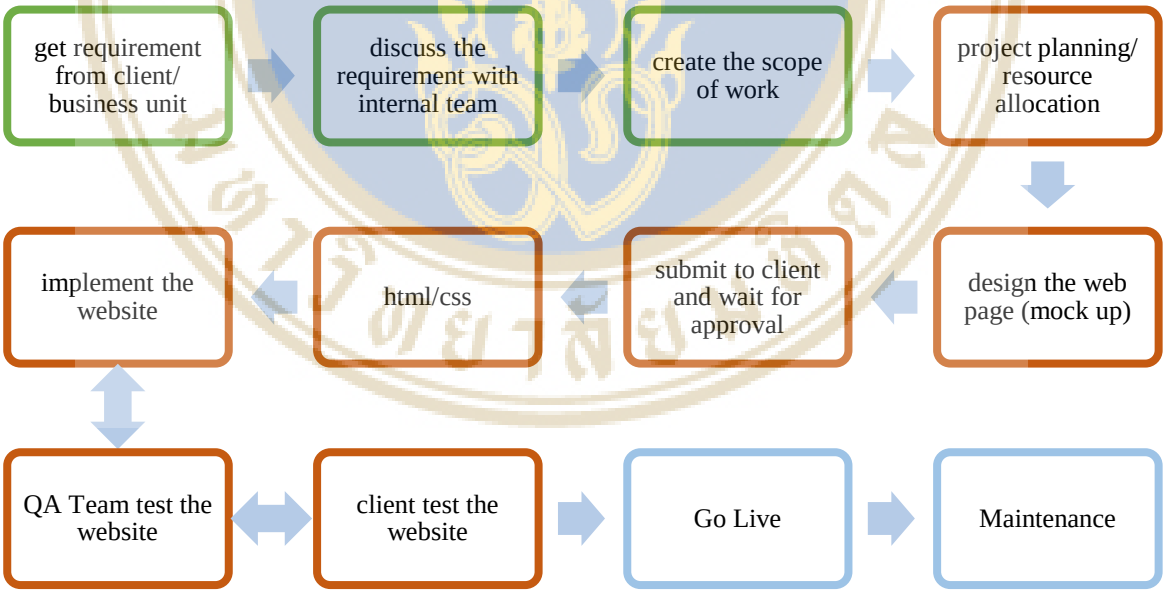

Figure 4. 1 The work flow for website development of Topspace

These processes are similar to the 6 phases of website development from Bowlby (2008).

1. Information gathering phase is when the sales team gets the requirement from the client and discusses with the team.

2. Planning phase is where the PM plans the timeline and the resource allocation for the project.

3. The Design phase is where the design team build a mockup and submit it to client, and the HTML/CSS designer creates the interactive design from the mockup.

4. The Implementation phase is when the programmer creates the website by using the programming language.

5. Testing phase is after programmer submits the website to tester, they will work together to fix bugs, UAT testing for client is also included in this phase. This is where the client can give feedback on the design.

6. Lastly, the maintenance phase is when the system goes live and depends on the agreement for lifetime maintenance.

Since, Sanook! has two types of product which are website solution, and web portal, the work process discussed above was only for website solutions.

Next, I am going to explain more about the work process of web portal development. As discussed with VP-UI& Designer, the work flow for internal work or web portal development has two types, 1) get requirement from business unit (BU), and 2) create the design website by designer themselves base on the research that designer made.

For the first one, get requirement from BU, the project owner will give the requirement to the team (designer, IT), then the team will follow the requirements. While in the meeting room, designer will make a quick prototype to illustrate what they understand from the requirement and discuss with the project owner that they are on the same page or not, if not, the designer will refine the prototype and show it to the project owner again, this process will be repeatedly until they are running out of time. Normally, it took around 2 weeks because if it more than that, the implementation phase will be delay.

Similar to a case study from IDEO (Brown,2008), that first, designer gets requirements from business unit, and build a quick prototype from what they have and

show it to the project owner and ask “Is it right?” If it is not, then make an adjustment until meet the expectation.

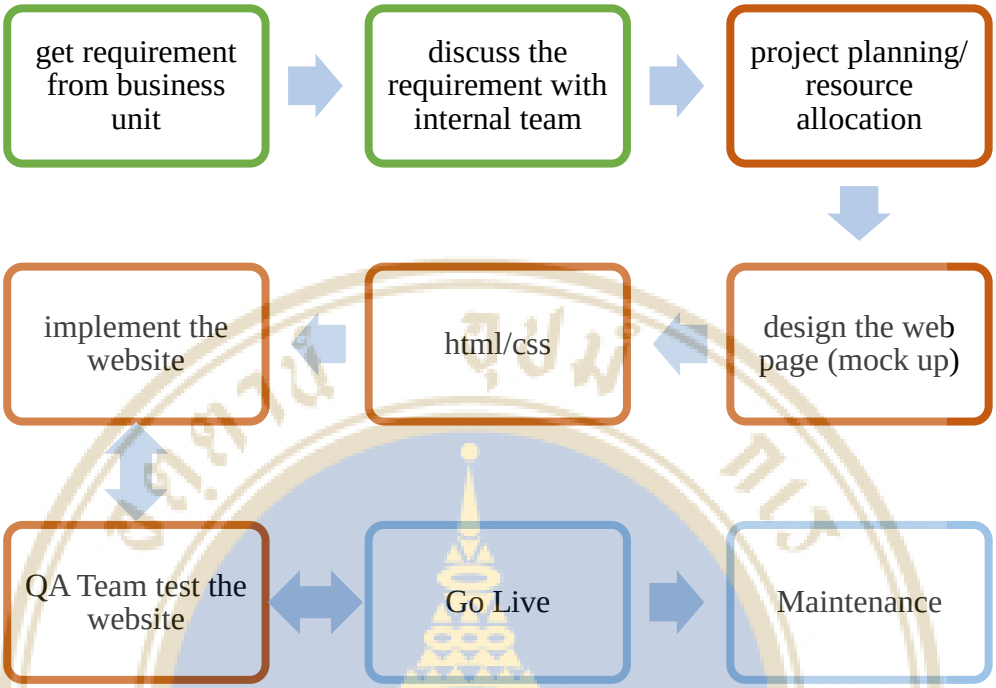

Figure 4. 2 The work flow for website development of sanook!

However, the problem of this process is project owner is the only one who can make a decision, and the designer team cannot make any decision or give comment, which is not work for designer team. So, if it is not the new product or service for sanook!, the designer team prefer to do the research to redesign sanook.com by themselves.

The second type of website portal development is create the design website by designer based on the research that designer made. This type the interviewee mentioned that it is way better than the first one because the team feel that they own the project, and they work hard for it. The design page was based on the research that designer made. The participants in the research is the user that never explore sanook.com before, while let the participants try the new design, they also record the way of user engagement. So, the designer can see which position the participants click or not click and then designer will go back and rearrange the position to make the not click position to be click and conduct another research again and continue the loop until the stat of user engagement is satisfied. Since, sanook.com is a

website portal, the page is similar, the research that designer made can be used as a template for the whole website which can decrease the time of design phase in the future. Still, the research need to conduct forever because trend of the user engagement is always change.

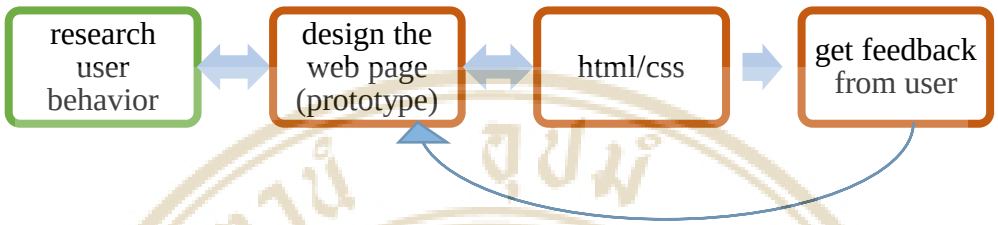

Figure 4. 3 The work flow for website design development of sanook! Design team

This work process is similar to IDEO case (Brown,2008) that already mentioned above but the different is the people who involve in the feedback process is not only the project owner but the user that will be our future users which is more effective than project owner alone. The iteration to be used is also not limited because the research is keep going.

4.2 The Knowledge about Rapid Prototyping

Based on the interview, most of interviewees do not have the theoretical knowledge about rapid prototyping. They feel that it is more in the product development field than website development. From the investigation of the work process based on the website development phases, it is interesting that the process that they used is similar to rapid prototyping process such as when the design designs the mockup and send it to client to see the design of the web then they can give feedback to the development team and we redesign it to them and let them see again. Also, the internal workflow like when designer sketch the mockup or prototype for the project owner to see the design of the web, some of designers need to do up to 20 iterations until get the right one that meet project owner's expectation. Moreover, the process that designers team design the web base on the research is also called rapid prototype,

they build a web test by using the tool called invisual for mobile first design template, so the participants can enter to the site and give them feedback. According to Reis (2009), the methods of doing rapid prototyping is 1) sketch out the idea, 2) build a simple model, 3) act a role-play, and 4) build a test website, among others.

From what I mentioned above, sanook! applying 2 of 4 methods already. Sketch out the idea, it happens when designer have a meeting with the project owner and sketch their idea on the paper, or when designer create a mockup to the client to see the mood and tone. Another method that applied by sanook! is build a test website, it happens when the designer conduct the research with the participants and let them uses via a real browser. This means that sanook! already apply rapid prototyping approach in the company unconsciously or in other words, without being consciously aware of it. They have a practical knowledge about rapid prototyping by the work process in the company, they just lack of the theoretical knowledge that cause by the limitation of the company in knowledge sharing.

4.3 The Adoption of Rapid Prototyping for Website Development in sanook!

Most of interviewees agreed that it is possible to adopt rapid prototyping approach to be used as a standard process of website development only if the time is not limit because as sanook! provide the website solution to clients, it is impossible to do this method due to the cost of manpower will increased as man-day increased, client will not satisfy for paying the overhead cost as one of the interviewees pointed out. In contrast to make the website for web portal, similar to the design team is currently doing, give the prototype to user to test and once it is not work, go back and adjust, and repeatedly until the click behavior is match with the user. The time is not limit, and it can do over and over.

The majority of interviewees said that rapid prototyping can help in communication between designers and other stakeholders like clients, project manager, sales team, programmers, and testers, so they can see the same page. Sometimes the requirement from sales team might not be clear but if the designer do rapid prototyping, it may illustrate the picture of the requirement and if sales team see

that it is not right, so they can give feedback right away which lead to meet the customers' requirement sooner and it will decrease time in the UAT phase, also increase customer's satisfaction. Related to this finding, Hujer (2011), pointed out the benefit of doing rapid prototype are increasing the speed of development, match with user's need but some of the interviewees mentioned that doing this approach is increasing cost of design phase which contrast with the study of Hujer (2011), mentioned that it can decrease cost of development. Based on the findings, one of the interviewees also mentioned about the complexity or the size of the project. If the level of complexity or the size of the project is high, it may not be proper to apply rapid prototyping method because it will cost too much time in the designing phase, but if we do only few pages, it may applicable to apply this method.

Based on findings, we can conclude that the work process in sanook! is a kind of rapid prototyping approach but it is not fully adopt. The factors that stop sanook! to use this method as a standard are

1) the time frame because the team has to work against time.

2) as from observed in the organization, customer can be a factor that stop the company to apply this approach because customer does not know what they want at the beginning, most of them need to try the finish product, so they can give feedback or comment.

3) the complexity or the size of project can be another reason, due to the size of project is big, designer will not be have enough time to design all pages but can do only few pages which will not be effective, at the end of project have to redesign it again.

All interviewees agreed that apply this method can be helpful in communication between designers and other stakeholders include programmers, and testers. So, they can see the result at the beginning, and the requirement will not change during the development time.

CHAPTER V
DISCUSSION

This study investigated the adoption of rapid prototyping in website development in Thailand by focusing on a medium-sized website development company. By addressing the following question 1) to what extent is rapid prototype use in website development in Thailand 2) if it does, do people use it consciously or unconsciously, and 3) to what extent how many iteration use for feedback used?

From the findings, we can summarize that rapid prototype can be adopted in website development in Thailand, and it also already been used but most of the time, the designers did it without being consciously aware of it. There are some interesting issues that addressing during the investigation as discussed below;

1) The limitation of time frame

In the business of online agency business, the time is the key to win the client; the company that can do with the less time will be get the job which means that if we are too slow, we will lose the project. In order to achieve the goal, we need to set the time frame and divide it to each phase properly. So, in order to apply rapid prototype at the design phase it seems spend a lot of time to get the design as customer's expectation. So, the company limit the feedback iteration from client to only 2 times, and if customer want to feedback more, they need to wait until UAT phase. In contrast to the internal work process, that sanook! do for sanook.com, to redesign the service that already launched, the feedback of rapid prototype is unlimited until designer team meet their own goal.

2) Communication between all stakeholders

Based on the findings, all participants agreed that apply rapid prototyping will help in communication between designers, clients, programmers, and testers. They can share the same understanding, and it will help to decrease the development time because clients will not feedback more in UAT

phase. Giving the comment in UAT phase is not good because team need to fix the product that already finished, and will affect to the time of the next project.

3) The level of perfectionist

Another issue that can be the factor of applying or not applying rapid prototyping approach is the level of perfectionist, means that if the stakeholders are picky, they will spend much time to comment on the design and team need to refine the design several iterations up to 20 iterations and the client may select the design of the first iteration, it is wasting development time. The worst case is they do not know what they want, at the beginning they may say one thing but during the time of development the requirement always change, so rapid prototyping may not help and team think that it is no need because in the end, client will make a comment again.

4) Size of the project

The size of the project can be the factor that stop the team apply rapid prototyping method because if the size of the project is very big and very complex, to prototype all pages may cause a lot of time. So, team needs to gather all information and spend the time on design phase as much as they have, then can show it to customer to make a comment.

5) Work process

The work process in sanook! is designer does not required to attend the meeting with client, sales team and project manager will be the people who get the requirement and tell the designer later, which rapid prototype cannot be apply in this process.

Limitation

The limitation of this study is the time of doing the research because we have only four days to interview, which cannot set the schedule to other interviewees. Also, this study focus on only one medium sized company which cannot confirm for all of the website development company in Thailand. To improve this study, we need more time to investigate the company, and it would be better if we can observe another

company, so we can compare the work process between two companies. The findings would give a more accurate picture of the application of rapid prototyping in website development in Thailand.

Recommendation

For practitioners, it would be better if they can investigate on another companies like Dentsu Thailand, Y&R, or another big agencies company. They have more standard work process than sanook!.

For sanook!, the work process in sanook is quite not have a standard, the process of internal and external project are different. For external project, the process is messy, and take a lot of time in development. Also, the customer always change the requirement at the end of the development time, and sanook! does not have system analyst, sales team will gather the requirement from client, which sometimes the requirement is not clear, and it can increase the development time because need to ask the client again. So, it would be better if sanook! fully adopts rapid prototyping approach as a standard of work process and set the feedback iteration for 3 times. If the client feedback more than three times, there must be something wrong between the communication which we need to start over and fix the problem. Moreover, in the requirement gathering phase, it would be better if the designer, and clients that involve in the project attends the meeting too, so designer can do rapid prototype and help all stakeholders to share their understanding and can give feedback immediately on the wrong issues. For internal project, we can do many iterations as we want because times change, trends also change, as sanook! provide the website to everyone in Thailand, we need to apply new technology to keep update ourselves all the time. Also, to fix the problem of lack of knowledge about rapid prototyping, they should have a training from other parties to train about how to apply rapid prototyping effectively.

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