Development of Visual Language Design Guideline For User Experience-Based Interactive Systems

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Abstract

Websites and web applications have become more complex with the advancement of technologies in our industry. It used to be a one-way static medium has evolved into a very highly interactive system. The developer of an organization's websites or web application needs to be dynamic and efficient to accept any frequent change requests. However, some of the main challenges faced by the front-end developer are mainly caused by the inconsistency of the webpages design and incomplete portal change requests. The change request often provides incomplete resources such as incorrect banner sizes, blur images, and incomplete information. Furthermore, some of the requests need to be completed within a very short time-frame. To address these issues, in this paper, we developed a visual language design guideline for a telecommunication company in Malaysia, based on the customization of a widely used visual language design. The developed guideline is then evaluated by the company's internal team. The evaluation shows that the visual language design guideline did help the team in achieving a consistent website.

Keywords: *User Experienced, Software Design, Visual Language Design, Software Development life Cycle, Interactive Systems*

1. Introduction

Access to the use of the Internet is evolving in people's everyday lives. In the economic domain, internet marketing and the rise of electronic commerce have changed the way business operates around the world. With this tool, businesses have acquired a new way to conduct tasks, communicate with users and manage their business [1]. One of the main applications needed for internet marketing is to have a good web application. Web design is a crucial factor in ensuring a good interface that can meet customer needs and for this reason, businesses need to ensure good designs in order to succeed in competitive online markets[2]. Web designs can contribute to higher levels of customer satisfaction[3],[4] and thus increase online purchasing intentions[5] and trust. User experience is therefore synonymous with usability and user-centered design[6]. However, maintaining the web with the most recent updates and promotions can be a challenge. The request comes from the marketing team to the developer team can be rapid and need to be completed within

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a short period. It is much more challenging if the information provided is incomplete and promotional graphics submitted in the wrong size and low quality.

In this paper, we conducted research in a telecommunication company, in which the developer team facing challenges in maintaining their web applications and one of the proposed solutions was to come out with a visual language design guideline. We organized this paper into 7 sections. In the following section, we briefly present the motivation and case study. In section 3 we described the methodology used in this research. We did a comparison study on 5 existing visual language designs and this briefly reported in section 4. The proposed guideline components are presented in section 5. In section 6, we briefly described the evaluation results and we conclude this work in section 7.

2. Motivation and the Case Study

To better understand the motivation behind this work, in this section, we briefly introduce the case study used in this research which involves a telecommunications company in Malaysia. Since 2018, a digital development unit has been developed to build and manage the company's business website. This team uses the Agile development model known as Scrum. In this model, incremental builds are delivered every two weeks' time to the client. As depicts in Figure 1, the Scrum team involves a product owner, scrum master, front-end website developer, a microservice developer, Tibco developer, where Tibco provides a general framework for the integration of incompatible and distributed systems, making it easier and quicker to link in real-time.
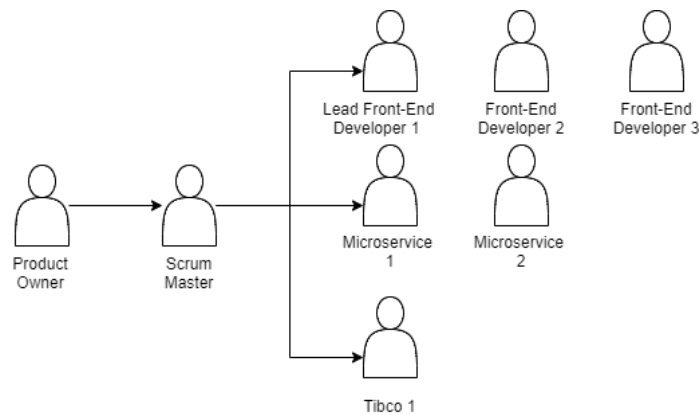

Figure 1: The Scrum Team Organization

In scrum, before any project starts, there will be a kick-off meeting and a sprint planning meeting, for an item that needs to be implemented, usually within two weeks timeframe. The item that needs to be delivered on that particular sprint must be sorted by the scrum master and product owner but must within the team capability. It is also a scrum culture to have a stand-up meeting for 5 minutes to update their task and obstacle face by the team every day. In the team, they categorized the workaround into three categories of tasks. The categories are a

superfast item, medium-complex item, improvement, and defect item. This work was proposed to address the problem specifically in the development of the superfast item.

The main challenges faced by the front-end developer are mainly caused by inconsistency of the webpages design in company's websites and incomplete portal change request resources which include incorrect banner size, blurb image and information provided by the requester are incomplete. Furthermore, the change request needs to be completed within a very short time. Figure 2 illustrated the request process and the time-frame allocated for the three task categories. Another motivation was, there are situations where developers left the company and their position need to be filled by the new employee. The process of exchanging knowledge is nearly impossible to transfer if there is no guideline regarding design [7]. Thus, to address this problem a visual language design guideline is proposed to reduce the problem of inconsistent of design in developing the webpages.
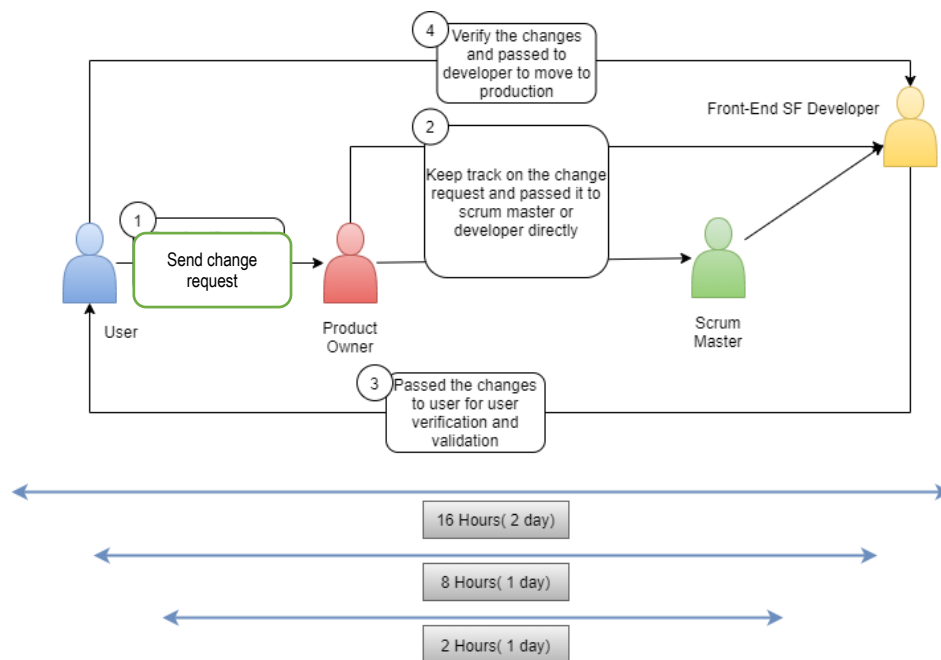

Figure 2: Request and Workaround

3. The Guideline Development Methodology

The methodology for developing the guideline consists of four phases. The four phases are plan, do, check, and act (PDCA) as shown in Figure 3. In phase 1, we conducted project planning and observed the condition of the development team. This observation gives a good understanding of the process materialized in the team and define the problem statement. Based on the problem statement identified, we conducted a literature review and investigated the related work. In this phase, we reviewed five visual language design guidelines which include Carbon IBM Design Language System [8], Atlassian Design [9], Apple Design [10], Material Design [11] and Airbnb Design [12].

The second phase of the study was to developed the visual language design guideline. Based on a comparative study, we have chosen the Atlassian Design as the base of the guideline. We adopted the guideline and customized them based on the requirements of the company's website. This comparative study is reported in the next section. In phase 3, we evaluated the developed guideline within the development team by using the guideline in a few change requests tasks. The evaluation results are discussed in the following section.

The final phase in this study was to officially use the guideline and iteratively improve it based on current requirements.
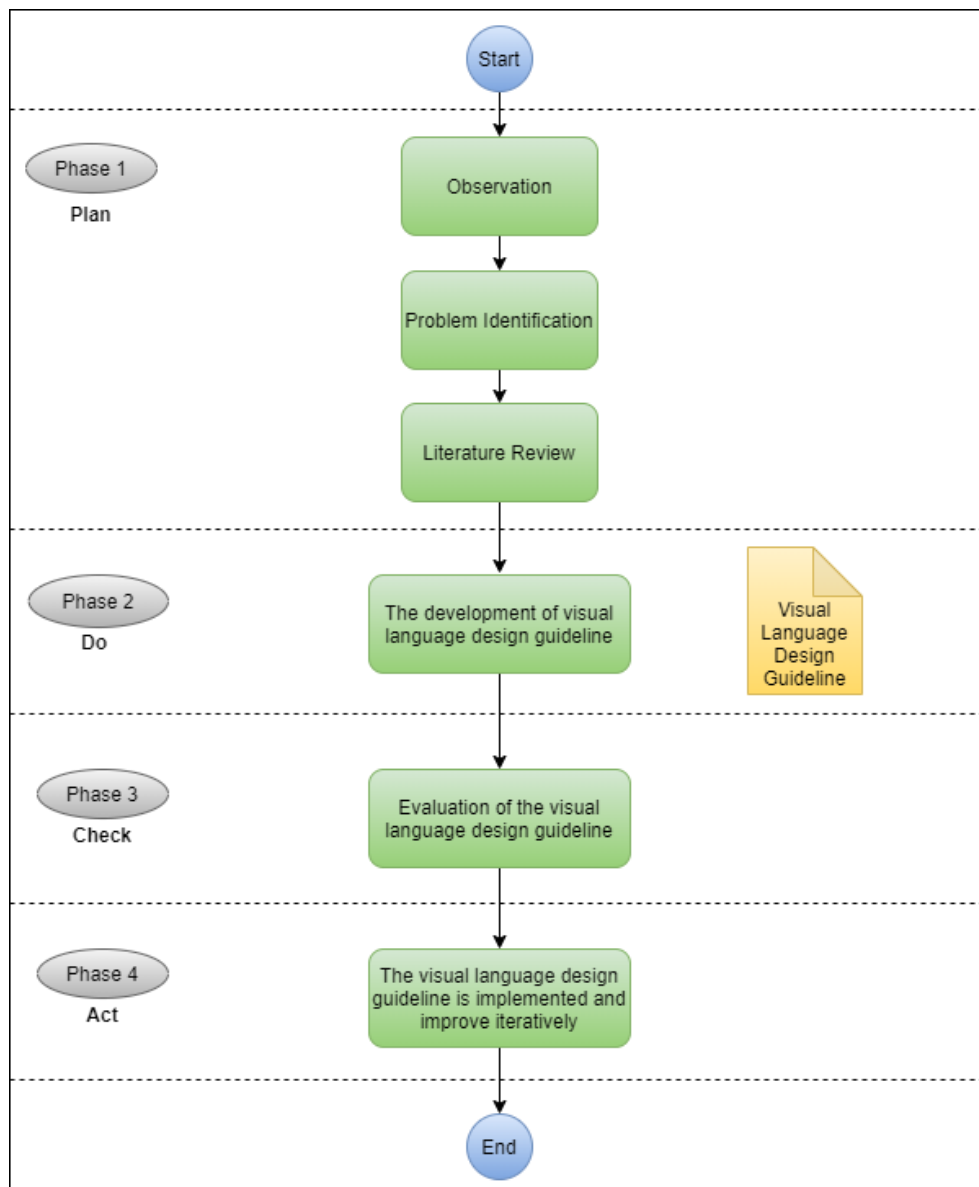

Figure 3: The Visual Design Guideline Development Methodology

4. The Comparisons of Existing Visual Language Design Guideline

In this research, we have compared five visual language design guidelines and the comparison results are shown in Table 1. The Airbnb Design is explained in more abstract way in terms of the content while Atlassian, Carbon Design, Material Design and Apple Design explain their guideline in a more listed and structural way.

The comparison was done based on the content of the visual language design guideline, such as the elements, voice and sound, the designer kit and the source code. The components parts of Airbnb Design are very limited and it is difficult to capture the component guideline. This is because the way Airbnb designs the voice and the sound of the material is more abstract, making it a little difficult to grasp their design guidelines.

On the other hand, the Carbon design, Material Design and the Atlassian Design Guideline is having the same content of elements for its guideline where, the components, voice and tone, designer kit and source code are in it. The carbon design components have the same amount of component elements in the guideline but the Atlassian Design explains it in a clearer and structure way compared to the carbon design. Both of these guidelines contain voice and tones to deliver better brand communication and attitude.

Table 1. Comparison of Existing Visual Language Design Guideline

Visual Language	Components	Voice & Tone	Designer Kit	Source Code
IBM Carbon	√	√	√	√
Atlassian Design	√	√	√	√
Airbnb	√	√		
Apple Design System	√		√	
Material Design	√	√	√	√

A designer kit is a set of graphic files and tools that can help designers or front-end developers to create user interfaces for their applications. Carbon design and Atlassian design both have a designer kit and source code. The carbon design offers many design kits that can be used such as Sketch, Vue, Angular, Vanilla and React but the Atlassian design however only using react as their designer kit but with some clearer explanations on each of its components.

The Apple design only consists of a component and the designer kit information. The drawback of the Apple design is that it does not guide on how language should be used such as the voice and tone of its product. There is also no source code from

the Apple design that can be viewable compared to the Atlassian design, Material and Carbon design. In this comparison, we observed that every design guideline has its strength and weakness.

However, we have chosen the Atlassian Design as a baseline for the research because it has clearer and systematic guidelines. The guideline recommendations by Atlassian Design also offer flexibility and are constantly updated and expanded to meet the changing needs of the company product and also ensure that the people only need to learn it once. Atlassian Design includes suggestions on the good and bad practices in developing the design guideline. One of the first steps explained in building the visual design language is by listing the of importance use in managing the priority of that webpage. Then, followed by the color, grid, icon, typography and writing style of the website.

Atlassian Design is well arranged and efficient. In addition to technical specifics for product design, user interface, and branding, they also include additional information, such as their step-by-step design process, key staff, and additional graphic design tools. Once the foundation has developed, the next step is to identify the component of the product such as avatar, badges, banner, breadcrumbs and button. This helps the development team to understand and reuse all the information in the visual guideline to make it more efficient and increase the website's usability.

5. The Developed Guideline

The design and style guideline is a reference to assists designers and developers in creating new web experiences for the company's users while maintaining consistency with the initial design intent, the brand and underlying business drivers. This visual language design guideline is structured to allow designers and developers to learn about the behavior of responsive pages, which include grid, the layout of the page following templates, the available components and instruction to use the user interface components and finally to view visual and design assets using user interface elements.

Figure 4 depicts the major and sub-content of the developed visual language design guideline. These components of the visual language design guideline are created based on the current components and elements use in the company's websites. This guideline is divided into four major topics where we will look into the screen layout design which will be used in developing the website, table and mobile view platform. Then, we will look into the user interface design components that have been divided into fourteen subtopics based on main components.

The components that have been identified in the visual language design guideline are the colors, typography, iconography, illustrations, logo, types of buttons, dropdown, date picker, tooltips, input forms and many more. Then we will look at the two layouts of the landing page and product page of the company's website. It has been identified as the media assets style guide for the company. As the developed guideline has confidential information of the case study company, we are not able to include details of the guideline in this paper.
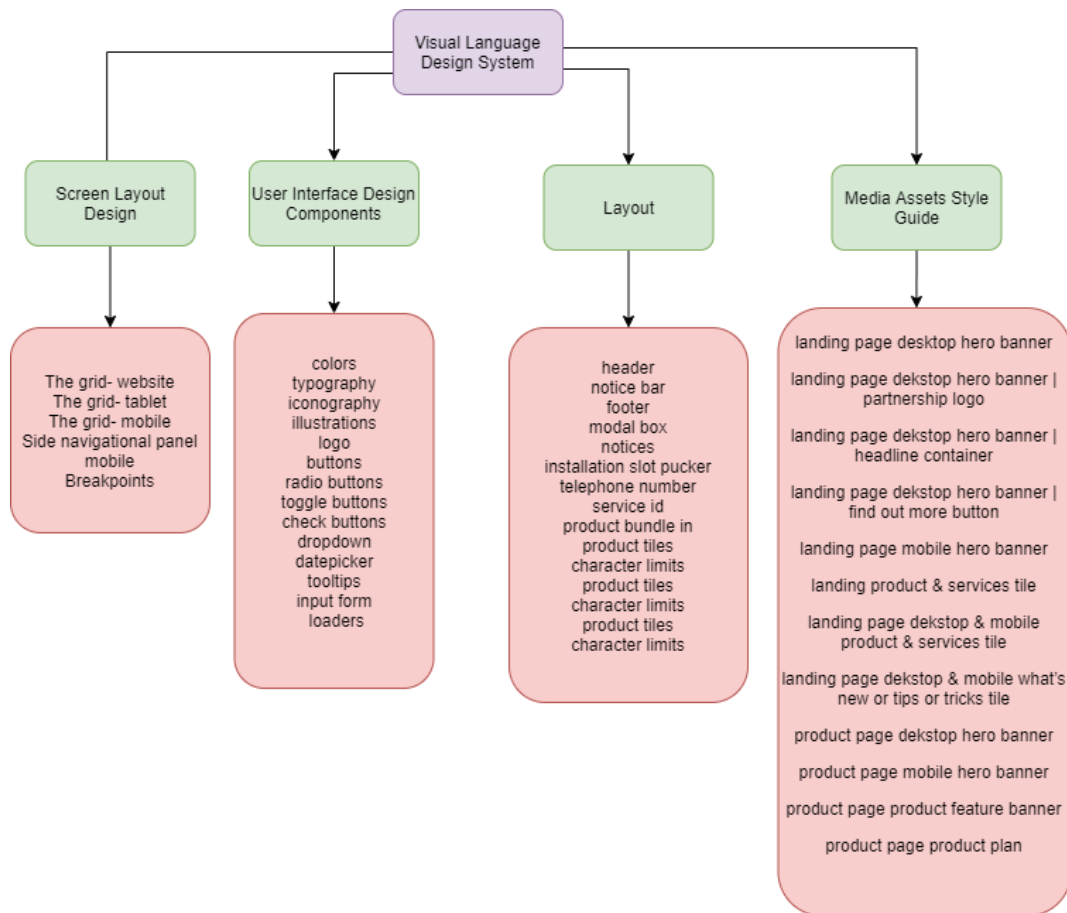
Figure 4: The Main Components of The Developed Visual Language Design Guideline

6. The Visual Language Design Guideline Evaluation

In this section, we will discuss the assessment process and the observations that have been made on the usability of the visual language design guideline using the system usability scale (SUS) survey method. The approach used for this assessment is through a heuristic evaluation. Heuristic evaluation is an easy-to-use examination technique for computer programming that helps to identify user interface design problems with ease of use. For this research, the evaluation is not the usability of the system but the usability of the visual language guideline by the portal development team.

The 13-question survey was circulated to the seven members of the internal team for their feedback on the visual language design guideline. The easy-to-use survey questions have been modified and customized based on the SUS questionnaire design from the usability.gov website as follows:

    a)   Name of the respondent.

    b)   Position of the respondent in the organization.

    c)   I think I would like to use this visual language design guideline.

    d)   I found the visual language design guideline is unnecessarily complex.

    e)   I thought the visual language design guideline was easy to use.

    f)   I think that I would need the support of a technical person to be able to use this visual language design guideline.

    g)   I found the various style guide in the visual language design guideline were well explained.

    h)   I thought there was too much inconsistency in this visual language design guideline.

    i)   I would imagine that most people would learn to use this visual language guideline very quickly

    j)   I found that the visual language design guideline is very cumbersome to use.

    k)   I felt very confident using the visual language design guideline.

    l)   I needed to learn a lot of things before I could get going with this visual language design guideline.

    m)   Do you have any suggestions on improving the visual language design guideline?

The participants are the graphic designers or UI/UX designers, front end developers, one of a user in campaign teams, product owner and scrum master. There are two demographic questions, ten questions with five points of response items (strongly agree to strongly disagree) regarding the guideline and one open-ended question that have been prepared and asked the respondent. In this survey, the evaluation scale used is by using a degree of agreement with five Likert scales to evaluate the respondent's degree of agreement. The five Likert scales strongly disagree, disagree, neutral, agree and strongly agree with the statement given in this questionnaire. In this project report, we will look at the results of the ten questions regarding the visual language design guideline.

6.1 Results of Evaluation on the Visual Language Design Guideline

In this section, we will present the count result and the modifier rating of SUS that we received after examining the visual language design guideline. The members were allowed to view the visual language design guideline. Members will be given a SUS overview to give their perspectives on the ease of use of the guideline. As stated in the previous section, 7 participants which come within the internal team has answered the survey. The score of the questions is based on the Likert scale where the value minimum 1 is strongly disagree to the max value of 5 which is strongly agree with the statements. The table below shows the result of the participant's SUS score before it is calculated.

Table 2. SUS Results Before Calculation

Participants	Questions									
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
P1	5	3	4	1	4	1	4	1	5	1
P2	5	5	5	3	4	3	4	1	4	5
P3	4	4	5	1	4	2	4	1	5	2
P4	5	2	5	2	4	2	3	2	4	1
P5	5	1	5	2	4	1	5	1	5	1
P6	5	5	5	2	4	2	5	1	4	1
P7	5	4	5	1	5	1	5	1	5	2
Total	34	24	34	12	29	12	30	8	32	13

Table 2 shows the maximal scale score obtained is 34 at question number 1 and the minimum scale score obtained is 8 at question number 8. Question number 7 is *"I found that the visual language design guideline is very cumbersome to use"*. Some participants find the visual language design guideline is very complicated to use due to the lack of understanding of the purpose of the guideline.

Table 3. Comparison of Existing Design Guideline

Participants	Scale			
	Odd Item	**Even Item**	**SUS score (/100)**	**Grades**
P1	17	18	87.5	A
P2	17	8	62.5	D
P3	17	15	80	B
P4	16	16	80	B
P5	19	19	95	A
P6	18	14	80	B
P7	20	16	90	A
Average SUS Score			82.14	A

Table 3 shows the maximum SUS score obtained is 95 and minimum SUS score obtained is 62.5. The average SUS score is 82.14 this means that the visual language design guideline is very easy to use by the internal team. Based on the SUS adjective rating the visual Language design guideline is in the "Good" rating. This visual language design guideline needs to be improved to suit the internal team needs. Hence, based on the survey we can conclude that the visual language design guideline is very easy to use and helpful in helping the team to improve the incomplete resources and inconsistent of the website components.

7. Conclusion

In this paper, we have presented our work in developing a visual language design guideline to assist a team that responsible to develop and maintain a telecommunication company in Malaysia. We also evaluated the ease of use of the developed guide, and the results show positive feedback from the team. There are suggestions from the team and we hope that this guideline will be improved iteratively until we get a matured guideline in the future.

Acknowledgments

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