Individual Research Paper

ENGN2225 Systems Engineering Design

DESIGN COMMUNICATIONS: Wabber System

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Abstract

This paper focus on the design communications of the Wabber project. Design communications serve as a significant role in the project, where the ideas are modelled and designs presented to the clients. There are many design communication approaches, whose aim is to present the design to the clients to receive real-time feedback. The physical artefact and the mechanism diagram are two effective ways to help the designers fully demonstrate their designs to the clients. Two case studies are developed, explaining and relating these two approaches to customer product experience and the principle of water taps. The paper then applies these two approaches to the Wabber project, which assist in showcasing the design to the clients and user groups. The group enables the undesired design details to be rectified based on the feedback and subsequently provides the clients a better product as a result.

Background

With the increasing influence of the aging population and the rise in the number of disabled in Australia (ABS, 2013), a Wabber project is established. It is a project developed to assist the elderly in walking and helping them to achieve everyday tasks such as picking up objects from the floor. Such small tasks may be difficult for those with poor mobility or backache. The aim of this project is to combine a walking aid and a grabbing system. It could potentially improve the lives of many elderly in the aging society both socially and economically as they may pay substantially less for two devices in one (Daniel, 2014).

The systems engineering design process of the project has been completed followed by the Verification and System Evaluation parts, which determined whether our design complied with our client's requirements and selected the most feasible idea for the Wabber project. The final step is to clearly showcase the complete design to the clients through design communications methods and to

gain useful feedback from them. Subsequently, the group can rectify the undesired design parts based on the users' feedback and provides the clients a better product as a result.

Theory

Design communication is an essential part of any design process. It exposes the design to the real world, delivers the design to the clients and receives real-time feedback from them. As most designers know, good communication improves the quality of a design: clearly articulating goals and requirements sharpening a designer's thinking (John Anderson, 1999). It demonstrates the importance of being able to communicate the design to those who it will be marketed towards in the future (Lauren, 2014). Problems in design communication can lead to delays, mistakes and even the ultimate failure of projects (Anja Maier, 2013). Visual (sight, pictures) and kinaesthetic (feelings, sensations) systems are two effective representational systems, which play an important role in design communications (Cerri, S., 2000). There are many design communications approaches using these two systems:

Prototyping is an approach that uses visual and kinaesthetic representational systems to assist the users clearly understanding the designer's ideas. Prototyping is a representation of a design, made before the existence of the final solution (Moggridge 2007). It allows one to test how one's solution will work and even present the solution to users for feedback. The prototype created could be a physical artefact, or a CAD model, a sketch, or anything to help show how your idea will work. It is the visualization of the ideas that guarantees their successful and comprehensive communication. Graphic communication is a subset within visual communication. It is another effective communication approach that involves using visual material to relate ideas, such as drawings, photographs, slides, transparencies and sketches. It has numerous benefits such as the visualization of concepts, maintaining attention, displaying ideas to give the viewer a picture of the construction or relationships of whatever that is being shown. That is the reason why a diagram is sometimes worth ten thousand words as it has numerous benefits (Cognitive Science, 1987).

Short literature review

Customer product experience and prototyping is often used when advertising new electronic products. Sony 'Experience' spaces at Best Buy is a place to show and experience the new home theatre products or prototyping (Figure 1). The experience space provides an ideal place to inspire, engage and educate consumers on Sony's home theatre products. It not only showcases the new

products but also gives the shoppers a fantastic first-hand experience of products in order to entice potential buyers. Most people prefer to experience the product before purchase. Experience will quickly assist them in gaining a profound understanding about the product features, which cannot be provided by the advertisements. Sometimes the new products' prototypes are also be showcased and experienced by the users in Sony 'Experience' spaces, which is in order to get the feedbacks. Subsequently, Sony can rectify the undesired designs based on the users' feedback and provides the clients a better product as a result. In this case, it is evident that experiencing the product and prototyping is an effective way to convey the designs to the clients and gain useful feedbacks.

Figure 1: A Sony Experience Area in a Best Buy in Rochester (Minn, 2014).

The mechanism diagram is another approach, which is often used to demonstrate the structure and operating mechanism of the products. In Anderson Secondary School (Singapore), it is a quite hard thing for students to understand the structure and mechanism of new thing by only using the theory. The teachers hence teach their students the principle of water taps works by using a mechanism diagram (Figure 2). The diagram clearly shows the inner structure of the tap and how is the tap works during the "Open" and "Closed" status. The students can easily and clearly gain a profound understanding about the structure and operating mechanism through the mechanism diagrams. The advantages of using mechanism diagram for communication is clearly proved in this case study.

Figure 2: Mechanism Diagram of Water Tap (Anderson, 2008).

Application to Wabber System

The case studies highlight the importance of experiencing products and mechanism diagram, which can be applied to the Wabber project to help clearly showcase the ideas and improve the product.

Firstly, a physical artifact has been made based on customer requirements, which are light-weight, cheap, durable, user friendly and pick-up abilities. It would be served as a prototype for users experiencing it (Figure 3). The physical artifact is the visualization of ideas that allows the users to clearly understand the design conception. The group will begin with introducing the specifications, features, structure and operation of Wabber using the prototype, followed by experiencing the product. During the experience, a first impression of the product will be made and the design features could be fully demonstrated to the users. A real-time feedback will be provided after the experience. Hence, the undesirable parts of the design will be modified and a better product will be served to the users as a result.

Figure 3: Physical Artifact of Wabber

A mechanism diagram has been developed to assist introducing the structure and operation of Wabber (Figure 5). It is the visualization of the inner structure and operation, which could assist the users to profoundly understand the components, structure and operation of Wabber. In the diagram, each parts of the Wabber has been labeled and two status (Normal, Pick up) has been clearly showcased: When the users press the head of the grabber, the tongs will be open to pick up goods. When the users release the force, the tongs will be auto-compressed in by the strong spring. Additionally, the durability of the design could be also showed as it based on the durability of the components. Thereby, the group could get feedbacks about the components and the inner structure, and rectify the undesirable parts.
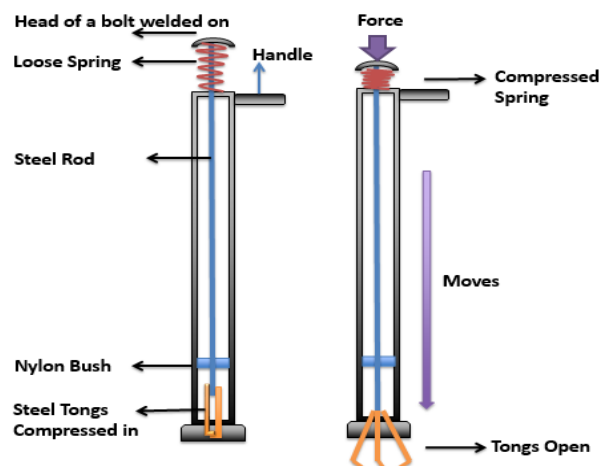

Figure 4: Mechanism Diagram for Wabber

Discussion

Some issues may arise from the method in which design communication method should be used. The main reason for this is due to an insufficient understanding of the effect of each method. Different methods could be applied to different designs as requirements and effects are both different. After discussing and analysing, some of the methods are costly, repeated and not effective in the Wabber project. The group finally chose the prototype and mechanism diagram to demonstrate the design, as they are not only effective, economical but also comprised of the benefits of other approaches such as video, PPT, and drawing. A prototype is the visualization of the design ideas. The users can experience the prototype to fully understand the operation and features. The group can also get real-time feedback from the experience, which are important to improve the quality of a design. A mechanism diagram is low cost, simple and clear. It can clearly showcase the inner structure and operation of the Wabber. These two approaches has been created to fully assist in the communication of the Wabber ideas to the client efficiently and succinctly.

After building up the prototype and gaining the feedback from the users, the group found that some components of Wabber could be further developed. One is the spring part (Figure 4), which is too strong to press. The group decided to change it to an easy-pressing spring. Other is the tongs part (Figure 4), which could hurt users or objects as they are too sharp. The group will cover the outer layer of tongs by using strong plastic. The colour of Wabber is also be considered based on the clients' requirement. The group decided to produce multiple colours for users to choose. After modifying the design, the group will showcase the most appropriately product for the clients.

Conclusion

The topic of Design Communications was imperative to the Wabber project, in order to fully demonstrate the design to the clients. In the Wabber project, prototyping and Graphic communication are effective ways to be applied to communicate the design to receive real-time feedback. Therefore, the group could rectify the undesired design and further develop the design based on the clients' feedback and provide the clients a better product as a result.

References

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Integrate Peer Review Critique

I was greatly appreciated that two students gave me very useful peer reviews. It not only help the author to improve their paper, but also let the students, who does the peer reviews, understand the topic through doing the feedback. As the saying goes 'Two heads are better than one', when we

work together to perfect one project, the project could be completed better. Moreover, it form a teamwork between the author and peers. It even help students make friends and could get help for this course from the classmates. Some detailed feedback is shown in follow:

Aspect 1

Provide comments around: *Demonstration that the task requirements have been met*

Grade   Satisfactory

Comment   Use of Language:
-Your words and the way you structure your sentences is generally good. Just make sure you use plurals where they are necessary...
-e.g. "the increasing number of disables", rather than 'disables' you would say, "increasing number of people with disabilities".
-be careful of shortening words as well. This is a formal report, using words such as 'till' instead of 'until' is not okay.

- Just a few sentences could use some re structuring, e.g. In your abstract, " his knowledge is then applied to Walker/Grabber project, ultimately resulting in a solution that design will hence be fully demonstrated to the user groups."
Try something a little different such as, "This knowledge was applied to the walker/grabber project in order to communicate the main aspects of the final design to different user groups."
-Check that you mean use groups, maybe mention the client and how it will effect them.

Report Sections:
Abstract:
-In your abstract, outline your project just a little more. Maybe just a sentence on how this topic will impact your project, and what benefit it will have for the client.
-You outlined design communication

Background:
-Read over and check language use. It's very broken at times.
-You have outlined your topic and its purpose
-Add more detail into how the topic will benefit your final project.

Case Study
- This is a great example of how effective design communication will boost an engineering project and enable people to better understand features.

Application
-Your evidence of prototyping is great.
-The description of the model is good, you've outlined its purpose and its strong points as well as pointing out how a physical solution is effective at communicating an idea
-Good use of CAD to outline even more what the device is and how it works

Discussion
-Another issue you haven't mentioned is for people that need the stick in order to stand and balance. By putting the two design solutions into one, you've created something that must be lifted from the ground in order to be used properly. For someone who lacks balance and/or has a major motor disability, this solution will not work.
-Reword this section and make it more coherent

Conclusions
-Good points raised in the conclusion

As suggested from the paper, I have rectified the words and the structure of sentence in the paper. In the abstract section, I outlined how the topic impact the project. In the background section I have checked the language used and modified it.

Aspect 2

Provide comments around: *Take a whole-of-system approach when discussing the design*

Grade Satisfactory

Comment -You have looked briefly at the entire system process then discussed what the next step is in background.
-I think you could benefit from adding more information about how exactly your report section will benefit the overall project you're working on.

Aspect 3

Provide comments around: *Detailed understanding of the systems engineering theory*

Grade Satisfactory

Comment -You outlined the theory.
-Maybe look for a few more reputable sources and outline how they apply this part of the systems design process, and how it has benefited them in their projects.
-You seem to understand the general purpose of this stage though.

Aspect 4

Provide comments around: *Demonstration of systems theory to improve design outcomes or operational performance*

Grade Not satisfactory

Comment You need to outline more about how this topic will benefit your project.
You have outlined how it will be applied, but not a lot about why it is necessary or how it will benefit the project.
You also need to mention that by de-constructing the project and putting it into terms that anyone can understand, you allow your product to reach more people. But you may also start to notice components that can be improved because you can now receive feedback from a wider range of people.
Design communication is vital for the final product, but also necessary for the stages before that where you discuss prototypes and concepts with the client.

Aspect 5

Provide comments around: *Quality and relevance of bibliography*

Grade Satisfactory

Comment -Wikipedia is not a reputable source. Try to find somewhere else that says the same thing.
-try looking at the sources listed at the bottom of the article.
-Your references are a little inconsistent. You mention where you got something (as in '[ONLINE]' etc) for three sources. For Harvard referencing this is not necessary.
-You have a number of references that are generally formatted correctly
- try looking for a few more for the theory section. Otherwise they're fine.
-You didn't upload your Turn it in report so I can't asses originality

As suggested, I have added some reputable sources and two literature reviews in the theory section and short literature reviews section. In the application section, I applied two approaches to the project and outline the benefits for my project and also fitted in a paragraph about the customer requirements. In the discussion section, I added a paragraph about the development of the design based on the clients' feedback. In the reference section, I have changed the reference styles to Harvard styles and found more useful references.

Aspect 1

Provide comments around: *Demonstration that the task requirements have been met*

Grade Satisfactory

Comment Abstract and background are good. In theory i suggest expanding more on how the samsung galaxy case study was a form of good communication.

Aspect 2

Provide comments around: *Take a whole-of-system approach when discussing the design*

Grade Satisfactory

Comment In applicaion you talk about your design and show the drawing of it (which is good) but you also need to talk about how are you going to communicate this with the customer

Aspect 3

Provide comments around: *Detailed understanding of the systems engineering theory*

Grade Satisfactory

Comment Theory is okay, you state a lot of the methods of prototyping but you don't really talk about communication. Discuss more about good communication, how its done and techniques.

Aspect 4

Provide comments around: *Demonstration of systems theory to improve design outcomes or operational performance*

Grade Not satisfactory

Comment You are just stating what is already known in your discussion, talk about what could go wrong and talk about how your group can realistaclly create a prototype (i.e there won't be enough resources to create a real life prototype)

Aspect 5

Provide comments around: *Quality and relevance of bibliography*

Grade Outstanding

Comment plenty of references which shows you have clearly researched the topic

As suggested from the second peer reviews, I have added some paragraphs about how I am going to communicate the project with the customers in the application section. In the theory section, I have discussed about some good communication approaches and how it is done.