CS2003 Usability Engineering Report

Group 38 Coursework for 2018/19

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Problem 6 – inter-vehicle messaging system

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Word count - 2977

Usability Engineering Lifecycle

The usability engineering approach that we used for this project was the star lifecycle which is also known as the Lucid model. We chose this model as evaluation is very important in this approach. There are four basic activities that are needed for the design process, this include; establishing requirements, designing alternatives, prototyping and evaluating (Preece, Sharp and Rogers, 2015).

The star lifecycle approach suggests that after each activity, the activity is evaluated. We chose this approach because using this allows you to start at any activity and move on to any other activity after evaluating it (Helms, James William). This proved to help us as we started on different activities such as the design process, we first started to design our prototype and then evaluate the designs and see what went wrong and if we missed any required functions. We then moved on to the requirements stage to see what other requirements we could gather and add this to our designs. This gave us a better understanding of the project and what requirements are needed. When using this cycle we did some research to see if there were any other systems that have a vehicle messaging system which would help us in our establishing requirements stage and prototyping stage.

When designing our prototypes for our system we decided to first sketch it out on paper, which is considered as a lo-fi prototype and then used “Marvelapp” as our tool to design our final designs. We first used a paper prototype by sketching all the possible screens that could be added on our app so that it was quick and easy for all members in our group to see (Snyder, 2011). This allowed us to make small changes or add features if it was necessary. Our “Marvelapp” prototype was made to be interactive so that we could assess the user’s pathway throughout the system. Using this prototype also let us focus on designing the main aspects of the screen such as the icons and the colour scheme. However, using a hi-fi prototype could lead to our designs for our prototype to be too sophisticated and high tech, resulting in our system not meeting the requirements we designed it too (Telono, 2019).

The Gantt chart that I created included our initial planning for this project. We followed the lab worksheets that was provided to us weekly in our seminars. Each worksheet provided us with guidance on how to complete the project, we went through each stage according to the star life cycle, evaluating each activity before moving to the next. This can be seen in the Gantt chart in the appendix. There were 10 worksheets provided to us by Dr Mark Perry which helped us each week when working on our project, from this I believe we worked on 13 tasks during this project. These tasks started from selecting which usability engineering cycle to use to creating our final prototype using “Marvelapp”.

User Requirements

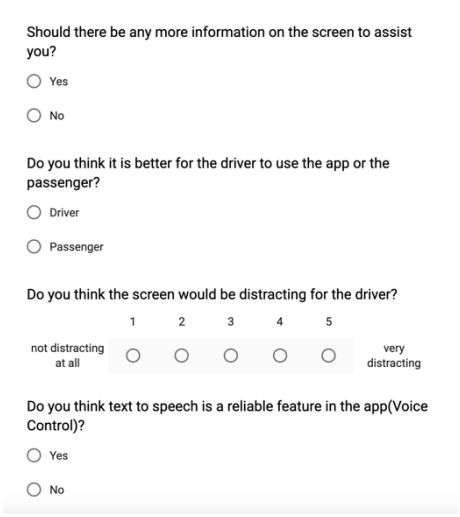
When developing our list of user requirements we discussed ideas as a group which led us to sending out questionnaires and researching similar systems which may have similar functions to our system.

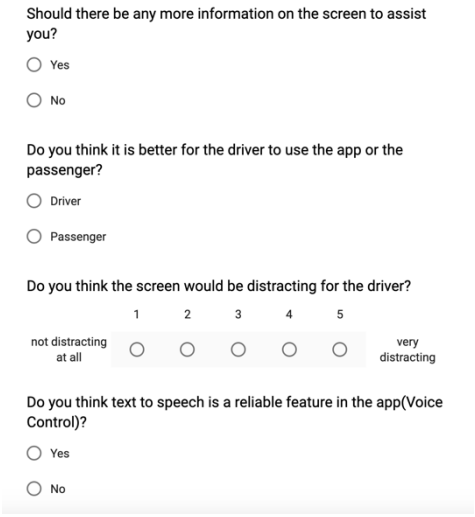
Formal list of requirements:

1. Text to speech function
2. Predefined messages
3. Voice control
4. Cars are displayed within the proximity range
5. Display and alert if messages are being received or if friends are nearby
6. Unique ids for users
7. Chat history
8. Adjustable proximity range

The questionnaire that we made gave us insights on who would be using the system and how. We found that that the majority of users would have a valid driver's license as the app is built mainly for drivers being able to communicate with each other. However, the system that we designed can be used for other people than the driver so that passengers can use the system to message other users with the app.

Furthermore, in our questionnaire we provided screenshots of designs of how our app would look like. We received feedback on requirement 6, how we displayed our notifications if a friend or previous connection was nearby. Our results showed the majority found that our notifications were clear. Our sample size was 24 which gave us a suitable number of responses. However using a questionnaire did not give us enough detail from the responses, this led us to making the requirement of display and alert if friends are nearby function to have a sound so that the driver or passengers know for sure if they have received a notification. Moreover, the questions that we asked helped us when gathering and refining our requirements but using questionnaires may limit our data quality. This is because participants may be untruthful in their answers and provide wrong answers due to privacy reasons (Preece, Sharp and Rogers, 2015).





In our research we found that lorry and truck drivers have their own communications system which allows them to communicate on radio. This allowed us to evaluate this system and see if it was appropriate or similar in any way to our system such as having a proximity range which lets them communicate within a certain range. This was the first system that we all thought of which was similar to our system in a way. We discussed as a group to develop an app for smartphones that users can use as everyone has a smartphone in this modern world.

We discussed as a group to have a text to speech function as we all thought that having messages read out loud would be more suitable than users looking at their phones whilst driving. We agreed that this was a good requirement to have as we also researched other text to speech systems so that we could gain an understanding of how it would work. In our questionnaire we asked participants to see if the text to speech function was reliable, majority said that it was reliable which helped us when refining this requirement.

Another similar system was “WhatsApp” which has a messaging style which we wanted to implement. This style helped us to add predefined messages on our app. These functions helped us in designing our prototypes. Furthermore, we also looked at the layout of WhatsApp and saw how they lay out their messages. This helped us gain an understanding of what our system needs to have.

Another system that we researched was “Siri”, we thought that having something similar to this would be helpful in navigating the app that we made. In Siri you can activate voice control by saying a certain phrase hands free. Therefore, we thought voice control would be a suitable requirement as we want drivers using the app to be safe and not break the law by using their phones in the car.

There were also other systems that we used as a basis of our system as we thought they were similar in a way. “Uber” was one of them, as on “Uber” you have a map and can track your driver on their whereabouts, this feature helped us when establishing our requirements as wanted something similar so that cars can be displayed on a map. We used this a requirement so that cars are displayed within a proximity range. This can be seen in requirement 4 which is a required function from the brief.

In the system that we created we planned to let users have unique ids so that they can be distinguished by other drivers using the app. This is a required function as it was told to be required from the brief. The same also goes for our chat history requirement as it is required for users to be able to look at previous messages that they have sent or received.

Application of usability engineering principles

When starting our design of the prototype we looked at our requirements list and attempted to translate the requirements into a prototype, we did this by using Gestalts laws of perceptual organisation. For our app we researched and decided to create a custom background. This was because we found that having a custom background would be attractive for users when using the app as it is in the first screen displayed when the app is opened for the first time (Medium, 2019). Our final prototype can be seen in our group report (Marvelapp.com, 2019).

Voice control – for this requirement we decided to add a microphone icon on every screen in our prototype. This was to imply that whenever the icon is seen, there is an option to use voice control. This is an affordance as looking at a microphone icon users know what to do and don't need any instructions on what to do. However, in this case we decided to add a phrase so that users can say "Car-Net" so that the system knows when to start listening and convert speech into actions. This can also be seen in other voice control systems such as "Amazon Alexa" and "Siri". Furthermore, we decided to make the microphone icon bright and big so that users are visibly aware that they can use voice control (Wiedenbeck, 1999). This is to show users that the icon is visible and that having a bright colour attracts the user's attention so that they know whenever they use the app, they know what function it does. This lets users associate the icon with voice control. Moreover, by adding this icon on every screen shows that the designs are consistent on every screen so that users are comfortable with the meaning of the icon and are not confused. Consistency is one of the heuristics principles by Nielsen (Anon, 2019).

Cars are displayed within the proximity range – for this requirement we researched some apps that show locations and maps and we saw that "Uber" has a particular design that we wanted to create similarly. We created a map screen which shows the users car and other users and friend's cars that are nearby their location. We chose this style of design as it's a very common design that apps have so, we decided not to change it as people using the app are probably comfortable with the map layout from other designs than have a new style introduced to them. This will also create an incentive to use the app as they already understand the concept. When the users can see a friend that is nearby their map, we chose to give it the colour green as it symbolises, they are "online "and "active" (Smith, 2019). These icons are also used on other popular apps such as Instagram and Facebook.

Predefined messages – For this requirement we let users have the option to select a predefined message to send or quickly respond to a message. We put this function on the messaging screen where users can select on different messages on a drop-down button. We chose to design it this way so that it was perceptible. The text was made black so that it can be distinguishable from the background. Moreover, we added a dropdown icon so that users are visibly aware that there are more options by selecting the drop-down icon. we attempted to make the screen have a symmetrical layout. This is important because "If an object is asymmetrical, the viewer will waste time trying to find the problem instead of concentrating on the instruction" (Facweb.cs.depaul.edu, 2019). This is one of Gestalts principles and important when designing screens. We tried to make all screens symmetrical for example, placing texts and pictures in the middle.

Display and alert if messages are being received or if friends are nearby - we chose to have messages pop up on the screen from the top so that users are visibly aware they have received a notification. This can also be seen in other systems as it is a common feature to have a message pop up on the screen on the top. We did this so that users can still see the screen of the map that shows other users and the message notification. Furthermore, there is also a speaker icon on display whenever the notification pops up. This is to indicate the text to speech function as the user is alerted of the message

by sound and read out by the system so that the user does not need to take their eyes off the road. The image of the speaker gives an affordance of sound as users already know the meaning of it and don't need an explanation that there's going to be sound coming from the system.

Users to have unique ids – for this requirement we translated our requirements for this to make 2 screens. The first screen is a login page where the users already with a unique id can login and another screen where users can sign up to receive a unique id. The sign-up page shows the information that is needed to sign up. We chose to put this information together as proximity between these information is important and shows that they are related. Furthermore, we presented this information using borders rather than have the information sit in front of the background to show the information more clearly as presentation is important. We also decided to match the style of other sign up pages so that users feel more comfortable and know what information to enter when signing up.

Chat history – when designing this we looked at other communication systems such as "WhatsApp" and "Facebook Messages" these are both popular messaging systems that people use every day. Therefore, we decided not to change the style and matched it so that users are more comfortable navigating through their chat history.

Adjustable proximity range – for this requirement we added a chip button icon so that users can turn the proximity function on or off. We also added a scale so that users can select a range of proximity on the scale. The scale was done so that users can easily slide left or right rather than enter the proximity range. This is because

Usability Evaluation

When evaluating the prototype that we created we made sure that we looked at 4 factors throughout the project. This included observational study, systems performance, rememberability and external factors which can be seen in our group report. This helped us at the end of our prototyping phase as we evaluated our design and checked if our design meets the factors.

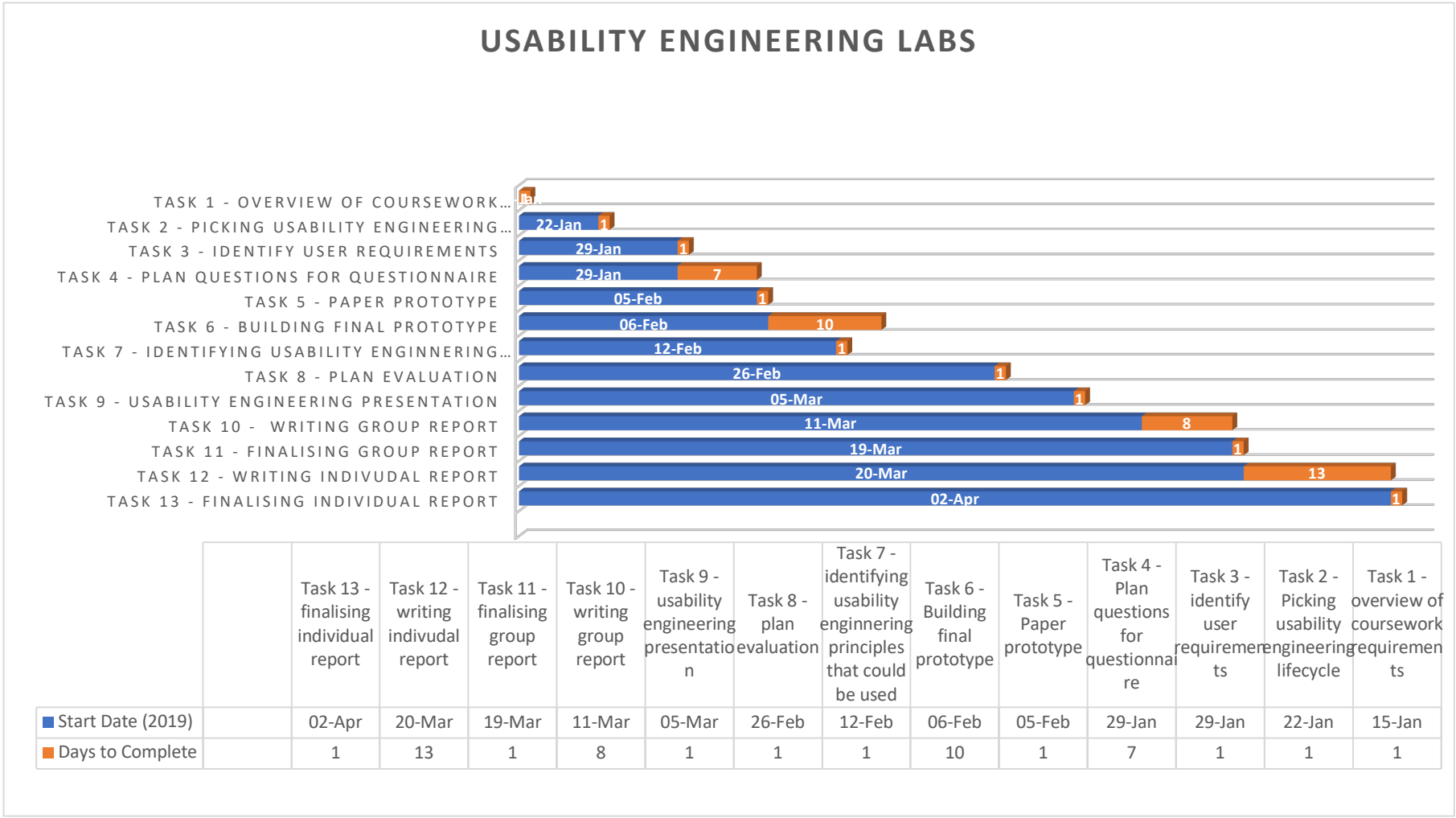
We planned to have a focus group to take part and evaluate our designs using the heuristic evaluation method. The plan was for each individual in the focus group to test our prototype in different conditions and check if our designs had any specific problems with the system. The individuals had to check if our prototype followed the 10 heuristics principles by Nielsen. If this plan occurred, we would have been able to collect more and detailed feedback of the prototype, this would have allowed us to gain better understanding of the systems functionality and usability. If we were to change something in our plan, we would have attempted to have a focus group and conduct this in the appropriate conditions.

We attempted to apply Nielsons 10 usability heuristics for user interface design, this can be seen in our questionnaire which we provided in our group report. We asked questions such as “should there be any information on the screen to assist you?”. This relates to the visibility of system status. “The visibility of system status refers to how well the state of the system is conveyed to its users. Ideally, systems should always keep users informed about what is going on, through appropriate feedback within reasonable time” (Nielsen Norman Group, 2019). We asked this question so that participants could inform us if the information on the screen gives them enough information for them to understand what is going on. However, we received feedback from users that told us that in some screens we are providing too much information which is too much for them to handle. This can be seen in our map screen where we provide information on user’s whereabouts on a map. We could have improved this by changing the screen and implementing a radar system which would be visually better for users to interact with.

We could have improved and changed our systems in many ways. One way in which I would have wanted our system to look like is for our system to be built inside the cars dashboard. Modern cars these days have improved in technology and on dashboards. We could have built our system for cars on their dashboard. This would have been easier for users as users interact with their dashboard daily when driving such as using the navigation system or changing the radio station. This would be a great concept for the system than building an app.

Another way our systems usability could have been improved on is applying more Heuristics principles by Nielson. We could have attempted to make it easier for users to edit their messages, this would be very difficult when using voice control as the apps aim is for the user to use the built-in voice control function in the app. “The designer is at fault for making it too easy for the user to commit the error. Therefore, the solution to user errors is not to scold users, to ask them to try harder, or to give them more extensive training. The answer is to redesign the system to be less error prone” (Nielsen Norman Group, 2019). We could have improved the system by making it easier for users to edit their messages and for them to confirm their actions by having a prompt message come up saying “are you sure?” this would allow users to fix their mistakes and avoid errors before sending a message.

Appendix



		Task 13 - finalising individual report	Task 12 - writing indivudal report	Task 11 - finalising group report	Task 10 - writing group report	Task 9 - usability engineering presentation	Task 8 - plan evaluation	Task 7 - identifying usability enginnering principles that could be used	Task 6 - Building final prototype	Task 5 - Paper prototype	Task 4 - Plan questions for questionnaire	Task 3 - identify user requirements	Task 2 - Picking usability engineering lifecycle	Task 1 - overview of coursework requirements
Start Date (2019)		02-Apr	20-Mar	19-Mar	11-Mar	05-Mar	26-Feb	12-Feb	06-Feb	05-Feb	29-Jan	29-Jan	22-Jan	15-Jan
Days to Complete		1	13	1	8	1	1	1	10	1	7	1	1	1

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