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Exercise 1 - Usability (3 + 3 = 6 points)

Solution 1:

The six goals for which the usability is usually broken down are as follows:

Goal 1: Effective to use

Description:

It refers to how good a system is able to serve its purpose. This is measured by the capability of the system to allow the users to perform tasks accurately and completely.

Example: Cheap or old touch screen smart phones which have very poor touch quality that the user has to keep tapping the screen twice-thrice to let the function works. This also happens many times in ATM machines.

Goal 2: Efficient to use

Description:

It refers to the way any system provides support to its users to complete any task. It basically refers to the ease with which a user can repeat a task to completion with minimum amount of effort involved.

Example:

A phone answering machine is more efficient to let the user carry out common tasks (e.g., listening to messages) through a minimal number of steps. In contrast, the voice-mail system is comparatively inefficient because it required the user to carry out many steps to perform the same task every time.

Goal 3: Safe to use

Description:

This involves saving the user from undesirable conditions and dangerous situations. It refers to to the possibility of reducing the errors in the system and the measures to recover in case an error happens.

Example:

In Microsoft Office, in the ‘File’ menu, option ‘Save’ and ‘Save As’ are next to each other. A user who wanted to save the new version has to click ‘Save As’ but might end up clicking ‘Save’ button accidently leading to the loss of the old version of the file. A measure might be to use ‘Undo’ function, however, the ‘undo’ history is sometime limited.

Goal 4: Have good utility

Description:

It refers to the appropriateness of the functionality provided to the users in order to help them to do the required task. It is the extent to which the system allows the users to meet their needs.

Example: A example of a system with low utility is a software drawing tool that does not allow users to draw free-hand but forces them to use a mouse to create their drawings, using only polygon shapes.

Goal 5: Easy to learn

Description:

It refers to how easy it is for the user to learn using a system without much effort. It should be easy to learn the system by exploring the system on their own.
Example:
An example where this goal fails is learning computers especially, by elderly set of people. They need special practise and guidance to understand its working.

Goal 6: Easy to remember
Description:
It refers to how easy it is to remember the functioning of a system, once it is known to user. It also refers to the amount of time that the user took to remember its functionality.
Example:
An example where this fails is the syntax design of any programming language. I have not practised Java since two years and now it is difficult for me to remember the exact style of its programs. I again need to brush up the language and has to keep it in practise to make use of java to write programs. Similar is the case with softwares like Adobe Photoshop, Adobe After Effect etc.

Question 2:

Effective to use:

The iPod classic design allows user to perform tasks accurately and completely. It serves its purpose of music options in different genre well.

Efficient to use:

The menu design allows user to perform the task (listen to music/watch video/…) very easily. To listen to music after turning the iPod on, user needs to press one button and choose a track to complete the task based on the user music type choice.

Easy to learn:

To operate the iPod itself is easy to learn, however the way to put information into it using iTunes can confuse people who never used it before. Without previous knowledge about iTunes or without using manual, it's impossible to find out how to put music/videos/… to the iPod.

Observation about other three goals:
Safety: It's safe to store music of different genre but for a non-touch ipod, a song deleted is deleted forever.
Utility: Yes, it has high utility when it comes to listening to music.
Easy to remember: The buttons are easy to remember as the design of the buttons follow external consistency as that of a traditional music player.

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Exercise 2 - Analyze Interfaces (4 * 9 = 36 points)

Interface 1: Coffee Machine

We tried to analyze the coffee machine interface from various examples of possible coffee machines to broaden our understanding of the principles of the interface designing.

Affordances(Mostly real Affordance):

1. The coffee machine affords to press buttons to fill empty coffee cups.
2. It affords to allow user to control the type of coffee or the strength of coffee by having buttons on its interface.
3. It affords to fill cups with hot water or (sometimes) hot milk

Fig 1.1: Picture Source Link

Visibility

1. Usually, the buttons are clearly visible at the interface with icons for amount, type and strength of coffee content and the user can accordingly enter the choice as shown in Fig 1.1
2. However, not every coffee machine has its buttons clearly visible as shown in Fig 1.2 where a new user might have to look for the button first which is at the back to start the machine.

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Fig 1.2: Picture Source Link

3. Sometimes, the coffee butons are confusing. For example: in fig 1.3, there is no need of the term 'Extra' when there is - and + sign available there. I do not know what does - Extra mean.

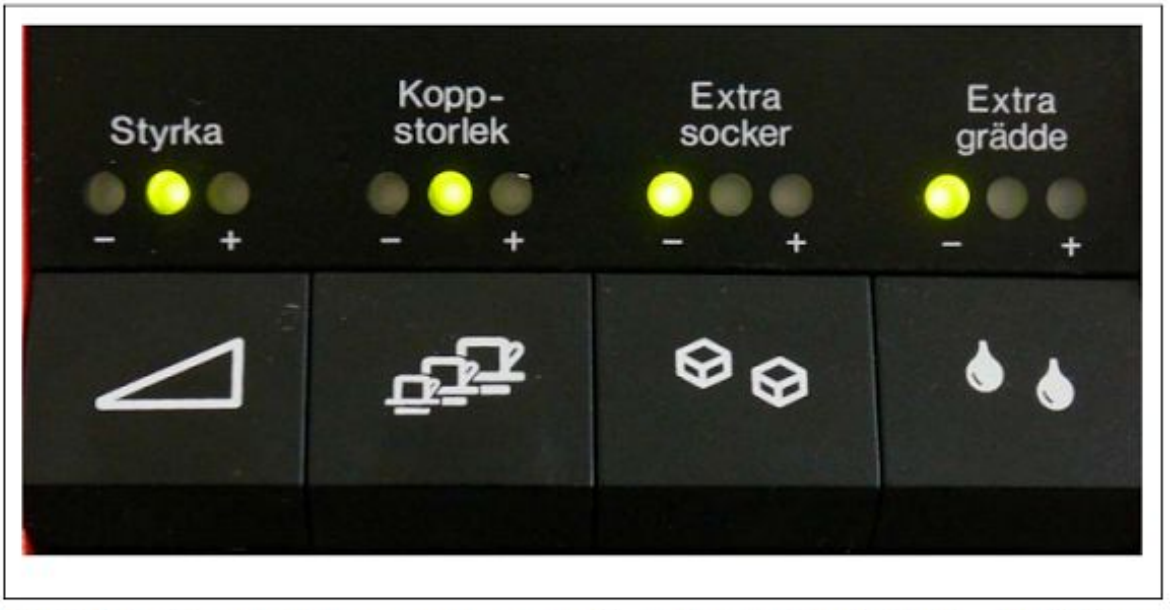

Fig 1.3: Picture Source: Link

Feedback:

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1. The coffee machine makes a sound when the required amount by the user(Large, Small, Medium) is filled in the cup.
2. The coffee machine gives an indication when the waste box in the coffee machine is full and needs to be rinsed and also, the machine pauses unless the completely filled tray is cleaned as shown in Fig 1.4.
3. Sometimes, the coffee machines can only be unlocked by specific transponder or certain employee card rating as done in MPI Building E1.4 in campus where it gives feedback by getting unlocked with a transponder.

Fig 1.4 Picture Source Link

Mapping:

1. The coffee machine uses ‘perception’ analogy to show the cup amount filled during the process it fills the cup as can be seen in Fig 1.5 which is taken at MPI E1.4 Building while filling my cup of coffee.

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Fig 1.5 Picture taken at MPI Building E1.4

2. The size of the buttons for different cup sizes keep on increasing/decreasing as the size of the coffee cup increases/decreases using physical analogy as shown in Fig 1.6

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Fig 1.6: Picture Source Link

3. The distance between the point from where the coffee is poured out from the machine and the platform on which the empty cup is placed follows spatial analogy with the size of a coffee cup.

Constraints

1. There are physical constraints to the size of the cup which can be put on the coffee platform which depends on the the height between the tap and the platform.
2. There are cultural constraints of the type of coffee people drink like in Asia, usually the coffee is milk-cafe while the people in Europe prefer espresso or coffee with less milk. So, in Aisa machines should be such that the buttons for milk-coffee varities should be more as compared to the machines in Europe.
3. There are constraints to the size of the buttons on touch display and sometimes they are so close, that one might end up tapping the wrong button as shown in Fig 1.7 with no option to cancel the order.

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Fig 1.7: Picture Source Link

Consistency

1. Two buttons are doing the same functionality in ‘Auto-Off’ and ‘Power-off’ as shown in Fig 1.8 which is a fault in internal consistency of the machine.

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Fig 1.8: Picture Source Link

2. The external consistency is not maintained in choosing the amount of ounces of coffee required as sometimes a controller is suppose to be rotated as shown in Fig 1.9 or has to selected from buttons as shown in fig 1.7.

Fig 1.9: Picture Source Link

3. The size of the machine is also a constraint as usually people prefer small coffee machines in their kitchen as compared to huge ones as it becomes a task to find all the functionalities in that small set of machine.

Metaphors Used:

- A coffee cup, a brew over ice, water or other suitable icons are used as shown in Fig 1.7 to mark what the given button does.
- As shown in fig 1.9, the increasing direction of ounces of caffeine are shown as per clockwise or anticlockwise rotation.
- As shown in Fig 1.7, the button '+' shows an increase while the button '-' shows a decrease in the amount of caffeine requested in the coffee cup.

Conceptual model behind the interface:

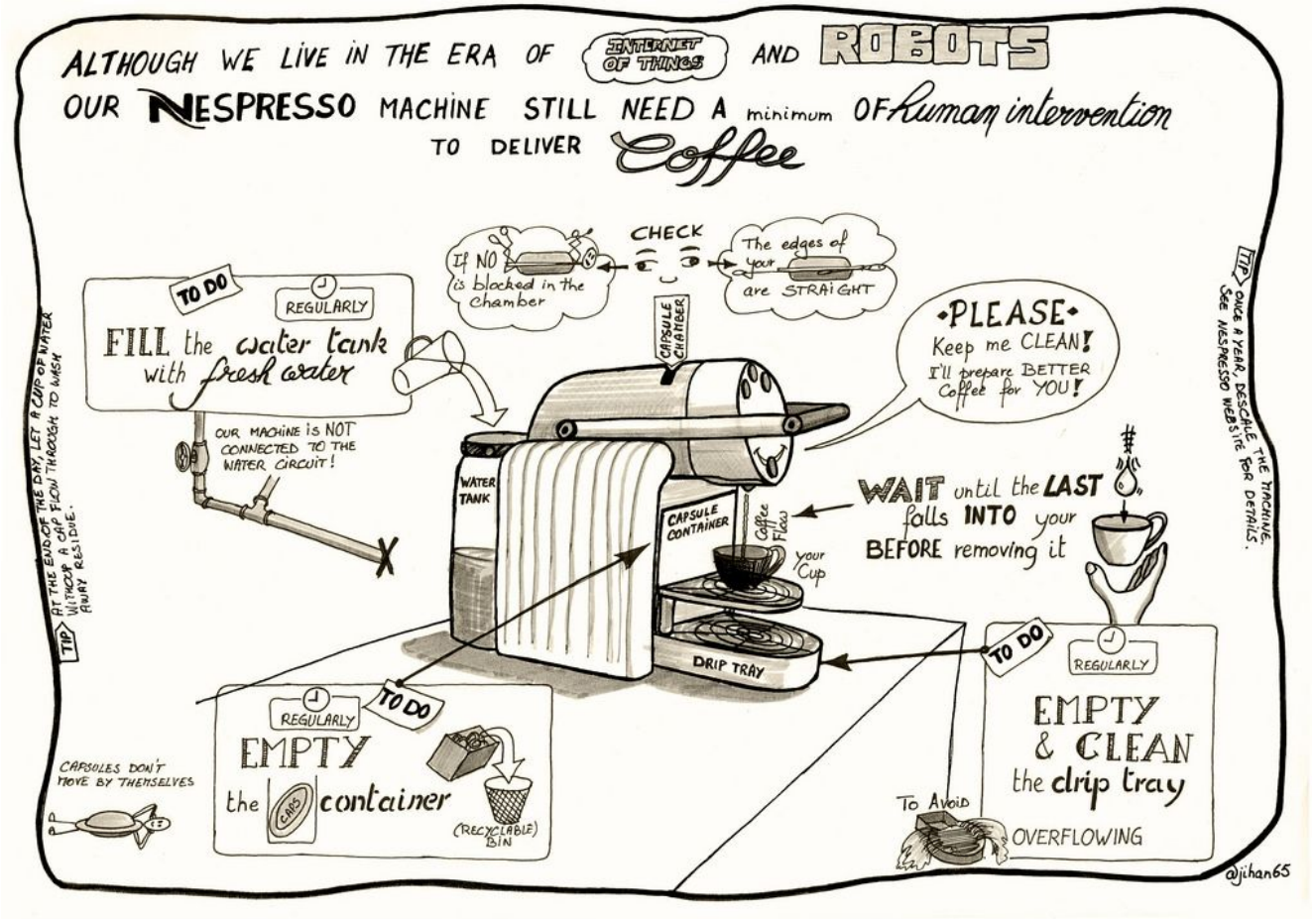

Fig 1.10 Picture source Link

- Fig 1.10 shows a typical sketch of what human has perform to interact properly with the coffee machine.

- In its design, it provides access to a user interface to the functionalities like the type of coffee to be chosen, water or milk can also be selected. There are separate containers to store beans, milk, water, creme and waste from the machine. The machine gives proper feedback accordingly.
- The platform where the cup has to be placed is central and the functionalities are on the front while the storage containers are back as the user doesn't have to interact with them everytime.
- All of these different materials are incredibly easy to take apart, clean, and properly dispose of.

Suggested improvements:

- The display of the options in a touch-based interface in a coffee machine ca be in different languages and allow user to select the language.
- Instead of so many buttons for different cup sixes, there could be just + and - to indicate the amount of coffee required.
- The pressure valt becomes jammed which might hamper the safety of the user. There should be proper alarm system for the same.

Interface 2: Apple Watch

Affordances(Mostly Perceived Affordance):

1. It affords to press buttons on its interface for different applications like alarms, play music etc apart from keeping up the user up with time and date.
2. It affords to allow users to read mails and text messages and respond to them. However, the response is not very easy as the buttons are very small.
3. It affords to aware the user by buzzing on the wrist of user with every new notification as shown in fig 2.1

Fig 2.1 Picture source Link

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Visibility:

1. This watch does not play a good role in giving clear and easy access to the user about the various applications as there are too many application icons on that small screen of the watch as shown in fig 2.2

Fig 2.2 Picture Source Link

2. It is difficult to respond to a message or type on it as the buttons are very small and the scroll bar in the corner is not even properly visible.

Fig 2.3 Picture Source Link

3. The visibility of notification icon, say if a call comes, a user could easily end up cancelling the call or pressing the wrong icon as they are very close to each other as shown in figure 2.4

Fig 2.4 Picture Source Link

Feedback:

1. The watch gives feedback for different notifications by buzzing or vibrating on wrist.
2. The feedback is same for all new notifications ie vibration at the wrist.
3. The watch also gives feedback in form of adjusting the output to the various output appliances as shown in figure 2.5 in which the watch changes the quality of sound based on the user choices.

Fig 2.4 Picture Source Link

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Mapping:

1. There is physical analogy in some of its applications like the running application in which the number of calories lost increases as the user keeps on running.
2. There is spatial analogy of the icons alongside the 2 or 3 buttons on its edge and sometimes these buttons are used to switch between applications.
3. There is physical analogy for adjusting volume in the watch.

Constraints:

1. There are physical constraints of the screen size to be limited to that of a wrist watch as shown in fig 2.5
2. There are physical constraints of the button sizes as they are very small and make it hard for the user to identify and explore the different functionalities of the watch.
3. There are logical constraints when it comes to using the interface of the clock as we do not have the option to reduce the icons on the watch interface as that of the mobile phones even if a particular application is not interesting to the user.

Consistency:

1. The icons of different applications used here follow external consistency as at all other places where this application is available, these icons follow external consistency.
2. There is internal consistency in its interface for the colors as always a notification in green color refers to a notification on whatsapp but a blue color refers to notification from skype.
3. The layout of the keyboard for typing follows external consistency as that of the Qwerty style keyboard found all over the world as shown in figure 2.5

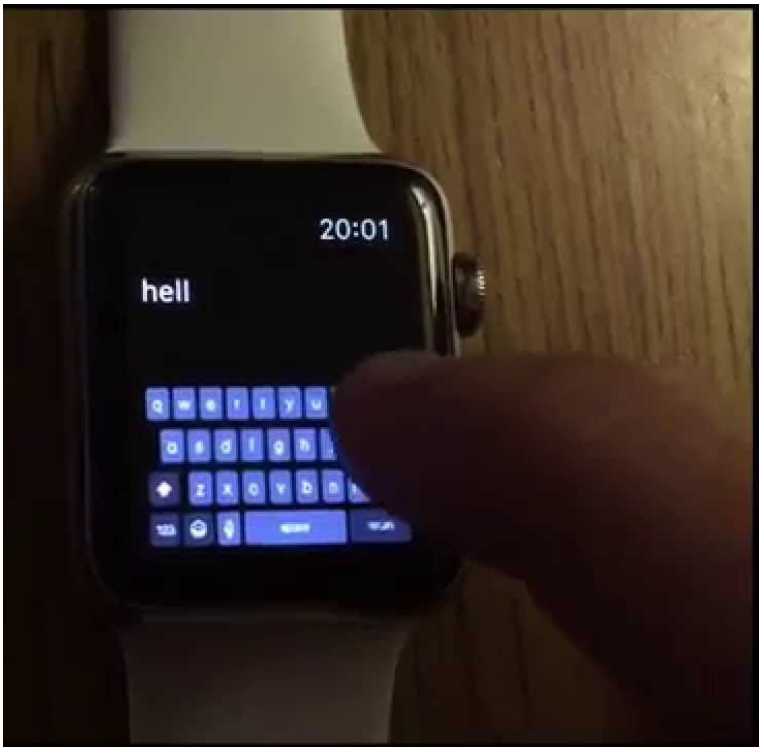

Fig 2.5 Picture Source Link

Metaphors Used:

The icon of an envelope is used to refer to mail, icon of picked receiver is used to pick the call, music icon of a node is used to start music application etc. as shown in fig 2.4. And fig 2.2. These icons are consistent with the icons on mobile phone applications and the desktop applications.

Conceptual model behind the interface:

The development of the interface can be seen in fig 2.6. Apple tried to incorporate all the basic applications which a smartphone user uses daily in that wrist watch so as to make its applications more easily accessible to the user and to get the user constantly in touch with the updates from its user. The conceptual design was to incorporate these applications along with a mainstream watch function which shows time and date to the user to come up with a smart watch. Fig 2.7 shows the different watch series available according to different budget of the user differing the amount of functionality.

Fig 2.6 Image Source Link

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Fig 2.7 Picture Source Link

Suggested improvements:

1. There can be different level of vibrations to differentiate between the notifications lik for mail, only one vibration and for call continuous vibrations etc.
2. The size of the dial of the watch could be made a little larger so as to improve the visibility of the icons of the different applications and make it friendly to the elderly people as well.
3. There could be option given to the user to choose which notification are they interested in. Buzzing every notification is not a good idea.
4. A small projection button could be there so that user can use a plain wall as his or her user interface whenever he or she likes to see something in large size, something similar to idea of Pranav Mistry from MIT.

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Interface 3:

Saarfahrplan (all the pictures from this section are screenshots of the Saarfahrplan app Version 2.2.5 for iPhone)

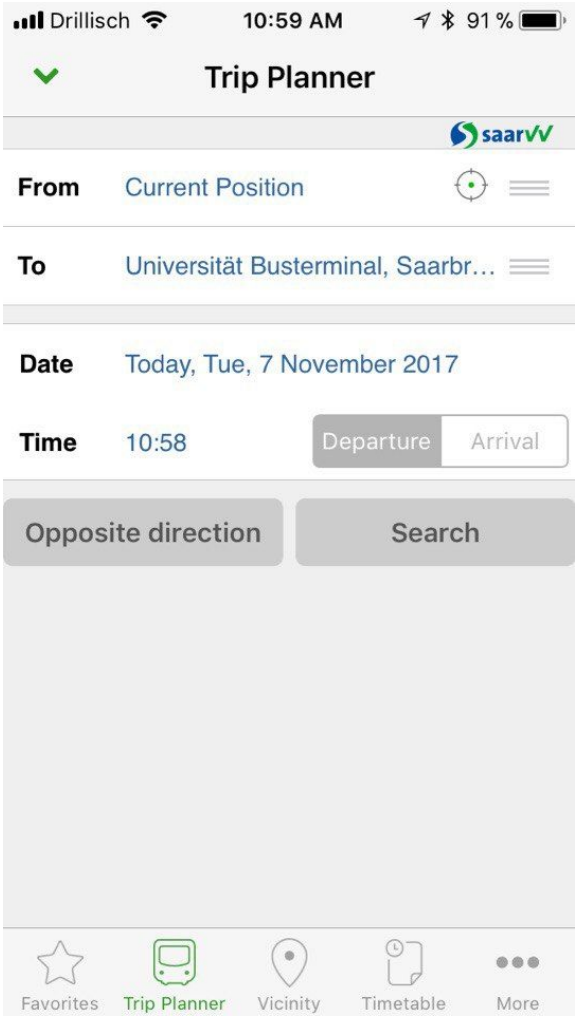

Fig. 3.1 Start Page

Affordances

- Saarfahrplan app allows user to find an optimal way from one location to another (within Saarland) with buses, trains, trams, by foot.
- It allows user to access information about transport delays (Fig. 3.2)

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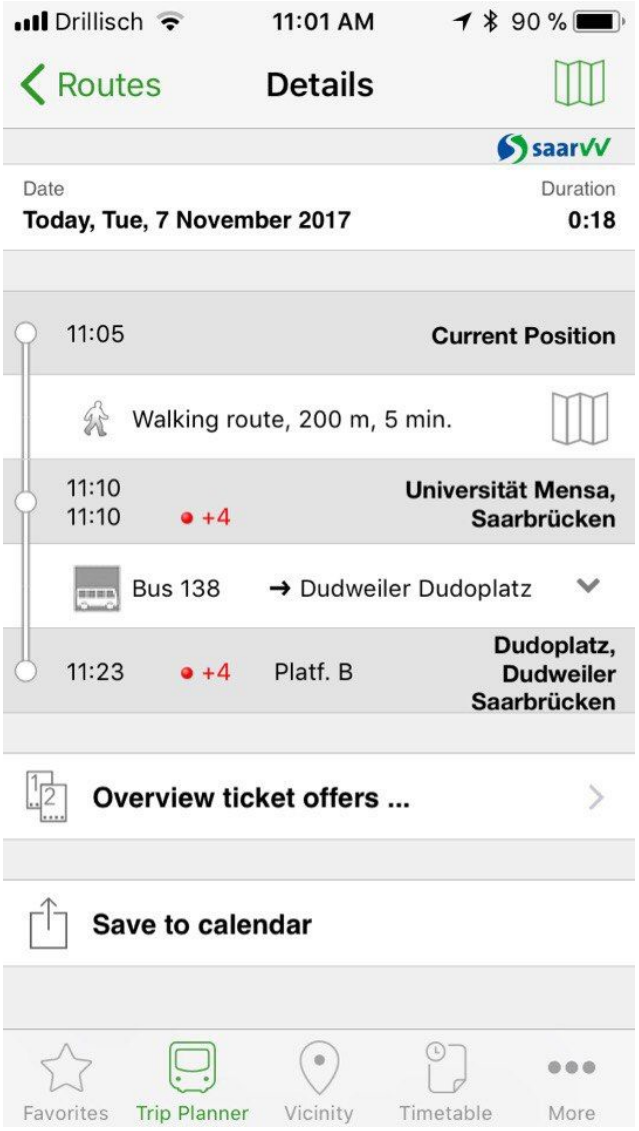

Fig. 3.2. Root

- It allows user to see the root on the map (Fig 3.3)

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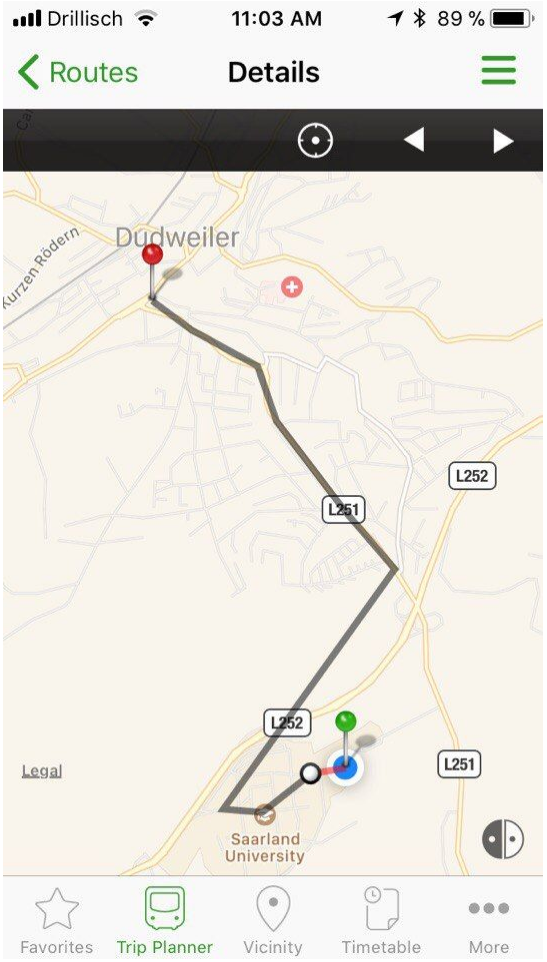

Fig. 3.3. Root on the map

- It allows user to see their location on the map (Fig. 3.3: Blue dot)
- It allows user to estimate time it will take to get from one location to another (Fig. 3.2: Top right corner).
- It allows user to choose the time and date when they want to depart from start location or arrive to the goal location.

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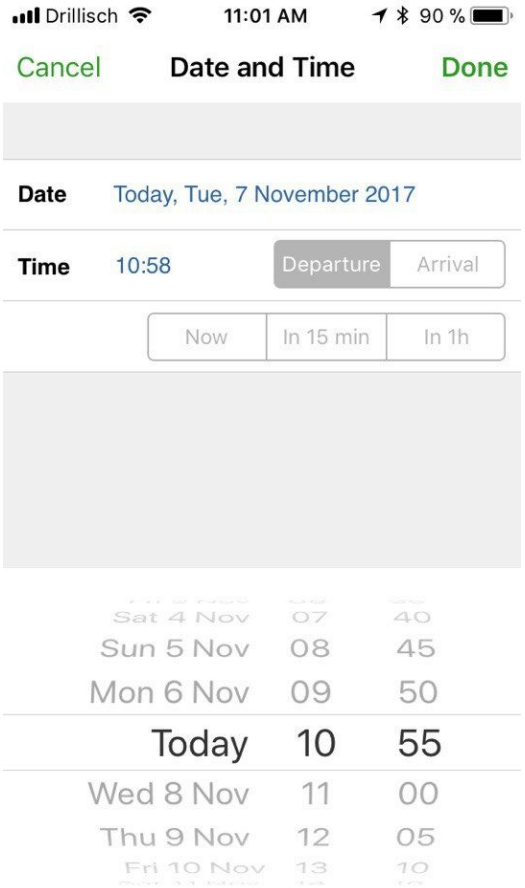

Fig. 3.4. Choosing time and date.

- It allows user to look for the location names in the list provided by the app or choose from locations user looked for recently.

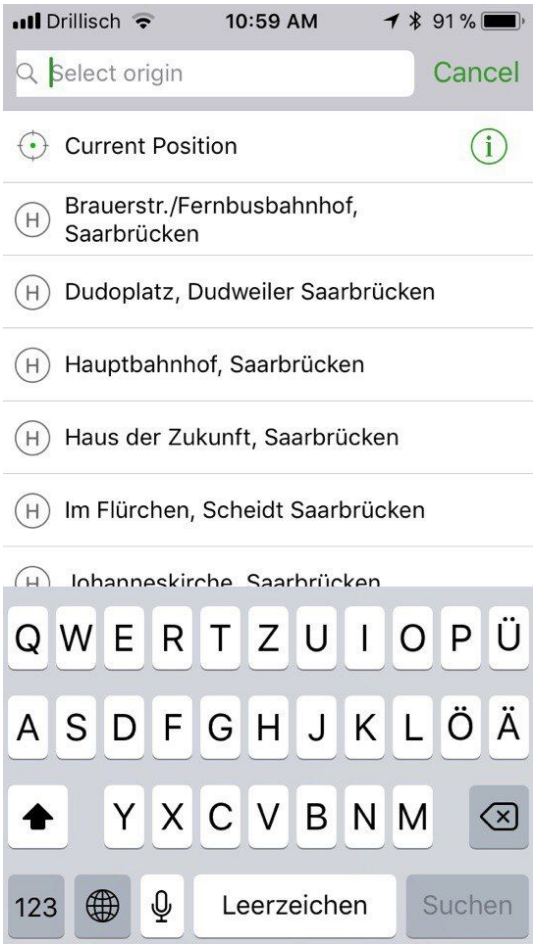

Fig. 3.5. Choosing location

- It allows user to see list of stops the chosen transport will make before it gets to destination.

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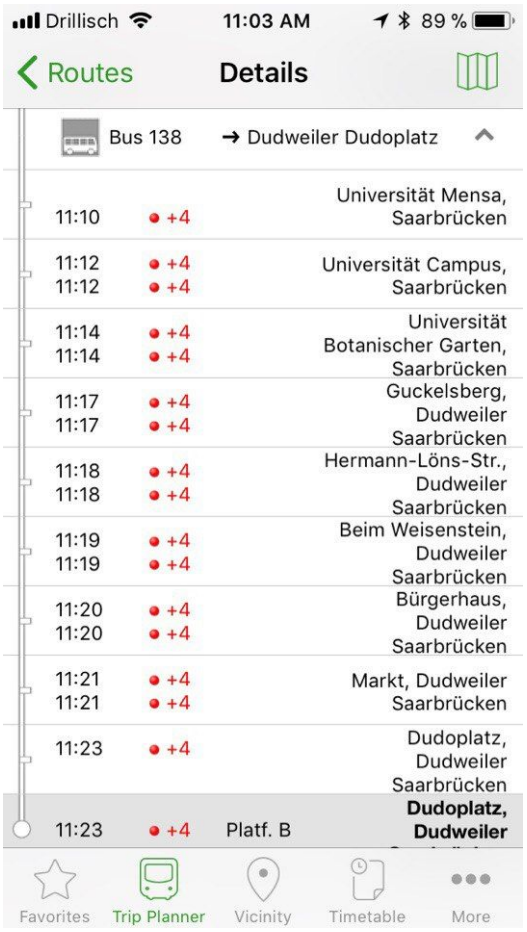

Fig. 3.5. List of stops.

Visibility

- It's easy to find how to use the most important functions: choose start position (marked as "From"), goal position (marked as "To") and goal position. However, it's not that easy to find how to use some other functions, for example, it might take a lot of time to figure out that in order to see the root on the map user needs to pres sign from Fig. 3.6.

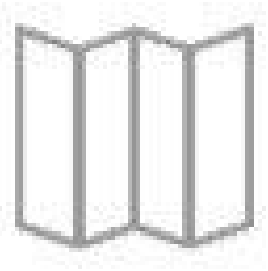

Fig. 3.6. Map sign

Feedback

- After user provides information about Start/Goal location and Time/Date app gives user the list of possible routes and basic information about each root: departure time, arrival time, duration,

number of changes, in how much time must the user start the journey, how much should the user walk and how much time will it take + it indicates if the transport is delayed.

- After user chooses a root from the list provided by the app, it gives user further information about it: separate information about each transport (time, platform). User have an opportunity to see the root on the map, see list of stops of each transport.

Mapping

- In order to see the root on the map, user needs to press a small picture of a map (although, initially it's not obvious that the picture depicts a map)

Constraints

- User have to chose from the list of locations when they indicate start and goal location. It helps to avoid typos in the names of locations.

Consistency

- + internal consistency
- External consistency:

What metaphors are used (if applicable)?

- There is a vertical line at the left side of the screen, which shows at which point in time of the root the user should be to take the root.
- Picture of map to open root on the map (Fig. 3.6)

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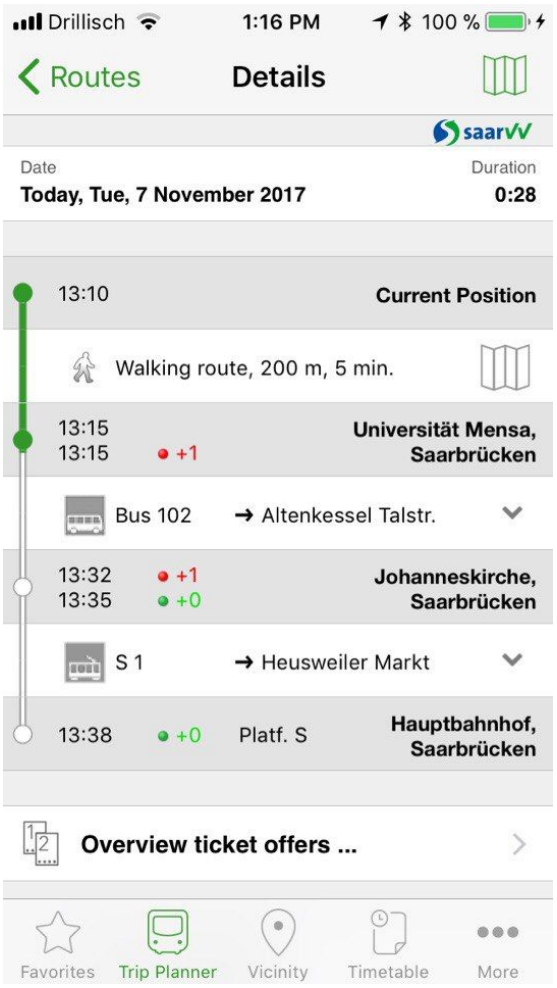

Fig. 3.7. Time line

The conceptual model behind the interface.

- User enters start location, goal location and time -> app gives information about different routes. The app is designed in a way so as to enable the user to perform the above actions efficiently.

How can the interface be improved based on the principles discussed above?

- The app can offer an option to save favourite routes, such that user can just change time. Thes will make use of the app more efficient

Interface 4:

Dishwasher

We tried to analyze the dishwasher machine interface from various examples of possible dishwasher machines to broaden our understanding of the principles of the interface designing.

Affordances

- The dishwasher allows to wash dirty dishes pressing buttons.

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- Choose a program of dishwashing
- To use a delay start option
- Cancel washing

Fig. 4.1. Electrolux EI24ID50QS

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Fig. 4.2. Electrolux EI24ID50QS

Visibility

- In a lot of dishwashers in order to find buttons user need to open the dishwasher (Fig. 4.1. and Fig. 4.2)
- In other dishwashers the interface is outside and clearly visible (Fig. 4.3)

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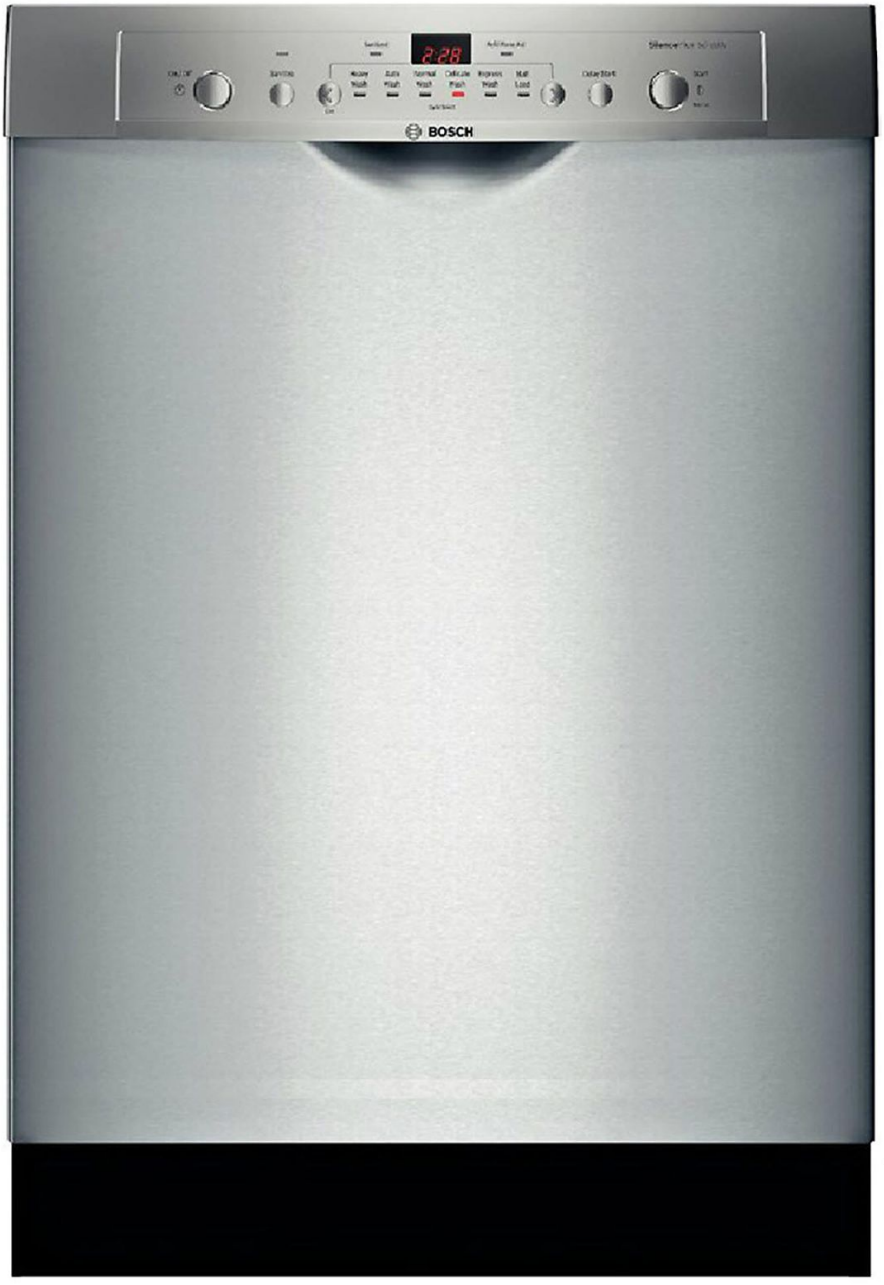

Fig 4.3. Bosh SHE3AR75UC

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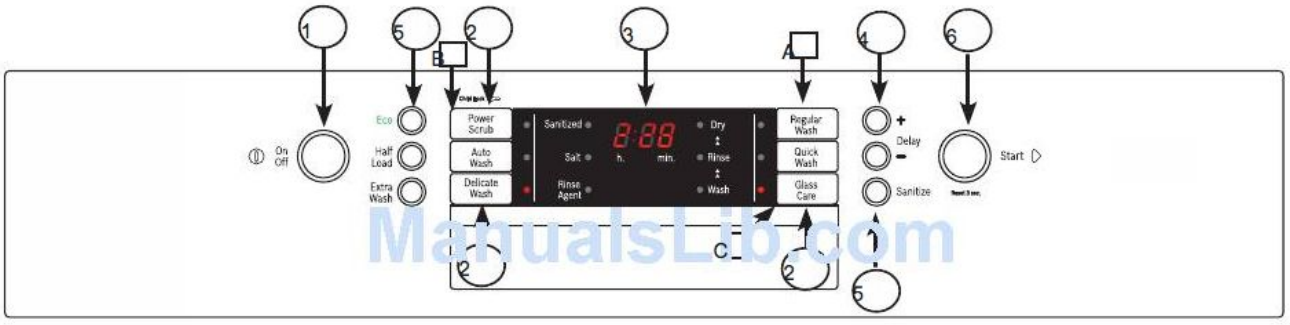

Fig. 4.4. Bosch

Feedback

- Dishwasher shows time which is required for chosen programme or if the dishwasher is in process of washing, it shows time left till the end of the programme (Fig. 4.1 and Fig. 4.3).
- It shows chosen programme (blue indicator in Fig. 4.2 and red one in Fig. 4.3)
- It makes noise when it's finished.
- It shows error messages (Fig. 4.5).
- Can indicate when it needs rinse aid to be refilled (Fig. 4.5).

Fig. 4.5. Error Message Bosh

Mapping

- Some interfaces provide pictures which help to visualize programmes (Fig. 4.1, Fig. 4.2).
- The buttons are placed in the order in which user needs to use them (Fig. 4.4): Turn on - Choose programme - Start (From left to right)

Constraints

- User cannot choose several programmes at one time
- Washing cannot start without choosing programme
- Washing cannot start if Rinse Aid should be refilled (gives an error: Fig. 4.5)

Consistency

- External consistency: In some dishwashers, user needs to just choose a programme (Fig. 4.5), in some others user needs to combine several options (Fig. 4.4) (Eco/Half Load/Extra Wash + Programme).

What metaphors are used (if applicable)?

- Pictures to indicate different programmes (Fig. 4.2)
- Arrows to choose a programme (Fig. 4.5)

The conceptual model behind the interface.

- User loads a dishwasher -> Chooses a programme -> Washing starts -> Dishwasher makes a sound -> User unloads the dishwasher. The dishwasher is designed in a way so as to enable the user to perform the above actions efficiently.

How can the interface be improved based on the principles discussed above?

- Whenever there is an error, the user has to refer a dictionary of errors corresponding to the error number in the current scenario. Instead, we suggest to use digital messages like “Refill rinse aid.”
- We can have separate sections for separate dishes made of different materials like plastic, glass etc so that we can wash them simultaneously with different temperatures.