RAPPORT
EchoClock

Designhögskolan UMEÅ

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Cognitive Design

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Technical Information:

- I / O device and a display device
- 5.7 "LCD display with touch
- 7 pulse inputs (one for electricity, chilled water for 3 and 3 for hot water)
- Digital input for personal alarms
- Presence detector to the energy-saving mode
- Support for modbus-connected units
- Power supply: 9-28V

Cognitive Design

The task was to redesign the interface of Echolog, a device that displays electricity and water consumption in AB Bostaden's apartments. The project is part of Umeå municipality's long term project The Green Citizen of Europe, a project where Bostaden is one of the main actors.

The main goal of the project was to create a user friendly interface that helped tenants lower their consumption of water and electricity. Interviews were made with the users to see the main areas that are being used and if there was anything with the device that they found hard or that they felt was unnecessary. After interviewing some users about the current user interface it appeared to have some problems. The intended way of using the Echolog for controlling and understanding one's own consumption was identified as a problem as some of the tenants did not know what was a button or not on the device. There was not that many function so most tenants that we interview used it as a weather station.

We identified a few problem areas, one was that some users felt stressed by the red color shown when they were consuming too much energy and/or water. Users also found it difficult to understand what the calculated average was based on. One commented that "It is perceived as a pointer that is telling you that you are using too much as it most of the time shows red". We concluded that the problem was that because the device only had two colors, red and green, the tenants read this as either you are doing good (green) or you are doing bad (red). What we also found in our interview was that the device seemed to be too sensitive sometimes as it changed from green to red when flushing the toilet. One of our interviewees said that they had been discussing if they would "charge 5 kronor for every toilet flush" when having friends over for a party. We tried to solve this by having a meter that showed the consumption over one hour and not in real time.

It was further found that it was hard to understand the units used, for example kWh. We therefore chose to add the possibility to change the unit to something more understandable. The example of units that we added was "minutes of TV watching." This was intended as one example of many possible easily graspable units. For water we chose to add the units "number of toilet flushes" and "minutes of showering."

The current interface seems to have had an impact on users – one user mentioned that "it is stressing to see others using running water when they are brushing their teeth or washing

their dishes. This interviewee also mentioned that she started to take shorter showers. What also came to light was that the sensor was too sensitive and in one apartment the tenants had even put up a post-it over the device to stop it from lighting up as they felt that they were being judged for their consumption.

Some users felt they could have a better overview of their cost and consumption, but they were not sure if the measurement was correct and some also mentioned that there was a limit to how much you could save when it i.e. came to water. When asked, many of the tenants interviewed had lowered their electric bill since they first moved in.

What we concluded from these interviews was that many of the tenants had lowered their consumption.

Further we asked the tenants if there were any other features that they would like to see implemented on the device. All of the interviewees said that they would like if they could book a laundry time directly from their apartment, this was already possible using a digital terminal. Many tenants would also like to see the possibility to control the engine heater directly from the Echolog device.
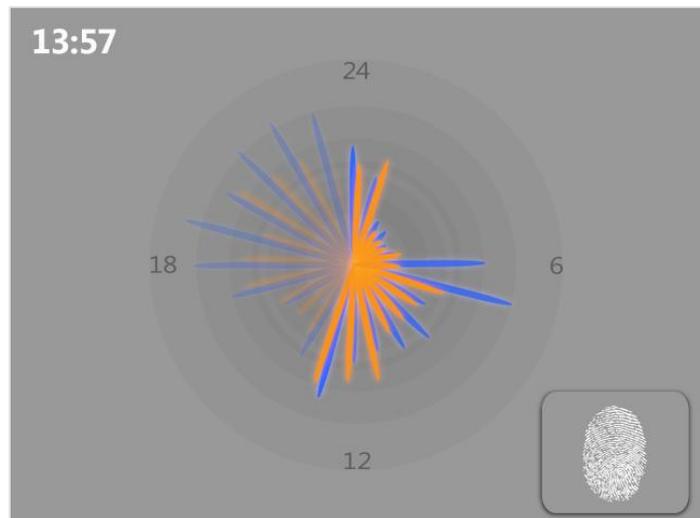
User studies were conducted to find out what the users thought about the new design and its functions. The studies provided us with a different approach and point of view which was useful to further develop our design. In both cases we tested the design with design students. It might have been preferable to test with residents but but due to time constraints this was not possible.

EchoClock

Main page

The first page that meets the tenants in Bostadens apartments is a graph in form of a clock. The clockgraph displays the electricity and water consumption over the last 24 hours. Each line of the clock shows the consumption, orange for electricity and blue for water. The clock is filled in with one line every hour. The graph moves clockwise and in front of every line you can see the line from the previous day in the shaded color. The thought with this display/figure is to invite the users to want to know more and at the same time not feel judged (which was sometimes the case problem with previous interface). The main concept here is "touch to show more". Each line on the clock represent one hour of usage. This graph moves together with the change of time clockwise. The fingerprint is shown to invite the user to press on the screen.

The start page

The start page has the same graph of a clock but also more information such as, the time, date and the temperature inside and outside and a symbol to represent the current weather outside. The start page also has a menu with five buttons so the user can go deeper into the system.
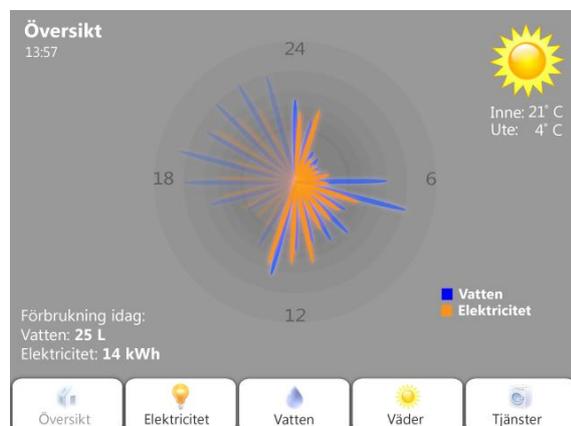
Main menu

The five buttons displayed on the menu are colored in light grey which make them pop out more from the picture, to invite the users to push them. The button has both symbols and text to make sure that there is not confusion and the device would be usable for people at all ages. The symbols used were a house to show how to get to the start page, a light pulp to represent electricity, a water drop for water, a sun for the weather and a washing machine for the service button to show one thing among the implements the service button has.
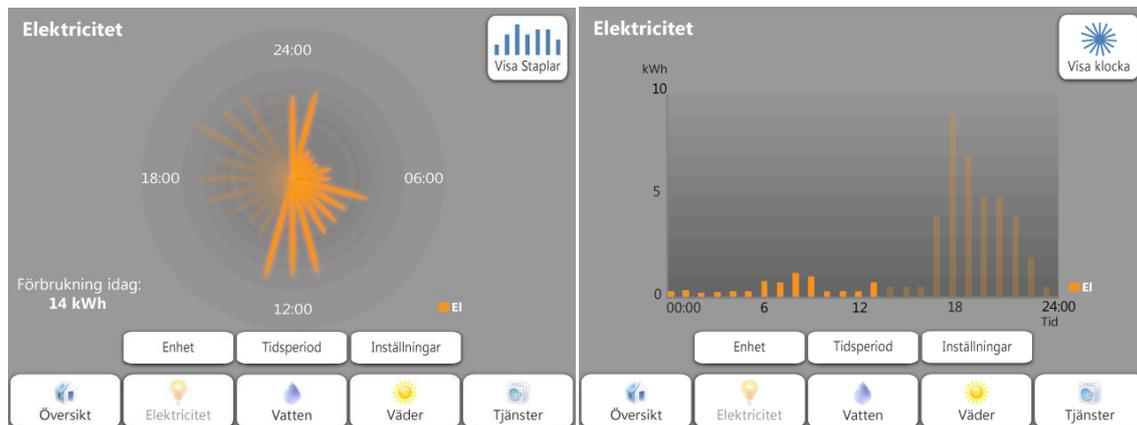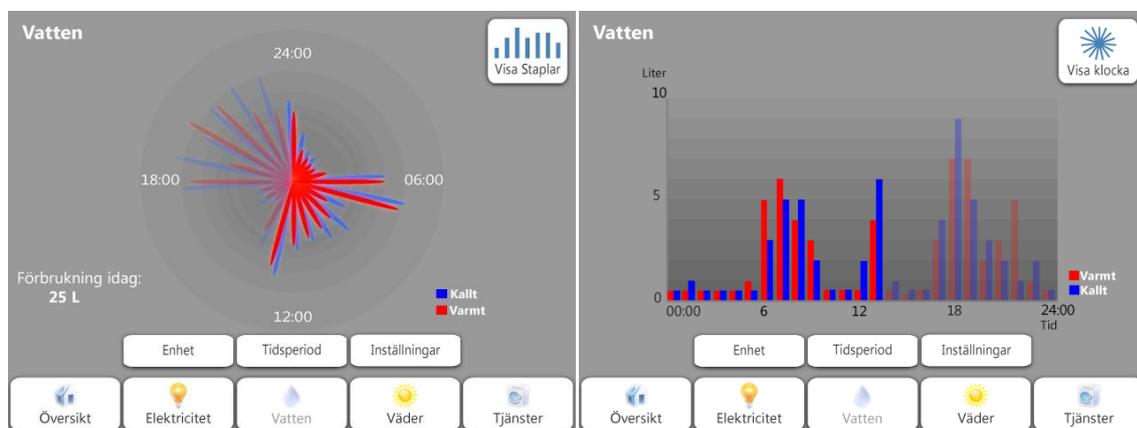

Electricity menu

To follow the previous design, the electricity menu has the same type of clock design as the main page, that to create continuity through the system. Up in the right corner there is also a button that visualizes a bar graph, when this button is pressed, the users will see a bar graph instead of the clock graph which is easier to use and interpret then the clock graph. In the electricity menu there is also a possibility to set unit, timescale and settings, to make it more clear for the user. On unit you can choose to display
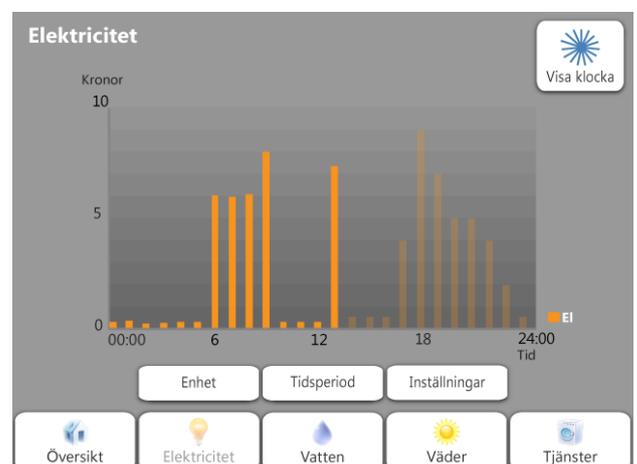
the electricity consumption in kWh, but you also have the possibility to change the unit to hours watching TV and Swedish kronor. When pressing timescale, you have the possibility to show different periods of time from today, yesterday and this week and month to other months to have an overview of the household´s consumption over time. When pressing settings you can set the cost depending on what electricity company you have and what you pay for each kWh. Further, in settings you can also decide if you want to display the average for the household on your graph, this is to make it faster and easier to get and overview comparison of the consumption, and give the user an option to understand more about their consumption.


Water menu

The design for the water menu follows the same thought as for electricity. When first entering the water menu, the clock graph is displayed. Here the possibility to change to a bar graph is placed on the same location as previous on the electricity menu. In the water menu there is a possibility to set unit, timescale and settings. Under units you can set the water consumption to liter per hour or if so desired, there is a possibility to set it to "number of toilets flushes", "minutes of showering", or Swedish kronor . In the menu called "timescale (Tidsperiod)" there is an option to display different periods of time, options include "today", "yesterday", "this week" and so on. Under "settings" you can decide if you want to display average for the household on your graph, that to make it fast and easier to see if the consumption is more or less than before. The thought is that this could make it easier for the users to easier see their consumption and to further motivate them to save more.

Weather menu

As many mentioned during the interviews was that they liked the weather menu, we have on this page chosen to display a forecast for five days with the current day included. For the current day the temporary temperature is displayed, but also the high and low temperature for the day is displayed here. On the right side of the menu the forecast for the following four days are displayed with estimated
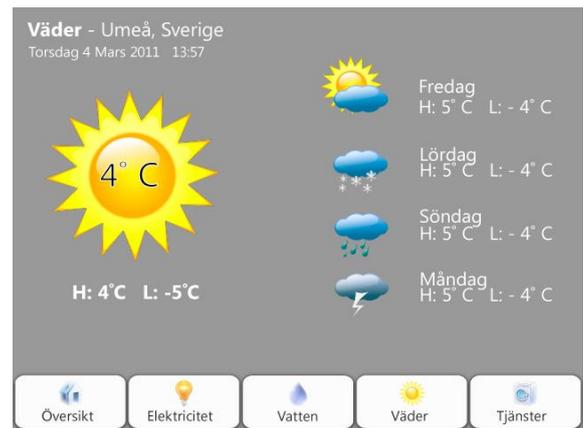

high and low temperature but also a symbol for the estimated weather, for example cloudy, sunny, rain, snow and so on. The thought is that the weather should change a long the day as the temperature changes.

Services menu

We decided to make an application and a new menu on the display called "services/tjänster". In this menu you can set the time for the engine heater, book laundry time, read messages and set the language for the device. For the engine warmer menu you can easy start it now to have a car warm within 45 minutes or set the time for several days. Feedback is immediately sent back to the user when made a new setting. For laundry we made a calendar for booking, each date is divided into three separate boxes, this is to represent the possible times available, green stands for available time and gray for booked. In the message menu the tenants can receive messages from the landlord or Bostaden. Under language settings there is a possibility to change language on all menus on the device.
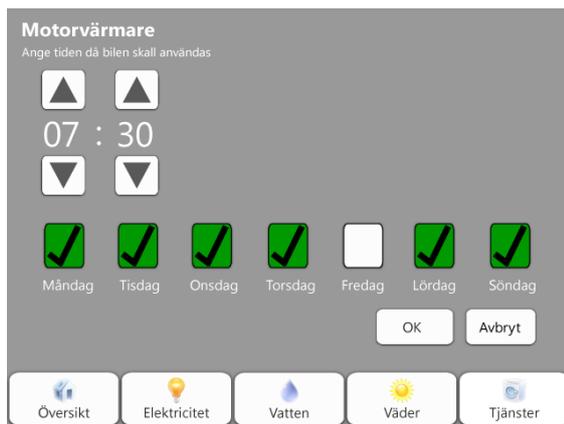
Usability testing

All colors have been tested whether or not they are visible for colorblindness, and there is a possibility to separate the colors chosen in the graphs when presenting two different colors. For colorblind people the distinction between the colors is easy to interpret and see the difference from the colors that we used.

Conclusions

Our design proposal aims to remind the user of their day to day energy and water consumption and to do so without adding stress and negativity to their lives. The interface aims at staying consistent, easy to learn and contain few surprises to the user. Consumption can be viewed at various levels of detail and in units that makes more sense to the user than simply displaying kilowatt-hours.

Video

We produced a five minute instructional video to demonstrate our design. The video can be viewed at Youtube at the following web location:

http://www.youtube.com/watch?v=5xFAhY6OWmQ

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