1 PreProject

1.1 Rich Picture

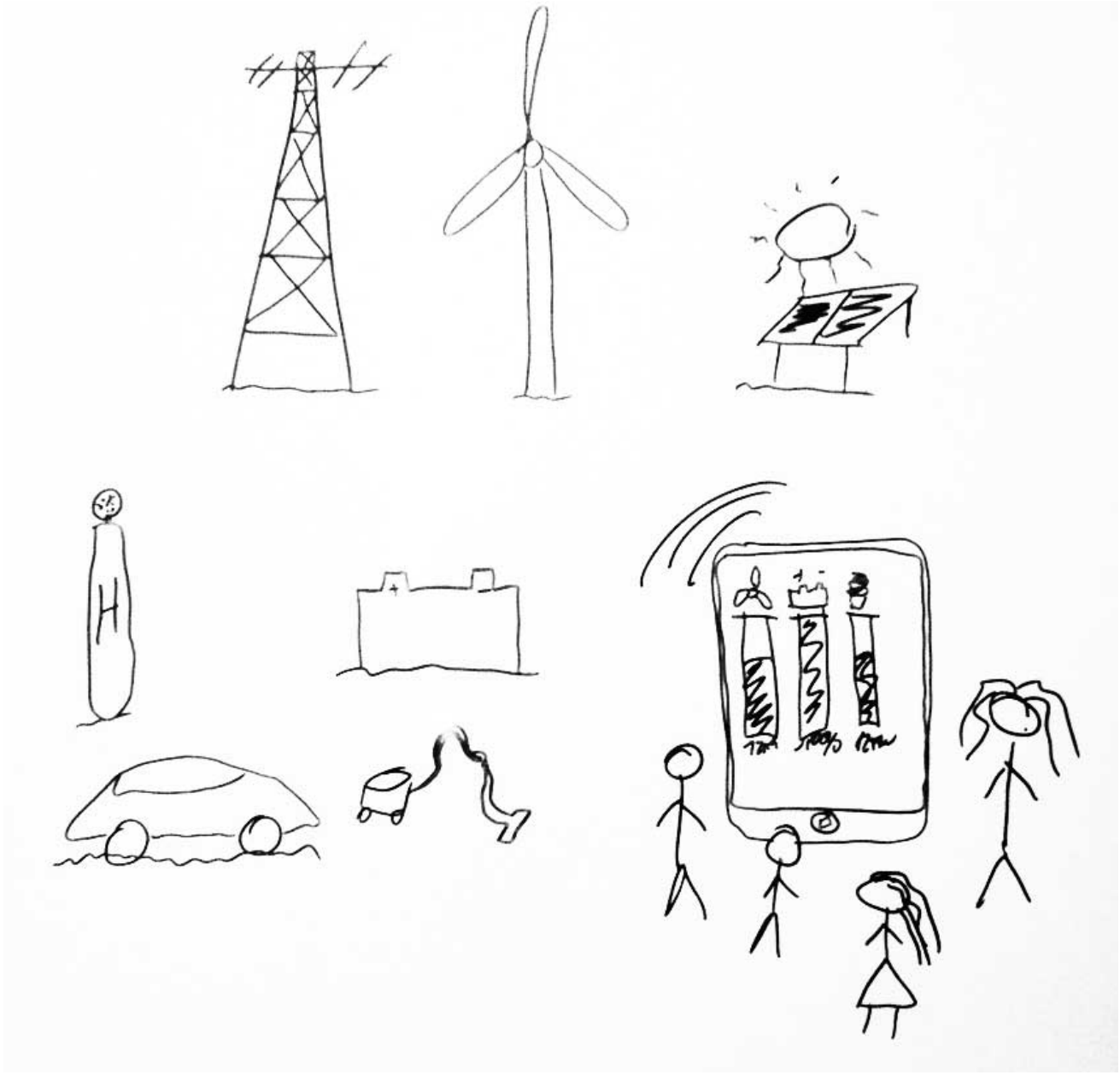

Figure 1: The surrounding environment is shown in the rich picture. The elements are: solar-panels, hydrogen storrage, battery-charger, windturbine converter, userinterface, the electric grid and different loads such as a hyrogen engine, vacumcleaner etc.

1.2 Storry Telling

Aarhus University, a place full of innovation and great ideas. Jan Nielsen welcomes a class of high-school students to the green system simulator. Here it is possible to see how much energy you can get out of green energy harvesting such as wind and solar energy. When the system produces to much energy, the energy is stored in form of Hydrogen. The Hydrogen is to be used for a Hydrogen driven engine which is placed nearby the green system simulator. Here people can really come an get an idea about how much they can help the environment, but also their own wallet, if they invest in some green energy for their own house. The guests can navigate around on a screen to see how much energy each device creates or consumes, this is shown in a down to earth way, where everybody can follow, even persons without no special education or courses in the energy field.

1.3 Storycards

Story Card 1: I want to be able see how much energy is being harvest by the wind turbines and solar panels and how much energy is being consumed, this should be a user friandly graphycal interface.

Story Card 2: When the energy production is higher (batteries full charged, and no loads connected), the energy should be stored as hydrogen in a safe way so later it can be converted again to energy by a fuel cell, used as gas for a hydrogen car or generator.

Story Card 3: In order to show of, the interface has too be userfriedly and easy too use, so students coming over to AU - Herning without any energy knowledge should be able to easly navigate the system.

Story Card 4: The system will be in a outside enviroment, so it as to be robust against weather conditions and people temper.

Story Card 5: When batteries and hydrogen tanks are fully charged, the energy should be provided into the national power grid or/and university electrical system.

Story Card 6: For further improvements and development the system have to be fully documented, scalable and modular hardware construction.

1.4 Preliminary Use Cases

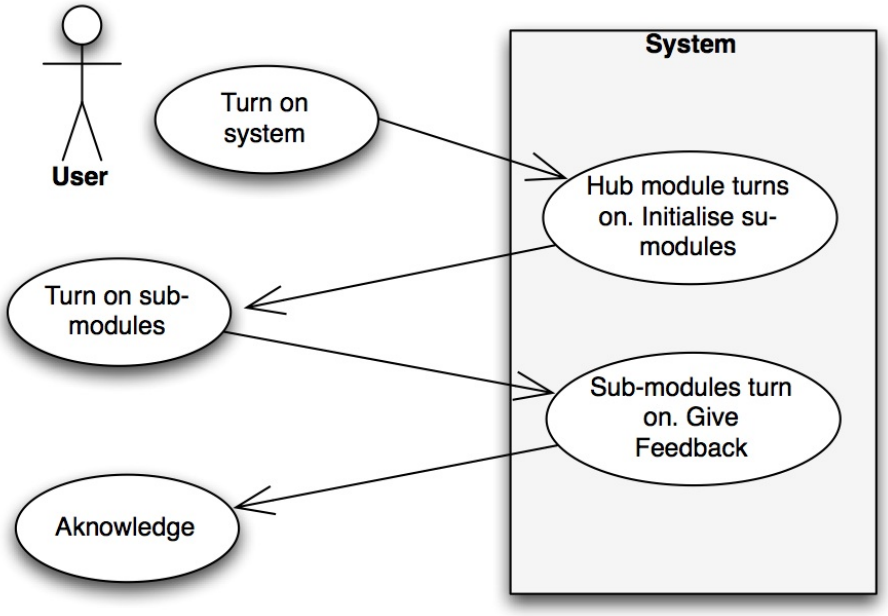

Figure 2: System initialisation.

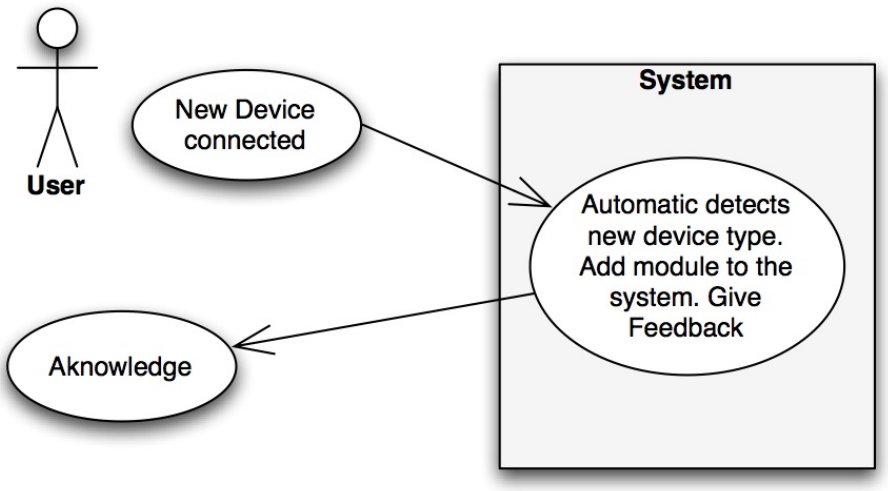

Figure 3: New device connected to the system.

1.5 Stakeholder Analysis

This section descripes how much influence the different persons involved in the project has.

Project coordinators:
Morten Opprud
Klaus Kolle

Customers/Users:
Jan Nielsen - Customer (Primary User)
High school students (Secundary Users)
Rene A. S. Josefsen (Web interface customer)

Developers:
Dennis Madsen
Theis Christensen
Pualo M. Fontes

Supliers:
Jens Mortensen
Per Lysgaard

Theory Advicers:
Henning Slavensky
Ulrich Bjerre
Kristian Lomholdt

	Has decision power	**Has no decision power**
Directly involved stakeholder	Klaus Kolle Morten Opprud	Jan Nielsen
Not directly involvedstakeholder	High School Students	Jens Mortensen Per Lysgaard

Figure 4: Stakeholder table

Klaus Kolle and Morten Opprud, are the project coordenators/managers, they have decision power over the final product and are directly envolved on the development.

Jan Nielsen is the customer, the primary user of the system so he has the decision power over the final product and is enroll in all the development process.

High School Students have decision power over the final interface since they are the secondary users of the system. They will be our testers.

Jens Mortensen is the component supplier, is not directly involved in the project and has no decision power over the final product.
Per Lysgaard is the money supplier.

1.6 System Definition

Proposal 1 - Fully automatically
The Energy-Hub system is the central device in the green-energy system. All inputs and output devices is automatically routed to the right place inside this device. That means when devices is connected to the Energy HUB, it automatically sees if it is an input or an output unit. On the web-page of the module the user have the possibility of using between two modes:
- Green System profile.
- Fast charging profile.
The Green profile only makes use of the green power devices such as voltaic-cells, wind power, energy from the charged batteries or from the hydrogen tank. The fast charging profile on the other hand charges the hydrogen tank and the battery on the fastest possible way. In other words, if there is not enough green energy, energy will be taken from the grid.
If we are in a condition where the hydrogen and battery storages are full, then energy produced becide this will be sent to the grid or go to the schools electrical system.
Proposal 2:
To switch between the green mode to fast charging a button can be putted physicaly in the hardware box.

Proposal 3 (Optimizing):
Extra output extension model that the user can connect devices, and switch each output on and off. This can be used to present to high school students the navigation trought the system using some physical actions.

2 Interaction Design

2.1 Usability Goals

The below sections will be given points on a scale from 1 to 10, depending on the importance (10 is very important and 1 is less important)

- 10 safe to use (safety)
- 8 easy to learn (learnability)
- 8 easy to remember how to use (memorability)
- 6 effective to use (effectiveness)
- 5 efficient to use (efficiency/performance)
- 3 have good utility (utility)

2.1.1 Safety

The safety is a very important factor, as the system is meant to be placed outside where some people might come by and touch some things. Also the system is meant as a showoff system for high-school students without any technically experience, who might be interested in touching everything possible.

2.1.2 Learnability

It should be as easy as possible for Jan to learn the system, so he do not have to use a large amount of time just to figure out how to do simple operations.

2.1.3 Memorability

The system is build for Jan Nielsen who will probably only use the system when people comes by and wants to see the system. Also visitors should be able to easily do simple tasks in the system without any knowledge about it and without any technically background.

2.1.4 Effectiveness

The effectiveness of the system is not the most important factor, but still quiet important as we are talking about a green system, which should be affordable for the user to implement. When investing in a green system, normally it will have some information about estimated lifetime and buy time (the time it takes the system to 'buy home itself'). If the buy time is to long, maybe longer than the lifetime, the price for having such a system will be way to high.

2.1.5 Efficiency/Performance

The performance in the system is not critical when considering it from the users perspective. It doesn't matter if it takes a few seconds before the system responds the user.

2.1.6 Utility

The utilities in the system should be minimized as the interaction should be very easy to use and thereby a lot of utilities should not be implementet so the user have the possibilty to change in a lot of things.

2.2 User experience goals

Down below the user experience goals are listed in numeric order:

1. Entertaining
2. Motivating
3. Satisfying
4. Fun
5. Enjoyable
6. Helpful
7. Aesthetically pleasing
8. Supportive or creativity rewarding
9. Emotionally fulfilling
10. more?

Something about why the list above looks like it does.
This picture is taken directly from the book, the caption too . Should it be there ?

Figure 5: Usability and user experience goals. Usability goals are central to interaction design and are operationalized through specific criteria. User experience goals are shown in the outer circle and are less clearly defined.