liander

smart energy meter

A report describing participation in a design competition created by Liander on battleofconcepts.nl - by M.B.C. Grob, master student Industrial Design Engineering D&S at the University of Twente.

TITLE PAGE
with project information

This report describes my participation in a design competition for the mastertrack Industrial Design Engineering D&S at the University of Twente.

The smart energy meter.

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INTRODUCTION
to the design journey

In this report the progress and experiences regarding my participation in the Liander design competition is documented. This report is not the actual submission for the design competition: as determined by the rules of the design competition, the latter will be in the form of a 10 page file detailing the final concept.

Liander is searching for a new engaging product that can interpret the raw data provided by their new smart power consumption meter, soon available to all their customers. This new meter is more accurate and easier to readout and thus has a lot of unexplored potential to fulfill more functions than just the periodic readout. It could give the customer a detailed insight into their energy usage for example. Liander hopes that by adding such functionality the smart meter will be favoured by its target group.

Such an assignment needs to take multiple things into account: one needs to overcome the consumer's suspicion towards such an information gathering tool first and one must also try to show the value of the meter for the consumer.

In order to achieve this goal, first the company and its values will be analysed, followed by a product analysis to get a grip on the smart meter's unexplored potential. The target group and its demands and wishes regarding energy consumption will be researched as well.

Concepts will be generated based on the research and one will be selected to be further developed and optimised for the design competition. A 10 page file will be created to explain all intricacies regarding this design and will be submitted to the design competition.

This report will be concluded with an evaluation of the entire process and recommendations regarding both the design and the process.

DESIGN COMPETITION

battle of concepts

Based on a positive experience with a design competition/exhibition regarding packaging design the choice was made to participate in a fully fledged design competition in order to experience all facets involved in such a process.

Participation in a design competition deviates from the common assignments at university: there are specific rules and regulations, contact with employer is often not possible, submissions adhere to different standards, graphic design and representation are more important, etc. Hence participation in a design competition seems like a valuable experience for any student designer.

Battle of Concepts

Battle of Concepts[01] is one of many available design competitions, they act as an intermediary between companies and students/young professionals and offer a wide array of design competitions at a fast pace. The competitions are open for all students - a large portion of the submissions are by students without a design or technical background.

Both the companies and the students/young professionals benefit from the partnership: the companies manage to acquire cheap and creative ideas while the students and young professionals use the opportunity to get recognised and earn prize money.

Types of battles

Battle of Concepts offers three different kinds of battles:

01. Open **battles**
02. Private **battles**
03. **Premium battles**

OPEN

Open battles are usually organised by government (funded) organisations such as municipalities or companies such as TNO. All submitted ideas will be published after the deadline and are open for comments and reviews by the public. The general public is also able to vote on the concept they like best, though this does not influence the jurors' decision.

PRIVATE

Private battles are the most common form of battle. All submissions can only be viewed by the organising company, no feedback is possible.

PREMIUM

Premium battles are comparable to **private battles** with one exception: **premium battles** consist of two rounds. After the first round the company will hold a meeting with a select group of winners to discuss their concepts. The meeting is then followed by a second round as a continuation of the first.

In all three types of battles a jury selected by the organising company will judge the submitted concepts. The professional background of the jurors however is not known, so it is safe to assume that chances jurors have a professional background in design are very slim - one needs to take this into account with the presentation of the concepts. There is also no contact possible with the company besides the battle description.

Rules and regulations

In order to succesfully participate in the design competition, it is important to adhere to all the rules and regulations of the employer and the intermediary. The most important rules will be treated below.

"1. Intellectueel eigendom

DESIGN COMPETITION

battle of concepts

Deelnemers aan een Battle dragen al hun rechten met betrekking tot de door hun ingeleverde concepten (in het bijzonder de intellectuele rechten) over aan het bedrijf dat de Battle heeft uitgeschreven en doen afstand van alle niet overdraagbare rechten met betrekking tot deze concepten. Als je hier niet mee akkoord gaat, is deelname aan Battles niet mogelijk.

2. Uploaden concept
[..]

Het is niet toegestaan om persoonlijke gegevens in je concept op te nemen waardoor je identiteit door de opdrachtgever achterhaald kan worden."

It is not permitted to include any personal information in the submitted concept to avoid prejudice when judging the submissions and to adhere to the CO0 license by Creative Commons[02]. The submissions must be absolutely void of anything that can trace back to the creator. One also waives all rights regarding the idea's intellectual property when uploading it to the site of Battle of Concepts.

"8. Deelname in groepen
Bij sommige Battles is het mogelijk om met meerdere personen gezamenlijk één concept in te leveren. De voorwaarden van de desbetreffende Battle bepalen of dit is toegestaan.

[..]

9. Eén concept per deelnemer
Het is een deelnemer niet toegestaan om meerdere concepten voor eenzelfde Battle in te sturen."

It is not permitted to send in more than one concept per contestant and it also not permitted to create more than one account per person. This is why an evaluation process will determine the most promising concept, which will then be submitted.

THE ASSIGNMENT

Liander: smart meter

The (**private**) **battle** regarding the Liander design competition can be located on **Battle of Concepts** and forms the design brief for the competition. The six page document contains succinct information about the company, the motive behind the assignment, offers a few leads to give an impression about the desires of the company and it lists criteria for the deliverables[03]. A brief summary of the above will be given here.

Company

Liander[04] is public utilities company that focuses on the energy distribution network. Liander forms the heart of Alliander[05], a company originated out of the restructuring of Nuon[06] into a distribution section and a production section.

Liander's main aim is to safely deliver electricity and gas to the consumer. Their secondary aim is to cooperate in sustainability regarding energy consumption and transportation, such as the creation of a smart grid for electrical mobility and the introduction of the smart meter.

More information about Liander will be dug up later on in this report.

Motive

Liander is constantly trying to improve the energy grid. One of the things involved in this activity is the introduction of the smart meter - a meter that monitors gas and electricity usage digitally and remotely. By the year 2020 at least 80% of all consumers should use this smart meter according to a European guideline.

To make the smart meter more appealing to the consumer Liander wishes to make the information provided by the smart meter available to the consumer as well that translates the raw data into a fresh exciting package.

Inspiration

Liander is aware of representations of data in the form of graphs such as Plugwise or the Google PowerMeter *(fig. 01)* and does not want something similar[07].

fig. 01 Plugwise and Google PowerMeter

The design brief contains three examples of products that interest Liander with regards to presentation of information *(fig. 02)*:

- The solar smart phone
- The Belkin Conserve Insight
- The Next-Gen dashboard

The solar powered smart phone is all about environmental bragging rights: you can share with your peers how many of the messages you have sent have been powered by the sun.

THE ASSIGNMENT

Liander: smart meter

Belkin Conserve Insight can be connected to any electrical device and translates the energy usage of the product in a monetary value, appealing to people's desire to save money.

The Next-Gen dashboard features a digital plant that represents your gas consumption. If you drive environmentally friendly the plant on your dashboard will flourish, if you drive environmentally unfriendly the plant will wither and die.

fig. 02 Solar smartphone, Belkin conserve insight, Next-Gen dashboard

Those three products give insight into triggers and methods desired by Liander for their own product regarding the smart meter.

Criteria

The concept must be easily accessible to the 2.9 million customers of Liander and it must also be a cheap solution.

The concepts will be judged on several aspects:

- Professionality: is the basis of the concept solid
- Innovative/'newness'
- Expected results
- Feasibility

Deliverables

The concept has to be presented in a PowerPoint presentation exported as a .pdf. Presumably this is to set a convenient standard and limit the use of animated graphics. A maximum of 10 sheets is allowed, if this amount is exceeded it will not result in disqualification, but points will be deducted.

Graphic representations of the concept are encouraged, but not required.

ABOUT LIANDER

vision and company information

Liander Inc. is a Dutch public utilities company and one of the major regional energy network managers in the Netherlands. The company saw its first light of day in 2008 after Nuon was forced to split up its activities as mandated by Dutch law. Production, transmission and distribution all became separate companies as a direct result of this so called WON law.

Energy distribution became Alliander's responsibility. Alliander consists of the business divisions Liander, Liandon and Liandyn *(fig. 03)*.

01. Liander maintains the low and medium voltage network as well as the low and high pressure gas network in the provinces Gelderland and Noord-Holland as well as the majority of Flevoland, Friesland and Zuid-Holland. The company caters to 3,000,000 customers' electricity needs and 2,100,000 customers' gas needs. The company has goals expected from an energy distribution company, such as sustainability and service towards the consumer, but this is not effectively or uniquely conveyed to the consumer.

02. Liandon is the technical specialist: they focus on designing, building and maintaining complex private energy grids and large industrial and other installations for some 670 customers throughout the Netherlands and abroad. With its 750 staff Liandon forms Alliander's knowledge centre.

03. Ziut (previously Liandyn) focuses on lighting in public areas - public lighting, traffic control lighting, light architecture and camera systems are their main expertise. The company is a result of the fusion of Liandyn and IP Lighting. Out of the three subdivisions Ziut has the most distinguished and clear-cut style and company image, most likely due to their fusion with other companies.

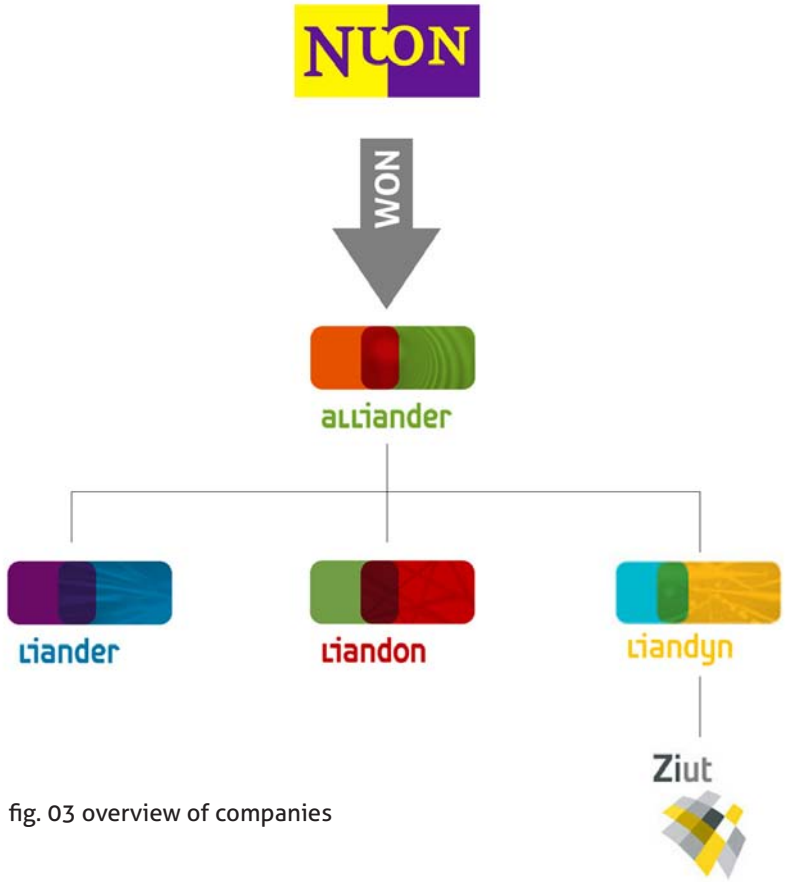


fig. 03 overview of companies

One things that stands out is that Liander does not really have a clear company image or vision, which is quite common for a public utilities company, especially after restructuring. This is reflected in the lack of design regarding the smart meter, and it exacerbates determining the desired concept direction. The company most likely does not know either what they desire, so it is up to the designer to show them the possibilities.

SMART METER
functionality and potential

The smart meter is an initiative of the European Union. It is intended to help the consumer become more aware of their energy consumption, to save money and to actively contribute to a more sustainable environment.

The smart meter is also more accurate than its predecessors. Data is collected every 15 minutes and then sent to a main server once a day. This effectively means that the data will not be real-time available to the customer: there is a one day delay in the data stream *(fig. 05)*. This is an important aspect to keep in mind when designing a graphical representation for the customer with regards to their energy consumption. For instance you could design a general overview or give a general impression but you cannot give them real-time information they can act upon and thus should not present it as such.

fig. 06 the smart meter

The design of the smart meter is quite sober *(fig. 06)*. It is indicative of the nature and origin of public utilities companies like Liander. The product looks very technical and inaccessible to inexperienced users, a missed opportunity to increase usability of a previously non-transparant product, a product hidden in the meter cupboard.

A similar mistake should not be made with the product and/or interface that translates data provided by said smart meter - the product should be easy to access and invite the user to experiment with it and use it.

Consumers are usually suspicious with regards to products that monitor activities in their daily lives and send the info automatically to a main server, so this is something that needs to be overcome.

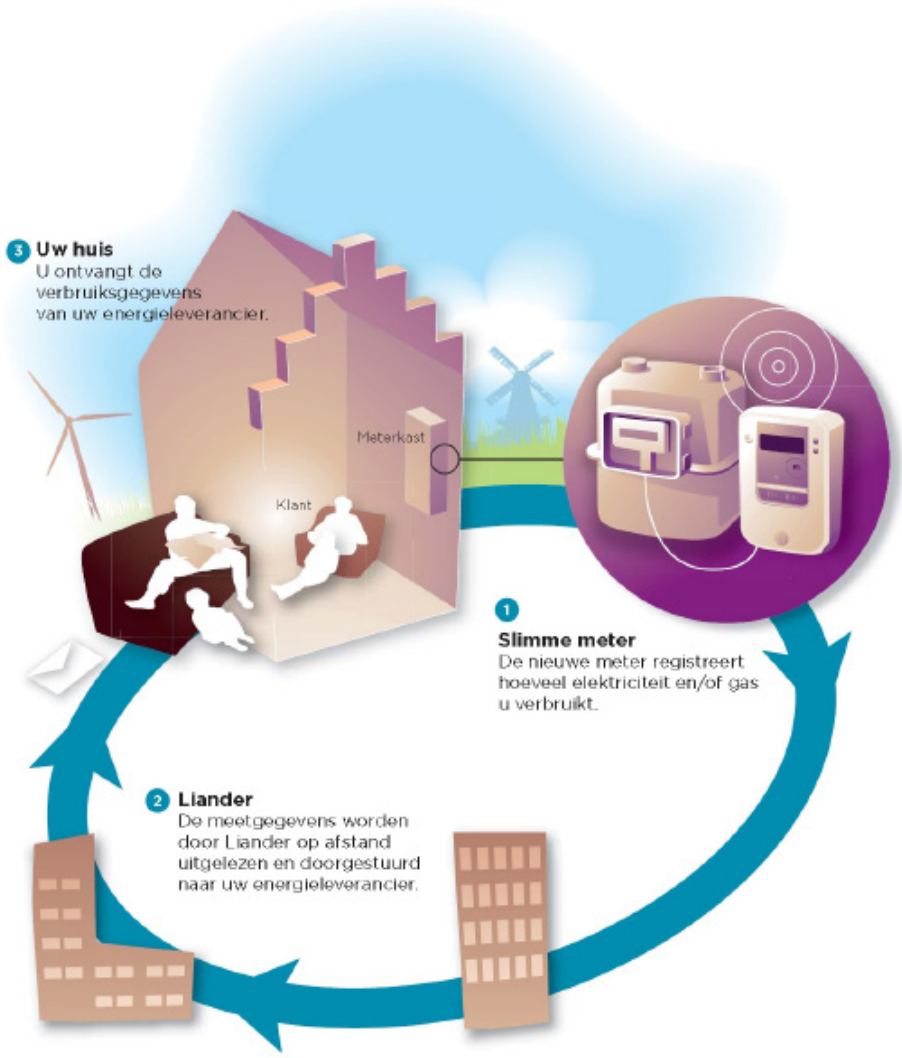


fig. 05 the smart meter in action

TRIGGERS

to persuade the user

The main goal of the assignment is to persuade the user to have a smart meter installed. To achieve this goal some obstacles need to be overcome, such as the suspicious stance towards information sharing technology as has been explained in the "smart meter" section. As approach to create solutions it has been chosen to look at it from the point of triggers.

Triggers are acts or events that act as a stimulus on several levels. A trigger could persuade the customer to acquire a smart meter or it could assure continuous use of the product.

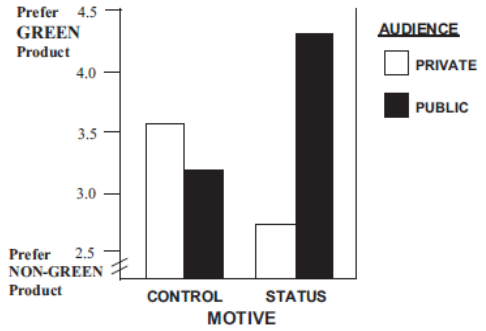


fig. 07 green as status symbol

Target group

In order to persuade the user, first the user must be identified. In case of the public utilities companies, that target group is a very varied one, after all we all require electricity and gas. It is safe to assume it is always targeted at adults (18 - 80), but the group has no common denominator besides their energy distributor.

As has been mentioned, the European Union dictates that by 2020 at least 80% of all users should use a smart meter. This is the percentage of the target group that is aimed for, for example one could afford to exclude a certain age range like at the lower or higher regions and still reach that target. The most likely scenario is that the higher age range will not be catered to.

Triggers

The relevant triggers that have been identified to overcome issues and entice the user to use the smart meter are:

- Environmental awareness
- Saving money
- Sharing information with peers
- Gaming element
- Future vision

Status is a very important factor with regards to environmental awareness[08]. Basically the user only cares about the environment if it benefits them as well in some way, in this case that is showing off to their peers about how they can afford to spend cash to create a better future for everyone. It has to be added that in time of crisis this expenditure is the first to go.

Other aspects are quite straightforwards, such as emphasising on the money saving aspect. Much like with the Belkin Conserve Insight, people care about things if it affects their wallet. So interpreting information in monetary terms would be a good method to understand and motivate the consumer.

Sharing information with peers is a popular one nowadays with the wide range of social networking sites. One could tag along with these social networks where a lot of info is shared with peers to overcome suspicions towards the smart meter and its information network.

Gaming elements can be exploited to keep the information interesting and keep the consumer interested. It can outline clear challenges and rewards, and transform conserving energy into a game rather than a chore.

Lastly, presenting a future vision can help add context to energy consumption to the consumer. It could paint a picture of what the future may look like, and what our children can expect ("think of the children"). This context highlights the consequences of energy consumption.

DESIGN VISION

guidelines, wishes and demands

To ensure that the design appeals to the desires of the company and of the target group, a list of requirements and a graphical representation of a future vision were created. This list of requirements (and wishes) keeps all the stakeholders (Liander, consumer, maintenance, installation) into account, but it is still a rather abstract list due to a lack of contact with the company and the general lack of design management within Liander.

List of requirements

- The design must incorporate the smart meter in its current form.
- The design must communicate with the smart meter/server once a day.
- The design must be easy to operate.
- The design must be easy to install.
- The design must be easy to maintain.
- The design must appeal to at least 80% of the customer base.
- The design must be cheap to produce and maintain.
- The design must add clear context to the information supplied by the smart meter.
- The design must not use a lot of energy itself.
- The design should motivate the user to consume less energy.
- The design should convey the company's image (assuming the company will create a clear image).

Vision

In order to start with a clear vision for the direction of the concepts, a visualisation was made of the desired goal *(fig. 08)*. The smart meter needs to fulfill a purpose, it needs to address certain issues and it needs to add value for the consumer - the smart meter still has a lot of unexplored potential.

The principle of the smart meter is to create insight for both consumer and company in an accurate and automated manner. It needs to create insight in the user's energy consumption and in the process, the latter is important to take away the user's suspicions towards a product that monitors information regarding their lives. One does not want to create a monster in the closet, one wants to create a clear insight into the consumer's energy consumption.

fig. 08 smart meter vision

To solve the issue described above there are many triggers that can be exploited, these triggers will be explained on the next page.

IDEA GENERATION

ideas in development

Based on the research and the design brief concept directions have been created. These concept directions have then been used as a basis for the idea generation phase. A visualisation of this idea generation phase can be seen on the following page *(fig. 09)*.

Exploiting triggers

Methods of displaying information have been mapped, as well as possible triggers in the research. These triggers can be used to display information to the user or to persuade them. The main triggers are:

- Environmental awareness
- Saving money
- Sharing information with peers
- Gaming element
- Future vision

The trigger environmental awareness is less altruistic than anticipated, as has been explained on the previous pages. This trigger works best if the user gets to show off their green behaviour to the world and their peers, it acts as a status symbol (think of the Toyota Prius). To exploit this trigger the user needs a means to show off the information to their peers, which is in line with the third trigger. One idea is to create a plant for your garden that reflects your energy usage for everyone to see.

Saving money is as straightforward as they come: the user only cares about the information if it is presented in monetary terms. If the user is aware of the exact costs of their energy consumption, they will feel motivated to try and do something about it. Hence this trigger will motivate the user to care about the user; the smart meter will serve an important purpose for the user. Think of displaying figures in euros.

As the saying goes: "sharing is caring". When people get to share information with others, in communities or when sharing information with peers, they are stimulated to create solutions: it opens up discussions. This could be a valuable tool with regards to energy consumption: people get to share and compare. However, initially this can be a touchy subject so the user must get to choose who to share the information with - social networks such as Facebook are ideal for this purpose.

A gaming element spices things up, it offers a challenge to the user and is usually accompanied by rewards. A gaming element can be used to keep the information interesting and add an incentive to using the information. Silly ideas such as *"save your pet fish"* could become reality, where a high energy consumption drains water from the fish bowl.

The effects of energy consumption are not immediately palpable, they seem like a distant concern. This future vision can be translated for the user and can be visualised to offer context. This trigger ties in closely with "think of the children" - the current energy consumption can be extrapolated and shown as an effect on our environment for example, either played as an online scenario or displayed as image.

Other options

One also needs to keep in mind that all senses can be used to convey the message to the user. Such senses are:

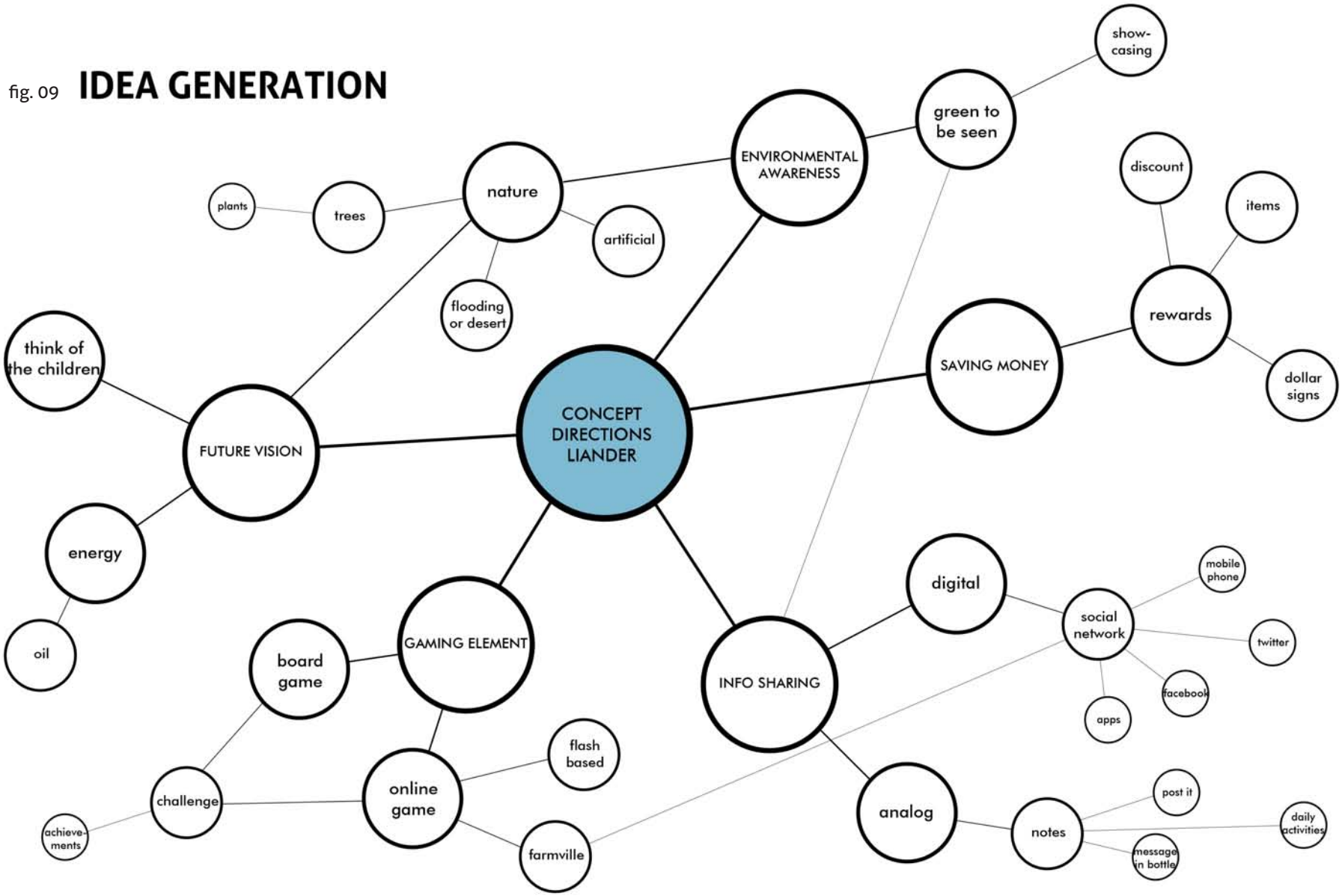
- Sight
- Hearing
- Taste
- Smell
- Touch
- Balance
- Temperature
- Pain

This last approach could lead to interesting concepts, for example think of "*bah this house smells of a high energy consumption*", "*this food tastes less good today, is our energy bill high again dear?*", or hearing cheering/booing when opening the meter closet.

IDEA GENERATION

ideas in development

fig. 09 **IDEA GENERATION**



CONCEPTS
general introduction

The three concepts presented in this section try to appeal to the requirements of the consumer and adhere to the requirements set by Liander, as far as these are known.

Considering that the concepts are created for a competition and no contact with the employer is possible, a different approach was deemed necessary. For example, the choice was made to present a wide palette of possible solutions to increase chances that the employer finds what they are looking for. For this purpose a multitude of triggers has been used for each concept.

Another consequence of the lack of interaction with the employer is the extent to which the concepts are developed. Normally multiple concepts would be presented to the employer, after already having assessed their demands prior to creating the concepts. This presentation would serve as a selection moment during which one concept would be chosen to be fully developed. Without any contact with the employer however, the choice was made to fully develop the three diverse concepts and submit the most promising concept for the contest.

General information

Data provided by the smart meter needs to be converted into terms that are useful to the consumer. Context needs to be provided to give the numbers meaning. Factors such as family size and composition, house type, size and location, having insulation or double glazing, power saving devices, having solar panels, holiday periods, having tenants or not, weather circumstances, etcetera, will have its effect on the energy usage data.

While factors such as weather circumstances apply to everyone in a region, housing factors are more relative. One can imagine there is a big difference in energy usage between a bungalow and an apartment in a flat. There will even be a noticable difference between detached or semi-detached houses and terrace houses. Thus housing factors are factors that need to be compensated for when comparing energy usage.

Graphs and statistics

Numbers need to be crunched to be of use to the customer. For this purpose graphs have proven to work best if one needs to access detailed information. There are some pitfalls regarding presenting statistics however: for instance it is easy to mislead the average user by playing around with the scales of the axis.

The competition description states that Liander is not interested in representations in graphs, so this area will not be explored, instead it will just be recommended for detailed representations of energy usage. The concepts will focus on intuitive graphical representations of the raw data; the aim is to present the data in an easy-to-process appealing manner.

Other

There are some general ideas that could be applied to each concept, such as giving feedback on the user's energy usage - think of helpful tips such as "turn down the thermostat when you go on a holiday" or "turn your devices off if you do not use them rather than leave them on standby". Such advice should be used sparsely however because it has been proven to have a counterproductive effect if overdone.

CONCEPTS
digital photo frame

The first concept aims to provide the consumer with a real tangible product linked to the smart meter. Through the use of a digital photo frame one can supply the user with data regarding their energy usage in a graphic yet non-intrusive manner.

Functionality

During normal use the photo frame would display a family picture selected by the user, with one exception: the background would be interactive, influenced by long term data on energy usage provided by the smart meter *(fig. 10)*. To be more specific: the background of the picture would be a future extrapolation of the environment.

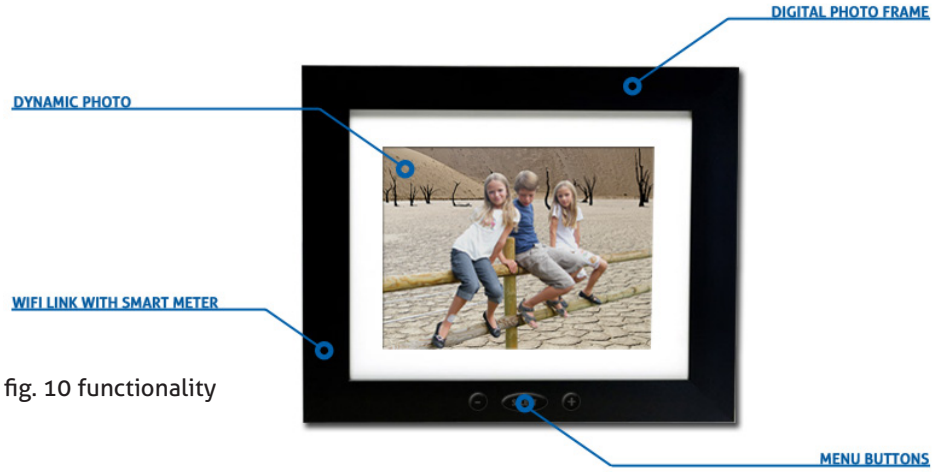


fig. 10 functionality

If the household consumes an extraordinary amount of energy, this would be reflected in the background image - think of images involving deserts or floods. In the same way, if the household consumes very little energy by comparison, the background image would change accordingly - think of images involving lush vegetation. Energy consumption in between these extremes are divided on a scale, a representation hereof can be seen on the next page *(fig. 12)*.

fig. 11 displaying detailed information

The user could also choose to interact with the photo frame, displaying detailed short term and long term information about their energy usage at will. This information will be displayed in the form of graphs and tables that take context into account, and if desired by the user it will be accompanied by useful tips on conserving energy *(fig. 11)*.

Triggers

The concept aims to remind the consumer in a gentle and slightly whimsical manner of their energy consumption and the effect of their general consumerism. It also appeals to the consumers' sense of future liv-

ing circumstances for their children - the "think of the children" argument. To a lesser extent, because the info needs to be requested by the user, the product also appeals to immediate energy usage and provides the user with data that could let them conserve energy and thus save mo-ney.

Costs

Prices for digital photo frames range from $20.- to $250.- for consumers[09]. To be able to provide basic functionality of the product, the cheapest digital photo frames will suffice with one exception: functionality of the concept dictates that the photo frame needs to be able to interact with the smart meter and thus requires a network link with said meter.

One also needs to take into account the development costs of the software and that if bought in bulk, the digital photo frames will be relatively cheaper. It is estimated that this concept will amount to about $25.- per customer to provide full functionality.

FAMILY FUTURE
energy consumption extrapolated

fig. 12 photo frame concept visualisation

Advantages & disadvantages

An advantage of this concept is that it creates a very clear context for the consumer displaying the information in a very comprehensible manner, doing so in a non-obtrusive way. The user can choose to access more detailed information at will.

CONCEPTS

digital photo frame

Another advantage is that it is a product that is easy to operate, and regular photo frames are found in every household, meaning one could reach a large target audience.

The relatively high costs of the concept due to the use of a digital photo frame could be a deal breaker for the company. However, one needs to take in mind that it is easier and cheaper to make use of an existing product and adapt it accordingly than create an entirely new product, especially when it is modular and can fulfill other functions as well for the consumer. A digital photo frame is most definitely a product that can persuade users to make use of the smart meter.

fig. 13 cartesian chart of photo frames

Recommendations

It is recommended for Liander to seek contact with a producer of photo frames and inform about the specific costs to fulfill their needs[10]. Liander also needs to decide what they wish to convey to the consumer and reflect this in the choice of photo frame *(fig. 13)*.

The choice was made to use a simple and neutral design to present to Liander. An impression of the product in context is displayed on the next page; it shows two different options of displaying the photo frame and also shows a more modern version of the photo frame *(fig. 14)*.

fig. 14 the product in context, multiple options

CONCEPTS

facebook & iPhone application

The second concept focuses on offering an online service to the consumer in combination with a reward system for sustainable behaviour. This online service allows the user to show off their 'greenness' to their circle of friends and family and gives them detailed insight into their energy usage.

Functionality

The concept tags on to the popularity of contemporary social networks. Liander's customers are able to install an application on Facebook or on their iPhone. The application interfaces with the smart meter. The smart meter communicates with Liander's server and the data is processed and compared with information from peers *(fig. 15)*.

The application revolves mainly around achievements with regards to energy use. These achievements can be shared with peers on Facebook or on their iPhone - the key here is that the customer gets to choose who to share it with.

The achievements can be continuously updated and added from Liander's side and also accessed on Liander's site. As achievements one could consider things such as "used 10% less electricity than their peers", "used 5% less gas than their peers", "has a very low latent energy use", "saves 500 euros cash every year with their smart energy use", etcetera. These achievements aim to both stimulate and inform the users.

The user could also choose to receive more information: for instance the user could receive personalised tips regarding their energy use.

Triggers

The concept makes use of a multitude of triggers to appeal to the wide range of consumers.

fig. 15 the trinity of online service

The green achievements can be shared with your peers. This kind of showcasing behaviour shows to be very effective with environmentally friendly products: they act as a status symbol.

There is a money saving element to the achievements as well. When achievements are unlocked points are gained. Those points can be spent on items in the Liander shop, such items should convey Liander's image and vision. Items such as energy saving light bulbs, iPhone skins, Wii Fit sets, energy plug meters, etcetera would be suitable for this purpose *(fig. 16)*.

The achievements also involve a competitive element, a gaming element. Customers can be stimulated to compete to try and unlock achievements before their friends are able to.

fig. 16 possible rewards

Costs

Developing an application on a mobile platform or on Facebook costs about $100,000.- per application, if one is to assume a development time of about 1,000 hours at $100.- per hour, which is common for such complex and elaborate applications.

The development costs would be shared amongst Liander's three million customers, thus development costs per customer would be a mere three to four cents per application. Aiming it at multiple (mobile) platforms (6) would increase this cost to a total of $0.23 per customer.

Advantages & disadvantages

A big advantage of this concept is that it a software based solution, which is relatively cheap to develop for Liander. Not only that, a software based solution aimed at contemporary social networks has the potential to reach a large amount of people.

Consumers tend to be wary of products that monitor activities in their daily lives and send that information to a company. Social networks have overcome this problem already: people are very willing to share a lot of information about their lives on social networks. Liander could tag along with this trend.

Liander already has an online service that displays energy consumption aimed at companies - this service could easily be extended to all consumers. Modularity of this kind is always welcomed by companies because it decreases fixed costs.

One disadvantage of the product is that there is no tangible product. This could make it more difficult to initially persuade the consumer to use the product. However, once they have installed the application the fact there is no tangible product will no longer form a problem.

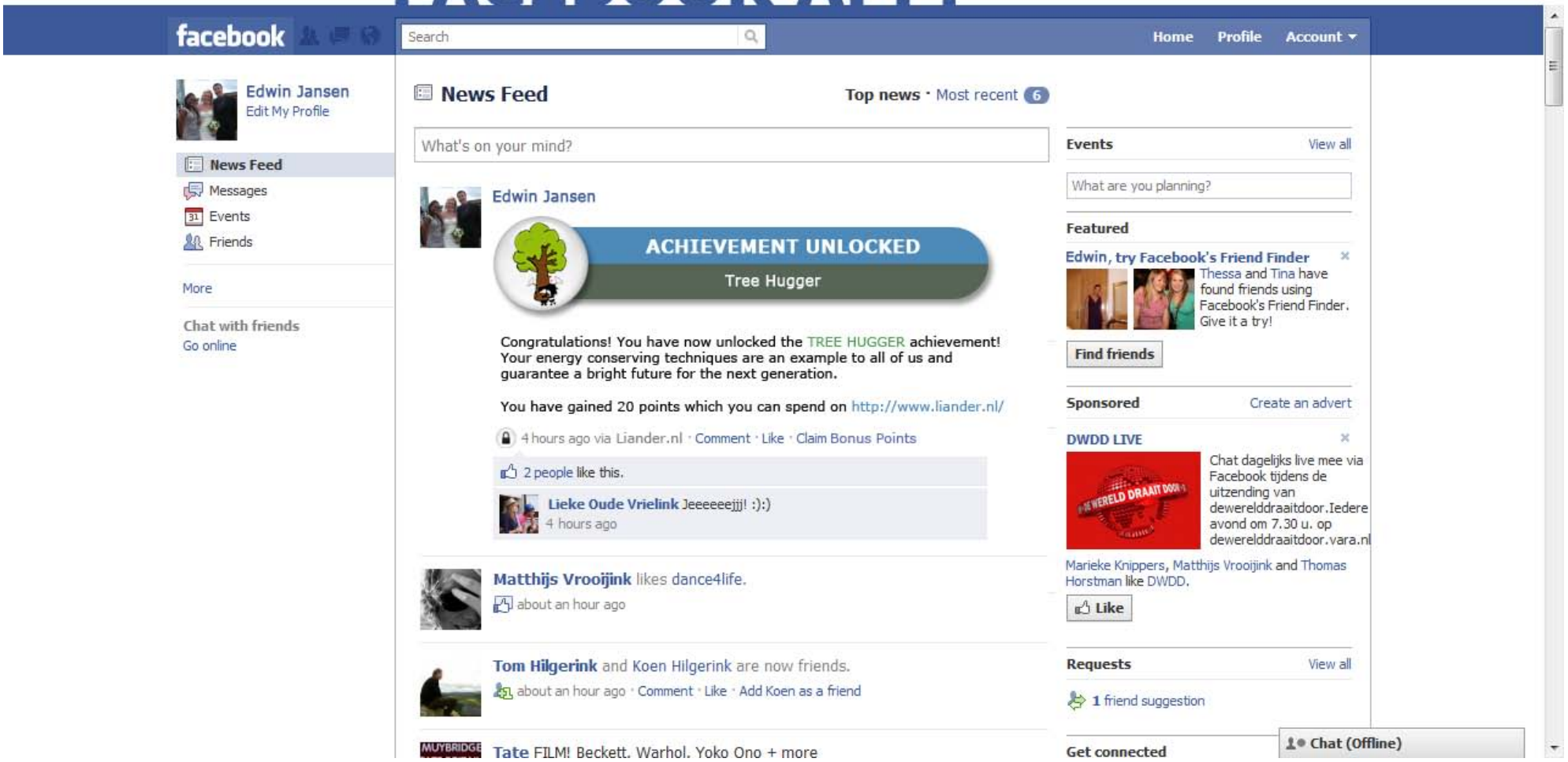
Recommendations

The service should first be aimed at Facebook and iPhone *(fig. 17)*, later on the applications should be extended to other mobile platforms, such as Android, Blackberry, Symbian, Bada, Windows Mobile, etc. By doing so, an even larger target group could be reached and enticed.

The list of rewards should fit Liander's goals and vision, hence this requires a thorough review. The possibility of importing data gathered by the smart meter into games on the above platforms, or standalone platforms, should be explored as well. A visualisation will follow.

fig. 17 impression of the iPhone application

FACEBOOK APP.



An impression of the product in context can be seen in the image above. When the user has managed to unlock an achievement, it will be displayed on their Facebook page. It will inform the user of the achievement and the amount of points they have obtained by unlocking the achievement. The user's peers are able to comment on the achievement and are informed of the origin, serving as advertisement for Liander.

Overview of achievements

The overview of achievements can be found on Liander's site, an impression hereof can be seen on the right *(fig. 18)*. Here the application keeps track of all achievements unlocked by the user and the amount of points they have acquired.

These points can be spent in the Liander shop to acquire goodies. The type of rewards should be selected carefully: these rewards carry out Liander's vision and act as advertisement.

The descriptions of the achievements are playful and are meant to entice. The entire achievement list intends to motivate the user to unlock all achievements possible. The list displayed on the right is far from complete; it is merely an impression of what could be. Liander can update the list and rewards continuously as they see fit, keeping the data and application fresh without any additional costs.

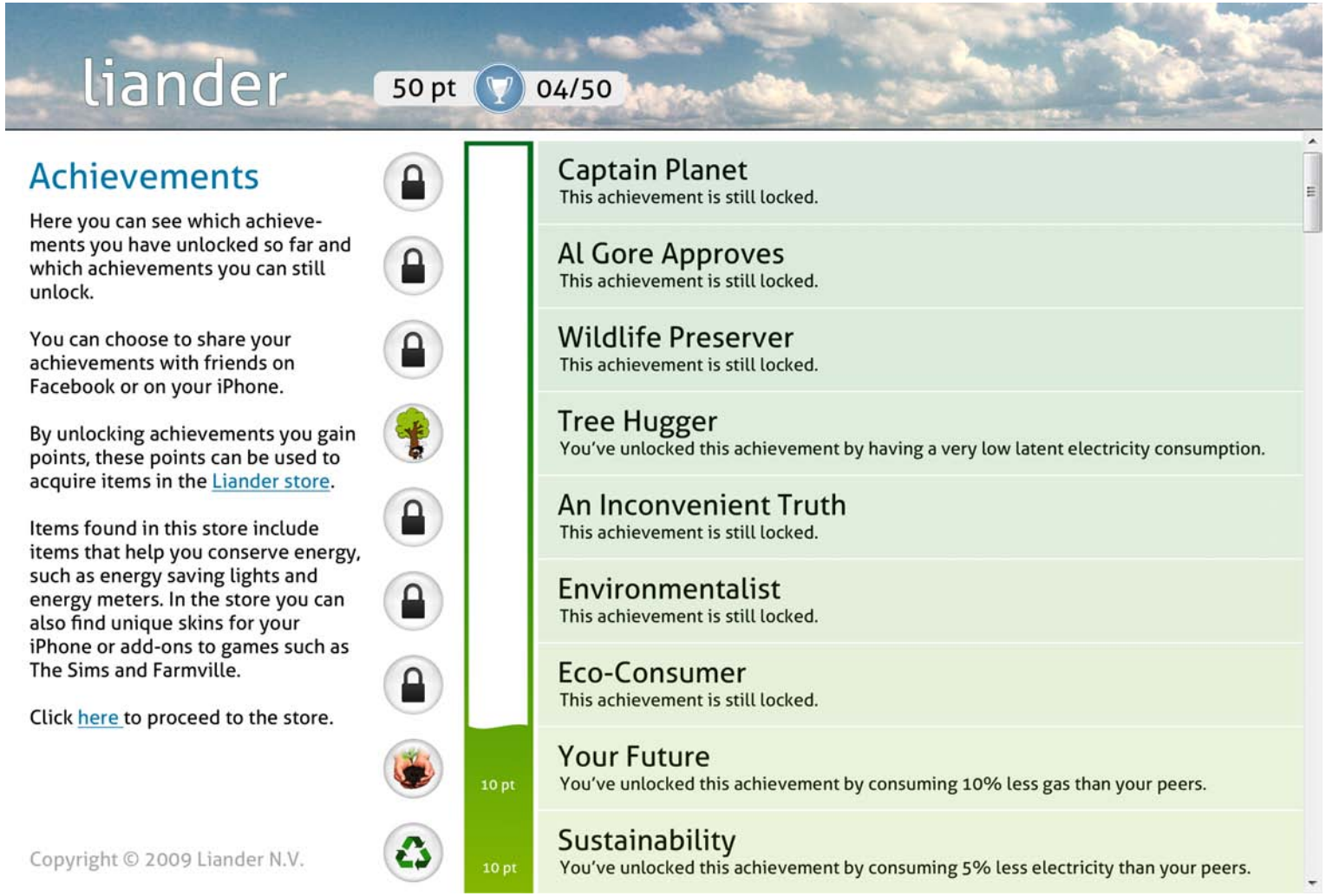


fig. 18 impression of the achievement list on Liander's site

Importing data into games

Another possibility for the application, as a sort of extension, is to allow data from the smart meter to be imported into games. Considering the fact the application is aimed at Facebook, it would make sense to try and incorporate the data into Facebook related games such as Farmville *(fig. 19)*. An impression of this implementation can be seen in the image on the right. Such an implementation would create awareness of the consequences of energy consumption amongst children.

This idea could extend to other games as well, think of The Sims and variants. The purpose of this would be to create awareness amongst youth as well and create a basis for their future generation of consumers. Liander has already shown that it has an interest in this approach, which is reflected in their flash based game called "De Bliksems"[11]. This game is meant to teach children about energy, how to conserve energy, to create a general awareness basically.

This purpose is beyond the scope of the current project, but it is possible to extend the application as presented to fulfill multiple purposes in the future. Perhaps this kind of modularity is desired by Liander.

fig. 19

impression of importing data in games

Lastly, presented here are some statistics regarding the use of social networking sites *(fig. 20)*, particularly regarding use amongst adults. This could help give an impression of the adult audience that can be reached with this application, considering the fact that this concept deviates from the others in the sense that it relies on using certain programs. However one should not overlook the potential of youth that use social networking sites; they could get their parents involved as well if the benefit is clear. It is believed that is it possible to reach Liander's goals through Facebook and apps.

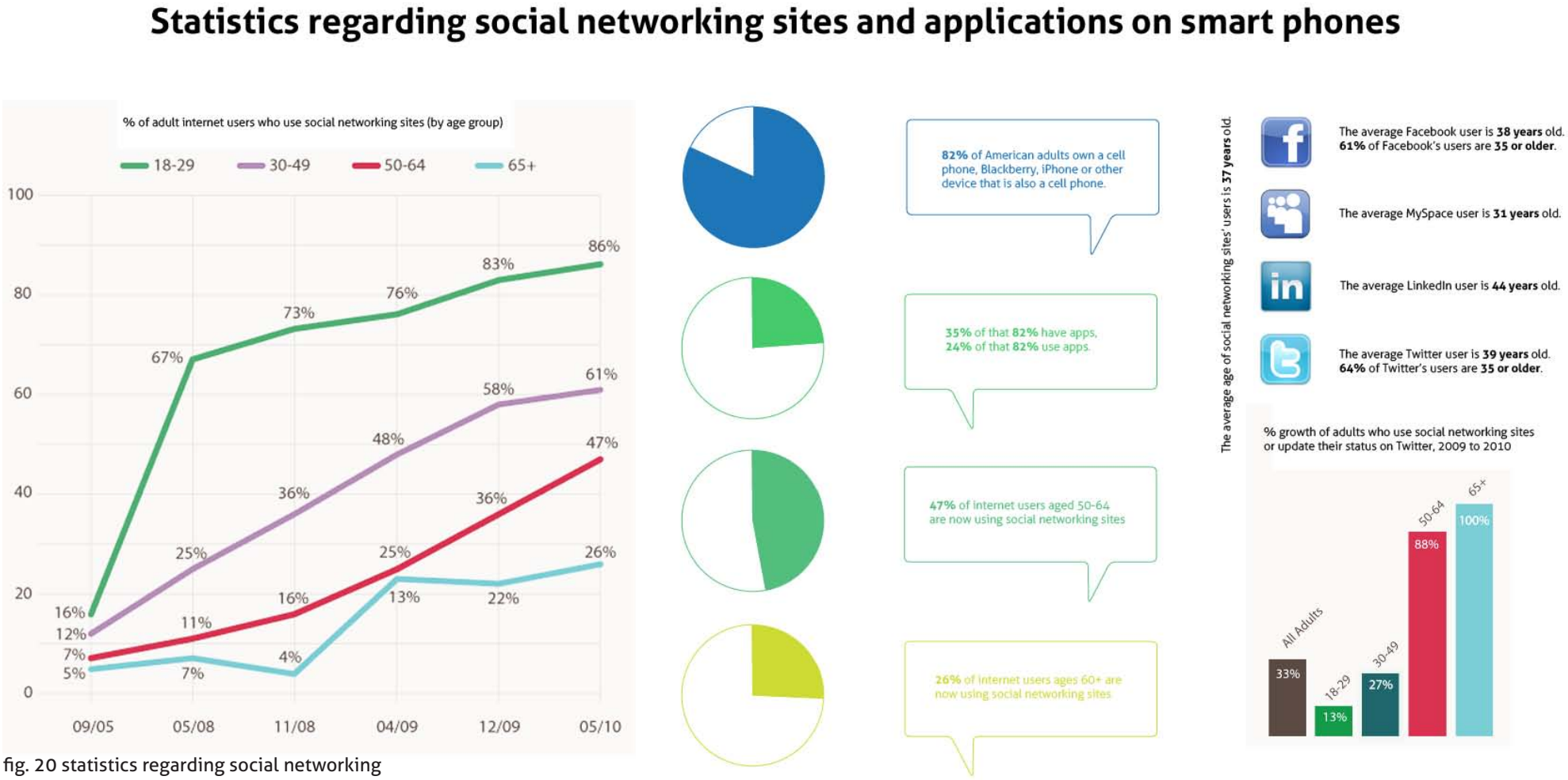
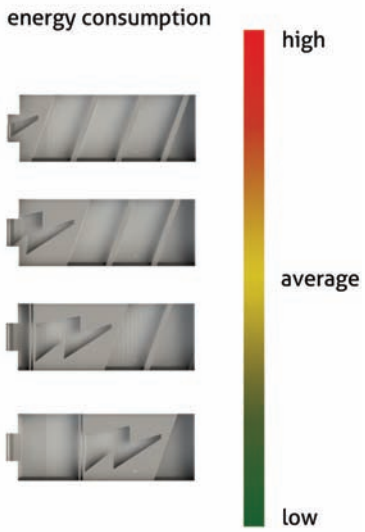


fig. 20 statistics regarding social networking

The final concept aims to supply the user with small pieces of information regarding their energy usage in a creative and unexpected manner. These small subtle reminders should make the user aware of their energy consumption on a daily basis without being obtrusive.

Functionality

The product is succeeded by an advertisement campaing. In this advertisement campaign, a message will be conveyed to the consumer using a very strong image. This image, a battery icon, is shown in various items of food *(fig. 21)* and accompanied with the question "how much energy do you use?" *(fig. 22)*. This advertisement campaign is intended to make consumers aware of the fact they do not know exactly how much energy they use and it is also meant to get the symbol known amongst the consumers.



This advertisement campaign will be succeeded by actually releasing a product that allows the user to reproduce the image that was portrayed in the advertisement campaign. The product is able to effectively 'print' the battery icon on a person's sustenance, which gives the user an impression of their energy consumption.

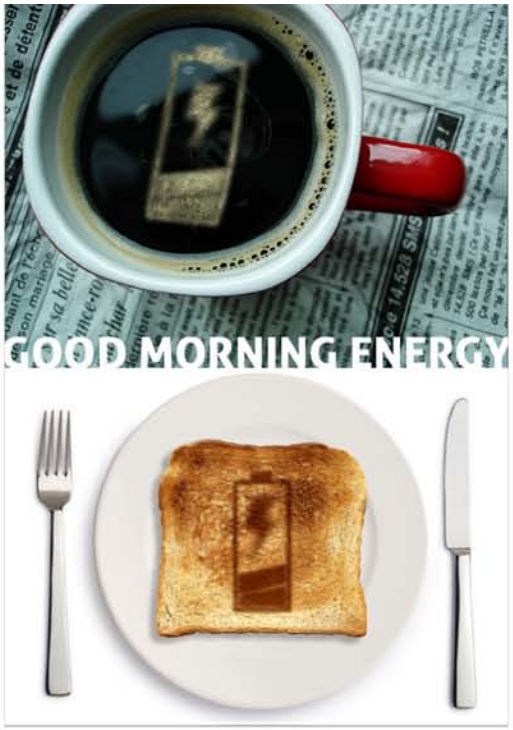
The product communicates with the smart meter, the information supplied by the smart meter dictates how much of the battery icon is filled up *(see image on the right)*. The product can be filled with different cartridges, containing different substances such as sugar, pepper, grated cheese, etc, and with a simple press of the button the sym

fig. 21 the battery icon on food

bol is printed with the substance on the desired item.

Triggers

Unlike the previous two concepts, this concept uses a pull strategy rather than a push strategy. The customers are made aware of the issue and drawn in through the advertisement campaign. This advertisement campaign is subsequently consolidated by the gimmicky product.



The product communicates with the smart meter once a day and adjusts the battery symbol according to the data received. Those two small actions are the only thing the product needs to do, thus it does not consume a lot of energy. The energy it does use comes from a small battery that can be recharged by shaking the entire device - the kinetic energy will recharge the battery, similar to a dynamo on a bicycle.

Costs

The costs of the advertisement campaign are disre-

fig. 22 an impression of the advertisement campaign

garded in this section, just the costs of the product will be highlighted.

The product would be made of polished ABS to give it a high quality look. At a current price of about $01.55 per kg of ABS injection moulded at 100 Mpa the product would cost roughly $0.12 to produce[12]. The costs of remaining components (WiFi link, power source and mechanics) would roughly amount to $5.- in total.

Production costs are estimated at 200%. To include packaging, assembly, and overhead costs, an estimated $2.- is added per device. Remaining costs such as transport and retailing is estimated at 70%.

All the above combined leads to a total estimated cost of about $12.31 per product per consumer.

Advantages & disadvantages

The concept reminds the user in one quick glance and in a playful manner of their energy consumption and does so on a daily basis. These small reminders will aid the user in acquiring insight in their energy consumption.

fig. 23 shapes

A tangible product is nice for the consumer: they can choose when to use it and the ubiquity of the product alone will remind them of its purpose (especially after the advertising campaign) and thus contribute to Liander's goal. The combination of a localised advertising campaign plus product will reach a very large group of consumers.

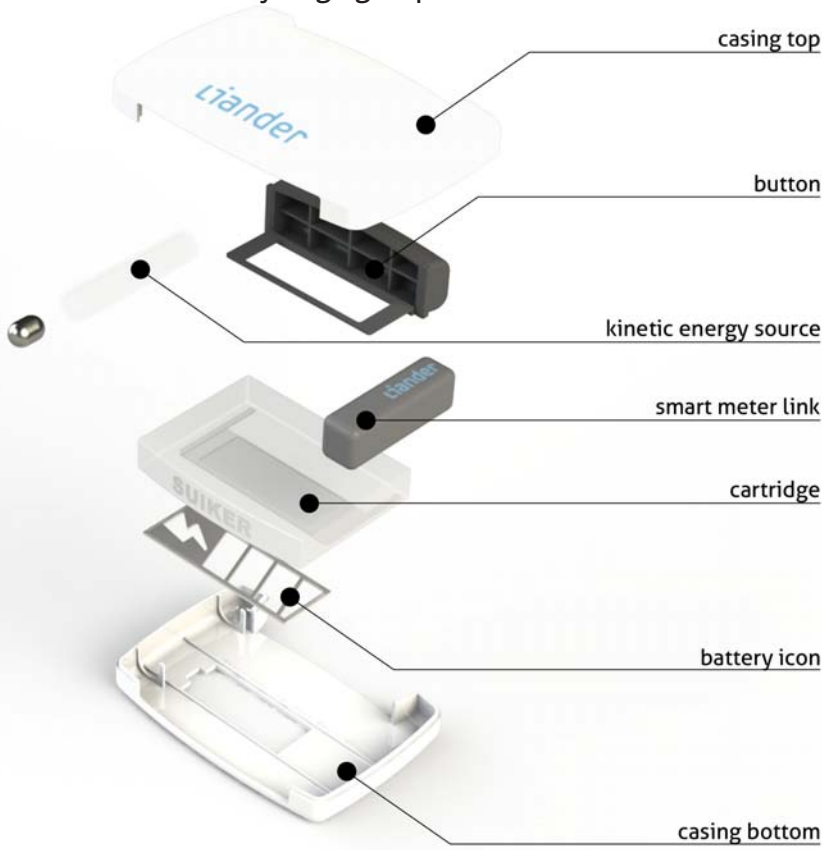


fig. 24 an exploded view of the product

Recommendations

The concept knows two disadvantages however: the inability to display detailed information and the costs. In both cases the importance needs to be weighed and if required compromises can be made.

Also not all images can be created with the device: one would require an inlay for a toaster to create the image on bread and a UV light to create an image on fruit.

The concept presented here lacks the ability to display detailed information. If this lack of detailed information really poses a problem Liander can decide to create an additional service. The easiest method to add this functionality is by adapting their current online service to cater to all their consumers rather than just companies.

The technical aspects need to be researched and in more detail. Due to time restraints it was not possible to pursue all that in this project. Certain aspects such as "easy to clean" need to be looked in to: preferably the product should be suitable to put in the dish washer.

Product details

fig. 25 shake it

The shape of the product has been kept simple: a cross between a printer and a scanner conveys the purpose of the device naturally *(fig. 23)*. Of course it needs to be handheld as well, which determines the size of the product.

The product can be filled with different cartridges, containing substances such as sugar, pepper, grated cheese, etc.

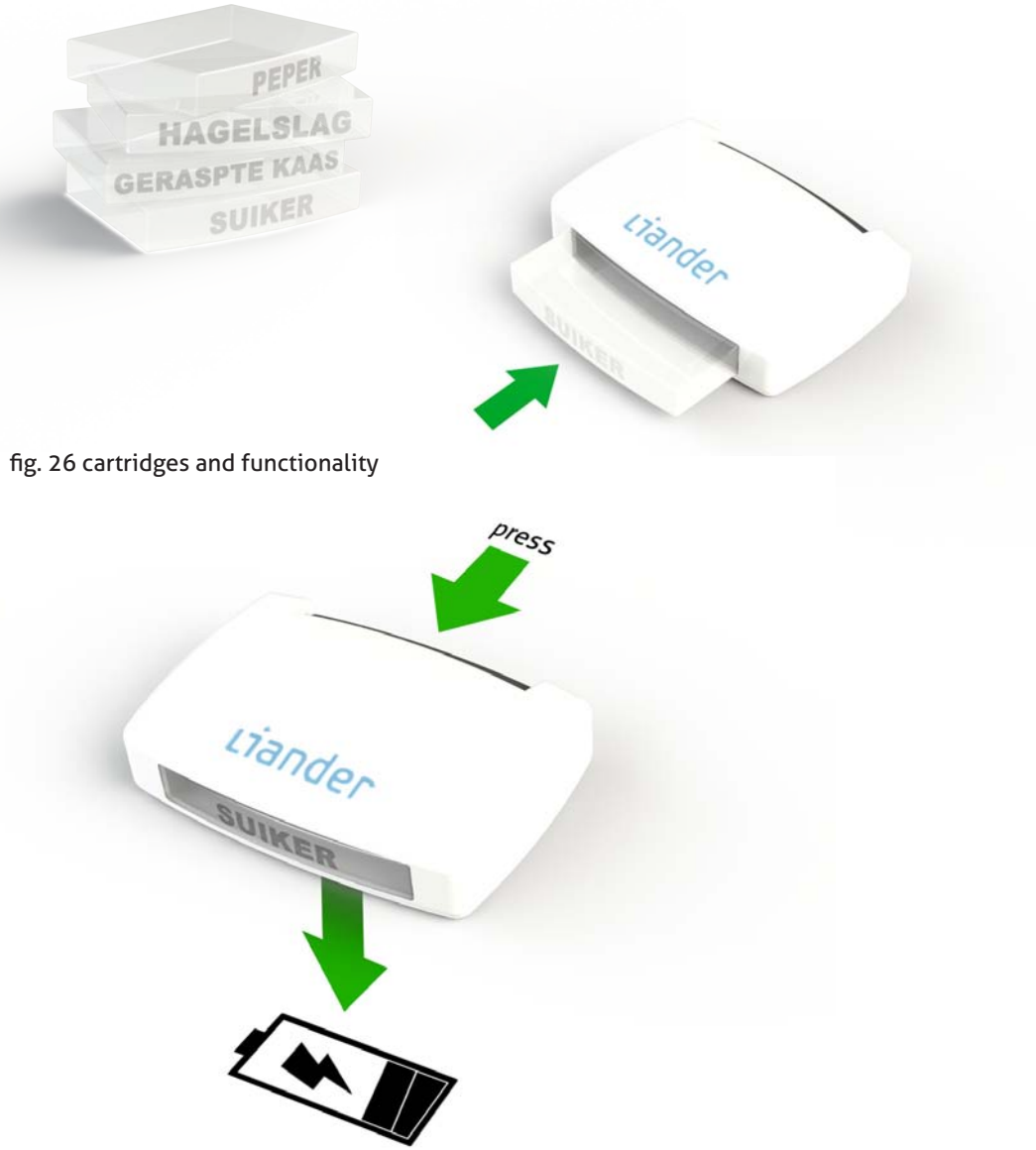


fig. 26 cartridges and functionality

With a simple press of the button the symbol is printed on the desired item with the substance in the cartridge *(fig. 26)*.

Another feature of the product, as has been explained earlier on, is the method of recharging the small battery inside. For more detail see the exploded view on the previous page *(fig. 24)* where the general layout of the product and the key components are visible that are required for the product's functionality.

Neutral colours are recommended for the product, such as black and white. Other colours that could be used for the product are Liander's colours: blue or blue and purple *(fig. 27)*.

Though not implemented, it is also possible to use a coloured LED light to give the user a quick impression of their energy consumption *(fig. 28)*. The LED could be placed inside the casing and thus lighting up the cartridge, or it could be placed underneath the semi-transparant surface of the device. One could even choose to make the entire product of this semi-transparant material to illuminate the entire device with the LED.

right: fig. 27 different colours of the product
top: fig. 28 LED visualisation

This LED is optional: if one wants to allow the user to see their energy consumption at a quick glance then the LED would be a valuable addition. If that is not desirable it is just an added cost and a drain on the energy source.

CONCEPT EVALUATION

determining the best candidate

As per rules of the design competitions on **Battle of Concepts** it is not allowed to submit more than one concept per account. As has been explained earlier in this report, the most promising concept will be chosen to be submitted.

Evaluation of the concepts

To determine the most suitable candidate for the competition, the concepts were evaluated using six characteristics. Those six characteristics were linked to an index value to indicate their importance. These index values have been determined based on the assignment description, the list of requirements and the design vision - Liander has indicated they wish to reach as many customers as possible and that the product has to be cheap, hence these characteristics have the highest index value. The table below gives an overview of the results.

Concepts	**Criteria**					
	Costs	*Reach*	*Information*	*Longevity*	*Incentive*	*Willingness*
	0.3	*0.2*	*0.1*	*0.1*	*0.2*	*0.1*
Facebook/iPhone application	++	+	++	++	+	++
Digital photo frame: future extrapolated	-	++	++	++	++	+
Good morning energy consumption	+	++	-	+	+	+

After compensating for the index values, the Facebook/iPhone application comes out as the most promising candidate at 1.6 points. The digital photo frame is on second place with 1.3 points, followed closely by the 'good morning energy' concept with 1.2 points. Hence the first concept was chosen to submit to the design competition as it would fit Liander's desires and requirements best.

CONCEPT SUBMISSION

proof of participation

Of course the concept needed to be actually submitted for succesful participation in both the battle and the course. A **Battle of Concepts** account was created to be able to submit the most promising concept - info such as curriculum vitae had to be uploaded as well. Below is the message you receive when you submit a concept.

Je concept is ontvangen!

Terug naar Berichten

Battle Team Toevoegen aan contactpersonen
Aan m.b.c.grob@hotmail.com

30-9-2010
Beantwoorden

Battle of Concepts

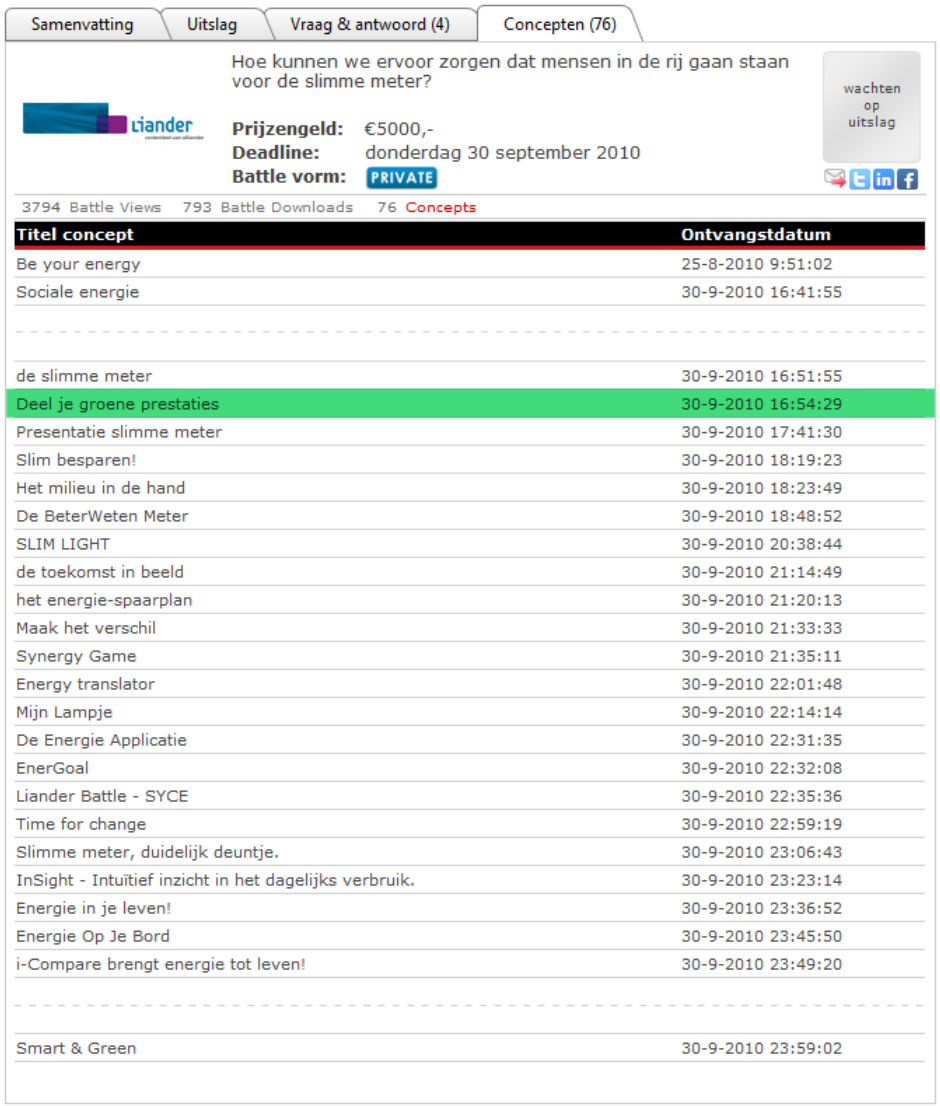
Denk mee met het bedrijfsleven.
Win geld & word ontdekt!

Beste Mark Grob,
Hartelijk dank voor deelname aan de Battle van Liander.
Je concept "Deel je groene prestaties" is succesvol ontvangen op 30-09-2010.
Zodra de uitslag van de Battle bekend is, ontvang je hier per e-mail bericht van.

Succes!

Met vriendelijke groet,
Battle of Concepts

On the right side of this page the date and time stamps of delivery can be viewed *(fig. 29)*. The outcome of the battle will be published within four weeks after the deadline.



Samenvatting | Uitslag | Vraag & antwoord (4) | Concepten (76)

Hoe kunnen we ervoor zorgen dat mensen in de rij gaan staan voor de slimme meter?

wachten op uitslag

Prijzengeld: €5000,-
Deadline: donderdag 30 september 2010
Battle vorm: PRIVATE

3794 Battle Views 793 Battle Downloads 76 Concepts

Titel concept	Ontvangstdatum
Be your energy	25-8-2010 9:51:02
Sociale energie	30-9-2010 16:41:55
de slimme meter	30-9-2010 16:51:55
Deel je groene prestaties	30-9-2010 16:54:29
Presentatie slimme meter	30-9-2010 17:41:30
Slim besparen!	30-9-2010 18:19:23
Het milieu in de hand	30-9-2010 18:23:49
De BeterWeten Meter	30-9-2010 18:48:52
SLIM LIGHT	30-9-2010 20:38:44
de toekomst in beeld	30-9-2010 21:14:49
het energie-spaarplan	30-9-2010 21:20:13
Maak het verschil	30-9-2010 21:33:33
Synergy Game	30-9-2010 21:35:11
Energy translator	30-9-2010 22:01:48
Mijn Lampje	30-9-2010 22:14:14
De Energie Applicatie	30-9-2010 22:31:35
EnerGoal	30-9-2010 22:32:08
Liander Battle - SYCE	30-9-2010 22:35:36
Time for change	30-9-2010 22:59:19
Slimme meter, duidelijk deuntje.	30-9-2010 23:06:43
InSight - Intuïtief inzicht in het dagelijks verbruik.	30-9-2010 23:23:14
Energie in je leven!	30-9-2010 23:36:52
Energie Op Je Bord	30-9-2010 23:45:50
i-Compare brengt energie tot leven!	30-9-2010 23:49:20
Smart & Green	30-9-2010 23:59:02

fig. 29 battle submission

EVALUATION

reflecting on the process

Participating in this design competition was an interesting experience. There are some vital differences between executing an assignment for an employer with open channels of communication and executing an assignment for an employer within the confines of a design competition. It is also quite exciting to compete with others to create the 'best' concept.

The choice was made to accompany every aspect of the concepts with graphical representations, it was an interesting experience to visualise every single aspect of the concept. This was done to ensure that the ideas would be properly conveyed to the jurors, whose professional background is unknown. Another benefit is that it looks more appealing and keeps the information more interesting to read.

The circumstances regarding a design competition are more realistic compared to an assignment in a university setting in the sense that you most likely do not deal with people who have a background in design or engineering. With a shared background the nomenclature is familiar and potential of ideas is much more easily recognised by the receiving party. Without a shared background, every idea needs to be thoroughly explained: all potential needs to be highlighted with care. It also means that ideas need to be developed much further before a choice can be made than when dealing with a design team. If one were to work for a design company this situation would be very common, after all the employer would most likely not share a background in design or engineering.

The lack of communication with the company required a different approach. Usually a few ideas would be developed into concepts, after which one would be selected and all attention would be on that one chosen concept. In this case communication was impossible, so all choice was left to the designer. This was exacerbated by the fact that the company who created the battle is a nontransparant public utilities company without a clear company image. Both factors combined meant that it was tricky to determine the exact wishes of the company and thus be able to respond to those wishes. This disadvantage was compensated for by additional research and by offering a wider palette of concepts to the employer.

The strict deadline and relatively short time available for the project meant that a lot of work had to be done in a short period of time. A strict planning was therefore paramount. Constantly reviewing the workload was helpful as well: a weekly review of what had been done, what conclusions could be drawn from the results and what steps had to be taken next in order to fulfill the goal was required to stay on track.

The lack of feedback, even after submission, is a bit of lost opportunity to further sharpen design skills. Besides the rank determined by the jurors no feedback can be acquired on individual parts of the concepts or the presentation thereof. Perhaps in hindsight it would have been better to wait for an **open battle** where more feedback is given, though mostly by the general public. Still, it is something to consider for future reference.

LITERATURE LIST

sources of information

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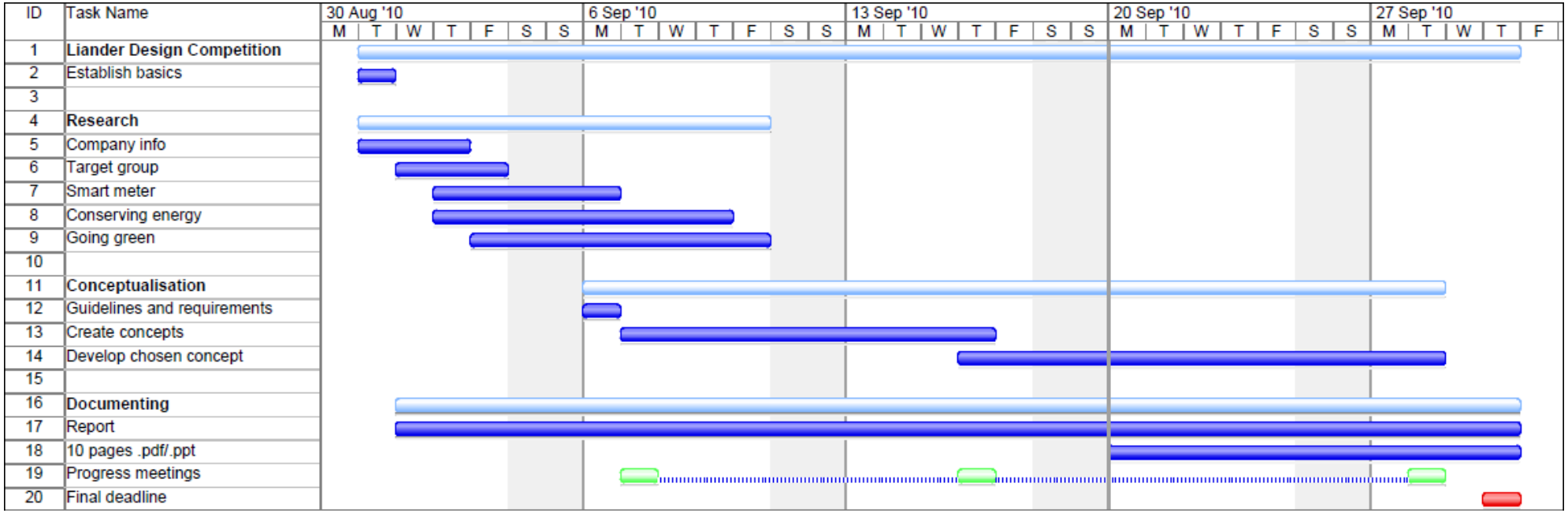
APPENDIX
project planning

Project planning



Technical drawings of the "good morning energy" concept - bottom part of printer