THE RECIVIATOR - SMART HOMES BUILT FOR MODERN DAY SERVICE DEMANDS

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ABSTRACT

Our concept is a luxurious time saver for food shopping and food handling, that has a social dimension and a sustainable embodiment. The prototype consists of both a real-size interface on a touch TV screen, and a scaled model showing a functioning elevator built using Lego Mindstorm NXT, going between floors and delivering packages in different directions - directly into the kitchen. This was displayed during a two-day long exhibition allowing us to get valuable feedback from visitors. We found out that once the initial concept was understood, people got really excited and started visualising different ways of adding features and value to our concept. We conclude that this is a field for further investigation, it would reduce time spent on grocery shopping, travelling and waiting, plus allowing existing services to be even better, since the deliveries are stored properly and safely. All the technology used in this project already exists. It is the combination that is novel, and perhaps a little bit ahead of its time.

KEYWORDS

Collaboration; Concept house; Food; Elevator; Deliveries; Smart Home; Flexibility; Environmental Sustainability; Time effective; Space efficient; Common Storage; User Interface Design; Human Centred Design; Interaction Design; Communication; Futuristic; Building structure; Social Interface.

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INTRODUCTION

What would make a 54 square meter apartment appeal to a family of four? This was our initial question since Swedish building company PEAB currently are looking for ways to attract new target groups to these smaller apartments, having especially families in mind. To answer this question we needed to ask another: What does families, with children living at home, value as much as living space?

BACKGROUND

Even though a large living space is something that many families want, being healthy and have time to spend both on each other and individually is of course more sought after. Lack of time to rest leads to stress, which in turn is a major cause for illness. [1]

A study on stress within the 27 countries in the European Union indicate that Sweden is the most stressed country of them all. [2] The study showed that those currently working are most likely to say that exposure to stress is one of the main health and safety risks at work. Those in Sweden are the most likely of all to mention stress. Two thirds, 67 %, of all the Swedish participants did this. In 18 Member States stress, depression or anxiety are the most mentioned health problems either caused or made worse by work. Almost half of all of those in Sweden who currently work mention these issues, compared to only 19% of the least stressed EU citizens, whom live in Romania and Slovakia. [2]

An article in the Swedish newspaper Svenska Dagbladet states that half of all Swedish parents with kids living at home feels pressured for time, and that the number one wish is to have more time for the children and for themselves [3]. Bronnie Ware, an Australian nurse that has worked in palliative care for a long time, found out that what people regret most on their death bed is that they worked too hard, did what was expected of them instead of what they wanted and that they did not make time for family and friends [4].

METHOD

After the internal ideation phase a first stage concept was created and brought with us to early meetings with potential users and PEAB representatives. The user interviews where held one and one as well as family wise and consisted of user feedback on our concept as well as questions concerning their daily habits and additional feedback on use. During this phase we could start limit our target group by matching our concept with user needs, wants and habits to find our that our concept where best suited for families that wanted to have more time for each other. With PEAB, shorter presentations of concepts were held, followed by their comments. We had to rethink some parts of our ideas since ultimately they know the market and represents the building manufacturers. Our goal was to strive towards something that was realisable in the near future.

After evaluating our concepts and ideas we established that our target group are likely to trade living space for time, we needed to find a way to provide them with that. Therefore the next step was to look at how the adults in a family typically spends their time. We have categorised the time we spend each day into these four categories: sleep, work, chores and leisure. Arguably these categories will describe every productive individual of a society. In our concept we will attempt to reduce stress by reducing the amount on of time spent on chores and instead add it to leisure. Leisure time being the time you spend with friends, family or by yourself. This is the part that people want to have more of. [3]

The amount of sleeping time and working time is problematic, and frankly undesirable, for us to alter. That is a balance that we feel is best decided by each person or family without our meddling. Chores however is something that most of us want to do less, but that we all need to put time and effort into, albeit in various degrees. To free up this kind of time we needed to find a solution where the building itself could take care of at least one chore for us. This was indeed a challenge, but we kept on thinking, and focused primarily on food since it had turned out to be a major stress factor when we conducted the group interview during the ideation phase.

The parents talked about the stress of grocery shopping with kids, and that it was time consuming to travel back and forth to the store several times per week, waiting in line etcetera. When we asked them about existing home delivery services they answered that this was an improvement for them, but that it was still bad because existing services has a time interval, usually 4 hours, during which you need to be home and wait. That actually added a lot of stress. Another factor was that if you missed the delivery the food would just be left outside of the home, at risk of becoming stolen or go bad if the items are temperature sensitive.

CONCEPT AND DESIGN

We realised we were on to something: We would let the house store the food for us. Furthermore we wanted the apartments to feel luxurious and be able to connect other smart home functionalities in a good way. Besides all this, we really wanted to have a collaboration between neighbours so we wanted to make sure to utilise some kind of crowd delivery, and possibly add a social aspect to this concept. Lastly, for this to appeal to a modern family it is important that both concept and its realisation has a well thought out environmental aspect.

We decided to make a storage in the lower level of the house that would store the food, as well as other deliveries of course, in a safe manner and cold when needed, plus connect an elevator to this system. (See figure x.x) However, not any kind of elevator, but an elevator that leads directly into the kitchen of the apartment. To control the elevator and have a central unit for all the smart home technology in the apartment, we have an interface in the form of a touch TV. We thought about just having an app solution, but decided to go in the other direction and make it a focal point in the heart of the kitchen. This is because we are sure there could be more smart features in this apartment and thought it was nice to design for a way to gather them all in one place. Another reason for this is that we want to appeal to the modern family who spends a lot of time in the social area of the kitchen and the living room. The screen is rotatable and doubles as a TV for the living room. This enables facing the sofa towards the kitchen, which we hope will increase the social interaction in the families.

The different parts described above forms our unity. We did a play on words and named it “the Recivator”. The Recivator can of course deliver any kind of goods, provided it has the right size, but we focused on the food deliveries because of our interview findings. The design we came up with allows the delivery to be pushed out onto the kitchen counter. A strong motivation at this point onwards was to imagine never having to lift another grocery bag for the rest of our life’s.

Also imagine that you connect this system to your personal storage area, allowing you to order up whichever item you need at the moment. No more digging among moving boxes for futile attempts on finding whatever it is you are looking for. We got the inspiration from a wine cellar system in the book Smart Things: Ubiquitous Computing User Experience Design, that worked in a similar way. [5]

We expanded our design by the concept of crowd deliveries which could be done by making a deal with a food grocery company that they will deliver daily, or maybe even twice a day, if the residents order from them. This means a person can order small and still get the order without paying delivery costs, because the total sum of the house would most likely be higher than the required amount every time, thanks to the “strength in numbers” concept; many small orders will equal one large order.

To add a social element to this and strengthen the environmental aspect even more we thought up the “free for all” concept. The food stored in the house is kept safe, but what if someone is not ordering up the ordered items? They will go bad eventually. There will be a time limit to

get your food. To know if the time limit should be two days, a week or another length we would need to do a lot more testing, but after that time period the food order will be “free for all”. Then any neighbour can get the order delivered to the apartment, depending on who claims it first. There could also be a function releasing the food earlier if the owner knows that the food will not be brought up in time. This would decrease the risk of the food going to waste and adding value to the entire system. Who would not love getting free food from time to time? Other things that makes the Recivator good for the environment is that it significantly reduces the number of travels to and from the stores. In some cases grocery shopping is what makes a family get and keep a car, so we might even be able to reduce the number of cars in the city.

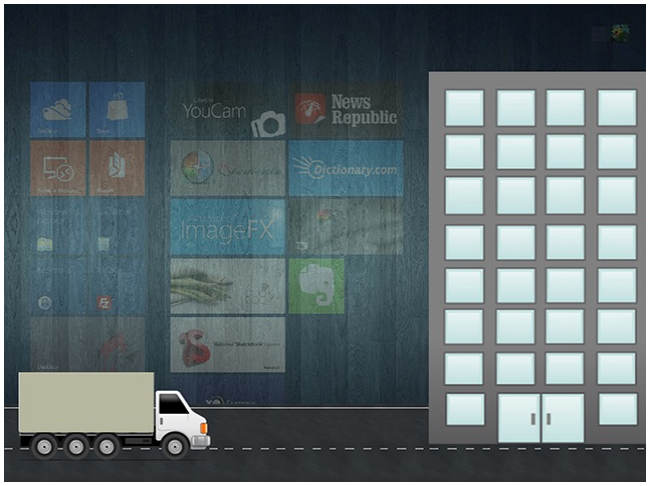

Figure 1. Our interface prototype in active state, showing what the screen looks like when there is a delivery on the way and no one uses the interface for other activities.

RESULTS

The prototype that we displayed was made of three different parts; an intersected house model, in the scale of 1:5, three stories high to show two kitchens on different floors on each side of an elevator, also showing the bottom floor where the groceries and other packages are stored; the elevator motor function that was programmed and built with Lego Mindstorms NXT and conveyer belts to move the packages in different directions; and finally a real size touch TV that showed our interface as a layer on top of a computer interface. To use the computer the user simply touch any part of the greyed out surface, see figure 1.

In order to test the prototypes we participated in a two-day long exhibition, showing visitors the concept and asking them for feedback. As we suspected the concept took a little bit of explaining but when we had done so, the users got enthusiastic and started to envision a lot of different scenarios where the Recivator could improve their own lives as well as others, resulting in a lot of valuable feedback.

We thought that people would object to the social aspects, but to our surprise everyone we talked to about this was positive and we got several suggestions about things that they wanted to be able to do that took the concept further than we would have dared to suggest. Another potential problem that we thought a lot about was that elderly people might have a hard time using the technology and that it would be problematic if this was the way to control things in the home, as well as receiving mail and getting important notifications about things related to the house. Instead this turned out to be an eager user group and the by far most common comment we got during the exhibition was that this would be a perfect solution for elderly.

Figure 2. Display of our three stories house model in scale 1:5, The elevator delivers a package from the basement store to floor 3, right onto the kitchen sink.

While many people thought about how this could improve living conditions for elderly, others focused on the collaborative aspect of the system. The possibilities to send and receive messages related to the house was highly appreciated. For instance if there is information regarding the house that the residents need to be aware of or to notify neighbours about special circumstances.

Taking the concept further, a couple of visitors suggested that a lot of the food should be commonly shared, talking about milk that is something many people want to have but that will go bad unless consumed. This would take the concept a lot deeper in the direction of collaboration and environmental thinking.

Figure 3. Close-up of the kitchen sink and elevator delivery.

DISCUSSION

The two main problems of our solution are the scope and the building cost. The large scope makes it harder to visualise than a more scaled down idea, and harder to visualise mean harder to present for stakeholders and investors. We could have done a smaller project with another focus, but we wanted to do a paradigm shift in the way we think about houses. The technology in society are growing at a high rate, but the houses do not follow this technological (r)evolution, which is a bit odd considering Sweden's high tech culture.

We have thought about only using a storage room in the entry level, letting the residents pick up things on their way up. This would save money. Yes, this would most likely save money during the construction, but we would lose all the social aspects as well as the luxury of being able to getting things rather effortless. Freshly baked bread could be delivered onto your kitchen counter just in time for breakfast.

We believe adding these values would lead to these houses being more coveted, which in turn would give them higher listings than old fashioned buildings that lack structure for smart home services.

There are no certainty that the free time the Recivator creates will be spent on leisure and non stressful activities. It may very well be the case that it will free up more time for work. Disregarding the direct positive impact the Recivator will have on the elderly and the retired, even if free time is put back into work, it would be beneficial in the long term assuming that more work hours equals more work progress. Without the stress of having to do these chores, and knowing that you can work overtime and still have food home for the kids will reduce stress.

More wide scale user studies and research has to be conducted in the field with real implementations to be sure of the exact outcomes of our concept. Given our estimations the concept would reduce the number car trips to the stores, but there is no data to suggest that the cars would not be used for other purposes when they no longer has to drive to the stores, and thus instead increasing the carbon dioxide pollution.

CONCLUSION

As one of our peers pointed out, the money always has to come from somewhere. If the stores would not have to exist, the cost of maintaining them would not exist either, and this would shift around costs, leading to lower price on food. The difference would be used to pay for a more expensive housing situation. Presuming that the costs would be a zero-sum equation – what would be the earnings?

Our answer is: The increased leisure time, the reduced stress, the feeling of luxury, the control centre for all smart home applications, the increased social activities between neighbours, the potential of increased social interaction within the families, the added information control via message boards and your storage items just a few screen clicks away.

REFERENCES

1. McEwen, B. S., & Stellar, E. (1993). Stress and the individual: mechanisms leading to disease. Archives of internal medicine, 153(18), 2093-2101.
2. Working Conditions, Flash Eurobarometer 398, Publication: April 2014, http://ec.europa.eu/public_opinion/flash/fl_398_en.pdf
3. SvD Nyheter (2012-09-11) Förälder och välavlönad? Då är du verkligt stressad. Collected: 2014-10-28, from: http://www.svd.se/nyheter/idagsidan/tiden-racker-inte-till_7488164.svd
4. Warren, B. (2012). The Top Five Regrets of the Dying: A Life Transformed by the Dearly Departing by Bronnie Ware. Proceedings (Baylor University. Medical Center), 25(3), 299.
5. Kuniavsky, M. (2010) Smart Things: Ubiquitous Computing User Experience Design, Morgan Kaufmann, San Francisco.