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**THINGS.INFO – HOW TO CREATE A WEB PLATFORM
REPRESENTING ALL MAN-MADE OBJECTS AND
THEIR RELATIONSHIPS**
Master thesis

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Ready for defence
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ABSTRACT

The research question is how to create the appropriate (highly usable, rapidly scalable, modifiable by all internet users) web and mobile platform for Things.info - visualised interactive database of world's man-made physical objects and their relationships?

Thesis covers theoretical background, poses underlying assumptions and critical success factors to accomplish the task in question.

Two critical success factors – early adopters and high usability - are studied experimentally. Possible early adopters are identified through qualitative interviews. User experience testing is carried out based on lean UX theory and using interactive prototype.

Overall, lean startup and agile software development methods are recommended to develop the platform in question.

KOKKUVÕTE

Magistritöö uurimisküsimuseks on, kuidas luua sobiv (kõrge kasutatavusega, kiirelt skaleeritav, kõikide internetikasutajate poolt modifitseeritav) veebi- ja mobiilplatvorm Things.info, mis sisaldab andmebaasi kõikidest maailma inimese poolt loodud füüsilistest objektidest (asjadest) ja nendevahelistest seostest. Magistritöö kirjeldab esiteks sellise platvormi loomiseks vajalikku teoreetilist raamistikku, eeldusi ning kriitilisi edufaktoreid.

Kahe kriitilise faktori – varajase faasi kasutajate saamise ning kõrget kasutatavuse – parima elluviimise võimalusi uuritakse eksperimentaalselt. Võimalikud varajase faasi kasutajad identifitseeritakse läbi kvalitatiivsete intervjuude. Kasutajakogemuse testimine viiakse läbi 'lean UX' teooria põhjal ning interaktiivset prototüüpi kasutades. Katsetulemuste põhjal tehakse järeldused ja soovitused Things.info arendajatele.

Tervikuna soovitatakse platvormi arendamiseks kasutada 'lean startup' ja agiilse tarkvara arendamise meetodeid, et jõuda tulemuseni minimaalse võimaliku aja- ja ressursikuluga.

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1 INTRODUCTION

Overview of Things.info and research question

The goal of Things.info is to create a web platform containing all man-made objects and their relationships that will be used by a big percentage of all internet users. In Things.info there will be increasingly exact information about the production, use and recycling (also disposal) of things – man-made physical objects – thus enabling people to make educated choices in their interactions with things.

The research question is how to create the appropriate (highly usable, rapidly scalable, modifiable by all internet users) web and mobile platform for Things.info - visualised interactive database of world's man-made physical objects and their relationships?

Why it is needed?

There are several possible futures for humankind and the planet. In the context of diminishing natural resources and growing population it is increasingly clear that we have to change how we produce, consume and dispose things (man-made objects). As the economy has become essentially global and intertwined, the new emerging production-usage-disposal system has to have the same features – global network, that is collectively coordinated, unless we are going to fall back into unwanted state with some historical technologies providing for essential needs.

The work is based on assumption that humankind needs an information system that describes in great detail the current use of resources, is personal, enables collective modeling of future scenarios and tracks progress of collectively set goals.

Who is the main target group?

Long-term sociological research by Paul Ray and Sherry Anderson (2000) has shown emergence and rapid growth of a value-based societal group in most of developed countries. They are called ‘cultural creatives’ and their percentage in Western societies (US, Europe, Japan where studies have been conducted) has grown from appr 5% thirty years ago to appr 25% and growing as of now (Cultural Creatives 2013). For this group living in sustainable harmony with our planet is one of the main and clearly defined values. Many members of this group are actively looking for ways to consume sustainably via conscious purchasing, long-term use, reducing consumption and recycling.

Critical success factors

For Things.info to achieve its goal, we have outlined following critical success factors that have to be fulfilled at the same time:

- 1) one virtual environment operating on majority of devices (mobiles, PCs, tablets and other devices connected to the internet interacting directly with humans);
- 2) data model fitting for all kinds of man-made objects, their interactions with people, production and disposal processes;
- 3) sufficient technical capacity, emphasis on optimization;
- 4) simple and useful, because critical number of users needed;
- 5) personal and macro-level relevance at the same time.

We are describing, analysing, prototyping and testing a subset (simple, meaning good user experience design and useful, meaning solving some customer pain) of the minimum set of conditions for achieving these goals. We assume the fastest take-off of Things will happen, if developed fully or partially on commercial basis, because if successful, then traction (actual number of people using Things.info growing fast and continuously) and financial sustainability have been achieved, these being pre-requisites for long-term viability of the project.

Scope of this work. Books as a pilot product category

In our work we are focusing on three areas of this otherwise huge project:

- 1) Laying out theoretical framework for the whole Things.info project,
- 2) Customer development,
- 3) Prototyping and usability testing.

We have chosen books as a main product category for customer development, prototyping and user testing, because of two reasons. First, the environmental impact of books as objects is quite well quantified and measurable, making it possible to show the effects of changes in consumer behaviour. Secondly, we thought in which market segment it is possible to change consumer behaviour with minimum effort, building on the already existing trend (growing share of e-books etc).

Through measuring environmental impact of book production we can estimate the area of forest annually felled for the world book production. According to Swedish Forest Industries Federation (2013) the global paper production in 2010 was 394 million tons and out of that 28% or roughly one quarter was printing and writing paper. We assume that half of the overall printing and paper production goes for printing books, so estimate the global annual book printing paper production ca 50 million tons.

According to PaperImpact (2013) „for producing 1 ton of paper 2.5 to 4.0 m³ of wood is needed, depending on the type of pulp. In theory this means that 25 to 80 tons of paper can be made out of 1 hectare or on average 250 m² of forest for 1000 kilos.“ It has to be kept in mind, that recycled fibre is increasingly being used for paper production and usually the forest lot is not clearcut while obtaining logs for pulp production. Given these considerations we assume the range of 'tons of paper per hectare of forest' to be 10 to 80 tons per hectare of forest.

Based on these assumptions and calculations we can estimate the forest area annually needed for obtaining logs for book printing paper production is 0,6 – 5 million hectares (6 000 – 50 000

square kilometres). This area can be compared to three Luxembourgs in the lower end up to the whole territory of Costa Rica in the higher end!

Focusing on books is also a market-oriented choice, because compared to most other products it is relatively easy to change consumer behavior towards sharing books, switching to e-books and proper recycling. Internet users are to some extent accustomed to search, buy, read, organise, lend, share and donate books in web applications, so using Things.info for books does not demand a totally new type of behaviour from users.

2 THEORETICAL FRAMEWORK

As mentioned in introduction there are three focus areas for current thesis:

- 1) Laying out theoretical framework for the whole Things.info project,
- 2) Customer development,
- 3) Prototyping and usability testing.

Hereby we will describe the theoretical framework for all of these areas.

2.1 Theoretical framework for the whole Things.info project

It should be mentioned that there are several underlying assumptions based on both theories and facts for choosing the strategy for developing Things.info. At the first glance they may seem not much related, but together they form the foundation for Things.info, meaning that if one of the following aspects of theoretical framework will be proven wrong by real facts in the coming years, Things.info will have a serious problem and has to reconsider all the underlying assumptions based on the theoretical framework as it stands at the moment.

2.1.1 Limits to growth, planetary boundaries, planning for 10-11 billion humans in 40 years

Concern over the mismatch between growing population and diminishing resources has its roots already in the end of 18th century, when in 1798 Thomas Malthus published his „Essay on the Principle of Population“. Modern thinking about planetary sustainability dates back to 1960s. „The Limits to Growth“ (Meadows et al 1972) was the first research work to draw wide attention on the possibility of world’s resources becoming scarce in foreseeable future. „A comparison to

Limits to Growth with Thirty Years of Reality“, study by Graham Turner (2008), compares the scenarios posed in Limits to Growth to real data from the period 1970-2000 and concludes that „The analysis shows that 30 years of historical data compares favorably with key features of a business-as-usual scenario called the ‘standard run’ scenario, which results in the collapse of the global system midway through the 21st Century.“

More recent research (Rockström et al 2009) aiming to describe for the first time „the planetary playing field“, where humanity could safely act and reversibly, the borders of which are dangerous to cross, comes from Stockholm Resilience Centre.

„In 2009, a group of 28 internationally renowned scientists identified and quantified a set of nine planetary boundaries within which humanity can continue to develop and thrive for generations to come. Crossing these boundaries could generate abrupt or irreversible environmental changes. Respecting the boundaries reduces the risks to human society of crossing these thresholds.“ (Stockholm Resilience Centre 2013)

The nine boundaries (Figure 1) and the complexity of their relations is worth quoting in full: „Anthropogenic pressures on the Earth System have reached a scale where abrupt global environmental change can no longer be excluded. We propose a new approach to global sustainability in which we define planetary boundaries within which we expect that humanity can operate safely. Transgressing one or more planetary boundaries may be deleterious or even catastrophic due to the risk of crossing thresholds that will trigger non-linear, abrupt environmental change within continental- to planetary-scale systems. We have identified nine planetary boundaries and, drawing upon current scientific understanding, we propose quantifications for seven of them. These seven are:

- 1) climate change (CO_2 concentration in the atmosphere <350 ppm and/or a maximum change of $+1 \text{ W/m}^2$ in radiative forcing);
- 2) ocean acidification (mean surface seawater saturation state with respect to aragonite $\geq 80\%$ of pre-industrial levels);
- 3) stratospheric ozone ($<5\%$ reduction in O_3 concentration from pre-industrial level of 290 Dobson Units);

- 4) biogeochemical nitrogen (N) cycle (limit industrial and agricultural fixation of N_2 to 35 TgN/yr) and phosphorus (P) cycle (annual P inflow to oceans not to exceed 10 times the natural background weathering of P);
- 5) global freshwater use ($<4000 \text{ km}^3/\text{yr}$ of consumptive use of runoff resources);
- 6) land system change ($<15\%$ of the ice-free land surface under cropland); and
- 7) the rate at which biological diversity is lost (annual rate of <10 extinctions per million species).

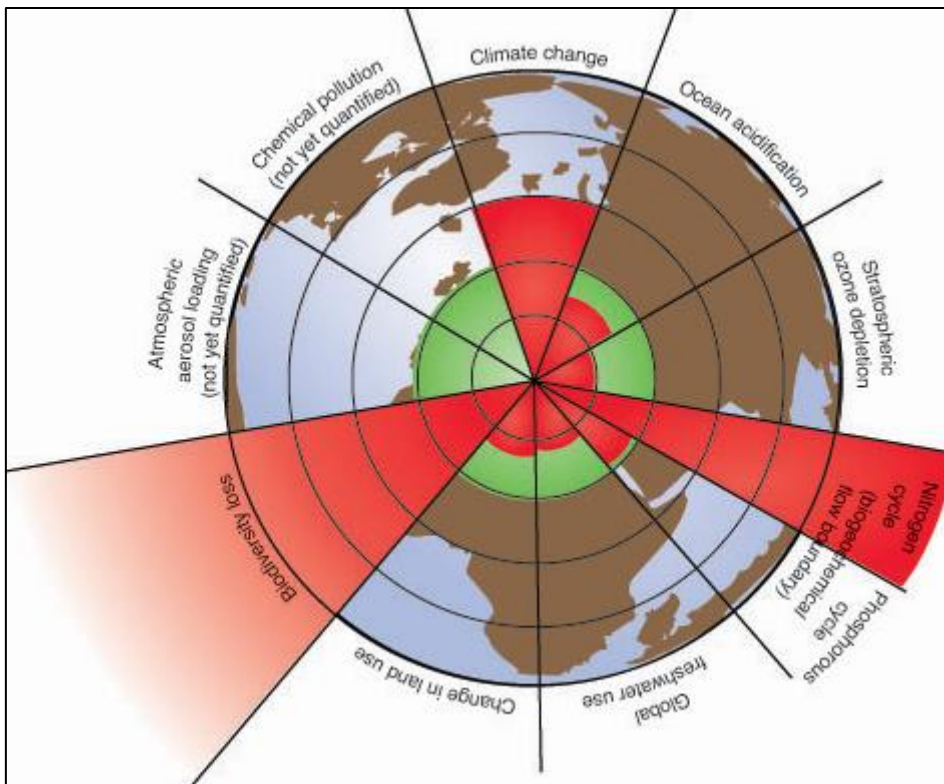


Figure 1. Planetary boundaries. (Stockholm Resilience Centre 2013)

The two additional planetary boundaries for which we have not yet been able to determine a boundary level are chemical pollution and atmospheric aerosol loading. We estimate that humanity has already transgressed three planetary boundaries: for climate change, rate of biodiversity loss, and changes to the global nitrogen cycle. Planetary boundaries are interdependent, because transgressing one may both shift the position of other boundaries and cause them to be transgressed. The social impacts of transgressing boundaries will be a function of the social–ecological resilience of the affected societies. Our proposed boundaries are rough,

first estimates only, surrounded by large uncertainties and knowledge gaps. Filling these gaps will require major advancements in Earth System and resilience science. The proposed concept of “planetary boundaries” lays the groundwork for shifting our approach to governance and management, away from the essentially sectoral analyses of limits to growth aimed at minimizing negative externalities, toward the estimation of the safe space for human development. Planetary boundaries define, as it were, the boundaries of the “planetary playing field” for humanity if we want to be sure of avoiding major human-induced environmental change on a global scale.

The Earth has entered a new epoch, the Anthropocene, where humans constitute the dominant driver of change to the Earth System (Crutzen 2002, Steffen et al. 2007 as cited in Rockström et al 2009). The exponential growth of human activities is raising concern that further pressure on the Earth System could destabilize critical biophysical systems and trigger abrupt or irreversible environmental changes that would be deleterious or even catastrophic for human well-being. This is a profound dilemma because the predominant paradigm of social and economic development remains largely oblivious to the risk of human-induced environmental disasters at continental to planetary scales (Stern 2007 as cited in Rockström et al 2009)“ (Rockström et al 2009)

It is clear, that the risks for abrupt environmental change are noteworthy, body of research detailing all aspects of crossing planetary boundaries is accumulating, but the governments and intergovernmental organisations have been slow to act (for example have more or less failed to reach a meaningful agreement addressing the climate change). One reason is that people are not directly participating in these negotiations, meaning that the outcome is not personal, but something imposed on people. The hypothesis is, that if people could individually think through the issue, see clearly the impacts of their everyday decisions and actions, if they could collectively negotiate a system, whereby the quality of life grows for all, at the same time living sustainably within the means of Earth. Or even better – having sustainable abundance within the means of the planet.

It is important to note, that we assume the world population continuing to grow, but the birth rates continue to decrease and eventually the population becomes quite stable. Taking UN

Department of Economic and Social Affairs Population Division medium and high estimates (correspond better to the observable trend) the human numbers by mid 21st century will be between 9 to 11 billion (United Nations 2010). This means we assume certain growth trajectory in terms of users, use of resources (production, use and recycling of objects) per capita, and thus can better set up the data model for Things.info and develop its simulation capacities for future scenarios.

The underlying assumption for Things.info is that there are planetary boundaries and we have crossed some of them and close to crossing some of the others. Also we assume that a participatory and politically possible platform for becoming aware of these boundaries and enabling coordinated action for staying in 'the planetary playing field', is needed.

2.1.2 Increasing connectivity

Keeping in mind that the current world population is over 7 billion, passing that mark symbolically in October 2011 (BBC 2011) we see that the connectivity of the world population is rapidly increasing and can reach close to 100% level in less than 10 years.

International Telecommunication Union (ITU) estimates in its report „ICT Facts and Figures. The World in 2013“ (ITU 2013) that in 2013 there will be „6.8 billion mobile-cellular subscriptions. In 2013, there are almost as many mobile-cellular subscriptions as people in the world, with more than half in the Asia-Pacific region (3.5 billion out of 6.8 billion total subscriptions).

Mobile-cellular penetration rates stand at 96% globally; 128% in developed countries; and 89% in developing countries. ... In 2013, over 2.7 billion people are using the Internet, which corresponds to 39% of the world's population. In 2013, 41% of the world's households are connected to the Internet. Half of them are in the developing world, where household Internet penetration has reached 28%.“ (ITU 2013)

Cisco predicts in its Global Mobile Data Traffic Forecast Update, 2012–2017 that „By the end of 2013, the number of mobile-connected devices will exceed the number of people on Earth, and

by 2017 there will be nearly 1.4 mobile devices per capita. There will be over 10 billion mobile-connected devices in 2017, including machine-to-machine (M2M) modules-exceeding the world's population at that time (7.6 billion).“ (Cisco 2013)

Based on these facts and estimates our assumption is that the whole world population is becoming rapidly connected to the internet, thus capable of setting up personal accounts in Things.info and using the platform.

2.1.3 Cultural creatives and growing value-based movements as initial target groups and early adopters for Things.info

Although we cannot describe all the important and outstanding sustainability-related movements, we can mention some that are most relevant to Things.info to convey the idea of the real spread of such movements. Also, in this chapter we briefly touch upon some analysis tools that are used by environmentally-minded people, either directly or indirectly, which in turn could provide traction for Things.info, if it can substitute some of these tools.

2.1.3.1 Cultural creatives

„The Cultural Creatives: How 50 Million People Are Changing the World“ by Paul H. Ray and Sherry Ruth Anderson (2000) is a seminal work describing quantifiably important shift in the values of adult Americans and in later studies also citizens of other developed countries (Cultural Creatives 2013). This phenomenon has been largely going on under the radar of sociological research. Ray and Anderson are showing through their research, mostly conducted from early 1980s to late 1990s, on more than 100.000 Americans, plus more than 500 focus groups and 60 in-depth interviews (Cultural Creatives 2013), that the fastest growing group in American society, identifiable by a certain value set, is 'cultural creatives', that has grown from ca 5% in 1960s and 1970s to more than 25% in 1990s. Moreover, „In national surveys in the United States, Western Europe and Japan, they are now about 35% of each country's population, plus or minus 2%“.

Cultural Creatives are distinguished from two other initially large value groups – Moderns and Traditionals who together made up most of the US population in 1960s – by a specific set of values. Traditionals' values can be described with keywords and phrases like 'family', 'church', 'community', 'traditional roles for men and women', 'pride in army and military service' etc. Traditionals, who made up roughly half of the US population in 1960s, are in rapid decline. The largest value group is Moderns, whose values can be described with following words and phrases: 'money', 'success', 'city', 'career', 'progress', 'having choices', 'trend' etc.

Cultural Creatives' main values are:

- 1) Authenticity, actions must be consistent with words and beliefs,
- 2) Engaged action and whole process learning; seeing the world as interwoven and connected,
- 3) Idealism and activism,
- 4) Globalism and ecology,
- 5) The importance of women.

Core Cultural Creatives also value altruism, self-actualization, and spirituality. (Ray and Anderson 2001 pp 8-14; Wikipedia 2013)

Ray and Anderson created a checklist to identify Cultural Creatives in Western society. The below characteristics were identified as qualities of a Cultural Creative. Agreement with 10 or more indicates respondent's status as a Cultural Creative. „You are likely to be a Cultural Creative if you...“

- love nature and are deeply concerned about its destruction
- are strongly aware of the problems of the whole planet (global warming, destruction of rain forests, overpopulation, lack of ecological sustainability, exploitation of people in poorer countries) and want to see more action on them, such as limiting economic growth
- would pay more taxes or pay more for consumer goods if you knew the money would go to clean up the environment and to stop global warming
- give a lot of importance to developing and maintaining your relationships

- give a lot of importance to helping other people and bringing out their unique gifts
- volunteer for one or more good causes
- care intensely about psychological and spiritual development
- see spirituality or religion as important in your life, but are also concerned about the role of the Religious Right in politics
- want more equality for women at work, and more women leaders in business and politics
- are concerned about violence and the abuse of women and children around the world
- want our politics and government spending to put more emphasis on children's education and well-being, on rebuilding our neighborhoods and communities, and on creating an ecologically sustainable future
- are unhappy with both the left and the right in politics and want to find a new way that is not in the mushy middle
- tend to be rather optimistic about our future and distrust the cynical and pessimistic view that is given by the media
- want to be involved in creating a new and better way of life in our country
- are concerned about what the big corporations are doing in the name of making more profits: downsizing, creating environmental problems, and exploiting poorer countries
- have your finances and spending under control and are not concerned about over-spending
- dislike all the emphasis in modern cultures on success and "making it", on getting and spending, on wealth and luxury goods
- like people and places that are exotic and foreign, and like experiencing and learning about other ways of life

„If you agree with 10 or more, you probably are one [Cultural Creative] – and a higher score increases the odds“. (Ray and Anderson 2001, *preface xiv*)

2.1.3.2 The biggest movement under the radar

Similarly to Cultural Creatives, Paul Hawken has identified in his book „Blessed Unrest. How The Largest Movement In The World Came Into Being, and Why No One Saw It Coming“ (Hawken 2007), although from another perspective, large cultural, but also active and action-based movement, that had not been described globally so far.

Hawken did something that had not been systemically done before. He estimated the number of NGOs active in the broad areas of caring for environment (protecting and restoring nature, sustainability-related NGOs), social justice and indigenous rights. He found out there are already over 1 million such NGOs globally, from 2-3 person or neighborhood organisations to international NGOs with millions of members. He also found out that the emergence of this movement has mostly happened under the radar of media and research, because it has no name and no single leader, but it does not make it not-existing.

Hawken: “The dawn of the twenty-first century has witnessed two remarkable developments: the appearance of systemic problems that are genuinely global in scope, and the growth of a worldwide movement that is determined to heal the wounds of the earth with passion, dedication, and collective wisdom. Across the planet, groups ranging from ad hoc neighborhood associations to well-funded international organizations are confronting issues like the destruction of the environment, the abuses of free-market fundamentalism, social injustice, and the loss of indigenous cultures. They share no orthodoxy and follow no single charismatic leader, yet they are organizing from the bottom up and coalescing into larger networks to achieve their goals—most urgently, ecological sustainability. While greatly unrecognized by politicians and the media, these groups are raising awareness in a grassroots way and creating a profound transformation of human society.” (Blessed Unrest, 2013)

It has to be mentioned, that although more than one million NGOs with unknown millions of members is probably still a minority in the overall population, it is one of the socially active groups (there are definitely others as well), whose members usually do something real, be it donating to a good cause or actively participating in processes.

2.1.3.3 Cradle-to-Cradle, Zero Waste and Let's Do It! movements

Some other important movements should be mentioned that are focusing very much on the design and production of things (and systems comprising of material objects and human interaction with them, like buildings) we use, how we get rid of them and how we clean up the garbage accumulating in our countries and oceans.

Cradle-to-Cradle

Cradle-to-Cradle – phrase coined by William McDonough and Michael Braungart – is a industrial design philosophy increasingly adopted by various engineers and put into practise. Also, it is a growing movement with several Cradle-to-Cradle organisations established in various countries.

Cradle-to-Cradle is approaching sustainability from a design perspective, demonstrates the need for a fundamental conceptual shift away from current industrial system designs, which generate toxic, one-way, “cradle-to-grave” material flows, and toward a “cradle-to-cradle” system. Cradle-to-Cradle is powered by renewable energy in which materials flow in safe, regenerative, closed-loop cycles. The Cradle-to-Cradle Framework (C2C) articulates this conceptual shift. Simply put, C2C designs industrial systems to be commercially productive, socially beneficial, and ecologically intelligent. (McDonough et al 2003).

Zero Waste movement

Zero Waste movement originates from the ideas of Paul Connett and others, the main concept being that it is entirely possible in only couple of years locally or 10-20 years globally, to phase out 'waste' as such – things and materials that are thrown 'away' to dumps, landfills and even incinerators, because there is no value in them for anyone.

„The Zero Waste strategy says no to incinerators, no to mega-landfills, no to the throwaway society and yes to a sustainable society. While it may sound like an idealistic goal, we can put it into a realistic time frame. We do not expect to reach zero waste next year, but we can anticipate

that some communities could be very close to Zero Waste by 2020. People will quibble about how close we can get to zero but the point is to make it our goal. Put another way, let me pose this question: bearing in mind the needs of future generations, how much waste do you think is acceptable? More than anything else Zero Waste is a new direction. We have to move from the *back end* of waste disposal to the *front end* of resource management and better industrial design. We need to design waste out of the system, and remove it from the dictionary!“ (Connett 2007)

Zero Waste proposes a 10-step strategy, how to re-design our packaging, waste collection and treatment systems to achieve near to zero waste quickly and there are several good examples already from around the world – municipalities in Southern Europe, San Francisco, Mumbai, Flanders, Buenos Aires etc (GAIA 2012).

Furthermore – in Zero Waste the key element to success is community involvement, meaning that an important part of the community has to be involved and even actively participating in reaching the Zero Waste goals. This means very practical knowledge about things they buy, packaging, impacts on environment, ecological, social and financial benefits of practically introducing Zero Waste in their community.

Let's Do It! and other cleanup movements

Let's Do It! (LDI) movement originates from 2008, when on May 3 more than 50 000 volunteers cleaned up more than 10 000 tons of illegal garbage in Estonia. There are two other and older movements/organisations of volunteer-based cleanups in the world – Clean Up the World (based in Australia) and Ocean Conservancy (US) – but Let's Do It! is noteworthy, because it is embrace of modern technology and rapid growth. LDI has grown in five years to include appr. 100 countries and ca 7 million people-days have participated in cleanups. (Let's Do It 2013)

LDI is also cooperating with Zero Waste movement and with other cleanup organisations. Things.info is closely cooperating with LDI and LDI community could be one group of early adopters of the product. Also, we see Zero Waste and Cradle-to-Cradle as important partners in testing and getting traction for Things.info.

2.1.3.4 Ecological footprint analysis and life cycle analysis

An increasingly used method for measuring concrete environmental impact of goods and services is ecological footprint analysis developed by Mathis Wackernagel and William Rees, outlined in their book *Our Ecological Footprint: Reducing Human Impact on the Earth*. (1996). The value of ecological footprint method is in its creation of one comparable measuring unit – global hectares (gha) – that allows to compare the environmental impact of nearly all kinds of goods and services. Although having its limits, ecological footprint analysis can definitely be better communicated to large audiences than 'life cycle analysis' method, that has similar goal of measuring environmental impact of goods and services and does it in a very detailed way, but has not so far come up with one or even couple of universally comparable indicators.

Both ecological footprint analysis and life cycle analysis need exact data about various production and recycling processes and thus will probably need the information collected in Things.info.

2.1.3.5 Growth of production and purchase of Fair Trade, organic, eco, certified etc goods. Accompanying need for increased traceability and transparency

Recent 10-15 years have seen significant growth in production and buying of goods with labels claiming to show special environmental and social considerations by producers during production and delivery of the product. There is a large variety of certification and labelling schemes designed for most of the categories of products sold directly to people – organic food, organic cotton, Fair Trade products, FSC and PEFC certified timber and paper products, passive houses, also green internet service providers, sustainable travel, Green Key hotels etc.

For example, In Britain, the market for Fair Trade products is growing rapidly. Sales in 2012 were £1.57bn, up 19% on the year before. (Smithers 2013) Fair Trade itself covers coffee, chocolate, tea, flowers, bananas and many other products. A poll conducted in 2011 amongst the FSC certificate holders (forest owners, companies producing timber and paper products) resulted that „More than half those polled say that they expect FSC certification to help them gain new

clients in the next 12 months. More than two-thirds of respondents plan to source more FSC material in order to meet growing demand.“ (FSC 2013)

At the same time the variety and amount of labels is becoming sort of jungle in which it is increasingly difficult for concrete person to orientate and make informed purchasing (or no-purchasing) decisions that will have maximum and real impact towards stated goals by the labelling organisations.

Our hypothesis goes, that the more consumer has possibility to get directly and comfortably information about the production process, environmental and social impact of a product, the less it is needed to only trust (or not to trust) various labels and even more – person can also get information about non-labelled products and compare them. Given the trend towards increasing transparency about production and delivery processes, also the trend of increasing traceability of products back in their production chains, Things.info is offering one platform for both the producer and potential buyer to add/get information, compare and communicate.

2.1.4 Evolutionary context. Gaia theory. Evolutionary trend towards cooperation. Emerging body of humanity

Development of Things.info has to be seen in wider, possibly evolutionary context that has been described by Elisabet Sahtouris in “Earthdance. Living Systems in Evolution.” (1999)

Gaia Theory

In 1974 James Lovelock and Lynn Margulis published „Atmospheric homeostasis by and for the biosphere: the gaia hypothesis“ (1974) where they first pose the idea with supporting evidence, that life on Earth has and is creating favorable conditions for its existence. „During the time, 3.2×10^9 years, that life has been present on Earth, the physical and chemical conditions of most of the planetary surface have never varied from those most favourable for life. The geological record reads that liquid water was always present and that the pH was never far from neutral. During this same period, however, the Earth's radiation environment underwent large changes. As the sun moved along the course set by the main sequence of stars its output will have

increased at least 30% and possibly 100%. It may also have fluctuated in brightness over periods of a few million years. At the same time hydrogen was escaping to space from the Earth and so causing progressive changes in the chemical environment. These in turn through atmospheric compositional changes could have affected the Earth's radiation balance. It may have been that these physical and chemical changes always by blind chance followed the path whose bounds are the conditions favouring the continued existence of life. This paper offers an alternative explanation that, early after life began it acquired control of the planetary environment and that this homeostasis by and for the biosphere has persisted ever since.“ (Lovelock and Margulis 1974, Abstract)

More specifically, Earth as a planet has features of a living organism – keeping its temperature in a certain range suitable for carbon-based life, very precisely balancing the proportion of gases in the atmosphere and doing it on a planetary time-scale (Lovelock 1979).

Human species (humanity) has clearly become a force influencing atmosphere, biosphere and even geology of the planet. Being part of the biosphere ourselves (individuals belonging to the human species) and becoming increasingly aware of our impact and the workings of planetary system, we as humanity can now consciously regulate our relationship with the planet to be favorable for the majority of life-forms and ecosystems on Earth. Going further from Gaia theory, it is now humanity and self-regulating planet together, who face the choice for our common future.

Holons and holarchy. Negotiated self-interest at all levels

Also, other important concept is self-negotiated interest at all levels (Sahtouris and Lovelock 2000, p 52), which is based on Arthur Koestler's concept of holons and holarchy (Koestler, 1978 as cited by Sahtouris and Lovelock 2000). Holons are wholes usually embedded in bigger wholes, like cells in a tissue or organs in organ system (Figure 2). Holons are dependent on the holarchy they are embedded in and the health of holarchy depends on the health of holons. For this to happen continuous negotiations have to take place that result in the health (autonomy) of the holon and holarchy at the same time.

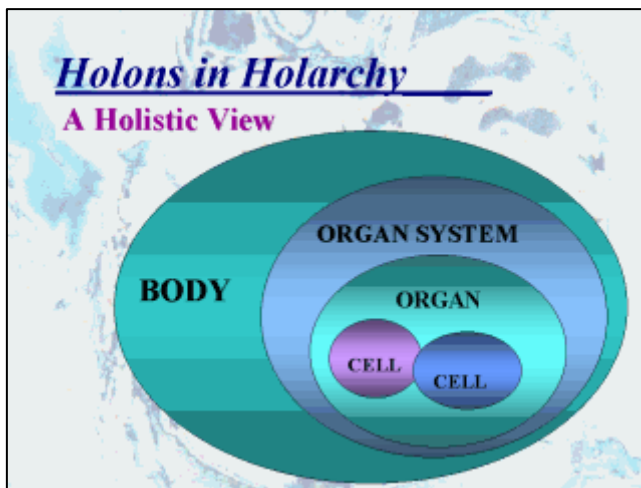


Figure 2. Holons in Holarchy (Sahtouris and Lovelock 2000, p 26; Lifeweb 2013).

If considering individual humans as holons in the holarchy of humanity or bigger holarchy of the planet, it is clear that there has to emerge somehow negotiated mutual agreement that guarantees health for the whole system (holarchy). That is why the possible new operating agreement between majority of world individual human beings on how to produce, use and recycle in harmony with Earth has to be by definition a co-creative environment (possibly internet- based) for billions of individuals. Things.info project is figuring out one possible way to make it happen in reality and here in thesis we are going deeper into some critical success factors.

Evolutionary trend towards cooperation. Body of humanity

Sahtouris shows cycles in evolution – unity – separation – competition – conflict – negotiations – cooperation – unity on higher level. She argues that we are growing out of the conflict phase as a species and entering the cooperation phase needed to balance our relationship with the planet and develop further. „Our worldwide economic system, our transportation and communications technology, our information revolution, have bound us into a body of humanity that is now being pushed for the sake of its survival to evolve from competition to cooperation among nations and with our environment. We see that the integrative evolutionary forces, which produced protists and multicelled creatures, are now pushing us to complete our own organisational task“ (Sahtouris 2000, p 388).

Again, we see that there seems to be an evolutionary pressure pushing us gently or less so towards more cooperation on a higher level of complexity. Basically, our (humanity's) task is to figure out, how 9-11 billion can live on healthy planet in sustainable abundance?

The role of Things.info and similar projects

We claim that planetary coordination and cooperation system for production, usage and recycling of planet's resources is needed sooner than later. There are some projects being developed with such ambition, like FuturICT (2013). Things.info hopes to contribute to the task by creating a platform that will attract considerable percentage of internet users via its usefulness, at the same time map with increasing exactitude the resource-related processes on the planet and thus makes it possible collectively coordinate and plan the production, use and recycling of Earth's resources.

2.2 Customer development model

For getting traction (active users and paying customers) without large sums of investment, Things.info needs to utilise lean startup methods. We have chosen Steve Blank's customer development model (Blank 2006) for identifying possible early adopters of Things.info, solving whose real problems we should focus on during the first phase of product development.

If we think that we will create world's best solution for the biggest pain that there is. If we have spent countless hours for building our solution and we have used all thinkable marketing tricks. But if there are no followers, no real users for that, our work has been useless. It is wise to start early on a discussion with our customers and find out, what they really need.

„The Customer Development model of a startup starts with a simple premise: learning and discovering who a company's initial customers will be, and what markets they are in, requires a separate and distinct process from product development.“ (Blank 2006, p 11)

Customer development focuses already in the early phase of startup to the real needs of people. Customer development is divided into four steps: customer discovery, customer validation,

customer creation and company building. In current research we are focusing only on the first step – customer discovery (Figure 3).

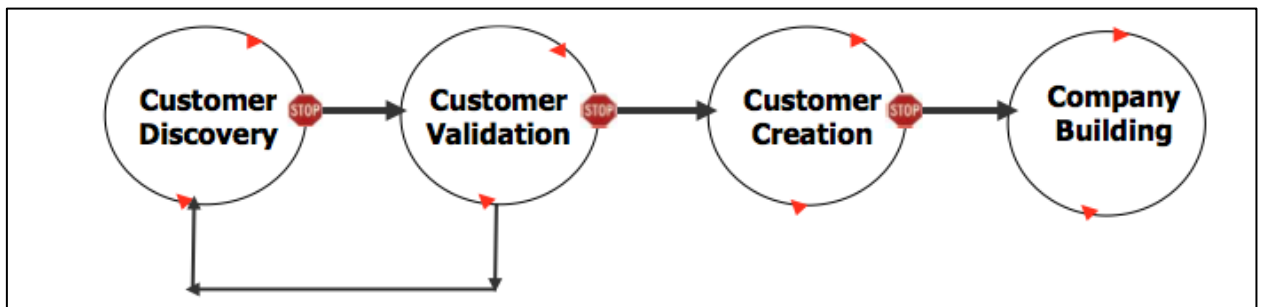


Figure 3. The Customer Development Model (Blank 2006 p 16)

„The goal of Customer Discovery is just what the name implies: finding out who the customers for your product are and whether the problem you believe you are solving is important to them. More formally, this step involves discovering whether the problem, product and customer hypotheses in your business plan are correct. /.../ The job of the Customer Development team is to see whether there are customers and a market for that vision.“ (Blank 2006, p 18)

Blank has also coined the term 'earlyvangelists' – people „who will not only spread the good news about unfinished and untested products but also buy them“. And he has described the five steps customer usually goes through until making the decision to buy a product:

- 1) The customer has a problem.
 - 2) The customer understands he or she has a problem.
 - 3) The customer is actively searching for a solution and has a timetable for finding it.
 - 4) The problem is painful enough the customer has cobbled together an interim solution.
 - 5) The customer has committed, or can quickly acquire, budget dollars to solve the problem
- (p 35)

„The purpose of Customer Discovery is to identify those key visionary customers, understand their needs, and verify your product solves a problem they are willing to pay to have solved - or not. Meanwhile, you start development based on your initial vision, using your visionary customers to test whether that vision has a market. And you adjust your vision according to what

you find out.“ (Blank 2006, p 36)

Having chosen customer development model for identifying possible early adopters, we have to choose next the appropriate method for doing customer discovery.

2.3 Prototyping and usability testing

In recent years, the user expectations of a software have risen to a level where usability is as important quality attribute as the functionality of the software. Rubin and Chisnell (2008, p 4) define the usability accordingly: (...) what makes something usable is the *absence of frustration* in using it. When a product or service is truly usable, *the user can do what he or she wants to do the way he or she expects to be able to do it, without hindrance, hesitation, or questions.*“ Anderson (2011) widens the scope of good software (Figure 4) and adds the *desire* to use a product or service to it. „The danger is in confusing „ease of use“ with actually *desiring* to use something. These are two entirely different things. Both are essential, but simply making something more usable will not guarantee any more clicks or conversions,“ states Anderson (2011).

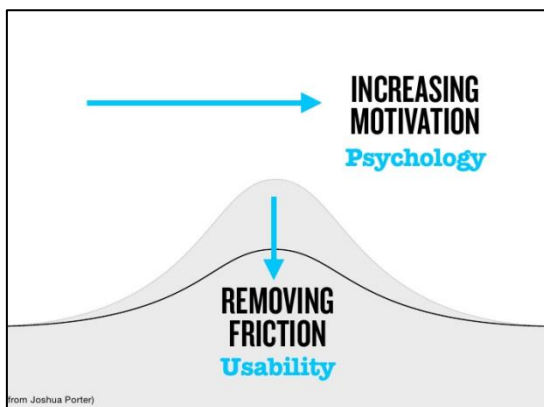


Figure 4. The difference between usability and psychology in creating good software (Joshua Porter via Anderson (2011, p 10))

However, while acknowledging the importance of psychology in increasing the users' motivation to use Things.info, it is not in the scope of current research. The focus will stay on usability issues that are dealt with a lean user experience (lean UX) spirit.

The software development process of Things.info is based on The Lean Startup and The Lean UX (lean user experience) methodologies, advocated by Ries (2011) and Gothelf (2013) respectfully.

According to McCoy (2011): „Traditional User Experience (UX) design techniques were developed in waterfall environments. Designers conducted research, developed models, derived frameworks, and specified detail with the understanding that they have to get it "right", because once the product enters development [phase], changes are difficult and costly.“

The Lean UX leverages the modern lean and agile development practices. It focuses design and development effort on high value users, features, activities, and experiences, and in doing so, reduces the wasted effort and cost of spending time on issues that do not really matter (or do not matter right now). (McCoy 2011)

Gothelf (2013) concludes that the Lean Startup method relies on *experimentation, rapid iteration of ideas and evolutionary processes*. It builds on established ideas from many disciplines, from lean manufacturing to design thinking (Ries via Gothelf 2013). The lean way to build a new product is to follow the feedback loop (Ries 2011): *build – measure - learn*.

Figure below (Figure 5) describes three cycles (think-make-check) of Lean UX. Several of these techniques (namely ideation, prototypes, usability testing) have been used in the current usability studies of Things.info, described in detail in the following chapters.

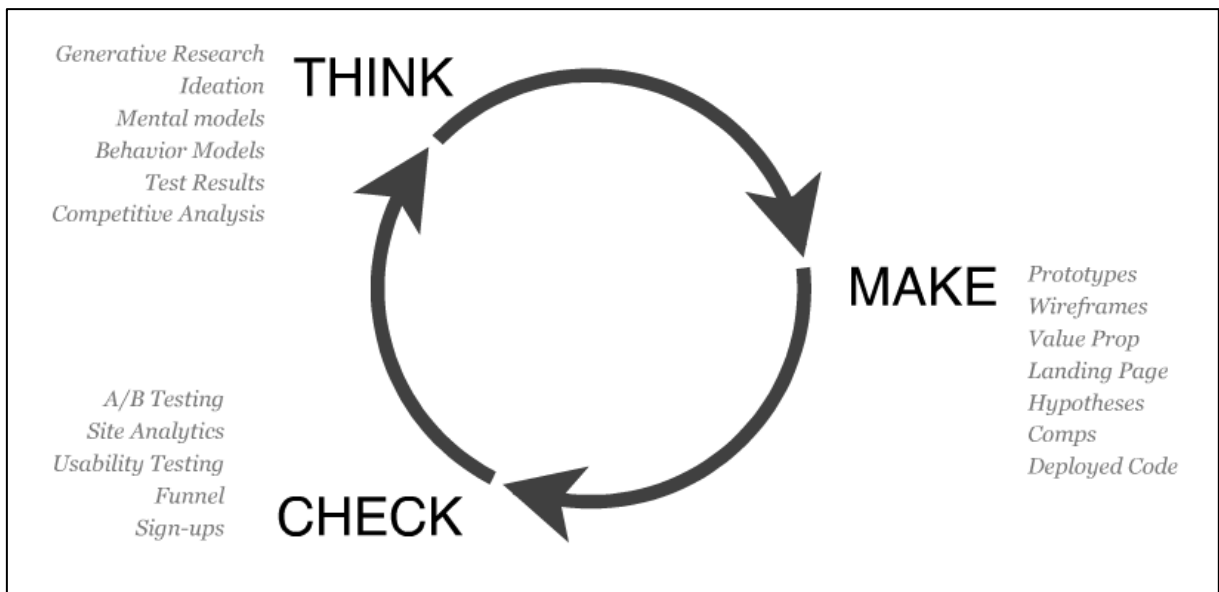


Figure 5. The Lean UX Cycles (Source: McCoy, Fraser 2011)

2.3.1 The Lean UX

The Lean UX methodology is based on three pillars: design thinking, agile software development, and the Lean Startup methodology. In the following chapters these principles are introduced in detail.

2.3.1.1 Design thinking

Gothelf (2013) explains design thinking via Tim Brown's words: „Innovation powered by ... direct observation of what people want and need in their lives and what they like or dislike about the way particular products are made, packaged, marketed, sold, and supported... [It is] a discipline that uses the designer's sensibility and methods to match people's needs with what is technologically feasible and what a viable business strategy can convert into customer value and market opportunity.“ In Lean UX, the value of design thinking lies in a fact that teams are encouraged to collaborate across roles - nondesigners are part of the design process because there are no gated-handoff processes (known as waterfall process) between the analysis, design, coding etc. (Gothelf 2013)

2.3.1.2 Agile software development

There are four core principles in the Manifesto for Agile Software Development (Beck, K., Beedle, M., van Bennekum, A. *et al* 2001):

- 1) *Individuals and interaction* over processes and tools
- 2) *Working software* over comprehensive documentation
- 3) *Customer collaboration* over contract negotiation
- 4) *Responding to change* over following a plan

These are all included in the Lean UX (Gothelf 2013).

2.3.1.3 The Lean Startup

The Lean Startup uses a feedback loop called „build-measure-learn“, according to Gothelf (2013). „Lean Startup initially advocates the creation of rapid prototypes designed to test market assumptions and uses customer feedback to evolve them much faster than more traditional software engineering practices... Lean Startup processes reduce waste by increasing the frequency of contact with real customers, therefore testing and avoiding incorrect market assumptions as early as possible.“ (Ries, 2011 cited in Gothelf, 2013)

To conclude the differences of Lean UX, Gothelf (2013) names three underlying principles:

- 1) removes waste from UX design process,
- 2) brings nondesigners into the design process,
- 3) shifts the mindset to adopt a model based experimental approach.

2.3.2 Personas

Cooper *et al* (2007, p 77) states that „the best way to successfully accommodate a variety of users is to design for *specific types of individuals with specific needs*. Figure 6 is a simplified example of how personas are useful. If you try to design an automobile that pleases every possible driver, you end up with a car with every possible feature, but that pleases nobody.

Software today is too often designed to please too many users, resulting in low user satisfaction. Figure 7 provides an alternative approach.“

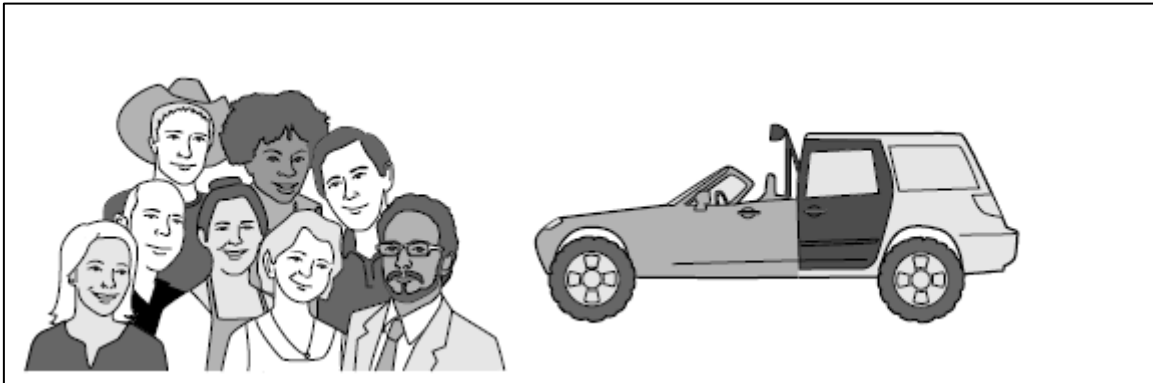


Figure 6. A simplified example of how personas are useful (Source: Cooper, Reimann, Cronin 2007, p 77)

Cooper *et al* (2007, p 78) explains that „by designing different cars for different people with different specific goals, we are able to create designs that other people with similar needs to our target drivers also find satisfying. The same holds true for the design of digital products and software.“

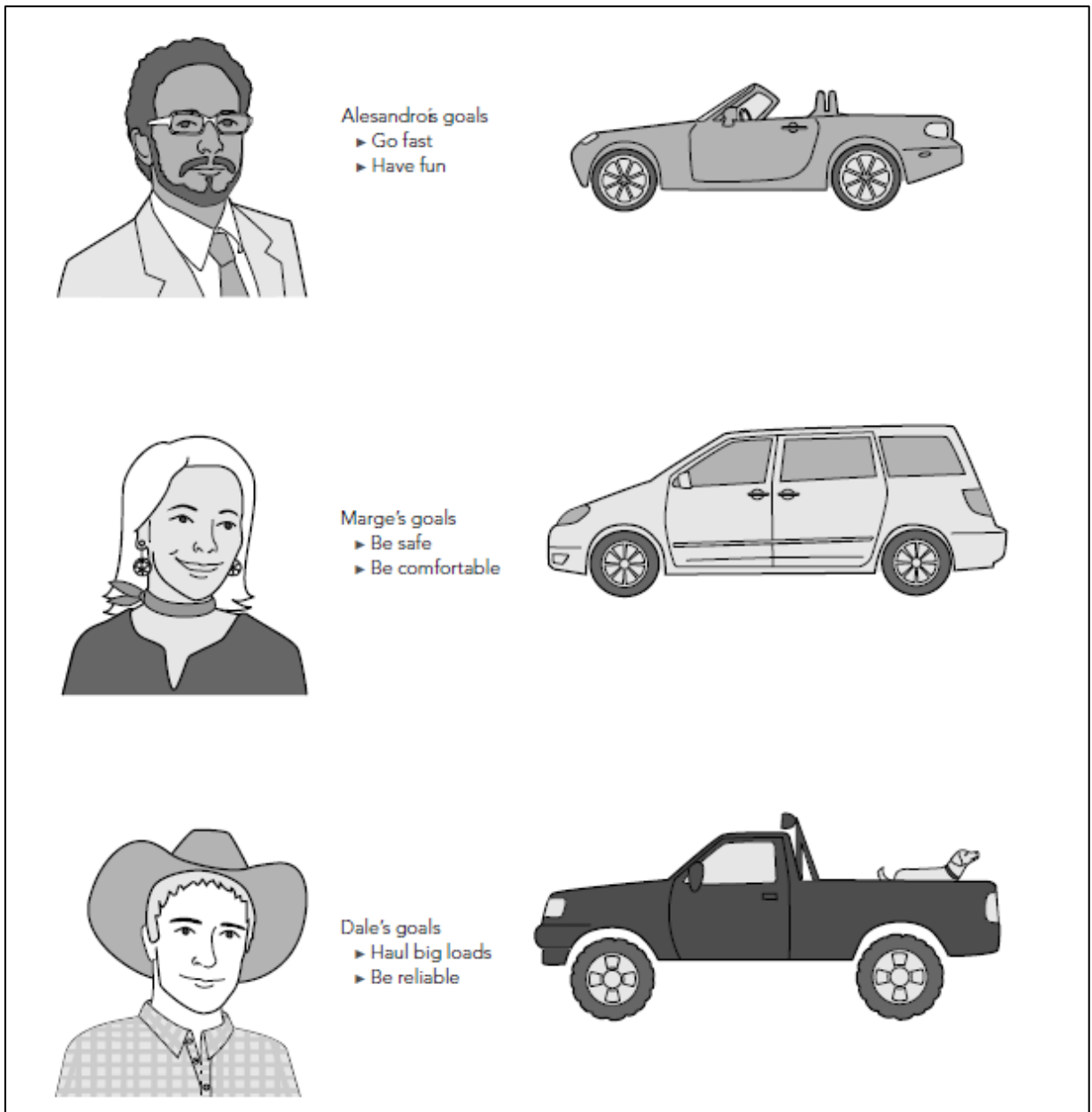


Figure 7. A simplified example on how personas are useful (Source: Cooper, Reimann, Cronin 2007, p 78).

2.3.3 Usability Testing

Rubin & Chisnell (2008, p 20) describe the less formal approach of usability testing „as iterative cycle of tests intended to expose usability deficiencies and gradually shape or mold the product in question.“ The authors' book „*Handbook of Usability Testing, Second Edition: How to Plan,*

Design, and Conduct Effective Tests“ is emphasizing on this iterative approach, so is the current research.

According to Dumas & Redish (1999, p 12), „usability testing is a systematic way of observing actual users trying out a product and collecting information about specific ways in which the product is easy or difficult for them“. They bring out three main principles of usability testing:

- 1) Usability testing is best used to *diagnose problems*, not to verify that all is fine.
- 2) Usability testing is best used *early and often*, not once at the end when it is too late to make changes.
- 3) Usability testing is best used as part of a *process that focuses on usability throughout the design and development*, not at the sole time when users are considered.

In the following table (Figure 8), Dumas & Redish (1999) compare what it costs to carry out usability tests and what it costs not to carry out usability tests.

\$	\$\$\$\$
<p>Build usability into products from the beginning.</p> <p>Test and fix iteratively before release.</p>	<p>Spend money later:</p> <ul style="list-style-type: none"> • on fixing problems • on support calls • on training <p>Get poor reviews.</p> <p>Deal with unhappy and unproductive customers or employees.</p> <p>Lose customers or employees.</p>

Figure 8. Focusing on usability may cost money, but not focusing on usability is likely to cost a lot more (Dumas & Redish 1999, p 18)

Dumas & Redish (1999, p 22) summarize the five characteristics of every usability test:

- 1) The primary goal is to improve the usability of a product.
- 2) The participants represent real users.
- 3) The participants do real tasks.
- 4) The observer observes and records what participants do and say.
- 5) The observer analyzes the data, diagnoses the real problems, and recommends the changes to fix those problems.

All of these five characteristics have been included into the usability tests of Things.info and are presented in detail in the following chapters.

3 METHODS AND PROCESSES USED IN THE RESEARCH

3.1 Method for customer discovery

It is obvious that for customer discovery input from real people is needed, but there are several methods for getting it. Two main options are surveys and interviews, which respectively have different pre-conditions to give meaningful results.

„Surveys can be very useful, particularly for reaching large numbers of people easily. Unfortunately, surveys are somewhat limiting: respondents only answer questions that are asked and open-ended questions that invite long, written responses are likely too largely unanswered. As a result, surveys often end up being broad but not deep. An alternative approach is to go deep but not broad. Direct conversations with fewer participants can provide perspectives and useful data that surveys might miss. A direct discussion with concerned participants usually takes one of two forms: interviews with individuals and focus groups involving multiple users at one time. Interviews and focus groups have different strengths and challenges.“ (Lazar et al, 2010)

We need to go deep, because we need to identify real problems of real people, not average problems of average person, which would more be the result of a survey.

„The ability to “go deep” is perhaps the strongest arguments in favor of interviewing. By asking questions that explore a wide range of concerns about a problem and giving interviewees the freedom to provide detailed response, researchers can use interviews to gather data that would otherwise be very hard to capture. Given a chance to talk, and questions that encourage reflection and consideration, interviewees may go on at great length, generating ideas and sharing insights that would have been lost in surveys.“ (Lazar et al 2010)

3.1.1 Method for interviews

As there are several methods for structuring and conducting interviews, first we have to choose between fully structured, semi-structured or unstructured form of an interview. The difference between these is presented by Lazar et al:

„In a fully structured interview we must follow the script. If the interviewee makes some comments that you would like to follow up or if you think of some unanticipated question that you would like to ask, you are out of luck. Requests for clarification or additional question are inappropriate, as they interfere with the primary motivation for using a fully structured interview: ensuring that each interviewee is asked the same question.

If we want some room to ask for clarification, add questions, or follow interviewee comments wherever they may take us, a semi-structured interview may be more appropriate. These discussions generally start with a set of questions, which may be similar (if not identical) to questions that might be used in a fully structured interview. However, in a semi-structured interview, we can feel free to let the conversation go where it may. If interviewee mentions something of interest, we can say "tell me more about that..." After the interviewee clarifies, we might inquire "how does this relate to..." or perhaps ask a question from further down on our list. Our goal is to dig through the interviewee's comments, opportunistically looking for opportunities to gain additional insight and understanding.

Semi-structured and unstructured interviews open up the possibility of exploring topics in a depth and breadth that may be harder to achieve with fully structured interviews. As interviewee comments lead you to ask questions that you had not thought of and as they discuss issues that you need overlooked, your understanding of their concerns and perspectives will broaden in directions that you might have missed with a fully structured interview.

Fully structured interviews are most appropriate when you hope to compare responses across individuals. All interviewees are asked the same questions, so comparison should be straightforward. These comparisons are often most useful for evaluations aimed at understanding user responses to designs or systems.“

We chose the semi-structured interview form as it provides both some quantitative data (answers to yes/no questions) and qualitative data in the form of free descriptions of customers' problems, needs and proposals.

3.1.2 Creating hypotheses as basis for interview questions

Using the guidance of Blank 2006, we have identified the following hypotheses about Things.info that serve as a basis for constructing interview questions.

Product hypotheses:

- 1) You can track, where a certain product is produced (see the production chain of that product),
- 2) You can see and learn about the components of the product,
- 3) You can learn how to recycle or discard the product if you do not need it any more,
- 4) You can lend out a product,
- 5) If you do not need something, you can donate it to someone who is looking for that.

Customer hypotheses. Our customer:

- 1) Is caring for environment,
- 2) Uses computer and/or mobile phone and has internet access,
- 3) Likes to share (things),
- 4) Is curious about the ingredients and origin of products,
- 5) Can find information about the product in one web environment, instead of searching in different pages,
- 6) Have problems in finding concrete information about the product in the web.

Market type hypotheses:

- 1) We are creating a new market,
- 2) Customer needs simplicity and convenience,
- 3) Customers will come from existing social network markets.

Competitive hypotheses:

- 1) We are better than our competitors, because in our webpage you can see the history of all things,
- 2) We are better than our competitors, because we give ideas how to re-use things,
- 3) We are better than our competitors, because we make eco-friendly suggestions, how to recycle or dispose things,
- 4) We are better than competitors because in our webpage you can take a look at both historical and modern production of man-made objects.

We have not added channel and pricing and demand creation hypotheses, because it is too early. After the interviews we know more what our customer is thinking, so we have information to create these hypotheses.

3.1.3 Constructing questions for interviews

First we had to identify appropriate types of questions to get from the respondents the information we need and then phrase the questions themselves.

3.1.3.1 Choosing appropriate questions and structuring the interview

There are several types of questions used during interviews that serve different purposes. „Questions may be of a number of different types. Warm-up questions seek to establish trust and rapport with the respondent. Demographic questions elicit factual data about the respondent (age, sex, occupation). Core questions address key themes of the research. Prompts and probes seek to elicit additional information about a core question (for example, can you say a little more about that?).“ (David et al 2004, p 88)

Instead of warm-up we used the introduction for establishing the trust, but otherwise structured questions into demographic and core questions plus used one prompt.

Also we used Maurya (2010) as a basis to structure our interview (Figure 9).

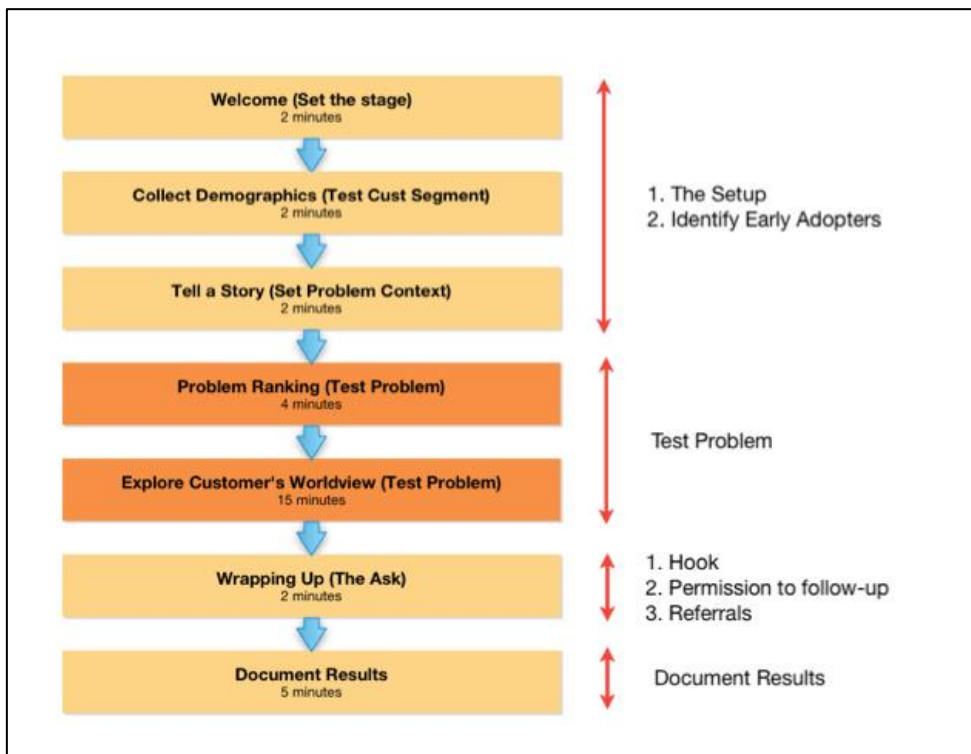


Figure 9. The Problem Interview Script Outline (Maurya 2010, p 114)

First we have introduction, then collect the demographics we need. Instead of telling a story, we start with questions that will lead to the core questions. By wrapping up we have a question that hooks the interviewee (prompt). At the end we thank the interviewee and make a brief summary.

3.1.3.2 Interview script

Following is the interview script outline used with all the interviewees. The interview has five different stages, described in detail below.

3.1.3.2.1 Introduction

"Hi, my name is Piret-Klea Velleste. I am doing master thesis in Tartu University. Our project is called Things.info. I would like to conduct an interview with you about your relationship with things. It will be used only for my schoolwork. The interview is anonymous and I will record it for the better result. It will take approximately 10 minutes. Do you agree to answer to my questions?"

3.1.3.2.2 Demographic questions:

- 1) What is your gender?
- 2) What age group you belong into: 18-24, 25-34, 35-44, 45-54, 55-64, 64+
- 3) What is your country of residence?
- 4) Which genre of books do you like to read:
 - a. Romances
 - b. Mysteries
 - c. Science fiction
 - d. Fantasy
 - e. Spy thrillers
 - f. Horror
 - g. Historical fiction
 - h. other...

3.1.3.2.3 Core questions:

- 1) How many books have you lent or borrowed at the moment?
- 2) How do you keep track of the books you have lent out or borrowed?
- 3) If there is a internet-based library application where you can see the books you have lent out? Will you use it and how often?
- 4) If you want to read a certain book, how do you start your search?
- 5) What do you do with the books you do not need any more?

- 6) Have you ever repaired a book, used it for other purposes than reading, or thrown away a book?
- 7) Do you shop in second hand shops (vintage shops, websites) or rented some working tool?
- 8) What do you want to know about their previous owners?
- 9) On what basis do you choose to whom to donate things you do not need any more?
- 10) What are the products that you want to know more about how to dispose them?
- 11) What is the reasonable range (km) for you to pick up a free sofa / washing machine / bag of toddlers' clothes?
- 12) Do you care about things' origins? (If the product is produced environmentally-friendly way or where it is produced or has there been any child labor used in production?)
- 13) Have you sometimes not bought a product if you are aware that the product is not produced ethically (child labor used etc)?
- 14) What are the questions you usually try to find answers to from the Internet?
- 15) What was the last web-page where you created an account?

3.1.3.2.4 Prompt question

- 16) Did any new questions arise during our conversation that you have not thought before?

3.1.3.2.5 Summary and thanking the interviewee

Wrap up of the interview.

3.1.3.3 Selection of interviewees. Locations of interviews

Most of the interviews were held in reuse center Uuskasutuskeskus in Tallinn. We chose to start there, because Uuskasutuskeskus values the reuse of things instead of selling new ones. Some of their customers are also ecologically aware, thus their opinion is valuable for us.

After that we had some interviews with people in co-working space Hooandja, where people from different specialties work. For having international input, we had some Skype interviews with persons in United States, Portugal and Sweden.

3.1.3.4 Number of interviewees

There is certainly an effective limit to the number of interviews, when you have most of the information you need and additional interviews do not add much valuable information any more. According to Maurya (2010) „You are done when you have interviewed at least 10 people and:

- 1) can identify the demographics of an early adopter,
- 2) have a must-have problem and,
- 3) can describe how customers solve this problem today.“

We reached 12 interviews, when the answers started to repeat.

3.1.3.5 Language. Recording. Transcriptions

Interviews were conducted in Estonian and in English. All the interviews were digitally recorded with the consent from interviewees. All the interviews were transcribed. Transcriptions in Estonian were translated into English and are available in appendix 1.

3.1.3.6 Method of analysis

As a method of analysis we used the approach of coding as described by Lazar et al (2010, p 194): „Coding is perhaps the single most significant act in the process of qualitative analysis. Coding involves the identification of common themes (words, phrases, meanings) within the data being analyzed. Ever time the same theme is mentioned it is tagged. Then all instances were the tag (code) has been made can be compared.“

Recurring answers were coded and re-worded into a short phrase describing the essence of recurring theme in answers. Coded phrases were listed and sorted in decreasing number of

occurrence of the code (recurring theme in answers). Number of coded response to a question was the basis for drawing conclusions from the pool of all answers.

3.2 Prototyping and usability testing

Lean UX techniques, as suggested by Ries (2011) in his book *The Lean Startup: How Constant Innovation Creates Radically Successful Businesses* and described by Gothelf (2013) in his book *Lean UX: Applying Lean Principles to Improve User Experience*, were used for creating a proto-persona that is the basis for creating interactive prototype and carrying out usability tests.

3.2.1 Creating the interactive prototype

Creating the interactive prototype started by creating the proto-persona that represented the best guess of the product's (Things.info) end user in the eyes of prototype creators (Figure 10). Gothelf (2013) describes this persona format as following: „The top-left quadrant holds a rough sketch of the persona and his/her name and role. The top-right box holds basic demographic information. /.../ The bottom-left quadrant contains the user's needs and frustration with the current product or situation, the specific pain points your product is trying to solve, and/or the opportunity you are trying to address. The bottom-right quadrant contains potential solutions for those needs. You will use the bottom-right quadrant to capture feature and solution ideas.“

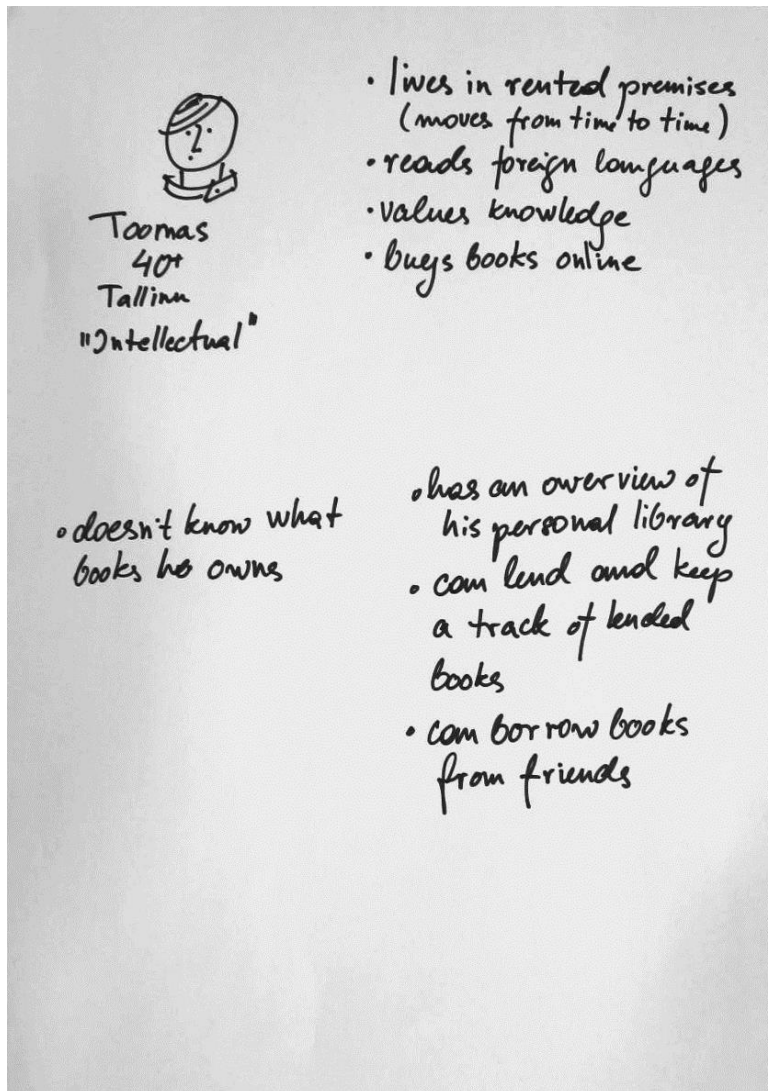


Figure 10. Description of proto-persona that was used for prototyping.

Prototyping software Axure was used for creating interactive prototype because of personal preference of the prototyping specialist Anu Kõnnusaar.

3.2.2 Usability Testing

The following paragraphs describe the preparation work that was carried out before the usability testing took place.

3.2.2.1 The usability test recording tools

As testing equipment, an average laptop computer, a video-recording hardware and usability testing software Morae were used. The users voices, emotions and screen activity (the mouse movements) were all recorded during the usability testing.

3.2.2.2 Thinking out loud protocol

As a testing method, thinking-out-loud protocol was used - all the users were instructed to speak about their thoughts – what were they searching for in order to complete the given tasks, were the buttons in the logical place for them or not, if they found themselves in a hopeless situation then they were asked to say what they would do in the reality, would they continue to use the system, call on the contact number or close the program.

3.2.2.3 Prototype and formulation of the test-question/task

A collaborative decision among the authors of the current research was taken to focus on one test-question/task – to register a book „Indiaani tarkuste raamat“ by Kent Nerburn into the Things.info system by using the created prototype.

In the minds of prototype creators (a professional designer Kerti Alev and prototyping specialist Anu Kõnnusaar), it would take users up to four-five steps to register a new book into the system. These steps are described in the following sections with references to the screenshots of prototype.

3.2.2.3.1 Step 1

Step 1 - sign in to the system from the main page (Figure 11).

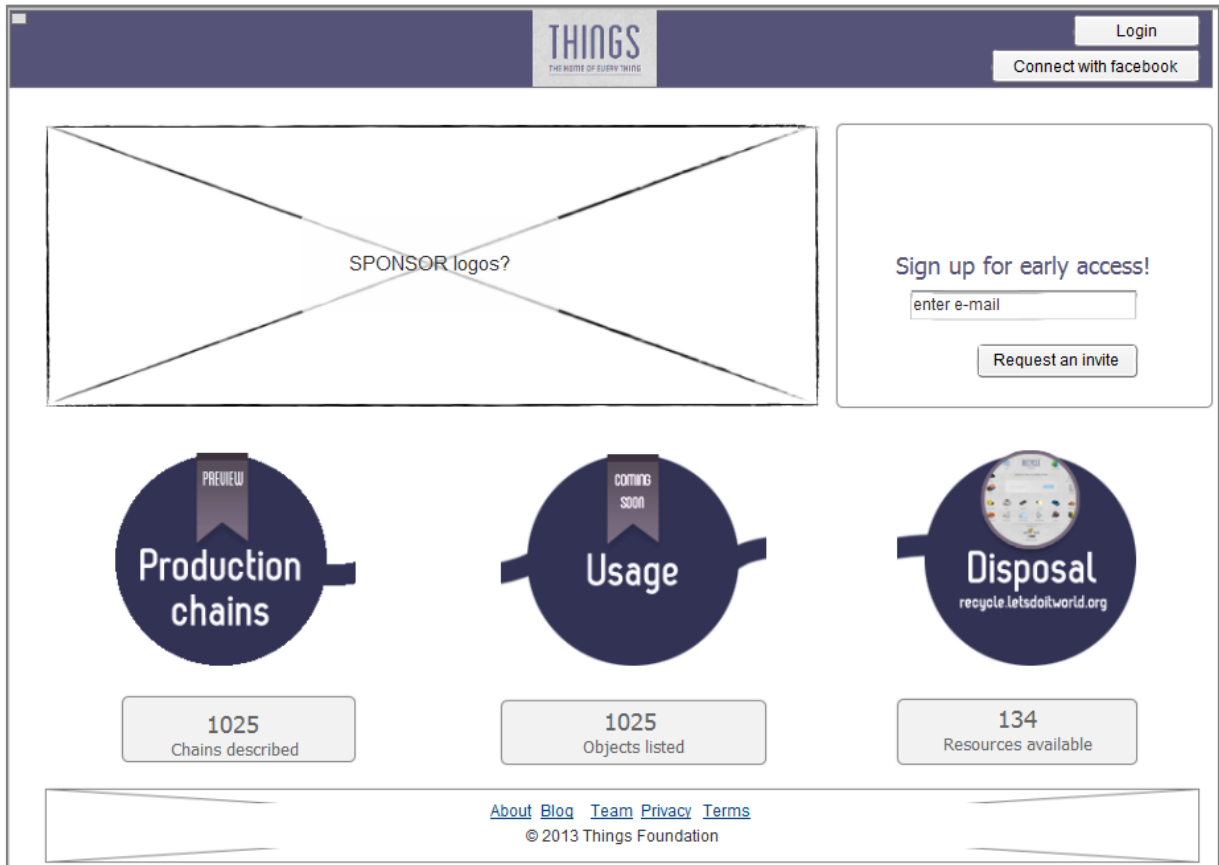


Figure 11. The main page of the Things.info system.

3.2.2.3.2 Step 2

Step 2 - to sign in on the login view (Figure 12).

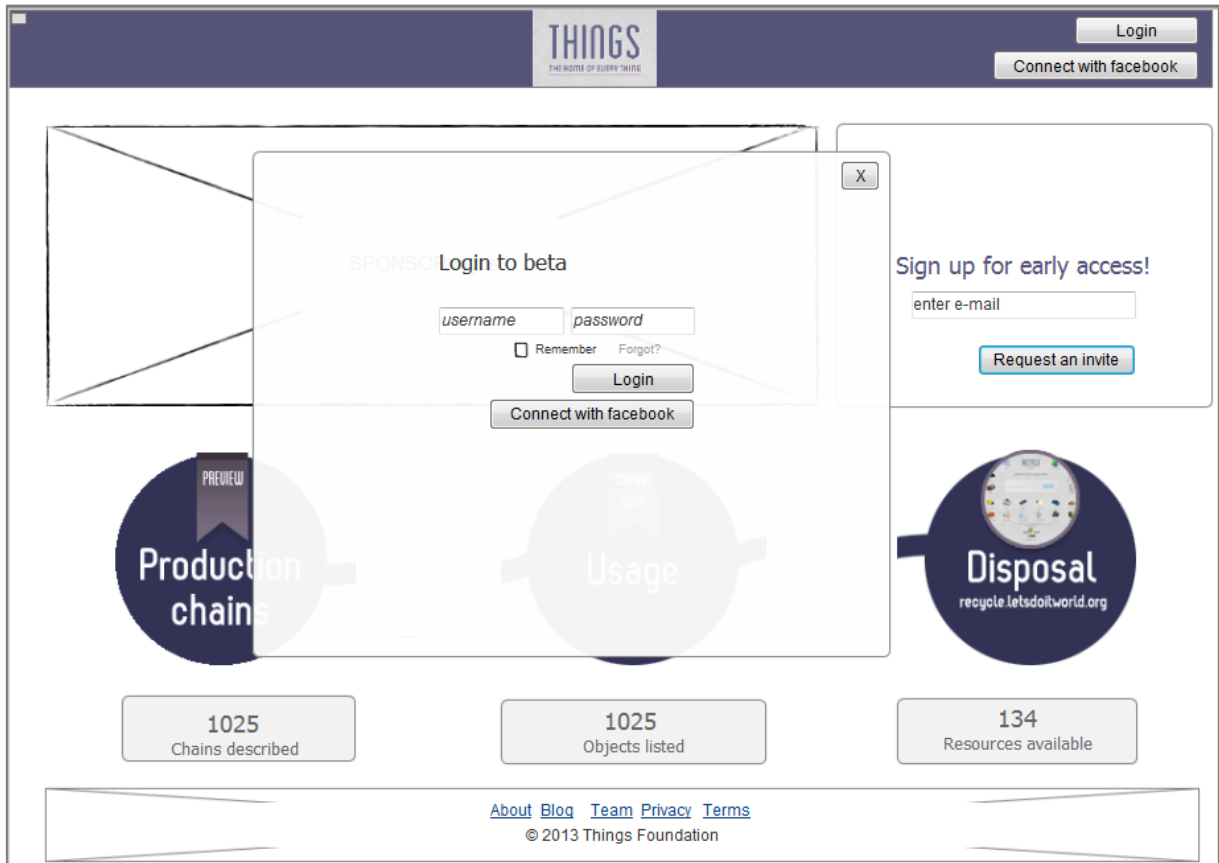


Figure 12. The sign in page of the Things.info system.

3.2.2.3.3 Step 3

Step 3 - to locate the „Books category“ on the „All categories“ page (Figure 13).

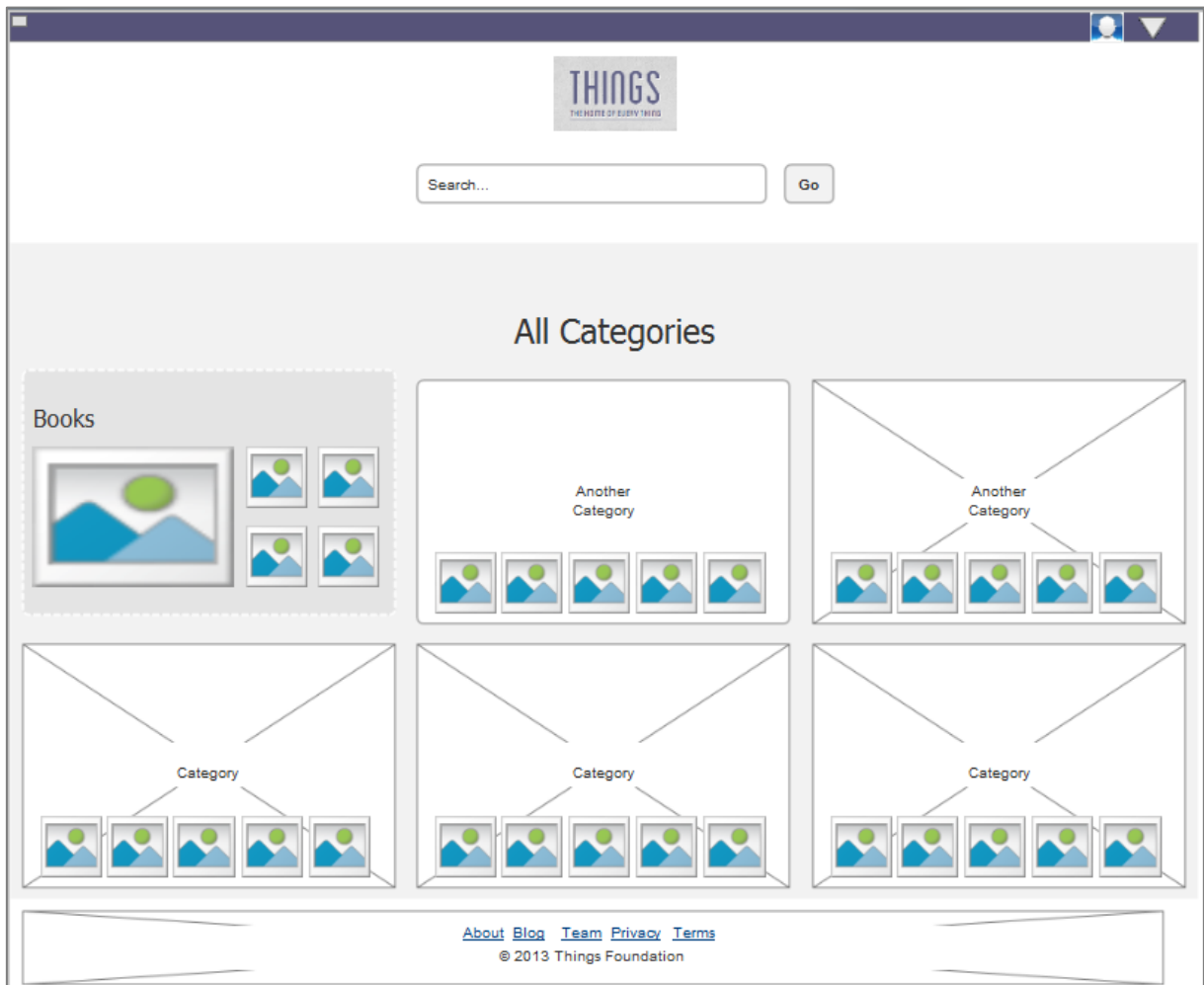


Figure 13. The „All Categories“ page of the Things.info system.

3.2.2.3.4 Step 4

Step 4 - to notice the „add a new book“ section on the tab „All Books“, to fill in the form, and to save/register the newly added information to the system (Figure 14).

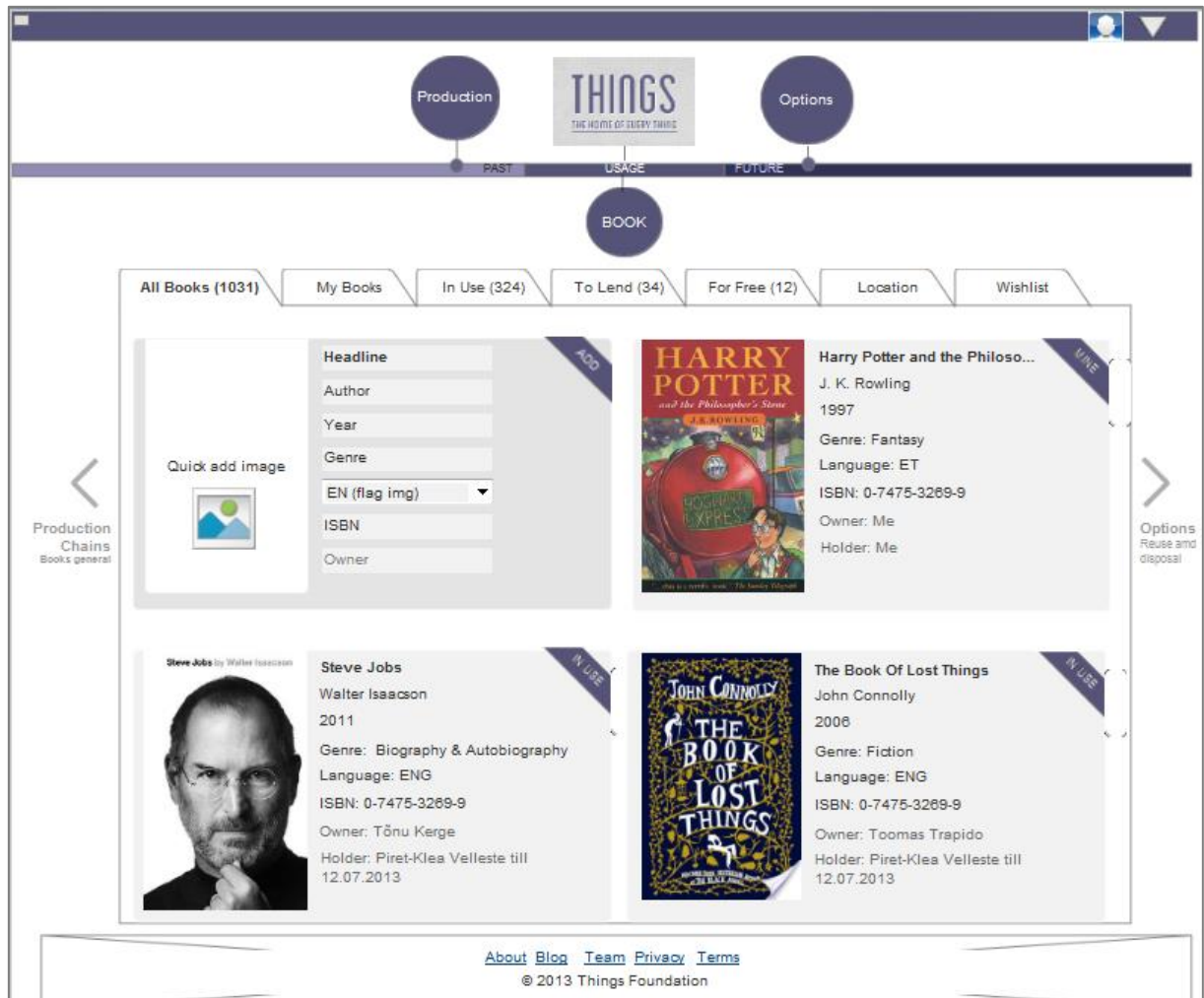


Figure 14. The tab „All Books“ on the „Category Books“ page of the Things.info system.

3.2.2.3.5 Step 5

Step 5 - to notice the „add a new book“ section on the tab „My Books“, to fill in the form, and to save/register the newly added information to the system (Figure 15).

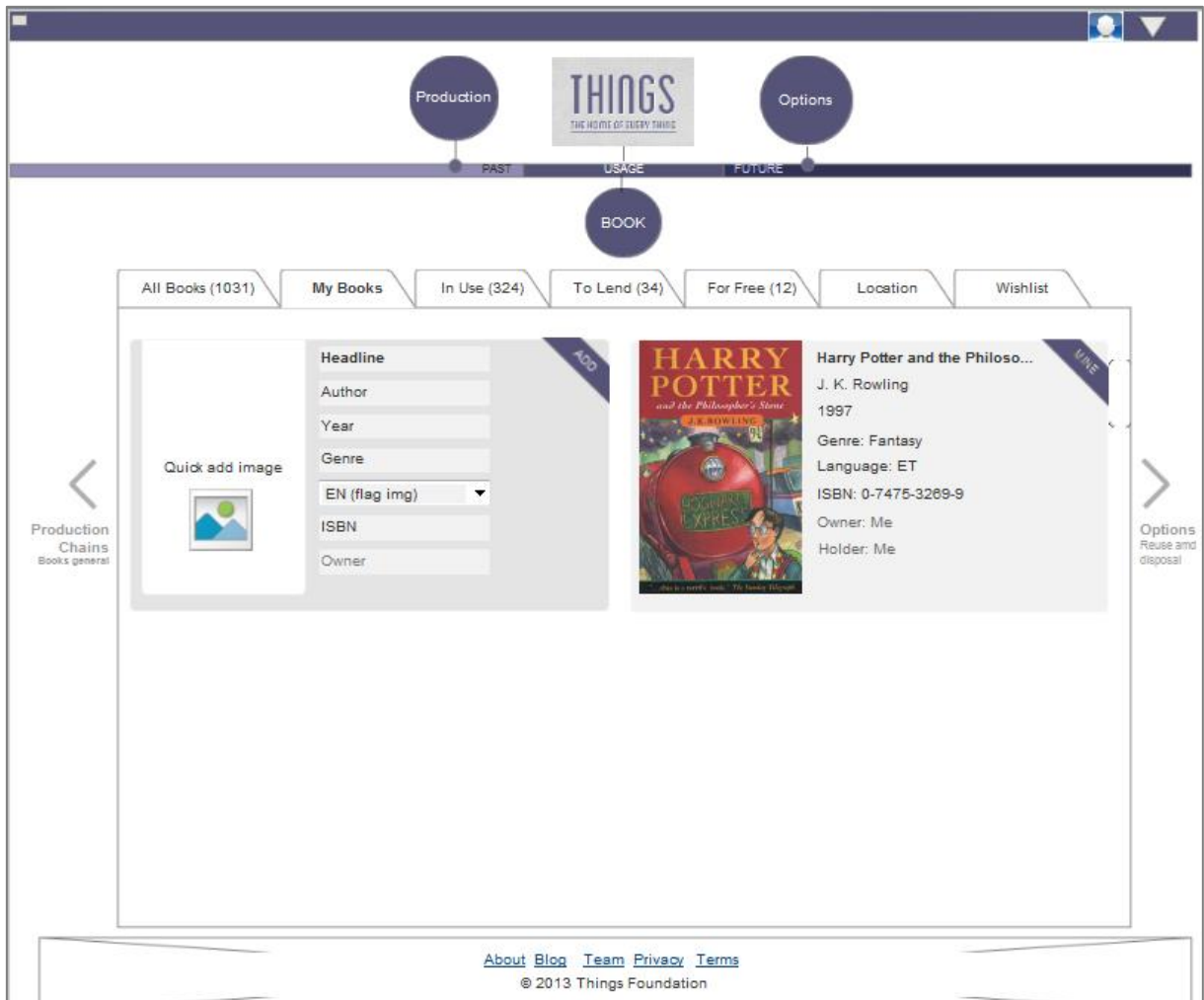


Figure 15. The tab „My Books“ on the „Category Books“ page of the Things.info system.

4 RESULTS

Experimental research was conducted to identify the early adopters through customer discovery process and to prototype and user test the user interface for the category of books in Things.info. Following are the results of these two research activities.

4.1 Customer development

Results of customer discovery process are divided into summary of the interviews conducted and analysis of the information obtained from the interviews.

4.1.1 Results of interviews

Altogether 12 interviews were conducted in reuse centre Uuskasutuskeskus, co-working space Hooandja and for international input we conducted three interviews via Skype.

Answers to demographic questions

Following tables (Table 1, Table 2, Table 3, Table 4) summarize the demographic data of interviewees.

Gender	Male	Female
Number of interviews	4	8

Table 1. The demographic data of interviewees.

Age groups	18-24	25-34	35-44	45-54	55-64	64+
Number of interviewees	0	5	5	0	1	0

Table 2. The age groups of interviewees.

Countries	Estonia	Sweden	Portugal	United States
Number of interviews	9	1	1	1

Table 3. The countries that interviewees represented.

Genres	Romance	Mystery	Science fiction	Fantasy	Spy thriller	Horror	Historical fiction	Other...
Number of interviewees	4	1	5	4	3	0	4	9

Table 4. The book genres that interviewees preferred.

Others genres or types of books named were: travel (2), biography, gardening+home, professional, dance, fashion, children books, documentary, thin, poems, science blogs, psychology related literature, self improvement, judaica, theological, spiritual, meditation, health and diet, art, cookbooks, creative do-it-yourself plus concretely one book "Musta pori näkku".

Answers to core questions

Q1: How many books have you lent or borrowed at the moment?

Number of books	Number of responses
0	4
1	2

Number of books	Number of responses
3	1
5	1
8	1
Did not give an answer	3

Q2: How do you keep track of the books you have lent out or borrowed?

Coded response	Number of responses
Do not keep track of them and or rely on memory	8
Count on library reminders	3
I do not (much) lend them	2
I give books away	2
There have been some losses	1

Q3: If there is a internet-based library application where you can see the books you have lent out? Will you use it and how often?

Coded response	Number of responses
No, do not think I will use it	5
Maybe / I do not know / try to use it	3
I think yes	2
I read them in my phone or e-reader	1
Maybe I would borrow more because there is a list I can follow	1

Q4: If you want to read a certain book, how do you start your search?

Coded response	Number of responses
----------------	---------------------

Coded response	Number of responses
From library	5
I ask from friends / friends suggest	3
I rarely buy books (if there is no other options)	3
I ask from my wife. She gives me.	1
I think my first trend here is to find it in the original language	1
I download it	2
I do not use e-books	1
It depends on the book genre	1
Amazon (bookshop's website)	3
Apple (iTunes)	1
Apollo (bookshop's website)	1
www.kriso.ee (bookshop's website)	1
www.bookdepository.com (bookshop's website)	1

Q5: What do you do with the books you do not need any more?

Coded response	Number of responses
Nothing, they stay home in the bookcase	4
I give them away	4
I would bring them to (community) libraries / reuse center	2
I would bring them to reuse center Uuskasutuskeskus	1
I rarely have books that I do not need	2

Q6: Have you ever repaired a book, used it for other purposes than reading, or thrown away a book?

Coded response	Number of responses
No	5
Only repairing	2
I have binded old books	1
For me, books are no different from other goods in terms of recycling	1
If there is a bookshelf in reuse centre then I will probably donate them	1
Yes, I give books into circulation	1
I have thought of making a iPad or Kindle cover, so more for decorative purpose	1

Q7: Do you shop in second-hand shops (vintage shops, websites) or rented some working tool?

Coded response	Number of responses
Yes	1
Yes, I organise with my friends a market where we exchange clothes	1
Yes, I have visited Humana	1
Yes, most of the stuff I buy is reused	1
Yes, have bought old books	1
Yes, clothes	1
Yes, home appliances	1
Yes, I try to go there but I usually do not find anything	1
No	1
Did not give an answer	3

Q8: What do you want to know about their previous owners?

Coded response	Number of responses
Nothing	4
If the goods are fine / good enough for me then there is no question	4
If there is a personalized message / story	2
Maybe some stories would make me not to buy it	1
Some basic demographics	1
Why did he sell it / does not need it	1
How old is the item	1
If it was from smokers' house	1

Q9: On what basis do you choose to whom to donate things you do not need any more?

Coded response	Number of responses
Ask my friends if they need it	6
Second-hand shops / organisations that donate to people who need them / charity / reuse centre	6
Someone who needs	3
I offer books to friends / colleagues	2
Near my home	1
Reuse center Uuskasutuskeskus	3
I just came here to see how it (Uuskasutuskeskus) works	1
Sold at marketplace	2
Sõbralt sõbrale (reuse center)	1
Humana (reuse center)	2
There used to be Humana but it is more like weird bureaucracy...	1

Coded response	Number of responses
Salvation Army	1
I offer through Facebook	1
Use them for cleaning	1

Q10: What are the products that you want to know more about how to dispose them?

Coded response	Number of responses
Electronics / machines	4
Batteries	2
Computer mouse	2
Computer cables	1
CD-s	1
Clothings / how to prepare clothes for donating	2
Big things that are left over in housekeeping	1
Furniture	1
Garden litter	1
Soil	1
Plastic bag of my garbage, does it decompose?	1
Some stuff that people can not easily reuse	1

Q11: What is the reasonable range (km) for you to pick up a free sofa / washing machine / bag of toddlers' clothes?

Coded response	Number of responses
In the boundaries of Tallinn	2
If it is a good bargain then 50 km from Tallinn	1

Coded response	Number of responses
The limit is Estonia	1
I live in Tallinn and have no car and I would not go across Estonia to pick it up	1
4 km walk distance	1
20 km around my home, but if there is a certain thing I need then more	1
With public transportation up to approximately 25-30 km	1
I have to rent a car and the range is 50 km	1
50 km	1
100 km	1
In a range of county. If it fits to my car then further	1
Depends on the transportation that I can use	1
When it is a sofa then I need to use some special delivery methods	1
Transportation minus retail price, so if the transportation costs more than the retail price, I would not go	1

Q12: Do you care about origins of things? (If the product is produced in an environmentally-friendly way or where it is produced or has there been any child labor used in production?)

Coded response	Number of responses
Yes (if it is possible)	9
Grocery / food	2
Kids toys	1
Clothing	1
If I know that some product line is not ethical I feel bad if I use it / I am conscious about that but I am not perfect	2

Coded response	Number of responses
I usually take a look at the labels of items	1
Everything is made in China anyway	1
I can I decide buying against China	1
No	2
Only thing I do not follow is electronics	1

Q13: Have you sometimes not bought a product if you are aware that the product is not produced ethically (child labor used etc)?

Coded response	Number of responses
No	3
No, I look at the price and quality ratio	2
No, I buy 90% my stuff as reused	1
No, I do not know the product line	1
Yes	1
Yes, If there is a environmentally friendly product line	2
Yes, meat-products	1
Yes, fruits	1
Yes, cosmetics	1
If I go to shop to buy something new then I do some research beforehand and read the labels to get more information	1

Q14: What are the questions you usually try to find answers to from the Internet?

Coded response	Number of responses
Everything	4

Coded response	Number of responses
Choosing electronics to buy (reviews)	2
Price	2
Availability	1
Things	1
Services	1
Clothing	1
Diet	1
Health	1
Diseases	1
Environmental impact of product	1
I have specific professional interest and want to increase my knowledge in this field	1
When they were invented and how things work	1
No, I do not search anything	1

Q15: What was the last web-page where you created an account?

Coded response	Number of responses
Lufthansa.com	1
Facebook.com	1
Auto24.ee	1
Blogger.com	1
The1000days.org	1
Spotify.com	1

Coded response	Number of responses
Things.info	1
iHerb.com	1
Booking.com	1
ebay.com	1
There was a training I participated	1
I rarely visit Internet	1

Q16: Did any new questions arise during our conversation, that you have not thought before?

Coded response	Number of responses
Yes, about the origins of things / where are they produced	2
Yes, The story of things, so who were the people who used these items	1
Yes, I have not thought so deeply!	1
Yes, I would not buy something if there is no environmentally friendly line	1
Yes, I must read books	1
Yes, system for keeping track of books lent and borrowed	1
Yes, about books and reusing them for other purposes	1
Yes, for what I use search engine	1
No	3

4.1.2 Analysis. Identification of early adopters

Analysis of interviews is based on Miles and Huberman (1994) and David (2004). From results and analysis we outline the features of possible early adopters for Things.info.

4.1.2.1 Analysis

Analysing the results we found the following recurring needs and attitudes expressed by the interviewees.

Majority of interviewees have experienced the need to give away or donate things. All of them either have found or are looking for a solution how to donate or give away things. Most interviewees offer things to their friends and / or donate for charitable purposes. The variety of shops and organisations where to take things as donation is wide.

When asked where interviewees find books they are interested in, the frequent answer was that they start from friends. They have also strong relation with libraries. People prefer to lend books from libraries and they rely on reminders from library for remembering the return dates.

Interviewees are willing to use second-hand products. Previous history of an item is not very important, but the need to know item's quality was expressed. Also, the distance that people are willing to travel in order to pick up an item, is very different (from 3 km up to 300 km) and related to the means of transportation that the interviewees can use (on foot, public transport or (friend's or rented) car).

We can also see that interviewees do care about the origin of things, some of them consume consciously and some feel bad for not using ethically produced goods, if they do not find any options to do that. There is also an attitude that everything is produced in China anyway and also some negative attitude towards buying from China.

Interviewees express the need to dispose electronics e. g. batteries, computer accessories, CD-s etc, properly and would like to get information about that.

When asked about what they search in the internet, responses show small preference for choosing electronics to buy, looking at reviews and prices. Last new accounts were opened more in travelling or green (eco) websites.

4.1.2.2 Possible early adopters of Things.info

According to Blank (2006) „In customer discovery we can create a product that meets people needs but we need something to enter the market, we need early adopters.“ Blank defines five steps of problem-severity for a person and respective behaviours see Figure 16.

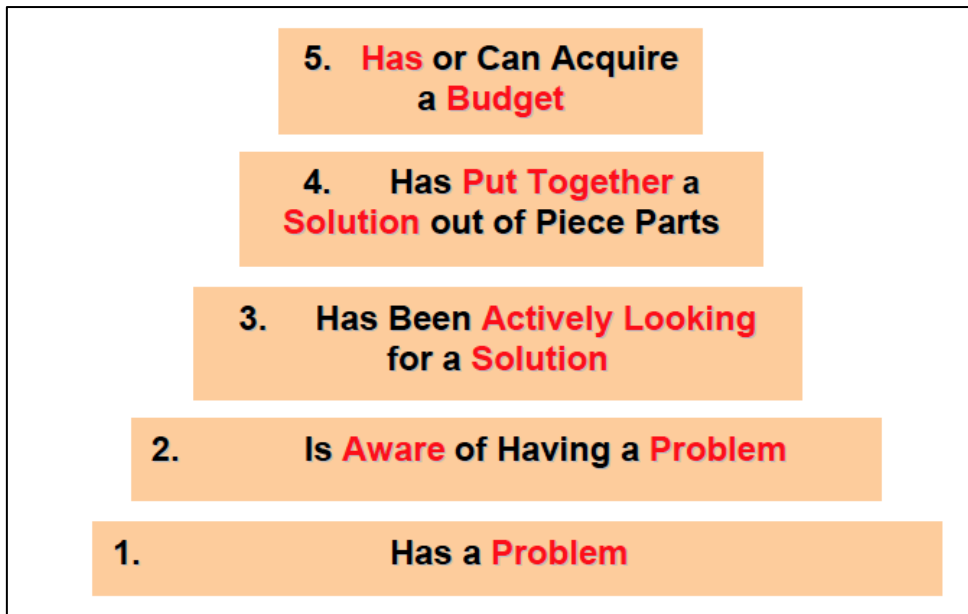


Figure 16. ‘Earlyvangelist’ characteristics (Blank, 2006)

‘Earlyvangelists’ can be found only at points 4 and 5. „Those who have already built a homegrown solution... They are the ones you will rely on for feedback and for your first sales; the ones who will tell others about your product and spread the word that the vision is real.“ (*Ibid*)

In the interviews we can identify the problems that people have already tried to find solutions to, as expressed by interviewees in the following excerpts from the interviews (appendix 1).

„I had this problem with the books I do not need any more and then there was a possibility to give them away to a library. I had to vacate my mum’s apartment and there was a library nearby. And we just gave the books away.“ (Person H)

„I have binded old books and made new covers from leather.“ (Person J)

„Sometimes books that I borrow from the library are not in good condition when I get them. I just make sure that I will not /.../ damage the book even more, so I do some repairing.“ (Person K)

„I organise with my friends a market, mainly accessories and clothes. We exchange them or buy or sometimes give them for free.“ (Person G)

„A while ago when I had a cooperation with youth organization, I organised an exchange. And the items that remained unsold I took to Humana. The idea was to show world education, global development. Not to take the things to local place, but to people in the third world, who can get help through it.“ (Person G)

„I have tried to fight with garbage companies... because people do not know that garbage they are collecting and sorting and things they have consumed... that this is a raw material that companies are willing to pay money for! So the garbage companies do not need to ask money.“ (Person F)

„When I can, I decide against buying from China. I especially do that with food products. I tend to buy locally. I have a son and for him when I chose his toys. I never ...the toys that he has are not made in China. I usually buy some wooden toys or Lego-toys. They are probably made in China. But the company is European. I am not sure if Lego nowadays is made in China. I tend to choose more expensive, usually these items are more expensive. But at least I know that they are not toxic. And they are safe for children.“ (Person K)

The possible early adopters of Things.info are:

- 1) ecologically minded persons, who donate items wisely and are open for using second-hand products themselves,
- 2) persons who want to give items they do not need any more to their friends,
- 3) aware and interested in the origin of products,
- 4) caring about how to dispose or recycle products that are no more usable or necessary.

Every identified group of early adopters (any given person could belong to multiple groups) needs a specially developed feature or set of features in Things.info.

4.2 Prototyping and usability testing

Three users, based on the proto-persona description, were asked to test the Things.info interactive prototype. Usability testing took place in a natural environment (not in the usability lab conditions). None of the users had seen the prototype beforehand.

In the following paragraphs, each user testing report is presented, followed by general notes and users suggestions on what to change in the prototype.

A general conclusion is made in the discussion phase based on these usability test reports.

4.2.1 Testing report of user 1

Table below (Table 5) is a summary-analysis based on the video recording of user 1 usability testing.

Task	Passed	Passed with problems	Failed
To register a book „Indiaani tarkuste raamat“ by Kent Nerburn to the system		<p><u>6:00 minutes</u></p> <p>Main page (Figure 11) (minutes 0:00 –2:05) – user was looking for more than 2 minutes for a way to register a book without signing in. As this was not possible, user agreed to register, but also said that in reality she would not have done it in principle.</p> <p>All categories (Figure 12) (minutes 2:05 – 2:10) – found books category without any problems.</p> <p>Books category, tab All Books (Figure 13) (minutes 2:10 –2:40) – could not find the place how to register a new book.</p> <p>Books category, tab My Books (Figure 15) (minutes</p>	

		<p>2:40 –3:00) – found the place how to register a new book (but the prototype itself was broken and the user was asked to register the book in the tab All Books).</p> <p>Books category, tab All Books (Figure 14) (minutes 3:00 –6:00) – user filled in the form and made several suggestions (explained below).</p>	
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Table 5. Usability testing report of user 1.

User 1 suggestions (Figure 17):

- 1) Field „Genre“ – a dropdown list would be better than the current text field option
- 2) Field „ISBN“ – this is too detail for an average person
- 3) Button „Save“ – it was well hidden, the „ADD“ sign could act as a save-button

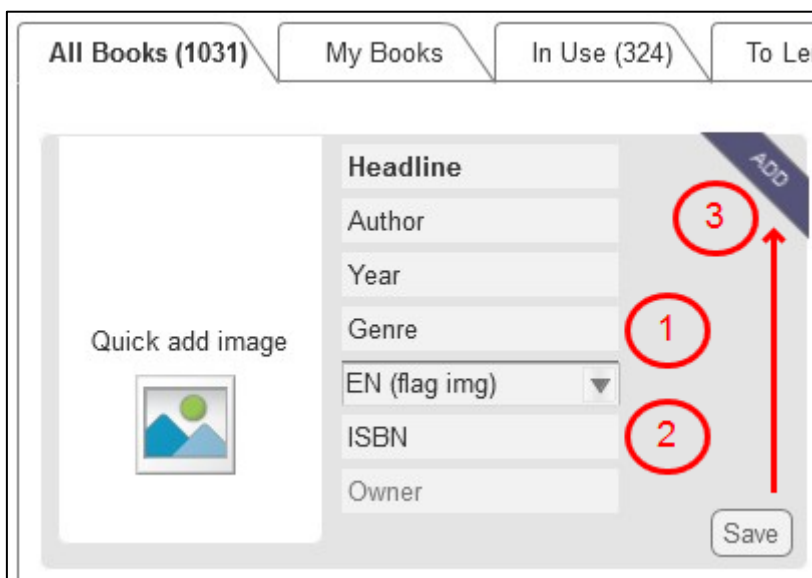


Figure 17. User 1 suggestions on what to change in the Things.info interactive prototype.

4.2.2 Testing report of user 2

Table below (Table 6) is a summary-analysis based on the video recording of user 2 usability testing.

Task	Passed	Passed with problems	Failed
<p>To register a book „Indiaani tarkuste raamat“ by Kent Nerburn to the system</p>		<p><u>2:20 minutes</u></p> <p>Main page (Figure 11) (minutes 0:00 –1:20) – user was confused on the main page as nothing indicated that there would be any connection to the books at all; phrases „coming soon“ and „preview“ indicated that the product was not ready yet; after 50 seconds of clicking around he thought that he has to register in order to see what the system has to offer. He clicked first „Connect with Facebook“ button, but this functionality was not working in the prototype, and then „Login“ button.</p> <p>All categories (Figure 13) (minutes 1:20 –1:27) – found books category without any problems, user commented that there should have been other categories as well, that the current design was far too leading towards „Books“ category.</p> <p>Books category, tab All Books (Figure 14) (minutes 1:27 –2:20) – user saw the form that needed to be filled in order to add a new book, but was confused by the „Add“ sign, he expected it to work as a button.</p>	

Table 6. Usability testing report of user 2.

Notes:

- 1) If the user could not grasp the whole webpage on the screen, he always scrolled to the bottom of the webpage to have a complete overview of what the webpage had to offer.
- 2) The user filled the form with abstract words, thus the usability feedback on filling the form was lost.

User 2 suggestions:

- 1) To add a „Call to action“ button on the main page.
- 2) Button „Save“ – it was well hidden, the „ADD“ sign could act as a save-button (Figure 18).

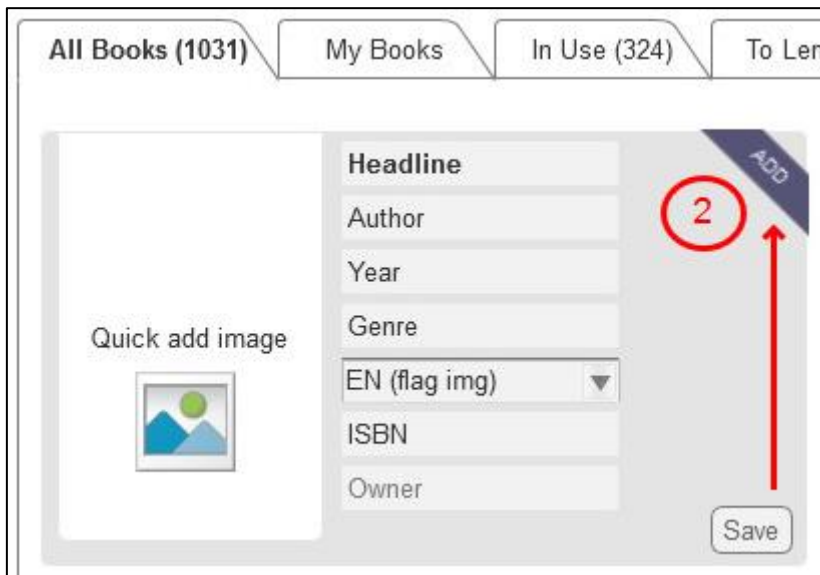


Figure 18. User 2 suggestions on what to change in the Things.info prototype.

4.2.3 Testing report of user 3

Table below (Table 7) is a summary-analysis based on the video recording of user 3 usability testing.

Task	Passed	Passed with problems	Failed
To register a book „Indiaani tarkuste raamat“ by Kent Nerburn to the system		<p><u>9:00 minutes</u></p> <p>Main page (Figure 11) (minutes 0:00 –4:30) – for the first 2 minutes user was looking for a way to register a book without signing in, she concluded that „the webpage is not working!“ because the so called „process diagramme (Production chain – Usage – Disposal)“ was not clickable. The user was very sceptical about joining a new system while phrases „coming soon“ and „preview“ were used. The user only agreed to register for testing purposes, but said that in reality she would not have done it due to negative experiences with similar systems in the past.</p> <p>All categories (Figure 13) (minutes 4:30 – 4:40) – found books category without any problems.</p> <p>Books category, tab All Books (Figure 14) (minutes 4:40 –9:00) – user filled in the form and made several suggestions (explained below).</p>	

Table 7. Usability testing report of user 3.

Notes:

- 1) The user was very sceptical to click on „Login“ or „Connect with Facebook“ buttons as she and her friends have had too many negative experiences with systems that start to act on the users behalf once the user has joined the system.
- 2) The user suggested that the system could be connected to the webpage „Good reads“ database (<http://www.goodreads.com/>).

User 3 suggestions:

- 1) The main page should offer more information about the system; it should also say that there is an option to keep the information for private use only.
- 2) After filling in the field „Headline“, the system could automatically fill in the other fields if a similar book is registered to the system (Figure 19).
- 3) Field „Genre“ – a dropdown list would be better than the current text field option (Figure 19).
- 4) Field „Owner“ could be filled in automatically as I had to register myself in order to use the system (Figure 19).
- 5) Button „Save“ – should be visible and could be located straight under the last field of the form (Figure 19).

The image shows a web interface for adding a book. At the top, there are four tabs: "All Books (1031)", "My Books", "In Use (324)", and "To Lend". Below the tabs is a form with a "Quick add image" section on the left containing a placeholder image icon. The main form fields are: "Headline", "Author", "Year", "Genre", "EN (flag img)" (a dropdown menu), "ISBN", and "Owner". A blue "ADD" button is in the top right corner. A "Save" button is located at the bottom right of the form. Five red circles with numbers 1 through 5 are placed over the form to indicate suggestions: circle 1 is over the "ADD" button; circle 2 is over the "Headline" field; circle 3 is over the "Genre" field; circle 4 is over the "Owner" field; and circle 5 is over the "Save" button, with a red arrow pointing from circle 4 to circle 5.

Figure 19. User 3 suggestions on what to change in the Things.info prototype.

5 DISCUSSION

In this chapter we are presenting recommendations for the development of Things.info in the areas of finding early adopters and developing user interface, followed by some general recommendations and observations about the whole Things.info project.

5.1 Customer development

Following are the recommendations for developing the minimum viable product of Things.info based on the results of conducted customer discovery process.

- 1) One feature of Things.info that people seem to have a need for, is an easy and comfortable option to show one's friends which books person wants to give away. The pre-requisites for realising this feature are the registered user account, personalised library and friends list.
- 2) People also expressed strongly that they want to dispose electronic goods (batteries, computer parts and accessories) in an ecological way. So a highly geographically contextualised feature in Things.info, showing possibly all disposal options for electronic goods on map view, having practical information about the opening times, types of things accepted and other conditions, would solve the problem interviewees identified. This feature will work also without the registration and would thus generate use of website without mandatory registration that is a barrier for certain share of internet users.

5.2 Prototyping and usability testing

Proportionally, users spent too much time on the main page trying to figure out if it was possible to fulfil the scenario without logging into the system. Once they reached the conclusion (with or without a help of the researcher) that it was mandatory to sign into the system, users progressed rapidly towards the end of the given scenario – to register a new book into the system. Table 8

below gives a brief overview of the sex, age and education level of the users, as well as about the time it took them to pass the scenario.

Users	The time it took to pass the given scenario
User 1: female, 30+, higher education	6:00 minutes
User 2: male, 30+, higher education	2:20 minutes
User 3: female, 30+, higher education	9:00 minutes

Table 8. Overview of the usability testers' sex, age and education level, as well as the times it took users to pass the scenario.

The conclusions of the users' suggestions would be following:

- 1) Main page (front page) should be more informative – it should explain what the Things.info systems is about, introduce the possibility for keeping the registered things private to the user, a promise not to spam the registered users nor to share the information on social media on users behalf.
- 2) All categories page – as the only category presented there was „books“, it was very easy to find it and it might not have been the case if the other categories would have been described in detail as well – thus, the testing did not give any useful feedback about the user interface of that particular page.
- 3) Books categories page, tab „All books“:
 - a. After filling in the field „Headline“ or „ISBN“, the system could automatically fill in the other fields if a similar book is registered to the system.
 - b. Field „Genre“ – a dropdown list would be better than the current text field option.
 - c. Field „Owner“ could be filled in automatically as the user had to register in order to use the system.

- d. Button „Save“ – should be visible (not be hidden as in prototype) and could be located straight under the last field of the form or the sign „Add“ could have the save-button functionality.

5.3 General discussion

The goal of Things.info is to create a web and mobile platform containing all man-made objects and their relationships, as described more thoroughly in the introduction and theoretical framework. This huge goal can be achieved only using modern methods of software development (agile development, lean UX, iterating with prototypes, continuous user testing) and lean startup (customer development, short development cycles, focus on early adopters etc).

We think that Things.info can be realised as a symbiosis between entrepreneurial (for making it quickly financially sustainable and thus enabling its continuous development) and educational/research (lots of background information is needed and this could be well put into public domain also) activities. Also, Things.info can achieve the stated goals only with massive crowd-sourcing (large number of users generating content). This, in turn, means that Things.info has to be useful for large number of internet users, which brings us back to customer development – finding real problems of real people and offering solutions that work.

Based on the findings from customer development and user testing, we have following recommendations:

- 1) Make the authentication process as simple as possible and offer some content without authentication,
- 2) In next 2-3 iterations of prototypes, very different product categories, for instance, books, cars and clothes, should be developed and user tested. This would provide understanding how different various target groups could be and whether conceptually different user interfaces have to be built or could different product categories be shown in one user interface without major modifications,

- 3) Prioritise the development of the feature showing geographically and textually exact information about disposal and recycling options in a certain area, either countrywide, for example in all Estonia, or in smaller area, for example in city of Tallinn.

We have experienced during the course of current research and real development of the product that initially the whole idea of Things.info is too big to grasp for most of the people. So, to realise it, we have to break it into meaningful parts that people will start using and then gradually approach the stated goal. However, while finding persons to the team of Things.info we have also seen that it is exactly the overall vision and outlines of the strategy for achieving it that attract persons who are well-educated, professional, curious, ambitious and who will persevere through difficulties – characteristics needed to make the vision of Things.info into reality.

6 LITERATURE

Anderson, S. P. (2011). *Seductive Interaction Design: Creating Playful, Fun, and Effective User Experiences*. Pearson Education.

BBC News. (2011). Population seven billion: UN sets out challenges. *BBC News*. Retrieved May 4, 2013 from <http://www.bbc.co.uk/news/world-15459643>

Beck, K., Beedle, M., van Bennekum, A. et al (2001). *Manifesto for Agile Software Development*. Retrieved April 8, 2013 from <http://agilemanifesto.org/>

Blank, S. (2006). *The Four Steps to the Epiphany: Successful Strategies for Products that Win*. Cafepress.com.

Blessed Unrest. (2013). Retrieved May 5, 2013, from <http://www.blessedunrest.com/>

Cisco. (2013). *Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2012–2017*. Retrieved May 6, 2013, from http://www.cisco.com/en/US/solutions/collateral/ns341/ns525/ns537/ns705/ns827/white_paper_c11-520862.html

Connett, P. (2007) *Zero Waste: A Key Move Towards a Sustainable Society*. Retrieved May 7, 2013, from <http://www.americanhealthstudies.org/zerowaste.pdf> American Environmental Health Studies Project.

Cooper, A. , Reimann, R., Cronin, D. (2007). *About face 3 : the essentials of interaction design*. Wiley Publishing, Inc.

Crutzen, P. J. (2002). Geology of mankind: the Anthropocene. *Nature* 415:23.

Cultural Creatives. (2013). Retrieved May 6, 2013 from <http://culturalcreatives.org/cultural-creatives/>

David, M., Sutton, C. (2004). *Social Research, The Basics*.

Dumas, J. S. & Redish, J. C. (1999). *A Practical Guide to Usability Testing*. Revised Edition, Intellect Books.

FSC. (2011) *Global Market Survey Report 2011*. Retrieved May 5, 2013, from <https://ic.fsc.org/market-information.345.htm>

FuturICT. (2013). Retrieved May 7, 2013 from <http://www.futurict.eu/>

GAIA (Global Alliance for Incinerator Alternatives). (2012). *On the Road to Zero Waste. Successes And Lessons From Around the World*. Retrieved May 7, 2013, from <http://www.no-burn.org/on-the-road-to-zero-waste-successes-and-lessons-from-around-the-world>

Gothelf, J. (2013). *Lean UX: Applying Lean Principles to Improve User Experience*. O'Reilly Media, Inc.

Hawken, P. (2007) *Blessed unrest: How the largest movement in the world came into being, and why no one saw it coming*. New York: Viking Press.

ITU (International Telecommunications Union). (2013). *ICT Facts and Figures. The World in 2013*. Retrieved May 5, 2013, from <http://www.itu.int/ITU-D/ict/facts/material/ICTFactsFigures2013.pdf>

Koestler, A. (1978). *Janus: A Summing Up*. London: Pan Books

Lazar, J. et al (2010), *Research Methods in Human-Computer Interaction*. West Sussex, UK: John Wiley & Sons.

Let's Do It! World. (2013). Retrieved May 7, 2013, from www.letsdoitworld.org

- Lifeweb. (2013). Retrieved May 9, 2013, from <http://www.ratical.org/LifeWeb/Articles/LSinetHF.html>
- Lovelock, J. (1979). *Gaia: A New Look at Life on Earth*. Oxford: Oxford University Press.
- Lovelock, J.E., Margulis, L. (1974). *Atmospheric homeostasis by and for the biosphere: the Gaia hypothesis*. *Tellus*, 26, 1-2, 2-10. DOI: 10.1111/j.2153-3490.1974.tb01946.x
- Maurya, A. *Running Lean*. (2010). O'Reilly Media.
- McCoy, T. (2011). *Lean UX, Product Stewardship, and Integrated Teams*. Retrieved March 17, 2013, from http://www.cooper.com/journal/2011/02/lean_ux_product_stewardship_an.html
- McCoy, T., Fraser, J. (2011). *Lean UX & Integrated Teams*. Retrieved March 17, 2013, from http://www.slideshare.net/seriouslynow/lean-ux-product-stewardship-integrated-teams?from=ss_embed
- McDonough, et al. (2003) *Applying the principles of green engineering to cradle-to-cradle design*. *Environmental science & technology*, 2003 37 (23), pp 434A–441A. ACS Publications. DOI: 10.1021/es0326322
- Meadows, D. H. et al. (1972). *The Limits to growth: a report for the Club of Rome's Project on the Predicament of Mankind*. New York: Universe Books
- Miles, M., Huberman A. M. (1994). *Qualitative Data analysis: An Expanded Sourcebook*. London: SAGE Publications.
- Nielsen, J. (1993). *Usability Engineering*. Morgan Kaufmann Publishers Inc.
- PaperImpact. (2013). Retrieved May 12, 2013 from <http://www.paperimpact.org/how-much-wood-is-needed-to-produce-1000-kilos-of-paper-1961.html>
- Ray, P.H., Anderson, S.R. (2001). *The Cultural Creatives: How 50 Million People Are Changing the World*. New York: Harmony Books.

Ries, E. (2011). *The Lean Startup: How Constant Innovation Creates Radically Successful Businesses*. Penguin Books.

Rockström, J., Steffen, W., Noone, K. et al. (2009). Planetary Boundaries: Exploring the Safe Operating Space for Humanity. *Ecology and Society*. Vol. 14, No.2, Art. 32. Retrieved April 22, 2013 from <http://www.ecologyandsociety.org/vol14/iss2/art32/>

Rubin, J. & Chisnell, D. (2008). *Handbook of Usability Testing, Second Edition: How to Plan, Design, and Conduct Effective Tests*. Wiley Publishing, Inc.

Sahtouris, E., Lovelock, J. (2000). *Earthdance. Living Systems in Evolution*. iUniversity Press.

Smithers, R. (2013). Growing taste for Fairtrade shows it's Britain's cup of tea. *Guardian*. Retrieved May 4, 2013 from <http://www.guardian.co.uk/money/2013/mar/02/fairtrade-taste-growing-britain>

Steffen, W., P. J. Crutzen, and J. R. McNeill. (2007). The Anthropocene: are humans now overwhelming the great forces of Nature? *Ambio* 36:614–621.

Stern, N. (2007). *The economics of climate change – the Stern review*. Cambridge, UK: Cambridge University Press.

Stockholm Resilience Centre. (2013). Retrieved May 9, 2013, from <http://www.stockholmresilience.org/>

Swedish Forest Industries Federation. (2013). Retrieved May 12, 2013 from http://www.forestindustries.se/documentation/statistics_ppt_files/international_3/global_paper_production_by_grade

United Nations. Department of Social and Economic Affairs. Population Division. (2010). *World Population Prospects: The 2010 Revision*. Retrieved May 4, 2013 from <http://esa.un.org/wpp/Excel-Data/population.htm>

Wackernagel, M., Rees, W. (1996). *Our Ecological Footprint: Reducing Human Impact on the Earth*. Gabriola Island, BC: New Society Publishers.

Wikipedia (2013) *Cultural Creatives*. Retrieved May 5, 2013, from http://en.wikipedia.org/wiki/The_Cultural_Creatives

7 APPENDICES

There are 12 interviews as appendices attached to the thesis.

INTERVIEW 1

Person A.

Location: Reuse centre "Uuskasutuskeskus" Tallinn, Mustamäe tee 5

Date: April 22, 2013

Interviewer: Piret-Klea Velleste

Person-to-person interview, standard layout.

Abbreviations used:

R=Researcher

I=Interviewee

R: How many books have you lent or borrowed at the moment?

I: Borrowed or lent? Lent one.

R: How do you keep track of the books you have lent out or borrowed?

I: Generally I give books away. I don't much lend them and I don't keep track of them.

R: If there is a internet-based library application where you can see the books you have lent out? Will you use it and how often?

I: Maybe and then rarely.

R: If you want to read a certain book, how do you start your search?

I: First I look into library accounts, I rarely buy books.

R: What do you do with the books you do not need any more?

I: I give them away.

R: Have you ever repaired a book, used it for other purposes than reading, or thrown away a book?

I: No.

R: Do you shop in second hand shops (vintage shops, websites) or rented some working tool?

I: Yes.

R: What do you want to know about their previous owners?

I: I really don't want to know.

R: On what basis do you choose to whom to donate things you don't need any more?

I: If an item is emotionally important to me, then I will give it to my friends. In case of books, I offer it to friends that are interested in the subject of the book. Rest of the things I take to reuse center 'Uuskasutuskeskus', which is easy and convenient.

R: What is the reasonable range (km) for you to pick up a free sofa / washing machine / bag of toddlers' clothes?

I: If you think of Tallinn, then in city boundaries.

R: Do you care about things' origins? (If the product is produced environmentally-friendly way or where it is produced or has there been any child labor used in production?)

I: Yes.

R: Have you sometimes not bought a product if you are aware that the product is not produced ethically (child labor used etc)?

I: If there is an ethical alternative.

R: What are the questions you usually try to find answers to from the Internet?

I: Lots of questions, in principle I google everything I don't know.

R: What was the last web-page where you created an account?

I: Lufthansa.

R: Did any new questions arise during our conversation that you have not thought before?

I: Something about me but generally no.

INTERVIEW 2

Person B

Location: Reuse centre "Uuskasutuskeskus" Tallinn, Mustamäe tee 5

Date: April 22, 2013

Interviewer: Piret-Klea Velleste

Person-to-person interview, standard layout.

Abbreviations used:

R=Researcher

I=Interviewee

R: How many books have you lent or borrowed at the moment?

I: I don't know exactly, but I think eight.

R: How do you keep track of the books you have lent out or borrowed?

I: What do you think of keeping the track. I take the book, read it and bring it back. I don't write it down. If its needed I take an list from library about what books I have read.

R: If there is a internet-based library application where you can see the books you have lent out? Will you use it and how often?

I: Just mark it down? I don't think I will use it.

R: If you want to read a certain book, how do you start your search?

I: From library.

R: What do you do with the books you do not need any more?

I: I would bring them to Uuskasutuskeskus.

R: Have you ever repaired a book, used it for other purposes than reading, or thrown away a book?

I: No.

R: Do you shop in second hand shops (vintage shops, websites) or rented some working tool?

I: Yes.

R: What do you want to know about their previous owners?

I: I might but I wouldn't.

R: On what basis do you choose to whom to donate things you don't need any more?

I: To where it is easier. Probably near my home.

R: What is the reasonable range (km) for you to pick up a free sofa / washing machine / bag of toddlers' clothes?

I: If I really need it or it's a good bargain then 50 km from Tallinn.

R: Do you care about things' origins? (If the product is produced environmentally-friendly way or where it is produced or has there been any child labor used in production?)

I: No.

R: What are the questions you usually try to find answers to from the Internet?

I: About things and services... I don't know.

R: What was the last web-page where you created an account?

I: I don't know, I haven't made any accounts recently.. maybe it was Facebook long time ago.

R: Did any new questions arise during our conversation that you have not thought before?

I: No.

INTERVIEW 3

Person C.

Location: Reuse centre "Uuskasutuskeskus" Tallinn, Mustamäe tee 5

Date: April 22, 2013

Interviewer: Piret-Klea Velleste

Person-to-person interview, standard layout.

Abbreviations used:

R=Researcher

I=Interviewee

R: How many books have you lent or borrowed at the moment?

I: I have not borrowed any.

R: How do you keep track of the books you have lent out or borrowed?

I: There have been some losses but I don't keep track.

R: If there is a internet-based library application where you can see the books you have lent out? Will you use it and how often?

I: I think yes.

R: If you want to read a certain book, how do you start your search?

I: If there is no other options except buying then I buy. But when there are friends around me then I ask from friends first. But if not... there is other ways.

R: What do you do with the books you do not need any more?

I: I had this problem and then there was a possibility to give away for a library. I had my mum's apartment that I had to vacate and there was a library nearby. And we just gave the books away.

R: Have you ever repaired a book, used it for other purposes than reading, or thrown away a book?

I: No, I haven't. When I had a problem of giving the books away then there was a library nearby and they were happy to take the books.

R: Do you shop in second hand shops (vintage shops, websites) or rented some working tool?

I: No.

R: What do you want to know about their previous owners?

I: No, I don't want to know anything, I don't buy used stuff. I just was interested...

R: On what basis do you choose to whom to donate things you don't need any more?

I: If there is someone who needs it I investigate before I discard. But if there is no-one who needs...I don't know, maybe clothes are.. I haven't had much thought about it. On the other hand I would just bring the stuff here and give it away.

R: What is the reasonable range (km) for you to pick up a free sofa / washing machine / bag of toddlers' clothes?

I: I don't know... maybe 20 km around my home. But if there is a certain thing I need then more.

R: Do you care about things' origins? (If the product is produced environmentally-friendly way or where it is produced or has there been any child labor used in production?)

I: Yes.

R: Have you sometimes not bought a product if you are aware that the product is not produced ethically (child labor used etc)?

I: No, I don't think so.

R: What are the questions you usually try to find answers to from the Internet?

I: ...

R: What was the last web-page where you created an account?

I: I rarely visit Internet.

R: Did any new questions arise during our conversation that you have not thought before?

I: Oh-yes, about the things' origins.. I haven't thought about it. In which country.. is it now good. Today everything is made in China.

INTERVIEW 4

Person D

Location: Reuse centre "Uuskasutuskeskus" Tallinn, Mustamäe tee 5

Date: April 22, 2013

Interviewer: Piret-Klea Velleste

Person-to-person interview, standard layout.

Abbreviations used:

R=Researcher

I=Interviewee

R: How many books have you lent or borrowed at the moment?

I: Lend? None, I think none.

R: How do you keep track of the books you have lent out or borrowed?

I: I don't lend books so I don't keep track of them.

R: If there is a internet-based library application where you can see the books you have lent out? Will you use it and how often?

I: I don't know. I wouldn't.

R: If you want to read a certain book, how do you start your search?

I: I ask from my wife. She gives me. No, I don't read books.

R: What do you do with the books you do not need any more?

I: They stay home in the bookcase.

R: Have you ever repaired a book, used it for other purposes than reading, or thrown away a book?

I: No, I haven't thought, they stay in my bookcase and that's it.

R: Do you shop in second hand shops (vintage shops, websites) or rented some working tool?

I: Yes I have.

R: What do you want to know about their previous owners?

I: Nothing. If the tools are fine then there is no question.

R: On what basis you choose whom you donate things you don't need any more?

I: There's the problem. We have at home lots of stuff. I just came here to see how it works, I don't understand it.

R: What are the products that you want to know more about how to dispose them?

I: Clothings of course. Clothes are piling up!

R: What is the reasonable range (km) for you to pick up a free sofa / washing machine / bag of toddlers' clothes?

I: If the item is worth it then there is no limit! Okay the limit is Estonia.

R: Do you care about things' origins? (If the product is produced environmentally-friendly way or where it is produced or has there been any child labor used in production?)

I: Not really, everything is made in China anyway.

R: Have you sometimes not bought a product if you are aware that the product is not produced ethically (child labor used etc)?

I: No.

R: What are the questions you usually try to find answers to from the Internet?

I: No, I don't search anything.

R: What was the last web-page where you created an account?

I: Of course Auto24, I have no other accounts.

R: Did any new questions arise during our conversation that you have not thought before?

I: Yes, I must read books. I have planned but have had no time.

INTERVIEW 5

Person E

Location: Reuse centre "Uuskasutuskeskus" Tallinn, Mustamäe tee 5

Date: April 22, 2013

Interviewer: Piret-Klea Velleste

Person-to-person interview, standard layout.

Abbreviations used:

R=Researcher

I=Interviewee

R: How many books have you lent or borrowed at the moment?

I: Lent or borrowed? I lend from library, at the moment I have lent two I think.

R: How do you keep track of the books you have lent out or borrowed?

I: It's the matter of trust if i borrow my book to someone. If to friends and acquaintances, then I trust that they will bring my book back. If I lend it from library then library has deadlines to adhere, otherwise I have to pay the fee.

R: If there is a internet-based library application where you can see the books you have lent out? Will you use it and how often?

I: It probably spares my brain. My brain is not a garbage bin. Yes, I think it is a very good idea.

R: If you want to read a certain book, how do you start your search?

I: At first I ask from my friends do they have this book or I go to library to find out. If there is a book with a good value then I buy but mostly I borrow.

R: Have you ever repaired a book, used it for other purposes than reading, or thrown away a book?

I: For me, books are no different from other goods in terms of recycling.

R: Do you shop in second hand shops (vintage shops, websites) or rented some working tool?

I: Yes, everyday.

R: What do you want to know about their previous owners?

I: Ordinarily I don't care who has used it before, rather I'm interested if the product is good enough for me.

R: On what basis do you choose to whom to donate things you don't need any more?

I: Some individual stuff I know what my friends will like, so I give it to them. Generally I donate them to some second-hand shops. Especially to organizations if I know the things will reach to the ones who need them. Previously I have donated them to Humana and sold at marketplace.

R: What are the products that you want to know more about how to dispose them?

I: Preferably some stuff that people can not easily reuse, like batteries. I would search for that.

R: What is the reasonable range (km) for you to pick up a free sofa / washing machine / bag of toddlers' clothes?

I: As I live in Tallinn and have no car, I have to ask for help anyway, but I would not go across Estonia to pick it up.

R: Do you care about things' origins? (If the product is produced environmentally-friendly way or where it is produced or has there been any child labor used in production?)

I: Previously I did not pay any attention to that, but nowadays my family members are working on Fair Trade issues, so I have become more aware of these matters as well. Of course I'm interested!

R: Have you sometimes not bought a product if you are aware that the product is not produced ethically (child labor used etc)?

I: I think I would do that, but because I buy 90% my stuff as reused so I better look at the price and quality ratio. But if I would go to shop to buy something new then I would look also the background.

R: What are the questions you usually try to find answers for from the Internet?

I: I'm not the kind of person who needs to know the things through details. I have specific interest to deepen, my speciality. If I don't know something then I google.

R: What was the last web-page where you created an account?

I: Created in... Blogger.

R: Did any new questions arise during our conversation that you have not thought before?

I: Yes! I haven't thought so deeply! Which is good, you make people think!

INTERVIEW 6

Person F

Location: Co-working space "Hooandja" Tallinn, Rävåla pst 8

Date: April 23, 2013

Interviewer: Piret-Klea Velleste

Person-to-person interview, standard layout.

Abbreviations used:

R=Researcher

I=Interviewee

R: How many books have you lent or borrowed at the moment?

I: Lent out... I think none.

R: How do you keep track of the books you have lent out or borrowed?

I: To borrow or lend?

R: Both.

I: Keeping track so it should be written down. I have a register in my head...

R: If there is a internet-based library application where you can see the books you have lent out? Will you use it and how often?

I: I rather think... I would not use it. Because I boldly admit that 99% of books are digital. I read them in my phone or e-reader. So in my case lending out or borrowing a book is a rarity. If I do see in someone's bookshelf a cool book then I browse it and if I want it I lend it. But it can happen once or twice in year. Though our library at home is full of interesting books that I have read... so people rather look at the title and download a digital book.

R: If you want to read a certain book, how do you start your search?

I: I think my first trend here is to find it in the original language. As a second choice I prefer English translation, as they tend to be better than others. Then I buy it for example from Amazon. Science fiction is my favorite and I have a friend who is really enthusiastic about it too, so I get my recommendations usually from him. He reads 4-5-6 books in a month. Every time I visit him, he has some suggestions of what to read and then I will download these books and read them.

R: What do you do with the books you do not need any more?

I: Nothing. I rarely have books that I don't need. I have some biographies that have sentimental value for me. My wife has all kinds of health and gardening and who knows what books. She reads them once a year or two. But no, we don't lend them out or present them any way. Or do anything useful with them.

R: Have you ever repaired a book, used it for other purposes than reading, or thrown away a book?

I: As a matter of fact yes. Because we have attended all kinds of environmental projects and we think also that way. We have done DIY absolutely with other stuff like clothing, furniture... but not with books. Because I think books are like.. if you give it to someone it is personal ... the person you are giving it to.. he really has to want it. You just can not give it to someone like: take it! But if there is a bookshelf in recycling centre then I probably will donate them.

R: Do you shop in second hand shops (vintage shops, websites) or rented some working tool?

I: Most of the stuff I buy is reused. I would buy everything as reused.

R: What do you want to know about their previous owners?

I: Nothing... or.. perhaps if he has left there a personalized message.. but what should I want to know.

R: On what basis do you choose to whom to donate things you don't need any more?

I: Generally I give them away to some organization that deals with giving them forward, like Uuskasutuskeskus or Sõbralt sõbrale. There used to be Humana but it is more like weird bureaucracy... and of course through Facebook, that we have something to give away.

R: What are the products that you want to know more about how to dispose them?

I: Throwing away.. I haven't had the need to throw away stuff.. If I look it at the other side then I am interested of and I have taken part in some projects. I have tried to fight with garbage companies.. because people don't know that garbage that they are collecting and sorting and consumed.. that this is a raw material that companies are willing to pay money for! So the garbage companies don't need to ask money.

R: What is the reasonable range (km) for you to pick up a free sofa / washing machine / bag of toddlers' clothes?

I: Depends on the cost.

R: It's free.

I: Free.. So then the price is transportation minus retail price. So if the transportation pays less than the retail price is.

R: So you wouldn't tell the kilometers but count it in money.

I: Yes, if it is economically useful. Maybe someone in Sweden will give me for free but the transport there and back can cost three times more than if I buy it here. So it will lose the point! But if I think environmentally- friendly then all the fuel and logistics..

R: Do you care about things' origins? (If the product is produced environmentally-friendly way or where it is produced or has there been any child labor used in production?)

I: Yes, because I have been involved in it last 5 years. We have also made a project called Keskkonnad. Yes, in that sense grocery, clothing. Only thing I don't follow is electronics. In that sense I care but there are so many parts and I just can't track it. But yes, grocery.. it's like everyday stuff.

R: Have you sometimes not bought a product if you are aware that the product is not produced ethically (child labor used etc)?

I: Yes, on daily basis I choose the products carefully, especially meat-products and some fruits.

R: What are the questions you usually try to find answers to from the Internet?

I: You know, Google is nowadays oracle so I ask everything from Google. Absolutely everything. From diet, health to some diseases. Absolutely everything: clothing, choosing electronics to buy. So everything.

R: What was the last web-page where you created an account?

I: Thousand days.

R: Did any new questions arise during our conversation that you have not thought before?

I: M.. about books.. the point with the books was better administration and their lending. I haven't thought that before? I have thought that in another context. If some person needs some advice I will give him a book but put some administration into it.

Very cool would be for an e-person as I am, that nowadays the border between e-books and regular books is fading away. There is technology that will print out you an e-book and add nice thick covers around. So there are this kind of e-books available. And vice versa, there is technology that will make from regular books e-books. Very cool will be that if you have this device at home and put those 2 technologies together! So, you like go to a bookshop and there is that device that has this two-in-one. Some books are good to hold in you hands and some books

are good to browse in public transportation.

INTERVIEW 7

Person G

Location: Co-working space "Hooandja" Tallinn, R vala pst 8

Date: April 23, 2013

Interviewer: Piret-Klea Velleste

Person-to-person interview, standard layout.

Abbreviations used:

R=Researcher

I=Interviewee

R: How many books have you lent or borrowed at the moment?

I: I don't know.

R: Approximately.

I: I think five.

R: How do you keep track of the books you have lent out or borrowed?

I: I have no system. What I remember that I remember. Friends are returning books.

R: If there is a internet-based library application where you can see the books you have lent out? Will you use it and how often?

I: I'm not sure I will use it. Lending a book is not something I do actively that I need to administrate it.

R: If you want to read a certain book, how do you start your search?

I: If it's possible I will buy it, if I hear that my friend has it then I borrow from him.

R: What do you do with the books you do not need any more?

I: Some cases I have.. I haven't done it but I have thought to take them to recycling center or that kind of place. But at the moment they are at my home.

R: Have you ever repaired a book, used it for other purposes than reading, or thrown away a book?

I: Directly no.

R: Do you shop in second hand shops (vintage shops, websites) or rented some working tool?

I: Sometimes we organise with my friends a market, mainly accessories and clothes. We exchange them or buy or sometimes give them for free. But I'm not that second hand shop person. I try to go there but I usually do not find anything.

R: What do you want to know about their previous owners?

I: Maybe if there was a story with them then there is a value. But generally I haven't thought of that.

R: On what basis do you choose to whom to donate things you don't need any more?

I: Well.. if we do those markets, then we can decide what suits with someone's style or so. But a while ago when I had a cooperation with youth organization then I organised a recycling market. And the items that we remained unsold I took to Humana. The idea was to show world education, global development. That not to take the things to local place but to people in the third world, who can get help through it.

R: What are the products that you want to know more about how to dispose them?

I: I don't know, maybe electronics. Is there is someone who can benefit from it. Or what to do with it.

R: What is the reasonable range (km) for you to pick up a free sofa / washing machine / bag of toddlers' clothes?

I: It depends how valuable it is for me. I think in a range of county. Maybe if it fits to my car then farther.

R: Do you care about things' origins? (If the product is produced environmentally-friendly way or where it is produced or has there been any child labor used in production?)

I: Yes, basically I do. If I know that some product line is not ethical I feel bad if I use it. Sometimes I feel there are no options for me.

R: Have you sometimes not bought a product if you are aware that the product is not produced ethically (child labor used etc)?

I: Certainly yes, some things because of that I don't use it, or I try to use it less.

R: What are the questions you usually try to find answers to from the Internet?

I: I can not define my questions in the way you want me to, I use the Internet for any question I have.

R: What was the last web-page where you created an account?

I: I don't remember.. Okay, actually there was a training I participated.

R: Did any new questions arise during our conversation that you have not thought before?

I: Yes, I think so. Maybe the story of things, so who were the people who used these items.

INTERVIEW 8

Person H

Location: Co-working space "Hooandja" Tallinn, Rävåla pst 8

Date: April 23, 2013

Interviewer: Piret-Klea Velleste

Person-to-person interview, standard layout.

Abbreviations used:

R=Researcher

I=Interviewee

R: How many books have you lent or borrowed at the moment?

I: None.

R: How do you keep track of the books you have lent out or borrowed?

I: I don't. I give books away and want them to circle. So when I have read a book, I look for a person who wants to read it and I give it to him.

R: If there is a internet-based library application where you can see the books you have lent out? Will you use it and how often?

I: No, I wouldn't.

R: If you want to read a certain book, how do you start your search?

I: First I look it up if it's in digital format and then I download it from some webshop. So I buy them. And if there isn't any I feel uncomfortable and I quit. I don't like things if they are in the shelves. I feel guilty if I buy a book and it just stays there. And I don't bother to find a person who wants to read it. And I feel guilty to take boxes full of books and bring them to some waste management or recycle. In other words, I don't bother to manage it.

R: What do you do with the books you do not need any more?

I: I give them away. There are few books I feel connected to so that I want to keep it.

R: Have you ever repaired a book, used it for other purposes than reading, or thrown away a book?

I: Yes, I have it in my mind ... I don't know if it's a topic of this interview, to make a sticky that you can put on to books and other things. And this sticky basically says that this thing is a shareware. So things are happy when they are in circulation. And you can use this item as long as you need it. And if you really don't know what to do it, give it back to his basic owner. Here is his address... But I haven't bothered to create it.

R: Do you shop in second hand shops (vintage shops, websites) or rented some working tool?

I: Yes.

R: What do you want to know about their previous owners?

I: I haven't thought about it, but it would be very interesting and valuable knowledge. But what do I want to know specifically? Some basic demographics of course. If I buy a sweater from second-hand shop, it would be nice to know who was the previous owner, whether an aunty in Iceland or a schoolboy in Germany. But I think I don't want to know anything else. Things have their stories and maybe it would be cool to know it, but maybe some stories would make me not to buy it.

R: On what basis do you choose to whom to donate things you don't need any more?

I: I think to someone who needs it. If i don't know any acquaintance in need I gather these things together and take them to Uuskasutuskeskus. I generally don't keep any things. I wear my clothes as long as possible and in a matter of fact, I have only few things.

R: What are the products that you want to know more about how to dispose them?

I: All the big things that are left over in housekeeping. Furniture, I'm not sure where to take it and in what circumstances. I still haven't figured it out. Some things i know, where to put slate or rocks or metal or oil, but about furniture, I don't know. I also don't know what to do with garden litter. And landfill.

R: What is the reasonable range (km) for you to pick up a free sofa / washing machine / bag of toddlers' clothes?

I: I think one hundred kilometers.

R: Do you care about things' origins? (If the product is produced environmentally-friendly way or where it is produced or has there been any child labor used in production?)

I: Yes.

R: Have you sometimes not bought a product if you are aware that the product is not produced ethically (child labor used etc)?

I: No, because I don't know the product line. Normally I don't know. Even if someone is selling home-made pickled mushrooms... or at the market, if there is a sign of Estonian strawberries I actually don't know.

R: What are the questions you usually try to find answers to from the Internet?

I: Any.

R: What was the last web-page where you created an account?

I: Let me think... it was Spotify.

R: Did any new questions arise during our conversation that you have not thought before?

I: Yes, I haven't thought about it where the things are produced. Even the websites like the schoolmate of Tanel... yes, Trapido. I actually don't understand how does it help me. But yes, it sounds interesting.

INTERVIEW 9

Person I

via Skype

Location: Interviewer in Tallinn, interviewee in Sweden

Date: April 22, 2013

Interviewer: Piret-Klea Velleste

Person-to-person interview, standard layout.

Abbreviations used:

R=Researcher

I=Interviewee

R: How many books have you lent or borrowed at the moment?

I: None.

R: How do you keep track of the books you have lent out or borrowed?

I: By remembering.

R: If there is a internet-based library application where you can see the books you have lent out? Will you use it and how often?

I: I will use it very rarely, because I lend books very rarely. So my answer will be no.

R: If you want to read a certain book, how do you start your search?

I: It depends on the book genre. If it is a storybook, then I get it digitally, i.e. download it from Amazon or Apple. But if it's a specific book or poem, then I get it on paper and then I prefer Apollo or Amazon.

R: What do you do with the books you do not need any more?

I: I do not buy things I do not need.

R: Have you ever repaired a book, used it for other purposes than reading, or thrown away a book?

I: Yes I have, I have thought of making a iPad or Kindle cover, so more for decorative purpose.

R: Do you shop in second hand shops (vintage shops, websites) or rented some working tool?

I: Yes.

R: What do you want to know about their previous owners?

I: I want to know have they valued it but probably I would see it by its looks.

R: On what basis do you choose to whom to donate things you don't need any more?

I: Depends where I am. When I'm traveling and in the area where people need things then I leave them my clothes and boots. When I'm in Europe then recycle centers and friends who will need it and I have one to spare.

R: What are the products that you want to know more about how to dispose them?

I: I want to know more about that question. Broadly my main concern is that in time-to-time when I take my garbage out, that garbage is in plastic bag, and my concern is, does the bag decompose.

R: What is the reasonable range (km) for you to pick up a free sofa / washing machine / bag of toddlers' clothes?

I: Depends the transportation that I can use. When I walk and the item is not heavy, then 8 km here and there. When it is heavier, then with public transportation approximately 25-30 km. When it is sofa or some other thing, then it depends on the help from my friends and special

delivery methods.

R: Do you care about things' origins? (If the product is produced environmentally-friendly way or where it is produced or has there been any child labor used in production?)

I: About new stuff, yes.

R: Have you sometimes not bought a product if you are aware that the product is not produced ethically (child labor used etc)?

I: Yes.

R: What are the questions you usually try to find answers to from the Internet?

I: The topic is about things, right?

P: The topic is things.

I: In the internet I search the opinion of other people, if they have purchased some thing, I am interested to know, are they happy or not, in other words, I look at the reviews, I compare them with other similar products and try to find the one that has appropriate price for me and where to buy it.

R: What was the last web-page where you created an account?

I: Things.info, inspired by our previous talk, but before that.. I try to remember... no, don't remember it.

R: Did any new questions arise during our conversation that you have not thought before?

I: No.

INTERVIEW 10

Person J

via Skype

Location: Interviewer in Tallinn, interviewee in Portugal

Date: April 26, 2013

Interviewer: Piret-Klea Velleste

Person-to-person interview, standard layout.

Abbreviations used:

R=Researcher

I=Interviewee

R: How many books have you lent or borrowed at the moment?

I: At the time I don't have any books to borrowed. I have few books that I have bought. I think I have like like 3 that I want to read in coming months.

R: How do you keep track of the books you have lent out or borrowed?

I: I just borrow from libraries so these libraries they usually send me a e-mails. And I keep those

e-mails and...They also have a very effective service, that e-mails me in the day before the expert date of my borrowing period. So that I use that just simple e-mail to control when I have to return... and control those things.

R: If there is a internet-based library application where you can see the books you have lent out? Will you use it and how often?

I: The books I have lent someone I don't have no system to track on that. I know if there is a very close friends I know that I landed the book to them. And I often remind them if I see the book in their house. If there was a system I'm sure if there was that, I can control this that is simple enough. I will try to use it, yes.

R: If you want to read a certain book, how do you start your search?

I: well... I will basically look in... I will use an searching engine, in the Internet and I will look for how much does it cost. Or if I'm sure that I want to read the book I will try to buy it. If not sure, I will try borrow it from the library, first to see if this responses my expectations. So I use this search engine and I check the library website also.

R: What do you do with the books you do not need any more?

I: I give them away. Sometimes I give them away for... there are some community libraries that take donations. Other times well they are just pilling up in my bookcase.

R: Have you ever repaired a book, used it for other purposes than reading, or thrown away a book?

I: Yes, sometimes books that I borrow form the library and that are not in good conditions when I get them. I just make sure that I will not...contribute for the book to be even more damaged so I do some repairing. I don't think I have ever thrown away any books, that is something weird for me. So I do some repairing, I don't think I have never thrown away a book.

R: But something DIY, making shelf or table out of books.

I: Ou, you mean using books building something? That's a good idea, I have never tried it. But that's interesting idea.

R: Do you shop in second hand shops (vintage shops, websites) or rented some working tool?

I: Yes I do. I buy clothes in second hand and I... what els I did I buy... and everything els, I got some of my home appliances in second hand store.

R: What do you want to know about their previous owners?

I: Hm... basically.. how old is the item and well... let me think... well I guess... I also bought some stuff in www.craigslist.org when I lived in US and that time a also wanted to know is it from was from smokers house or not. Because it really... if something that comes from someone who is a smokers can not be in good condition, it can be smelly. So.. but basically I want to know in what condition is the item is, if it is a really old or can I use it. I don't care who is the previous owner.

R: On what basis do you choose to whom to donate things you don't need any more?

I: Well, first I will ask from my friends. If they are in the need of anything that I have and I don't want to use anymore. I donated to Salvation Army to these kind of communitary initiatives, I donated tho these community centers, what els... I think that those are the two. First family,

friends if they need anything if not, I give away for the community centers.

R: What are the products that you want to know more about how to dispose them?

I: The items I don't know much are... Let's say are electronics and appliances. When I say electronics it's not just computer its more cables, computer cables for example,... for example computer mouse, CD-s. I have like 2 bags full of CD-s. I don't know what to do with them. Well... I think the rest I know how should I dispose. The problem is that sometimes there are no eco-centers in the facility that could receive these items. So what I have to do is to keep these items at home until I have the opportunity to travel these places where are these eco-centers. And this is not very efficient, because I forget that I have that. So only when I do my home cleanup I have to remind my self that I have these items I have to take care. I have these stuff like one year. It's not very effective.

R: What is the reasonable range (km) for you to pick up a free sofa / washing machine / bag of toddlers' clothes?

I: That depends if you have a car. I don't have a car. So... if I have to rent a car or something... then I would consider like 50 km more or less. If I have to drive long way, it's not easy, because you spend lot of time just driving to get something and you also spend fuel. You have to consider all of these. It's reasonable like 50 km.

R: Do you care about things' origins? (If the product is produced environmentally-friendly way or where it is produced or has there been any child labor used in production?)

I: I usually take a look of the labels of the items. And... well when I can I decide buying against to China. I especially do that with food products. I tend to buy locally. I have a son and for him when I chose his toys. I never... the toys that he has are not made in China. I usually buy some wooden toys or Lego-toys. They probably made in China. But they company is European. I'm not sure if Lego nowadays is made in China. I tend to chose more expensive, usually these items are more expensive. But at least I know that they are not toxic. And they are safe for children. Usually there is food an children items I am more concerned. Where is this produced and where does it come from.

R: What are the questions you usually try to find answers to from the Internet?

I: Well... often there is when I look something to buy I look for the prices, different places. I also look for reviews what people are saying about this article... what els... if I also look in recycle or Craigslist in my area if there use something someone is selling something that I need. And... I think that's it... what els... I don't remember anything els... sometimes I look for websites of the company's to see their corporative page... if I understand some of their mission, vision, respecting the in terms of respecting the environment... but mostly the are prices where I can get the goods.

R: What was the last web-page where you created an account?

I: Okay... let me think... I think probably booking.com it was for taking for a traveling I do.

R: Did any new questions arise during our conversation, that you have not thought before?

I: Let me think a bit... I think one of the last questions when I was asked what do I search. For me is so general, I'm searching lots of things all the time but not for things. I'm doing research so I always use the search engines to understand what the concept is... not so much about things.

But when I think how do I use this search engine for things... I didn't not think about this first place. Because if you are... let's say thinking and buying something or... that you need... something I do not think that immediately I go to internet. Maybe I go first to ask some of my friends: do you know anything about this... to get some advice.

INTERVIEW 11

Person K

Location: Tallinn

Date: April 28, 2013

Interviewer: Piret-Klea Velleste

Person-to-person interview, standard layout.

Abbreviations used:

R=Researcher

I=Interviewee

R: How many books have you lent or borrowed at the moment?

I: I think three. All are my connected to my profession.

R: How do you keep track of the books you have lent out or borrowed?

I: I don't. I rely on my memory.

R: If there is a internet-based library application where you can see the books you have lent out? Will you use it and how often?

I: I don't know how often. Maybe I would borrow more because there is a list I can follow. I want to have a code in the book. So the code has all the information about this book, like this QR-code or something like that. So I can take the code with my phone and I have the information when I have borrowed... and do less work on my own.

R: If you want to read a certain book, how do you start your search?

I: I don't use e-books. There are two options, either I go to electronical bookshop www.kriso.ee or to an UK website www.bookdepository.com. But first I check whether or not the book is available in a local library.

R: What do you do with the books you do not need any more?

I: They are just in my home on the shelf.

R: Have you ever repaired a book, used it for other purposes than reading, or thrown away a book?

I: Only repairing. I have binded old books and made new covers from leather.

R: Do you shop in second hand shops (vintage shops, websites) or rented some working tool?

I: I have visited Humana and I have bought old books.

R: What do you want to know about their previous owners?

I: Maybe I want to know why did he sell it, or doesn't he need it or trades it or.. why does he sell it. This is what I want to know.

R: On what basis do you choose to whom to donate things you don't need any more?

I: First I think of my friends who will need it. When I have clothes that don't fit me anymore I give them to friends who don't have enough money to spare or they are smaller and clothes fit them. But about other things I think about my colleagues, do they want to read it.

R: What are the products that you want to know more about how to dispose them?

I: I will not throw away books. I give them away. But mostly commodity items, such ... one thing is.. what to do with old electronics, that will not go to dumping ground. Maybe there is a way to recycle. I have lots of computer mice and batteries and that kind of stuff. And how to prepare clothes for donating.

R: What is the reasonable range (km) for you to pick up a free sofa / washing machine / bag of toddlers' clothes?

I: I think in the range of Tallinn.

R: Do you care about things' origins? (If the product is produced environmentally-friendly way or where it is produced or has there been any child labor used in production?)

I: If there is a possibility to choose, then of course I prefer environmentally-friendly products. But in my professional context, then if I really need to get the book I need, then it doesn't matter.

R: Have you sometimes not bought a product if you are aware that the product is not produced ethically (child labor used etc)?

I: Yes, cosmetics.

R: What are the questions you usually try to find answers to from the Internet?

I: About products?

R: Yes, about products.

I: Price first of all, then availability, and then I look at the environmental friendliness or product line.

R: What was the last web-page where you created an account?

I: iherb.com.

R: Did any new questions arise during our conversation that you have not thought before?

I: Yes, about books and reusing them for other purposes. I have only repaired the books by binding and making new leather book covers.

INTERVIEW 12

Person L

via Skype

Location: Interviewer in Tallinn, interviewee in New York

Date: April 28, 2013

Interviewer: Piret-Klea Velleste

Person-to-person interview, standard layout.

Abbreviations used:

R=Researcher

I=Interviewee

R: How many books have you lent or borrowed at the moment?

I: -

R: How do you keep track of the books you have lent out or borrowed?

I: -

R: If there is a internet-based library application where you can see the books you have lent out? Will you use it and how often?

I: -

R: If you want to read a certain book, how do you start your search?

I: -

R: What do you do with the books you do not need any more?

I: -

R: Have you ever repaired a book, used it for other purposes than reading, or thrown away a book?

I: -

R: Do you shop in second hand shops (vintage shops, websites) or rented some working tool?

I: -

R: What do you want to know about their previous owners?

I: -

R: On what basis do you choose to whom to donate things you don't need any more?

I: I donate clothing as well even if it's a little bit ripped. I don't think people will want those things. Some people say that they throw away everything. Sometimes I use them for cleaning. When I throw things away I first ask my friend and then I give them to charity.

R: What are the products that you want to know more about how to dispose them?

I: It's actually I was thinking about it before we met, today. Sometimes still confuses me... Food

I'm pretty good in knowing how do despise them, but some weird like machines, I have to really look it up, it would be really nice to know it. I have to google it. But in you'r site I just have to look it up.

I also told Toomas that it would be nice to have a app for what you are doing. It would be great! When I saw the video those people were in grocery store. We have to have to google it but it would be really have an app for it. That would be awesome. I'm trying to eat healthier because I eat sugar all the time. I'm actually really curios the stuff I'm buying lately. Lot of it I don't know really about.

R: What is the reasonable range (km) for you to pick up a free sofa / washing machine / bag of toddlers' clothes?

I: So..here in New York people get rid off stuff all the time. In my area it's Tuesday a trash night. And we use to get our stuff from the street. But that's like years ago. But few years ago there was a bed bug inflate and there was bed bugs everywhere and it was really dangerous to take anything from the street. I would't probably not do it any more.

And then on Craigslist, you can get of free things. But otherwise I don't know. There a Salvation Army 20 minutes walking distance from me that has really good prices.

R: But getting free something?

I: If you would not be paranoid as I am, you could totally get something from the down the block. A saw a nice suitcase down the neighbors in the trashes. It was completely clean and stuff. But that makes you wonder like are they good enough or do they have to many suitcases or does there been some bugs going on. Or what's going on?

R: Do you care about things' origins? (If the product is produced environmentally-friendly way or where it is produced or has there been any child labor used in production?)

I: Yeah I do. But I wouldn't be hypocrit. Like I have lot of perfume that is not the best for Earth. I'm like conscious about that but i'm not perfect, you know.

R: Have you sometimes not bought a product if you are aware that the product is not produced ethically (child labor used etc)?

I: I haven't really thought about it. To tell you the truth. When I buy something...If they have a environmentally friendly product line I'll rather grab that and get exited about it. But when I want to buy lets say perfume...I don't really look that if they have environmentally friendly line.

R: What are the questions you usually try to find answers to from the Internet?

I: About things...when they were invented and how things work. I like website www.howstuffworks.com so I go on there a lot. I also like TED-talks. I'd like to know mostly where they are coming from when they were invented and how... and some of them I'd like to look where there going, what's the new stuff that they are making. Sometime I look DIY videos, recycled stuff. I make lot of stuff. I made from a cardboard for a shoe shelf. Yeah, I like to look that what to do with staff.

R: What was the last web-page where you created an account?

I: Oh.. eBay

R: Did any new questions arise during our conversation, that you have not thought before?

I: Well yeah... if I wouldn't buy something if there is no environmentally friendly line.