Kristiina Soini-Salomaa (ed.)

Lahti Design Annual Review **2017**

Lahti Design Annual Review **2017**

Contents

About the authors

Antti Heinonen, MA Arts and Culture, is a lecturer and programme coordinator of Media Content Design at Lahti University of Applied Sciences, Institute of Design. His main interests are visual communication design, storytelling and visualization.

Sara Ikävalko, MA in Strategic and industrial Design, is a senior lecturer and programme coordinator of Industrial Design at Lahti University of Applied Sciences, Institute of Design. Her background is in user driven design and city development. She is especially interested in working on bringing public administration, designed together with people. She has been a pioneer in developing and implementing new co-design methods in the field of city planning.

Harri Kalliomäki, BA (furniture design), is a senior lecturer and program coordinator of furniture design and interior architecture at Lahti University of Applied Sciences, Institute of Design. His main interests are user-centred design and furniture design process.

Mirja Kälviäinen, PhD (Arts and Culture) is a principal lecturer and course leader for the MA level design and media studies at the Lahti University of Applied Sciences, Institute of Design. She also carries docentships in two other Finnish universities. Her research work has included methods for user driven design, design thinking and service design with front end innovation process and co-design applications. Lately her research interest has concentrated on design for environmentally sustainable behaviour change.

Katariina Mäenpää, PhD (BA), is a project manager and RDI specialist in University of Applied Sciences, Institute of Design. Her main interests are consumer behavior, marketing, creative processes, innovation processes and regional development.

Noora Nylander, MSc (Pack. Tech.), BA (Pack. Design), is a senior lecturer and programme coordinator of Packaging Design and Branding at Lahti University of Applied Sciences, Institute of Design. Her main interests are sustainable packaging and industrial design, inclusive packaging design and development of new packaging solutions.

Emmi Putkonen, 4th year Industrial Design student, is a project assistant at the City as a Service for Young Citizens project. She's interested in human-centered design methods, strategic design and future insights.

Anu Raappana, Lic Sc (Education) is a reseacher, RDI specialist and project manager in Lahti University of Applied Sciences, Institute of Design. She is interested in development of pedagogy and RDI processes.

Kristiina Soini-Salomaa, PhD (Education) is a RDI director in University of Applied Sciences. Her main research and professional interests are strategic development of RDI activities, design research, design thinking methodologies, future studies and forecasting.

Kristiina Soini-Salomaa

Foreword

This is the first review of the publication series named the Lahti Design Annual Review, which presents the latest research, development and innovation activities in the context of design, written by experts from Lahti University of Applied Sciences (Lahti UAS). In the year 2016, the city of Lahti launched a competitiveness strategy that highlights the significance of design. The Lahti region has a long tradition in the design-intensive industry and in the art and design education. There are famous furniture, graphic and fashion industries in the Lahti region which have created the foundation for design education at Lahti University of Applied Sciences at Institute of Design.

Through our vision in the RDI design focus area, we help to promote economic competitiveness, the circular economy and well-being. The aim is to make design RDI activity an integral part of regional and national design ecosystems. The key themes in the design focus area are: visualisation of systems and information through information design, a co-design approach to services and operating environments, and a user-centred approach in industrial design. This review presents some of the significant actions that have been carried out as a part of our projects to reach the goals and promote the transition towards design-intensive and user-centred products, services and operational environments.

In the first article, Dr. Kristiina Soini-Salomaa expands on the goals and challenges related to RDI activities in the design focus area. During the last years, RDI activities at the Institute of Design have increased rapidly. The need for design expertise in the various development areas has grown together with the expectations of broader design competence of professionals. In the past, design expertise was focused more on product design. Now the strong emphasis is on systemic, user-oriented and strategic approaches. According to many surveys, the use of design varies a lot among companies and the public sector. One of the main tasks in our RDI projects is to increase the understanding and use of design.

The integration of RDI activities with education and learning means teaching with an industry focus and giving students an active role in the development of work practices and networking. The article by Ms. Anu Raappana and Mr. Harri Kalliomäki showcases one experiment that is part of an RDI project called Design or Die. The theoretical framework of the experiment is based on the concepts of team learning. The aim of the experiments and other concrete measures

of the Design or Die project is to produce information that can be used in the development of design education in Finland. One of the findings was that team learning has significant benefits, especially in design education. Team learning is one way to respond to the challenges of the changing world of work through education. By utilizing team learning, students learn to take responsibility for their learning, work in groups and develop a holistic understanding of their own competences.

In Ms. Noora Nylander's article, design process and pedagogy are described in depth. This article discusses design pedagogy by illustrating trials with learning tasks, which include the design process but which are aimed at improving students' survival skills as future designers. The aim of these learning trials is to build collections of learning tasks that support students' design process skills without neglecting their personal and artistic processes. Three examples have proved that students have more knowledge about their design process than they may realise. They were asked to revisit their journey or create analogies for what it means to be in the design profession. As the next step, learning tasks could be built to help students understand themselves and create better professional self-knowledge.

As new generations of citizens grow up and actively use public services, new requirements for city services and the environment are needed. Dr. Mirja Kälviäinen, Ms. Sara IKävalko and Ms. Emmi Putkonen have mapped challenges related to city services for young people. Their article looks at the explorative user research activities around young adults as public sector service users in the Finnish metropolitan region cities. A mosaic of explorative methods has been used to study user demands, such as multiple communication channels and the use of the city environment to produce a rich picture of the possible use and needs of services by young citizens. The analysis produced insights into the challenges and solution opportunities for communication and service development within city-based services and the city itself against the demands and restrictions set by the digital native population. The continuation of the project is looking further at how a young citizen might be involved in co-developing and experimenting with the service prototypes.

The important goal of our RDI activities is to promote user-driven environmental sustainability. One path tries to enhance the performance of existing systems – mostly products and behaviour related to them – with design interventions in the existing technosphere. The other path pursues sustainable lifestyle solutions and a socially satisfying consumption culture. The article by Ms. Noora Nylander and Dr. Mirja Kälviäinen shows examples of student work made under sustainable design studies in the packaging design program and discusses how starting from the user-centred approach and moving towards systems can create better sustainable behaviour. By using user-driven design as a starting point, the students started

to design new behaviour and services. Thinking about packaging as a service could also provide even more sustainable benefits to the brands and ease the burden of how to be sustainable in a cool manner.

The projects that have recently begun are TAJUMO - Art and Design Centre and PAJU - More productivity and job satisfaction with service design. TAJUMO aims to create an overall concept for an experiential art and design centre (ADC); whereas PAJU, working together with the personnel of Lahti museums, will grow into a completely new way of providing meaningful experiences to the people visiting the ADC. Ms. Katariina Mäenpää and Dr. Kristiina Soini-Salomaa describe in their article the activities to create a concept for an experience centre that will serve as the cornerstone of national and international cultural tourism for the city of Lahti as a tourist destination. The most essential aspect is the co-creation with the customers, citizens and stakeholders.

The complex and process-based data can benefit from information visualisation as a means to deliver the required information to the selected audience. The article by Mr. Antti Heinonen and Dr. Mirja Kälviäinen introduces the information design case for the InforME project—visualising renewable energy production possibilities for the rural countryside of Finland. In many systemic and process-based information communication cases, it is suitable to deliver the information in a narrative form, which is especially vital to collaborate with the information content so that the script contains the necessary information and forms an understandable storyline. The data-wrangling process should be done together because the narrative form requires both specific content elaboration or simplification and organising the data into a correct information-carrying script.

I warmly thank all the authors who made it possible to publish this review for the first time. I hope that this review gives you some new insights and further ideas in design education, research and development.

Lahti, 10 December, 2017

Dr. Kristiina Soini-Salomaa
RDI Director, Design
Lahti UAS

Kristiina Soini-Salomaa

RDI in Design at Lahti University of Applied Sciences

Abstract

The RDI activities in the design focus area at Lahti University of Applied Sciences are practice-based, development-focused and an applied approach leading to the most user-driven results as possible. The research and development themes are multidisciplinary, complementary, and they facilitate cross-sectoral expertise that supports the creation of future solutions. Key themes in the design focus area are visualisation of systems and information through information design, co-design approach to services and operating environments and user-centred approach in industrial design. Over the past decades, there has been a shift from shape making towards the sense making of the future. Meanings have become important, as is seen in co-design, service design and in a strong user-centred approach in design.

In this paper, design expertise for an ever-changing operational environment is discussed. According to many research results, the use of design varied a lot among businesses and the public sector, and the ability to use design expertise seems to be strongly connected with general RDI intensity. This is illustrated by the utilisation of The Design Ladder model. One of our main goals in RDI work is to climb up the design ladder with our partners and stakeholders.

Rationale and background of RDI activities

The RDI activities of Lahti University of Applied Sciences (Lahti UAS) are part of the national and regional research and innovation system, which operates in the context of international and national networks and active collaboration with partners and businesses. The activities follow a practice-based, development-focused and applied approach leading to concrete results. RDI activities facilitate skills and knowledge transfer and emphasise an international dimension and value networks. The aim is to generate activities that are practice-based and beneficial to organisations by responding to future needs and promoting the region's growth, competitiveness, well-being and employment opportunities in the focus areas. (Lahti University of Applied Sciences 2016)

The framework for RDI activities is provided by the multidisciplinary focus areas specified in the updated strategy of Lahti UAS: Design, Smart business, Well-being and regenerative growth and Circular economy solutions. A set of RDI themes, in which Lahti UAS will seek national and international prominence, has been selected based on the focus areas. The RDI themes are also used to regenerate the region's skills and knowledge base and introduce areas of excellence in development as subjects of learning. (Lahti University of Applied Sciences 2016)

Focus area-specific RDI themes - design

The RDI themes of each focus area form the structure of the RDI programme at Lahti UAS. The themes are multidisciplinary, complementary, and they facilitate cross-sectoral expertise that supports the creation of future solutions. Focus-area-based RDI activities are aimed at promoting the region's growth and competitiveness and well-being and strengthening the internationalisation of its businesses and communities. The chosen themes are delivered in collaboration with networks and businesses encompassing the region's industries, SMEs, public and third sectors.

Through our Design philosophy, we help to promote economic competitiveness, circular economy and well-being. The aim is to make design RDI activity an integral part of regional and national design ecosystems.

Key themes in the design focus area are:
→ **Visualisation of systems** and information through information design
→ **Co-design approach** to services and operating environments
→ **User-centred approach** in industrial design

The information design theme deals with information sharing by visual methods to concretise complex systems, such as ecosystemic environmental solutions, well-being service processes, big data and various user interfaces. Information design can be applied in diverse braches of activity. The aim is to develop expertise related to information design and visualisation.

The service design theme deals with the development of user-oriented service processes related to different sectors. Service design methods are employed to generate service business, create new service concepts, promote circular economy and well-being. The design approach helps support well-being through everyday preventive actions, workplace well-being and sense of purpose.

The industrial design theme deals with the development of user-oriented, environmentally friendly products and services and resource efficiency. The design approach is used to develop bio-based and other eco-efficient materials and to design material flows responsibly. Environmentally friendly design encompasses eco-efficient marketing, re-design, virtual production opportunities and the development of sharing economy.

Focus areas

Design

Smart business

Entrepreneurship -the working philosophy at LAMK

Well-being and regenerative growth

Circular economy solutions
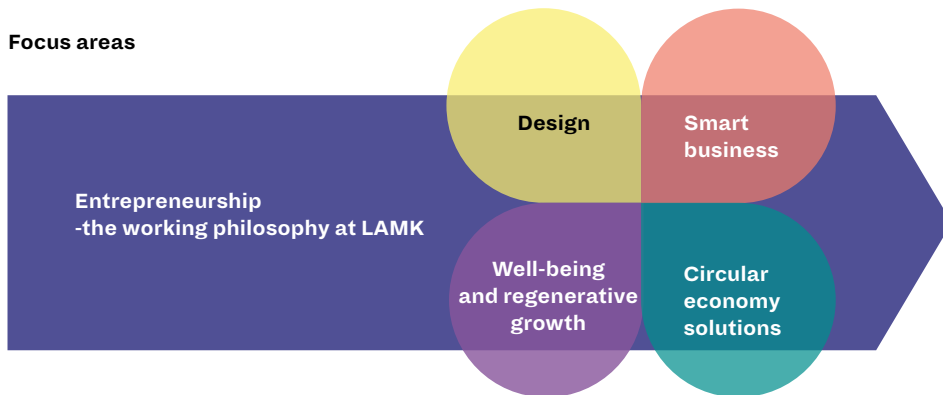
Picture 1. Focus areas (Lahti University of Applied Sciences 2017).

During the last years, design-focused research and development activities at Lahti UAS have increased rapidly. At the moment, the Institute of Design is running, together with other faculties, universities and business partners, seventeen different development projects. The need for design expertise in the various development areas has grown, together with the expectations of broader design competence of professionals. Before, design expertise was more segmented by material, manufacturing technology or customer orientation; now, systemic, user-oriented and strategic approaches are emphasised in almost every development process. When designing systems like operating environments, organisations, behavioural models, service packages or customer experiences, different kinds of design expertise is needed to provide satisfactory solutions.

From the shape making to the sense making

In industrial design, goods are usually mass produced in the assembly line. Often, the design is done separately from the production. Industrial designers have long used different kinds of tools, like prototypes, for shape making of products and services. Over the past decades there has been a shift towards the sense making of the future. Meanings have become important, as is seen in co-design and service design (Sanders 2013; Buchenau & Fulton Suri 2000).

In shape making the future, prototypes are used to explore and communicate design ideas, materials and processes before the final products appear. In the sense making of the future design methodologies, solutions can be used to observe and model customer behaviour and

experience in order to understand and develop novel services and systems.

Referring to Barroso and VanPatter, Design Thinking starts upstream with no outcome assumptions and results in diverse outcomes. Product Design Thinking traditionally starts downstream with product creation assumptions and results in product outcomes, and Service Design Thinking with service creation assumptions and results in service outcomes. Experience Design Thinking starts downstream with experience-making creation assumptions and results in experience outcomes. (Barroso and VanPatter 2015)

Understanding the different approaches in design thinking, Barroso and VanPatter (2015) recommend to step back, and from a sense making perspective, better understand the various differences, options, intentions, limitations and possibilities before making decisions and investments in product or service development.

One key question seems to be the lack of understanding of the significance of design. Many organisations, especially SMEs, do not recognise design as a strategic part of business or they do not understand the value creation that is related to the user-orientation or the customer behaviour. For these reasons, companies are often unable to use designers' expertise in the product or service development.

The main task in many of our ongoing projects is to increase the understanding and use of design. In the Designed Growth (Muotoiltua kasvua) project, 100 SMEs were contacted and 30 SMEs interviewed to map the understanding, use and expectations of design. According to the results, the use of design varied a lot. On the other hand, the design as a concept or expertise was not really understood and on the other hand, design was seen as a strategic factor in business.

A very similar situation is recognized in many other surveys. Companies' ability to use design expertise seems to be strongly connected with general RDI intensity and activities of the company. Design thinking is gradually understood as a strategic approach when developing products, services, environments and organisations together with the people and stakeholders. (Alavuotunki, Halme & Salminen 2015)

The Design Ladder is based on the hypothesis that there is a positive link between business success, placing a greater emphasis on design methods in the early stages of development and giving design a more strategic position in the company's overall business strategy. (Danish Design Centre 2017) The Design Ladder was developed by the Danish Design Centre in 2001 as a communicative model for illustrating the variation in companies' use of design. It consists of four steps: non-design, design as form-giving, design as process and design as strategy.

In the first step, design is an invisible part of product development, and the task is not handled by trained designers. The solution is driven by the involved participants' ideas about good function and aesthetic. The users' perspective plays little

STEP 4
DESIGN AS STRATEGY
Design is a key strategic element in our business model

STEP 2
DESIGN AS PROCESS
Design is an integrated element in development processed

STEP 2
DESIGN AS FORM GIVING
Design is used as finish, form-giving or styling new products/services

STEP 1
NON-DESIGN
Design is not applied systematically
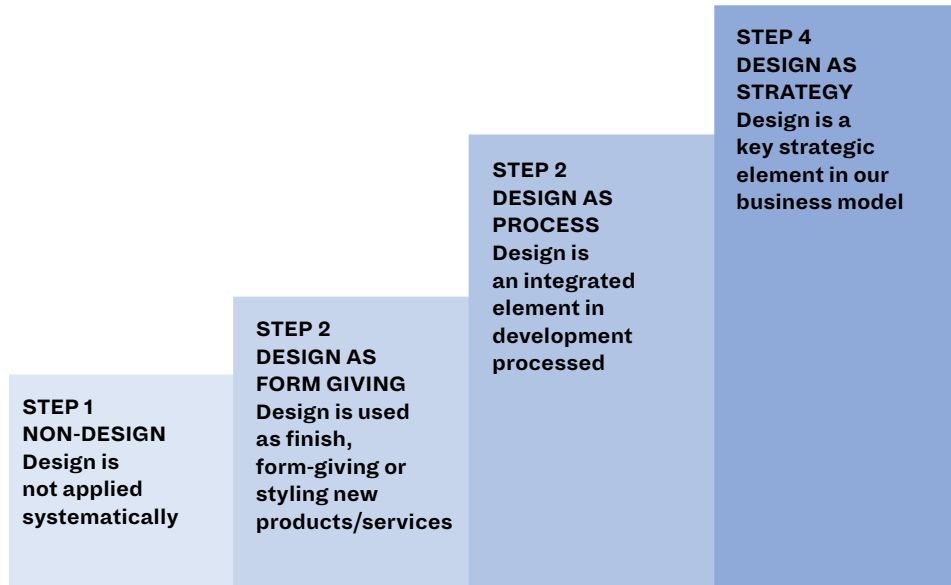
Picture 2. The Design Ladder (Danish Design Centre 2017).

or no role in the process. In the second step, design is viewed exclusively as the final form-giving stage (shape making), whether in relation to product development or graphic design. The task may be carried out by professional designers but is typically handled by people with other professional backgrounds. (Danish Design Centre 2017)

In the third step, design is not a result, but an approach that is integrated at an early stage in the development process. The solution is driven by the problem and the users (sense making)

and requires the involvement of a wide variety of skills and capacities, for example, process technicians, materials technicians, marketing experts and administrative staff. In the fourth step, the designer works with the company's management to rethink the business concept completely or in part. Here, the key focus is on the design process in relation to the company's business visions and its desired business areas and future role in the value chain. (Danish Design Centre 2017)

Conclusions

Responding to these complex development challenges, we must proceed with our RDI activities even more effectively, especially with regional partners, SMEs and actors in the public sector. Lately, we have prepared development projects focused on user-centred package design solutions and new products in the construction industry promoting the use of the side streams of construction materials and circular economy. We have also raised the importance of service and co-design in the social and health care sector planning a new training program both for designers and healthcare professionals. The aim is to co-design together service solutions for different target groups, such as the elderly.

The challenge is also to redesign design education towards more multi-disciplinary approaches and teamwork, not only within the design field but with other disciplines. One of the key findings identified in Malhotra's et al. study is the multi-disciplinary approach required in design research methods for the future. Future mapping activities should include input of designers but also a selection of perspectives of experts from various backgrounds. A designer's usual strength lies in comprehension and synthesis of visual information. Other activities, such as statistics, ethnographic research, trend and socio-economic data analysis, etc., require a different set of skills. A combined effort of this multi-disciplinary team is needed to envision and articulate all of the nuances and information involved. (Malhotra & al. 2014)

For this transformation of design education, we have designed, together with other Finnish design universities, a large programme which covers all the aspects and needs for redesigning the learning models, tools and environments. Our ambitious goal is to establish a new joint Academy, which helps us to meet the challenges of the future.

References

Alavuotunki, K., Halme, K. & Salminen, V. 2015. Muotoilun hyödyntäminen ja vaikutukset yritysten kilpailukykyyn. Työ- ja elinkeinoministeriön julkaisuja. Innovaatio 58/2015.

Barroso, A. & VanPatter, GK. 2015. Talking Up Sense Making Clarity: The Next Design Thinking Evolution. Next Design + HUMANTIFIC. [Cited 30 Nov 2017]. Available at https://www.academia.edu/17742845/Ask_Humantific_Part_3_of_3_Clarity_The_Next_Design_Thinking_Evolution

Buchenau, M. & Fulton Suri, J. 2000. Experience Prototyping. In B. Boyarski and W. A. Kellog (eds.). Proceedings of the conference on designing interactive systems; Processes, Practices, Methods, Techniques. NY: ACM Press.

Danish Design Centre. 2017. THE DESIGN LADDER: Four steps of design use. [Cited 30 Nov 2017]. Available at http://danskdesigncenter.dk/en/design-ladder-four-steps-design-use

Lahti University of Applied Sciences. 2016. RDI Programme 2016-2018. [Cited 30 Nov 2017]. Available at https://www.lamk.fi/english/about/strategy/Documents/lamk-rdi-programme.pdf

Malhotra, S., Das, L.K. & Chariar, V.M. 2014. Design research methods for future mapping. International Conferences on Educational Technologies 2014 and Sustainability, Technology and Education 2014. [Cited 30 Nov 2017]. Available at http://files.eric.ed.gov/fulltext/ED557342.pdf

Sanders, E. B.-N. 2013. Prototyping for the design spaces of the future. In L. Valentine (Ed.) Prototype. Design and Craft in the 21st Century. Bloomsbury.

Anu Raappana & Harri Kalliomäki

Developing design education

Abstract

Research, development and innovation activities at universities of applied sciences are based on the integration of practical experience with the latest knowledge and expertise. RDI is part of education and contributes to its development. RDI supports industries and regional development and helps to renew education. The integration of RDI activities with education and learning means teaching with an industry focus and giving students an active role in the development of work practices and networking. Development activities enhance knowledge about design through practical examples for the benefit of students. Projects produce learning and applicable empirical knowledge.

This article showcases one experiment that is part of an RDI project called Design or Die. The theoretical framework of the experiment is based on the concepts of team learning. The experiment was carried out in two study modules of the Interior Architecture and Furniture Design programmes. The aim of the experiments and other concrete measures of the Design or Die project is to produce information that can be used in the development of design education in Finland.

Keywords: design education, team learning

The Design or Die project

In recent years, working life has undergone a massive change at a rapid pace. This is evident in the frequency of technological, organizational and other operational changes in workplaces. (Alasoini et al. 2014, 10) The change has also affected the design sector. For example, digital transformation has changed and will continue to change designers' work and working environments, while at the same time creating new possibilities for entrepreneurship and necessitating a review of the traditions according to which design education has been organized and put into practice until now.

The main aim of the Design or Die - Creative Value Creation and Competitiveness project is to increase the possibilities of recognising and utilising creative competence as a new source of competitiveness among businesses, organisations and networks. In the Design or Die project, design is seen as an all-round strategic vehicle of value creation and competitiveness for both businesses and society at large. The project strengthens cooperation between different operators within the creative sector by utilising their knowledge of multidisciplinary modes of operation. The project also aims to promote the employment of professionals, amateurs and students within the creative sector.

To this end, the project contains concrete measures including experiments, events, co-creation pilots implemented with companies, multidisciplinary innovation workshops and camps, international hackathons, webcasts and benchmarking of good practices in order to strengthen cooperation with similar projects and networks within the Baltic region. During the project, web-based materials and solutions will be developed for common use based on the pilots, along with training programmes for teachers, educators and advisers, and advisory services for creative professionals. All measures are evaluated and valuable information is collated for use in the development of design education in a way that benefits students – future designers.

Education experiment

The observations presented here are based on a review of the implementation methods of the Lahti University of Applied Sciences Institute of Design, Interior Architecture and Furniture Design programmes. The experiment has been conducted as part of two courses: Expert Project and Product Development Project. Both courses carry seven ECTS credits each.

In both courses, the pedagogical approach is a student-driven project which is implemented as team work. In the experiment, we observed the students' learning process as well as the teacher's role and its evolution through team learning. The analyses were carried out by the teachers of the courses in question. During the analysis, teachers compared the experience of previous years to the experiences gathered now. The aim of the experiment was to provide teachers information on the effective use of team learning methods and how team learning can help nurture thinking, students' understanding of the design process, and other basic skills related to a designer's professional identity.

Team learning is a collaborative, interactive and responsible learning method that involves both individual and community processes (Hytti et al., 2010; Seikkula-Leino 2007). In team learning, all members of the group have an influence on learning. Students themselves are responsible for the process and participation. (Johnson et al., 1994) Students are the active participants in their studies. The role of the teacher has changed from a classroom authority to one who poses questions, supports and listens to the students. Team learning is related to the concept of learning by doing. Team learning often happens in concrete real life projects where students have active hands-on roles as workers and experts. (Seikkula-Leino 2007; Vuorinen, 2001; Reunanen & Heikkilä 2015).

Interior architecture and furniture design education focuses on planning expertise and research in living environments and public spaces such as workplaces, commercial and leisure environments and related products and services. Essential aspects of design education include visual quality, user orientation and sustainable development. Students become

acquainted with user-oriented design and architecture and develop solutions in a range of design tasks according to users' personal, social and cultural needs and aspirations. Students learn to analyse and transform the built environment. Studies in interior architecture and furniture design have been traditionally based on projects and teamwork. The Design or Die project is one tool which can be used to advance our understanding of team learning and pedagogical solutions based on it.

The different phases and forms of the studies clearly and consistently promote the development of professional and general knowledge, skills and competences needed in the world of work. Learning takes place in real and simulated workplace environments as often as possible. The key is to practice, reflect and continue independent study as a professional (Määttä et al. 2015, 11).

The findings

→ **Teams generally** accomplish more than individuals. One particularly good feature of team learning is peer learning and the support provided by group members. Experience shows that the team is often able to identify the strengths of each individual, thus helping team members utilize their individual strengths more effectively. What is also important is the experience of success achieved by teamwork and of being able to contribute individual expertise towards the team's success.

→ **Team learning** has significant benefits especially in design education. Teamwork teaches students to work in groups in the same way as they will in their future careers. However, student teams still need to be more multidisciplinary. Working as a professional is based on cooperation with many different sectors. Team learning promotes students' ability to work in multidisciplinary teams.

→ **The target level** of the team is higher than that of individual students. Sometimes the goal is set too high, and the teacher's job is to help students find a goal that is realistic. This often creates opportunities for better outcomes than what is possible to achieve in traditional, individual design work.

→ **Attention must** be paid to the configuration of a team. It needs to be of the right size and have the right members.

→ **The success of team** learning is based on the students' readiness to work in teams. This is taken into account in the student selection, and the participating students generally have good team work skills.

→ **There is a significant** change in the role of the teacher as a result of team learning. The teacher cannot approach the job in the traditional way. In the team learning process, the teacher is more or less a coach or facilitator.

→ **The role of** - and need for - teaching materials is also different. The teacher no longer needs to use as much time to produce teaching materials in advance. The need for material arises from the students' learning process. The teacher has to learn to utilize open access materials in order to be able to guide students to use a range of different sources. The importance of different information retrieval methods (e.g. observation, questioning and interviewing) also increases in team learning.

Conclusions

Team learning is one area of development in design education. Although it is already a well-known method in design education, it needs to be more carefully thought out and understood, and there must be a common understanding of the changes team learning brings, for example, to the role of the teacher in guiding the learning process of students. Team learning is one way to respond to the challenges of a changing world of work through education. By utilizing team learning, students learn to take responsibility for their learning, work in groups and develop a holistic understanding of their own competences.

During the experiments, it became clear that the team learning process is also a learning process for the teachers. The amount of new information students are able to bring to the project is significant. It is important to note that world views, assumptions of human nature, values and the individual student's way of perceiving the world are more prominent in the team learning process than in traditional teaching-based learning. This aspect enriches the learning process in many ways. Both students and teachers win in this situation.

The Design or Die project includes several experiments and aims to bring new visions and topics to the discussion concerning the development of design education. The experiment introduced in this article is just one example of the various ways in which the Design or Die project generates knowledge for the future development of design education.

The Design or Die project is funded by the European Social Fund. The project is scheduled to run from 1 September 2016 to 31 December 2018. The project partners are Aalto University, the University of Lapland and the Finnish Association of Designers (Ornamo).

References

Alasoini, T; Lyly-Yrjänäinen, M.; Ramstad, E. & Heikkilä, A. 2014. Innovativeness in Finnish workplaces. Renewing working life to bring Finland in bloom. Tekes. Review 312/2014.

Hytti, U; Stenholm, P; Heinonen, J. & Seikkula-Leino, J. 2010. Perceived learning outcomes in entrepreneurship education: The impact of student motivation and team behavior. Education + Training, 52 (8/9), 587-606.

Johnson, D. W; Johnson, R. D. & Johnson H, E.1994. The New Circles of Learning: Cooperation in the Classroom and the School. Alexandria, VA: ASCD.

Määttä, J; Sirkkilä, H; Hoffren, J. & Nyman, T. 2015. Opettaja valmentajana Humakissa. Työelämälähtöistä, ryhmäperustaista pedagogiikkaa kehittämässä. Humanistinen ammattikorkeakoulu. Helsinki.

Reunanen, E. & Heikkilä, T. 2015. Opettajasta valmentaja restonomi-opinnoissa. Opettaja 11/2015.

Seikkula-Leino, J. 2007. Opetussuunnitelmauudistus ja yrittäjyyskasvatuksen toteuttaminen. Opetusministeriön julkaisuja 2007: 28. Koulutus- ja tiedepolitiikan osasto.

Vuorinen, I. 2001. Tuhat tapaa opettaa: menetelmäopas opettajille, kouluttajille ja ryhmän ohjaajille. Resurssi. Tampere.

Noora Nylander

How to enhance a design student's personal journey while at the same time creating an understanding of how to use processes and tools

Abstract

Design thinking as a process helps create more creative solutions to complex problems. As a design teacher, one notices students struggling with how to understand the theoretical processes and how to incorporate them into their design and ideation practices. The design process and many variations of ideation cards are good tools for helping design students to learn and build their own design processes. The key is to understand how a personal, creative touch and practicalities are reflected in process thinking. This paper discusses design pedagogy by illustrating trials with learning tasks, which include design process but which are aimed at improving students' self-survival skills as future designers. The aim of these learning trails is to build collections of learning tasks that support students' design process skills without neglecting their personal and artistic processes.

Keywords: Design process, design pedagogy, learning

Why it is important to enhance the self-survival skills of students to deal with complex future problems?

The aim of the Design or Die project at the Lahti University of Applied Sciences is to increase the utilisation of design thinking and knowledge in the multidisciplinary product-service development processes of companies and the public sector. The project will look for solutions to renew and make design education more multidisciplinary. Thus, the project will strengthen an understanding of the possibilities of design thinking as a strategic tool as well as a profession, which will in turn strengthen competitiveness. Additionally, the project will instil new knowledge as a part of design education and pedagogy.
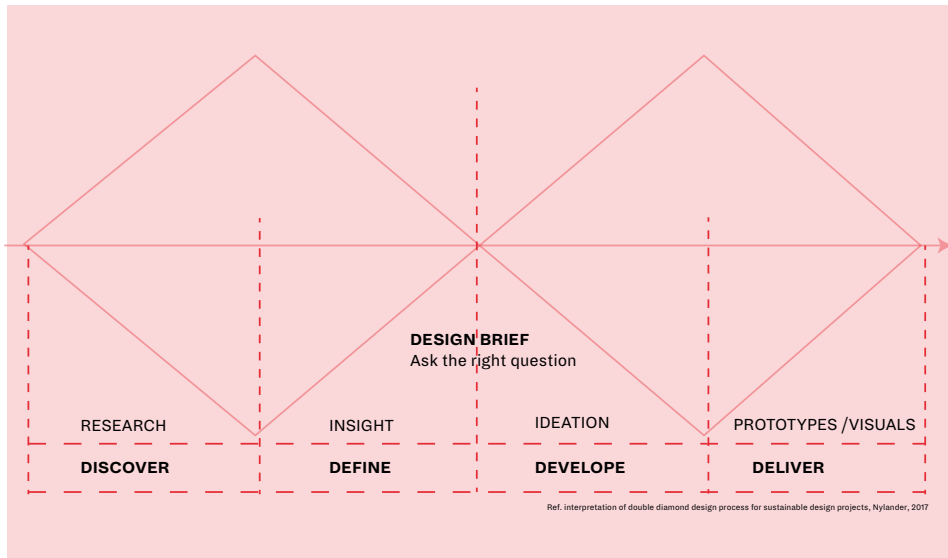
Design thinking as a process helps create more creative solutions to complex problems. As a design teacher, I have noticed during my teaching years students struggling with how to

understand the theoretical processes and how to incorporate them into their design and ideation practices. At the Lahti Institute of Design, we have a strong background in creating high-quality tangible solutions and prototypes, and our pedagogical model is based on the constructive concept of learning. The problems that designers solve in a rapidly changing world are becoming more and more complex. We design product service systems, meaning that we increasingly encounter more complex problems in society, such as sustainability and new consumption models.

In fact, as designers we need to address and educate students on how to redesign and deal with systemic problems as well as how to manage cognitive and physical interventions with people on their own. The Icograda Design Education Manifesto 2011 says that future design education needs to accomplish the following: "instil a compassionate and critical mentality and nurture a self-reflective attitude and ability to adapt and evolve through innovative learning tools and methods for communication and collaboration." The manifesto further states that educators need to do the following: "prepare students for technological, environmental, cultural, social and economical change. To this end, it [design education] should evolve from teacher-generated projects to more participatory problem definition, enabling students to democratically address their own concerns and ways of learning with student-initiated projects." (Bennet & Vulpinari 2011)

Doordan (2013, 68) notes that sectorial advances often fail to address systemic problems. Systems-oriented design theory suggests that sectorial solutions are not enough, but that systems also require redesign. Sustainability and circular economy is one key driver that will guide all futures design choices and encourage designers to design new product-service systems as well as symbolic and emotional products and systems. When new types of design approaches are developed, increasingly designs need to take into account the intangible and immaterial aspects for our daily lives. In fact, ecological choices are not only based on rational arguments, but also on emotional causes. Tan and Johnstone (2011, 5) demonstrate that they are even more important than facts. Because consumption is symbolic and emotional, the rational choice model does not explain or promote such social, cultural and psychological motives. Sustainable ways of living may seem difficult and dull at first (Power & Mont 2010, 2574, 2577). This, though, calls attention to the important task of design for branding and providing immaterial, emotional-cultural value in addition to mere functional products. Appealing to people's innermost desires in the same way as does commercial marketing is seemingly a more effective means of enacting behaviour change than the negative information campaigns prevalent today.

A designer can focus on product-based design or on creating solutions for branding and intangible systems. For many years, I have been

DESIGN BRIEF
Ask the right question

| RESEARCH | INSIGHT | IDEATION | PROTOTYPES /VISUALS |

| DISCOVER | DEFINE | DEVELOPE | DELIVER |

Ref. interpretation of double diamond design process for sustainable design projects, Nylander, 2017

Picture 1. Double diamond process interpreted (Nylander 2017).

teaching sustainable design and developing a process for guiding students through complex design tasks. The first trials resulted in students becoming frustrated when facing the enormous responsibility and burden of addressing complex issues. In my teaching, I have also wanted to support students' freedom to choose their own approach to a given design problem. Thus, I want to teach them to think for themselves as well as to gain skills and a sense of security in navigating their way through complex systems. Usually, as teachers we promote a certain process model for students (picture 1) and then guide them in how to use that model along their journey. I use as a basis process, a so-called double diamond design process, which simply and visually describes the characteristics of the design process (Design Council UK 2017).

In the creative design process, several possible ideas are created, which is called divergent thinking, and then these ideas are narrowed down to the few best ideas, which is called convergent thinking. Double diamond design describes well this process and how it is done twice (research + insight and develop + deliver).

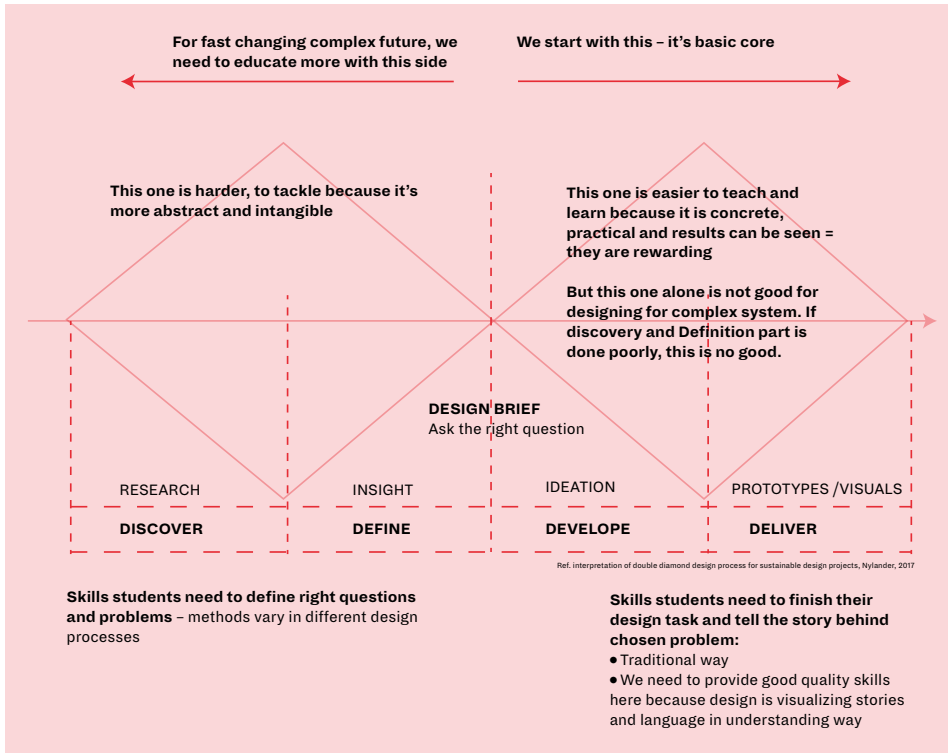## Design process as a tool to educate design students

One popular way to educate design students is to use the design process as a tool. Design School Kolding has used this kind of pedagogical method already for many years. In their pedagogy, they require students that be able to link theory and practice. They support students' abilities to accomplish this task by providing instructors who are experts in their field to help students to bridge gap between theory and practice by themselves. Students choose the methods that they are most comfortable with. The freedom of choice makes the teaching exciting and unpredictable at times. Thus, teaching and research occur in close relationship with one another and help both students and teachers test new methods and theories. One could say that the creative approach to teaching methods and using research in close co-operation with students creates new thinking and knowledge. (Design School Kolding 2016)

Currently, it is possible to find many different design methods cards available for designers, like ones published 2002 by IDEO. Silje Kamille Friis from Design School Kolding has based her co-creation cards on a theoretical model. Thus, she wants to make it possible for both designers and non-designers to use them. She describes the cards as follows: "My starting point has been to create a common language when people with different professional backgrounds have to work together in a creative process. The cards are the seeds for a better understanding of how each individual works in a design process." The aim of the method cards was to help students think more in terms of process and method. Thus, the students would gain their own experience and be able to formulate a design challenge – not only think in the form of ready-made solutions. (Friis 2015)

When students are in their final phase of preparing a thesis, they are asked to create their own design process. However, in cases where the theoretical models and practice of being a designer do not meet, the students may become lost within a jungle of different possible methods to use. I started to look at how to understand students' learning from a design process point of view by developing different kinds of evaluation tasks in their design courses. Student motivation also plays crucial part in the learning process. Normally, those parts of the design process (picture 2), which are more tangible, practical and easy to understand, are rewarding and motivating. Additionally, since the results of our design are judged from the standpoint of the visual and concrete solutions they offer, students put a great deal of effort into this part of the process. However, in complex systems the thinking that occurs before the design brief and tangible part of the process becomes quite important. The tangible and rewarding part will not be beneficial without good thinking during all phases of discovering and defining the insights of the design brief.

One part of the design process involves students using cards to develop their own new processes (Friis 2015; Kälviäinen 2016).

For fast changing complex future, we
need to educate more with this side

We start with this – it's basic core

This one is harder, to tackle because it's
more abstract and intangible

This one is easier to teach and
learn because it is concrete,
practical and results can be seen =
they are rewarding

But this one alone is not good for
designing for complex system. If
discovery and Definition part is
done poorly, this is no good.

DESIGN BRIEF
Ask the right question

RESEARCH   INSIGHT   IDEATION   PROTOTYPES /VISUALS

DISCOVER   DEFINE   DEVELOPE   DELIVER

Ref. interpretation of double diamond design process for sustainable design projects, Nylander, 2017

Skills students need to define right questions
and problems – methods vary in different design
processes

Skills students need to finish their
design task and tell the story behind
chosen problem:
● Traditional way
● We need to provide good quality skills
here because design is visualizing stories
and language in understanding way

Picture 2. Double diamond process with pedagogical insights (Nylander 2017).

However, how can students use such cards if they do not understand the process? One option is to guide students through a given process and the options they can choose along their design journey. Here, the teacher works as a shepherd dog – giving students enough freedom but still keeping them focused on the desired target result (Star & Neal 2017). Above all, it is important to evaluate what students learned as a result of using the process and what theories and tools they acquired for their academic knowledge bank. My experience is that when certain steps of the process are repeated and reflected upon, they become a pattern of learning. This

constructive concept of learning, when added to cognitive and communal learning, builds on students' abilities to think by themselves and gives them the chance to practice using the process tools they have become familiar with. However, it is equally important to create understanding and point out that they need to be able to utilise the processes in different contexts in a rapidly changing world.

Pedagogical examples: course tasks for gaining an understanding of your design process

To look more concretely at how to use a design process as a teaching tool that students can make use of in their own design projects, I present following two different learning tasks for design students:

→ **Learning from theory** and drawing on it: "Read and draw", for 1st year students on the basics of a design course.

→ **Reflecting on what** you did — a tool to use during all phases of the design education: "What did we learn about the design process?", for any course and group of students to enable them to learn about what they did and how it is linked to other learning objectives in their education. This is also a tool for teachers to obtain feedback about how students are progressing and see how they have understood the design process,

whether the one provided for them or their own design process.

"Read and draw":

The task was to read Kettunen's (2001) book, called Muodon palapeli, and draw with your team a picture showing a design process. The pictures will be presented to the rest of the class in a following lesson.

The results of this task show that with the same text as the background, students developed many different design processes. Some of the students dealt more with phases of the process, while others also addressed the feelings and mental aspects of the creative process. As a teacher, I must say that by lecturing on the same topic, I would not have managed to obtain such a rich collection of design processes. Additionally, all of them contained correct information from different points of view. In later years, we will see how much the process remains a part of student learning, but I think when they have had enough time to analyse the theory book, they will also have learned the process better.
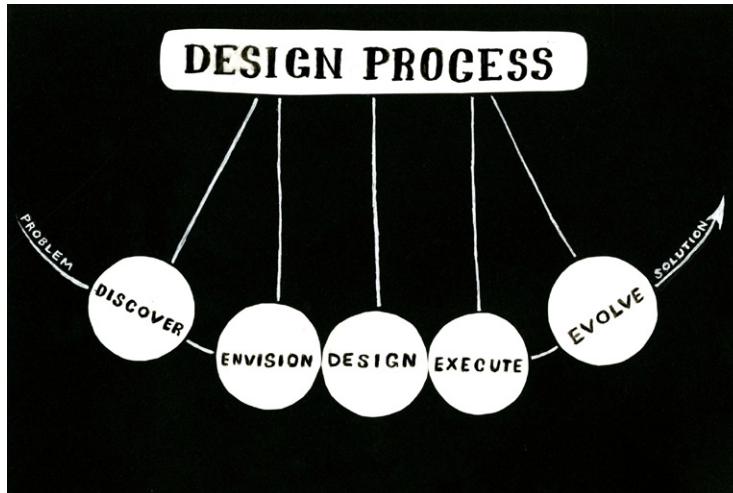
Picture 3. Example of the "Read and draw" results (Eggen, Lahtinen & Koppanen 2017).
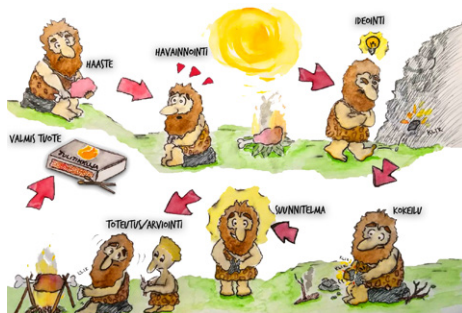
Picture 4. Example of the "Read and draw" Grumph process (Sorsila, Kervinen & Elme 2017).
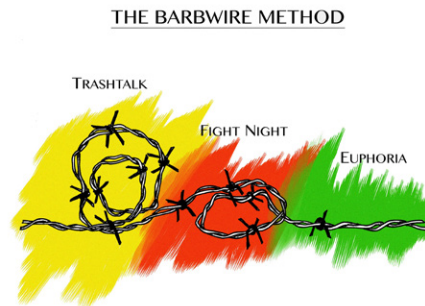
Picture 5. Example of the "Read and draw" Barbwire theory (Juntunen, Lahtinen & Erikkilä 2017).

"What did we learn about the design process?"

Draw with your team your design process as a timeline or path/journey (use one A4 sheet of paper). Mark in the process all the phases of the design work and methods you were using. Your group might have used several methods at the same time.

1 **Mark as "Brief"** the time phase when your design process was defined as a task – as a design brief, which you are working on with your team at the end of the process.

2 **Mark the times** at which you were using such tools as workshops and computers and when you were creating ideas, further discussing them and promoting your process.

3 **In addition,** think about the following: which methods you were using to help the process:
    a. To make your thinking richer and more diverse – divergent ways of looking for many options and solutions
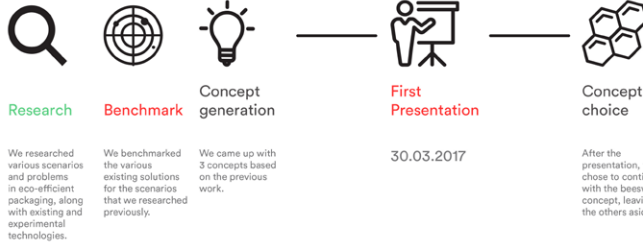   b. To narrow down your thinking – convergent way to look for "either or" kinds of solutions
    c .... and why you think this happened?

4 **In addition,** mark on a timeline/path whether or not other courses that you are taking at the same time helped your work here, e.g. workshop courses, modelling and software courses.

Examples of the methods and phases of the design process include:

→ **Benchmark/ checking** competitors, existing similar ideas and systems
→ **User interviews**
→ **User observation**
→ **Moodboard** – defining visual and formed intention for your design
→ **Information from book** / internet reference
→ **Model making**
→ **Testing your** idea with mock-ups
→ **Testing your** idea with users
→ **Testing your** idea with prototypes
→ **Sketching**
→ **Visualising a user** scenario
→ **Storytelling**
→ **System map** -> visualising a system
→ **Customer journey** mapping tool
→ **OKALA sustainable** design strategy wheel tool
→ **SWOT**
→ **Business model** canvas
→ **3D modelling**
→ **Feedback discussion** and mid-term pres-entations with a team, individually and with a larger audience
→ **Visits to companies** and to meet other external stakeholders involved in the design process.

Phase 1
Brainstorming

Research — We researched various scenarios and problems in eco-efficient packaging, along with existing and experimental technologies.

Benchmark — We benchmarked the various existing solutions for the scenarios that we researched previously.

Concept generation — We came up with 3 concepts based on the previous work.

First Presentation — 30.03.2017

Concept choice — After the presentation, we chose to continue with the beeswax concept, leaving the others aside.

Phase 2
Concept development

Data gathering — To further develop our beeswax concept, we created a survey with some questions and interviewed approximately 100 people.

Data visualization — We created infographics to visualize the data gathered through the survey.

Concept perfection — Data at hand, we perfectioned our concept based on the responses from the survey.

Moodboard — We developed moodboards for the packaging structure and for the graphics.

Paper prototyping — We created the first paper prototypes of the packaging, trying lots of different shapes.

Second Presentation — 08.05.2017

Processes that broadened our thinking
Processes that narrowed our thinking

Phase 3
Finalization

Graphics & Identity — We then designed the Beeco brand, along with the packaging graphics.

Prototyping — We printed and created the final prototypes, ready for presentation.

Final Presentation — 08.05.2017

2017

Eco-efficient design
Design Process
Project: Beeco

Alessandro Ferrari
Neus Iglésies Camprubì
Pamela Komppa
Raha Rouhollahi

Picture 6. Example of "What did we learn about the design process?" results: Beeco design process (Ferrari, Iglésies Camprubi, Komppa, & Ruohollahi 2017).

31

Picture 6 is an example of one project process used by students after having completed the large design task. As I compared this process with all the other processes, I noticed that the students had used many methods and were able to analyse their effects on their design as well. Some students also described the effects of the teamwork as well as the beneficial and stressful parts of the process. These remarks, as a reflection, were the best part of the evaluation task, since they also described personal learning, not just the process itself.

My next development goal is to continue asking for process drawings from the students so that I can obtain a better understanding of what will happen in the next years – does it affect learning and usage of the design process, and how? I am also planning to give these drawings to students when they start their final thesis project as a tool to assess what they have learned during the years.

The learning tasks described in this paper are part of the pedagogical development work being done for the "Design or Die" project. The aim is to build a collection of learning tasks that will include design process, but which also aim to build students' self-survival skills as future designers. The aim of these learning trails is to build collections of learning tasks that support students' design process skills without neglecting personal and artistic processes. Even these three examples have proved that students have more knowledge about their design process than they may realise. They are asked to re-visit their journey or create analogies for what it means to be in the design profession. Thus, they end up describing and understanding their work as a process and on a personal level quite well. As the next step, I believe we can build learning tasks that will also help students understand themselves and create better professional self-knowledge.

References

Bennet, A. & Vulpinari, O. (eds). 2011. Icograda Design Education Manifesto. International Design Council (ico-D). Taipei.

Design Council UK. 2017. The design process – what is double diamond. [Online document]. [Cited 13 Oct 2017]. Available at : http://www.designcouncil.org.uk/news-opinion/design-process-what-double-diamond

Doordan, D. P. 2013. Developing Theories for Sustainable Design. In Walker, S. & Giard, J. (eds.). The Handbook of Design for Sustainability. London, New York. 57-72.

Eggen, Lahtinen & Koppanen, 2017. Unpublished course project of Design theory. Lahti University of Applied Sciences. Institute of Design.

Ferrari, Iglésies Camprubi, Komppa & Ruohollahi, 2017. Unpublished course project of Environmental packaging design. Lahti University of Applied Sciences. Institute of Design.

Friis, S. K. 2015. Co-creationed cards. U Press.

Juntunen, Lahtinen & Erikkilä, .2017. Unpublished course project of Design theory. Lahti University of Applied Sciences. Institute of Design.

Kettunen, I. 2000. Muodon palapeli. Sanoma Pro Oy.

Kälviäinen, M. 2016. Design cards for teaching. Unpublished educational material. Lahti University of Applied Sciences.

NEXUS; researching, developing and educating for the future. 2016. Design School Kolding. Research publication 2015-2016. [Cited 13 Oct 2017]. Available at: https://www.designskolen-kolding.dk/sites/default/files/publication/download/forskningspublikation-dskd.pdf

Nylander, N. 2017. Double diamond process interpreted. Unpublished teaching material.

Nylander. 2017. Double diamond process with pedagogical insights. Unpublished teaching material.

Power, K. & Mont, O. 2010. The Role of Formal and Informal Forces in Shaping Consumption and Implications for Sustainable Society: Part II. Sustainability 2010, 2, 2573-2592.

Star, D. & Neal, A. 2017. Rethinking graphic design process. From proceedings of Cumulus REDO conference. Design School Kolding.

Sorsila, Kervinen & Elme 2017. Unpublished course project of Design theory. Lahti University of Applied Sciences. Institute of Design

Tan, L. B. & Johnstone, M-L. 2011. Barriers to Being Green. 2011 ANZMAC Conference Proceedings. Australian and New Zealand Marketing Academy.

Sara Ikävalko, Mirja Kälviäinen and Emmi Putkonen

Young citizen as service users

Abstract

As new generations of citizen grow into the age for actively using public services, this places new requirements on city services and environments. Young adults from 16 to 30 years of age form the first part of the digital native generation. This paper looks at explorative user research activities regarding young adults as public sector service users in Finnish metropolitan regions. A mosaic of explorative methods has been used to study user demands, such as multiple communication channels and the use of city environments, to produce a rich picture of the possible uses of and needs for services by young citizens. The exploration-based methods have included user workshops, self-reporting design probes and theme-based, user-produced material. This qualitative study on the user experience worlds of young adults has been carried out in upper secondary schools and vocational schools, at the university level and with social user networks. The purpose of these studies has been to take into account user empathy for envisioning service experiments that can be tested in real user contexts and environments. In addition, this study aimed to cover different types of user profiles and backgrounds with respect to service communication and solutions. The analysis produced insights about the challenges and possible solutions for communication and service development of city-based services within the city itself in relation to the demands and restrictions set by the digital native population. Analysis of the user information yielded evidence for physical, face-to-face and digital starting points for public services. The next phase of the project will look at how a young citizen might become involved in co-developing and experimenting with the service prototypes.

Introduction

The project discussed here, which looks at the city as a service for young citizen, has carried out exploratory and participatory user research with young citizen around 16 to 30 years of age. The means for conducting user research have been a mosaic of participatory methods, including workshops, self-reporting empathy probes and theme-based, user-produced material. The qualitative and participatory research for discovering a young adult user's experience worlds has been carried out in upper secondary schools and vocational schools, at the university level and with social user networks. The main participatory

work has been conducted in the Lahti area, but the results will be distributed to the metropolitan areas of Finland through the Ohjaamo (Steering) network of multidisciplinary career and other life steering services. This paper presents highlights of the results, with information about interesting urban places and the activities of young citizens within them. Further, the results focus on the value-based meaningful activities of young people and their social media use. The project is part of an effort to help develop city services for young citizens by envisioning future services and prototyping, experimenting with and testing them. The initial vision for such experiments is presented here based on the results.

City Metro project aims

The user research and user understanding presented in this paper represents the initial part of a project called 'The city as a service for young citizens'. The project is part of a city research and metropolitan politics programme for 2017–2018 and it addresses issues pertaining to the ways in which a new generation experiences the city and their expectations for future city services. Young adults from 16 to 30 years of age are part of the digital native generation. When the public sector in cities tries to communicate, inform and execute services for city residents in this age group, they need to rethink their offerings according to the emerging digital native profile demands. With this user cohort, it is important to study and analyse the related motivations and needs, multiple communication channels, varying user profiles and other user demands. The provision of low-barrier services requires investigations that will clarify where and how young adults live, work and study, where they will move and search for information, and how they would be willing to engage with public services: in physical, face-to-face form or with digital starting points. The digital native generation is also interesting in the sense that the possibilities for participation can be promoted by focusing on peer-to peer marketing and various activities. Future groups of citizens will require changes in the language, channels and interactions with the services, even changes in service contents.

The change in the service model is especially evident in Lahti's future strategy, which encourages the organising of services with self-responsibility and participation in mind. The city of Lahti wants to develop activities such that it can be considered a city for young citizens. For this reason, many of the participatory user research activities have been carried out in the Lahti region. The whole city is being viewed as a service project for assessing young adults as future public sector service users in Finnish metropolitan regions. The user research results from the project will be shared with other metropolitan areas of Finland through Ohjaamo, a steering service network providing collected public services for young citizens, especially regarding work life and other career-based support as well as general support on organising their life choices.

The project involves Ohjaamo organisations

from Lahti, Helsinki, Vantaa and Espoo as research and development platforms. From the organisational side, these hubs are struggling with multi-producer-based systemic challenges, and this is further increasing the challenges in communicating their service image to youngsters and young adult users in a positive and understandable, even desirable, way. The initial interviews with Ohjaamo staff members already revealed that from the digital native, young adult point of view, the public services and the way they are organised and described are often alien to this audience and asking for this type of support can easily be experienced even as stigmatising. Also, some practical abilities, such as information searches and filling in official forms, are not easy tasks for this user group. These and some deeper mental support requirements indicate that the continuing need for face-to-face services at certain points is still vital with respect to the practical and mental barriers to career building, even though the digital service trend has been emphasised also in the public sector. When viewing the city as a service for young citizens, the Ohjaamo network and its services provide one excellent route for experimenting with new service provision ideas that combine the needs of personal services with wisely used possibilities for digital services and self-service opportunities.

Participatory user research
Mosaic of participatory methods

Services have in recent years been presented as the enabler of society-driven innovation and a transformation tool for societies (Meroni & Sangiorgi 2016, 14). Services can bring about socio-technical transformations with the use of co-design tools to help orchestrate these processes. The possibility of generating systemic and lasting changes with collaborative operations for user research, co-design and experimenting with prototypes is based on a practical, contextual understanding of how a community works (ibid., 158–159). Designing adequate services is a complex interdisciplinary effort with respect to creating innovative relationships between the users and service providers. According to Meroni & Sangiorgi (2016, 13, 18–20), the starting point for a service design approach lies in user knowledge acquisition. The service design approach is marked by user empathy, where users act as a source of insight for collaborative and co-design activities within situated actions. The insights, ideas and user engagement necessary for a generative search for opportunities in design processes is also a possible tool for redesigning public services with the help of active citizenship.

UNESCO's 'Growing Up in Cities' project contains many initiatives that place children and young people at the centre of urban renewal. A sustainable, engaging and activating process should ground the decisions in young citizens' experienced realities and remove adult-based assumptions of what they need. Young people's right to participate and be valued for their contribution in community development is of utmost

importance (Groundwater-Smith et al. 2014, 151). The research approach to the city as a service for young adults has reflected these demands and the demands of the new Finnish KaPA law (2016) for public digital services, where user perspectives on the availability, quality and seamless cooperation of the services are vital features. The 'City as a service for young citizens' project is trying to build new action models to enhance the positive experiences of the city for young people. In the spring of 2017, during the initial phase of the project, the Lahti Design Institute organised generative and participatory user research to provide insights into developing experiments for young citizens aimed at new city services. Young citizens participated in the research phase as the experts on their own everyday life.

The participatory tradition draws strongly on ethnography as the approach for user research and applies field-work traditions derived from ethnographic studies. The ethnographic approach emphasises, without judging, holistic insight and descriptive understanding of the everyday contexts and realities from the standpoint of the cultural representatives and real actors involved. The life worlds, the habits, rituals and experiences that constitute the everyday lives of the user group, should be scanned from the user point of view. This means also paying attention to the ways people talk and categorise their activities. In addition, ethnography has been committed to describing the here and now for the purpose of recommending future stages. The addition of the participatory tradition to ethnography means respecting and giving an equal standing to different types of knowledge and mutual learning, negotiating goals and purposes, and applying various tools and processes to facilitate participation and design (Blomberg & Karasti 2013, 87–90).

With a vast number of techniques and tools at its disposal, participatory design tackles the user-orientated design cycle from the standpoint of real-life challenges and understanding the practice. The purpose is to envision new futures, with mutual learning representing the space for finding possible solutions. Envisioned ideas and scenarios become more concrete through prototyping, and the testing with real-life actors is part of the collaborative process. Prototypes enable further co-construction and learning through shared concrete experiences with the new imagined services. The process involves users in the experimenting and evaluative process as active subjects (Bratteteig et al. 2013, 120, 128–135).

Following the spirit of emphatic design thinking, the project has been using participatory approaches via user workshops, user self-reporting and the user-based production of materials. In the initial phase of the project, user research for discovering the insights of new citizens was carried out in Lahti's upper secondary schools and vocational schools, at the university level and with social user networks in Lahti and wider Metropolitan area. According to Groundwater-Smith et al. (2014, 87–88), it is

important to make participation accessible in the places where young people go. Educational institutes provided this possibility.

The aim has been to analyse the young citizens' life-worlds holistically and especially to clarify where the young adults are based, where they move and search for information, and how they would be willing to enter the city-based services. Attention has been payed also to the possible practical and mental barriers related to public services. The young users have interacted with the project group by proposing materials and even producing their own materials about the everyday experiences they have in the city or with the challenges of life where support might be required. According to Groundwater-Smith et al. (2014, 9–10), participatory action leads to commitment, even if it is only listening to and motivating young people to express themselves, and even more when involving them into the decision-making process. In this research approach, young people are seen as active agents and it is recognised that the adult researchers do not always know what is best for them.

As suggested also by Groundwater-Smith et al. (2014, 128–129), participatory user research makes uses of an applied mosaic approach, meaning researchers adopt multiple methods to canvas the views and experiences of young citizens. A wide range of methods and tools have supported the participants' contributions, allowing for a composite picture, or a mosaic, of the youngsters and young citizens' lives. The tools have prompted conversations, which in turn has led to reflection, interpretation and further discussions about potential services and their channels. This kind of approach offers possibilities for motivating young people to participate and for taking an active role in exploring meaning with their peers and the researchers. The aim of the participatory user research method was to collect a rich and deep picture of young citizens' user experiences, one which offers insights for modelling the service qualities beyond practical touchpoints. The project aims to broaden the understanding of how to organise city services for youngsters and young adults, thereby create inviting and stimulating city environments that will in the future motivate young people to play a role as city and city service developers.

User participation through workshops

Participatory user research operations involved upper secondary schools and vocational schools and applied university level students in workshops during school hours. 97 girls and 36 boys took part in the pre-designed workshop tasks. The workshops were integrated into suitable studies that could benefit from the workshop-type methods for learning or from the content of the workshops. This created interactive and mutual learning benefits for the workshop operations, reflecting one of the important features of participatory research (Blomberg & Karasti 2013, 87–90).

The workshops included a task on how to find and contact the public services and asked

what services the youngsters had been using thus far. This task was conducted through discussions within small groups of students. The groups documented the results in a chart showing the following: the different channels pertaining to diverse sectors of city operations and examples of the specific interactive tools used by students and the social groups of relatives and other people that they use to locate the services.

An important motivational background for using the services is that the value basis of young citizens is important for the future. The material included a set of 16 value statements based on Schwartz's theory of basic values, including polar directions of self-transcendence versus self-enhancement and openness to change and ideas about conservation (Schwartz 2012). In the participatory workshops, the young participants individually chose the value statements they considered important from the set of 16 and wrote additional information describing how a particular value proposition is visible and put into practice in their everyday life and what further actions they propose to take.

The third part of the workshop consisted of visual sorting activities of an attention-provoking and non-attention-provoking nature and consisted of evaluating interesting and non-interesting sorts from 50 presented stimulus pictures. These pictures included real public service communication pictures for young customers and other types of pictures relating to typical material in young people's peer-to-peer communication. The selection of pictures was pre-chosen by a graphic designer in the research group.

Many of the workshop tasks and their components relied on card sorting based on categorisation, evaluation or choosing methods. Card sorting is an associative technique that asks participants to group objects together or in different classes in order to investigate how the participants make sense of the world. The intention is to get the participants to organise information that is given to them as a stimulus from the information already collected by the researchers (Goodman & Kuniafsky 2012, 180–181, 201–202).

In addition to the above-described general workshop, more activities were also organised with visual communication students using two charts. One chart included poster material arranged in a friend-book type of presentation of yourself and the other chart collected information about the use of time in certain places and surroundings. The individually filled friend book asked participants to tell about themselves, how they spend their time, what things in life are most important for them, where they go during the day and what kinds of social media channels they use. The second chart was completed as a group task. It asked students to describe where they spend their time, how they feel about these typical places, if these places are public or private, and how often they use them.

Design probes for self-reporting

Different object-based tools can be called generative, as they prompt notions that may be difficult

Picture 1. The participating students in a workshop are organising the stimulus pictures on a line according to the positive or negative interest value that the pictures seem to have for them (photograph: Emmi Putkonen).

to express in words. They are useful in exploratory, early stage development research when trying to understand how people come to think, feel and know about their lives and they open up spaces for divergent opportunity exploration (Goodman & Kuniafsky 2012, 179–180). Design probes using object-based tools were used as one research tool by relying on user participation via self-documentation. Groundwater-Smith et al. (2014, 11–12) describe that in trying to engage with youngsters, the consultation should not include only adult, professional starting points, but also derive from the young people's point of view. Groundwater-Smith et al. (2014, 56–57) further specify that in the participatory partnership, identifying the research questions even by

the young themselves and beginning with data collection is important with respect to the transformative potential. In the design probe task, second-year design students from industrial design and interior design departments were asked to create sets of eight different design probe kits that were then distributed to participants in their own circles. Their basic themes varied from broad perspectives to the participants' lives to specific tasks such as finding a job. As the final result, 33 girls and 12 boys self-reported about their lives with the support of these design probes.

The purpose of the self-reporting design probes was to provide inspiration, collect information and support design empathy (Mattelmäki

2006, 49). Design probes are a collection of assignments through which users can record their life contexts and experiences as well as express their thoughts and ideas. Probes provide them with the means to explore experienced opportunities. The purpose of design probes is to expose the design agenda and invite participants in a motivating and provoking way to provide self-documenting responses that address their emotional, aesthetic and experiential reactions to everyday life and to the respective environments. The material can be deliberately playful, and subsequent user material can be viewed as inspirational rather than factual. The probe kits can be built out of various task materials, such as immersion workbooks, diaries, day-in-the-life exercises, image collaging, documenting by photos and cognitive mapping (Brandt et al. 2013, 158–160; Mattelmäki 2006, 40–42, 48–49). In the case of this project, we also collected city experiences via mapping types of exercises. The purpose of the mapping tasks was to increase the understanding of how young people relate to places and social networks (Goodman & Kuniafsky 2012, 195–198).

These self-reporting probes and the resulting materials contained and produced information about the daily activities, movements, places and time schedules of the participating young adults. These materials also included sensitive outcomes about the life experiences of the young adults, including their problems and anxieties about handling current everyday life and their fears for the future. Such experiences as loneliness and money problems were included and even worries about large global problems. In the final output, the stimulus-based materials or simple self-originating descriptive tables were more productive than the open diary type of tasks, where only a few of the participants had bothered to start writing long stories about their activities and experiences. Even if the probe tasks were prompted by the young people themselves, there were not always any answers to them, or else the answers were different from what the task setters had expected. Such a task as 'My glorious day' produced no answers or only answers pointing to a normal, cosy day as being participants' idea of a glorious day. Typically, a follow-up on the probe material includes an interview, which, according to Mattelmäki (2006, 87), aims to correct possible misinterpretations or search for further opportunities with the participants. In this research task, such interviews were not conducted due to practical time issues.

Theme-based, user-produced materials

In the actively collaborating Kannas Upper Secondary School in Lahti, the visual communication lessons were carried out during the spring of 2017 so that the students could design several different projects about their city experiences. These tasks covered the city environment and how the youngsters make use of it. Altogether, 85 girls and 26 boys participated in the tasks,

Picture 2. Examples of the various design probes used for young participants' self-reporting (photograph: Emmi Putkonen).

which assessed especially their favourite places in the city of Lahti, their activities in the city environments and the reasons for engaging in such activities. The results of the student work were also displayed at an exhibition. Groundwater-Smith et al. (2014, 103–105) point out how in the participatory approach visual and art-based methods can engage youngsters in data collection decisions and data analysis, allow them to use their preferred means of communication

and help them contribute to the reporting and dissemination of research.

This further self-reporting type of approach was also exploratory and applied a photo-elicitation type of method together with collage and mapping methods. Photo elicitation should prompt conversation with vivid, concrete and meaningful expressions on the part of the participants, in this case the young people, and between them and the researchers.

Photo elicitation can be based on the pictures collected by researchers, but in this case the visual material was user generated, as the young students themselves took photos about aspects of their life and city or their experiences in it and even created multisensory narratives around these photos. The teacher-given tasks and questions acted as prompts for the photos and context for the narratives. Participatory collage and mapping types of user research activities were also promoted. Collage and mapping activities invited the young participants to externally express their internal thoughts and feelings and also to assign an order to and describe the sense-making aspects of the city with significant images (Goodman & Kuniafsky 2012, 179–182, 189; Groundwater-Smith et al. 2014, 107–109, 111, 115, 123–124).

Real participation should let go of manipulation to facilitate interaction and creative participant-initiated self-expression. The material-producing tasks tried to ensure that the meaning that the young citizens make of their lives in the city was recognised and understood and that they were respected as engaged, active citizens who have experiences regarding their own lives (Groundwater-Smith et al. 2014, 16, 22). However when carrying out and completing the tasks based on their observations about the city environment, the young students admitted that without the tasks from the teacher they would not necessarily had paid attention to the environment. Also, Groundwater-Smith et.al. (2014, 11–12) point out that typically, adults

set the spaces where young people can take action, including the limitations and norms that rule the activities allowed. In the school task-based self-documentation about the use of the city environment, it was evident that alcohol and drug use or sexual types of activities were not described, although through observation it was possible to detect that the participating age cohort did engage in these types of activities in the city environment. Cooperation in the school context had an impact on the results via institutional authority, the gatekeeper influence and social constraints (Groundwater-Smith et al. 2014, 78–81).

Picture 3. Exhibition at Felmanni Library on the materials produced by the students during the visual communication courses in the upper secondary school in Lahti (photograph: Ilari Huovila).

Results from the young citizen user worlds

The general insight view of the life worlds of these young citizens was emphasised when analysing the results from the mosaic of user research methods. We collected illustrations through the analysis process to present some of the highlights from the findings. Especially, the most interesting results regarding the city services are presented here. In the analysis process, the fact that the majority of the participants were females was also considered so that the 'voice' of the male participants would also be visible in the results. The first illustration (Figure 1) presents the city as the environment for young citizen activities. The youngsters often said that they like to use the city environment for hanging out with their friends. A general complaint was that there were no places for hanging out. The Finnish winter is especially problematic since being outdoors is not an option. These hanging-out types of places were missed, even though public libraries and the schools' facilities were used for doing together such activities as homework. Shopping malls and cafes proved to be meeting places for young students. They often include the demand to spend money, and that can be problematic if you do not have it. Hanging out also includes moving to the edges of the city, since there are no places in the city centre. It is possible to move to the edges of the city since most young people have motor vehicles, mopeds or such. The scattering of residential areas in wide district around the Lahti area resulted also in non-use of the central city and places such as the market place, which seemed to be more of an area to pass through while for waiting for buses than a hang-out area. Also, hobby-related places were mentioned and enjoyed by many students. In Lahti, the good possibilities for sports are highly valued. The sports places are also places for hanging out and sports represent a means for engaging in relaxed joint activities rather than only serious sports.

The interesting feature coming out of the student-created materials was the importance of nature and parks for the youngsters. These were of course the hang-out places during the summer time. Nature and the tranquillity of nature was valued also for exercising alone or with your dog. City-specific places were also of interest, such as the meeting place harbour in Lahti. Local identity was mentioned in different ways as an important feature for the youngsters, although some of them desired to move to some larger metropolis. The special enjoyment of or wishes expressed about the city environment included the request to add more colour to the city. For example, graffiti was mentioned as a means to bring joy to the urban environment. Also, some negative aspects of the city were mentioned, such as how the city market place or some corners can be boring and empty or that drug users gather in some places in the city centre, producing feelings of insecurity.

One important motivational background for using the services is the value basis that the young citizens hold as important. In the user

Figure 1. The map of a young citizen user's experiences of the city with respect to possibilities of the city as a place relevant, interesting and usable to this user group (visualization: Emmi Putkonen).

workshops (Figure 2), the information especially for inquiring into this was produced through a set of 16 value statements relating to Schwartz's theory of basic values (Schwartz 2012). The value statements chosen and how these value propositions were visible and prompted actions in the young citizens' everyday lives were depicted as a four-fold map describing the different value sectors. It was interesting how the concrete actions described some other values than just the statements chosen, so we moved them to other, more suitable sectors in the value map. The colours on the map describe the original value sectors chosen by the participants.

Figure 2. The map of values and their actualisations with respect to the practical actions described by the young participants through the value statements they chose to present as meaningful things in their lives (visualization: Emmi Putkonen).

The special areas important for creating experiments to improve existing services or offer new services for young digital native citizens included social media-related channels. For the analysis, we collected the results from the use of these channels and their purpose into a table. It was then possible to produce a visualization describing the use frequency and use purpose of the various social media services. One important notion is that a great deal of information is shared by the youngsters through social media, but it is not their main source for conducting information searches as such. Rather, questions regarding guidance
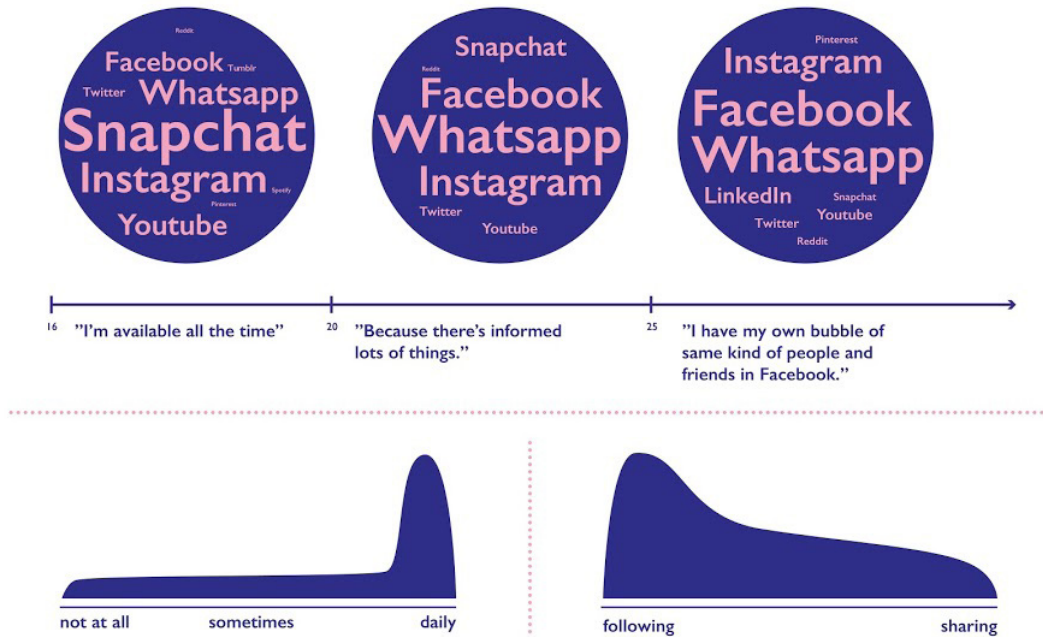
Figure 3. The frequency of social media channel use and the purposes of such use (visualization: Emmi Putkonen).

are posed on social networks. The results from the Ohjaamo (steering) and user experience analysis of their customer stories show that information searching from the Internet is not an easy task for youngsters. They also have problems in using official forms and material typically found on Web-based official services. This shows that the notion of digital natives does not actually help with Web-based digital self-service use. The wide use of various social media services does give the public sector more options and demands for the channels used to reach young citizens. Possibilities indeed exist in peer-to peer marketing via information sharing and through recommendations and the support offered by young people in answering each other's questions. In addition to the main research, a young researcher in the project

group also did some observational scanning of social media use, especially in the new channel Jodel, and this revealed that young people even shared and discussed their intimate worries and anxieties on this anonymous channel (Figure 3).

A set of user-persona descriptions were made to describe our understanding of the different life situations, social spheres and contexts of the different types of teenagers from 16 to18 years of age and young adults living independently up till the 30 years of age. The descriptions of the age group between 16 to 30 years of age included students from different school and university levels. The age cohort also included youngsters still looking for direction in life, those without a job, in temporary jobs and without an educational direction. These users might need even stronger support from the public services. Also, we developed an immigrant youngster user persona and young adult personas for persons who already have a partner, even children, and a regular job and income.

Insights gained for service experiments

Understanding and mapping out service ecologies with their practices, tools and environments can be used as a way to identify unnoticed opportunities and resources to reframe service-scapes and interactions (Meroni & Sangiorgi 2016, 22). The imagining of future directions for service systems can be conducted via transforming visions and user research-related insights into a plausible hypothesis. In

this way, the design for services is able to envision scenarios that can be prototyped, thus reaching reality with these scenarios (Meroni & Sangiorgi 2016, 155). The purpose of the city as a service for young citizens project was to quickly and flexibly take the research insight-based service and environmental ideas into practice and test them during the project. One important approach has been to think about how to also involve young people in designing the service scenarios and prototypes and collaborating with them during the experiments. As Groundwater-Smith et al. (2014, 13) state, the participatory process should move beyond consultation to co-design, co-evaluation and co-implementation.

The research materials and their analysis provided us with an understanding of and insights into for several types of service experiments. Difficulties in finding information and interest in the feedback from the youngsters led to the conclusion that the experiments with communication through different channels and feedback from the young citizens should in particular be considered though various try-outs. These should include different digital channels and their content, use and sharing for different purposes. We made experimental business cards for Lahti Ohjaamo so that they could give them as a feedback reminder to the young visitors, encouraging them to send a message about their life conditions several months after their Ohjaamo service visit. The need for reminders was found out from the user material. This

related to several questions regarding handling your responsibilities, not remembering to come to official meetings, or fears of books being late from libraries and the ensuing fees, even when you had too little money in the first place. Even WhatsApp feedback was ideated to cover the easy feedback possibilities.

A larger experiment on providing feedback to Ohjaamo was also planned so that it could better take into account young people's experiences with the guidance services, not only counting the official influence measures forced on Ohjaamo's activities by the public authorities. This was put into action via an Ohjaamo passport self-reporting service, in which customers report their experiences and offer their points of view on the meaningful service points.

Given the fears of the global future, an easy way to be active with respect to environmental questions was provided during an environmental day in Lahti. A selection of funny memes about environmental protection issues was provided for the young people to distribute, as well as the possibility to count and to see your own environmental backpack using a mobile application. The experiment was planned together with the environmental technology students, who also carried out the interaction with the youngsters in the city.

Envisioning was also done for further experiments on preventing feelings of loneliness and providing meeting possibilities that could include cultural mates, borrowing a mate, meeting pop-ups or cross-generational housing possibilities. Not all of the young citizens, especially when new in a city, have a specific network of supporting people around them. Handling the different changes in life, finding your own path, coping with time and stress and even many practical activities seemed to require support. One evident problem of city environments as a service is the lack of hang-out spaces for youngsters. This would require experiments with allocating possible empty spaces or movable elements, such as containers for hang-out purposes. Also, the means to get youngsters participating more in organising activities for themselves was discussed. Though they did have some ideas, often they have no money or other means or channels to initiate these kinds of operations.

The envisioned service experiments started to take place during the summer of 2017. The 'City as a service for young adults' programme will continue by following the testing of these experiments and gathering results from the experiences gained by the experiments. Also, new experiments will be envisioned through the user-research insights. The goal of the experiments is to be able to create, with useful improvements, long-lasting service innovations and also to be able to scale the results to meet the needs of other services than just the experimented services for the digital native, young generation in cities.

References

Blomberg, J. & Karasti, H. 2013. Ethnography. Positioning ethnography within Participatory Design. In Simonsen,J. & Robertson, T. (eds.) Routledge International Handbook of Participatory Design. New York, USA, Abingdon, Canada: Routledge. 87–116.

Brandt, E. & Binder, T. & Sanders, E., B.-N. 2013. Tools and techniques. Ways to engage telling, making and enacting. In Simonsen, J. & Robertson, T. (eds.). Routledge International Handbook of Partipatory Design. New York, USA, Abingdon, Canada: Routledge. 145–181.

Bratteteig, T., Bodker, K., Dittrich, Y., Mogensen, & P. H., Simonsen, J. 2013. Methods. Organising principles and general guidelines for Participatory Design projects. In Simonsen,J. & Robertson, T. (eds.). Routledge International Handbook of Participatory Design. New York, USA, Abingdon, Canada: Routledge. 117–144.

Goodman, E. & Kuniafsky, M. & Moed, A. 2012. Observing the user experience: a practitioner's guide to user research. Waltman, USA: Morgan Kaufman.

Groundwater-Smith, S. & Dockett, S. & Bottrell, D. 2014. Participatory Research with Children and Young People. London, UK: Sage Publication Ltd.

KaPa laki. Valtiovarainministeriö. [Cited 26 Sep 2017]. Available at http://vm.fi/kaPA-laki.

Mattelmäki, T. 2006. Design Probes. University of Arts and Design Helsinki publication series A69. Helsinki, Finland: University of Arts and Design.

Meroni, A. & Sangiorgi, D. 2016. Design for Services. Abingdon, Canada, New York, USA: Routledge.

Schwartz, S. H. 2012. An Overview of the Schwartz Theory of Basic Values. In Online Readings in Psychology and Culture, Unit 2 article 11. [Cited 26 Sep 2017]. Available at https://scholarworks.gvsu.edu/cgi/viewcontent.cgi?article=1116&context=orpc

Noora Nylander & Mirja Kälviäinen

User Experience Design as a Sustainable Design Strategy: A Case Study With Packaging Design Student Projects

Abstract

Design theory and studies introduce two paths for pursuing user-driven environmental sustainability. One path tries to enhance the performance of existing systems – mostly products and behaviour related to them – with design interventions in the existing techno-sphere. The other path pursues sustainable lifestyle solutions and a socially satisfying consumption culture that especially embraces the possibilities of products as a service, service systems and other dematerialization types of solution. The product-centred efforts focus on the use-phase functional usability type of approach using strategies and tools from usability and environmental psychology (such as affordances, visual- and form-based cues for acting in a certain way and interventions), mostly adding information and feedback for the user in the product use process by different means. These efforts try to diminish harmful impacts or too much resource use during the consumer use phase. Packaging has been said to be a silent salesman. Naturally, this is true since it communicates the brand message quite obviously and good packaging design sells. However, packaging design for user experience can provide even larger benefits to the brands. Thus, one can develop system and techno-sphere level of sustainability, which is very popular way of doing sustainability in the packaging industry but, without taking users into account, the system stops speaking with people. This paper shows examples of student work made under sustainable design studies and discusses how starting from the user-centred approach and moving towards systems, we can create better sustainable behaviour.

Keywords: sustainable design, user experience, packaging design, product-service system

Two ways to pursue user-driven environmental sustainability

Design theory and studies introduce two paths for pursuing user-driven environmental sustainability. One path tries to enhance the performance of existing systems – mostly products and behaviour related to them – with design interventions in the existing techno-sphere.

The other path pursues sustainable lifestyle solutions and a socially satisfying consumption culture that especially embraces the possibilities of products as a service, service systems and other dematerialization types of solution (Doordan 2013, 60; Chick and Micklethwaite 2011, 118–137). The product-centred efforts focus on the use-phase functional usability type of approach using strategies and tools from usability and environmental psychology (such as affordances, visual- and form-based cues for acting in a certain way and interventions), mostly adding information and feedback for the user in the product use process by different means (Lockton, Harrison and Stanton 2012; Lockton, Harrison, Cain, Stanton and Jennings 2013, 39–40). These efforts try to diminish the harmful impacts or too much resource use during the consumer use phase (e.g. Cor and Zwolinskia 2014; Sohn and Nam 2015). Bhamra, Lilley and Tang (2011) also combine these interventions in the different stages of consumption in order to tackle the barrier of old habits when changing behaviour.

Lockton et al. (2013, 44) conducted a user study in the office environment about the interaction with heating. They came to the conclusion that whether there was a sustainable heating behaviour framing of this kind of instant-use situation with changes in products or supporting services, it was equal for the user providing availability for the possibilities of changing their behaviour into green direction. Since the 1990s, a number of research centres related to sustainable development have advocated going beyond products as the means for promoting sustainable consumption. This entails developing an integrated mix of products and services that is able to satisfy customer demands.

Product-service systems (PSS) were defined in the United Nations Environment Programme 2009. The system design for eco-efficiency entails a system of products and services that are together able to fulfil a particular customer demand based on the interactions of stakeholders. The characteristics for it is satisfaction-based economic model wherein need is fulfilled but together with products, services and stakeholder interaction not by selling or using mere products (Vezzoli 2013, 276–277). Design for sustainability emerged from the earlier idea of products seeking superior environmental performance to product service systems as they provide the means for radical systems designs. The idea is that the possibilities for the efficient operation of products, upgrading and availability as a shared resource can diminish the amount of material resources required. Sometimes a material product can be completely replaced by a service and even route towards dematerialisation is open (Ryan 2013, 410–411). Understanding and defining the use phase as the real functional use phase of a product comes from the basis of a life cycle analysis type of approach to green design. As the marketing and choice phase is not a typically described action in the life cycle models, the life cycle and product-based approach has easily skipped over the lifestyle

choices dependent choice, design or change points of view. However, when developing the phase of the users' choices of solutions, we come to discuss and develop the new concepts with dematerialised offerings and lifestyle solutions that introduce new consumer cultures and lifestyle systems that can even ignore some of the past, wasteful consumption habits associated with traditional products (Bhamra, Hernandez and Mawle 2013, 110–113). Also, by looking at current habits and lifestyles, there are possibilities of finding new PSS that enable consumers to lead their habitual lives in more ecological ways.

One example of systems design is the development around circular economy. Circular economy models promote the multiplication of use circles in the use phase of the product with such issues as re-use, repairing, reselling, reallocating, redesigning and repurposing. All of this means supporting service systems design, not just designing new products (even if they were designed with an eco-sensibility). Platforms such as eBay advertise themselves as advocates of this kind of sustainability with such phrases as: "The most ecological product is the one never made." This points to the platform enabling the resale of already existing products for further use, even over and over again. Design for circular economy develops system-based approaches to the use phase, such as non-wasteful use, long-life attachment, product durability, standardisation and compatibility to enhance product longevity, ease of maintenance

and repair, upgradability and adaptability, disassembly and reassembly to enhance possibilities for recycling and different means of dematerialising products with design-as-a-service or performance-as-a-service solutions. The aims are twofold: to slow resource loops and to close resource loops altogether (Bocken, de Pauw, Bakker and van der Grinten 2016, 308–320). All of this type of product life cycle design tackles the big systemic issue in the consumption phase of products: the overconsumption of goods (although the initial departure point is not designing for behavioural change).

Emotional triggering by designing to change behaviour

Chapman (2013, 366–369) reminds us of the fact that design has worked a lot with emotional triggers regarding novelty and desirability in mass markets, which drive consumer society's wheels with never-ending novelties and visual images providing signs, meanings and styles, in addition to having mere practical functions. Building and modifying identity and social-cultural lifestyles by replacing objects is typical. Obsolescence can also refer to emotional, immaterial relationships with objects rather than to functional failure or ageing (Chapman 2013, 366–367; Badke and Walker 2013, 399). This emotional aspect should be counted as part of sustainable design efforts to make green choices desirable and, in the case of durables, to provide long-lasting attachment relationships. Chapman (2013, 372) studied the phenomenon of enhancing emotional

relationships with electronic objects during the use phase. The findings about what makes these relationships long-lasting included personal history narrative, service attachment, detachment (in the sense that it does not cause too high expectations), ageing well on the surface with tangible character, fictional new or unknown delight still emerging and certain product-based feelings of autonomy and consciousness that require skill and practice in interaction.

As desirability is one of the tasks and achieved qualities for design, emotional design with goals for desirability and attachment is important in green design. In fact, ecological choices are not based on rational arguments but also on emotional causes. Tan and Johnstone (2011, 5) showed them to be even more important than facts. Because consumption is symbolic and emotional, the rational choice model does not explain or promote the social, cultural and psychological motives. Sustainable ways of living may seem difficult and dull (Power and Mont 2010, 2574, 2577). This points to the important task of designing for branding and providing immaterial, emotional-cultural value in the offerings, in addition to them being mere functional products. It seems that appealing to people's innermost desires in the same way as commercial marketing is in fact a more effective means of creating behavioural change than the negative information campaigns that are prevalent today. This calls for social marketing based on positive appeals related to subjective well-being and self-fulfilment, and not on tactics of scaring people and presenting dull educational campaigns (Muratovski 2013, 178).

The different aspects and user path type service journey as a solution results reflect the same process solution needs (such as aware-ness, despair, design, change) and celebrate steps for promoting the consumer behavioural change (Tischner and Stebbing 2015, 320–326). All of the steps in this AD2C2 model can be recognised in the Finnish user research results. In fact these results specify the AD2C2 model even more in the general level of user informa-tion and understanding.

Service design is a process where the customer who enters a service can face it through many phases and touch points that are relevant to the service. Packaging – thought of as an object – can provide a service-type of experience to the user. Packaging provides multiple contact points between the customer or user and the product itself. It communi-cates, provides user convenience and trans-ports as well as protects. Packaging has been said to be a silent salesman. Naturally, this is true since it communicates the brand message quite obviously and good packaging design sells. However, packaging design that is designed for user experience can provide even larger benefits for brands. Sienna (2015) observes that the usual business claim is that a busi-ness provides "the best customer service in the world", when in reality a business aims to be "the best service in the world". On the other hand, instead of those claims, the customer's

User research reflected with the AD2C2 model

Show concrete examples of the results, show comparable information against something familiar.

Pay attention to the target-group-based interest points when creating the awareness promotion: design interesting and motivating information using e.g. health, food, animals, nature trekking, nostalgia, slow life, savings and social relations as the starting point.

Analyse and anticipate all possible negative responses

Make the solutions easily findable and available in everyday life.

DESPAIR? X

DESIGN

Enabling solutions to try new, more sustainable behaviour

Motivation

Make the solutions easy to use, providing visible results. Make the solutions normal and fitting to everyday life. Make them also, if possible, social.

AWARENESS

Awareness   Opportunities

Target-group-specific Communication, Information, Education

Urgency can also be implied, also negative content can be needed to wake people up.

Positive Reinforcement

CHANGE   Support implementation In real life

CELEBRATE

Create the feeling that you can immediately achive things. The motivating factors include rewarding social interaction, admiration and fun, acceptance, passion-interest-based rewards and savings.

Fitness of the solutions to such positive lifestyle aspirations as wellbeing, nostalgia and positive social image is important. Visible results are motivating even in the long run.
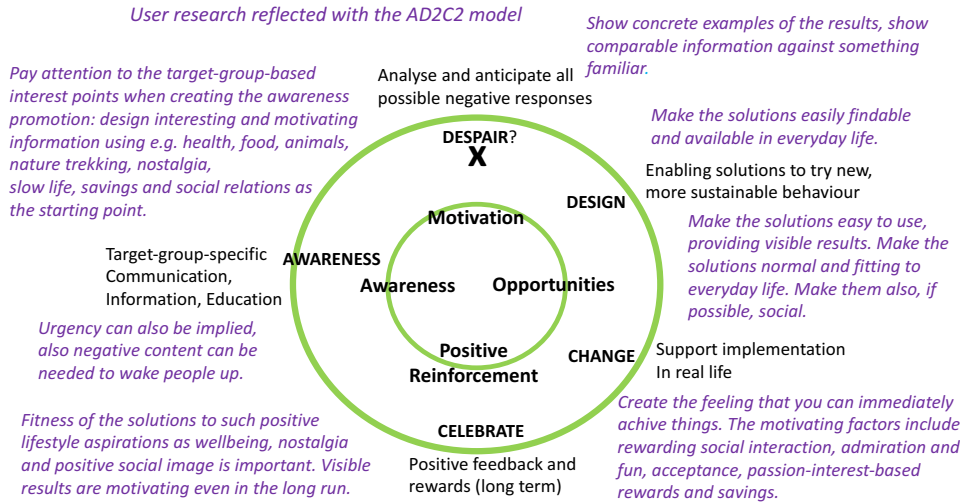
Positive feedback and rewards (long term)

Figure 1. The findings of the Finnish user research results mirrored with the A2D2C behaviour change model, including the design interventions modelled by Tischner and Stebbing (2015, 320–326).

goal is to be "the best customer in the world". The era of social media is changing the communication between customers and brands a lot. Before, it was important to create, for example, brand loyalty, but now it is important to create dialogue between customers and brands. Davis and Bigornia (2015) described how the brand-enthusiastic millennial generation feels about loyalty towards brands. They are more and more willing to have a dialogue with the brands (e.g. through social media). This means that they provide information about themselves freely, but

they want brands to listen to them. Otherwise they will go for something else.

Packaging design cases for sustainable behaviour

In sustainable design we can look the process from the technocentric side or from the human-centric side. Especially in the packaging industry, many good sustainable things (e.g. material development or recycling systems) happen on the system side, but (having taught user-driven design) we see that the systemic approach does

DISTRIBUTION
Availability in different environments
and for different users

USABILITY – CONVENIENCE
– all steps of the using process

DISTRIBUTION by user
-> packaging is carried
home - how

MANUFACTURING
How it affects environment

RETAIL/MARKETING
The role as
a salesman

INFORMATION TO USER –
UNDERSTANDING (Norman D.)
-> How intuitively user understands the products
-> Can we educate sustainability with packaging

PACKAGING
**SYSTEM
LIFE CYCLE**

*

SUSTAINABLE
USER EXPERIENCE
– **CYCLE OF USE**

ADDEND VALUE TO USER
– POSITIVE USER EXPERIENCE
Delight of finding out yourself
Link to something personal.
Desire & personal aspirations

RAW MATERIALS
Are they safe and ethical?

WASTE PROBLEM / RE-USE?
User does not want to become waste manager!

END LIFE:
RECYCLE /UPCYCLE
How material end life properties are communicated
to user

END LIFE:
RECYCLE /UPCYCLE

* Users touch point with system cycle **–> creates desire to have**

Ref. interpretation of techno-sphere and consumption cycle of packaging
Nylander, 2016

Figure 2. An interpretation of the techno-sphere and consumption cycle of packaging (Nylander 2016).

not always communicate well with end users. For example, the system side fills the requirement of putting recycling marks in packaging graphics, but users do not want to become waste managers and figure out what all this means. Users do not necessary know what a system has put into the products it has created. We need to enable their knowledge and experience so that they can also behave in a sustainable way and so that they get feeling of being sustainable. In figure 2 one can see what happens in packaging system and user experience cycles. We especially need to create an understanding of the user and personal links with the user before we make system-side decisions, so that we can combine with them to create better sustainable behaviour. For example re-use is tricky: how can we create the re-use scenarios that are really needed? (For example, 'How many lampshades do I need?) There are concepts for building a lampshade from leftover light bulb packaging – but as a user, I (for example) need non.

Earlier we stated that it is not enough to only do product design. We need to consider people's behaviour, habits, culture – the things that people do in their daily life. In Bali, people

make worshipping baskets for gods and everyday families put them in front of alters and homes. At the end of the day, all these baskets are wiped away to the road ditch. These are bio-based materials and do not cause harm for the environment in rural areas, but if the same people act similarly with, for example, plastic materials, the results are worse. We have already witnessed the results – for example the ocean plastic problem. Thus, we need to change our habits and behaviour as well as build systems that support it.

The interpretation of the double-diamond process in figure 3 shows how design students were asked to use it in their sustainable design projects. There are so many ecological strategies, tools and methods for students to work with regarding the problem that, as teachers, we want to simplify their starting point. The important thing here is that students are asked to figure out an ecological problem from the user behaviour point of view. Additionally, students are asked to, for example, look for future sustainable lifestyle scenarios, think of packaging as a service instead of a product and do some user observation or interviews to gain insight about people's behaviour.

In addition, later in the design process students are asked to visualise their systems and the user process when defining their problem as well as when explaining their concepts and results. They also choose other design methods based on the question they are investigating. Lately, popular futuristic starting points have

been disappearing and edible materials.

In the case of the Yue mooncup, students chose to look into the problem of female sanitary products creating waste and hygienic problem waste in the world. This was a project from our Asian exchange students and they found the mooncup option (instead of using common sanitary napkins) while studying in Finland. The mooncup is a reusable sanitary product which the user can wash and sterilise, and use for many years. Students wanted to promote this product to Asian markets, but while making user interviews they found out that the problem of using the product is not based on sustainability. The users said that the idea of a mooncup is good but that sustainability is not the main concern. They would not dare to look for this kind of option since it is an embarrassing topic to talk about because female issues are quite a taboo in their culture. There are also issues about female virginity which silence the discussion of using this kind of products. After these user remarks, students began to design a service which would provide information, a starter package and a toolkit for users, so that they could buy and be informed about the product in a discreet way. Designing toolkits actually increases the amount of packaging materials, which would be a bad idea sustainably, but on the other hand this promotes new behaviour in the larger perspective and is a good design choice from a behavioural point of view.

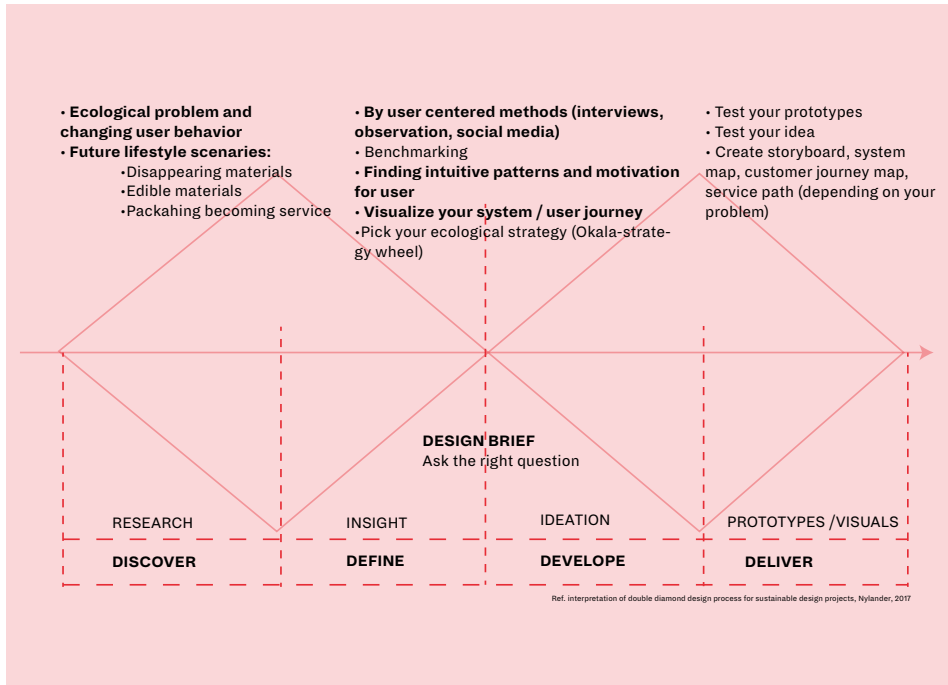Soap, cream and bee balm concepts are examples of disappearing packaging materials

Figure 3. An interpretation of the double-diamond design process for sustainable design projects (Nylander 2017).

when thinking of the re-use of packaging from the user's point of view. What kind of things one wants or needs to re-use and how intuitively the re-using scenario works between product and packaging. One example is hand cream packaging which is made out of soap and could be used afterwards as hand soap. Bee balm packaging, on the other hand, is made out of beeswax and the packaging can later be used for caring for leather products like shoes.

Figure Veggies is an example about promoting for a new behaviour by appealing also to users' emotions in a non-educational way. The packaging object that students are changing here, with a re-usable option, are plastic vegetable pouches. Moreover, they wanted to promote the

problem of misshaped vegetables getting thrown away and creating food loss, and they appeal to people in this with the trend of body-positive thinking.

The Beeco packaging concept creates longevity for packaging material and also creates interaction with users and packaging. Take-away food packaging is made out of beeswax sheets, which users can later be refolded around the food or re-used for preserving other food products.

By using user-driven design as a starting point, the students started to design new behaviour and services. They included the systemic approach but also commercial marketing in their designs.

Good packaging design helps brands to sell, but thinking about packaging as a service could provide even more sustainable benefits to the brands and also ease the burden of how to be sustainable in a cool manner. We can more effectively change behaviour when we appeal to peoples' innermost desires (in the way that commercial marketing does). By mixing the systemic approach and figuring out peoples' everyday choices and wishes, we can create behaviour which is linked to circular economy thinking. The millennial generation is eager to give information about themselves (e.g. in social media) but they want discussion, not just to be brand loyal. Co-designing with them and taking users into the development process could also be beneficial to brands.

Picture 1. Packplay 2. Cream and soap (Saukkonen and Tammivuori 2016).

Picture 2. Packplay 2. Bee balm (Tyrväinen and Ala-Olla 2017).
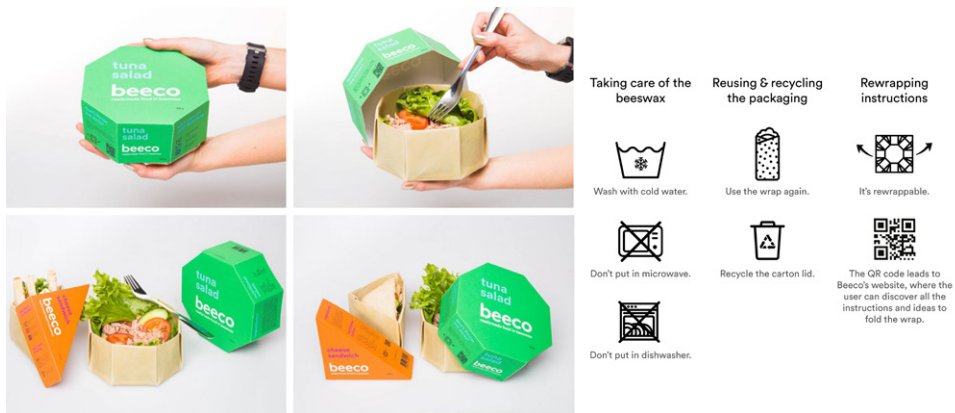
Picture 3. Packplay 2. Beeco packaging (Komppa, Ferrari, Rouhollahi & Iglesies Camprubi 2017).

Picture 4. Packplay 2. Figure Veggies (Koistinen, Hoppula, Leung & Minami 2017).

References

Badke, C. and Walker, S. 2013. Design Sleepwalking: Critical Inquiry in Design. In Walker, S. & Giard, J. (eds.). The Handbook of Design for Sustainability. Bloomsbury Publishing Pld. London, New York. 389–407.

Bhamra, T., Lilley, D. and Tang, T. 2011. Design for Sustainable Behaviour: Using Products to Change Consumer Behaviour. The Design Journal. Vol. 14 (4), 427–445.

Bhamra, T., Hernandez, R. and Mawle, R. 2013. In Walker, S. & Giard, J. (eds.). The Handbook of Design for Sustainability. Bloomsbury Publishing Pld. London, New York. 106–120.

Bocken, N.M.P. de Pauw, I., Bakker, C. and van der Grinten, B. 2016. Product design and business model strategies for a circular economy. Journal of Industrial and Production Engineering. Sustainable Design and Manufacturing for Circular Economy. Vol. 33 (5), 308–320.

Chapman, J. 2013. Emotionally Sustaining Design. In Walker, S. & Giard, J. (eds.). The Handbook of Design for Sustainability. London, New York. 363–374.

Chick, A. and Micklethwaite, P. 2011. Design for Sustainable Change: How design and designers can drive the sustainability agenda. AVA Publishing, SA.

Cor, E. and Zwolinski, P. 2014. A procedure to define the best design intervention strategy on a product for a sustainable behavior of the user. 21st Conference on Life Cycle Engineering. Procedia CIRP, 15 (2014). 425–430.

Davis, T. and Bigornia, A. 2015. Why brand enthusiasm will create demand for more sustainable products. In Proceedings of Sustainable Innovation Conference, 2015.

Daae, J. and Boks, C. 2014. A classification of user research methods for design for sustainable user behaviour. Journal of Cleaner Production. Vol. 106, No.1 2015. 680–689.

Doordan, D.P. 2013. Developing Theories for Sustainable Design. In Walker, S. & Giard, J. (eds.). Handbook of Design for Sustainability. London, New York. 57–72.

Lockton, D., Harrison, D.J., Cain, R., Stanton, N.A. and Jennings, P. 2013. Exploring Problem-framing through Behavioural Heuristics. International Journal of Design. Vol 7 (1), 37-53.

Lockton, D., Harrison, D. and Stanton, N.A. 2012. Models of the user: Designers' perspectives on influencing sustainable behaviour. Journal of Design Research. Vol. 10 (1/2), 7-27.

Muratovski, G. 2013. Advertising, public relations and social marketing: Shaping behavior towards sustainable consumption. In Crocker, R. & Lehmann, S. (eds.). Motivating Change: Sustainable Design and Behavior in the Built Environment. Oxon UK, New York. 178–197.

Norman D.A. 1988. The Design of Everyday Things. London. MIT Press.

Nylander, N. 2016. An interpretation of the techno-sphere and consumption cycle of packaging. Unpublished teaching materials.

Nylander, N. 2016. An interpretation of the double-diamond design process for sustainable design projects. Unpublished teaching materials.

Packplay 2. 2017. Unpublished design project of environmental packaging design. Lahti University of Applied Sciences. Institute of Design.

Power, K. and Mont, O. 2010. The Role of Formal and Informal Forces in Shaping Consumption and Implications for Sustainable Society: Part II. Sustainability 2010. Vol. 2., 2573–2592.

Ryan, C. 2013. Critical Agendas: Designing for Sustainability from Products to Systems. In Walker, S. & Giard, J. (eds.). Handbook of Design for Sustainability.London, New York. 408–427.

Sienna, K. 2015. Badass – Making Users Awesome. Canada: O'Reilly Media.

Sohn, M. and Nam, T-J. 2015. Understanding the attributes of product intervention for the promotion of pro-environmental behavior: A framework and its effect on immediate user reactions. International Journal of Design. Vol. 9(2)., 55–77.

Takahashi, N., Shi, Q and Wong, S. 2015. YUE mooncup packaging and service concept. Unpublished design project of environmental packaging design. Lahti University of Applied Sciences. Institute of Design.

Tan, L. B. and Johnstone, M-L. 2011. Barriers to Being Green. 2011 ANZMAC Conference Proceedings. Australian and New Zealand Marketing Academy.

Tischner, U. and Stebbing, P. 2015. Changing Paradigms: Designing for a Sustainable Future. 1st Cumulus Think Tank Publication. Aalto University School of Arts, Design and Architecture. Helsinki. 317-327.

Vezzoli, C. 2013. System design for sustainability: The challenge of behavior change. In Walker, S. & Giard, J. (eds.). The Handbook of Design for Sustainability. Earthscan/Routledge. Oxon UK, New York. 276–290.

Katariina Mäenpää & Kristiina Soini-Salomaa

Building the shared together: Co-designing an art and design centre

Abstract

The city of Lahti has a long history as a centre of art and design. Its furniture and clothing industries, as well as time-honoured education in art and design, have created a distinctive and unique brand in Lahti city. However, the attractiveness of the brand and gained reputation have been declining lately, in order to reverse this trend and regenerate the brand and reputation, urgent actions are needed. In answer to that demand, the TAJUMO and PAJU projects were established. TAJUMO aims to create an overall concept for an experiential art and design centre (ADC), whereas PAJU, working together with the personnel of Lahti museums, will grow into a completely new way of providing meaningful experiences to the people visiting the ADC. This means radical change to the museum service environments, moving towards shared, and more participatory and interactive spaces. The tradition of participatory design provides service design tools for the inclusion of current and potential museum customers as well as for including the personnel, other stakeholders and networks. Currently museum visitors are typically elderly people with higher education and incomes than the average people. Existing art and culture establishments are presently reaching toward the non-visitors and trying get them involved (Lindholm et al. 2015). What if everyone is activated and invited to co-design a new ADC from the very beginning of the process?

Project TAJUMO – an art and design centre

An active urban lifestyle, self-motivated activities and social influence are the trends of contemporary society. The idea of inclusion has invaded many areas of society to the extent that several researchers have started to talk about the birth of new kind of citizenship; people have grown up from giving allegiance to become active operators (Lindholm 2015, 14). Inclusion represents something very characteristic of this century, and it can be defined as the efficient utilization and application of ideas, abilities and knowledge of individual actors in order to achieve jointly agreed goals (Auvinen & Liikka 2015, 5). If you want to get people involved in

something, you have to include them and invite them to join a co-design process.

The TAJUMO project represents a perfect example of something that cries out for co-design. The objective is to create a concept for an experience centre of art and design that will serve as the cornerstone of national and international cultural tourism for the city of Lahti as a tourist destination. The art and design centre (ADC) is expected to become a tourist attraction that will increase the pleasantness for inhabitants, as well as the attractiveness of Lahti to industries in the region. It invites tourists and travellers, as well as locals, to get involved in telling the story of the art and design that spring from Lahti.

Lahti Art Museum needs new facilities and, along with this, a new concept of action in order to achieve an independent and recognized position among Finnish art museums. New venues for the art museum in the centre of Lahti are currently under assessment and the decision about the placement will be made at the end of the year 2017. The Institute of Design will move in a new campus area in the Mukkula quarter and thus it is crucial to ensure the presence and visibility of design education; this will be an essential part of the new ADC in Lahti city centre. This can be achieved by creating a new concept of a city centre-based multi-mode environment, which combines art, design, business, education, new technology and citizen engagement.

The TAJUMO project will intertwine what are currently quite separate functions of design expertise and art exhibition operations into one vital and seamless concept. It also unites several networks of local artists and designers in order to develop together new content, exhibitions and events. This hub of creative actors is endeavouring to recreate the image of Lahti downtown, since the reputation of Lahti city centre has lost its attractiveness as the in particular retail shops have disappeared. TAJUMO is an ambitious pursuit: to strengthen the city brand and network of city developers.

At the beginning of the project the current situation of art, culture and design offerings were mapped. After that a series of innovation workshops began for different target groups and stakeholders in order to find out the needs and expectations of the service package. In order to offer unique art and design experiences to museum customers, the whole range of services, including cafeterias, restaurants, boutiques and accommodation must be included in the development process. Good examples of urban branding based on remarkable art, gallery and museum traditions can be found abroad.

The new ADC will provide a functional and mutually active space, or frame of mind, for locals, tourists and travellers, students and design professionals. In addition, the enterprises of the Lahti region will be invited to the design process, since interaction in a cross-disciplinary environment is a fruitful platform on which new ideas can breed and on which businesses can be born and develop. Besides, participatory and service design offer excellent tools to support the activities. The ADC is designed to be an

urban, easily approachable oasis of exhibitions and an inspiring, a high-quality forum in which to gather and have meetings in the very heart of Lahti, where new art and design products as well as completely new forms of cultural services, will be available to see, buy and experience. The aim is to strengthen the exhibition co-operation with the Design Museum, the Foundation of Furniture and the Foundation of Furniture Museum few to mention.

The ADC will also serve as a novel learning environment. It will bring together regionally, nationally and internationally relevant materials, literature and archives for students and researchers. Students and schoolchildren will have an opportunity to learn from the masters when art and design exhibitions and collections are easily available. Various kinds of workshops and interactive learning methods will be used to support the engagement and creativeness of participants. Support services and technological equipment, like a library of recycled materials and 3D printers, can be placed into the ADC in order to be available for designers, entrepreneurs and students in the Lahti region.

More productivity and job satisfaction with service design: The PAJU project

Museums are radically changing their service environments towards more participatory and interactive spaces in order to support clients' activities and experiences. Without content, you just have an empty building with a few walls, a floor and a roof. The spirit comes with the content created by people. The personnel of an art museum create the atmosphere and prepare the stage for artists and prepare the space for the visitors. When a new concept for an ADC is under construction, the personnel is one of the most valuable assets and sources of knowledge that must be involved in the project. The PAJU project speaks with the voice of the museum's personnel, supports them in the organization's cultural change and walks with them towards new ways of doing museum work. It aims to increase the ability of public sector workers in general to handle notable working environment changes which arise as a result of service environment changes. A self-supporting working model is created, which can be utilized in public sector organizations in connection with service design and change processes. A set of development tools is created during the project to facilitate the change processes. Job satisfaction and the productivity of employees can be upheld and promoted in change situations with these tools.

Service design and its methods are at the core of the development measures of the PAJU project. The methods are already established, especially in the development of public sector services, and this project combines user-centred design with the approaches of work satisfaction and the development of professional expertise. Service design aims to change the service environment and thus it automatically leads to change in the working environment perceived by the worker.

Change in the working environment can cause insecurities and anxiety and thus developing a new working environment cannot be done separately from the training of personnel and management. New service environments, like the new ADC, are deployed to produce value to the clients via more customer-oriented and more individualistic ways. Every worker in the organization must be aware and committed to a joint vision, strategy and values. This cannot be achieved without the engagement of staff: commitment does not exist, nor it can be created, if people do not recognize themselves in the organization's vision, strategy or values. The organization should support lifelong learning and development, and reward personnel achievements.

A working environment must be felt to be functional and safe. The well-being in the workplace leads to good results, and good results support well-being at work. The best results are achieved when renewal activities are run simultaneously. Leadership and management are the key dimensions when reforming the modes of operation. Well-being at work is a process in which the worker has the primary responsibility for his or her behaviour and well-being. The PAJU project aims to develop the museum personnel's self-management. The project links the methods of self-management with the service design processes, i.e. how an individual can react to the changes proactively in the customer-oriented service design processes. Employee involvement provides an option to create ownership of the work in organizations.

How does an employee react to this process? How does her or his expertise improve during the process and how is this process managed? What kind of information and support does he or she need to survive the change process? These are some of the questions that are answered in the project's workshops by describing, visualizing and modelling the processes of well-being at work.

Well-being at work maintains productivity during the change process. The PAJU project intends to build a model where an individual retains her or his experience of meaningful work during the change process and understands the changing working environment. In accepting the changing ways of working, an individual still feels in control of his or her work routines. It is important to maintain clarity during the change process, although it might be challenging. When confronting these questions, an individual needs tools to manage herself or himself in order to survive.

Every job in a museum and art centre is a service task. The growing requirements concerning the openness the service roles set new challenges for job descriptions. The main tasks of museums have been, and will be from now on, to preserve and save the cultural heritage and pursue research, education and communication relating to that, as well as exhibition and publication activities. Most museums and art centres have been organized according to these operations. In the discussions within the museum field, these operations
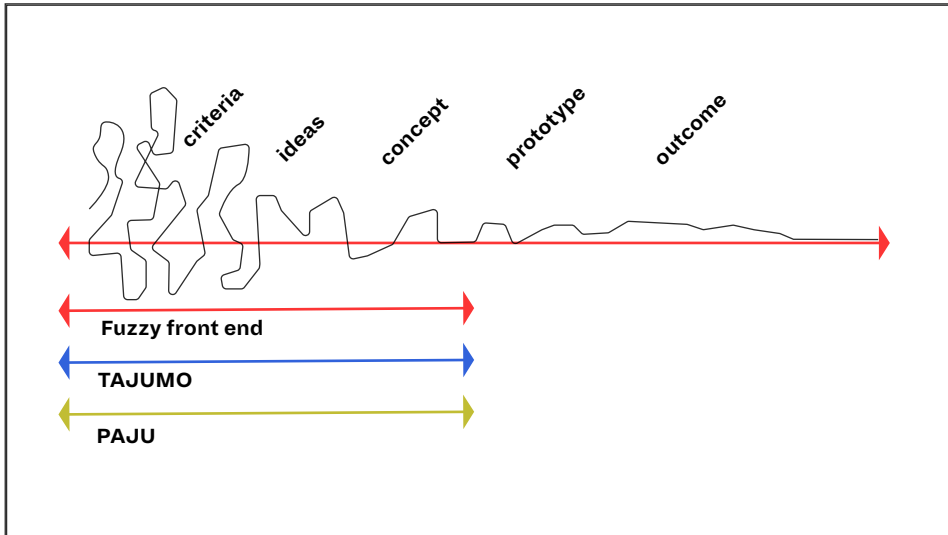
Figure 1. The focus of the TAJUMO and PAJU projects in the co-designing process (adopted and modified from Sanders & Tappers 2008).

are emphasized and their services are formed accordingly: museums provide collection, exhibition and audience services.

A valuable combination

During these two projects (TAJUMO and PAJU) the methods of service design will be truly tested. The inclusion of stakeholders from the whole, 360-degree view will be a challenging journey, but it is definitely the only way to proceed. There is no other way "to build the shared together", i.e. the space encountering

everyone, providing meaningful experiences and experiential meanings. Having a variety of stakeholders offers an opportunity to gain a comprehensive understanding of the issue at hand, put all the ideas into same pot and pilot them in every phase of service process development. In order to have an internationally remarkable, extensive and convincing new ADC that utilizes the latest technology in the city of Lahti, it must be created together.

The co-design process covers the whole creation continuum, from the initial thought or

perception of a need to the finalized solution to a need (i.e. usually a product or service). The positioning of the TAJUMO and PAJU projects in the co-design process line is illustrated in Figure 1. It is important to commit stakeholders from the very beginning, because the threshold to participate grows continuously as the projects proceed. People feel neglected and lose interest. The fuzzy front end is the phase where all the opinions and thoughts must be brought into open conversation and discussed thoroughly. Trust among stakeholders and a feeling of inclusion are evoked. This requires time and dedication, but this base work builds the foundation of co-design and needs to be done. If it is not done, essential issues may be lost for good and aspirations may remain half realised. It is also important to keep one's eyes wide open to the surrounding world, since plenty has been already tried and done abroad. Learning from others is one meaningful step on the way to success. (Sanders & Stappers 2008) Both projects are currently in this first phase.

The activities of the projects are divided into work packages, thus becoming manageable and assessable. Work starts with immersion into Lahti museums' current resources and operational models as well as by conducting a background study of international museum concepts. Relevant stakeholders are identified and invited to join the co-design process. Customer segments are reviewed carefully and their needs analysed. A summary of service offerings, business models, and marketing and communication practices, as well as technological applications, is compiled. The forum for discussion is established with the personnel of Lahti museums in order to assure that communication is open and the objectives of the projects are shared. The change in art museums' both operative and service environments, as well as the requirements from the current audience, are reflected in the personnel's work tasks and job descriptions.

Concept design and the creation of a service offering are instigated simultaneously with the background study. A seminar with top speakers and open workshops forms the beginning of public inclusion since an art centre is a public service and everyone has a voice to be heard. Expectations, ideas and opinions from every stakeholder are presented to the public by sharing them on an e-platform where the conversation can continue. The findings of the dynamics and factors of ongoing change are analyzed and the understanding of the complete phenomenon begins to accumulate. In addition, with the challenges of customer-based service design digitalization, technological requirements and alternative options for space and furniture design will be taken into account. Accordingly, the new business model for the ADC starts to form in co-operation with local business actors and the personnel, as meaningful value creators, define and adopt new roles.

The core operations of the ADC will be reviewed carefully and brightened up in order to exceed the requirements of the audience

– the ADC has to astonish and amaze them. Thus, the personnel of the ADC must be provided with the needed expertise and resources to meet the objectives of the new operational model. Service trade and business co-operation are realized in the design and composition of supportive services according to the findings of preceding studies and workshops. Altogether 200 firms will be involved in a broad network of co-operation working on different levels of partnership. The ADC aims to enhance the image of Lahti city centre and enrich the visitor experience by including that "little extra element of surprise" in it. It does not happen on the behalf of a single operator and requires infallible co-operation.

When the comprehensive main concept is ready, the focus will be transferred to the design and prototyping sub-concepts that will include, for example, new virtual and augmented reality applications in order to produce inclusive art experiences, virtual industrial design and furniture exhibitions, experimental new art and design exhibitions, and an interactive new form of web shop. Features of gamification will be included in the total offering of art exhibitions and thus this functionality will increase involvement during visits. The purpose is to explore new frontiers and find something that cannot yet be seen and something unexpected.

Working methods like user research, interactie social network platforms, co-creation, participatory planning and workshops are to prove their power. Feedback and evaluations of the comprehensive service experience and its experiential aspects will be collected from the attendants in order to fuel the continuous development of service process. Both the consumers and producers of the experiences have equally important roles in achieving something that draws unforgettable trails in the hearts and minds of attendants. The ADC will be the Disney of the art and design world, providing experiences that cannot be exceeded.

References

Auvinen, A-M. & Liikka, P. 2015. Osallistamisen käsikirja. Hämeenlinna: Suomen eOppimiskeskus ry. [Cited 12 Oct 2017]. Available at http://wiki.eoppimiskeskus.fi/download/attachments/26411093/eO_AVO2_Osallistamisen_k%C3%A4sikirjaA5_48_4%20(1).pdf?version=1&modificationDate=1424096301379&api=v2

Lindholm, A. (eds.) 2015. Ei-kävijästä osalliseksi – Osallistuminen, osallistaminen ja osallisuus kulttuurialalla. Humanistinen ammattikorkeakoulu. [Cited 13 Oct 2017]. Available at https://www.humak.fi/wp-content/uploads/2015/11/Arto-Lindholm-ei-kavijasta-osalliseksi.pdf

Lindholm, A. 2015. Johdanto. In Lindholm, A. (eds..), Ei-kävijästä osalliseksi – Osallistuminen, osallistaminen ja osallisuus kulttuurialalla. Humanistinen ammattikorkeakoulu.
[Cited 13 Oct 2017]. Available at https://www.humak.fi/wp-content/uploads/2015/11/Arto-Lindholm-ei-kavijasta-osalliseksi.pdf

Sanders, E.B.-N. & Tappers, P.J. 2008. Co-creation and the new landscape of design. CoDesign. Vol. 4 (1) 5–18. [Cited 13 Oct 2017]. Available at http://www.tandfonline.com/doi

Antti Heinonen & Mirja Kälviäinen

Researcher designer collaborations with narrative-based information design

Abstract

The complex and process-based data can benefit from information visualisation as a means to deliver the required information to the selected audience. In many systemic and process-based information communication cases, it is suitable to deliver the information in a narrative form. With any information design case, the collaboration with the researchers producing the data to be presented and the designers delivering the information as a design solution is important. When producing the data into a narrative form, it is especially vital to collaborate with the information content so that the script contains the necessary information and forms an understandable storyline. The data wrangling process should be done together since the narrative form requires both specific content elaboration or simplification and organising the data into a correct information-carrying script. As examples of this, work case studies are presented from an InforME -project, visualising renewable energy production possibilities for the rural countryside of Finland.

Introduction

As the amount of data is growing exponentially, the importance of delivering it to the different audiences in an understandable way is growing. This provides new opportunities for designers to work in the field of information visualisation. With the visualisations of complex processes and multi-fold data, the narrative nature of communication can be of use. In visualisations, this requires, in general, script-based image creation and, specifically, interaction design and using moving images. The production of graphics and visualising movement is often time consuming and changes at the advanced parts of the visualisation process are difficult to execute. For this reason, the investigation and improvements of the data-wrangling process for visualisations is of vital importance. The collaboration between the data-producing researchers and designers, as well as between the stakeholders relating to the audience group, should be promoted for ensuring the correctness of

the delivered information and the joint understanding of the communication goals. Time and resources are saved and the goals for information visualisation are achieved when the collaboration is considered as the important part of the information visualisation process.

The collaborating stakeholders in information design

The working models in information design, and further in producing the visualisations, can be divided into stems with one, two or three role groups. The data to be presented as selected and analysed information can be produced or collected by a role responsible for the content. This person can be an expert, such as a researcher or a journalist. Then, for the visualisations, the data has to be designed, turned or edited into the selected information in a visual form that the information visualisation is, in the end, delivering. This phase describes the core activity of the information design and the information designer. The visual, operational execution of the information design plan can form the third role set in the process. In some cases, all of these roles can be performed by the same actor. (Koponen, Hilden & Vapaasalo 2016 302-307) The collaboration between the different experts and roles in this process is vital to consider for achieving good information visualisation. The joint understanding about what is important to deliver needs to be achieved, and the correct delivering of data and the following information needs to be managed throughout the process.

In information design and in the visualisation production process, problems can be caused by the lack of jointly understood goals and language. Successful information visualisation requires good and shared understanding about the target audience, their information needs and what visualisation can achieve in certain communication situations.

Information design is about designing the way to present the information in the best possible way (Koponen et al.2016) It can be applied to clarify traditional literary or table formed information, but often the end result is visualisation following the models and guidance relating to visual communication and design. Following Koponen et al.(2016), "Information design is the study and practice of bringing clarity and comprehensibility to visual materials that are meant to direct, teach, explain, or otherwise inform."

Visualisation makes something visible for the visual sight with picture or pictures to be identified and interpreted. It works in an explorative way and tries to reveal new features from the data. This is different from the task for information graphics that is used for explaining and supporting communication by carrying certain information. (Koponen et al. 2016) For producing both of these outcomes, the principles of information design can be applied, and the end result can be static, moving or interactive data visualisation. Both of them can be produced by applying narrative elements for making the communication more understandable and interesting.
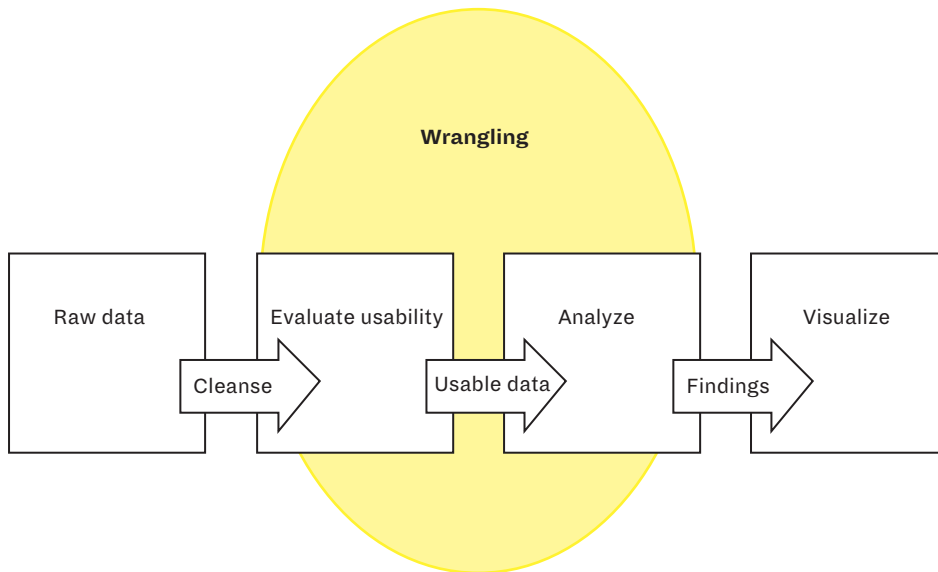
Figure 1. Data wrangling is an iterative data exploration and transformation process which aims to make data more usable for the visualisation (Kandel et al. 2011).

Information design works for refining data with different means and for different purposes. Data can be simplified, compared, organised and classified for clarity and ease of understanding. The refined data is, in this way, modified into usable data for visualisations and as the starting point for a script. The production of a message and visualisation creates needs for identifying and for achieving the communication goals, even changing the structure of the data. (Tufte 1984, 28) Often, this also means that the

possible variables and scales are defined for the presentations of the data. It can also mean that the different means for data refinement produce a narrative, such as comparing different things with each other (Lipton 2007) Systems-oriented design uses systems thinking and aims to capture the complexity of a system's models and processes. Systemic approaches could be valuable in design projects. Models can be used to develop a frame that makes it easier to assimilate new information and also makes it quicker to

gain an in-depth understanding of the systems to be designed. (Lurås, Lützhöft & Sevaldson 2015)

Also, the audience of the information design needs to be considered in the process and data refinement. They might have specific ways of understanding issues and specific interest to motivate them for looking at the information. (Lipton 2007) The aim of the information design is especially the ease of understanding for the audience that receives the information to be communicated. There might be certain communication purposes for the information visualisation such as braking up disillusions around the information within the target audience group. These kinds of goal issues have to be especially pointed out in the information design solution so that the defined major information points are emphasised in the visualisations.

Information design process and data wrangling

Data visualisation is an important tool for presenting complex information. Ideally, it uses a large amount of information and compresses, as well as simplifies, it. Static images can be more effective if the information, diction and presentation are designed to be clear and readable. It is often best to simplify as much as you can while fully serving the audience's needs. On the other hand, it is always best to avoid simplifying to the point of insulting the audience's intelligence. (Lipton 2007) Data visualisation can also be produced by using linear storytelling and interactive solutions. These enable versatile solutions

to present complicated information but can only be used in digital media. However, the production is more time consuming and cumbersome than with static images. The information design process should aim at utilising the facilities of the selected medium and format, for example utilising storytelling in an audio-visual product, or sorting or presentation methods in an interactive application.

Data wrangling is a process where raw data is sorted and cleaned into a usable form (Figure 1). It is a time-consuming iterative data exploration and transformation process that prepares data for analysis and findings. In-depth sorting and evaluating the usability of the data should be accomplished before starting the analysis. (Kandel et al. 2011) There might be a need to go back and look at or collect raw data again when analysing. This new data needs to be wrangled as well. It is possible to begin designing the visualisation before data analysis is fully done, but it should not be finalised before all the content is checked and designed. If the specifications for the presentation medium are known, those should also be considered already during the data analysis. (Lipton 2007) Data and visualisation experts might not share the same opinions when analysing and evaluating usability of the data. Both aspects have to be fully considered and taken into account before starting the visualisation process in order to make the end product reach the set goals.

During data wrangling, data is diagnosed, and after that it is cleaned, combined and transformed

Table 1. Properties of Author-Driven and Reader-Driven Stories. Most visualisations lie along a spectrum between these two extremes (Segel & Heer 2010, 8).

Author-Driven	Reader-Driven
Linear ordering of scenes	No prescribed ordering
Heavy messaging	No messaging
No interactivity	Free interactivity

into a suitable new form. The usability value of the data should be evaluated both through the research and visualisations. It is often that, after analysis, it is necessary to return to the transformation stage due to the observations made. (Kandel et al. 2011)

In visualising large amounts of data or complicated processes, also audio-visual and linear narration can be utilised. Narrative communication is one of the best ways to connect with the audience also when the question is about information design (Clarke 2013) Narration can adjust the amount of the information that the user has to absorb simultaneously and, in that way, reduce the cognitive memory load. Memorability can also benefit from the use of narration. People find it easier to remember things that they find interesting. (Adcock et al. 2006) Using scripting and data analysis, it is possible to attach information to natural story elements. The script can, for example, be factual or fictional, and it can visualise the selected information through characters or a storyline. People think of incoming information as if they were trying to form stories out of it in order to understand it. (Escalas 1998; Thompson 1998) Our emotions have different plots that are matched to current situations. Dramatic moments in a story awake more emotion than a steady one. Narratives make emotions meaningful by placing them in the context of an individual's personal history and future-oriented goals. (Escalas 1998)

Data stories imply a story that is written on the basis of data. Information specialist Martin Rosenbaum (BBC) has classified the data stories into eight different categories. These are measuring, proportional zing, inner comparison, outside comparison, change of time, serial tabling, category-based analysis and association. (Rosenbaum 2012) These categories can also be considered with data-based animation or video scripts and in data refinement. The making of good data stories requires, from the makers, both vast knowledge from data visualisation and from storytelling. Referring to Gershon & Page (2001) "Effective storytelling requires skills like those familiar to movie directors, beyond a technical expert's knowledge of computer engineering and science."

Data stories often aspire to utilise interaction, finding questions, alternative explanations and verification (Segel & Heer 2010, 1) These separate it from linear storytelling, which we use in movies, books and comics. Designers should take advantage of these matters in narrative visualisations.

Narrative visualisation can be separated into seven genres; magazine style, annotated chart, partitioned poster, flow chart, comic strip, slide show and video. These genres can be combined with interactivity and messaging to produce varying balances of author-driven and reader-driven experiences. (Segel & Heer 2010, 1)

In addition to data wrangling and possible narrative scrip writing, the actual data visualisation process can take place. The basis for analysing the process can be looked at from the point of view of the seven-stage model of visualisation project by Fry (2008, 1):

1 **Acquire the** data to be visualised
2 **Clean and** organise the data
3 **Filter unnecessary** data for visualisation out of the data material
4 **Enrich the** data by analysis
5 **Choose the** way to present the data and present it
6 **Refine the** presentation
7 **Add interaction**

Modelling the successful collaborative process with researchers and designers in InforME –project

In the 2016-launched InforME -project, the aim was to deliver information visualisations from the possibilities of renewable energy production to the residents of rural Finland. Even basic information about renewable energy processes is complex. The different aspects of renewable energy sources are hard to compare, but the countryside holds various potential sources. Furthermore economic, environmental and social impacts affect the consumer decision making. Consumers in the rural area also play a key role in the turn towards renewable energy sources, where there are a lot of possibilities to produce renewable energy at the local level. The project was based on the hypothesis that well-executed information design could give a boost to overcome knowledge and other information-related barriers. (Coates & Allison 2014)

In this study, research on renewable energy was carried out by energy experts. Furthermore, the information was processed and visualised together with design experts and students. The initial information visualisation workshops and small-scale projects with media students showed that the visualisations remain easily unfinished or the message they contain is somehow false. The possibilities of raw data use were not fully accomplished. This gave reason to try to focus on developing the data-wrangling process in this project in order to make the visualisation results
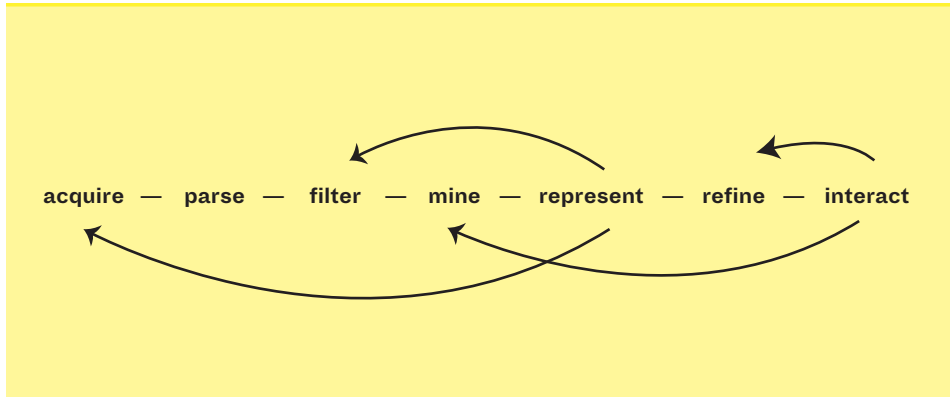
acquire — parse — filter — mine — represent — refine — interact

Figure 2. Computational information design (Fry, 2008).

better and even to improve the speed and flexibility of the production process.

It seemed necessary that the substance experts of the data, the information design experts and even the participants dedicated in the different stages of the visualisation production took part in the data wrangling together, preferably before the visualisation plans were made. It seemed also useful to have a facilitator for the co-design of these experts and participants that would understand the theories and working methods that information design has to offer. The long-lasting projects for information design made it possible to follow and analyse the work of the experts and students and plan the further processes according to the findings for good practices and away from the working models that steered the work in the wrong direction.

The first visualisation workshops with the InforME -project, their experiences, results and evaluation resulted in the initial list of improvements in the data-wrangling process collaboration, information design and visualisation production.

→ **The experts** jointly produced focus of the used context and user group in the task-giving phase improves the user value of the final visualisations.

→ **In presenting** the basic data, it is possible to define, categorise and explain the meaningful information for the designers/producers of the visualisations. In this way, it is possible to improve the understanding of the most important parts of the information already in the design phase.

→ **Presenting, for** the content experts, the visualisation drafts in detail, and assessing the information and story line solutions in them during the design phase, would improve the use value and content correctness.

→ **Jointly making,** presenting and assessing the idea phase visualisations with the process participants helps to perceive the given task well. The rising questions and answers also provide for coherent understanding of the final product.

The process continued by visualising the study results of energy production on Finnish horse farms. Based on the research material and guidance from energy experts, information design experts, the students from the Institute of Design produced different forms of visualisations from the given data. This interplay between energy experts and designers formed an interesting learning environment. Observations from the process showed that a procedure led by both information design and energy experts is essential for a good visualisation outcome.

One group of students worked to create posters based on wrangled data and background information. The data was presented to the design experts and students by energy experts through a lecture and discussions. The students had to understand the wider context in order to be able to simplify the data and pick out the core they decided to build the visualisation around. They had the possibility to quickly check facts and ideas with the energy experts by email and face-to-face meetings during the contact days. Some misunderstandings occurred, but they were cleared up during the design process and did not greatly affect the final products. All facts and ready-made design plans were approved and corrected with the energy experts. Meanwhile, the importance of presenting accurate information was emphasised.

After this phase, the students produced graphic design visualisation using the information design guidelines. Using the same data set from different points of view, a wide variety of findings and data visualisations were created. One example of a poster is presented in Figure 2.

After observing and evaluating this visualisation process and the results achieved, an even more specific list of tasks and requirements for producing good information visualisation results was thought out.

The potential of renewable energy in rural areas –visualisation workshop

Experts collected and selected three different information packets about solar energy, bio-fuels and renewable energy potential in horse farms for student groups. Target audience for visualisations were farms as the primary decision makers and people living in rural areas as the secondary. The goal was to create 'visualisation for those, who already have some interests in the subject'.

Figure 3. Example poster made by a student, Iiro Piipponen, in the media content design program about biogas production on horse farms.

At the beginning of the workshop information design lecture, InforME-project and information packets were introduced. Participants and experts deeply conversed on subjects together before participants selected the information packet they started to work with. Participants continued working independently by analysing and sorting the information in order to make findings from that. At the end, they created a message and content design for visualisation based on the findings.

Those that were analysed separately with experts and several questions about the information were solved. At this point, it is important to check in detail every piece of information that the visualisations are based on to avoid futile work and misunderstandings between experts and participants. Also, the experts from the

customer side checked promotional values and gave comments for designs.

Participants created visual content design plans for their visualisations and started idea sketching. The design process for the final visualisations was completed during three different contact days, including conversations with experts, independent work and presentation. Working with the complicated information and unfamiliar framework can be deceptive for information designers. The iterative process, where group discussions and multiple analysing of visualisations from different stakeholders take place, seems to improve the end results in visual terms and for usable communication purposes.

The workshop produced three different posters and eight pictograms for biofuel. Feedback from participants gave important information. Especially, at the beginning of the workshop, given information seemed to be too widely chosen and hard to understand in such a short time. Participants felt it as a restrictive issue when they couldn't solve these problems alone. Experts valuated the end results as good and usable but the time-consuming wrangling process decreased the amount of visualisations the workshop produced.

Also, during the poster design production, the designers found that all the wrangled energy production data is process based. These processes are mostly linear chains of events. This led the information design experts to study how animation and storytelling could be utilised in the visualisation processes.

→ **The use of open-working** platforms, such as Google Drive. are beneficial since they provide for a flexible workflow. The efficient use of these platforms already in the analysis phase of the data would provide for better than an e-mail platform for commenting on the plans and transformation of data.

→ **The proper developing** of the visualisation plan is dependent on the dialogue between the experts and the visualisation designers and makers. Especially in visualising complex data it is important to have confirmation from the experts to the chosen way of handling the information in every phase of the planning. This could appropriate social media platforms, such as Facebook or Yammer, to provide for quick feedback regardless of joint meetings.

→ **The experts should** also check the narrative elements of the visualisations through demands of the specific user group. Caution should be practiced with symbolic meanings or visual language that might provoke false interpretations with the users.

→ **Utilisation of horse** manure –animation project

Hereafter, another group of students used the same data set for creating scripts for informative 2d and 3d animations. As background

information, a video was also shown describing a farm where promoted-heat recovery technology was already in use. Linear working pipelines are not flexible and animation processes are resource consuming. Information has to be wrangled and analysed in detail before scripting. This kind of information-based scripting is trying to keep the elements of the story factual but still simplifying the form of visualisation. Scripting and data wrangling should be co-designed with the experts and designers to recognise and achieve common goals during the process.

The manuscript was based on promoting utilisation of the heat generated in composting horse manure. Crucial steps of the process were processed together with energy and design experts as well as the students, and a script was built around them. The jointly built storyboard defined how the information should be presented and visualised. The role of an audio narrative was defined to support the visual world and give the viewer more detailed information about the subject. A definite storyline made the story easy to follow for the viewer.

Character design for the animation aimed to produce well-designed characters which could also be used later in other visualisations or advertising materials concerning renewable energy. The visual style was created with vector graphics because of its scalability, effective animation tools and pre-sets. All the created assets like characters, equipment and sceneries were made on separate files with clear and cleaned structures. This makes reuse of the assets possible for other designers or students working with the characters in the future.

Figure 4. Figure 4. Experts and designers used storyboard for creating a linear storyline that was based on selected information (Heinonen 2017).

Figure 5. Workshop notes from data that formed a base for narrative manuscript (Heinonen 2017).

The main characters were built and rigged over "a skeleton" that enables a fast animation process (Figure 3). The animated skeleton can also be reloaded with new graphics if needed. Animation project files were cleaned, organised and guided for later use. In this way, separate animation assets are easy and fast to produce for different visualisations. For example, animated compost machinery can be rendered in a different colour, speed or resolution for an interactive application or a PowerPoint presentation. As a result of the process, a 5:43-minute-long animation was produced.

The production was based on creating better tools and pre-sets for the project and improving the production economy. Visualisations produced in the project and the collected information need to be in a form which enables other designers to work with them in the future. The message used can be designed better after collecting and analysing experiences and feedback. This cost-effective animation project model enables a more exact product analysis between different animation versions. For example, different characters can be rendered for the same animations or new parts added to the storyline.

Animation has been shown for energy advisers and feedback has been positive. Content is informative enough and the story is told in a way that it is easy to remember. The experts have further asked, as a usability issue, if the storyline and animation could be separated into smaller parts, because the long duration requires a lot of concentration from the viewer.

The collaboration between the experts and the visualisation producers was tight and it worked well. The long design process also provided expertise for the students from the visualisation content, and it also helped them to find solutions for the design independently.

The triangular model, where energy experts, information designer and visualisation designer worked tightly together during the whole process, made it agile and effective. Goals were clear and sharp, because all the details could be defined, designed and problems could be solved quickly. The experience we have gained from this workshop has already been utilised for similar types of visualization projects. For example, the importance of the information designer role in the process where base information for the assignment is defined, is significant for good results. This knowledge has been taken into account when following workshop have been planned.

The experience also proved that if designers are following the given information design guidelines, then the final visualizations are more readable and the information has better accessibility. Even the basic understanding of guidelines, related to subjects such as typography, composition and colours, will aid when working with data visualisations. The need for lectures about guidelines in this kind of a workshop, can be defined based on the background of participants.
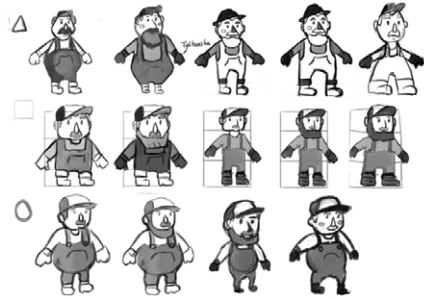
Figure 6. Farmer -character sketches. Designers and experts tried to create as recognisable characters as possible for a target group (Heinonen 2017).

Figure 7. Still frame from animation about utilisation of heat generated in composting horse manure, produced by the students and visualisation experts (Heinonen 2017).

Figure 8. Reference images for the animation were important for the designers in order to have a better understanding for creating the visual language (Heinonen 2017).

Conclusions

Information visualisations are a good way to deliver suitable information points from data sets for a targeted audience to understand these points correctly and easily, even in an entertaining and desirable way. In the InforME -project, information design for information visualisations was shown to be a practical tool in communicating complex energy data in a consumer-friendly format and thus to support the utilisation of renewable energy. However, the process for information design is not a simple one. As the amount, complexity and process or system type of the nature of the data and the following information is growing, it cannot be executed by one type of expert alone.

For many current information visualisation projects, the narrative way of transforming the data into easily understandable communication is beneficial. The narrative nature of a great deal of complex data, especially data relating to process type of activities, such as energy production, also requires storytelling and script-based knowledge, in addition to mere information visualisation skilled experts.

The information design process in these kinds of cases must be done together with special information content experts, such as energy experts and design experts. The multi-disciplinary process will produce more reliable, useful and informative visualisations. In the future, there is still room for the cooperation process between the research and design experts to be closer and smoother. The joint development process also revealed that the data presented should be strictly limited in order to focus on the most important issues and not to confuse, in this case mostly young designers. The process showed that information design and data visualisations can be a lot more than still images or illustrations. The narrative nature of the process type of data is especially informative when script-based design can be applied to communicate it. Bringing experts from the fields of storytelling, motion understanding and computer-generated graphics to the process gives the production of data visualisation new and interesting creative possibilities.

References

Adcock, A. R, Thangave, A., Whitfield-Gabrieli, S., Knutson B., & Gabrieli, J. D.E. 2006. Reward-Motivated Learning: Mesolimbic Activation Precedes Memory Formation. Neuron. 50 (3), 507-517.

Clarke, L. 2013. Narrative Information Design, Behance. [Cited at 20 Nov 2017]. Available at https://www.behance.net/gallery/12436357/Narrative-Information-Design

Coates, K., & Allison, A. 2014. An Introduction to Information Design. London: Laurence King Publishing.

Escalas, J. E. 1998. Advertising narratives. In B. Stern (eds.) Representing consumers. Voices, views and visions. London, New York: Routledge.

Fry, B. 2008. Visualizing Data. Exploring and explaining data with the processing environment. [Cited at 20 Nov 2017]. Available at https://doc.lagout.org/Others/O%27Reilly%20Visualizing%20Data.pdf

Gershon, N. & Page, W. 2001. What storytelling can do for information visualization. Commun. ACM. 44(8), 31–37.

Heinonen, A. 2017. Utilizing Information Design in Narrative Communication Production. Unpublished Master Thesis. Lahti University of Applied Sciences.

Kandel S., Heer J., Plaisant C., Kennedy J., Van Ham F., Riche Nathalie H., Weaver C., Lee B., Brodbeck D. & Buono P. 2011. Research Directions in Data Wrangling: Visualizations and Transformations for Usable and Credible Data. Information Visualization Journal. 10(4), 271-288.

Koponen, J. Hilden, J. & Vapaasalo, T. 2016. Teot näkyväksi. Informaatiomuotoilun perusteet. Aalto yliopiston taiteiden ja suunnittelun korkeakoulu.

Lipton, R. 2007. The Practical Guide to Information Design. New York: John Wiley & Sons.

McCandless, D. 2010. The beauty of data visualization. [Cited at 9 Dec 2017]. Available at 9.12.2016 from https://www.ted.com/talks/david_mccandless_the_beauty_of_data_visualization

Rosenbaum, M. 2012. , Data Journalism Handbook. [Cited at 20 Nov 2017].
 Available at http://datajournalismhandbook.org/1.0/en/understanding_data_5.html

Segel E. & Heer, J. 2010. Narrative Visualization: Telling Stories with Data.
[Cited at 20 Nov 2017]. Available at http://vis.stanford.edu/files/2010-Narrative-InfoVis.pdf

Thompson, C. J. 1998. Living the texts of everyday life. Representing consumers. Voices, views and visions. Barbara B. Stern (eds).). London, New York: Routledge. 127-155.

Tufte, E. 1984. The Visual Display of Quantitative Information. Graphics Pr.
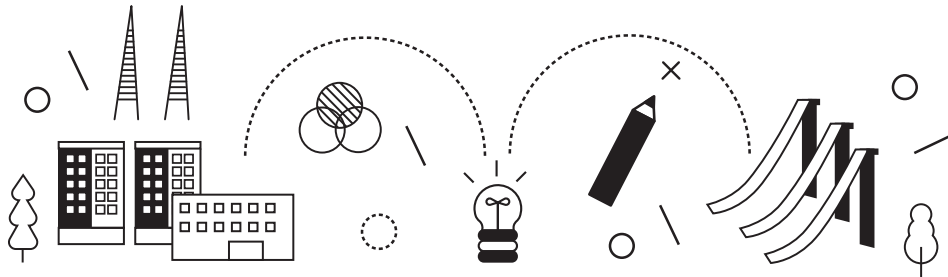
This is the first review of the publication series named the Lahti Design Annual Review. The theme of this publication is design education and design in research, development and innovation activities. It contains seven articles written by experts and students from Lahti University of Applied Sciences, Institute of Design. The aim of this review is to present the latest interesting research and development projects in the field of design.

LAMK

Lahden ammattikorkeakoulu
Lahti University of Applied Sciences

THE REGIONAL COUNCIL OF PÄIJÄT-HÄME

Leverage from
the EU
2014—2020

European Union
European Regional
Development Fund
European Social Fund