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User Experience and Usability in Complex Systems – UXUS

2010–2015

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CONTENTS

PREFACE

Challenge yourself to take the role of your customers

Every business seeks novel ways to create value and to differentiate themselves from competitors. Although this is vital for every company, not everyone has the courage to challenge their existing business. This is because of the risks related to exploring new opportunities. To mitigate these risks, companies need guidance from experts who have the most accurate perceptions about the value that companies provide: These experts are the customers and end users, who have a concrete perception of the value of new innovations. Although the importance of customers and end-users is evident, turning soft signals into hard business is not an easy task. Still the most challenging task is to engage customers and end-users in the companies' business development processes.

FIMECC's UXUS programme took on this challenge to change the complex industrial systems radically by enabling the use of User Experience (UX), Customer Experience (CX) and Brand Experience (BX) in the company's businesses. This task is something that the company cannot do itself, but requires wide co-operation between the companies, different researcher teams, customers and end-users. A natural platform for this kind of highly interdisciplinary, but target-oriented research is FIMECC, which is an operation ideology based on effective co-operation of winning teams and is tailored to overcome the most challenging problems with the most novel methods available.

FIMECC has strived for the best user experience for our customers over the years. This has been concretized as an efficient operating model and practices that best serve our programme consortiums to overcome the most challenging problems they have. These practices have been created together with our customers and partners through open processes in communication. As a result, our programmes have been able to produce world-class research results and significant business potential for the consortiums, as can be seen in the FIMECC UXUS final report. The FIMECC UXUS programme is a nice example of a consortium that has become an acknowledged ecosystem of partners who have a unique culture of solving things together.

I would like to warmly thank the whole consortium and our financial partner Tekes for the great achievement. In particular, I would like to thank the programme manager Maaria Nuutinen for her excellent work as a leading architect of the FIMECC UXUS ecosystem. Together, we all have created not only a significant number of results, but also built UXUS ecosystems that will live after the programme. They will serve as capability platforms and form a continuous opportunity creation process for the whole industry, which was the primary reason for the establishment of FIMECCRemember to place users at the centre and to challenge the existing!

Dr. **Kalle Kantola**

CTO
FIMECC Ltd.

Learning together – Please join us to share our experiences from the industry's expedition into the UX world

Five years ago, some of Finland's metals and engineering industry companies were looking for new ways to tackle concerns and challenges that, at first glance, seemed rather different: competitors whose products have essentially the same functions; new products that have been proven to improve efficiency and that have taken several months of dedicated work nevertheless may not sell as expected; materials that can surpass all those of competitors but still might end up not being used; a growing gap emerging between the complexity of professional products and the trends created by consumer products; the unclear future role of a Finnish R&D department in a global enterprise. At the same time, there was something in common: dedicated employees with their cutting-edge know-how and ideas only need an opportunity to show what they can do. A shared, strong faith in the dogma that industrial design and end users are key to reinventing a business, to coming up with innovative new products and services, and to enabling radical changes in direction that are about to emerge. These kinds of thoughts brought together a group of business people and researchers, and inspired them to embark together on a quest for new knowledge. How could the user experience, or "UX", be utilized to make Finland's metals and engineering industry more competitive? What does UX mean in the context of complex systems? What does it mean in the business-to-business context?

The FIMECC UXUS research programme (i.e. User experience and usability in complex systems) started in the end of 2010 and was kicked off in January 2011. We stated the overall target for the programme to radically renew practices of Finnish metals and engineering industry by developing and implementing new design and collaboration methods that produce personalized user and customer experiences. The programme thus started to challenge the present 'mindset' of industry (Nuutinen et al. 2011[1]).

When the programme was being drawn up, UX was still an unknown concept in this field, such that the word 'usability' had to be included in the name of the programme. Thankfully there were enough enthusiastic and bold people as well as pioneering businesses that were brave enough to jump in at the deep end – and through their example, others also joined in. We are still sometimes asked to explain the difference between UX and usability. There are naturally long and complicated answers to this question, full of references to scientific

1 Nuutinen, M., Seppänen, M., Mäkinen, S. J. & Keinonen, T. (2011). User experience in complex systems: crafting a conceptual framework. 1st Cambridge Academic Design Management Conference, University of Cambridge, 7–8 September 2011, Institute for Manufacturing (IfM). 14 p.

debates, but the best way to explain the difference is to look at what the programme has actually consisted of and what has been achieved by it. To us, UX offered an unknown world to explore and make sense of in our shared learning journey – not only UX, but also CX (customer experience) and BX (brand experience). What was essential were the plethora of new opportunities that experience-based thinking presented and the kinds of paths to innovativeness and possibilities to stand out from the competition that opened up. The best way to reason the value of UX is through achieved impacts. It was particularly satisfying when:

- a customer was convinced by the operational concepts developed on the basis of research and the business landed its first big contract as a system supplier,
- a Finnish business gained the status of a European-wide R&D centre and gained a new product to add to its portfolio within a multinational corporation,
- a vision formulated and developed in Finland spread like wildfire in the electronic media and opened up a path for implementing the vision industry wide, inspiring different stakeholders and giving a business a whole new status,
- a top manager stated that users should be in our primary focus,
- a young student landed his or her dream job,
- a student writing his or her doctoral dissertation suddenly understood the role of research in solving the challenges facing the industrial sector and was carried away by inspiration,
- a group of intelligent people from different fields learned to know and trust each other in a way that made them want to share their ideas and even their mistakes.

What was the single piece in the five-year research programme that made every other piece fall into place? Was it the support shown by a colleague at a programme meeting that helped an individual to believe in his or her vision? Was it a method that was developed? Was it the examples of others? Was it "the UXUS spirit"? To my mind, at its best, a research programme ties in with the ambitious research targets, shared learning and day-to-day work of its participants so seamlessly that it is impossible to tell which single moment was the crucial pivot for success. **Yet, openness and a willingness to share one's experiences are critical** – something in which FIMECC UXUS participants have set a great example. This publication aims to summarize the most valuable learning we have achieved during the programme as well as many examples that hopefully will support others in applying newly created knowledge in their business.

I believe that the most effective research programmes are the ones that bring together a group of individuals from different backgrounds to explore new opportunities – while learning by themselves and from each other new ways to make use of UX thinking. Despite our efforts to sum up the lessons learnt in the course of the programme, much of what we have learnt cannot be condensed into rules of thumb or recipes. **The participants themselves are a living, positive example that spreads and inspires more and more people to embark on their own journey.** Individuals can initiate a ripple effect that spreads the lessons learnt to new audiences better than any report could ever do. We nevertheless hope that this report gives the reader the initial push that they may need to start their own journey. It invites the reader to share our experiences, to look for more information, to ask questions and to join our ever-expanding network. The report showcases the outcomes of the programme, describes its effects and provides starting points for learning more about the subject. The picture painted in this report is complimented by three booklets published during the programme, by seminar presentations available on the website, as well as by the videos posted on YouTube.

This publication consists of six differently themed sections and eight descriptions between them, particularly focusing on companies' perspectives, their learning journeys on UX during the programme. They describe the actions taken and the lessons learned. The first section *"What is UX in industry"* shed light on the multiple perspectives of UX in an industrial context and is complemented by the following sections. The second section *"Building a UX mindset – towards permanent competitive advantage"* argues the logic of truly benefiting UX or experience-driven thinking when adopting it throughout your business and organization – even nurturing the new culture to emerge. The third section invites you to *"Open your senses, step into the user's shoes and see the world with your customers' eyes"* and guides you towards an emphatic understanding. After opening your heart you are ready to let *"User experience to be a guiding star in design and innovation"*. This fourth section introduces with the help of company case examples a unique experience-driven design approach based on defining a concrete UX vision and further UX goals developed in the programme. The fifth section, *"Collaborative UX explorations –prototypes, visualizations and inspiring co-design spaces"*, demonstrates the power of experiencing together when aiming towards radical innovations – and mindset change. The last section *"Enhancing the customer experience with visualization and customer insight"* shows how much more there is still to be done in customer relationships and how, for example, you can enhance the sales experience. The final article summarizes our UXUS expedition.

For me, the concepts UX, CX and BX stand for positive differentiation in products, services, business activities or innovativeness within organizations and between them. They stand for enthusiasm and willingness to see things through the eyes of others, with empathy, respect and a desire to do better. They also stand for investing in meticulous research and understanding that the experience of an individual user or customer is important enough to invest in. They stand for believing in cooperation and crossing boundaries in the interests of customers, end users and the common good, as well as the good of the individual.

We are privileged to have been able to dedicate so much time to this process, giving us enough time to learn and see the impacts of the shared efforts. Still, the journey has just begun. Join now and start your own UX learning journey!

I would like to thank everyone who took part in the programme – it has been an honour to have led it. I am proud of what we have achieved. I would also like to thank FIMECC and Tekes for making the programme possible and for all their support during the programme.

Maaria Nuutinen, PhD (Psych.)

FIMECC UXUS Programme Manager

VTT Technical Research Centre
of Finland Ltd

http://uxus.fimecc.com/news/glimpse-ux-b2b-industry-issue-1

http://uxus.fimecc.com/news/glimpse-ux-b2b-industry-issue-2

http://uxus.fimecc.com/content/ux-booklets-and-videos

Good or the best – Success with user experience. A video series on UX in Finnish, with English subtitles.

Tervetuloa mukaan oppimaan kokemuksistamme teollisuuden matkalta UX-maailmaan

Kilpailijoiden tuotteet, josta löytyvät samat toiminnot. Todistettavasti tehokkuutta parantava tuote, jonka kehittämiseen on satsattu lukuisia henkilötyökuukausia – mutta joka ei myy odotetusti. Materiaali, joka lyö laudalta muut tarjolla olevat, mutta ei silti päädy käyttöön. Kasvava kuilu ammattituotteiden monimutkaisuuden ja kuluttajatuotteiden luomien trendien välillä. Suomalaisen tuotekehityksen rooli globaalissa firmassa. Huippuosaamista ja ideoita ja työlleen omistautuneita ihmisiä, jotka kaipaisivat vain mahdollisuuden näyttääkseen kyntensä. Vahva näkemys, että teollinen muotoilu ja loppukäyttäjä ovat avaimia toiminnan uudistumiseen, tuote- ja palveluinnovaatioihin ja radikaaleihin hyppäyksiin. Tällaiset tunnelmat saattoivat yhteen joukon firmaihmisiä ja tutkijoita yhteiselle oppimismatkalle: kuinka käyttökokemuksesta, UX:stä eli user experiencestä rakennettaisiin uusin kilpailuvaltti Suomen metalli- ja koneteollisuudelle? Mitä käyttökokemus oikein tarkoittaa teollisten järjestelmien yhteydessä?

FIMECC UXUS -ohjelma (eli User experience and usability in complex systems 2010–2015) alkoi 2010 loppuvuodesta ja käynnistyi todenteolla vuoden 2011 tammikuussa yhteisellä tilaisuudella. Tavoitteeksi asetettiin Suomen metalli- ja koneteollisuuden käytäntöjen radikaali uudistaminen kehittämällä uusia suunnittelun ja yhteistyön menetelmiä, jotka mahdollistavat personoidun asiakas- ja käyttökokemuksen. Ohjelma lähti haastamaan teollisuudelle tyypillistä ajattelu- ja toimintatapaa eli kulttuuria (Nuutinen ym. 2011[2]).

Ohjelman suunnittelun aikaan UX (user experience) oli niin tuntematon käsite tällä kentällä, että ohjelman nimeen – ja tekemiseen – tuli sisällyttää usability, käytettävyys. Onneksi löytyi riittävä määrä innostuneita ihmisiä ja rohkeita, edelläkävijä yrityksiä, jotka uskalsivat heittäytyä. Silloin tällöin vieläkin meille esitetään kysymys, että millä tavalla UX on eri asia kuin "usability". Tähän on totta kai olemassa monta vastausta asiaankuuluvine viitteineen tieteelliseen keskusteluun, mutta parhaiten ero aukeaa tutustumalla itse siihen, mitä ohjelmassa on tehty ja saavutettu. Olennaista on se, mitä kaikkea uutta kokemuslähtöinen ajattelutapa mahdollistaa, millaisia polkuja innovatiivisuuteen ja erottumiseen se avaa kunkin omassa työssä. UX:ään satsaamisen arvo voidaan perustella parhaiten jo nähtävissä olevien vaikutusten kautta. Kun asiakas vakuuttui ohjelmassa toteutetun tutkimuksen pohjalta tehdyistä operointikonsepteista ja firma sai ensimmäiset isot kauppansa systeemitoimittajana. Kun suomalainen firma saavutti aseman

2 Nuutinen, M., Seppänen, M., Mäkinen, S. J. & Keinonen, T. (2011). User experience in complex systems: crafting a conceptual framework. 1st Cambridge Academic Design Management Conference, University of Cambridge, 7–8 September 2011, Institute for Manufacturing (IfM). 14 p.

Euroopan R&D-keskuksena ja sai uuden tuotteen tuotantoonsa multikansallisessa korporaatiossa. Suomessa ideoitu ja kehitetty tulevaisuuskuva levisi kulovalkean tavoin sähköisessä mediassa ja avasi reitin tuon tulevaisuuden toteutumiselle ja yrityksen uudelle asemalle suunnannäyttäjänä. Kuinka nuori opiskelija sai unelmiensa työpaikan. Väitöskirjan tekijä oivalsi tutkimuksen roolin teollisuuden haasteiden ratkaisemisessa ja löysi kipinän, joka kantaa ehkä koko uran. Kuinka joukko älykkäitä ihmisiä eri aloilta oppi tuntemaan toisensa ja luottamaan toisiinsa tavalla, joka saa jakamaan omat oivallukset ja kipeätkin opit.

Mikä viisivuotisessa ohjelmassa tehty työ oli se palanen, joka loksautti kaikki kohdalleen? Vai oliko ohjelmatapaamisessa saatu kollegiaalinen tuki se puuttuva sysäys, joka loi uskon oman vision eteenpäin ajamiseen? Tietty kehitetty menetelmä? Muiden innostava esimerkki? Parhaimmillaan tutkimusohjelma kytkeytyy niin saumattomasti osallistujien oppimiseen ja arkeen, ettei voi sanoa mikä yksittäinen asia johti menestykseen. Kriittistä on avoimuus ja halukkuus jakaa omakohtaisia oppimiskokemuksia – missä UXUS-toimijat ovat näyttäneet esimerkkiä.

Itse uskon, että laajimmat vaikutukset syntyvät siitä, kun joukko eri toimijoita yhdessä tutkii avautuvia mahdollisuuksia – ja oppii itse ja toisiltaan erilaisia tapoja hyödyntää UX-lähtöistä ajattelua. Suuri osa opitusta ei ole pelkistettävissä nyrkkisäännöiksi tai resepteiksi, vaikka olemme erityisesti satsanneet oppiemme kiteyttämiseen. Toimijat itse muodostavat elävän, positiivisen esimerkin, jonka lähtee laajenemaan ja vakuuttaa yhä uusia tahoja ja saa heidät lähtemään omalle matkalleen. Ihmiset kuljettavat tehdyn työn satoa ja vaikutukset laajenevat vesirenkaiden tavoin paremminkin kuin mikään yksittäinen raportti voi sitä tehdä. Tämä julkaisu antaa kuitenkin lähtölaukauksen lukijan omalle oppimismatkalle. Se kutsuu jakamaan kokemuksemme, ohjaa etsimään tarkemman tiedon lähteille, kysymään ja liittymään osaksi laajenevaa verkostoa. Julkaisu antaa esimerkkejä tuloksista, pyrkii kuvaamaan vaikutuksia ja antamaan lähtökohtia syventyä aiheeseen tarkemmin. Ohjelmassa julkaistut kolme booklettia sekä youtubesta löytyvät videot täydentävät tämän julkaisun luomaa kuvaa.

Tämä julkaisu koostuu kuudesta teemaosiosta ja kahdeksasta niiden väliin sijoitetuista vahvasti yritysnäkökulmasta kirjoitetusta artikkelista, UX oppimismatkoista. Ne kuvaavat ohjelman aikana otettuja askeleita sekä muodostettua näkemystä UX:stä ja sen merkityksestä. Ensimmäinen teemaosio "Mitä UX on teollisuudessa?" esittelee useita näkökulmia aiheeseen sekä luo hyvän pohjan perehtymiselle seuraaviin osioihin, jotka edelleen täydentävät UX:n moniulotteisuutta. Toinen *osio "UX ajattelutavan rakentaminen – kohti pysyvää kilpailuetua"* avaa kuinka yritys voi hyötyä toiminnot läpäisevästä kokemuslähtöisestä ajattelutavasta ja kuinka uuden kulttuurin kehittymistä voi tukea. Kolmas osio kutsuu sinut *"Avaamaan aistinsa, astumaan käyttäjän*

kenkiin ja katsomaan maailmaa asiakkaan silmin" ja opastaa kohti empaattista ymmärtämistä. Kun olet avannut sydämesi, olet valmis antamaan *"käyttökokemuksen olla suunnittelun ja innovaatioiden johtotähtenä".* Tämä neljäs osio esittelee konkreettisten yritysesimerkkien avulla ohjelmassa kehitetyn ainutlaatuisen kokemuslähtöisen suunnittelutavan, joka perustuu selkeän UX-vision ja konkreettisten UX-tavoitteiden määrittämiseen. Viides teemaosio *"Yhteiset UX tutkimukset – prototyypit, visualisoinnit ja inspiroivat yhteisen suunnittelun tilat"* demonstroi yhteisen kokemisen merkitystä kun tavoitellaan radikaaleja innovaatioita – ja ajattelutavan muutosta. Viimeinen osio *"Asiakaskokemuksen parantaminen visualisoinneilla ja asiakasymmärryksellä"* osoittaa, kuinka paljon on edelleen tehtävissä asiakassuhteiden parantamiseksi ja kuinka, esimerkiksi, voidaan parantaa kokemusta myymisestä. Julkaisun päättää artikkeli, joka kiteyttää tärkeimpiä oppeja yhteiseltä UXUS-matkaltamme.

Itselleni UX, CX ja BX ovat positiivista erottumista, joka voi ilmetä niin tuotteissa, palveluissa, liiketoiminnassa kuin innovatiivisuudessa tai toiminnassa organisaatioiden sisällä tai välillä. Se on kiinnostusta ja halukkuutta katsoa asioita inhimillisin silmin, myötäeläen, kunnioittaen ja parempaan pyrkien. Se on myös panostamista huolelliseen tutkimukseen, luottamusta siihen että käyttäjän tai asiakkaan kokemus on niin arvokas asia, että panostukset tulevat moninkertaisina takaisin. Se on uskoa yhteistyöhön ja raja-aitojen ylittämiseen asiakkaiden, loppukäyttäjien ja yhteisen ja itsen parhaaksi.

Meillä on ollut onni nauttia harvinaisen pitkäjänteisestä työstä ja aikaa oppia. Viisivuotinen ohjelma mahdollistaa jo työn tulosten näkemisen. Ensimmäisten tutkimusten ja ponnistelujen vaikutukset ovat jo selkeästi nähtävissä: voitettuina tilauksina, uusina innovaatioina ja innostuneina ihmisinä.

Kiitokset kaikille ohjelmatoimijoille – on ollut etuoikeus toimia tämän ohjelman vetäjänä. Olen ylpeä siitä, mitä olemme saavuttaneet. Kiitokset myös FIMECCille ja Tekesille ohjelman mahdollistamisesta ja kaikesta tuesta sen aikana.

Maaria Nuutinen, PsT

FIMECC UXUS ohjelmapäällikkö
TEKNOLOGIAN TUTKIMUSKESKUS VTT OY

http://uxus.fimecc.com/news/glimpse-ux-b2b-industry-issue-1

http://uxus.fimecc.com/news/glimpse-ux-b2b-industry-issue-2

http://uxus.fimecc.com/content/ux-booklets-and-videos

Osa 1:
Mitä UX on?

Osa 2:
Miten UX toimii?

Osa 3:
Miten UX-ajattelu uudistaa yrityksen toimintaa?

Osa 4:
UX strategisena valintana

Perspectives on enhancing business through UX

Imagine a beautiful summer day with blue sky and some thin white clouds passing overhead; you can see and hear ocean waves lapping on the shore in a relaxed calm way; it is the most perfect scene you can imagine; and then, the tranquillity is broken by a ship's fog horn calling in the distance. Each of us imagines a different view in our minds; some may see the ship that is blowing the horn, some may not. What we imagine is based on our own mind and our own experiences. What does this have to do with business and enhancing it? Let me try to explain.

When you think of your business and how to enhance it, there are two options. You can either go with the flow or differentiate. By going with the flow I mean that a conscious decision is made to be like the others and make things like others do. I think you agree with me that if one selects to go with the flow then it is a very demanding task to stand out from the crowd, right? Think for example of the supermarket you usually shop in, it can be (in Finland) Citymarket, Prisma or something else. They usually all have their own in-house food brands, Citymarket (Kesko) has Pirkka, Prisma (S-ryhmä) has Rainbow and so on. They offer the same things as other food brands but they are usually seen as fairly blank brands that serve as low cost options: nothing more, nothing less. They don't stand out and you don't necessarily even notice them when doing your shopping; they just exist. That is also the danger when going with the flow, you will just exist but it may be that no-one notices you.

If one makes the selection to differentiate from others in order to enhance their business, which is more or less what everyone wants or tries to do, the options of how to differentiate are almost limitless: One can go with a new kind of business model, a new product offering, a new brand identity and so on. Yet deep down under all of these is a single common nominator, experience. So instead of re-inventing the business wheel you can do things in a different way and focus on the experience. Identify who your customers are, who ultimately are the actual users of your product and who are the other stakeholders effected by your product. When you know these then focus on their insights and how you can improve their overall experience through your products or offerings. I am quite sure you will get "Aha" moments and you will start seeing gaps and opportunities to address. That is when

you can start creating true differentiating experiences. These experiences will eventually shape your business model as well.

Ok, I agree. It is easy to say that but what should one do?

One option is just to go out and discuss with your customers, end users and others affected by your product without pushing your products to them. Most probably your sales persons are already doing this in one way or another. Turn them into your R&D people; request them to pinpoint the customer's challenges, urge them to discuss the bigger picture around your product. Ask your sales people to form customer-specific stories, as an alternative to simply the sales figures and sales potential of a customer. Then create personalized stories around your products. These stories will eventually be your key selling points. Understanding the experience-based need of a customer through collaboration is a far more powerful sales tool than any marketing campaign can ever be.

Another option is to gather information from within your organization. Unless you are a start-up, there are already people in your organization who are in contact with different levels of your customer's organization. Your sales people are discussing with your customer's buyers, your service people are talking with your customer's engineers and so on. Bring these different areas of your organizations in discussion with each other and they will start sharing their experiences. That is when the "what if's" will follow.

The FIMECC UXUS program has been all about the user experience in complex systems. Experience can, for example, be about the usability of a product, the customer experience of a service, or their brand experience of packaging; the possibilities to interface with experience are limitless. Yet I believe it all starts with one thing: an individual, a person. To come back to the imaginary situation in the beginning, there is no ultimate way of doing things, we are all different. But when the individual is taken into account in the engineering your products, that is when you start to differentiate.

Iiro Lindborg

Development Project Manager,
Rolls-Royce Oy Ab

Building new knowledge on the experience economy in B2B

Experiences represent an existing, but fairly undervalued category of value creation in addition to services, products and commodities. Products and services not only provide rational value, but also emotional value to their users. In a business-to-consumer (B-to-C) context, providing emotional value is the core idea of many industries, from motorcycles to theme parks. Likewise in a business-to-business (B-to-B) context, providing not only utility and usability, but also positive user experience (UX) is becoming one of the driving forces for differentiation in the market. User experience can be managed and utilized in competition. In the FIMECC UXUS programme, we have studied UX from the points of view of design, strategy and organizational management.

We started the UX expedition together with the UXUS companies in 2010 by considering user interaction and user experience with their products. We noticed that even though user experience was discussed widely in research, the focus was mainly on consumer products. Moreover, there were no concrete methods for how to design for user experience. In the case studies of the companies, we focused on defining concrete goals for the experiences that the product users would value. We then interpreted the UX goals in regard to their design implications. Our work has been one of the first attempts to concretize how to design for experience in B2B products. UXUS demonstrations turned out to be eye-openers for the companies: they illustrated that user experience does not only mean continuous "wow" experiences, but for example users' sense of control, trust, feeling of presence, and feeling of competence.

One of the main drivers behind the programme preparation was the idea of how UX could be a strategic factor in competition. We believed, and still believe even more strongly, that UX really brings a competitive edge over rivals that is hard to imitate. This belief started to materialize during the programme, when many of the participating firms achieved results in the programme's case studies that had concrete business advantages. For instance, UX-driven new-product designs resulted in remarkably improved sales. In addition, changes in strategy took place; firms changed the means by which they aimed to win in their selected area of business. This kind of long 5-year programme highlights how slowly cultural mindsets change. It takes more than a year before a change in an organizational mindset really

starts to be realized and there starts to be a return on investments. However, this change leverages multiple positive effects throughout the organization that are manifested in, for instance, better brand image for the organization.

As experiences are tacit and unarticulated, positive UX cannot be leveraged without conscious efforts related to knowledge management that crystallize in three areas. Firstly, firms must build routines and processes to observe user experiences in real-use contexts, and transfer those observations back to their own use. Secondly, a tighter integration between organizational units is a necessity: sales and design can no longer be separated stages in the innovation process, but parallel ones, since experience-design will be done on the fly. Thirdly, firms must build and manage physical or virtual venues, where the designed experience can be conveyed to the buyers, and possibly new experiences will even be co-created by fitting the firms offering into the customer's use contexts.

As the mindsets in the UXUS companies expanded during the programme to understand UX as an essential part of strategy and as the mission for the whole organization, the concept of UX design was also extending. We started interesting company case studies where the focus was on future operational concepts and work environments targeting the year 2025. The case studies integrated thorough user studies with surveys of technology, business and societal trends. The resulting concepts of future ship bridges, future factories and future remote operators show that empathic understanding of the users and their work can be the basis for radical innovations that are credible and accepted by potential users. Concepts illustrated through videos worked well in disseminating the ideas and in engaging customers, users and other stakeholders to ideate and co-design the concepts further.

We have witnessed in the UXUS programme a tremendous shift towards the experience economy in an industrial context with complex product systems (e.g. cranes, automation systems). Following these notions, **it has become evident that it's a long journey to change the organization towards a UX/CX driven mindset. The journey requires systematic, continuous, repeating work by all people, as shown in the company journey stories described in this book. There are alternative routes in the journey towards an *experience business.*** The change requires time but every little step takes the company closer to the goal. The steps may include, for example, understanding users and customers with empathy as well as sharing this understanding; continuous expeditions into the users' world; setting targets for user-, customer- and brand experience; committing the whole organization to experience goals; ensuring that experience

goals are met at every customer touchpoint; and engaging customers to co-design activities. The prize may still follow: advantage over the competition is built through these small steps taken consciously.

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FIMECC UXUS in a Nutshell

The FIMECC UXUS (User Experience and Usability in Complex Systems) research programme aimed at developing and improving the competitiveness of the Finnish metals and engineering industry. The programme challenged current products, services, routines and organizational cultures by introducing user experience thinking for company operations.

Company partners: Fastems Oy, Kone Oyj, Konecranes Oyj, Rocla Oy, SSAB, Rolls-Royce Oy, Valmet Oyj and Valmet Automation Oy

Research institute partners: Aalto University, Tampere University of Technology, University of Jyväskylä, University of Tampere and VTT Technical Research Centre of Finland Ltd

Volumes

Duration	1.10.2010 – 31.12.2015
Budget:	17.4 M€
Company budget	8.8 M€
Research institute budget	8.6 M€
Number of companies original/final	5/8
Number of research institutes	5
People involved	
In the programme projects	190
Directly affected (e.g. people in events)	over 2000

Results

Number of publications	117
Number of doctoral theses:	8
Number of other theses:	20
Researcher exchange (months)	22
FIMECC prize wins (elected by FIMECC members)	1

UX journey

VALMET

HANNU PAUNONEN, JOUNI RUOTSALAINEN AND JAAKKO OKSANEN, VALMET AUTOMATION

Valmet Automation's UX journey: Towards an organization-wide UX-mindset

All that didn't happen in overnight

When we speak about the user-experience mind-set in our organization we have to see it as part of the development in our general user-centric approach. **In Valmet Automation, the history to look at control systems from user's perspective reaches back to the 1970s** (Figure 1). Our mind-set has partly reflected the global trends in user-centric research, and based on that, we have created the corresponding practices in the context of process control systems. Below, we will explain how these universal steps in a user-centric approach have influenced our development.

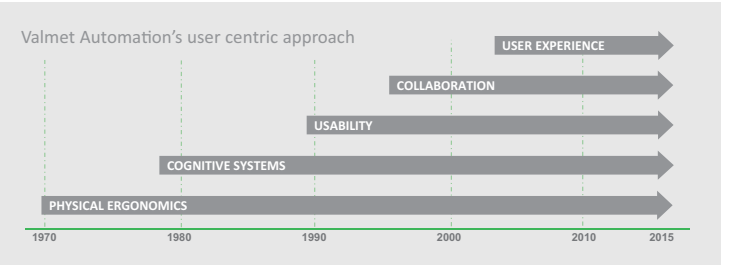

Figure 1. **The phases in user-centric research and practices**

Tools for professionals

At first the instruments in control rooms were physical switches and gages. The fields of **ergonomics** and information ergonomics concentrated on their shapes and their arrangements on control room panels. When the process plants and their systems became larger it was necessary to take a deeper view of the user's capacity to deal with complex situations, for example, in power plants or chemical plants. **Cognitive systems** research concentrated on operators' rational decision-making. It deepened our understanding of human perception and information processing and brought up important concepts, such as short-term memory limitations, mental models, mental set, and task support.

In Valmet Automation the results of cognitive systems research supported a shift in designers' mind-set from simply describing the production process for the users to supporting the users in their tasks and their decision-making. This happened alongside the switch to digital control systems and the emergence of video monitors. Our regular context studies in plants helped us to better understand the work done with our process control systems. However, at this point in 1970s and 1980s we tended to design the systems for professionals only. Efficiency in the tasks of an expert user was the main focus.

Just sit there and start to use

While personal computers became more common, **the usability** approach was taken into practice and we also started to put more emphasis on the learnability of systems. In the process industry, likewise new operators occasionally learn to use the system and especially in engineering and service tasks, more and more temporary consultants become users of the systems. The first usability tests were held in Valmet Automation in 1995 and after that, knowledge in R&D has been consciously increased. Different methods from context research to usability tests have been integrated into normal development processes. A special usability team in R&D had a key role in implementing usability methods. However, the usability methods applied mostly considered practical issues and subjective feeling was not consciously in focus.

A user is not alone

In the early 1990s our context studies showed that one of the biggest problems in process plants concerned communication inside the organizations. People did not know what others were doing because of long distances and continuous shift work at plants. Valmet Automation started research and development projects around system-based **collaboration** tools. Especially the insights from the research discipline CSCW (Computer supported cooperative work) had a lot of influence on our development work. During that effort, our view expanded from individual users to organizations and the first collaboration tools were launched as an integral part of the automation system.

It's not about the system but happiness at work

First, designing with the aim of creating a good **user experience** meant for us mostly dealing with practical usability issues, under the assumption that good usability would create a good experience. Total experience, including the feelings of the users, was only implicitly considered as a background factor. For example our whole organization knew the atmosphere in control room work well. One user from a power plant described this succinctly: **"You have to understand the continuous tension in the background when you develop the systems".**

Thanks to the earlier steps in our mind-set development, **we understand that it is not the product itself that creates the experience but the work done with the system.** The system can boost the work experience by being helpful and making the work efficient. At its best it can be surprisingly helpful. An example of our UX goals is that the system can be "an intelligent partner" for the user.

During the FIMECC UXUS project it has become evident to us that we can go further still in creating excellent customer and user experience around our system products. We have arrived at a better understanding about what user experience really is and how it should be seen from our organization's point of view. Many practical ideas in how to implement UX in our organization originate from discussions with other UXUS partners, including companies and research institutes.

In general we have learned at least two things:

1) Experience is an abstract phenomenon. In development projects, it cannot be communicated with a list of product features or specifications, but methods that create a richer experience regarding the work situations are needed.
2) The whole organization has to create a common understanding about the user's and customer's experience around the products. This understanding must also be part of strategic goal setting in management.

Turning towards real experience and the organization

Today we use **agile methods** in R&D. Those are a fruitful base for experience-driven development because they inherently contain prototyping, experimenting and discussing with other stakeholders in the organization. However, without special efforts, agile methods alone do not guarantee that users are considered at all, not to mention that user's experiences would actually drive the development.

We have gradually started to define **user-experience goals** more explicitly so that they are in actual fact directing the development projects. For example, goals like "feeling of freedom" and "feeling of immediateness" have generated many new innovations. Our user interface concepts and specifications today are a mixture of text, animations, videos and prototypes. Parallel with a concept there must be stories about the use situations told to the audience. Compared to slides and documents these presentations seem to create a much better feeling about the real work. It is also a lot easier to get feedback for example from users or sales and marketing persons and, in that way, to achieve **real co-design** with them. We have also started to use analytical methods to validate users' feelings when they try the new system features.

As much as possible, we try to create situations where the audience personally uses the system. A real experience cannot be achieved without personal involvement. For that purpose we have built the **UX Playroom** into our premises. It is a place for co-design, prototyping, storytelling and for "try it yourself" situations. It's a place to live and design around user's work. The idea is that you can ask a person, for example, from the cafeteria or a user from a plant and set about designing together. One example case where we used the UX Playroom successfully was the experimentation for speech and gesture control in the process control context. To get a grasp on those particular features in co-design situations required personal hands-on experimentation and a working environment that felt real *(page 157)*.

Earlier user experience work has mostly been R&D centric. The UX Playroom will be one element used for enhancing the organization-wide UX mind-set. The situations played and stories told by different stake-holders create common understanding about our common goals and products. It is also a place to show in a concrete way the importance of the user-experience approach in any role of the organization.

Figure 2. **UX Playroom working**

Figure 3. **Experimenting with speech and gesture technology**

Still on the way to something new

We have experienced a change in our mind-set during the last years. An example that evidences the level of UX awareness in our company is the common effort to build the UX Playroom. As we mentioned in the beginning of this paper the change did not happen overnight. **We think that the whole path travelled has been essential in making UX a part of the mind-set that genuinely displays itself in daily talks and routines.** However, we still have to move forward, for example, by implementing the UX goals in a more systematic way and by building storytelling methods around UX Playroom activities.

Key publications in UXUS:

Lehtikunnas, L. (2014), Speech and gesture interaction in process control, Tampere University of Technology, Master's Degree Program in Information Technology, Master of Science Thesis.

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Read snapshots from our history:

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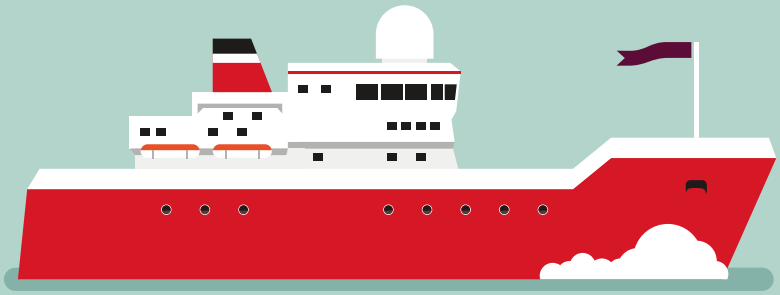


WHAT IS UX
IN AN INDUSTRIAL CONTEXT?

UX
User experience in industry

MOTIVATING EMPLOYEES
Experience design

EMOTIONS
Human experience

FUTURE SCENARIOS
Experience economy

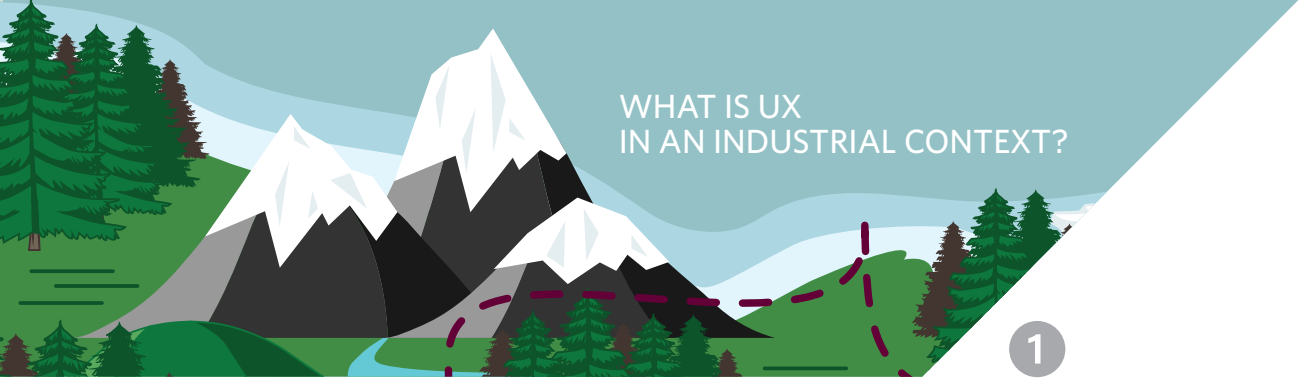
PROCESS CONTROL WORK
Functions of tools

UX & CX & BX
User, customer and brand experience

BRAND LOVE
Company-wide experience goals

What is UX in an industrial context?

Introduction: User experience is about feelings, expectations, and attitudes. Working with well-designed technologies facilitates professional self-image at work. Knowing what UX is in the context of complex systems helps to design for targeted experiences, resulting in user satisfaction, motivation and helping people flourish at work – thus enhancing customer companies' business success. Going deeper into human emotions, understanding the different functions of work tools, looking at future scenarios or broadening the view of experience in the direction of customer and brand experience, these each open up a never-ending source for innovations and discovering new ways for differentiating and benefiting in your own business. And if you reach "brand love", you know that you have succeeded. The articles in this section shed light on the multiple perspectives of UX in an industrial context and create also a good foundation for the sections that follow.



JUSSI P. P. JOKINEN, UNIVERSITY OF JYVÄSKYLÄ
PETRI MANNONEN, AALTO UNIVERSITY

User experience in industrial context

In the industrial context, products and services are designed to support the operations of customer companies. Users have a central role, even at large industrial production sites, and thus, focusing on UX can be a source of innovation in product development. Good UX in this context results in better utilization of the capabilities of users and their tools, more motivated and satisfied employees, and makes it easier to attract the best people to work for a company. This clearly has a long-term positive impact on customer companies' business success. **UX at work can thus be defined *as the way a person feels about using a product, service, or system in a work context, and how this shapes the image of oneself as a professional*** (http://uxus.fimecc.com/tags/ux-booklet).

UX in an industrial context involves multiple perspectives, which are all vital in understanding it. *Human–computer interaction* focuses on interfaces between users and machines, while economics provides a means to embed UX thinking in the industrial process. *Design* envisions and implements targeted experiences, and *psychology* provides researchers and designers with a fundamental understanding of human thought and behaviour. Due to these multiple perspectives, UX does not always need to be defined in the same terms. A better approach is to focus on defining the design problems at hand, and investigate which conceptions of UX can be helpful in solving these problems.

The industrial context places specific demands on how UX can be understood. For example, users in complex industrial work environments are not usually the customers, making the decision to buy the product. How then to create holistic experiences that satisfy the whole product chain, from the company that designs and produces the product, via the customer company, to the end user? In industrial

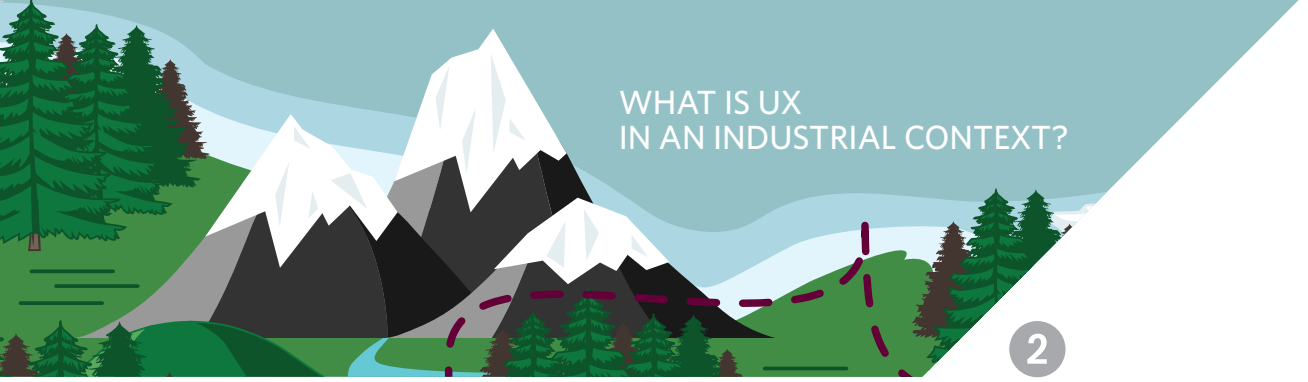
projects, the ability to clearly define targets and evaluate how well they are met is essential. This means that defining UX in an industrial context is necessary for the full-scale adoption of UX in an industry.

Figure 1. **User experience in industrial context**

Read more

http://uxus.fimecc.com/tags/ux-booklet

Kaasinen, E., Roto, V., Hakulinen, J., Heimonen, T., Jokinen, J. P. P., Karvonen, H., ... & Turunen, M. (2015). Defining user experience goals to guide the design of industrial systems. Behaviour & Information Technology, (ahead-of-print), 1–16.



JUSSI P. P. JOKINEN, **PERTTI SAARILUOMA**
UNIVERSITY OF JYVÄSKYLÄ

Emotional experience

Taking emotion into account at all levels of the product and brand design assures that the company considers not only the user, but the human being, at all levels of its operations.

Emotion is a foundational part of human experience. We all have feelings, and this is certainly true and apparent when we use technology. Familiar to us all are feelings associated with computers, but interaction with complex systems too has its emotional aspects. Interviews with the users of the products of FIMECC UXUS companies revealed that certain feelings are often associated with complex system interactions: competence, frustration, control (see Example 1).

Since we all have feelings, it may feel like an easy task to design for emotions: "I have them, so of course I know how this user interface should look and feel like!" Yet while intuition may be a powerful tool for designing, solutions based solely on intuition are not necessarily justifiable in the long run. Since scientific analysis of emotion helps in classifying, explaining, and understanding emotions, this may be helpful to design thinking, which would otherwise be left to intuition (see Example 2). It is therefore important to understand the psychology of the whole conscious and subconscious system of emotion.

There are multiple scientific theories of emotion, and we are still not sure (and maybe we'll never be) which one is best. But truth is not necessarily the most important aspect of thinking. Solving problems might be. Thus, we should consider different theories of emotion with different design problems and see how they can help us. *Core affect* theory, for example, is useful because it shows us how different emotions are related to each other on two dimensions, pleasantness and activation (Figure 2). Conversely, *appraisal* theory provides a complex but comprehensive cognitive model of emotion. It explains how emotion results from a subjective evaluation of a situation, and thus why the same situation may have very different emotional associations

depending on the person. For example, the impact of successful tasks on a feeling of competence depends on how problem-solving oriented the user is. Conversely, if a user has trouble dealing with negative emotions, events that obstruct may result in unexpected frustration and anger.

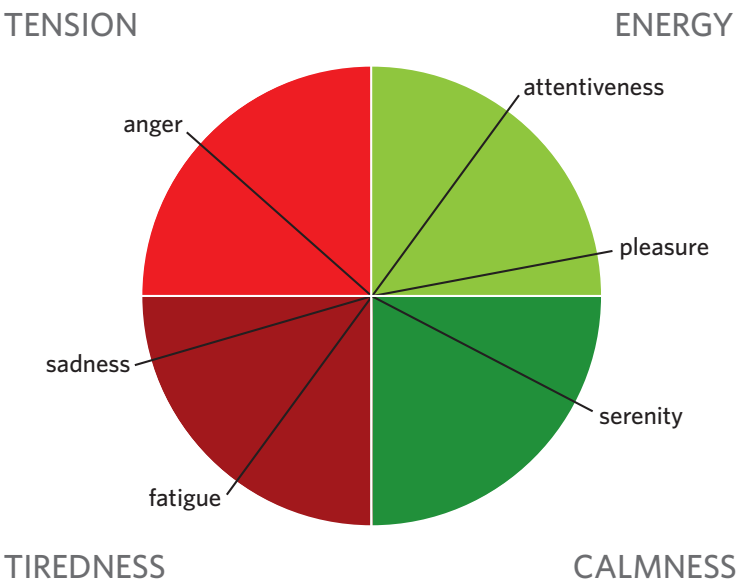


Figure 2. **Circumplex model of emotion with four main anchors and some example emotions.**

The main benefit of scientific investigation of emotional user experience is explanation: *why* do particular phenomena emerge in certain conditions? For example, a designer should be able to answer – on a theoretical level – *why* frustration is a central feeling in certain use situations, while it is non-essential in others. Since the system of emotions operates as a whole, designers should know what precisely they should manipulate in interaction situations to reach the outcome they hope. Since this approach relies on recent internalized psychological thinking, such as theories on cognitive emotional psychology developed recently, it enriches earlier ways of analysing emotions.

Example 1. Automation in complex systems changes the role of the user from a manual controller to a supervisor of computers. This means that we also have to reconsider emotion in complex systems. Does the user trust the system? Does the user feel confident in his capabilities? Does the user feel that the system does not obstruct his

goals? Interviewing overhead crane operators revealed that while automation often improves work efficiency, it also involves negative attitudes.

> *"Here we do things ourselves, there's no automation. If there were, no one would know what's happening and where. I follow my tasks through and do it myself and see that it's well done."*

The challenge for the emotional design of complex systems is to remember the human, and to understand the user's emotional process. Even with increased automation, the user needs to feel **competence**, or in other words, that his performance is due to his abilities and their successful and determined application. The user must not feel obstructed and **frustrated** by the system and must not feel anxious about what the system is going to do next.

Example 2. Feeling of **control** is critical in complex systems, and this notion has been acknowledged in UXUS companies. But how should one design for feeling of control? Scientific analysis of emotion may provide guidance in this. An interview with designers revealed that while they do consider feeling of control, their definition of it rests on intuition. However, an analysis of the interviews can reveal these intuitions and help in clarifying and justifying future designs. The designers were found to have two different perspectives on what feeling of control is, based on emotional activation (see the circumplex model of emotion in Figure 2). As these two aspects of feeling of control involve different design principles, it helps the designer to explicitly know which one she should be focusing on at any given time.

- *Non-active* – calm feeling of control is related to situational awareness and trust in automation, while associated design approaches include minimalist and transparent designs with all relevant information visible.
- *Active* – energetic feeling of control is related to efficiency of taking care of disruptive situations and being able to produce the required outcome. For this goal, design approaches include task-specific grouping and scaling of user interface elements and an interface that supports work tasks and shows an understanding of the users' work.

> *"The classification of feeling of control takes the concept further. In control room work, a lot of work activity is only geared to reading information from screens. The users update their situation awareness to be ready for tasks or exceptions. The non-active feelings category highlights a section that is sometimes difficult for designers to see because it is mostly invisible activity."*

Learn more

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HANNU PAUNONEN, VALMET AUTOMATION

Good, better, and best experiences in process control work

User experience is even more important in a work context than in consumer products

In a work context, carrying out duties and tasks creates a rich arena of work experiences. In today's world, work activities are supported by variety of advanced digital tools and equipment. That is why the role of tools and their user experience (UX) is essential when considering the quality of everyday working life and people's experiences of it. UX has recently received much attention in the field of human–computer interaction design and research. **Many complex work duties are easier to approach from UX design than traditional usability engineering or efficiency viewpoints**. For example, designing for a feeling of control can considerably help the task of staying in control of complex plant process. All in all, the UX of tools deserves more attention and empirical work, from both the researchers and practitioners, to create a deeper understanding of the meaning of UX in a work context.

A good tool is an amplifier of work, not the target of work itself

At their best, tools in use do not steal away attention but act as an incubator for the user's reasoning as well as an amplifier for a user's senses and capabilities, thus levering the whole work activity in a new dimension. On the mental side, a good UX helps the worker to concentrate on the important and most relevant tasks and supports him or her with, for example, demanding decision-making. At the same time, a tool with good UX obeys the roles and division of responsibilities, by ensuring that the user is and stays in control. On the physical side, a good UX mediates the look and feel of the object of work while

enabling the user with for example, additional speed, strength, and/or vision. However, a good tool UX is not about general "superhuman" capabilities but about context-relevant support and help in carrying out everyday work. With a good tool foregrounding a positive UX, users are able to excel themselves and save the day if needed.

Research setup: experiences in process control work

In this article we explore and describe how work experience and tool usage related UXs interplay in the context of process industry work. In particular, empirical work was carried out in two different process control environments: in an oil refinery and in a paper production context. A deeper understanding of UX in these work contexts was sought by interviewing the operators and by observing their work in situ. To analyse the transcribed interview data, we adopted an activity theory (i.e. activity-system model) framework. The activity-system model enables an analysis of the role of technology (tools) in the behaviour of individuals (operators) in connection with the social structures that an organization (oil refinery/paper mill) provides. The analysis was further continued by considering the tools used in work from the perspective of the three generic tool functions (instrumental, psychological and communicative) as it is assumed that a tool of good quality (i.e. high degree of systems usability) should support these functions. In the following we describe the main results of the interview study, i.e. the nature of UX in process control work.

Instrumental, psychological, and communicative UX

The user experience of the tool emerges when a worker connects the tool to a work activity and identifies the possibilities that the tool may provide for reaching the intended outcomes of the activity. Thus positive user experiences can be expected to emerge when the tool promises or implements improvements to the activity of the worker. And, respectively, negative emotions emerge when the tool somehow restricts the activity.

As mentioned before, the tools serve three functions in the work activities of process control operators: instrumental, psychological, and communicative. The instrumental tool function refers to the ways the tool enables the user to influence the environment. The psychological tool function is related to the possibilities for external control and development of the behaviour that the tool enables. The communicative tool function is about the tool's role as a medium of collaborative social activity and shared meanings.

Instrumental UX = truthful and timely process information + useful and meaningful operating possibilities

Instrumental UX in process control work is mainly linked to two core relationships between the operators and the operated processes, i.e. monitoring and operating. Positive instrumental UX emerges from receiving truthful and timely process information, and having useful and meaningful operating possibilities. A process control system includes hundreds or even thousands of measurements and calculations about the operated process. These are needed to depict the state of the process and all changes that are about to occur at a particular time. For the operator, a tool with good instrumental UX needs to provide situation-specific relevant information in logical form and structure. In addition, the tool needs to identify special conditions and circumstances and provide guidance on acting upon them. The core of instrumental UX is on how well the user feels the tool functions in regard to his or her tasks.

Psychological UX = understandable process and system information + user controlled information flow + trustfulness of the system

In process control work, psychological UX is related to the operators' feeling of control about the processes and automation system. Positive psychological UX emerges when, in addition to understanding the current state, the operator is able to predict the upcoming process events and corresponding actions of the automation system. In order to understand and predict the process and automation system behaviour, the operator needs to be able to grasp the available information and trust the system in its process measurements and automation logic. Currently the main challenge in keeping track of the environment in process plants is the vast amount of data. In order to provide an exceptional psychological UX, the tools need to enable the operators to study the measurements and other process data at their own pace, yet alarm the operators about any hints of non-optimal process behaviour.

Communicative UX = support for values and meaning-making

Communicative UX was found to build on the values and meaning-making of the work community. Positive communicative UX emerges when the tools are in line with the values of the work community and support the value-based behaviour of the workers. In addition, the tools should enable on-going learning and meaning-making in the community. In the studied process control contexts, the main building blocks of communicative UX were support for collaborative working practices and dynamic sharing of responsibilities (paper production),

and endorsing the safe working habits and safety guidelines (oil refinery). In addition, enabling the sharing of operating experiences and observations of process characteristics seemed to positively affect communicative UX.

Learn more

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VIRPI ROTO, **YICHEN LU**
AALTO ARTS

Motivate employees by experience design

With the increasing recognition of human capital as a competitive advantage in today's global economy, companies want to attract the best people to work for them by providing them with positive experiences at work. This is an opportunity for companies who manufacture tools for the customer company's employees. Unfortunately, UX research has provided few examples of UX design in a workplace context, since the focus of UX studies has been on consumer products. The focus in work tool design has been on job performance, not on employee experience. Yet, positive experiences at work are shown to develop employees' individual motivation and loyalty towards an organization, thereby improving organizational business success.

Motivated and loyal employees are an asset that is hard to copy.

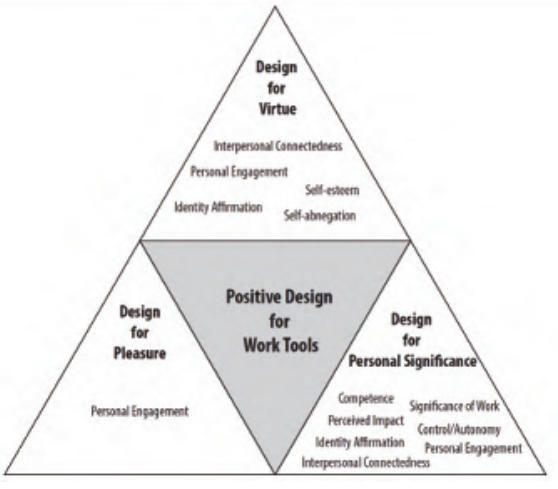


Figure 3. **Positive Design Framework for Work Tools can help in setting meaningful experience goals for work tool design.**

We aim high and want to design for experiences that make people flourish at work. We want to understand what makes their work meaningful and enjoyable. We found great pieces of research that revealed the mechanisms behind meaningful experiences and the types of positive experiences. By combining these frameworks, we developed the Positive Design Framework for Work Tools, which helps tool designers to set experience goals that enable increased job satisfaction, motivation, and enjoyment.

In Figure 3, did you notice that few mechanisms that make work meaningful fall under the pleasurable experiences section in the framework? This can be seen as a given difference between work and leisure context, but we see it as a new exciting territory for research: what is the role of Design for Pleasure in a work context?

Traditionally, design for work tools has focused on preventing negative effects, i.e., the problems associated with discomforts, distractions or health risks that interfere with workers' capacity to accomplish their work. Eliminating existing problems at work can remove dissatisfaction, such as cleaning dirt from the table, but more is required if you want to improve employees' motivation, as Hertzberg showed in 1959 already in his Motivator-Hygiene Theory. Although much has happened since to improve employees' motivation at work e.g. from an internal culture, job and space design perspective, little attention has been paid to the role of work tools as motivators at work: how the particular kinds of features and attributes of work tools contribute to a satisfying, exciting, and meaningful experience of the whole activity (e.g., Savioja et al. 2013). Our study has aimed to challenge the current problem-solving product design mindset by introducing experience-driven design thinking for product and service design. We have applied the latest innovations from the Experience Design in the business-to-consumer field into the business-to-business world, including Positive Design and Happiness Design.

*The essence of **Experience Design** is "to consider the experience before products", i.e., designers should decide what kind of experience to target before deciding what kind of product or service to design.*

*FIMECC UXUS researchers have popularized the term **experience goal** (or UX goal) to refer to the experiences that experience design activity targets at (Kaasinen et al. 2015). An experience goal describes the intended momentary emotion or the emotional relationship/bond that a person has towards the designed product or service (Lu & Roto 2014).*

We see that an experience goal is the core of a new design brief. Setting proper experience goals is a crucial process in iterations and verifications with the target user group and other stakeholders. Experience goals that tackle profound user needs can expand the design space away from routine, trivial design solutions to incremental and radical concept design, varying in realm from traditional industrial design to interaction design to service design and even to strategy design (Lu & Roto 2014). As described earlier, we developed the Positive Design Framework for Work Tools in order to help designers apply theory around workplace experiences and positive design in experience goal setting.

We tested the Positive Design Framework for Work Tools with seven design cases on an Experience-driven Design course. On this course, students at the Department of Design at Aalto University worked on design assignments from the UXUS companies and followed an experience-driven design approach during concept generation. The core activity is to define experience goals to design for, and as part of this activity, the students discussed the items in the framework. While the students found the framework hard to understand at first, many teams did utilize it in experience-goal-setting.

Below, an example of experience goals and the resulting radical design concept: pride-enhancing presentation stand for a sales person. (The assignment by Rolls-Royce Marine was to redesign a tugboat steering simulator stand for a travelling sales person.)

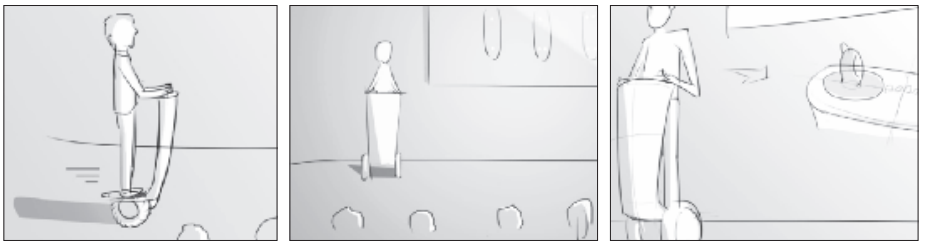


Figure 4. **Sense of directing, Pride and Expertise**

By analysing 50 experience goals from 20 work-related concept design cases carried out for UXUS companies by participants on four Experience-driven Design courses, we see that 30 of the goals (60%) are related to the feeling of pride at work. We are now focusing on the pride experience and aim to provide more actionable guidance for designing pride-enhancing tools for employees.

Learn more:

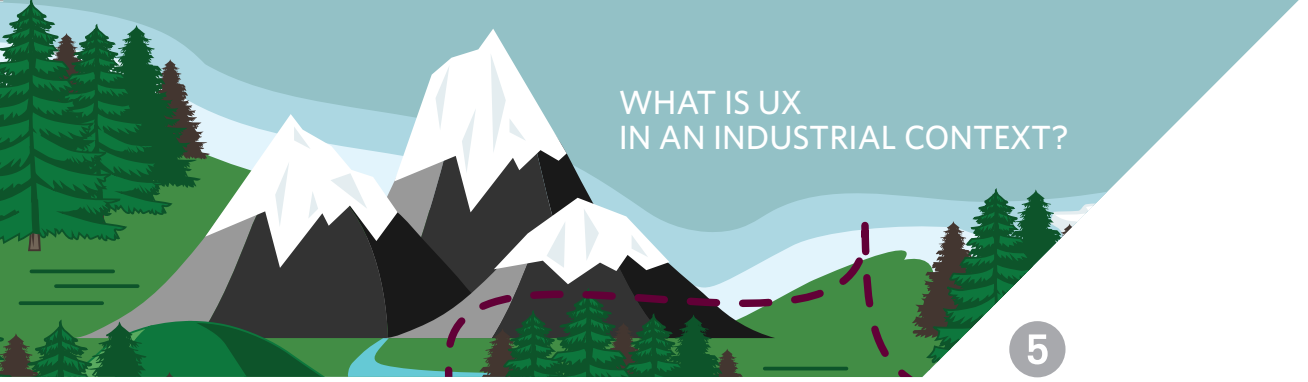
Kaasinen, E. et al Defining User Experience Goals to Guide the Design of Industrial Systems. Behaviour & Information Technology journal, Taylor & Francis (2015).

Lu, Y. & Roto, V. Staging Meaningful Experiences at Work – Positive Design Framework for Work Tools. Journal of Engineering Design (2015).

Lu, Y., Roto, V. Towards Meaning Change: Experience Goals Driving Design Space Expansion. In Proc. NordiCHI'14, ACM Press (2014).

Lu, Y., Roto, V. Design for Pride in the Workplace. (Under peer review)

Savioja, P., Liinasuo, M. and Koskinen, H. 2013. "User experience: does it matter in complex systems?" Cognition, Technology & Work: 1–21.



ANNA-LEENA VASAMO, **OSMO KUUSI**
AALTO UNIVERSITY

Future scenarios of UX in MEI –
Scenarios related to the Experience Economy

An important background to the FIMECC UXUS project has been the concept of the Experience Economy or Experience Society, introduced by Pine II and Gilmore in 1998.[1] Pine II and Gilmore suggested that the focus of economic activities has moved from the trade of fungible goods first to tangible goods, then to intangible services and is now moving towards memorable experiences. Though the concept of experience has been important for a long time in some industries e.g. in tourism and in marketing activities, new technological development has opened many new opportunities to focus on the customer or user value. A comprehensive description of those kinds of options is given in the Global Value Producing Networks (GVPN) of the Radical Technology Inquirer (Linturi et.al. 2015)[2]. The Inquirer suggests a systematic but flexible method that connects emerging Radical Technological Solutions (RTS) and the GVPNs to each other. The recent inquirer connects 100 RTSs to 20 GVPNs.

Anna-Leena Vasamo and Osmo Kuusi interviewed company representatives from the UXUS project in order to develop scenarios that explain future-oriented activities of the UXUS firms concerning the Experience Economy or Experience Society. To that end, the interviewees told about the recent or planned activities of their firms related to the 20 Global Value Producing Networks of Linturi et al. (2015). It was interesting that the interviewees found business activities that in some ways were related to every GVPN. However, most comments were focused on the GVPNs listed below. The number in parentheses is the number of the GVPN in the original list of 20 GVPNs.

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1 J, Pine II, B. J. and J.H. Gilmore (1998) Welcome to Experience Economy, Harvard Business Review |July-August 1998 Manufacturing (IfM). 14 p.

2 https://www.eduskunta.fi/FI/tietoaeduskunnasta/julkaisut/Documents/tuvj_11+2014.pdf

a) Automation of passenger vehicle traffic (1)
b) Automation of commodity transport (2)
c) Manufacturing close to customers (3)
d) Virtualization of retail trade and services (4)
e) Distance presence and remote control of tools (6)
f) Individualization of learning and guidance (7)
g) Equipment that increases awareness of the environment (10)
h) Functional materials and new material technologies (11)
i) Functional added value of intelligent goods (12)
j) Functionalization of spaces and structures (17)

The interviews resulted in three basic scenarios and several variants of them concerning developing combinations of the Big Data Society and Experience Economy/ the Experience Society. The scenarios are illustrated by the recent or planned activities of the UXUS companies. Besides the written descriptions, short 2D animated videos were developed in the spirit of UXUS to illustrate the basic ideas of the scenarios in a visual format (screenshot of one of the animations is below). The three scenario animations, namely "3D Printing – Changing the Industrial Paradigm", "Internet of Things" and "Increasing Awareness of the Environment" can be found on the UXUS website (http://uxus.fimecc.com/).

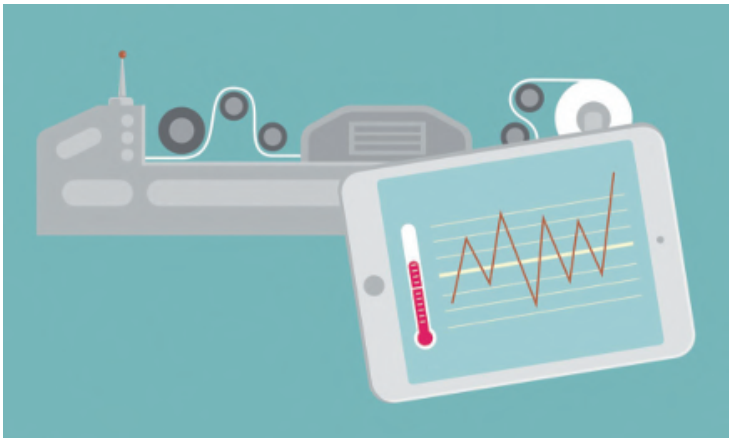


Figure 5. **Screenshot of the "Internet of Things" 2D animation.**

Customized products close to the customers

The key technologies of the scenario will be the various forms of additive manufacturing and imaging: 3D imaging of the outer surface of objects and/or 3D printing of goods with various properties e.g. small

and easy to print (e.g. for illustrating prototypes) or large and complicated (e.g. buildings with various materials). There are three basic scenario variants for the close-to-customer production that mean different challenges to Finland: 1) A company and its customer use their own additive manufacturing equipment. 2) Regional cheap supplier of 3D prints and 3) Regional or global suppliers of highly specialized and customized 3D prints.

Recent or planned applications in UXUS firms are mainly based on the scenario where either the company itself or the user/customer of the company has additive manufacturing equipment.

Valmet has planned to use additive manufacturing equipment for the on-site coating of the paper roll covers. Already now it is possible to use 3D printers for the illustration of micro structures of different types of roll covers. Also Konecranes has used printed scale models and continuously uses 3D printing to produce a part of their key product which has a very complex form and thus is not manufacturable with traditional methods. For Valmet, a promising product for the additive manufacturing is the headbox flow sheet. In the 2012 patent of Metso Paper WO 2012085343 A1 3D printing was mentioned as one possible production method of the headbox flow sheet. Spare parts of ships and offshore oil rigs are very promising products for the on-site 3D printing. Kone is planning to use additive manufacturing in the printing of large structures for houses.

Increasing awareness of key company employees concerning customer/user behaviour

Possibilities to make continuous observations of the operational environment of the company are radically improving. In the scenario, some key employees of firms will be able to see closely not only their own production facilities and employees of the firm, but also the users of the company's products. The companies use this continuous flow of information for measuring, comparing and framing their relations to their customers or to the users of their products. Rolls-Royce has centres on three continents that monitor data from many thousands of devices. A paper machine continuously monitors its condition and informs also the producer of the machine. Wall structures could also monitor their own condition – for example, wall structures that detect mould have been developed at VTT, the Technical Research Centre of Finland. Mobile equipment can be used in the collection of the data and in its adding to Big Data. Our ability to observe and receive information about our operational environment is about to grow also based on augmented reality, such as via products like Google Glass.

Intelligent goods monitor and fulfil customers/users needs/hopes without human intervention

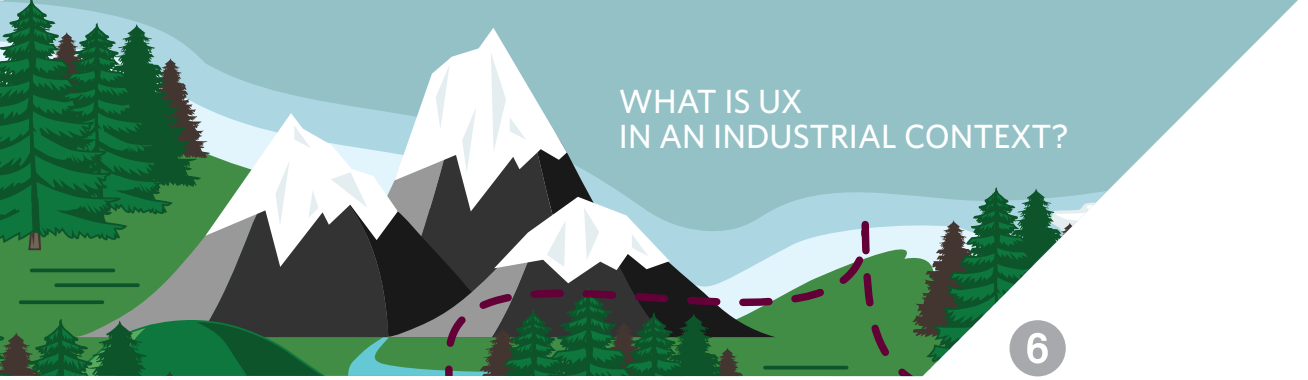
In a system based on the Internet of Things (IoT), components know where they meant to go after they were ordered and what they were meant for; machines can order the spare parts they need without human intervention. A robot forklift picks up a tool from a special shelf developed by Konecranes and robotic containers are manufactured in Finland by Konecranes, among others. The lifting and transfer of containers can be automated by current technology as can the loading and unloading of shipments that include standard sized boxes and boxes that fit inside them. Robotic transportation already functions reliably enough in closed areas and experiments on public roads have begun in several countries. Many companies already have automated warehouses and assembly lines, in which packing and loading are automated.

Learn more

3D Printing – Changing the Industrial Paradigm
https://www.youtube.com/watch?v=kdzsgyN1KT8

Internet of things
https://www.youtube.com/watch?v=q5j4goXAXCI

Increasing Awareness of the Environment
https://www.youtube.com/watch?v=WeK07_4bK64



EIJA KAASINEN, **MAARIA NUUTINEN**, VTT
VIRPI ROTO, AALTO UNIVERSITY
MARKO SEPPÄNEN, TAMPERE UNIVERSITY OF TECHNOLOGY

Broadening the view of experience – From User experience to Customer experience and Brand experience

An obvious starting point for experience thinking is user experience: how users experience products, systems and services. Experience thinking can be broadened to customer experience: how customers experience being in touch with a company and further to brand experience: how a company is experienced as a whole.

Starting from user experience

User experience (UX) at work is the way a person feels about using a product, a service or a system in a work context, and how this shapes the image of oneself as a professional. UX thus reflects the conception that a user has of a product or a service based on expected or actual use, including feelings, thoughts, expectations and attitudes. Good UX supports work satisfaction and motivation. Individual user experience evolves from expectations to accumulating experiences and reflections during the whole product life cycle. User experience cannot be designed but design can facilitate a certain, targeted user experience. User experience has to be built into products; it cannot be achieved with mere add-on features. UX vision and UX goals should be based on empathic understanding of users and their work. In addition they should reflect the provider company's business goals. UX vision and UX goals support design by defining in detail the experiences that the design should facilitate.

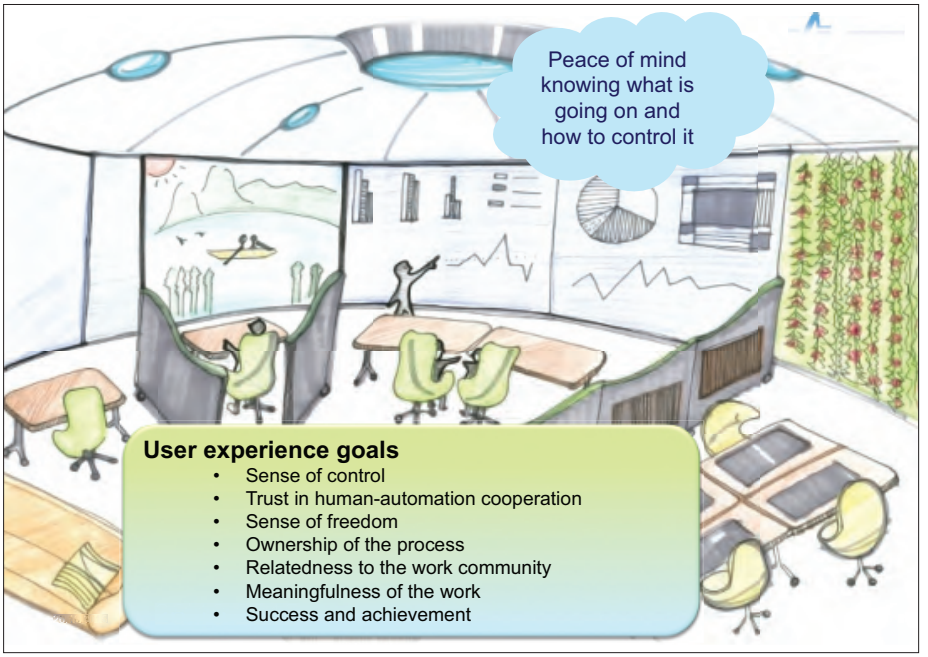


Figure 6. **User experience vision and its interpretation into experience goals guide the design as in this UXUS example from Valmet Automation: future control room's user experience vision and use experience goals**

Extending the view to customer experience

A company has several different customer touchpoints in which the overall **customer experience (CX)** gradually evolves. Identifying these touchpoints helps in defining how the targeted customer experience should be supported in each touchpoint. In addition to sales, customer touchpoints are for example, advertisements, web pages, brochures, services, call centres and manuals. Customer experience (CX) is evolving at all these touchpoints by individual experiences and when people share experiences.

As companies are increasingly transferring to service business, customer experience gets increasingly important: customers experience your services every day and the customer experience evolves accordingly in services provided by your own employees, by third parties and even with automated services.

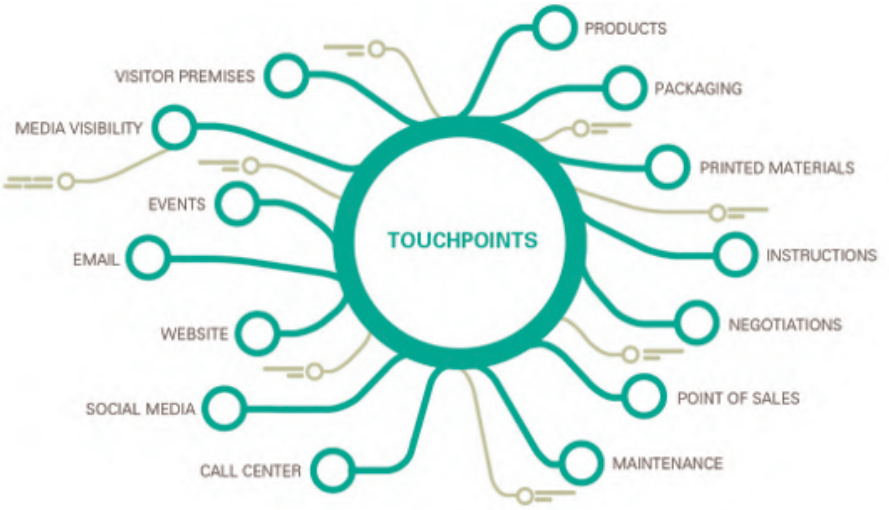


Figure 7. **Examples of the various customer touchpoints where customer experience evolves. (A glimpse of user experience for B2B industry – Issue 2)**

How is your brand experienced?

Brand experience (BX) reflects user experience and customer experience and also the experience of any other people within the influence of the company. Excellent BX attracts new potential customers but in addition it motivates the staff, strengthens the company identity, attracts new talent to hire, and supports the image of the company in the eyes of subcontractors and other business partners. BX helps the company to differentiate itself from its rivals by offering a coherent view on experiences, manifested at the user or customer level. There is a lot to do to influence how people experience your brand. Similar to user experience and customer experience, you have to have a clear vision of the targeted brand experience. Then all touchpoints to your company should reflect the uniform experience vision.

User experience, customer experience and brand experience all reflect the values and the viewpoints of users and customers. UX reflects how people feel using your products or services. CX reflects how people are treated at customer touchpoints. BX reflects your company or brand identity. UX/CX/BX consistency results in better business. It is the way to differentiate, to gain customer loyalty and to gain competitive advantage.

Figure 8. **Consistent user experience, customer experience and brand experience creates business benefit. (A glimpse of user experience for B2B industry - Issue 2)**

Learn more

Articles in this book:

User-experience goals as design guides (*page 121*)

Touchpoints – opportunities for engagement (*page 104*)

Towards a beloved B2B brand (*page 53*)

VIRPI ROTO, AALTO UNIVERSITY

Towards a beloved B2B brand

— *Honored Guru, what is the best possible outcome of successful work on UX, CX, and BX?*

— *Brand Love.*

— *But that's something for consumer brands. In B2B, only numbers count.*

— *So you would turn down a business offer by Harley Davidson if you get a cheaper offer?*

— *Umm... That decision I would regret for the rest of my life.*

— *Exactly. Imagine if you would have a company image like Harley Davidson. Clients would pay premium to get some of the brand glory in return.*

— *But it costs millions to build a brand like that.*

— *Wrong. Even tiny start-ups like Kyrö Distillery have created an authentic, humane brand that resonates. They get a lot of attention and collaboration offers. You just need to dig deep to find out what is the unique mission of your company, and proudly invite others to join the movement. It's about amplifying the experience of what you are at every touchpoint.*

— *Wow. Tell me more!*

The brand slogans of B2B companies tend to highlight their superior performance and fail to resonate, i.e., raise emotions that may lead to brand love. If you manage to create a brand slogan that shares a common passion among most employees, they will proudly stand behind it and it will resonate with your clients as well.

Figure 9. **Some B2C brands that resonate. B2B brands would benefit from better resonance**

After long-term research on experiences in the B2B world, our conclusion is that the best possible outcome of successful UX/CX/BX work is brand love. This means becoming The Company that everyone wants to do business with. Achieving this status requires a company strategy where all touchpoints between a company and its external stakeholders communicate an experiential company image that resonates with the customers and is different from the competitors. This cannot be achieved in a day or two, but together, with empathy and passion, it is possible to become a beloved B2B brand – and it is certainly worth the effort.

A concrete example case in the FIMECC UXUS programme was the Fastems brand development. We took a participatory approach to find out what experience stems from the company culture. The research outcomes include styling of Fastems MLS product to be identifiable, an interactive Fastems Style guide concept, the results of Fastems personality survey, and last but not least, company-wide experience goals.

A company-wide experience goal is a concept developed in the UXUS programme. It states the experience that should be conveyed at every touchpoint to the stakeholders. It is a concrete way to get brand experience integrated into the company operations. Company-wide experience goals are high-level, and each development project should specify how to address the goals in their specific case.

Traditionally, the marketing department and the management define the brand in a top-down manner. In Fastems' case, we wanted to ensure that the employees get the kind of goals that they find relevant and inspiring, so we followed the bottom-up process below to set company-wide experience goals.

Defining company-wide experience goals

1. Understand the brand experience and corporate identity.
2. Run a brand personality study inside the company to trigger experience thinking.
3. Define tentative company-wide experience goals and justify them clearly.
4. Iteratively test, discuss and refine the tentative goals' suitability for touchpoints by inviting representatives from different departments to a workshop.
5. Introduce the company-wide experience goals as part of a big internal event, and ask people to ideate ways to put the goals into action in the different touchpoints.
6. Invite and introduce examples of the ways of enabling the intended experiences, e.g. in an open style guide format.
7. Let the teams derive UX goals for each development project based on the company-wide experience goals.

The derived company-wide experience goals consist of two parts: an experience goal for design followed by the intended experience result for the user/customer. The first part concretizes the high-level experience goal as an experiential touchpoint characteristic, and the latter part explains the reason for the importance of the first part. The derived Fastems experience goals are:

Reliability for Trust
Professionalism for Pride
Flexibility for Difference
Impressiveness for Wow

The work on amplifying the best parts of company culture and touchpoint experience development has started at Fastems, which has right away increased customer satisfaction. **Fastems has shown that also in factory automation, the experience makes a difference.**

Learn more:

Roto, V., Lu, Y., Nieminen, H., Tutal, E. (2015) Designing for User and Brand Experience via Company-wide Experience Goals. Extended Abstracts of CHI'15, Seoul, South Korea.

Tutal, E. (2014) Participatory Design of Visual Product Identity Concepts – Towards a User Experience Styleguide. Master of Arts Thesis, 93 pages.

Roto, V., Nieminen, H., Nuutinen, M. (2013) Käyttäjäkokemus menestystekijänä. Presentation at Alihankintamessut, Tampere, Finland. https://www.tekes.fi/globalassets/global/ohjelmat-ja-palvelut/ohjelmat/liideri/uxus-presentation_alihankintamessut.pdf

Roto, V., Smedlund, A., Passera, S., Nuutinen, M. (eds.) (2012) Glimpse of User Experience for the B2B Industry, Issue 1, pp. 26–27. http://uxus.fimecc.com/news/glimpse-ux-b2b-industry-issue-1

Roto, V., Nuutinen, M., Smedlund, A. (eds.) (2014) Glimpse of User Experience for the B2B Industry, Issue 2, pp. 6-7. http://uxus.fimecc.com/news/glimpse-ux-b2b-industry-issue-2

UX journey

ROCLA

KERO UUSITALO AND TERHI RÄSÄNEN, ROCLA

Rocla: Creating experiences together

The forklift industry has come to a point where the majority of manufacturers can build products of similar performance and efficiency. There is no significant difference or differentiation among what's on offer. The question arose: **What is our unique differentiation value to our customers? Why would they buy our products?**

The main reason for joining the FIMECC UXUS program was based on a desire to identify the differentiating factors in our industry so as to maintain and enhance our competitive advantage in mature European forklift markets.

Rocla's R&D has to compete internally with the group's other R&D units to win projects in the Mitsubishi Nichiyu forklift group. **Where is our value in the eyes of international stakeholders?**

Rocla itself is a solution provider and our product offering should work seamlessly with sales, service, after sales and rental businesses. **What are the values we offer to these stakeholders?**

Industrial designers have been torch bearers for usability at Rocla for a long time but during the UXUS program it became evident that everyone in the organization is responsible for creating experiences for the user and customer.

First Steps

At first the UXUS program was in contact with our Research and Development branch **to study our operations and products** and how they reflect in the user experience. A UXUS researcher conducted a study of how those products up for renewal are experienced within our sales channels.

Then we drew on Fimecc funding to execute **field trips** to our customer and to places where our potential customers have operations. We sent our R&D specialists to see workers, working conditions and onsite operations. This was a crucial turning point for engineers, designers and coders to see and hear the experiences conveyed by forklifts. The mindset around creating designs started to change.

This also convinced our management to take user experience to a new strategic level: **a new R&D strategy** was created. The goal 'to create the best user experience in the market' now guides our R&D operations.

Field trips are nowadays considered a place where seeds of innovations grow and they are based on users work and expectations, as well as on the places where forklifts are driven.

Expanding the scope to include communication

When looking into users and customers from a product designing point of view, we realized that we also need to study the chain after the product is ready – **marketing and sales**. What happens at different touchpoints? How are our marketing materials used? What kind of experiences do our sales and customers have at product launches? How can we get our UX message through?

A group of researches started to investigate our NPI (**new product introduction**) process. They interviewed many persons in sales and marketing, as well as dealers, to find out the development points of the NPI. Based on this study we developed our NPI materials and created a new type of launch that is experience-driven and is emotionally engaging.

We also investigated with another researcher the **actual sales situations** at customer sites and interviewed sales persons of both domestic and international sales. We have created specific sales tools based on this research for specified segments.

With stronger collaboration, co-creation and participation, as well as new experiential communication methods, we were able to impact the perceptions of sales regarding UX-based products.

UX has to be learned and communicated

R&D specialists are responsible for their own specific tasks. However these tasks influence greatly what kind of experience we imbue in the forklift. **The mindset** is crucially important in reaching our targets for a given user experience. At some point of the study we realized the need for common user-experience guidelines for the R&D specialist. When we make field studies it is important to see the challenges facing drivers and their needs, but if you are not used to addressing those challenges then the findings can be quite minimal. For specialists **an empathic approach** to users work activities is not a built-in attitude or something taught at university, but we believe that with a little guidance, specialists are able to walk in same shoes as users. Therefore we asked Aalto University to create together with us **R&D guidelines** to aid the design of the user experience. We will put these guidelines into practice as part of our project process, and in this way, they are never forgotten when creating new products. The guidelines will be ready when the UXUS program comes to an end.

We have started to communicate the **UX- and CX- thinking** outside of the areas of R&D and marketing & sales, to other personnel and also to external stakeholders. People better understand what UX and CX mean when they can relate it to their own work. A continuous and two-way communication is essential, as it increases people's willingness to share knowledge and will ultimately influence the organizational values and culture towards UX.

B2B is H2H Customers are often considered as companies within the B2B environment, but this has proven to be a totally false assumption as a result of the UXUS program. Rather, **we enable experiences that bridge person to person, human to human.** The employees of a customer make decisions based on these experiences. So a customer is a user of experiences that we create.

When we use consistency in our communication, whether we are talking about UX, CX or BX, we maintain one common direction that leads to business success. The three experience factors are dependent on each other, and as a company we need to have one strong core.

UX journey

FASTEMS

HARRI NIEMINEN, FASTEMS OY AB

Fastems' UX journey – Experiencing factory automation

All human beings are hard coded to behave in certain ways. **We enjoy positive surprises, we are empathetic, and we want to be rational, though we are not.** These realities demonstrate that our behaviour as customers builds on how we experience the products and services on offer or in use. It is important to remember that this applies not only in business to customer (B2C), but also in a business to business (B2B) context, even though in a B2B context, decision-makers and users are not usually the same persons. Organizations do not make any decisions – human beings do.

One of Fastems' main roles is to improve our customers' competitiveness through automation. Historically, designing for experiences might not have been the most obvious approach in our business environment in the metal and engineering industry; it might even have been seen as a bit crazy. The world is changing. In an emerging outcome economy, where we sell measurable results instead of products and services, experiences play a very important role. **According to the Harvard Business Review, 'user experience is fast emerging as the new black in business culture'** (Harvard Business Review, July 16, 2013: The Rise of UX Leadership, by Robert Fabricant). By creating the right kind of experiences it is possible to create unique customer value, as well as competitive advantage that is hard to copy. Experiences also play a key role when we are talking about the attractive jobs of the future.

For Fastems, the main goal of the UXUS -journey was to create the right kind of experience mindset. **Everyone at Fastems should understand what UX is, what it means for our customers and our own business, as well as how to contribute.** Mindset is a big thing. It cannot be created during a couple of consultation sessions. Multiple viewpoints for creating a big picture as well as participatory activities leading to personal-level thinking and enlightenment are needed.

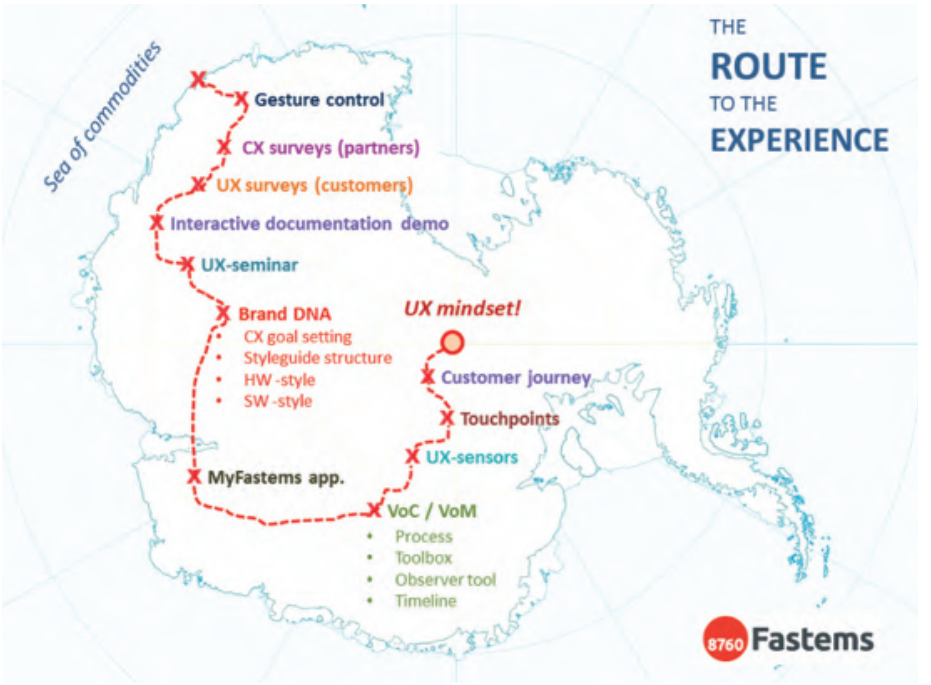


Figure 1. **Fastems' UXUS–journey**

Learning about UX

The first cases in our UXUS journey focused on learning as well as **awakening UX awareness and interest**. A vast amount of effort was dedicated to UX and CX –studies among our customers and partners. By doing this, we were able to create a good picture about the perceptions of UX in our business environment as well as gather **knowledge** about what kind of UX and CX we had already created.

When looking back, the most widely known result from these very first cases was the concept of gesture-based human–system interaction for a flexible manufacturing system. In this concept, physical control buttons next to the loading station were replaced with gestures that were the most natural for human operators, and on the other hand, were the kind that the system can interpret reliably. Related research is explained in more detailed in the chapter *'Prototyping future UX - Methods for developing new interaction concepts'* (*page 154*).

Experience goals and experience management

Experience goals state the experiences people hopefully have about the company. In this, it is important to remember that employees of the company should also find the goals relevant and inspiring, meaning that goals must be strongly in line with company culture. During the FIMECC UXUS research program we defined in a systematic way, through a bottom-up approach, the experience goals for Fastems. The company-wide experience goal concept as developed in the UXUS program is explained in detail in the chapter *'Towards a beloved B2B brand'* (*page 53*).

Customer experience builds on how the customer perceives **a customer touchpoint**; how it makes them feel and how they perceive the exchange of value. The touchpoint chart was created in order to provide a kind of external view to our company, view defining one- or two-way points that a customer possibly meets during the interface between the customer and Fastems. In the related **customer journey map**, we have touchpoints placed in a timeline, with the events and contributors specified. The customer journey map includes everything that our customer wants and goes through when interacting with our company. It provides a complete picture of the customer experience and in that way it helps us truly understand how our customer experience builds up and how to manage it. More about touchpoints can be found in the Chapter: *'Touchpoints – opportunities for engagement'* (*page 104*).

From an experience management point of view, we should be able to **communicate** experience goals at every single touchpoint we have - every product and service we create, every action we take, every

email we send should be in line with experience goals. This does not just happen. Styleguides are one of the key enablers in an experience-design approach. **The styleguide concept** created in UXUS is not just a bunch of paper with strict policies about visuals. It gives guidance for the communication of experience goals and shares case examples – all this while keeping styleguide users, employees experience in mind. More information about UX design can be found from the Chapter *'Developing practical Guidelines for UX Design'* (page 88).

Sensors and some elements for the future

In order to increase our customer's competitiveness through better experiences, it is important to know how they are really using the systems we deliver. **The UX-sensors concept** created in UXUS moves us from traditional interviews towards behaviour measuring and analyzing. More information about this concept can be found in the *Chapter 'UX sensors - Understanding the UX of complex systems through usage analysis'* (page 113).

Sensors were also created in the Voice of the customer/Voice of the Market (VoC / VoM)-case. The case included **benchmarking between industrial companies**, and at Fastems, the concept creation for continuous UX, CX and general VoC/VoM information gathering.

In Fastems' **Experience Centre** case, we explored the future possibilities for the company's Training Centre. The concept created describes the transformation from training facility to an innovation hub, which delivers a memorable experience to all stakeholders. In the future, the focus is on activity, business, learning, research and collaboration.

Being with our customers 8760 hours per year, while providing more value for their time, is one of the Fastems' targets. One of the touchpoints could be like the **MyFastems -application concept**, created during UXUS. The MyFastems application puts the customers' system and Fastems' services into the customer's pocket whereever she or he is.

Examples tell the story: UX offers unlimited source of innovation!

The journey continues

UX is a continuous journey. By the end of the UXUS program we have reached base camp. **During this first and most important leg it has been our great pleasure to work with such skilled, motivated and committed people as we have had in UXUS.** Fastems' UX journey continues.

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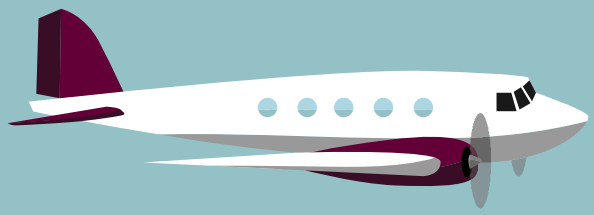
FINAL REPORT 1/2015



BUILDING A UX MINDSET

– TOWARDS PERMANENT COMPETITIVE ADVANTAGE

UX MINDSET
Edge over the rivals

UX TO STRATEGY
UX maturity grid

UX IN B2B RELATIONSHIPS

ORGANISATION CULTURE
UX-transformation compass

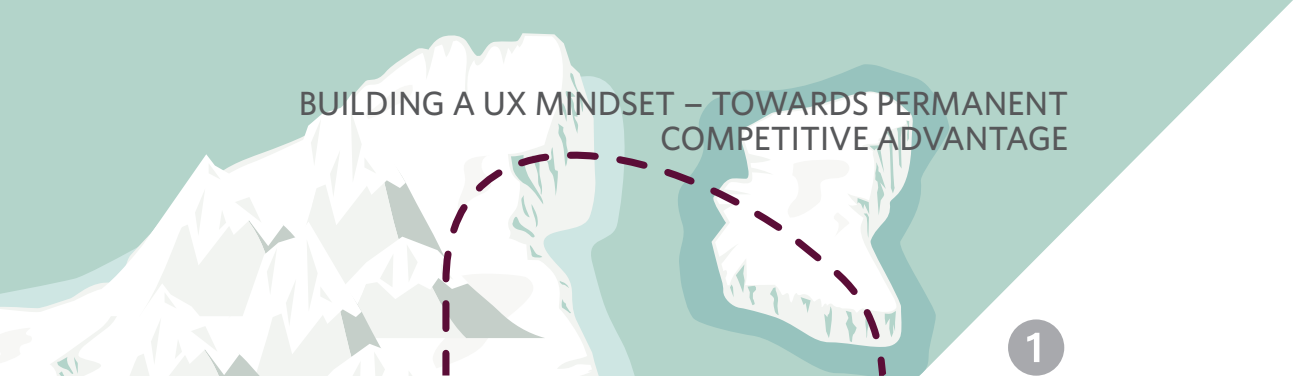
EXAMPLES
Means for adopting UX mindset

COMMUNICATING UX
Product introduction to sales channels

ENGAGING R&D
Developing guidelines

Building a UX mindset – towards permanent competitive advantage

Introduction: The real key to success and reaching long-lasting competitive advantage based on experience thinking lies in the mindset of the organization, its culture, its DNA. This is difficult and takes long time, but it's also difficult for rivals to copy, because it's in people. If everyone in your company knows and values the users' and customers' world and can even step into their shoes and feel what they are feeling, this creates the strongly beating heart of radical innovations and business success. To achieve this requires awakening and putting UX onto your strategic agenda but also real transformation in the organizational culture rooted deep in practices, conceptions and values held within the organization and industry. Both of these purposes can be guided by evaluations and we have developed two practical evaluation tools to be introduced in this section. This section elaborates further by contesting the logic of UX-based competitiveness, reviewing the present situation in B2B relationships, giving examples of actions to be taken in order to get an entire organization on board, as well as tackling some very typical challenges in B2B context.



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MARKO SEPPÄNEN, TAMPERE UNIVERSITY OF TECHNOLOGY
HANNU PAUNONEN, VALMET AUTOMATION
JUSSI JOKINEN, UNIVERSITY OF JYVÄSKYLÄ
MAARIA NUUTINEN, VTT

UX mindset gives you an edge over the rivals

User experience is in the DNA of the organization

A company can reach a permanent competitive advantage when it continuously introduces new and better products and services for the customer and for the user. During its lifetime a company can produce one or two outstanding innovations based on technology breakthroughs. Competitors will attempt to imitate those and very likely they'll do it rather quickly. A real competitive advantage is reached only when the company utilizes technology that is deriving continuously something new based on the customer's needs and their real work. In such a company, the whole organization has a deep understanding of the customer's and the user's work and the organization speaks about users and their experiences. It's mostly about your attitude to put yourself all the time into a user's shoes, in order to radically innovate something new for them, and to proudly present your innovation to the customers and users. Real users are present in discussions from informal talks in the cafeteria up to delivering new products to customers.

We discovered that there is a lot of user knowledge already in the organizations but it is not usually utilized in situations where it would be needed. Putting knowledge to work requires a change in the company culture. Building such a culture takes years. The change process is slow since it requires change in people's behaviour – it is not about technology change. Moreover, it does not happen without conscious leading. The competitive edge may be copied by rivals, however they will be several steps late.

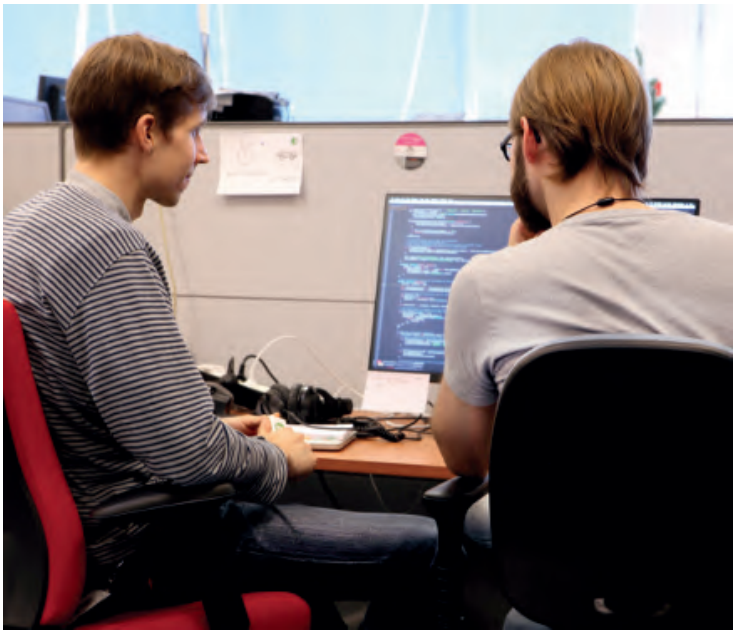


Figure 1. **User is kept in mind in even small decisions also in the floor-level activities**

Because it's difficult and slow to build up, it's also difficult for rivals to copy

"Every purchase decision boils down to one single question about the product: how you feel about it? Even in the case of elevators and escalators, it is the user experience that makes the difference."

–**Matti Alahuhta**, KONE (People Flow Magazine 1/2011)

The conscious and uncompromising work to realize the People Flow vision at KONE has provided a spectacular landmark for any company in how financial performance follows the successful implementation of strategic vision.

Company's management has a key role in creating and nurturing the UX mindset

In many companies R&D is the first part of the organization that consciously adopts a UX mindset. That happens in a natural way while applying modern UX-based design methods in the product development. A lot of research and education has linked UX and products together and encourages users and customers to participate in product development. However, too often less focus is spent in utilizing the knowledge that already exists in the company. To assess what is the current mindset you can use the **UX mindset maturity grid** we have developed in the FIMECC UXUS programme.

We studied UX maturity in different companies and found that even a simple tool serves well to spur the right questions in people's mind as well as to initiate good discussions between people. The company's management can manage the UX mindset change, for instance, by creating active functions, situations and places where persons in the organization can together and with users share ideas and meet face to face.

Think about people inside and people outside and lead them with small steps

Change takes time – be prepared to repeat the message and discuss with people to reach the shared mindset. When you develop something radically new you have to keep your own organization and your customers moving at the same pace, because changing people's expectations is a slow process. You can only take small steps at a time. It can start just by doing the same old things differently. For example, when starting a new UX-driven concept development project, you can involve people from different functions from your own company as well as from the customer side. You can merge the design team and marketing team. You can enliven your people with experimental projects that copy ideas from the game-world. Together you can invent small development ideas, test them in daily work and iterate again and again. Share your ideas of the future with customers and stakeholders – that is a good way to invite them to contribute to constructing the envisaged future.

When enhancing cultural change it is important that these kinds of actions deliberately aim at a shared as well as a personal understanding of why UX is crucial to your business; you can ask your teams collectively and as individuals what it will mean for your business, from the perspective also of normal activities, and how you can reach targeted changes. This requires that you also have a big picture in mind. Evaluate every now and then where you are now and what kind of transformation you are targeting and which area needs your attention. This helps you to find concrete ways to proceed. For that purpose we have developed the **UX culture compass**. It will also help you gain insight into your cultural strengths and find courage to challenge the present way of doing and thinking.

This same process applies to all people irrespective of whether they work for a supplier company or a customer company. Thus, the same processes that confirm the change processes within the company should be adopted to enable change processes within your customer company people. Radical experiments can shape the future. As an example, a video and prototype about the future process operation helped to shape the possible role of speech and gesture control

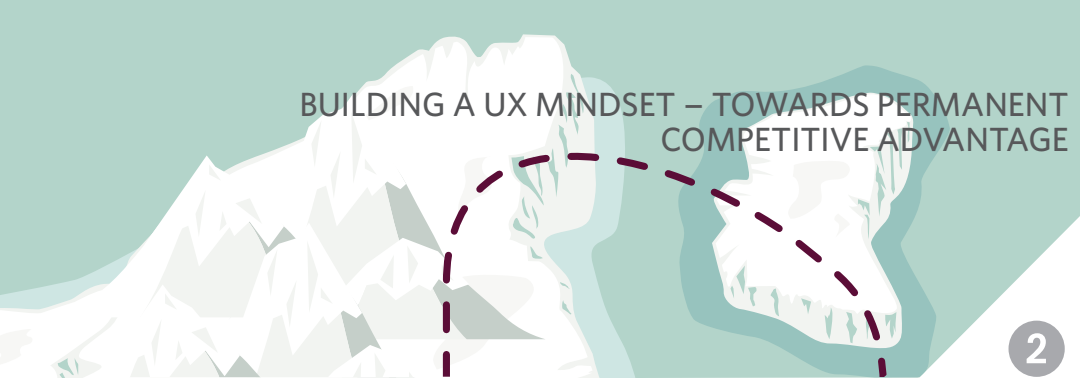
in control room work. It also created a common understanding about the future within the control system's vendor organization *(pages 154 and 157)*.

Give people the feeling of the real life work

Experience is an abstract phenomenon. Therefore letting people touch, feel and experiment is the very core of building understanding about how a user would feel when using a product. In a company there can be physical places for experimentation. Subjective experience is private and resides in our consciousness, so it cannot be removed surgically and analysed in a clinical laboratory. For this reason, it is necessary to let users give their own account of their experiences. The challenge of user-experience research is to let the users do this so that their account is rich and informative for design purposes, while at the same time being about the actual experience. Because experience is a multimodal phenomenon, involving all senses, it is important to include them all when asking users to tell about their experiences. Crane operators, for example, see the movements of the crane, hear its noises, but also tactually feel the controls of the crane. For an experienced operator, the crane becomes an extension, something which seamlessly moves according to the operator's will. Any study not accounting for the multimodal nature of experience will provide only partial understanding of user experience.

Valmet Automation has constructed a facility called the UX Playroom for this kind of experimentation *(page 162)*. It imitates real-life control rooms, the places where process control work is carried out in customer plants. The UX Playroom is a co-design space to try out, innovate and concretely feel and share ideas. In UXUS we found that stepping into the room immediately takes all participants into the right context and mindset. During the development phase, we designed methods geared to making the feeling of context even more real and to facilitating the telling and capturing of stories about real-life situations in customer plants.

In this way the UX Playroom works as a boundary object between people from different organizational units, even from separate organizations (e.g. suppliers, customers) and cultural and educational backgrounds.



HANNA-RIIKKA SUNDBERG
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How UX is perceived and utilized in B2B relationships

User experience should be taken into consideration in both developing new products and buying new technology for work use. Improving user experience has become an essential part of companies' strategy and culture. Increasingly more companies accentuate UX as part of their product strategy and demand UX knowledge from their employees as well. Instead of offering only products and services, companies compete by providing superior experiences to their customers, especially in the business-to-consumer markets. Even though industrial companies have woken up to the importance of emphasizing the experiential aspect of their offerings, knowledge gained from users could still be utilized more efficiently and with more versatility.

The role of user experience in a business-to-business context was studied by evaluating how UX is perceived and utilized in both the suppliers' and customers' functions in B2B relationships. We explored the role of UX in product development, sales, marketing and technology investment decisions in three industrial companies and their customer companies with the help of interviews and surveys. Even though UX was perceived as important, companies found it challenging to find appropriate channels for communicating user knowledge both inside the firm and with customer companies.

Incorporating UX in R&D can lead to better products

Bringing UX into new product development creates benefits for all counterparts; when suppliers focus on users' needs and requirements, the products will be better accepted into use and customers are more satisfied when their productivity increases.

However, it was found that actively involving users and different functions such as sales and maintenance in developing new products was challenging. The question is also, to what extent is it rational to have external parties involved in R&D activities.

"Of course when we talk about how this looks from the customer's point of view, we have some difficulties and it is not easy to get the end-users opinion on what really are the experiences and problems with older versions at their factories". (Interviewee from Sales & Marketing)

More experiential methods are needed in selling UX

Even though the experience aspect should be emphasized also in sales, formulating the benefits from positive UX into effective sales argumentation can be challenging. References are considered important, since they enable getting direct feedback from customers who already have experience in using the products.

"But the best way to bring it [UX] forward is to go to a reference site and let customers talk to each other about how things have gone, how the system works et cetera. That is the best way to have information transferred...

...If we say the same sentence that a customer says to another, then they won't believe us. But they will believe them [other customers]." (Interviewee from Sales & Marketing)

Testing products before making the investment decision was also found to be important, but this is not always possible. For example, it can be difficult to simulate the use of a control system without the actual connection with the production equipment.

Knowledge on UX should be distributed through more experiential methods. When it is not possible to provide reference examples to new customers, then experience centres that are built for testing and developing systems as well as video material that, for example, demonstrates the usage of products in a real work environment should be utilized.

UX matters in technology investment decisions

Technology investment decisions in companies can be complex processes that include multiple divisions with different requirements. The essential thing is to find a solution that responds to the needs of all parties – including users.

"One should not underestimate the user at all since they might be dealing with the system every working day for twenty years. This is why the operator should be able to influence the decision on what kind of system will be acquired." (Interviewee from a customer company)

Even though the products' market superiority and technical details, as well as the supplier company's reliability were considered the most important aspects in choosing a supplier, UX can have an indirect impact on supplier selection, as previous experiences with the supplier and their products affect decision making.

> *"With these hypotheses that the technique is equivalent based on its reliability, price and maintainability, then it [UX] should be one of the most important criteria, or even the most important." (Interviewee from a customer company)*

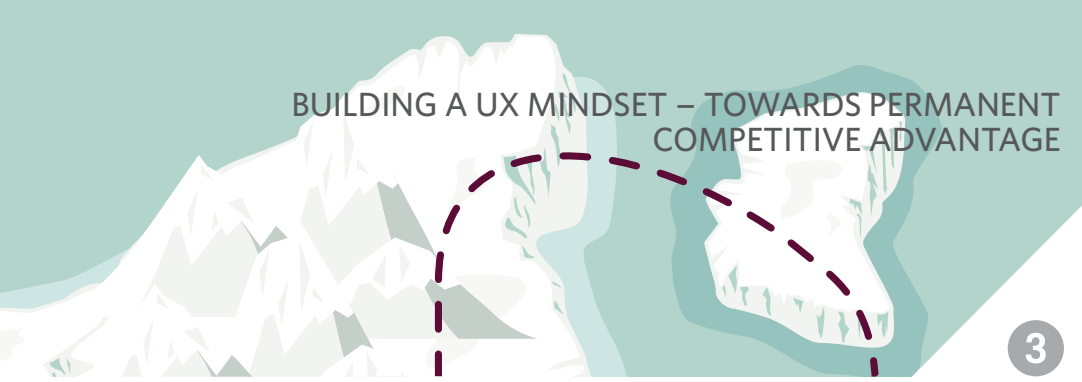
Learn more:

Sundberg, H.-R. (2015), The Role of User Experience in a Business-to-Business Context. Publication nro. 1278, Tampere University of Technology, 190 pages.
(http://dspace.cc.tut.fi/dpub/handle/123456789/22694)

Sundberg, H.-R. (2015), The importance of user experience related factors in new product development - Comparing the views of the designers and users of industrial products, 23rd Nordic Academy of Management Conference, 8-12 August, Copenhagen, Denmark.

Sundberg, H.-R. & Seppänen, M. (2015), 22nd Innovation & Product Development Management Conference, 14-16 June, Copenhagen, Denmark.

Sundberg, H-R. & Seppänen, M. (2014), Pitfalls in designing and selling UX: Cases in MEI, Academic Mindtrek Conference, 4-6 November, Tampere, Finland.



HANNAMAIJA MÄÄTTÄ, **MAARIA NUUTINEN**, **MAARIT HALTTUNEN**
VTT

Adopting a UX-mindset –
means for getting the entire organization on board with UX

In order for companies to become truly UX-oriented, all parts of the organization have to adopt a user experience -based innovation and business logic, a UX-mindset. This hidden part of organizational culture exists within organizational structures, management styles and daily practices as well as in the attitudes towards renewals. Adopting a UX-mindset enables the transition from a strongly technology and product-oriented company towards a more customer and user value-oriented company, which is also needed when aiming to fully utilize UX-based competitiveness potentials.

In the beginning of the UXUS-project, getting the UX message across to the entire organization was seen as difficult by the participating companies. Many times, UX was seen as the responsibility of a design team or an R&D team. In other words, UX was seen as something extra to be included in physical products, not a shared philosophy or mindset guiding the organization's business operations. One of the greatest challenges was to get sales people on board, as they were distant from R&D and did not participate in the development of UX-products. It is important to ensure that the UX message reaches all relevant actors, which is why the UX message should be modified according to the audience to which it is directed. Connecting UX goals to an organization's larger goals is important when aiming to make all employee groups participate in adopting a UX-mindset. When UX is visible in the organization's brand or strategy, it is better acknowledged inside the organization, and its meaning is easier to understand and its benefits are more clearly seen by all. Having UX on the management's agenda is thus crucial. Implementing the UX-mindset is challenging for organizations because of the multiple stakeholders who need to be considered. Special attention should be given to actors who are involved in product development or who collaborate closely with customers.

During the FIMECC UXUS programme, the participating companies discovered that various different means can be utilized to strengthen the UX-mindset. KONE's People Flow Day, **an experiential training event for employees** is organized at the company every year to help all employees better understand what the UX –based strategy at KONE means. The event is designed to bring the employees normally not connected to UX-issues closer to the users and customers by acting as researchers, talking to customers, interviewing the public, making on-site observations and filling in questionnaires. Through this event, KONE supports the mindset transformation from product-centric thinking to experience-based thinking within the organization. At Konecranes, **a field study method** is utilized to support the holistic understanding of the customers and users and of the contexts they operate in. The field studies are conducted by R&D people, who interview and observe customers and users at customer organizations. Disseminating the knowledge gained increases the awareness of what UX means in the context of various customers and markets. At Rocla, **the internal collaboration between R&D and marketing and communications** has been strengthened by integrating the two units. They work closely together and through the collaboration ensure that marketing people understand the technology behind product features and that the R&D people's thinking is based on user-benefits, not only technical features. The close collaboration has proved to be an effective way of ensuring that UX and brand thinking are driving the product development processes from early concept ideas into finalized marketing and sales materials for customers. Through this co-creation, specific messages and tools for different touchpoints can be created (for example in sales situations) that bring out the UX features essential to products. Metso Automation also found that it is difficult for the marketing people to participate in the product development processes if the discussions are filled with technical details. They found that **visualization and storifying can spark discussion and enthusiasm towards UX**. Stories from users, videos from user environments, illustrated concepts and prototypes of future tools are efficient ways to arouse discussion around UX. The prototypes and visualizations build an innovation environment where the whole organization, developers, customers and users, can discuss the present and future products.

During the UXUS-project, it became evident that in order to adopt a shared UX-mindset, **all employees in the organization should understand how they can provide good experiences through their own work**. It is crucial to get people talking about UX by building experiential forums that enable stronger collaboration with customers and users, and within the organization between different units.

Getting R&D and marketing to work together, truly and for real, is a good way towards UX minded product development. On the other hand, it ensures better skilled marketing without excesses or shortfalls.

Seija Junno, SSAB

Read more:

Heikkinen, M. and Määttä, H. (2013): "Design-driven product innovation in enhancing user experience oriented organizational culture in b-to-b organisations", presented in Tsinghua International Design Management –conference 1.-2.12.2013

Nuutinen, M., Heikkinen, M. and Määttä, H. (2013): "Evaluating the levels of design management in user experience-oriented companies –experiences from Finnish metals and engineering industry", presented in the 2nd Cambridge Academic Design Management Conference, 4.–5.9.2013
http://www.cadmc.org/CADMC2013Proceedings.pdf

Nuutinen, M., Seppänen, M., Mäkinen, S. J. & Keinonen, T. (2011). User experience in complex systems: crafting a conceptual framework. 1st Cambridge Academic Design Management Conference, University of Cambridge, 7–8 September 2011, Institute for Manufacturing (IfM). 14 p.

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Putting UX onto your strategic agenda
– obtain an overview of the UX maturity

Have you ever puzzled over how UX is perceived within your company? With this practical tool you can easily evaluate the maturity of your company's UX mindset.

Getting management to consider UX issues at a strategic level

Building a commonly shared mindset in a company where UX is considered a strategic asset and the core of new product development is a hard task. Elevating the priority of UX issues in decision-making should start from making the management aware of the importance of incorporating UX in the company's product strategy. But as several interviews in this programme have shown, managers also experience difficulties in understanding how UX should be utilized in daily work tasks.

> *"If you ask our managers what they think about user experience, they'll say: "It's very important". But what it involves is a whole other thing. And they don't organize anything around it or even generally understand that world. Or at least I don't believe they do."*

It became apparent that employees working in different functions have divergent perceptions on how to define user experience. For some, it can include only usability issues, such as the efficiency and effectiveness of a product. For others, UX is related only to the visual appearance of products.

> *"The major conversations that we've had with the management group have been about the colours and what kind of background colour we have, or the colour of the keyboard. But they are not really the core of the user experience."*

UX is a much more complex matter than simply appearances and thus it is important that 1) all people in the company understand UX in the same manner, and 2) building the UX mindset is managed with a strategic intent.

Evaluating the maturity of the UX mindset with a practical tool

In order to build a new mindset, it is beneficial to first assess how employees would rate the current state of UX maturity in the company. For this purpose, we created a simple UX maturity grid that is easy to complete.

This grid includes five stages of UX maturity: uncertainty, awakening, enlightenment, wisdom and certainty. The stage of UX maturity is evaluated within four categories including: 1) management's understanding and attitude towards UX, 2) UX status in the company, 3) UX improvement actions, and 4) a quote to describe the company's UX attitude. For example, regarding the status of UX in the company, at the lowest end UX can be seen as something still hidden in the R&D department, or at the highest point, as a significant competitive advantage acknowledged by the whole company.

By selecting a suitable stage for each category it is easy to evaluate the overall state of the UX maturity of the company from the employees' perspective. The development starts by knowing where we stand now. The tool can also be used to assess how the perceptions of UX issues have developed/evolved over time on, for example, a yearly basis.

However, the work towards a coherent understanding on UX does not stop with educating current employees about UX matters. Once a company has found appropriate tools for building the UX mindset and is advancing towards the stage of certainty, new employees have to also be thoroughly introduced to this culture so that they too understand the importance of UX in their work tasks.

> *"Sometime later they [UX priorities] will come through in an organization. But it takes a long time in these kinds of organizations for it [UX] to become the property of the whole company, it might not ever happen. There will always be new employees that have never heard of these kinds of things."*

Although work is required in making UX a cornerstone of a company's business, several benefits can be gained from focusing on users' requirements and needs. **Sustainable competitive advantage can be built on intangible competences that are built on a thorough, commonly shared understanding of better UX. Differentiation from the rivals' offerings is ultimately perceived in the eyes of your customers only.**

Stages / Categories	Uncertainty	Awakening	Enlightment	Wisdom	Certainty
Management's understanding and attitude towards UX	No comprehension of UX as a management tool. R&D mostly responsible for UX.	Recognizing that UX management may be of value but not willing to provide money or time to make it all happen.	Start learning more about UX; becoming supportive and helpful.	The possibilities of UX have been fully understood by the management and UX impacts on decision-making.	Consider UX as an essential part of the company management system.
UX status in the company	UX is hidden in the R&D department. Customer feedback on UX is probably not used.	UX is identified in some parts of the organization. The first actions to use UX in products and services have been taken.	The meaning of UX is understood coherently throughout the organization.	UX becomes visible to the customers as well as through e.g. sales and marketing activities.	UX has an official status in the organization and is perceived as a significant competitive advantage.
UX improvement actions	The opportunities to be gained by improving UX are not realized in the organization.	UX is recognized as an object for improvement, but it is yet unclear how it should be done.	The importance of UX and employees' roles in creating it is understood in the company.	UX goals are set to ensure that the development process has clear UX targets.	Methods are developed continuously to monitor and evaluate UX.
Quote to describe the company's UX attitude	"We don't know why we have problems with UX."	"Is it absolutely necessary to always have problems with UX?"	"Through management commitment and UX improvement we are identifying and resolving our problems."	"Defining UX targets is a routine part of all of our operations."	"We know why we do not have problems with UX."

Figure 2. **User Experience Maturity Grid.**

Learn more

http://uxus.fimecc.com/sites/uxus.fimecc.com/files/tool_to_measure_ux_maturity.pdf

A tool for evaluating the UX maturity in a company is a fine idea. At an early stage, even a simpler matrix may be sufficient. We used a 3x3 matrix when comparing the divisions and businesses and looking for the first development projects.

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5

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MARJA LIINASUO
MAARIT HALTTUNEN, VTT

Going deeper into your organization's culture – a UX-transformation compass to guide your UX-journey

Our research shows that a comprehensive reform of the organizational culture is needed to fully utilize the potential of UX in companies. In doing this, it is important to be aware of the current state of UX-orientation in an organization. An evaluation frame was developed for companies **to determine the current state of their organizational culture – and made it visible.** All organizational activities must be considered to reinforce the transformation towards a truly experience-driven organization. The frame gives a comprehensive view of the current state of the company. Our approach is based on organizational culture research at VTT and on the understanding gained from the participating companies in the FIMECC UXUS programme.

In evaluating organizational culture, it is first important to discuss the mission statement of a company; how is company's purpose understood? What are the perceived values? What is the competitiveness based on? How is the professional identity constructed? Organizational culture is then evaluated in four areas while taking into account the mission statement: business understanding, customer and user relationships, management practices and development work.

Basic mission of the company	Technology-oriented or product-oriented mission	Understanding of the company's purpose Perceived values Conception of competitiveness Professional identity	Experience-driven mission
Development work	Product-centered development focusing on technical features	Goals of development Collecting customer and user knowledge The role of customers and users in development Focus of development work	Development aimed at producing unique experiences
Customer relationship	Transaction-based customer relationship	Customer's perception of the company brand Understanding of the customer's operations Motives for interaction Nature of interaction	Mutual value creation and constant collaboration in shaping future markets
Management practices	Focus on processes and cost-efficiency	Company strategy Enabling Customer- and user-centered activities Values of management Development culture	Experience driven strategy guiding all activities in the organization
Business understanding	Competing with the same offering others are providing	Conception of the business environment The role of UX in business Justifying the value of UX Responsibility for UX in our business goals	Experientality as a significant competition factor

Figure 3. **The evaluation frame for determining organizations UX-orientation culture**

In our frame, the archetypes of organizational culture are: 1) product-oriented, 2) UX-focused and 3) experience-driven. The current state is visualized in a UX-transformation compass, showing which sector is emphasized in each area. With the visualization, it is possible to identify key areas requiring further development towards UX-orientation.

The purpose of evaluating the organizational culture is to encourage internal discussion and build a stronger UX-orientation. The value of the evaluation is in conducting it as an organizational learning process. First, it is important to identify the need for change and to engage the key people. Then the view of the organization's current situation should be examined, after which the shared vision of development targets and actions can be determined. A development plan as a part of the organization's change process is essential, as well as ensuring that the prerequisites for change exist.

Evaluating the UX-orientation is most suitable for organizations that have some understanding of UX and are aiming towards a deeper understanding of the organization's culture, and are motivated to pursue a transformation towards UX in the form of development projects. After visualizing the results of the culture study, the needs for more detailed transformations are identified, and key action points are determined. Thus, the frame can function as a compass in planning and reflecting a company's journey towards UX.

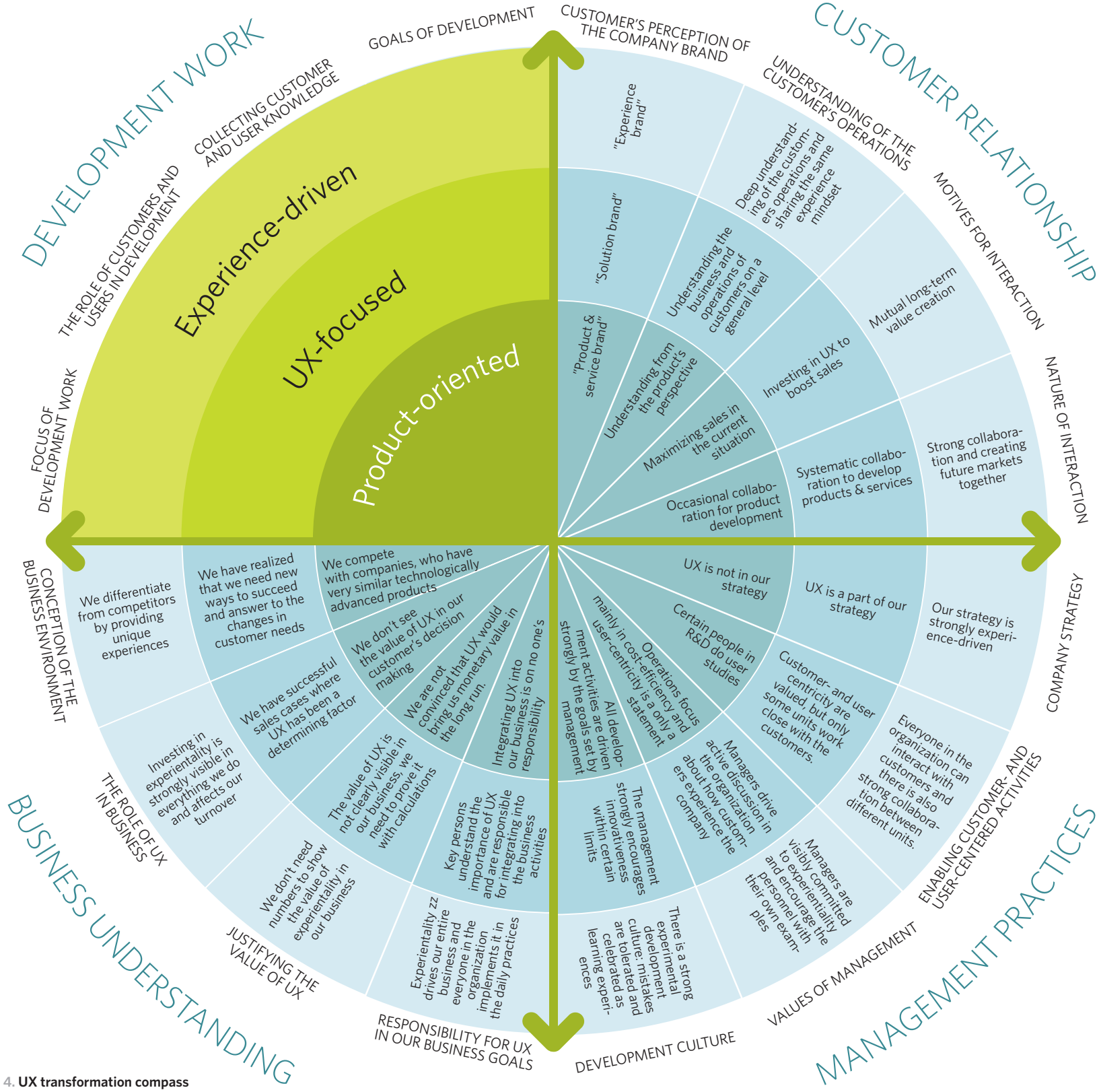

Figure 4. **UX transformation compass**

See the UXUS-company perspectives below on how the UX-orientation has evolved during the programme.

"During the UXUS research program, UX awareness and activity has grown a lot in Konecranes. Today we have several of our own successful stories about UX-driven design cases, and they encourage us to take the next steps towards more mature level of UX."

Johannes Tarkiainen, Konecranes

"Once the interest towards UX and CX has been evoked, the question then is, now what? How does this affect my work? At Rocla, the transformation is still ongoing and is at different phases in the organization. The evaluation approach is in demand as atool for self-evaluation regarding customer experience."

Kero Uusitalo, Rocla

"UXUS-program has really opened people's eyes in our company towards user experience and the power it has. It's been really interesting to see the change in UX expectations of our technical managers for example. Now the bar is set high in everything we do."

Iiro Lindborg, Rolls Royce

Learn more

http://issuu.com/vttfinland/docs/uxus?e=5313536/10318056
(in Finnish)

HANNAMAIJA MÄÄTTÄ, VTT
LAURA KANTO, AALTO UNIVERSITY
HANNA-RIIKKA SUNDBERG, TAMPERE UNIVERSITY OF TECHNOLOGY
MAARIT HALTTUNEN, VTT
TERHI RÄSÄNEN, ROCLA

Broadening the scope of change

– Rocla's New Product Introduction -tool as a means to communicate the value of UX to external sales channels

In order to make UX a competitive factor in the B2B market, an important actor group, the dealers, also need to be engaged in UX so that they are able to sell the user benefits of a product in addition to the technology to customers. As UX is not a quality of the product, but rather a design philosophy behind the business, it may be difficult to communicate the UX-message in the desired way. Recognizing the organizational challenges of communicating the value of UX is thus essential when integrating UX-thinking that encompasses the entire organization all the way to the sales channels.

In the FIMECC UXUS programme, the role of successful knowledge transfer was recognized as extremely crucial in developing and launching UX-based products at Rocla. The company's New Product Introduction (NPI) tool was studied as a means to communicate the value UX to the sales channels and dealers. The NPI includes sales brochures, technical details of products and product launch events that are organized in collaboration with the marketing and R&D unit. People from the R&D unit, marketing and communications unit, internal sales channel and dealer network were interviewed to obtain a comprehensive view of how UX is perceived in the organization and how well the NPI functions as a UX communication tool.

The case showed that it is challenging to transfer UX-related knowledge via traditional sales materials and to truly motivate the dealers to highlight the UX-elements of products. Due to the tacit and ambiguous nature of UX, the traditional knowledge transfer mechanisms need to be redesigned. Since the experience dimension is

central to UX-based products, it should also be reflected in the means for knowledge sharing within the organization. New, experiential methods are needed to capture the essence of UX-based products, such as test drives and interactive events where people can see and try the products themselves. Participation and co-creation are also essential in developing and launching UX-based products. If the sales people are genuinely engaged during innovation processes, the commitment to UX-driven products and their sales is enhanced. A continuous and two-way communication is essential, as it increases people's willingness to share knowledge and will ultimately influence the organizational values and culture towards UX.

During the FIMECC UXUS programme, Rocla developed their approach to communicate UX and use it to engage dealers. With stronger collaboration, co-creation and participation, as well as new experiential communication methods, the company was able to impact the perceptions of dealers in regard to UX-based products.

When Rocla developed their first UX-driven product, they involved dealers in 20 countries and forklift drivers at customer sites in a co-creation to study user needs. Several forklift drivers tested the prototype on behalf of customers and gave valuable feedback.

Also the marketing materials were created based on UX thinking to design the best customer experience: for example, a cartoon animation was used to explain the unique UX features and benefits in a simple, funny way that appealed to customers' emotions.

A product launch event they organized was all about great customer experience – under a Valencian sun, the dealers tested the new UX-based product against the competitors, and the verdict was written all over their enthusiastic faces: more than 40 new forklifts were sold already at the event.

Learn more:

Kanto, L., Määttä, H., Sundberg, H-R. and Heikkinen, M. (2014): "Challenges in transferring user experience related knowledge to support commercialization of innovation", presented at the NordDesign 2014 conference, 27 – 29.8. 2014, Espoo, Finland

7

VIRPI ROTO, **ELINA HILDÉN**, AALTO ARTS
HARRI NIEMINEN, FASTEMS
KERO UUSITALO, ROCLA

Developing practical guidelines for UX design

Since UX work is new to many FIMECC UXUS companies, we have investigated ways to guide and engage R&D people to take UX into account in their daily work. At Fastems, we interviewed employees and ran co-creation workshops to ideate UX Styleguide content, structure, and format. At Rocla, somewhat similar activities were undertaken to provide a set of guidelines to take UX issues into account during product development. In both cases, a participatory approach helps to create feasible guidance and to generate commitment for utilizing the guides.

When introducing UX thinking to a company, we need to advance both on the ideological and practical path. The ideological path changes people's mindset, and the practical path changes the ways of working. In the best case, these two are combined, so that UX practices at work directly relate to the way of thinking.

We report here two different kinds of guideline development case, one in Fastems and another in Rocla.

FASTEMS

Fastems sees it is as important to have user experience that is in line with their brand experience and DNA, and that the same experience is communicated at all touchpoints between the company and the customer and/or end user. Especially in the phase when the company is trying to learn and adopt experience thinking, it is helpful to give guidance and share examples on what experience design could mean in practice.

The main goal of this case was to develop a Fastems Styleguide that focuses on user experience. Instead of a thick brand book, we wanted to develop an interactive Fastems Styleguide, living in the company intranet. Instead of rules for visual appearance, the content in this Styleguide stems from the agreed Fastems experience goals. More examples and guidance can be added to the style guide over the coming years, which directed the UXUS efforts to defining a structure for the online style guide.

We used a co-design approach in designing the style guide, and ideated a set of different communication channels for distributing the UX guidance, see below.

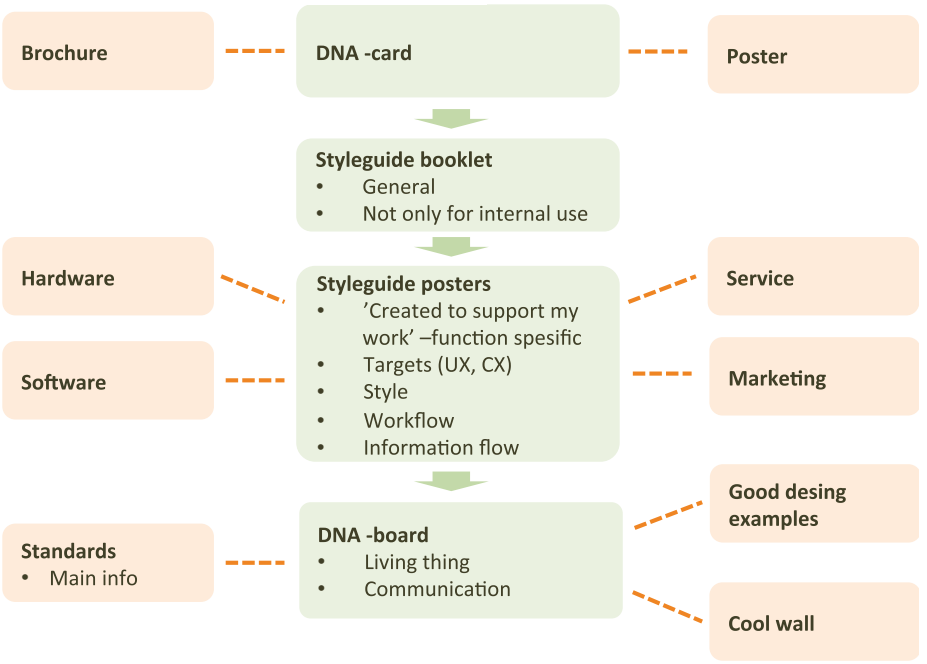

Figure 5. **Ways to deliver the UX style messages**

ROCLA

The main objective of this study was to investigate ways to support the shift from problem-driven to experience-driven design processes through practical guidelines. The aim was to provide understanding of how to develop Experience Design Guidelines that best serve a company's needs and how to integrate them into the company's design culture.

Figure 6. **The UX guidelines for Rocla were developed in a co-design workshop, which started by evaluating the UX of a forklift by attaching post-it remarks to the forklift itself**

The UX guidelines that would start this change towards a UX-driven design culture came to be a set of six guidelines:

1. Set the UX goals
2. Take responsibility
3. Understand the context
4. Justify decisions
5. Test to evaluate
6. Design simple and intuitive

These guidelines, along with suggestions for actions to support the change, are put together in a PDF-format. Kero Uusitalo, Design Manager at Rocla, describes the guidelines as following: *"UX guidelines will be stated as a part of the R&D process. The process we are following dictates how R&D works during projects. As a part of this process tool, the UX guidelines enter designer's daily work. Without this statement, UX can be overruled and forgotten over time, due to personnel or organizational changes. Yet, this is not sufficient. Having instructions on how to implement guidelines within projects at the management and designer level is crucial. These guidelines make an abstract subject come to life for people. Through them we start to discuss UX elements and do relevant work and eventually UX-guidance is no longer needed in daily work. Thus it's a perfect tool to change the mindset."*

fimecc
FINAL REPORT 1/2015

UX journey

KONE

ANNE STENROS AND **HANNU NOUSU**, KONE OY
REBEKAH ROUSI, UNIVERSITY OF JYVÄSKYLÄ
STINE VILHELMSEN, DESIGN-PEOPLE (DK)

Empathy and emotions in people-driven design

"Empathy fuels connection. Sympathy drives disconnection."

Brené Brown, Professor

Being aware of user needs is no longer enough. Instead, these needs should be understood as real and internalized by the company. Companies should see, feel and treat people's needs empathetically to establish genuine connections.

Figure 1. **Brené Brown on Empathy, The RSA shorts, animated by Katy Davis, Courtesy of RSA.**

Empathy as the starting point for connection between people and product design

People use, interact with and experience design. People are complex beings who approach any situation with multi-layered, overlapping and intertwining layers of feelings, thoughts, conditions, goals, predicaments and more. To make things even more complicated, the issues of culture, social and geographical conditions pose further challenges. Having knowledge and understanding of how people use and experience technology is one thing. Knowing and particularly feeling with people when they interact with a product is another. In order to create products that actually connect with their users, companies and designers should deeply understand how people experience their products. Therefore, as practitioners and researchers, we need to get out of our studios and offices and really experience how others experience the products.

Figure 2. **Their perspective, © 2013 Rebekah Rousi**

Not just knowing but feeling what it is like from their perspective

This collaboration, which started from a seed of curiosity and empathy, took the group out of their workstations, into active, busy and pressing **usage situations in five countries** – Australia, China, Denmark, the United Kingdom and Finland. The group, comprising professionals from the KONE Corporation, design-people and researchers from the University of Jyväskylä, went into shopping districts and malls from one end of the globe to another, as one among the many elevator users who depend on efficient, smooth and safe elevators to move from one floor to the next, to move from A to B.

Never trust second-hand information; go directly to the source itself.

Adolf Erik Nordenskiöld (1832-1901), Scientist, Explorer

The feeling started with a walk from one end of a busy shopping district in Australia to another. As a parent, pushing a child in a pram heavily laden with shopping on a hot day of 42° Celsius, we felt what it meant to have clean, reliable elevators, in air conditioned environments. We felt what it meant to have spacious elevator cars, with enough room for prams, shopping, shopping carts and wheelchairs. And, we felt what it meant to have efficient, logical services that do not leave people waiting for too long in uncomfortable conditions.

In shopping malls located in the United Kingdom and Denmark, we took **a female interaction approach** and interviewed women of diverse ages and life circumstances. Despite the geographical differences, results reinforced what we had been feeling in Australia, in that problems and concerns exist in terms of: priority rights – that people with disabilities, the elderly, people with small children and pregnant women should have priority; personal fears – potential malfunction and oxygen flow among others; social context – awkwardness and interpersonal interactions with other people and control over the vehicle and others.

To test how these feelings were internalized by people, we performed **the imagined elevator experiment**, in which 43 interviews were conducted in Australia and China regarding what people thought of when they imagined an elevator, recalled prior elevator usage experiences, and dreamed up ideal elevator designs for the future. Many of the responses started with the description of a box that travels up and down. However, people delved deeper into their imaginations and memories, with strong emotions arising regarding phobias, the sensations of situations, such as lack of cleanliness and control. Then came the excitement about the possibilities that designs of the future may offer to the elevator experience.

Figure 3. **Feeling safe, © 2015 design-people (dk)image by design-people (dk)**

Feelings give insight into what should be focused on in order to establish optimal user experience

These feelings and emotions were then transferred back into context, in **a local Finnish study** (45 participants), which examined the relationship between what people felt emotionally, and what they were feeling physically when travelling in an old, somewhat unreliable elevator as compared to a new one. There were connections made between the physical characteristics of the elevators, sensations felt in participants' bodies, and how they were feeling emotionally in the usage situations. To make matters more interesting, we explored the social dimension of elevator travel, by getting selected participants to guess (and try to feel) others' sensations and emotions. A part of what was discovered was that when people try to guess how they feel and evaluate it in quantitative terms (i.e., via a Likert-scale style semantic differential battery), they played it safe and selected somewhat neutral responses. Yet, when people qualitatively described how they thought the other (Part A) was feeling, they were much less reserved and offered more descriptions (compared to Part A) which were both negative, mostly in terms of the old elevator, and positive mostly regarding the new elevator (see Figures 4 and 5).

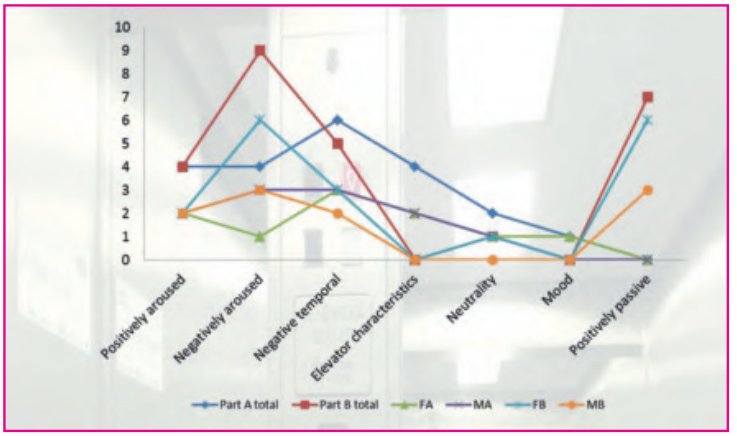

Figure 4. **Qualitative descriptions of experiences in the old elevator – Part A (people evaluating their own experiences); Part B (people guessing part A's experiences); FA (female part A); MA (male part A); FB (female part B); and MB (male part B)**

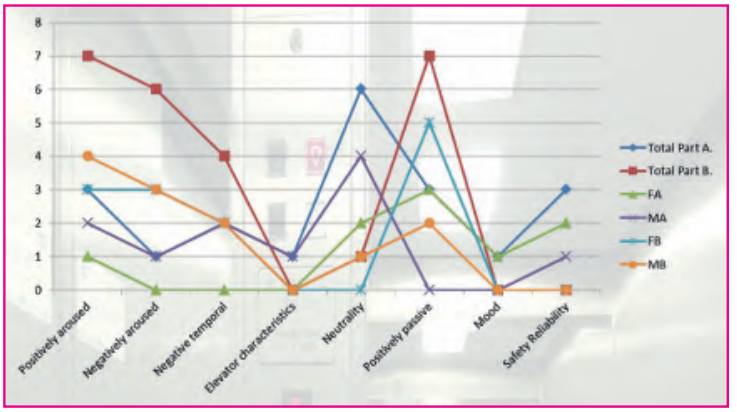

Figure 5. **Qualitative descriptions of experiences in the new elevator – Part A (people evaluating their own experiences); Part B (people guessing part A's experiences); FA (female part A); MA (male part A); FB (female part B); and MB (male part B)**

Figure 6. **Social dimension of elevator travel, © 2015 design-people (dk) image by design-people (dk)**

When comparing the quantitative results of the experiment we could see that trying to guess someone's physical sensations through observation was quite hard. But, guessing their experiences of the elevator design and the way they felt about the social atmosphere was fairly effective. Thus, there is a lot to be said about strengthening our understandings of and empathy for the social dimension of design.

As a result of this **long and multi-layered research process** which combined studies with meetings, workshops and seminars, **five concept designs** were resolved. These designs, which are applicable to several cultural contexts, were developed in response to the rich results available. The designs were tried and tested in **workshop situations**, with members of KONE Oyj elevator's design team and other interest groups. The designs took users' concerns – primary sources of emotion – and translated them into five user experience concepts for future elevator comfort from the female point of view.

Empathy is about standing in someone else's shoes, feeling with his or her heart, seeing with his or her eyes. Not only is empathy hard to outsource and automate, but it makes the world a better place.

Daniel H. Pink, Author

Read more

KONE. (2015),. Innovating people flow inspired by women – 5 social and emotional user experience concepts presented by KONE. KONE design research 2014 -15.

Rousi, R. (2015),. Consciousness in elevator travel - how technical design characteristics affect self-consciousness [Poster]. Towards a Science of Consciousness Conference, June 9-13, 2015, University of Helsinki, Finland.

Rousi, R. (2014),. Rousi, R. (2014). Unremarkable experiences – designing the user experience of elevators. Swedish Design Research Journal 1 (14), 57-64.

Rousi, R. (2013),. The Experience of No Experience: Elevator UX and the Role of Unconscious Experience [Poster]. Academic Mindtrek Conference, October 1-3, 2013, University of Tampere, Finland.

OPEN YOUR SENSES,

STEP INTO THE USER'S SHOES AND SEE THE WORLD THROUGH YOUR CUSTOMERS' EYES

ETHNOGRAPHY IN EMERGING MARKETS
Increasing user and customer understanding

VOICE OF USERS AND CUSTOMERS
Users and customers as innovators

CUSTOMER TOUCHPOINTS
Opportunities for engagement

LOGGED USAGE DATA
Benefits for supplier and customer

UX SENSORS
Understanding UX of complex systems

Open your senses, step into the user's shoes and see the world through your customers' eyes

Introduction: The most important thing related to experience-driven business is empathy. Empathy is about opening your senses and heart to others and seeing the world as they see it, and feeling what they feel. Field studies are needed to understand users and customers thoroughly. To understand global customers and users, you need efficient ethnographic studies. But merely observing users and customers is not enough; you also need to be interactive to hear their voice. A company and its customers have several touch points. It is beneficial to understand what kinds of experiences customers have and what they expect at each touch point. Logging usage data can further help in understanding how people use your systems, where the pain points are and how the user and customer experience could be improved. Gaining deep and empathic understanding of users and customers requires different methods and engages different actors. Building and sharing an understanding within the organization is the basis for defining the kind of experiences valued by users and customers.

HELI VÄÄTÄJÄ, TAMPERE UNIVERSITY OF TECHNOLOGY
JAAKKO HAGGRÉN, KONECRANES

Increasing user and customer understanding through rapid ethnography in emerging markets

Rapid ethnography enables us to gain an in-depth understanding of customers and end-users as well as the business of the customers and the local market. A new approach was developed and trialled for company R&D purposes at Konecranes during the FIMECC UXUS programme.

Field studies using an ethnographic approach at customer sites in emerging markets support new innovations in R&D and provide information for new business opportunities.

The initial motivation of Konecranes to start ethnographic field studies in emerging markets was to get information to support R&D activities. The goal was to gain a clear understanding about what to design and who to design for. Information about the customer also enables the supplier to direct the right products at the right customer. Further, it was also noticed that the information could be used in business development. This calls for transferring the knowledge gained into a form that can be used by other business units and sharing the information with them.

Field studies provide several opportunities for increased understanding. The motivations for the supplier to carry them out included 1) understanding what the company does and what future customer needs are in certain customer segments in new growing markets, 2) providing structured information about customer needs, 3) giving support to the product and technology strategy, 4) enabling new innovations and new business opportunities based on the knowledge gained, 5) understanding what the business drivers are for the customers, 6) identifying who are the non-customers, 7) identifying what

are the needs/opportunities for certain customer segments, and 8) identifying what are the challenges that customers face in their processes.

Customer visits provide richer information by enabling an understanding of a customer's business and what a user is doing and why, and not simply focusing on how the product or system is used.

The field study at the customer site includes four types of information collection. Interviews are used to get an overview of the company being visited and to understand their context. Interviews are also used to get information about the roles of persons and users who are met during the visit. Observations provide information about the context in which a supplier's products and systems are used and how it is connected to the customer's business. In addition, observations are used to get an overview of the machines and equipment used at the customer company. Furthermore, photos and video clips are recorded, when given permission, to capture the context of use to be used in later phases, visualize, and remind about the visited environment.

An intensive field study agenda together with a structured format for reporting results enables efficient work in the field.

When visiting customers in an emerging market, four to six customer visits are planned to cover the analysis of a customer segment. Approximately 10–15 visits are needed for a new market segment or market area analysis. One to three teams with two to four persons each conduct the visits. One visit is done by one team per day. The data gathered are analysed in the field after every two to three field days. The local team is included after the last field days. Analysis of the data takes from one to two days per single field day (one customer company).

The results are reported with a structured format:

- what the company does (overview),
- what is important (summary and key insights),
- profile of the interviewed persons (roles and their goals, what is the decision making process and their perceptions of the supplier's products)
- model of the acquisition process

Interview notes are taken by hand and sometimes audio recording is used. Video recording and photographing is used for taking notes about the context when possible and where needed. Videos are used to go through interesting points later. An affinity wall is used for the data analysis. A storyline is written to capture the interesting findings.

A joint discussion among the field teams is carried out regarding the company visits to identify the most important things found – including the similarities and differences between cases.

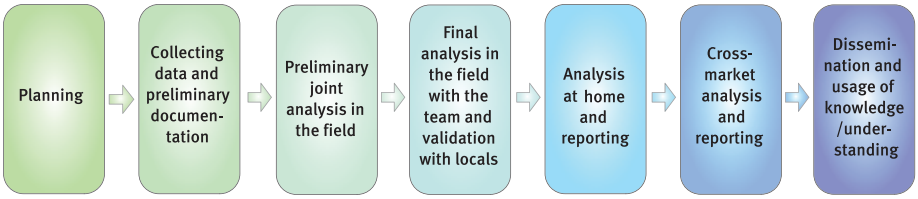

Figure 1. **The field study process from planning to knowledge transfer within a supplier company.**

After field work, a cross-segment or market-area analysis is carried out to identify patterns, similarities and differences and to disseminate tacit knowledge gained to any relevant stakeholders in the supplier company in an appropriate form.

The results of the field studies are first analysed. An executive summary of the field study's key findings is made in a form of Power Point slides. Then other cases from different segments and regions or market areas are included in the analysis and a comparison is made. In disseminating the results, possible stakeholders within the supplier that could utilize the results need to be identified. The type, format and channel used for communicating the knowledge gained needs to be considered when disseminating the results to different stakeholder groups.

LAURA KANTO AND **JUSSI PIHLAJAMAA**
AALTO UNIVERSITY

Managing the voice of users and customers in an industrial manufacturer's innovation process

Users and customers are a crucial source of information for all product and service innovators. Making use of user and customer knowledge is challenging, because the knowledge held by users is often tacit in nature and difficult to share. Therefore, organizational knowledge about management practices may fail to capture insights from users. A lot of different kinds of knowledge are gained in several ways from the user and customer interface. The means for disseminating knowledge that is relevant to actors in the organization as well as how best to use that knowledge have been recognized as problematic in industrial companies. The current tools and management practices used in industrial operations do not truly support the utilization of user and customer knowledge.

Case study: In the FIMECC UXUS programme our case study at Ruukki shed light on the management of "the voice of customers" by investigating the purposes of gathering information on the user and customer in industrial operations, the ways that knowledge is utilized by an industrial product and service manufacturer, and the challenges of making effective use of user and customer knowledge in the B2B context. Two different practices – mystery shopping and end-user interviews – were tested as user and customer knowledge gathering tools for innovation processes. Mystery shopping was found to be a powerful tool to gather information about a user's world by overcoming the dealer interface. It was a structured way to bring user-based knowledge directly into the service innovation process. End-user interviews on the other hand were found to be problematic. There is a need to plan the interviews thoroughly and the weak signals are the ones that might only be found by analyzing the interviews thoroughly.

Representatives for organizational functions within Ruukki's organization were also interviewed to study how user and customer knowledge was perceived by different actors.

The case findings highlight that the key challenges in making use of user and customer knowledge are that the users and providers may give different meanings to experience-based knowledge. The case study results support the previous finding that in order to integrate users' context-specific knowledge and situational experiences in the innovation process, there should be interaction between the innovators and the users throughout the different phases of the innovation process. Moreover, the variety, velocity and volume of user knowledge call for advanced knowledge management practices to support the innovation process. Innovators need efficient cross-functional collaboration and interaction among business departments to have the relevant knowledge when and where it is needed.

Read more:

Mystery shopping as a part of a service innovation process Kanto, Laura; Pihlajamaa, Jussi. ISPIM Conference Proceedings: 1-8. Manchester: The International Society for Professional Innovation Management (ISPIM). (2013)

OPEN YOUR SENSES, STEP INTO THE USER'S SHOES AND SEE THE WORLD THROUGH YOUR CUSTOMERS' EYES

3

VIRPI ROTO, **NETTA KORHONEN**, **ELINA HILDÉN**, **YUE HU**
AALTO UNIVERSITY
HANNA-RIIKKA SUNDBERG, **MARKO SEPPÄNEN**
TAMPERE UNIVERSITY OF TECHNOLOGY
HARRI NIEMINEN, FASTEMS

Touchpoints – opportunities for engagement

The FIMECC UXUS programme started with a focus on usability and user experience of products. However, we realized that we can and should provide good experiences at all touchpoints between the company and its external stakeholders, not only with products. Each touchpoint is an opportunity to improve customer engagement.

Several UXUS companies have started to map their touchpoints and customer journeys, which has been an eye-opening exercise. What differentiates the UXUS customer journey mapping from traditional customer journey mapping is the investigation of experiences at each touchpoint, instead of just listing the touchpoints. UXUS researchers have studied both internal and external stakeholders and collected touchpoint experiences, using different tools. In Fastems, more than 200 touchpoints were identified. In Konecranes, the focus of touchpoint identification was narrowed down to the preventive maintenance service of cranes. In Rolls-Royce, the customer journey mapping focused on the sales and delivery process of thrusters.

A customer touchpoint can be defined as *"points of human, product, service, communication, spatial and electronic interaction"* that together make up the interface between a customer and a company. Examples of customer touchpoints include emails, brochures, phone calls, software interfaces, contracts, personnel, and products.

Customer journey is *"the sequence of events – whether designed or not – that customers go through to learn about, purchase and interact with company offerings – including commodities, goods, services or experiences"*. The customer journey is described from the customer perspective, including external actors, as well as focusing on a specific service encounter or giving an overview of a longer process.

Figure 2. **Customer touchpoint identification workshop at Fastems**

Companies can co-ordinate a good customer journey by managing the touchpoints in a manner that they collectively meet or exceed people's emotional needs and expectations. Managing a good customer journey is, however, not all about improving customer touchpoints. It also includes finding out the root causes of problems and the broader reasons for negative feedback.

The process for identifying and evaluating customer touchpoints can be easily used in any company. One way to start, as we did in Fastems, is to organize an internal workshop for touchpoint and business process identification with post-it notes. With rough illustrations of customer journeys, interview your customer companies for possibly missing touchpoints and evaluate your company's performance at different touchpoints. The key is to find the touchpoints that are important and valuable for your customers and to understand how to overcome possible obstacles in increasing your company's performance at these touchpoints. The performance is not evaluated in a vacuum but against the firm's competitors' performance – sometimes performing at an average level is good enough to beat the rivals in the eyes of the customers.

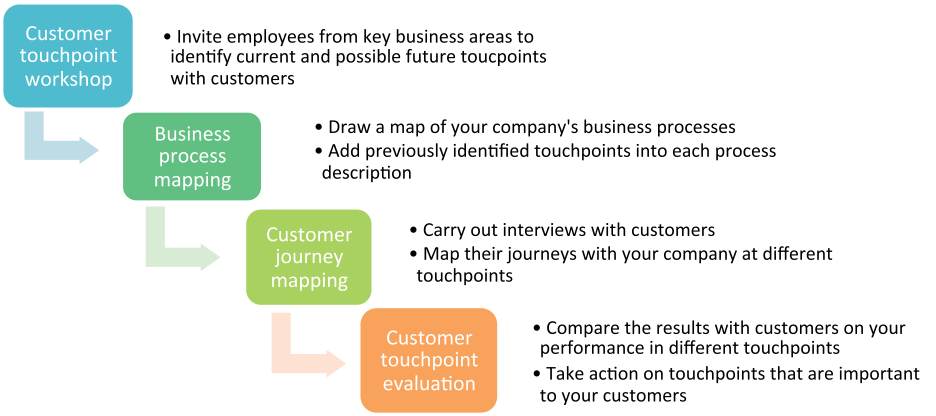

Figure 3. **Process for identifying and evaluating customer touchpoints in Fastems**

Experience-focused customer journey mapping means tracking and describing of customer's experiences with a company's services. Understanding the key moments of the customer journey will help in understanding the customers' needs and experiences. This, in turn, helps the company to better manage their resource and revenue allocation, value proposition, channels, and cost structure. In Fastems case, the customer journey was depicted starting from need-recognition and ending up with the use of products and services.

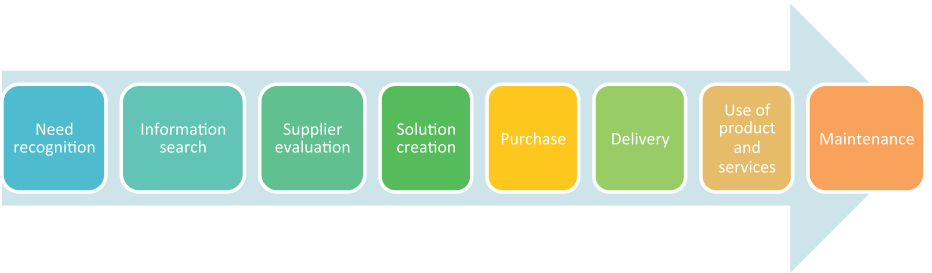

Figure 4. **An overview of the customer journey in the Fastems case**

The customer journey mapping template used in the **Rolls-Royce** case consists of empty slots for each step in the customer journey, and post-it notes of different colours to describe the action taken at each step. The vertical location of the post-it communicates customer's experience of the action, and the interface cards related to the step are attached below.

Figure 5. **Customer journey mapping at Rolls-Royce**

In the Konecranes case, the objective was to map the customer journey and touchpoints for preventive maintenance for the customer and to study how to evaluate the current customer experience of service touchpoints. As services are becoming digitalized, the goal of the study was also to understand how the digital touchpoints affect the overall experience and the customer journey.

First, the service process and the touchpoints were mapped as internal actions from Konecranes point of view, then from the perspective of the customer, through in-depth interviews. Interviews were supported with Service-Step -cards specifically developed for this study to understand complex customer journeys. The outcomes of the study provided Konecranes with visualized, experience-focused customer data to support and inspire the service development, and to aid discovery of improvement opportunity areas with possible experience goals.

In the Konecranes case, Service-step cards were created to support mapping the customer journey during interviews. Here, the interview assistant writes notes on cards as the interviewee is talking. The cards helped to see how the steps and touchpoints relate to the customer's own events. Cards also supported discussing the customers' experiences in each step.

The findings of Konecranes touchpoint study were presented on posters to Konecranes service developers. Visualization of detailed

customer journeys communicated the differences between different types of customers as well as how customers experienced each touchpoint. Visualizations also highlighted the opportunity areas to improve customer experience.

Figure 6. **Customer journey mapping at Konecranes**

A qualitative study like this can provide deeper understanding of what customers value, compared to questionnaires that measure customer satisfaction. It can also point out opportunity areas for designing better experiences. The approaches used were seen as a great way to promote the customer experience perspective in the service development, and the developers were interested in applying similar approaches and methods in their own work and in further projects.

As a summary, touchpoint identification and classification provides clarity to the jungle of interfaces between a company and its customers. A customer journey map reveals the customer's perspective on a service process by visualizing the typical steps the customer takes along a service process. In the above, three different formats of customer journey mapping are presented, as each one tackles the customer journey at a different level of detail. The special aspect to customer journey mapping in UXUS was the focus on customer's experience at each step. This approach opens new attractive opportunities in how to manifest the competitive advantage.

Understanding not only the utilitarian but also the experiential needs along the customer journey is the key to seizing the opportunity of customer engagement at each touchpoint.

Read more:

Muilu, A. (2015). Customer Touchpoint Mapping in a B2B Context. Master of Science Thesis, Tampere University of Technology, 78 pages.

Korhonen, N. (2015). Making sense of complex stories – Experience-focused customer journey mapping for industrial services. Master of Arts Thesis, Aalto University.

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Benefits for supplier and customer with the help of logged usage data

Visual analytics of logged usage data based on end-user interactions can increase understanding of user experience and system use. This in turn can support continuous development, technology renewal and service development that enhances the end-user's experience, as well as create competitive advantage.

The use of logged usage data in R&D can lead to better user experience

Studies using logged usage-data started in FIMECC UXUS in 2014 in the three case companies – Fastems, Valmet Automation, and Rolls-Royce – because R&D needed information on how end-users used their systems. Earlier, the source of information on system usage was field studies carried out in the customer companies. By means of the UX data collection the focus of field studies can be moved from the traditional **how the system is used** approach to the next level of studying **why system is used in the way it is**. The understanding gained of how users use the system based on logged usage data is therefore expected to give a strong background to the more focused user studies carried out in the field. Suppliers expect that the implementation of field studies can become more efficient by focusing directly on the reasons behind the identified behavioural patterns, instead of focusing firstly on the how.

Suppliers expect that information provided by analysis and the visualization of usage logs can benefit system developers, user interface (UI) designers, as well as UX designers. By understanding how users use the system in real-life, it is possible to develop solutions that fit better to the workflow, alternative ways of using or interacting with the system can be supported and created, enabling the development of novel innovative features.

Logged usage data can be used to create and provide novel and customized services for the customer

Maintenance services are one of the key services offered to customer companies currently. For the business of the customer company, the minimum amount of downtime of systems is of importance, for example. Using logged usage data in supplier's processes creates new opportunities for customized services. Based on identifying usage patterns and feature use, customized training could be offered to the customer.

Visual analytics tools for logged usage data are expected to provide insights that support creation and provision of novel and enhanced services. These include development of novel reactive and proactive services for maintenance, as well as support for developing teleservice activities and related services. Furthermore, life-cycle-related services, including system update services that are connected to technology renewal, were raised as a promising opportunity. Furthermore, Logged usage data can reveal when certain features potentially useful to the customer company are not being used, or the system properties are used inefficiently; here the supplier could offer customized training services to support the customers as well as end-users in system use.

Access to logged usage data needs agreement with and permission from the customer

In the case of complex industrial systems, the data collected by system instrumentation, including user interactions and sensor measurements, are often "owned" by the customer. Customers can be protective towards sharing this data as well as generally about granting access to their production systems, as it may reveal information about their production and processes. However, the willingness to share logged usage data varies depending on the supplier and customer as well as on the purpose of use and the benefit that the customer gets from this data. For example, if service agreements provide predictive maintenance and therefore are of clear benefit to the customer in terms of decreased downtime, access to data is more easily granted. Fault situations are another typical situation for granting access to logged data. On the other hand, using the same data for R&D purposes may need a separate permission from the customer and the agreements on the purposes of use need to be explained by the supplier.

To gain access to customer data, customers need to see value in sharing the logged usage data. Building the value proposition and its communication helps when expressing the value of sharing the data to the customer. Trust between the customer and supplier is needed, and secure solutions for data access and transfer need to be available.

Through UX data collection the focus of field studies can be moved from the traditional how system is used to the next level to study why system is used in the way it is.

Iiro Lindborg , Rolls-Royce Marine

Read more:

Väätäjä, H., Heimonen, T., Tiitinen, K., Hakulinen, J., & Turunen, M. Usage Data Analytics of Complex Industrial Systems – Opportunities and Needs. In Proc. ISPIM Innovation Summit 2015, Brisbane, Australia.

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UX sensors – Understanding the UX of complex systems through usage analysis

UX metrics are used as an integral part of B2C service development. Concepts such as usability, customer loyalty, brand perception, engagement and more can be tracked by using a mix of behavioural and attitudinal measures. By tracking usage of their services, developers attempt to understand where the pain points are and what the reasons for customer dissatisfaction might be. Tracking enables a real-time conception of what is going on at the customer's end and how the product or service is being used.

In FIMECC UXUS, TAUCHI (University of Tampere), the Tampere University of Technology and the University of Jyväskylä have worked on a number of company cases focused on bringing similar usage data analytics into the complex systems context. The core approach is to instrument existing user interfaces and other system components to collect data on users' interactions.

During our work, we have developed a model that characterizes the process of acquiring insights from the usage data of complex industrial systems. The model has four stages, which can be repeated iteratively to find the optimal fine-tunings for different stages: 1) Data collection, 2) Data transformation, 3) Data analysis, and 4) Visualization and exploration. Figure 7 shows an example of the fourth and final stage.

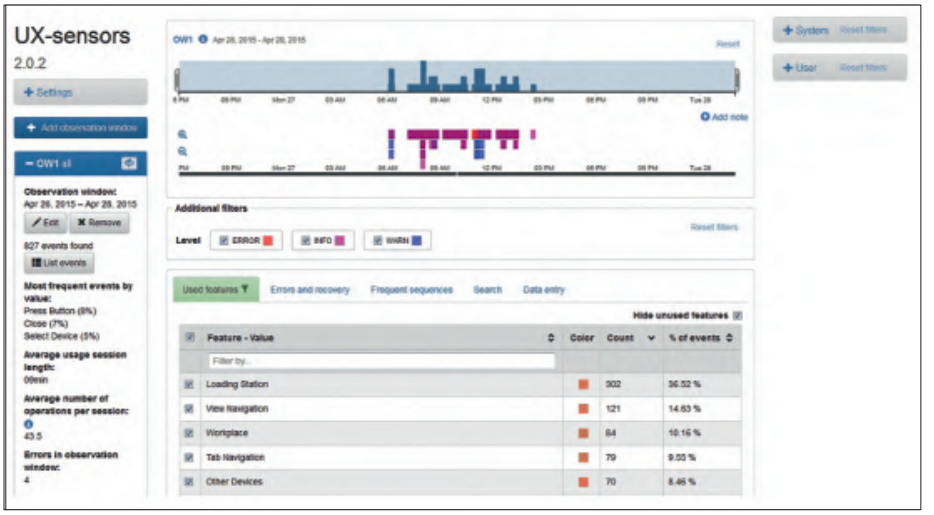

Figure 7. **An interactive graphical user interface displaying the event data that has gone through the first three stages, i.e., collection, transformation and analysis. The tool allows different kinds of filtering and exploration of the data.**

Logging everything is not the (only) answer

Although it can be tempting to add usage logging into every single facet of the system, it is not always possible due to a lack of resources or the complexity of the system, nor is it necessarily advisable if it would negatively impact the performance of the system. The key takeaway here is to plan and decide which features of the system are tracked and ensure that adequate contextual information is also captured, so that the findings can later be connected to related real world events. What are the key features and events that should be tracked depends on the context and the purpose of the final outcome, but also on the needs of the end user: What kind of decisions or actions he or she needs to be able to do based on the data provided?

Data analysis is messy – adaptive tools for wrestling with data are needed

One of the realities of usage data analysis is that data come in different shapes and forms from different systems – it can be impossible to institute a common format across different systems. What we have found is that it is more important to build and maintain adequate tools for wrestling the incoming data into a format that can be easily and efficiently analyzed. Rather than building a monolithic system that is difficult to change and manage, consider building a pipeline of specialized modules that can be plugged together to achieve the desired transformations. Ultimately, no matter the origin, the processed data should be in a unified format that can be fed into the visualization and exploration interface.

Thousands of rows or an interactive dashboard – making sense of usage data

It is not uncommon for developers and analysts to work with worksheets and raw log files in an attempt to discover the problems faced by the customer. We believe that it is worth the effort to build a modular and adaptable analytics interface that can assist in this work – not unlike what Google Analytics offers for understanding Web users' behaviour. Showing the most commonly used features, the most common errors and how the users move past them, and providing tools for searching for expected behaviours is the bread and butter of such interfaces.

Furthermore, machine learning and data mining techniques can be utilized as one means of uncovering recurring behavioural patterns, trends and anomalies from the usage data. These can be informative in understanding how the system use changes over time, where the bottlenecks lie and how to address them.

Ultimately, while such insights are critical for the development of successful systems, the process does not end there. It is also important to reflect on the analysis process and go back to square one to rethink the data collection, transformation, and analysis and visualization stages if necessary. Indeed, it may be worthwhile to log the usage of the data analytics tools themselves in order to understand where the development needs to be and ensure the logged data are turned into actionable insights as easily and efficiently as possible.

UX journey

ROLLS-ROYCE

IIRO LINDBORG, ROLLS-ROYCE OY AB

Rolls-Royce UX journey

Rolls-Royce embarked on the FIMECC UXUS journey after the program had been already running for a year. The journey has certainly been worthwhile. In Figure 1 you will find where our discoveries in UXUS have taken us.

Our first case was the **future bridge operator experience concepts** (oX) which took us into the bridge of a vessel in 2025. In the oX pre-studies we spent time analysing worldwide trends, looking at how different vessels are operated and where we could see gaps in technologies that we could address and how we could make the operation a better experience for the crew on vessels. We also investigated in detail the challenges the crew's face today on the bridge. The key to our concepts was the stories we built for them. They made it easy to explain the concepts and the ideas contained in them to our customers when we evaluated them. In addition to the different operation concepts created, a new kind of approach to user experience-based concept design innovations was created as part of this case. This method is explained in detail in the *InnoLeap chapter (page 139)*.

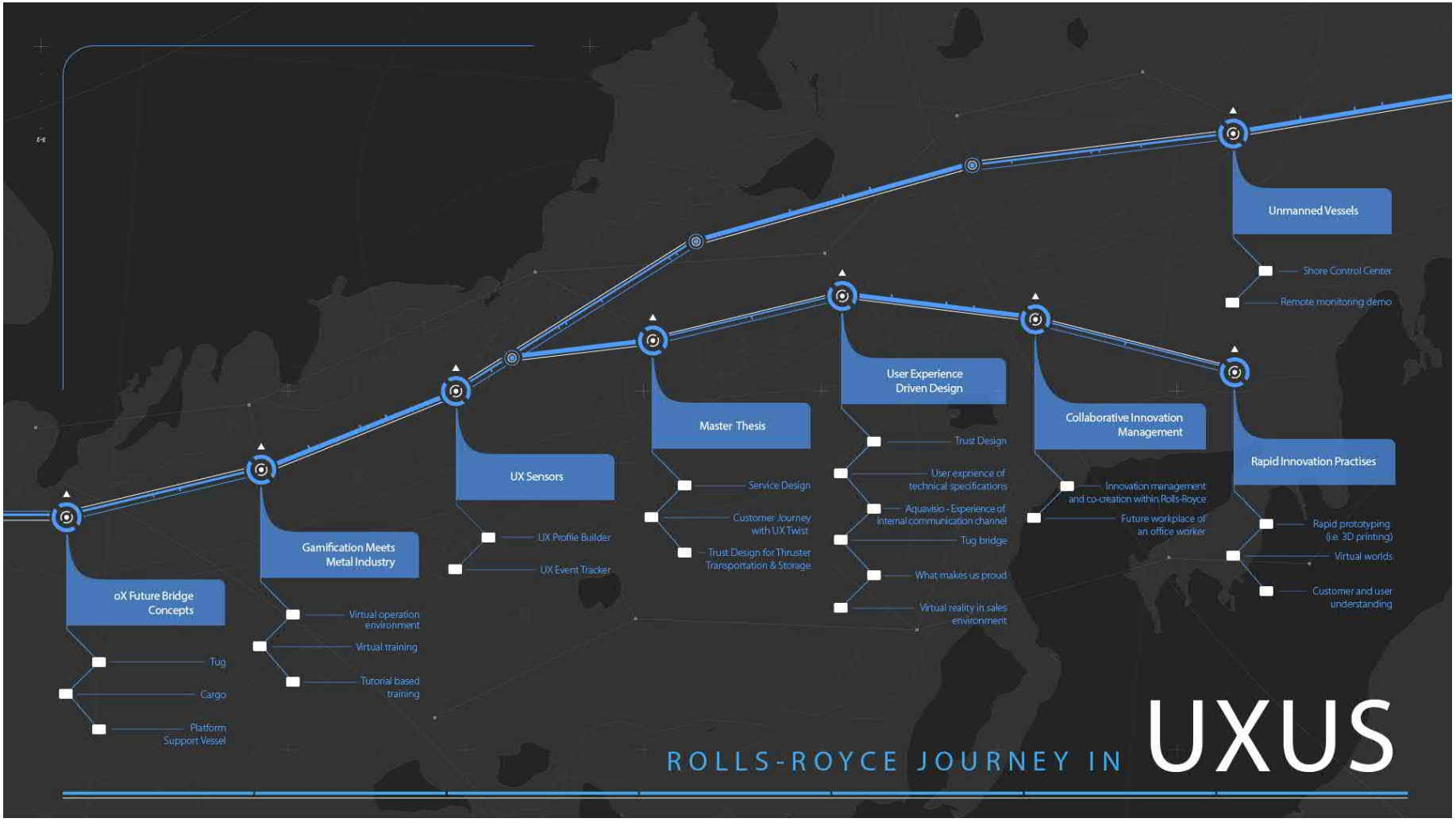

Figure 1. **Rolls-Royce journey in UXUS**

Our second case took us close to the gaming industry. We wanted to make equipment and vessel training as easy as possible through virtual training. In many games today you can see that the player needs to pass a specific training tutorial before they are able to play the game. We wanted to take this approach into the metal industry training and we created a virtual training environment for tugs that can be used to train captains in how to use their own vessel's features with their own equipment on their own virtual bridge. In the project we studied which features from our current captain's training could be made virtual and then implemented those into a virtual environment using a gaming simulator engine.

Our third case took us into the world of user behaviour studies. In **UX sensors**, we are looking at generating a system to collect user understanding from our systems so that we can focus our future research themes away from what is done onboard vessels to why certain sequences of events are carried out.

Our fourth main case took us even further into the future. In our **unmanned vessel** case we were looking at the user experience of unmanned vessels from the perspective of remote monitoring. There multiple challenges appear when an operator is taken away from the sea environment into a safe office environment and in this case we have been looking at the challenges that change brings and solutions to those challenges. This work will be continued on a separate TEKES-funded program called Advanced Autonomous Waterbourne Applications (AAWA).

In addition to our main cases we carried out multiple cases in **collaboration with students** from different schools. In a user-experience driven design course with Aalto University of Arts we had student projects that varied from trust design to utilizing virtual environments in a sales environment. With the Aalto Innovation Management Institute we studied collaborative innovation management and rapid innovation practices. Topics included for example utilizing co-creation inside an organization to enhance innovation and using 3D printing as part of product development. We have also been lucky enough to employ people to do Master's thesis work for us in the UXUS program. In this thesis work, we have looked at service design, our product packaging, and the user experience of our products throughout its lifecycle.

This four-year journey in the FIMECC UXUS program **has enforced our position in the maritime domain as the thought and innovation leader** and many if not all of these cases would not have happened if the FIMECC SHOK program would have not existed.

USER EXPERIENCE
AS A GUIDING STAR IN DESIGN AND INNOVATION

User experience as a guiding star in design and innovation

Introduction: To design for user experience (UX), there should be a clear idea of the targeted user experience. How is using the product/service/system supposed to feel like? In the FIMECC UXUS programme we have developed a design approach based on defining a concrete UX vision and further UX goals. The core of the UX goal definition is an in-depth shared understanding of the user's work and its objectives. Once designers gain an empathic understanding of the users' world, they can step into the user's shoes and understand how to best support users' work by technological means. In this section we first discuss experience design in general. Then we describe two UXUS company cases of UX-driven design: Developing a new remote operation concept with Konecranes and designing a paper quality control system with Valmet Automation. UXUS case studies have shown that user experience can also be the driving force for radical innovations, producing inspiring and credible concepts of future work environments. With Rolls-Royce case we illustrate how these future concepts facilitate shaping the future with customers and other stakeholders.

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User experience goals as design guides

"Superior UX" or "Wow" is often set as the goal of product development, but it is too vague a starting point for design. To design for the best possible UX, you need clear, concise and focused UX goals. UX goals describe the kinds of experiences your product, service or system should evoke in the users.

User experience as the guiding star in design

User experience (UX) at work is the way a person feels about using a product, service or a system in a work context, and how this shapes the image of oneself as a professional. With experience design you can facilitate a certain kind of experience that you would like the users to have. In the FIMECC UXUS programme, we have learned that it is beneficial to define a vision of the targeted user experience. A UX vision reflects the overall experience that the design team wants to facilitate for the user. Sharing the UX vision inside the organization helps in committing the design team and keeping the user point of view in everybody's mind throughout the design and development project. In this way, the UX vision can act as a guiding star during the design process and even beyond.

User experience is built-in rather than an add-on – after the product or system has been designed, there may not be much room for improving the user experience. Therefore, it is important to consider user experience already from the very beginning of the design work.

UX goals as a strategic design decision

A UX vision can be further elaborated into user experience goals that reflect an in-depth, empathic understanding of users and their work. UX goals are based on a thorough understanding of what the users want to achieve in their work, and how this could best be supported.

User experience goals often lead to specific design implications and technical requirements for the technology under development.

UX goals have to be appropriate for the target context of use. To truly engage users, the goals have to be in line with the brand experience and they also need to be meaningful for the users. In the design of industrial systems, several stakeholders can be involved and they should all share the common design goals. Combining different UX goal setting approaches brings in the viewpoints of different stakeholders. In this way, the stakeholders are also committed to UX goal setting and UX becomes a strategic design decision.

Insight and inspiration for UX goal setting can be found from various viewpoints

We have identified five different approaches to setting UX goals (Figure 1):

1) Company or brand image (Brand)
2) Scientific understanding of human beings (Theory)
3) Empathic understanding of the users' world (Empathy)
4) Possibilities and challenges of a new technology (Technology)
5) Reasons for product existence and envisioning renewal (Vision)

The approaches contribute to setting UX goals as described in Table 1

Figure 1. **Successful UX-goal setting combines different approaches (A glimpse of user experience for B2B industry – Issue 2)**

In UXUS design cases, we chose a set of 2–7 UX goals, which kept the design work focused. In Figure 2 we have some examples of UX vision and goals from UXUS case studies: Konecranes Remote

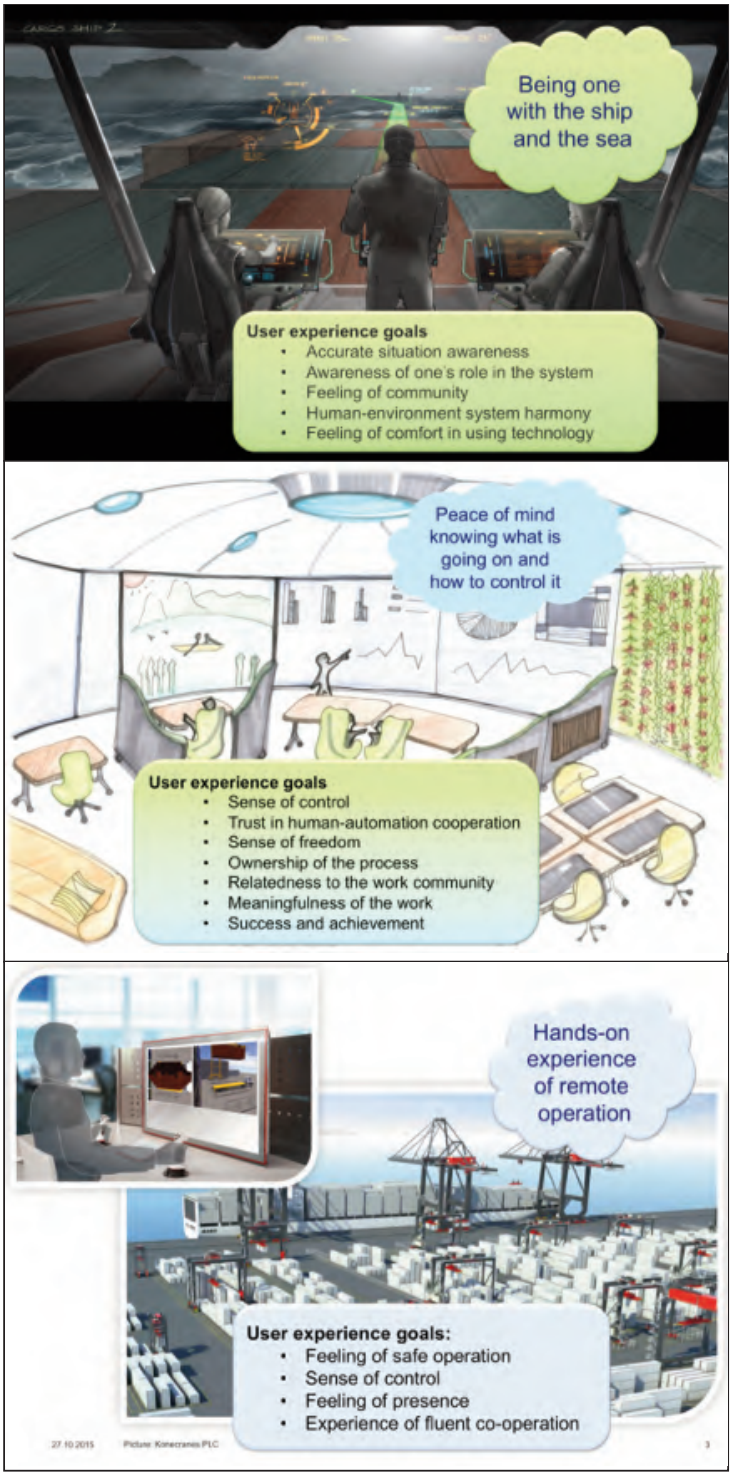

Figure 2. **Examples of UX vision and UX goals from UXUS case studies with Konecranes, Valmet Automation and Rolls-Royce**

Operator Station; Valmet Automation Future Control room and Rolls-Royce Future Ship Bridge Operations.

As the design process proceeds, the UX goals should be defined at a more specific level, such that they can be interpreted in terms of the design implications. During the later design phases, each design solution can then be traced back to the originally defined UX goals.

Table 1. **Contribution of the different approaches to setting UX goals**

Approach	Contribution to setting UX goals
Brand	A high-level UX vision to unite products under the same brand
Theory	A collection of possible UX goals to choose from
Empathy	A mindset focusing on the users' world
Technology	UX possibilities and UX challenges raised by a technical enabler
Vision	Getting rid of fixations on familiar solutions, inspiration from other domains

Ensuring the influence of UX goals

User experience goals should be communicated to the whole design team and other stakeholders, who should commit to the goals. The goals are then interpreted into design implications for the design process. User experience goals are not the only goals guiding the design, and there may be other goals from other parts of the organization regarding maintenance, price, compatibility, and so on. In practice, UX goals need to be integrated with these other goals, in order to ensure that there are no conflicts.

Concrete UX goals are especially useful in industrial contexts, where various stakeholders need to agree on what to design. Without clear UX goals, user experience is easily left as a good intention without any concrete influence. Shared UX goals among all stakeholders ensure that all who contribute to the design process have a clear conception of the targeted experience, and can make design decisions accordingly. In the design of industrial systems, the concrete UX goals help in keeping user experience in focus throughout the complex, multidisciplinary product development and marketing processes.

Read more:

Kaasinen, E., Roto, V., Hakulinen, J., Heimonen, T., Jokinen, J. P.P., Karvonen, H., Keskinen, T., Koskinen, H., Lu, Y., Saariluoma, P., Tokkonen, H., & Turunen, M.. (2015) Defining user experience goals to guide the design of industrial systems. Behaviour and Information Technology 34(10), pp. 976-991, Taylor & Francis (2015).

Kaasinen, E., Karvonen, H., Lu, Y., Varsaluoma, J. & Väätäjä, H. (2015). The Fuzzy Front End of Experience Design. Workshop Proceedings. VTT Technology 209.

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Getting started with the experience design process

A shared vision of the targeted user experience and further user experience goals are required when designing for experiences. To achieve this, the design process should start with an experience-goals elicitation process where all relevant stakeholders together prioritize and choose the target experience goals. In the subsequent evaluation, appropriate metrics are needed to ensure that the targeted experiences are realized.

Understanding the users' world is the main source of inspiration when setting experiences to aim for

The beginning of an experience design process can be "fuzzy", when the targeted product or service is not yet decided and making changes to the target result is still inexpensive. As described in the previous section, in the FIMECC UXUS programme we identified five approaches to gaining insight and inspiration for UX-goal setting: Brand, Theory, Empathy, Technology and Vision (Kaasinen et al., 2015).

We conducted surveys regarding nine different experience design projects (Varsaluoma et al., 2015) and found out that empathic understanding of the users' world was the most used source for insight when defining experience goals (7/9 studied design cases). However, vision, theory, technology and brand were also relevant sources in many design cases (each used in at least three cases).

Share and iterate experience goals with stakeholders in order to achieve a shared view of the target UX

It is important that the whole development team is aware of the experience goals that are targeted with the final product. Experience goals are usually described in a written format, e.g. "feeling of efficiency", "ease of use" or "ownership". However, as the design process advances it can be beneficial to use alternative methods to communicate the target experiences with stakeholders, such as moodboards, personas or scenarios. This can make it easier for the whole development team to grasp what the end user is supposed to experience when using your product.

Based on our findings from nine experience design cases, we propose a model to summarize the first steps of the experience design process (Figure 3). The model includes examples of the approaches for processing information, e.g. brainstorming sessions with stakeholders in order to define and choose the target experience goals. The model also gives examples of different methods used to communicate experience goals to various stakeholders in order to receive feedback to iterate the goals further.

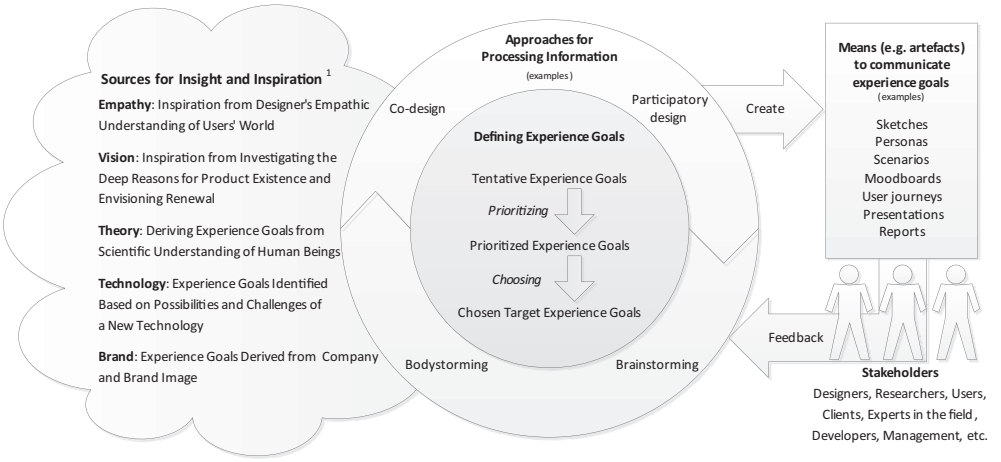

Figure 3. **Initial model for an Experience Goals Elicitation Process.[1] Kaasinen et al. (2015).**

Instructions for defining and evaluating experience goals

We summarized our learning regarding the defining and evaluating of experience goals into a set of instructions as presented in Table 2. An important step after the product has been developed (e.g. to a prototype level), is to test if the target experiences were achieved or not. This can be done with different approaches, for example, via user testing, interviews, or surveys.

Table 2. **Instructions for defining and evaluating experience goals.[2] Väätäjä et al. (2012).[3] Karvonen et al. (2012) and Karvonen et al. (2014)**

Instructions for defining and evaluating experience goals	
Defining Experience Goals	1. Use/choose methods and means to describe experience goals so that all stakeholders can create a shared and similar understanding. 2. Consider possible user requirements connected with the experience goals. You can also describe emotions or feelings it is hoped the user will experience. 3. Describe goals precisely enough to make them actionable for designers in the design process. Describe also the reasoning behind the goals (why) as designers need to select the proper means for conveying (how) the experience (what). 4. Prioritize the experience goals to aim for and choose goals that can realistically be achieved (or at least targeted).
Communicating Experience Goals	5. Plan what means (e.g. artefacts) to use to communicate the experience goals to stakeholders. 6. Iterate the goals as you learn more throughout the design process. Revise what deliverables to use if you find better ways of communicating.
Evaluating Experience Goals	7. If experience is measured, operationalize the experience goals and select appropriate (qualitative) metrics for evaluation.[2] 8. Plan how to trace the later design solutions back to experience goals so that it is possible to evaluate the fulfilment of the goals in different phases of the design work.[3]

Read more:

Kaasinen, E., Karvonen, H., Lu, Y., Varsaluoma, J. & Väätäjä, H. (2015), The Fuzzy Front End of Experience Design. NordiCHI2014 Workshop Proceedings. VTT Technical Research Centre of Finland Ltd. http://www.vtt.fi/inf/pdf/technology/2015/T209.pdf.

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Varsaluoma, J., Väätäjä, H., Kaasinen, E., Karvonen, H., & Lu, Y. (2015), The Fuzzy Front End of Experience Design: Eliciting and Communicating Experience Goals. Accepted to OzCHI'15.

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User experience in remote operation

We studied how to enhance remote operators' user experience during container crane operation and built a functional prototype, which was evaluated with users. UX goals (see detailed information in Kaasinen et al., 2015) were found to be a powerful way of keeping the user experience in focus during the project.

Usage of remote operation is increasing

In remote operation, a machine is operated from a distant location in which there is no direct human sensory contact with the machine. In today's remote operation solutions, the human operator depends for example on video camera feeds, sensors, and other technical means to receive information about the remotely operated machine and its environment. Remote operation is utilized especially in hazardous and safety-critical environments to improve for example the human operator's safety and the economic efficiency of the work. Examples of current application domains range from mining to space operations. In this FIMECC UXUS case from Konecranes, we focused on remote container handling with cranes in ports.

Creating an experience of hands-on remote operation

The aim of the case was to develop a new remote operator station (ROS) user interface (UI) concept for the operation of semi-automated container cranes. ROSs are used to operate the cranes manually from a remote office environment during loading and unloading of external road trucks and other types of chassis in the landside loading zone (see the fenced area in the mid-right-hand side of Figure 4).

Figure 4. **Visualization of a container terminal**

We started the project by familiarizing ourselves with the domain and the crane operation work through a study of the literature. Then, we created an initial and broad set of possible UX goals (for a detailed list of the initial UX goals, please see Koskinen et al., 2013). In order to validate and refine this set of UX goals, we conducted pilot interviews with two domain experts. Based on the pilot interview results, 'sense of control' and 'feeling of presence' were chosen as the main goals to be investigated in the actual field studies.

The field studies (see Karvonen et al., 2012b for a detailed description) were conducted in two international container terminals with altogether 12 crane operators. The studies focused on the analysis of the chosen UX goals and the crane operation work activity. After the field studies, we analysed the gathered data according to the core-task analysis framework and chose the final UX goals to guide the concept design work. The field studies resulted in adding 'feeling of safe operation' and 'experience of fluent co-operation' to the list of UX goals, as the study results obtained highlighted their importance.

UX goals worked as drivers for the design

The main vision for the new ROS was defined to be 'a hands-on experience in remote operation', as we wanted the remote operation with the UI to feel as vivid and safe as if it would be carried out on-site where the crane is located. The final UX goals to fulfil this vision were chosen to be the following (see Table 3):

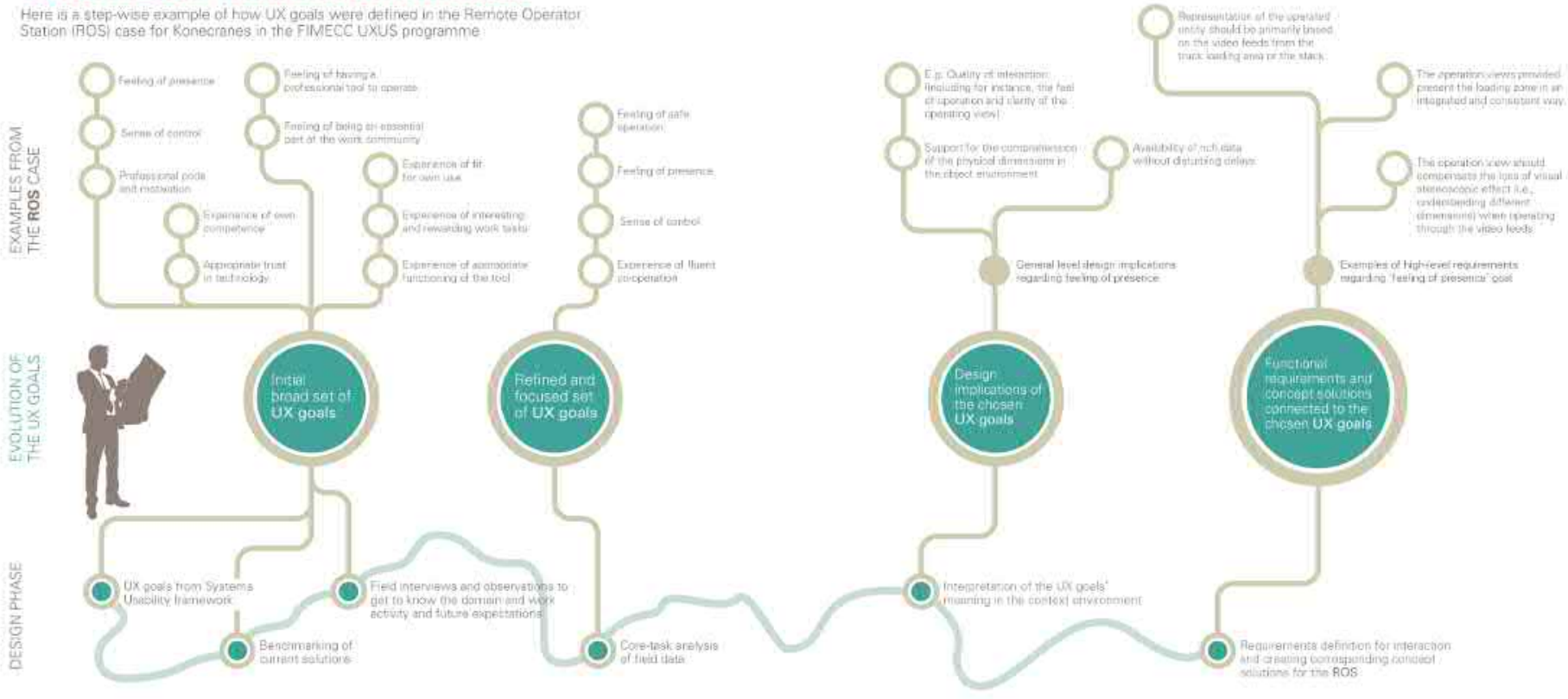

Figure 5. **A visualization of how UX goals were defined and utilized in the design process of the ROS case. (A glimpse of user experience for B2B industry - Issue 2)**

Table 3. **UX goals and their importance in ROS case**

UX goal	Importance in ROS case (i.e., why this goal was chosen)
Feeling of safe operation	The cranes are lifting heavy loads, and human lives can be in danger if something goes wrong.
Sense of control	An accurate sense of control with the ROS is crucial as the operator is not directly in touch with the crane.
Feeling of presence	Although the remote operator is not physically present at the site, (s)he still has to perceive the prevailing conditions in the object environment vividly and at a sufficient level of realism.
Experience of fluent co-operation	The crane operation work is – contrary to our initial conceptions – a very social activity with a great deal of communication between different professionals.

Detailed design implications of the chosen four UX goals were then defined (see the details in Koskinen et al., 2013). Also, 31 user requirements for the ROS UI that were connected to the final UX goals were defined. Furthermore, visualization issues were considered (Karvonen & Koskinen, 2012). Karvonen et al., (2012a) and Koskinen et al., (2013) describe the whole design process in detail. A condensed visualization of the process is presented in Figure 5.

Using virtual-reality prototypes for UX evaluation

As a result, a virtual reality-based prototype system of the ROS (see Figure 6) was built in the project. The prototype was used both in the concept design phase and in an evaluation study. The objectives of this ROS UI evaluation study were both to compare the user experiences of two different user interface concepts and to give feedback on how well the UX goals 'experience of safe operation', 'sense of control', and 'feeling of presence' are fulfilled with the developed ROS prototype. According to the results, the experience of safe operation and feeling of presence were not supported with the current version of the system. However, there was much better support for the fulfilment of the sense of control UX goal in the results. For details about the evaluation study and its analysis, please see Karvonen et al. (2014).

We see that when developing and implementing the final ROS system in later phases of product development, the UX goals and the associated user requirements need to be iteratively evaluated in order to find out how they are met at each stage and what they mean in detail regarding each solution. In the case of this project's end result, more work is needed in supporting the 'experience of safe operation' and 'feeling of presence' UX goals. Furthermore, we suggest that in the future development of the ROS UI , special attention should be paid to the 'experience of fluent co-operation' UX goal, since in our previous study it was not possible to address this goal appropriately.

Figure 6. **Concept illustration of the ROS system © Konecranes**

UX goals-driven design process produced successful results

During the different phases of design, the UX goals worked as the guiding stars for the design process and they were utilized for example, in user-requirements elicitation, concept-level solution implementation, and concept evaluation and testing. In our experience, the UX goals worked as powerful means of ensuring that the design process stayed on its correct course throughout the project.

Regarding UX in remote operation in general, we learned that the operation experience changes considerably compared to on-site operation, since it is not possible to fully take advantage of a human's modalities (e.g., seeing, hearing, and touching) compared to a natural setting when the operator is in direct contact with the environment where the operation happens. Therefore, haptic, auditory and other feedback deteriorates: the remote operator cannot realistically feel and hear what happens within and around the machine one is operating. In addition, as one danger in these types of systems we see the usage of limited (low quality) video feeds as the operators' main view to the object environment: the quality of the video feeds can affect the accurate detection of dangerous events considerably. Based on these findings, we argue that developing remote operation solutions cannot be based on traditional on-the-spot operation requirements and design guidelines.

Remote operation is growing not only in ports, but in a wealth of different application domains. Our work can be seen as one such remote operation project, which proved to be very successful:

The research conducted in the study case led to the development of an ROS that was sold to Lamong Bay Terminal in Surabaya, Indonesia (see the web links below). This was Konecranes' first customer project where the ROS (see Figure 7) was utilized.

Figure 7. **ROS in Lamong Bay Terminal, Surabaya, Indonesia**

EXPERIENCE OF HANDS-ON REMOTE OPERATION
Konecranes Remote Operation case

"The UX-driven concept development in the project was based on field studies and selected UX goals, such as "sense of control" and "feeling of presence". The project provided us with an innovative, yet practical concept for remote crane operation, which aptly responds to its user needs and fits excellently into its context of use."

Johannes Tarkiainen
Industrial design manager Konecranes Oyj

Learn more:

Kaasinen, E., Roto, V., Hakulinen, J., Heimonen, T., Jokinen, J. P., Karvonen, H., Keskinen, T., Koskinen, H., Lu, Y., Saariluoma, P., Tokkonen, H., Turunen, M. (2015), Defining user experience goals to guide the design of industrial systems. Behaviour & Information Technology, 2015; 34(10): pp. 976–991.

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Konecranes in Lamong Bay Terminal Inauguration video:
https://www.youtube.com/watch?v=zG2dn0BhWDU

News article about the inauguration of the new system in Indonesia:
http://www.konecranes.com/resources/media/releases/2015/next-generation-of-automated-container-handling-is-inaugurated-in-surabaya-indonesia

Public site of the Konecranes ROS:
http://www.konecranes.com/equipment/container-handling-cranes/remote-operating-station-ros

PETRI MANNONEN, AALTO UNIVERSITY
HANNA KOSKINEN, **MAIJU AIKALA**, **PAULA SAVIOJA**, VTT
HANNU PAUNONEN, VALMET AUTOMATION
NINA FLINK, TMI NINA FLINK

Enhancing UX goals with instrumental, psychological, and communicative tool functions

"Then when the situation is such that we are close enough to the intended product quality, the control of the measurements and the process is transferred to automation. We let the quality control system take care of it, all the further adjustments and control of the quality variables. And we take a coffee break."

"But that is the kind of system... the one that Perttu just outlined, that it collects and stores information about quite a bit of everything."

"Because it is... I mean because these systems are so integrated, it is a kind of hard to explain, there is this process control system and there is the quality control system but we use them jointly without really noticing the difference between them."

— Operator interviews

Designing for a certain experience while using a tool requires a comprehensive understanding of the supported work. At a general level, it is assumed that a good quality tool supports three tool functions, namely instrumental, psychological, and communicative. Also user experiences can be approached through these functions (see Chapter: *Good, better, and best experiences in process control work*, page 37). Instrumental UX refers to how well the user feels the tool functions in aiding his or her tasks. Psychological UX is about users' feelings about how well the tool fits into his or her tasks, and communicative UX is about the relationship between the values and meaning-making in the work community and the tool.

This article presents an example of utilizing these tool-function characteristics of UX in the design of a paper quality control system. The research involved gaining an understanding of paper quality work and its experiential aspects through interviews and observations, and utilizing this understanding to derive UX goals and design drivers for a new paper quality control system.

UX Design case: paper quality control system

One of the (Valmet) project cases was the development and design of a paper quality control system for a paper mill customer. The starting point for the study was to make a new generation of paper quality control systems that would be innovative not only in its technological base but also from the perspective of how the system caters for the experiential aspects of its use. The concept of a UX goal was introduced in the early concept development phase of the project to facilitate experience-driven innovations. UX goals were defined by combining multiple perspectives and information sources such as relevant literature, process control operator interviews, and product development organization's long-term goals. The resultant UX goals were: 1) quality awareness, 2) quality control, 3) quality success, and 4) learnability. The goals reflect user needs, company strategies, as well as the technical opportunities in the field.

In paper mills, the process control systems are highly automated and quality control is typically perceived as an integral part of the process control system. Thus, from the "practical" operator's point of view the quality control and the process control tasks represent one and the same thing: The core task of the paper mill operator is to produce paper products of good quality. These two aspects are inseparable in an operator's mind. The correlations in paper machine quality control are rather complex: one parameter controls several variables and sometimes it can be difficult to perceive these relationships and see how the quality develops. In connection with automation renewals, many automation system manufacturers have introduced quality-related operator-support systems. However, on closer inspection one sees that only a minority of them have been actively used due to the lack of usability and operator's poor knowledge of the systems. Following the limited adoption of the operator-support systems, question about the user experience surfaced and created new possibilities for experience-driven innovations.

A more detailed example about utilizing instrumental, psychological and communicative UX dimensions in further developing UX goals is shown in Figure 8. In the example, the first UX goal of the paper quality control development, quality awareness, is described and analysed in more detail.

Quality awareness – being aware of product quality, customer's needs, and company's business premises

Figure 8. **An example of utilizing instrumental, psychological and communicative UX dimensions in further developing UX goals with the UX goal quality awareness described and analysed in more detail**

Awareness and trust are identified in the literature as central aspects of usage of automation systems. The importance of awareness about the prevailing quality situation was emphasized also by the operators in interviews. Operators must be able to trust the quality information (e.g. accuracy and truthfulness) provided by the automation system. In addition, understanding quality from the customer's perspective and the relationships between quality, production efficiency and the business premises of the paper mill will further set the scene for quality awareness. Overall, the quality related matters should be shared and discussed throughout the organization in order to support creation of appropriate quality awareness in paper mill operation.

When looking at the question of quality awareness from instrumental, psychological and communicative perspectives, the instrumental tool function and UX could be facilitated for example through tagging the measurement information with the actual time the measurement was taken and location stamps in order to support the operator's valuation of the truthfulness and usefulness of the quality information in operation. From the psychological perspective and UX point of view, the new quality control system could help operators to perceive the effect of the different process variables on the quality of the product. Also paying attention to the appropriateness of the terminology (e.g. % cf. litre) used in the system could reduce operator's mental load and assist in perceiving different process phenomenon. From the communicative perspective, the UX could benefit from making the quality more clearly a subject for common review and discussion (e.g. by improving feedback loops). The customer's quality criteria could also be displayed and visible in the system.

Rooting the designs and user experiences into work activities

Division of UX into instrumental, psychological and communicative viewpoints is a way to enrich UX goal descriptions and design teams understanding of both the building blocks of certain experiences and design opportunities relating to them. It is also a means to take into account the activity rooting of experiences in a work context. Building user experiences into work activities allows for the designing of strong, long lasting, and meaningful experiences.

Read more:

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VTT
IIRO LINDBORG, ROLLS-ROYCE

InnoLeap – UX as a driver for innovation

InnoLeap is a user experience-driven approach to create radically novel, though still credible concept ideas and operational concepts. The FIMECC UXUS programme allowed for the development of the InnoLeap approach – the approach was utilized for the first time when creating future ship bridge concepts with Rolls-Royce Marine.

Why InnoLeap?

To succeed and grow in competitive markets today, companies need to create new business opportunities for themselves. One way to create these opportunities is to develop future-oriented and innovative product concepts, and visualize them in an engaging way for customers, the media, and other stakeholders. In this way, the public interest and demand towards the envisioned products increases. VTT's new concept-design approach called InnoLeap provides a solution for this type of activity.

InnoLeap entails a straightforward process

In a nutshell, InnoLeap bases itself on trend analysis and field studies of user activity in creating the first draft of the operational concepts. The developed concepts are then evaluated with users and other stakeholders. After considering the feedback gained, the final concept is then designed. Visualizations, such as concept pictures and videos,

encourage dialogue. Finally, it is possible to publish the concepts in traditional and social media to achieve publicity and even utilize crowdsourcing to co-design the ideas further with customers and other stakeholders.

Figure 9. **Innoleap process**

InnoLeap was developed in the FIMECC UXUS Rolls-Royce's future ship bridge case

We utilized the InnoLeap approach in creating design concepts with Rolls-Royce Marine as part of the FIMECC UXUS programme. The aim of the case was to provide an impressive vision of enhanced ship operations for the year 2025. The case resulted in futuristic ship command bridge concepts for three different vessel types: tugboats, cargo ships and platform supply vessels (PSVs).

Figure 10. **Visualization example of the future ship bridge concepts**

The InnoLeap process was applied to this case in the following way (see corresponding phase numbers in Figure 9):

1. We made the following trend insights:

a. Technology trends, which described the future technologies that have the most potential for the maritime industry (e.g., remote and autonomous operations).

b. Interaction trends, which described the relevant future human–technology interaction methods and techniques to ship bridge design (e.g., augmented reality).

c. Societal trends, which described the predicted future societal challenges that need to be tackled (e.g., global warming, environmental issues, and professional competence).

d. Trending theoretical ideas (e.g., joint cognitive systems, systems usability framework, core-task analysis, resilience engineering), which described what current scientific knowledge says about what is important for the type of work that is performed on the ship bridge.

► *Outcome: Summary of relevant trends and theoretical approaches.*

2. We analysed the user activity by:

a. Conducting field studies (e.g., interviews and observations) on different ships, which gave deep insight into mariners' current work activity.

b. Doing a core-task analysis, which helped in distinguishing the basic demands and aims of the work activity performed on different vessels' bridges.

c. Setting user experience goals, which provided empathic understanding of the mariners.

d. Creating work activity scenarios and personas to communicate the findings in a way that inspires the creation of new design ideas.

► ***Outcome:*** *Inspiration and empathic understanding of mariners working in ship bridges. The aim was to reach beyond direct transfer of users' ideas into product solutions. We did this with theory-based modelling, which provided the basis for an "innovative leap" through different abstraction and concretization mechanisms of user data (for more details about these mechanisms, see the scientific publications related to the case).*

3. We generated the initial concept ideas collaboratively with relevant stakeholders using:

a. Interaction methods and future studies workshops, where the most interesting interaction methods and trends from phase 1 were reviewed to provide inspiration.

b. Concept development workshops, where various new concept ideas were generated based on the results and understanding drawn from phases 1 and 2. The end result from this phase was several possible new concepts of operation that described novel ways of achieving the users' aims with predicted future technologies. The produced concepts were communicated with scenario stories, lo-fi sketches, and physical mock-ups (e.g., 3D-printed ship bridge consoles).

► ***Outcome:*** *Descriptions of innovative operational concept ideas for future ship bridges.*

4. We evaluated the potential of the initial concept ideas with actual users in:

a. Focus group interviews, which were useful for recognizing the weaknesses and strengths, the potential "wow" effect of the new design ideas, as well as choosing the best concepts for further development.

b. In-depth expert interviews, which were useful for enhancing the chosen ideas and in ensuring that they work in the actual context of use.

► ***Outcome:*** *Description of the evaluation feedback and best concepts chosen for further development.*

5. We created the final concepts

a. After evaluating the concept ideas (in phase 4), we created the final operational concepts based on the feedback gained. These concepts described our vision of the future work in ship bridges. This acted as a solid foundation for the production of visualizations in phase 6.

► ***Outcome:*** *Final concepts of operation.*

6. We produced concept visualizations

a. We produced impressive visualizations of the final operational concepts ***(Figure 10)***. These included engaging concept pictures, 3D-printed bridge consoles, and top-notch 3D-animated concept videos (see the links in the ***Learn more*** section). Concept pictures and videos were found to be an influential means of communicating the design ideas, especially through today's digital and social media.

► ***Outcome:*** *Impressive visualizations of the concepts.*

7. We published the concepts and created media buzz

a. We knew that the concepts won't sell by themselves! Therefore, we released them to the media through VTT's media department. VTT's status as a recognized research institute facilitated access to the mainstream media. Media buzz, in turn, has ramped up the demand for the proposed products and has improved Rolls-Royce's brand image. We also followed the dissemination of the concepts in the media, which allowed for an evaluation of their impact and the gathering of feedback from potential users and customers: for example, discussion in social media brought forward new ideas or enhancements to the proposed concepts.

► ***Outcome:*** *Media events, press release, buzz around the concepts in traditional and social media, as well as feedback on the concepts for further development.*

We witnessed an unexpected spreading of the concepts

The published concepts received a vast and positive media reception: over 400 separate news articles (e.g., in Wired, see the ***Learn more*** section for a link) and 40 000 YouTube views for the tugboat concept video in the three weeks following publication. Currently (September 2015), the YouTube versions of the videos have altogether amassed over 100 000 hits! Rolls-Royce uses the produced concept pictures and videos to influence its stakeholders, such as customers and maritime law regulators, so that the envisioned concept solutions can be implemented on real ship bridges in the future.

"The starting point for the concept development was to consider user experience in the maritime context. The development process combined analysis of work activity with experience-driven design. Based on these analyses, we created the concepts that reflect our vision of future bridge operations. Our customers have found the concepts extremely inspiring and really appreciated the user-oriented approach"

Iiro Lindborg, Development project manager
Rolls-Royce Oy Ab

Learn more:

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Concept videos:

Tugboat:
https://www.youtube.com/watch?v=27uCL90s20o

Cargo ship:
https://www.youtube.com/watch?v=_nApv-C7qSg

PSV:
https://www.youtube.com/watch?v=_kv1hQLKOB0

Concept pictures: https://www.flickr.com/photos/rolls-royceplc/sets/72157647334399764

Press releases:
http://www.vttresearch.com/media/news/on-the-ship-bridges-of-the-future-mariners-will-see-the-invisible-world

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http://www.vttresearch.com/media/news/rolls-royce-and-vtt-unveil-a-vision-of-ship-intelligence-with-futuristic-ox-bridge-concept

Wired publication:
http://www.wired.com/2014/03/rolls-royce-ship-bridge/

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UX journey

KONECRANES

JOHANNES TARKIAINEN, KONECRANES PLC

Konecranes insights into user experience

Long-term UXUS collaboration has generated many insights about the user experience in a B2B context for Konecranes. All the cases and actions had the same ultimate target: increase competitiveness through UX.

As is known, **technology trends** are shaping our future by renewing our ways of working, through growing industry digitalization, utilizing new kinds of technologies etc. One example of renewal in the lifting industry is the remote operating system, which becomes more common with automated container terminal solutions. Konecranes started researching the systematic **remote operating user** at the beginning of the FIMECC UXUS -program, and it has been cornerstone of Konecranes research throughout the program.

The collected information, analyses, and experiences produced remote operating knowledge, which guided Konecranes towards successful new product launches and business.

The first insight gained from the Konecranes UXUS research was the **UX-goal-driven design approach**. This design principle was followed in Konecranes research cases: for example, the UX goals set the targets for remote operating concept development. The goal setting is very much context-specific and the users are of course at the centre when designing experiences that address Safety of Operation, Feeling of Presence, Sense of Control and Ease of Co-operation. Working with UX goals yielded great inspiration during the concept development.

Secondly, what is **UX thinking** about? Product usability is of course a major factor when designing UX, but there are much more gains to be had. Holistic UX thinking spreads to all functions in the company. **Customer touchpoint analysis** was one applied approach at Konecranes that highlighted how many possibilities there are to delight and create experiences for the user: starting from the purchase and delivery touchpoints, to using and maintaining the product or service, until the end of the lifecycle services. Invoices can also be designed to be an easy to deal with experience.

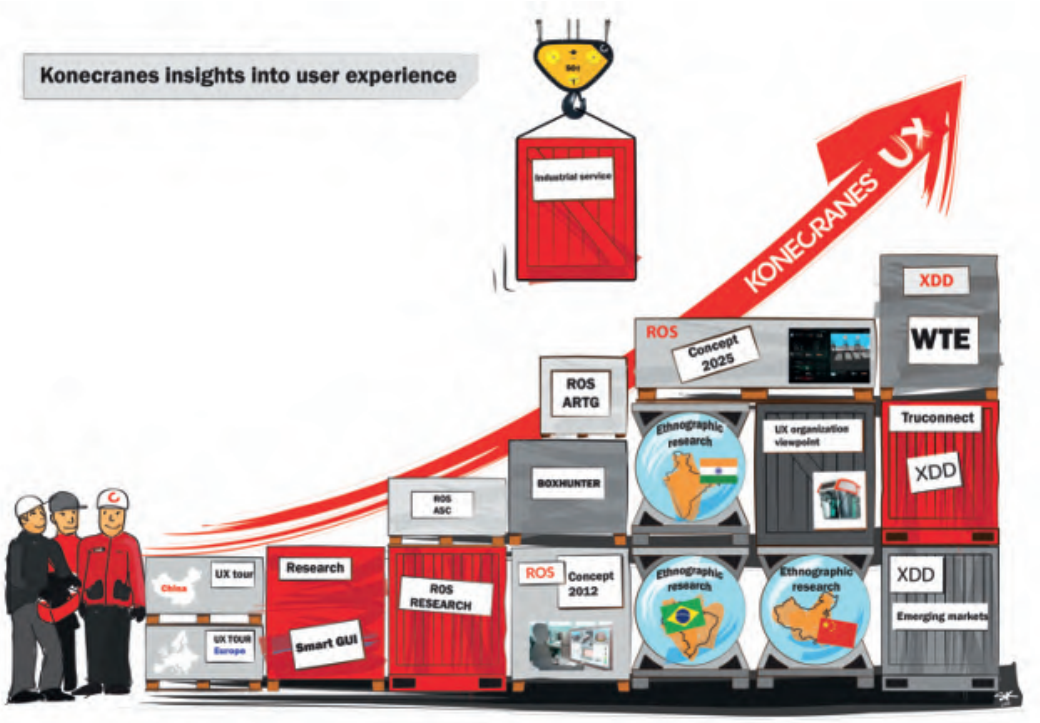
The third insight is the organizational viewpoint regarding UX. Based on the case study results, a good way to build the **UX mindset** in the organization was via the **in-house success story**. As analyzed by the Smarter cabin -project team members and customer representatives, this project organization had the responsibility and motivation to create better UX. It was also recognized that UX is not a separate function. Instead, it is part of everyone's work, and different teams and departments need to be committed to achieve a compelling user experience.

A fourth insight is the power of **ethnographic customer research**. It enables organizations to make the right, practical decisions in order to meet future business needs. Especially in regard to difficult, complex challenges, ethnographic research may bring out the missing pieces for business solution creation.

Nothing can beat the shared experiences from authentic, local culture and business.

A fifth insight relates to the **collaboration**. Together with the users, students, researchers, UXUS-companies, the Konecranes teams held a large number of co-creation sessions. The positive **UXUS team spirit** encouraged everybody to do their best and to further the UX-driven innovations developed. It was certainly proved that value comes from interaction.

By means of this great FIMECC UXUS -research program, Konecranes UX competence was lifted many steps higher. I'm looking forward to seeing all the UXUS benefits for Konecranes internal and external stakeholders in the near future.


Konecranes insights into user experience
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ROS ARTG
Truconnect
XDD
Ethnographic research
UX organization viewpoint
BOXHUNTER
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COLLABORATIVE UX EXPLORATIONS

–PROTOTYPES, VISUALIZATIONS AND INSPIRING CO-DESIGN SPACES

OPERATIONAL CONCEPTS
Demonstrating product innovations and new ways of working

PROTOTYPING FUTURE UX
Methods for developing new interaction concepts

VIDEO-ILLUSTRATED SCENARIOS
Discovering future potential

CO-DESIGN ENVIRONMENTS
Supporting UX work in the industry

Collaborative UX explorations – prototypes, visualizations and inspiring co-design spaces

Introduction: In the design and development of industrial products it can sometimes be challenging to get a handle on the aspect of user-experience. What are the concrete tools and methods to address the questions of how users perceive and feel about their work and the tools in use? How is the work at the moment and how would users like to see it develop in the future? Experience-driven operational concepts create an arena where people can come together, learn and ideate the future and explore the possibilities of the new ways of operation and how technology may impact work practices and experiences. Articles in this section further introduce and examine the different means for facilitating the concept design, for example by using a variety of prototyping methods, video-illustrated scenarios and interactive collaborative environments. As the articles in this theme show, development of future potential, i.e. experience-driven innovation, is an activity that the whole organization, including the end-users and customers, can participate in.

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HARRI NIEMINEN, FASTEMS
HANNU NOUSU, KONE

Product innovation with experience-driven operational concepts

Continuous development and product innovation is at the heart of successful companies. New concept development is a multifaceted process that touches on many stakeholders, clients, research and development, product management and sales and marketing, and ultimately on strategic leadership. In FIMECC UXUS, experience-driven operational concepts have been used to facilitate concept development in several ways – from ideating the future, to enabling new ways of operation, to exploring how technology impacts work practices and experiences. To demonstrate this, we present two concrete example company cases.

The gesture control concept demonstrates Fastems' user-centred focus in its innovation

In the competitive marketplace it is important to show in different ways that one is able to renew offerings and stay current with technological developments. In UXUS, Fastems, TAUCHI (University of Tampere) and the University of Jyväskylä collaborated to create a gesture interaction concept for loading stations that was focused on the experience goals of improving the workers' sense of control over the system and making its use entertaining and intuitive.

Gesture control in an industrial context is possible.

The results from the study show that gesture control in an industrial context is possible. By focusing on end-user experience and leveraging technologies familiar from consumer products, it is possible to create industrial systems that are easier to learn and more attractive to use, especially for young people. Overall, utilizing new, user-centred technologies can support the forerunner image of a company among prospective clients and end users.

Figure 1. **The prototype created within UXUS for demonstrating gesture control of loading stations**

"The gesture control system improves productivity and increases user-friendliness by replacing buttons that are hard to reach, slow to use, and that have unclear functionality. The potential market is huge as there are many viable applications in robotics, mechatronics, industrial vehicles, process control, and also in future home automation."

Matti Nurminen, Fastems

(FIMECC High Tech Result, http://hightech.fimecc.com/results/with-gesture-control-farewell-to-buttons)

UX design for gesture control should focus on robust and natural user experience to enhance trust and professional feeling.

Focusing on user experience when creating new ways of operating can pay off

Using elevators may be a huge part of daily routines for people working and navigating through complex built environments. Decreasing the time people have to wait for elevators and optimising the elevator scheduling is becoming increasingly important in order to improve people flow – and naturally also the user experience of the elevator users.

In UXUS, Kone and TAUCHI (University of Tampere) collaborated to create and study a mobile application allowing remote interaction between the elevator users and the elevator call system. The focus was on user experience goals decreasing the feeling of waiting and improving the feeling of control over the elevator. With a prototype application we were able to study the end-user experiences and expectations towards remote elevator control. The design and development of the functional prototype and its field evaluations contributed to the new and innovative mobile solutions provided by Kone today as a part of its product portfolio.

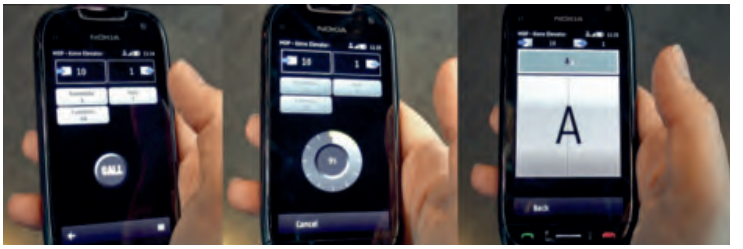

Figure 2. **The mobile application for remote interaction with elevators**

Mobile interaction with elevators can provide added value to its users in complex building environments.

Learn more

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PIIA PERÄLÄ, UNIVERSITY OF JYVÄSKYLÄ

TIINA KYMÄLÄINEN, VTT

HARRI NIEMINEN, FASTEMS

JUHA PERÄ, **JOHANNES TARKIAINEN**
KONECRANES

Prototyping future UX –
Methods for developing new interaction concepts

It is hard, if not impossible to understand the user experience of new interaction concepts without some sort of functional prototype. Concept videos, pictures and textual and verbal explanations can provide some understanding of the concepts – but only actual, personal use provides genuine understanding of what the user experience truly will be. Because of this, during the FIMECC UXUS project, several new interaction concepts have been prototyped by TAUCHI (University of Tampere) together with the companies, the University of Jyväskylä and VTT.

Building a prototype of an interaction concept enables its assessment and evaluation. This can range from hands-on experimentation by the developers to formal evaluations with actual end users. Testing by the developers and other stakeholders enables an iterative development of ideas, which is a key part of the development of interaction concepts. In addition, prototypes can act as a way to communicate ideas both inside organizations and also as part of brand management and advertisement work.

Prototyping must be agile to be efficient

Efficient prototyping requires the ability to flexibly combine different technologies and platforms. In turn, the overall sophistication and the type of prototypes can also vary greatly. In some cases, the prototype may be integrated into an existing system, such as with the Valmet Automation speech and gesture interface, while other prototypes may have only virtual presentation of the actual system, as in the Fastems gesture interaction concept. Interactivity may also vary from minimal, simulated interaction to almost a fully featured system

where full user tasks can be accomplished. What is required depends on the concepts studied, the user experience goals the work aims at, and the types of evaluations to be done.

Prototyping can address a variety of needs and technology maturity levels

In the UXUS project, several prototypes have been implemented. More details of each of the following prototypes can be found in other chapters; here they are considered as examples of different kinds of prototyping approaches.

In the remote operations cases, two very different prototypes were built in collaboration with Konecranes. They were used to study different subsets of the UX goals identified in the initial studies of the domain. The remote operator station with a virtual world was built to test if we can improve on the UX goals 'Feeling of safe operation', 'Sense of control' and 'Feeling of presence'. This prototype enabled full remote operation tasks and had a full user interface, which was also iterated with the prototype. The evaluations were controlled, the participants worked on a set of tasks and we gathered both objective and subjective data on their performance and experience.

To study UX-goal 'Experience of fluent co-operation', a different approach was necessary. For this, a science fiction prototyping approach was applied; we built an experience path, where different minimally interactive displays and workstations were built in an agile manner. The Wizard of Oz approach was applied to make the system interactive, i.e., a researcher was activating many functions that would be part of an intelligent system in the future. Some parts of the system were truly interactive for participants to try out. The evaluations were based on a researcher walking the participants through the experience path and explaining the different features of the system. In this way we could provide the participants with the feel of a future remote operations centre. Interviews, discussions and questionnaires were then used to collect participants' feelings about the interaction concepts. We also ran a parallel test in which the experience path was replaced with a traditional presentation of the interaction concepts.

With Valmet Automation, speech and gesture -based interaction with the Valmet DNA system was prototyped. In this case, the new interaction modalities were first prototyped separately and then integrated into the actual system. The solution was presented to representatives of the user population both in site visits and in seminars where they were present. For the new interaction techniques, the hands on experience that the prototype provides proved worthwhile. Especially speech was considered uninteresting, even inappropriate by users, until they could try it out themselves. When speech actually worked, their opinions changed radically.

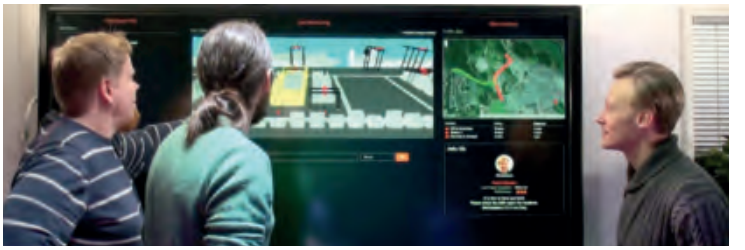

Figure 3. **Prototypes allow users to try out the idea under development rather than having to imagine the described concept only in their minds. Prototypes, thus, provide a basis for feedback and make forming personal opinions easier.**

"The operator of a power plant was not frankly excited when we told him about the speech control possibility. Even showing a demo introducing how the system could be controlled with speech did not convince him. Only after he himself tried it and noticed that the system actually understands what he's saying did he get excited. We learned that these kinds of new things have to be tested by people themselves; slide shows or even demos are not enough."

Hannu Paunonen, Research Manager, Valmet Automation

For Fastems, a prototype for gesture control was built. In this case, the actual system was simulated, similar to the remote operations case. The virtual system enabled evaluations to be done in usability laboratories and in presentations of the prototype at different events. In addition to the evaluations, the prototype was utilized as a marketing tool, communicating the forward-looking approach of Fastems as a company to potential customers.

Learn more

Heimonen, T., Hakulinen, J., Turunen, M., Jokinen, J., Keskinen, T., & Raisamo, R. (2013). Designing Gesture-based Control for Factory Automation. Proceedings of INTERACT 2013, Part II, LNCS 8118, pp. 202–209.

It has become clear that the user expectations of people are different in regard to new interaction methods. The best way to explore expectations vs. reality is through prototyping. Then you get the feedback on the real experience and not the feedback on expectations.

Iiro Lindborg, Rolls-Royce

TIINA KYMÄLÄINEN, **EIJA KAASINEN**, **MAIJU AIKALA**
VTT
TOMI HEIMONEN, **JAAKKO HAKULINEN** ET AL.
TAUCHI, UNIVERSITY OF TAMPERE
HANNU PAUNONEN, VALMET AUTOMATION

Discovering future potential through video-illustrated scenarios

As difficult as it is to predict the context of future industrial work, companies need foundational stories that envision the potential of new technologies for their domain.

Tangible prototypes and video-illustrated user experience scenarios offer powerful tools for illustrating and sharing future-oriented technology visions for a company

If one considers the future potential of new technologies to a company, there are many things to be decided – from the technologies themselves to how they could be applied and in which situations. In the Valmet Automation case, the key concerns were related to process control work in process plants. What does a future control room look and feel like? What technologies should be chosen from the wide set of alternatives? Could the process be controlled, perhaps, by using speech and gestures? Or could the process be controlled by using mobile and tablet devices remotely from different locations? Or in a more advanced future, the work might even be supported by an automation system that is an intelligent partner, which helps in the process and assists also in exceptional situations.

Future-oriented UX-scenarios engage users – employees and customers – into the company's foresight strategy.

Figure 4. **Video-illustrated scenarios of "A Day at a Future Plant"**

In "Control Room Anywhere" we plotted the course of natural Interaction technologies and smart automation in future process plants and created a future-oriented concept about an operator's day in a process plant (see Figure 4). The concept illustrated how operators carry out tasks with new interaction techniques and a smart automation system at a future date fixed as 2025. The focus was on explicit UX goals that were realized as an illustrated video concept "A Day at a Future Plant" and as a speech and gesture prototype. The concept was then evaluated with expert users – from various professions such as manufacturing industry and energy production – to gain an understanding of the elements constituting the experience and interaction that supported the UX goals.

The video concept focused on seven explicit experience goals that the design team were committed to: Sense of control, Trust in human-automation co-operation, Sense of freedom, Ownership of the process, Relatedness to the work community, Meaningfulness of the work, Success and achievement, and Peace of mind. In our research we traced the dependency of the experience goals towards each other (see Figure 5).

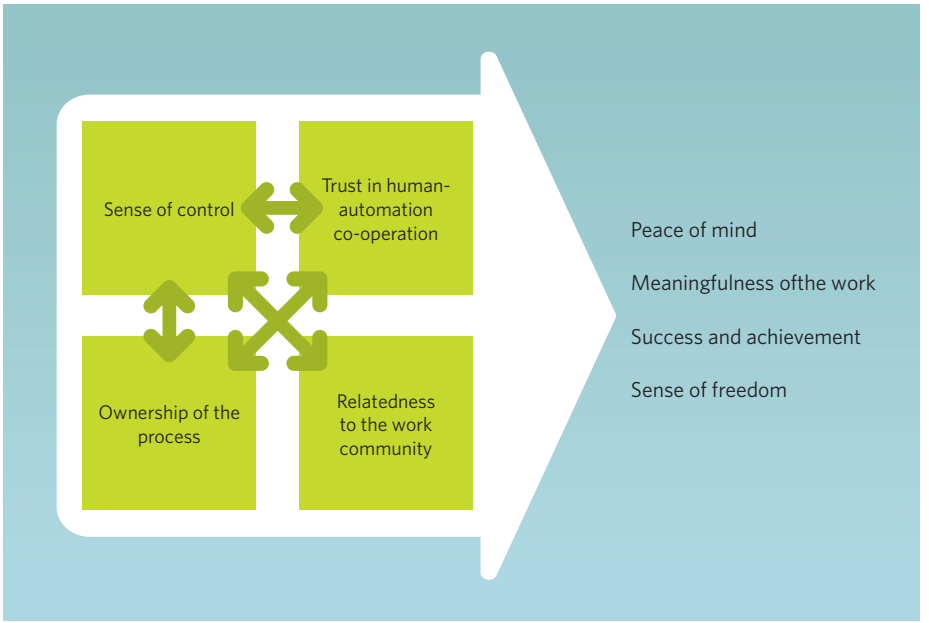

Figure 5. **The discovered UX goal dependency**

In the evaluations with experts, we discovered that new technological solutions are appreciated most when it is easy to identify their benefits. The starting point for achieving transformation in the mindset is knowledge of the technological possibilities and trust in the automation system. It was highlighted that although the intelligence of the control system increases with new technological possibilities, it is important that humans make the final decisions.

To design for the future you need an open mind, a culture of experimentation, and a solid, empathic understanding of the users and their work.

When evaluating the future concepts we were able to gain an understanding of the more specific elements that supported the UX goals. In general, we identified several building blocks of the UX goals that aroused a positive attitude in the work context that may also be applicable to other situations involving similar industrial expert work (see Figure 6).

Figure 6. **Defined building blocks of the UX goals in the control room context**

But what of the technologies illustrated in the concept?

We discovered the following potential benefits:

- Real-time access control and location information can improve work safety
- Speech commands can be used for navigation (secondary tasks), opening appropriate views for monitoring– but it is much too slow for operating (primary tasks) the automation system
- Gesture control with widescreen displays is advantageous for training, as it provides a tangible experience of the task at hand
- Game-like experiences can be expected to have a role in motivating future 'native-digital' operators

Videos for demonstration purposes help develop common understanding about the user experience of Valmet Automation products

Seeing the video-filmed concept and feeling the tangible prototype facilitates a personal experience of the future potential of new technologies.

"In Valmet Automation we found that providing videos as part of presentations is very useful for demonstrating future potentials for different stakeholders within the organization. The video-illustrated scenarios aroused a lot of discussion and also helped in provoking new scenarios and ideas. In principle, it seems quite a promising path to aim for methods that develop a common understanding about the future user-experience of company's products. Together with the Valmet Automation UX Playroom it was possible to produce concrete stories that envisioned potential future experiences for different stakeholders in the company."

Research Manager Hannu Paunonen,
Valmet Automation

Learn more

You may find the video-illustrated scenario "A Day at a Future Plant" from:
https://www.youtube.com/watch?v=Mxzx6IYZXDw

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Interactive co-design environments – Supporting UX work in the industry

Interactive collaborative environments combine various computing, display and sensor technologies to enable new forms of innovative group work. In such environments, people can engage in their work tasks in new ways and gain new insights. In FIMECC UXUS, Valmet Automation worked with TAUCHI (University of Tampere), VTT, Aalto University, and the Tampere University of Technology to create a novel co-design environment called the UX Playroom. The playroom has now been taken into use on the Valmet premises (see Figure 7).

Keep the user's world the focus of development efforts

The UX Playroom was created to support the development of process control systems and their user experience. Process control work includes quick reactions in sometimes critical and complicated situations with a significant emotional component. While developing process control systems, it is crucial that the design team understands the work situations and environments and empathizes with the users.

By mimicking a real control room and creating a feeling that the participants in a co-design activity could be users in a real control room, both from a practical and emotional point of view, the UX Playroom helps to keep the user's world in mind during the development efforts. In the UX Playroom, the actual users can also be engaged into co-design activities.

Figure 7. **The UX playroom**

The space allows one to step into the shoes of the end users and reflect on how the designed systems and interactions affect activities in the control room.

Co-design environments should support a variety of organizational activities

To be useful to a variety of stakeholders – from marketing and sales to R&D and product management – the co-design environment should support a variety of organizational activities. Naturally, different stakeholders also have different expectations and needs for the space. To support both design and marketing, the space should be easily modifiable and the UX Playroom should include applications with continuous readiness for presentations in marketing events. At Valmet, the ease of arousing discussions and storytelling within the UX Playroom has been beneficial for co-design activities together with the rest of the organization.

A successful co-design environment brings the use context close to the participants, while having a low threshold to participate and alternative ways to participate, which encourages creativity and informal interaction.

"Our experiences of implementing the UX Playroom in a product development organization's daily use are promising. It serves different activities from early ideation to marketing. The space helps keep the user viewpoint in mind when direct contact to end-users is limited. Similarly, it helps the designers consider the possibilities and limitations of the designed technologies in the physical control room. Without utilizing the space during development, they might be too focused on mere software. The space has encouraged internal, informal ad-hoc co-design activities."

Research Manager Hannu Paunonen,
Valmet Automation

Learn more

Hannu Paunonen & Hanna-Riikka Sundberg: "CASE Metso Automation: Organizational aspects in crafting a co-design space."
http://uxus.fimecc.com/sites/uxus.fimecc.com/files/uxus_esitys_uxplayroom_ruukki_12_2_2015f.pdf

Lauri Lehtikunnas (2014). Puhe- ja eleohjaus prosessinhallinnassa. Diploma thesis, Tampere University of Technology.

UX journey

VALMET

JUHA S. OJALA, TIMO HARJUNPÄÄ, MIKKO KARIOJA, VALMET

Valmet's journey:
enhancing customer experience

Valmet provides advanced and competitive technologies, automation and services for the pulp, paper and energy industries. The offering is easy to summarize but behind this statement lies a vast portfolio of various products, services and solutions that can daunt even the most experienced salesmen – not to mention the customers.

Visualization can be used to simplify complex offerings

In FIMECC UXUS, Valmet started first to develop approach for the sales materials related to mill maintenance outsourcing. The outsourcing contracts can be very complicated, as the scope typically includes all necessary maintenance services for a mill, including on-site maintenance organization, services by Valmet specialists and local supplier network, as well as maintenance materials.

Ever since Valmet started to provide maintenance outsourcing services – about fifteen years ago – the main structure of contract appendices and the main contract itself has remained more or less the same. The UXUS project gave us a good opportunity to improve

the **contract templates**. The project was focused on improving and simplifying documents by means of visualization. The project was done in steps, with the **service blueprinting** as the first step, after which **contract visualization** was done and in the end, **a visual service map** was created.

Blueprinting clarifies the sales process

The sales process and documentation used during sales projects were documented in the form of service blueprints by interviewing several persons from the Valmet organization. Major phases of the sales process are: screening of potential cases, evaluation of the offering, initial discussions with the customer, risk evaluation, agreeing the scope of services, agreeing commercial terms, and finally agreeing general contractual terms. Each phase of the process requires specific specialist know-how and documentation.

It is also possible to visualize contracts!

After service blueprinting the visualization of the contract and its appendices was started. A graphic designer from Aalto University went through our documents and proposed updates. After a couple of iteration rounds and workshops, the visualizations reached the final format.

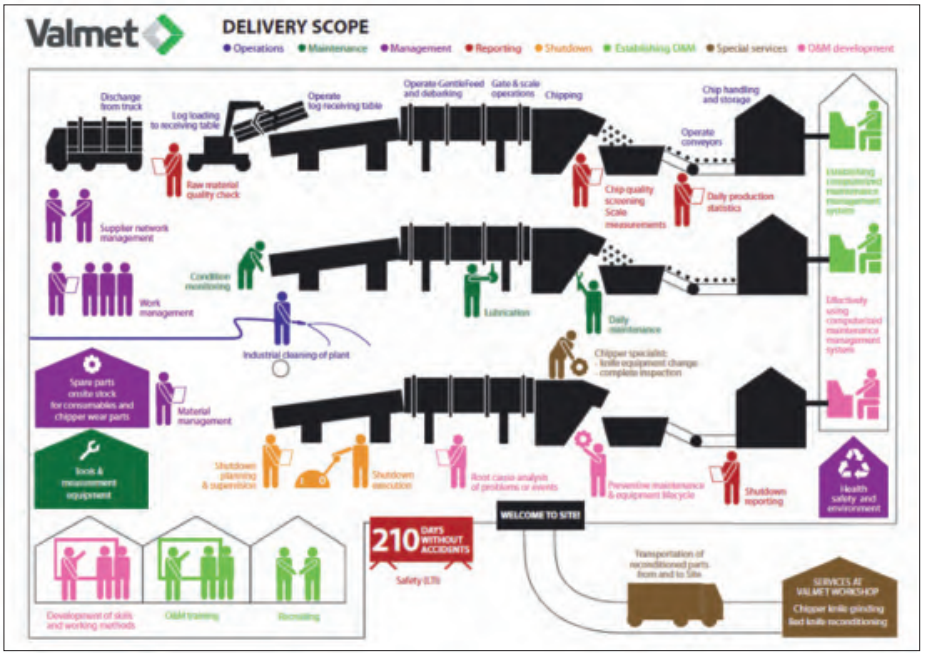


Figure 1. **Service map makes it easy to understand how the responsibilities are – divided between supplier and customer**

As the final step of the project, the visual service map was created. The visual service map makes it simple to understand how the responsibilities are divided between Valmet and customer.

We are confident that the new visual approach to outsourcing sales materials will facilitate the sales process, as the technical and commercial aspects of the agreement can be easily understood by the customer.

Commitment to a long-term outsourcing agreement requires full trust between the parties; there is no room for misunderstandings.

Modularity enables easy creation of customized solutions

Based on the highly promising results of visualizing outsourcing contracts, the project was extended to roll services, where the focus was on solution modularization and visualization of the related sales materials.

Valmet roll services has a high number of different products and services in its portfolio and until recently most customer quotations have been tailored case by case – a laborious approach that in the long run does not support the development of high-value-adding services. In order to serve customers better, it has been obvious that Valmet should move up in the value ladder by transforming its offering from single products and services more towards technical solutions and ultimately towards customers' business support. The modularity of the offering and the creation of new visual tools to communicate the new approach internally and externally were seen as major success factors in this development.

The project started with the definition of basic roll products and services supporting customers in their roll related needs. These basic sales items are the smallest sellable products and services, and they can be easily combined into larger service modules and solutions. With this modular structure we are easily able to create customized solutions matching customers' business goals. The modularization work was supported by VTT researchers who studied the different approaches to modularization, including customers' business goals.

Visualizations are needed for internal communications as well

Modularity does not always mean simplicity, so visual tools were needed to enable the clear communication of the new modular offering. Once again the graphic designers from Aalto University created examples of visual sales tools that could be used to communicate things like service concept, supplier's responsibilities, and even esti-

mated the business value to the customer. It is obvious that the clearly visualized materials help our sales managers in the customer interface where they can now more easily present Valmet's solution. The visualizations also help in internal communications, thus improving the co-operation between different functions and units in roll services.

Figure 2. **Demonstration of new kind of sales application**

ENHANCING CUSTOMER EXPERIENCE
WITH VISUALIZATION AND CUSTOMER INSIGHT

IDENTIFYING SALES TYPES
Challenges and solutions

CONTRACT VISUALIZATION
Rapid understanding and positive UX

VISUAL SERVICE MAP
Support for keeping scope

SERVICE MODULARIZATION
Service and customer matching

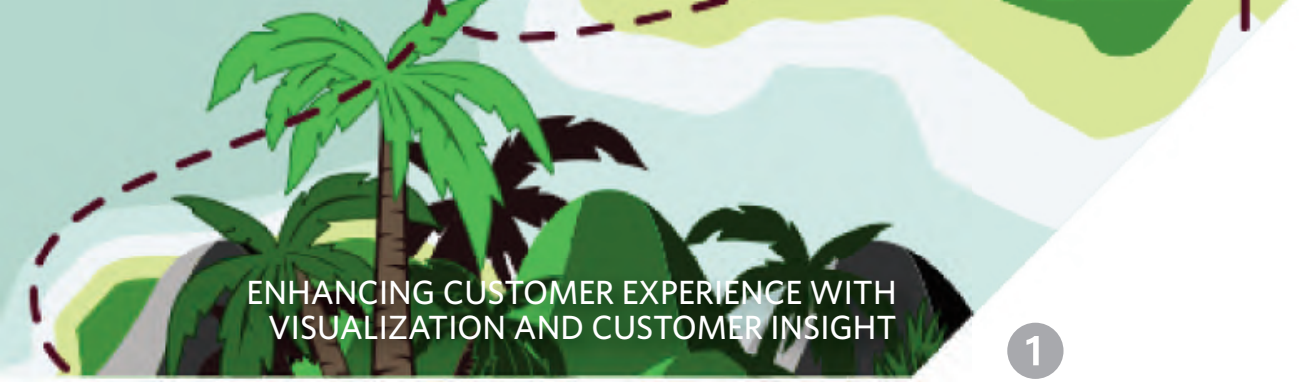
METHODS FOR SELLING
New tools and visualization

INFORMED SALES PERSONNEL
Visualization for internal support

BOUNDARY OBJECTS
Customer and supplier documents

Enhancing customer experience with visualization and customer insight

Introduction: Good customer experience is important from the early phase of the sales process on. Potential customer is more prone to become an actual customer when appropriate issues are focused on. Articles in this section show how supplier personnel can be more effective in customer relationship, especially during the sales process, by understanding customer's objectives and by using efficient new means such as utilizing iPads in a new way during the sales process and visualizing material relevant for customer. As a result, sales process becomes more successful and both customer and supplier have better experience about the mutual relationship as a whole.



ENHANCING CUSTOMER EXPERIENCE WITH VISUALIZATION AND CUSTOMER INSIGHT

1

MIKKO ILLI, AALTO UNIVERSITY

LASSE LEHTONEN, **KERO UUSITALO**, **TERHI RÄSÄNEN, RAILA HALME**
ROCLA

Ethnography in B2B sales

Industrial sales differ from the customer context in that the sales situation is more unique and customer needs vary more. This demands more innovativeness and situational ability from the supplier to respond. This justifies the use of ethnography in the study of how customer-specific needs are met in the sales interaction. I present below an example of user ethnography in a sales situation.

Four sales types were identified in the forklift truck manufacturer called Rocla. In the first type, which takes up to a few months to complete, one sales agent sells one to ten trucks directly to a customer. In the second type, a sales team sells a large amount of trucks, which takes around one year to complete. The third type is when a sales agent takes care of following up customers' needs continuously in a solution-business fashion. Lastly, trained engineers sell a warehouse solution based on automatically guided vehicle (AGV) technology.

Ethnographic observations in six sales meetings

Six ethnographic observations were made within direct sales, out of which one lasting 50 min was videotaped. In addition to these, eight interviews were conducted (see Figure 1.) with five sales agents, a concepts manager, a marketing manager and a dealer manager. The videoed data were analysed by the research team solely, and together with most of the interviewed persons. Next, we summarized the key findings of the analysis of the video. Participants in the discussion were a sales agent for the supplier, a customer's professional purchaser and a customer's warehouse manager. The sales items were four warehouse trucks.

Figure1. **Research setting**

1) **Grounding the negotiations:** At the beginning of the negotiation, participants made sense of the key values and sales arguments. At first, the sales agent promoted novelty, speed, energy efficiency and the new features of the truck. When he realized that customer is receiving bids from several different suppliers, his arguments changed towards price, purposefulness and testing features. The key learning from the start of the negotiation is that the sales agent can quickly learn about the current situation and ground the sales arguments according to that, even where it means abandoning the arguments planned beforehand.

2) **Configuration of the sales items:** in the next part of the negotiation the customer reveals the results of testing with a competitor's product that indicates that the forklift trucks sold do not need to be tailored. The reason originally was the special use of the machines by the customer. For the sales agent this constitutes a difficult situation, since he has used tailoring ability as a competitive advantage. Very quickly the sales agent needs to reframe a standard machine to look like a valid option and he uses the much higher salvage value as the argument. Here the sales agent needs to change the sales argument again and quickly turn something that he earlier promoted as additional value for the customer to appear as a problematic option. And also to make the standard option look like a valid alternative.

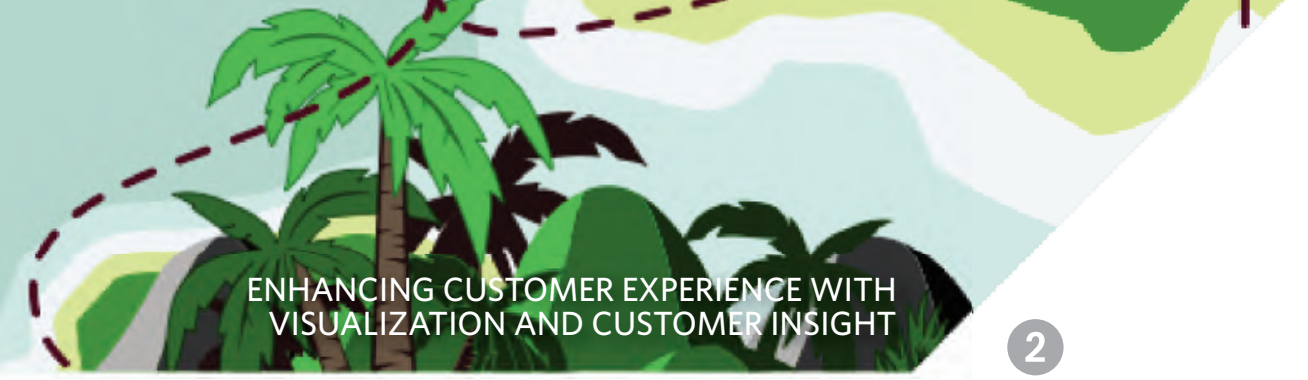
3) **Visualized facts in support:** the customer brings up a worry that the seller company's maintenance personnel might be fixing problems in the machines that do not exist. This seems like a problematic situation for the sales agent. However, instead of building an argument and trying to tell that they have responsible maintenance

personnel he uses the iPad to show visualized service reports of the customer's machines in use. Sensors in the machines track information about the age of the machines and components as well as mark down the service times for each machine. With the visualization the sales agent can give a convincing argument to the customer that all the repairs have been done for natural reasons according to the age of the machines. In addition he builds a dialogue with the warehouse manager and the purchaser about their own machines, as they reflect on comments related to the visualizations.

4) **Critical customer needs:** In the last part of the negotiation, the sales agent asks and lists all the critical requirements that the customer has for the machines, such as the lifting heights of the machines and key measurements related to the operating environment. The sales agent has previously visited one of the two customer's warehouses. It turns out during the discussion that there is an underpass which is too low for the supplier's truck in the second warehouse. This becomes a deal breaker for the customer. The critical height of the underpass had gone unnoticed by all parties. This small detail meant over two months of time given to negotiations was wasted and clearly points out the importance of having a good shared sense of the critical customer needs.

Read more:

Illi, Mikko, Salu, Ylirisku (2015), Applying conceptual design to B2B sales negotiations, Proceedings of the 31st annual IMP conference, 27th-29th of August 2015, Kolding, Denmark.



STEFANIA PASSERA, AALTO UNIVERSITY

Visual negotiation maps:

Focusing on customer needs and expectations during sales negotiations and contracting

Defining an accurate and customer-centric service scope is a big challenge in negotiations and contracts: customers might not get to experience the "flavour" of a service before implementation, and sellers might struggle to provide comprehensive representations of highly modular and tailored services. Visual service maps, as developed with Valmet, can help parties in keeping scope as a key focus of the negotiations and in co-constructing modular, tailored service proposals more easily.

Valmet case: visual tools for more collaborative and focused negotiations

Initially, the focus of the case was to redesign and visualize an operation and maintenance outsourcing agreement, used in the service sales division

The idea of visualizations having a large role in communicating with the customer emerged after interviewing the entire sales team, including supporting personnel in financing, legal and HR. It turned out that visualizations could be used also in presentations to customers from the very beginning of the sales and contracting process, and not only in contracts, to provide the parties with a "visual template for discussions".

During the feedback sessions it became apparent that visualizations do not simply serve a "neutral" role in enhancing communication, but were seen by the sales team as a way to represent and communicate value: visualizations had to be accurate and truthful, but they also had to play a role in providing "a feel" of what the service would be, and why it was a good choice for the customer.

Defining the scope of the service is one of the most difficult parts of negotiations. It is cognitively complex to envision and communi-

cate complex scenarios, processes, services and responsibilities. Services are immaterial and it is not possible to show a demo or a prototype to the customer in advance. Informative and evocative representations are thus necessary to envision the service and give the customers a chance to point out their needs, wishes and contribute ideas to a highly customizable service concept.

The sales team revealed that often, in negotiations, it is hard to document accurately all the roles and responsibilities of the parties. Every case is different, and Valmet's role could range from simple maintenance to taking over the whole plant operations and preventive, predictive and reactive maintenance of the site. When roles and responsibilities are not detailed sufficiently, misunderstandings arise and responsibilities are not, in fact, allocated.

We thus developed for Valmet two simple visual negotiation tools to help in capturing commitments and providing a bird's-eye view of the service: 1) Roles and Responsibility Map and 2) modular Service Map.

The Roles and Responsibility Map is presented as a matrix visualization (Figure 2): two horizontal rows represent customer and supplier, and columns represent different areas of responsibility. During the negotiations, the template can be used to document which party will have responsibility over a certain activity. Activities and responsibilities can be added and "traded" between parties during the discussions. The template can be projected during meetings and either edited digitally on the go, or function as a backdrop for post-it notes, added collaboratively by the representatives of both parties.

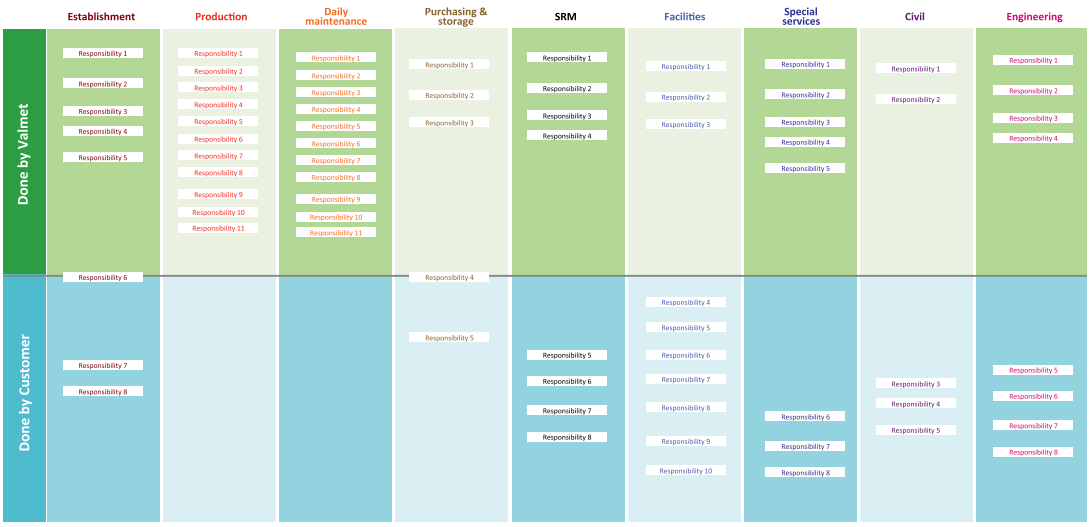


Figure 2. **Example of Roles and Responsibilities Map**

Valmet SERVICE SCOPE MAP

Daily production operations

- Work management
- Run equipment according to production plan

- Log discharge from truck
- Log loading to log receiving table
- Chip handling and storage

- Operating log receiving table
- Operating chipper
- Operating GentleFeed and debarking drum
- Operating conveyors
- Gate and scale operation

- Raw material quality control
- Screening
- Chip quality measurements

- Industrial cleaning of plant

Materials

- Establishing onsite stock for chipper wear parts and consumables
- Recommendation of other parts to be kept onsite

- Tools, machinery and measurement equipment defined in Appendix 6
- Internal transportation vehicles defined in Appendix 6

Daily maintenance operations

- Work management

- Daily maintenance

- Preventive & predictive maintenance
- Lubrication
- Condition monitoring

- Supplier network management
- Material management

- Effective use of computerized maintenance management system

Special services included

- Chipper knife grinding
- Bed knife reconditioning
- Knife equipment change supervision, and complete inspection of chipper specialist

- Transportation cost to and from the Supplier workshop outside the plant is included into scope

- Once in a year process specialist will make a process optimization

O&M development processes

Reporting on e.g.:
- Chip quality
- Raw material measurements
- Daily production statistics
- Scale measurements
- Safety (LTI)
- Technical planned and unplanned shutdowns

- Maintenance management systems

- Root cause analysis of problems or events
- Criticality analysis and RCM updates
- Life cycle cost analysis

- Developing preventive maintenance & equipment life cycle
- Overhaul programs

- Planning, supervising and executing shutdowns

- Developing personnel skills & working methods
- Developing of maintenance network (local and global)

O&M establishment

- Recruitment of on-site team

- Training of personnel

- Establishing computerized systems

Figure 3. **Example of Service Map**

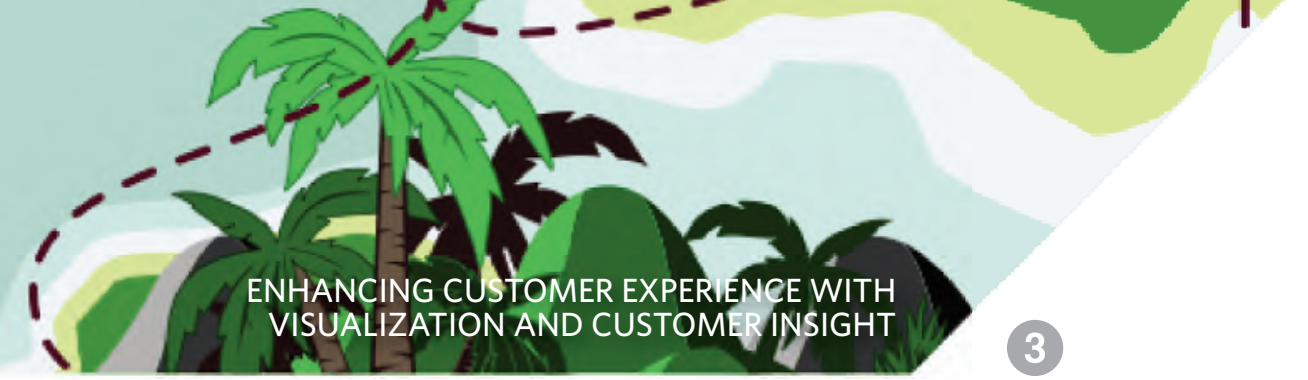
The Service Map (Figure 3) is another template that Valmet can use instead to detail synthetically and in a structured manner what the service will comprise. The Service Map includes a collection of icons, representing service activities and responsibilities, as well as a simple template, where the icons can be added together with simple descriptions and lists of what the service will include. Managers can thus create flexibly visual service maps to describe the offering, case by case, and try to summarize what the service is about in just an A4 paper.

The Service Map is also to be used as part of the contract appendix describing the scope, as a "snapshot of the achieved agreement" that the parties build together during negotiations. One of the key themes of the collaboration with Valmet was to close the information gap between sales negotiations, contract negotiations, and contract documents. Visualizations that are to be used in the contract templates are also used from the very first presentation to the customer, in order to facilitate a meeting of minds, by sharing the same mental images. The visual templates help in building the same mental image, as they translate conceptual links into spatial links and shapes. All images are editable, even collaboratively, so the parties can explore different service configurations together, in a tangible way.

Learn more

Passera, S., Smedlund, A., Liinasuo, M., Aikala, M. (2014). Designing Boundary Objects for the Sales of Industrial Services: How to Support Value Co–creation through User Experience. Working paper. Available at: http://ssrn.com/abstract=2648148

Passera, S., Haapio, H., Barton, T.D (2013). Innovating Contract Practices: Merging Contract Design with Information Design. Proceedings of the IACCM Academic Forum on Contract and Commercial Management 2013, 8th October 2013, Phoenix, USA. Available at: http://goo.gl/IlYo3L



ENHANCING CUSTOMER EXPERIENCE WITH VISUALIZATION AND CUSTOMER INSIGHT

3

MIKKO ILLI, AALTO UNIVERSITY
LASSE LEHTONEN, **KERO UUSITALO**, **TERHI RÄSÄNEN, RAILA HALME**
ROCLA

New methods for selling

iPads are becoming most common tools for Rocla's sales agents. iPads allow salespeople to better showcase the features customers need during the negotiation. In addition to this, new marketing materials have been developed to visualize customer needs, rather than merely displaying products, which results in an increased understanding of the important topics in a customer's working environment.

An iPad enables multiple ways to interact with the device during sales negotiations. An iPad also helps in preparation and taking notes. Software used in the forklift truck case were the sales force, the company's internal database called Qoolio, Powerpoint presentations, and connections with Big Data through the service report software.

Sales agent's tools

The sales agent may prepare for the sales meeting right before entering the customer premises by checking the earlier deals, contacts and possible situation regarding the customer's operating environment. Qoolio then helps to identify the product features in products under negotiation and give answers to the customer. The most noticeable feature through this research on the forklift-truck business was connecting the customer to their own working environment through a visualized service report. This helped provide facts to the customer on what their new product needs are based on. This effect was noticeable during the observations and helped in turning possible doubts of the customer about services to easily understandable facts. In addition to this the visualized service diagram connected all the participants in the negotiation into a reflective role giving inputs into the discussion from their own backgrounds. This relieved the general tension in the discussion. The use of Big Data gives direction to more fact-based and dialogue-based sales interactions and is more about how this data is visualized and constructed below user interfaces.

New marketing visualization presenting customer needs

New types of visualizations in marketing materials express the key customer needs in the forklift-truck business. The key needs were categorized as space, lifting capacity, and time. These values express crucial facts while negotiating and help to establish whether the deal is either possible or obsolete. The new sales material with gives clues to the customer and helps to better connect to the crucial customer needs. Therefore it helps the customer to understand what the limitations in the operating environment are that need to be considered when buying trucks. Even though these numeric values refer to the basics in the forklift-truck business and are discussed in many interactions with the selling organization and buying organization, they need to be considered with care. Our research points out that the sales agent and customer may be taken by surprise during the sales negotiation.

We agreed with the sales agents that either a new customer or a customer building a new warehouse has the potential to received support from this type of marketing material. When observing a negotiation with a warehouse manager it became evident that some of the key values were unclear to the customer, such as the operating lengths of the machines in the warehouse related to space. These operating lengths have a dramatic impact on choosing the right truck and decisions to be made between a walk-by machine or where the driver is inside the vehicle. Also machine speed can only be modified according to these facts. The preparation for the negotiation with the right kind of materials prevents loosing valuable negotiation time for all the participants.

Figure 4. **New type of marketing visualization presenting customer needs**

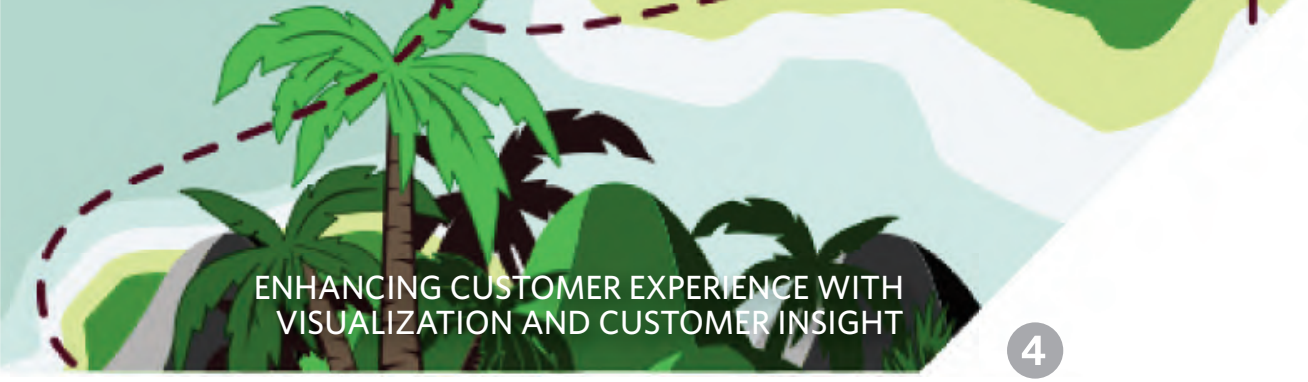
The new visualized marketing material (as an example, see Figure 4) presents customer needs connected to the most common topics in the forklift-truck business, such as space, lifting capacity and time. This material allows for markings and notes to be made on it whilst seeking critical knowledge regarding the operational environment. The effects that these materials seek to achieve are improved preparation and understanding of the needs as well as the ability to easily communicate them.

Learn more:

Illi, Mikko, Salu, Ylirisku (2015), Applying conceptual design to B2B sales negotiations, Proceedings of the 31st annual IMP conference, 27th-29th of August 2015, Kolding, Denmark.

New sales tools can make the sales process more efficient. Interactive, visual tools facilitate the discussion of customer's needs and help to ensure that all critical limitations and requirements are considered before presenting the solution to the customer.

Juha S. Ojala, Valmet



STEFANIA PASSERA, AALTO UNIVERSITY

Make your contracts visual and user-centered

for superior customer experience and collaboration

Why are contracts complex, uninspiring and long documents, while they could be a tool to foster trust and better collaboration between firms? In FIMECC UXUS we worked with SSAB, Valmet and FIMECC on making contract templates more readable and user-friendly through visualizations. Results from experiments show that users can understand visualized contracts faster and more accurately, and their experience is more positive when compared with traditional text-only contracts.

SSAB case: increase trust with suppliers through clarity and transparency

In SSAB's case, we aimed at improving two framework agreements used by the3sourcing division: the agreement on the purchase of equipment and machinery; and the agreement on purchase of industrial services. The goal was to create contracts that would be easier to read and communicate, and that would help foster a business relationship based on trust and transparency.

The new templates featured improvements in terms of layout, structure and organization of clauses for easier "storytelling". Additionally, they included a number of diagrams that further explained some particularly complex key clauses and concepts of the contract (e.g. in Figure 5). The document was continuously improved through iterative feedback sessions, and its effectiveness tested through a pilot user test with 26 contract users in SSAB. An anonymized version of one of the agreements was also tested with 122 international contract managers from large corporations, members of the IACCM (International Association of Commercial and Contract Management).

The results once again suggested that visualization increases dramatically the usability and UX of the document. Testers were able to answer more accurately and quickly comprehension questions about the contract when the content was presented in a more visual form (Figure 6).

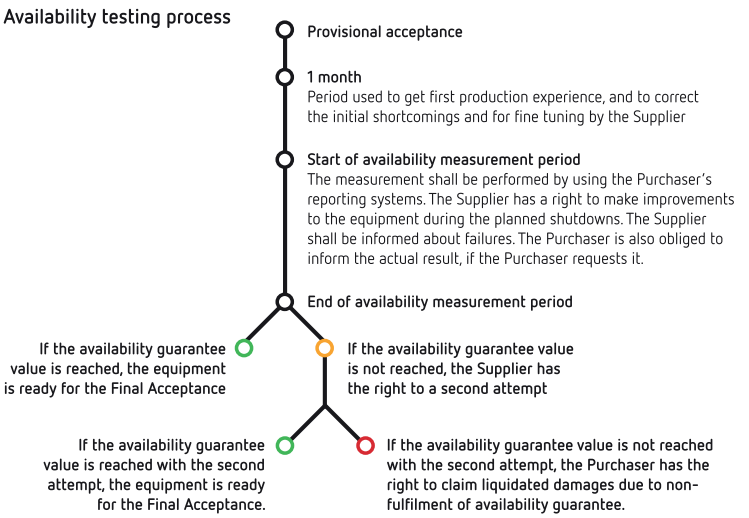


Figure 5. **Example of a process visualization used in equipment purchase agreements: the availability testing process**

A very interesting result of this study emerged by statistically analysing the interactions between different variables: visual contracts can help non-native speakers to understand the contract as accurately as native speakers. When using a textual contract instead, unsurprisingly, native speakers got right more answers that their non-native speaker peers.

This has significant implications since because English is the principal lingua franca (used in its infinite local variants, more or less skilfully) of business, very often, both contracting parties will rely on English, even though none of the negotiators or contract managers would be an English native speaker. Visualizations offer a chance to communicate more effectively with global partners.

A visual contract also feels less difficult and more useful and pleasant to use. Firstly, the two groups were asked to subjectively assess the difficulty of using their assigned contract version both before reading it (expected difficulty) and after (effective difficulty), via the comprehension task. The "before task" measure was taken to demonstrate whether the two groups differed in their expectations or preconceptions about the task difficulty, based on their previous experiences

with contracts. While there was no difference between the expected and effective difficulty experienced by the group working with the traditional text-only contract, the group working with the visual contract experienced less difficulty than they had previously expected. The visual version of the contract exceeded the expectations of the testers.

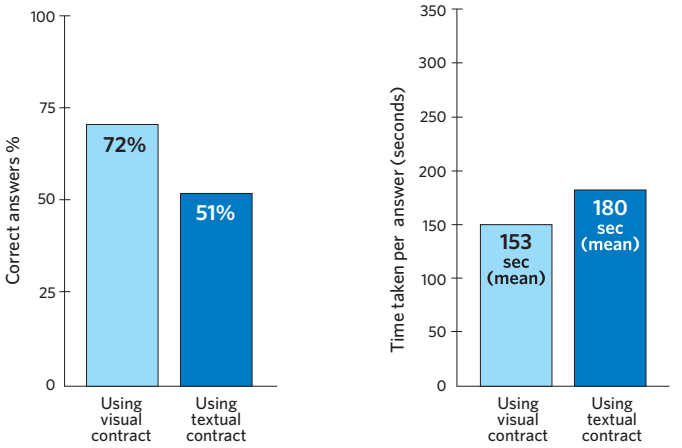


Figure 6. **Experimental results: readers understand better a visualized contract and are faster at reading and answering comprehension questions about it**

The two contracts were also compared in terms of perceived functional/usefulness and in terms of hedonic gratification. While the original contract was assessed as functional yet unpleasant, the visual contract was considered both more functional than the original as well as pleasant to use.

In conclusion, visualizations can reduce the cognitive efforts of contract professionals, so organizations can ensure that their workforce is more engaged in reading contracts, achieving better results at a fraction of the time and effort usually required. Visualization also improves the overall experience of contracts, possibly boosting the brand of an organization with its prospective partners, as it may communicate values such as transparency, openness to collaboration, and innovativeness.

What next? Automating the drafting of contract text and visualizations

Motivated by the positive experimental data, we moved on to tackle a practical question: how can we offer contract visualization capabilities in the easiest possible way? How can we automate as much as possible the visualization process?

An initial proof-of-concept prototype was created in collaboration with domestic and international research partners. The tool, based on simple, plain language inputs given through a dialog box, can generate clearly drafted contract text and its corresponding visualization (Figure 7). In the prototype we included clauses such as contract validity, price, guarantees, and liquidated damages due to delay.

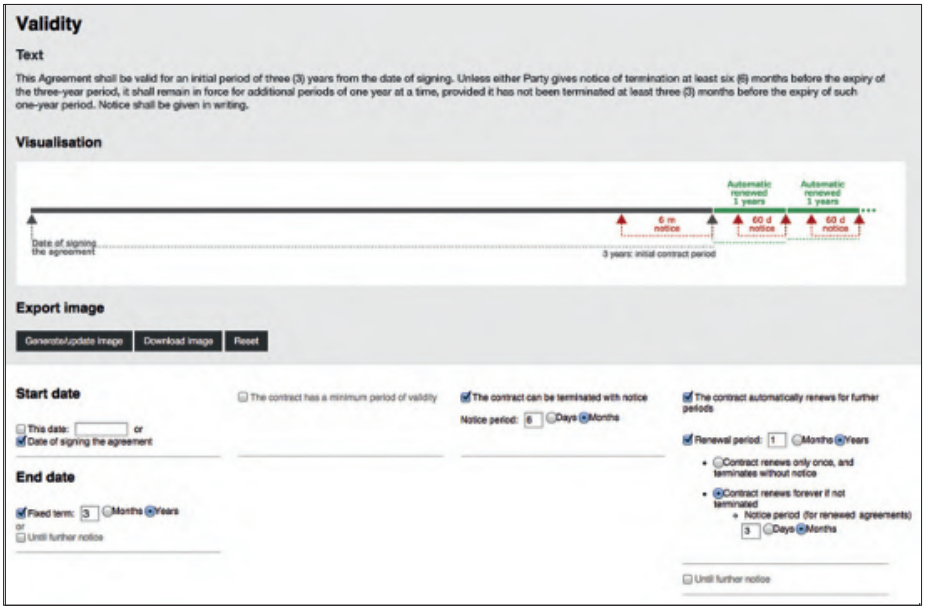


Figure 7. **An automatically generated contract validity clause, in textual and visual formats**

Valmet case: using visualizations not only in contracts, but also during negotiations

A similar development process has been carried out with Valmet. The focus was an operation and maintenance outsourcing agreement, used in the service sales division.

The whole sales team (including supporting personnel in financing, legal and HR) was interviewed, and it soon emerged that visualizations could have a larger role in communicating with the customer: they could be used also in presentations to customers from the very beginning of the sales and contracting process, and not only in contracts, so as to provide a "visual template for discussions" to the parties.

During the feedback sessions it became apparent that visualizations do not simply serve a "neutral" role in enhancing communication, but were seen by the sales team as a way to represent and communicate value: they had to be accurate and truthful, but they also

had to play a role in providing "a feel" of what the service would be, and why it was a good choice for the customer.

The case resulted in the creation of a redesigned template, which included several new diagrams, a more logical structure, and a service map. Additionally, the idea that visualization can help communication and building more positive customer experience has been well received in Valmet: several sales people started creating their own visualizations for different sales cases, experimenting with what would work best with customers.

The FIMECC case: "walk the talk" by adopting a redesigned Research Consortium Agreement

In light of the positive results obtained in the UXUS cases, FIMECC itself decided to walk-the-talk and have its Research Consortium Agreement redesigned and visualized.

The development work has been carried out in close collaboration with SHOK legal counsel Essi Heinänen, who provided feedback and input in several iterations. Additionally, researchers, program managers, university lawyers and company representatives were interviewed.

Only lawyers really read the document, while front-line project participants (researchers, case owners, work-package leaders and even program managers) do not even receive a copy of the contract. On the other hand, researchers would instead like to get pertinent information in simple, effective formats, rather than having to read the whole contract.

WHO	RIGHTS TO FOREGROUND INFORMATION (FI)	RIGHTS TO TRANSFER OWNERSHIP	RIGHTS TO SUBLICENCE	DURATION OF THE RIGHTS
INVENTING PARTY	**Ownership (10.1)**	**Yes, as long as (10.3):** - Rights and obligations arising from this Agreement and/or from applicable rules of a public funding organisation are transferred as well; - Other Parties have priority over third parties until 24 months from the end of Programme.	**Yes, but (10.4):** - Not exclusively; - Obligation to inform the other Parties during Programme within 30 days from the execution of license.	**No time limit unless Ownership is transferred**
OTHER PARTIES & THEIR GROUP ENTITIES	**Royalty-free Access Right** (non-exclusive, irrevocable and perpetual licence and right to use FI in R&D work and business operations) **(10.5)**	**No**	**Only if (10.7):** - To subcontractors for Party's own research or development work or business operations - To users of a Party's end product or service, if elements of FI are included in a Party's product or distributed appended to it	**No time limit.** Note however that a license to Background Information may be needed.
SUBCONTRACTORS	**Royalty-free Limited Access Right** (non-exclusive right to use FI to the extent it is necessary for carrying out work within the Programme) **(10.8)**	**No**	**No**	**For as long Access Right to FI is necessary for carrying out work within Programme.**

Figure 8. Example visualization from the FIMECC agreement: different parties' rights to IP generated during the projects

For these reasons, not only the contract template was redesigned and enhanced with several visualizations (see Figure 8), but we also created a visual slide-set that could be used to explain and share more easily key rules to the front-line project participants.

Learn more

Passera, S. (2015). Beyond the Wall of Text: How Information Design Can Make Contracts User-Friendly. In: Marcus, A. (Ed.) Design, User Experience, and Usability: Users and Interactions, vol. 9187. Lecture Notes in Computer Science. Cham: Springer International Publishing.

Passera, S (2014). Contract visualization: boost your brand and bridge the language barrier, Contracting Excellence: https://www.iaccm.com/resources/?id=8255

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Haapio, H, Passera, S. (2013). Visual Law: what lawyers need to learn from information designers, Vox PopuLII, 15 May 2013: https://blog.law.cornell.edu/voxpop/2013/05/15/visual-law-what-lawyers-need-to-learn-from-information-designers/

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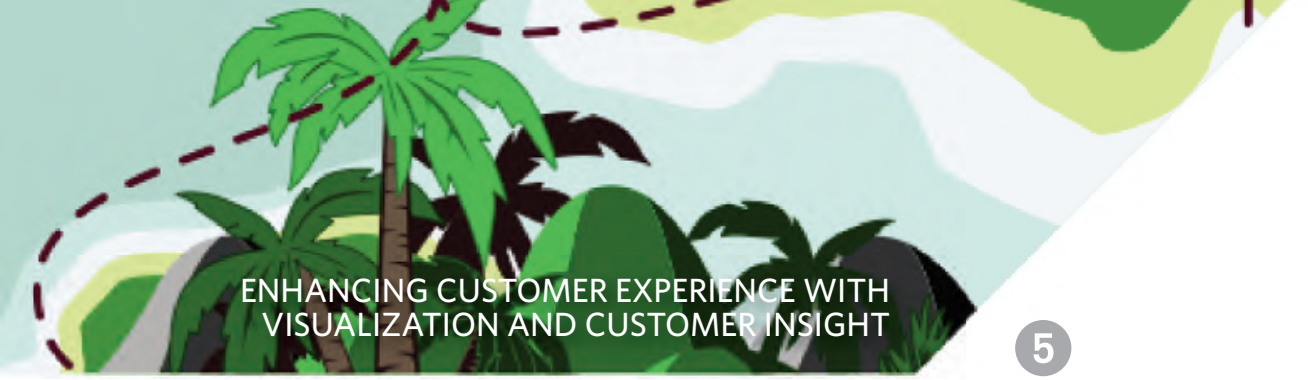
Passera, S., Haapio H. (2013). Transforming Contracts from Legal Rules to User-centered Communication Tools: a Human-Information Interaction Challenge, Communication Design Quarterly, Vol. 1, Issue 3, April 2013, pp. 38–45.

Passera, S (2012). Enhancing Contract Usability and User Experience Through Visualization – An Experimental Evaluation. Proceedings of the 16th International Conference on Information Visualisation, IV2012, 11-13 July 2012, Montpellier, France.



MARJA LIINASUO, MAIJU AIKALA
VTT

Customer perspective driven service modularization in supporting sales

Large industrial companies offer hundreds of services. A key question is how to match the right service to the customer in question. This calls for a service modularization that has been driven by a customer perspective.

Positive customer experience is supported by services that meet the customer's needs

Investments in capital-intensive machinery are typical for the process industry. The monetary impact of the investment is remarkable, restricting the possibilities to alter the production process for years. The nature of the investment combined with declining market demand in times of recession causes delays in updates and green-field investments in machinery. Therefore, machine suppliers have started to generate revenue through services, such as maintenance and supply of spare parts.

A supplier can create a strong relationship and increase customer experience by offering products and services that satisfy customer's needs remarkably well. This makes the customer feel unique and understood. A customer relationship brings benefits both to the customer and the supplier, as customer's needs are fulfilled and the supplier gains higher revenue and better market share.

If the supplier has an abundance of services, the challenge is to identify the optimal solution for the customer. Yet the number of possible types of services makes the choice demanding, and the variety among the types increases the difficulty. Finding the appropriate service for a new customer is challenging, and the same applies when selling new services to old customers. When selling new services, familiarity increases the chances of success but does not guarantee it.

We studied a company to find out how to facilitate the choosing of services in each sales situation. We asked sales persons to come up with means to put the customer in a central position in modularising industrial services (*see also In-depth: Boundary objects in sales, page 191*). We gathered the data by interviewing eight sales professionals at Valmet. The interviewees were (a) sales professionals working in the field and visiting customers periodically and (b) technology and sales material experts who mainly supported the sales by providing insight for sales people, but also occasionally visited customers. The interviewees represented different cultural backgrounds: four were Finnish, two Swedish, one Italian and one Portuguese.

The starting point is to know the customer

Most interviewees emphasized spontaneously that knowing the customer well was the most important factor for a successful sale (see Figure 9). 'Knowing the customer' was considered to be multifaceted: knowledge of technical details including parameters of machinery, market situation and trends, the customer firm's values and goals, as well as organizational status and targets. Even personal goals and interests of the customer representatives were considered among the factors.

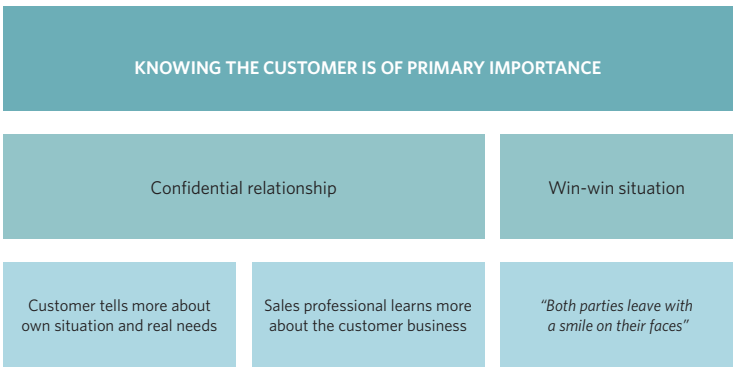


Figure 9. **Know your customer**

Customer's technical solutions and targets are important to know

As the basis for service modularization, interviewees' suggestions and ideas can be divided into two main categories; 1) customer-based modularization and 2) service-based modularization.

Regarding customer-based modularization, it was suggested to classify the technology used by the customer. Based on this classification, services could be arranged for timely customer-specific

matching. This requires that the customer is familiar with the supplier, or that technical solutions in the domain are homogeneous so that along with basic solution, details follow.

Interviewees also emphasized the importance of knowing customer's targets, starting from large-scale strategic goals to operational targets and detailed or situational sub-targets (Figure 10). Depending on the customer, the level of the target expressed varies and the supplier should always consider carefully these targets in the sales process.

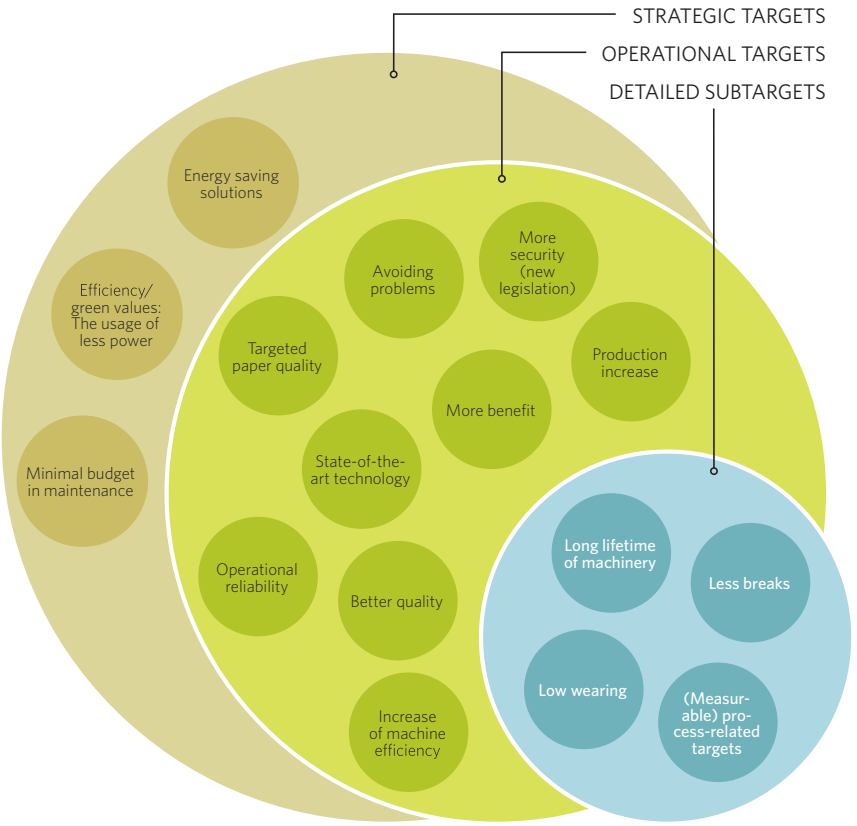


Figure 10. **Customer's targets**

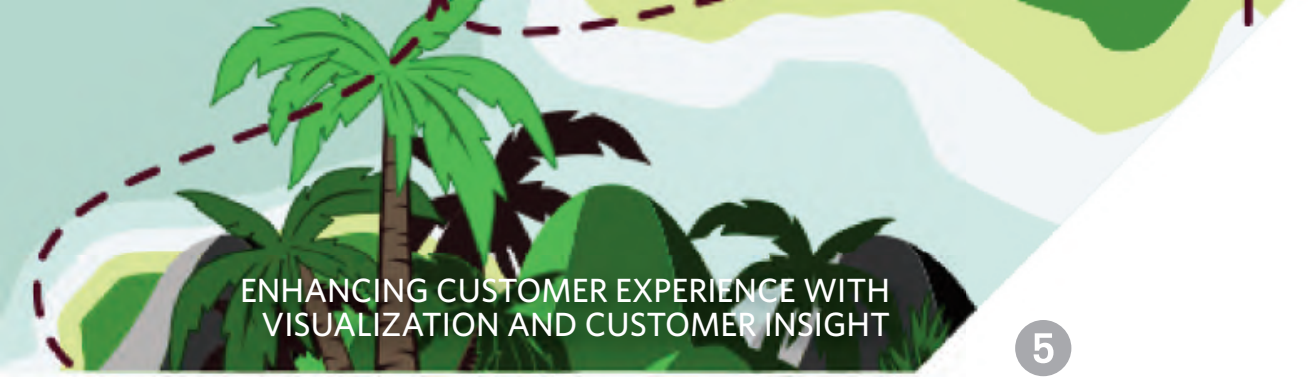
Service-based modularization requires each module to indicate its purpose from the customer's perspective

In addition to customer-based modularization, the interviewees considered service-based modularization. Then, each service module should indicate its purpose or value from the customer's perspective. For instance, the service category of "premium maintenance" could represent regular maintenance guaranteeing better operational

reliability for the customer. Similarly, when selling some product it could be stated how long the product is expected to be functional in the customer-specific technical environment.

5.5 Customers want to satisfy their needs in their own way

In the study, several viewpoints for service modularization were offered. The approaches are not exclusive: the customer- modularization manageable and concrete. However, very many viewpoints cannot be included, since based viewpoint can and perhaps also should be combined with the service-based one to keep the total offering becomes quite complex. One key aspect should always be remembered: whatever the need is, the customer wants to satisfy it in their own way. This brings us back to the principle of the importance of knowing the customer.



ENHANCING CUSTOMER EXPERIENCE WITH VISUALIZATION AND CUSTOMER INSIGHT

5

MIKKO KARIOJA, **JUHA OJALA**
VALMET
MIKKO ILLI, AALTO UNIVERSITY

In-depth: Boundary objects in sales

In modularising the industrial service offering for paper machine rolls, Valmet created a demand for communicating visually the complex service context to customers. Sales that are driven by selling total solutions rather than one-off maintenance services need to consider the interaction from new viewpoints, one being the customer type. Customer types vary between management, production and maintenance and result in different needs, such as strategy related, improved performance or critical needs that toned to be taken care of immediately. The benefits of visualizations as boundary objects are numerous: they open pathways to different professional's thinking, guide the sales team around the appropriate topics of discussion with the customer, help them to consider alternative approaches in demand, and support a dialogue in the sales negotiations (*see also Ethnography in sales, page 171*).

Modularity enables easy creation of customized solutions

Based on the highly promising results of visualizing outsourcing contracts, the project was extended to roll services, where the focus was on solution modularization (*see also Customer perspective driven service modularization in supporting sales, page 187*) and visualization of the related sales materials.

Valmet roll services has a high number of different products and services in its portfolio and until recently most customer quotations have been tailored case by case – a laborious approach that in the long run does not support the development of high-value-adding services. In order to serve customers better it has been obvious that Valmet should move up in the value ladder by transforming its offering from single products and services towards more technical solutions and ultimately towards customers business support. Modularity of the offering and the creation of new visual tools to communicate the new approach internally and externally were seen as major success factors in this development.

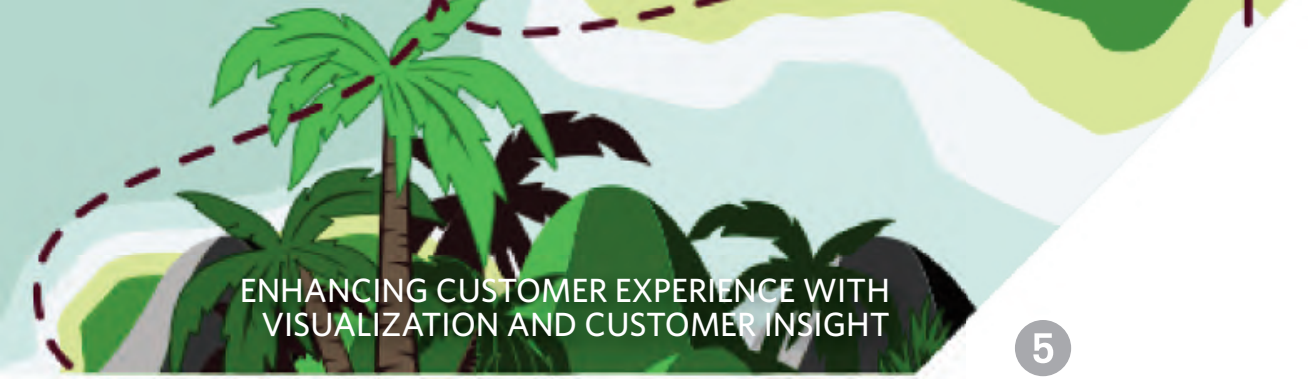
The project started with the definition of basic roll products and services supporting customers in their roll related needs. These basic sales items are the smallest sellable products and services, and they can be easily combined into larger service modules and solutions. With this modular structure we are easily able to create customized solutions that match customers' business goals. The modularization work was supported by VTT researchers who studied the different approaches to modularization, including customers' business goals.

Visualizations are needed for internal communications as well

Modularity does not always mean simplicity, so visual tools were needed to enable the clear communication of the new modular offering. Once again the graphic designers from Aalto University created examples of visual sales tools that could be used to communicate things like service concept, supplier's responsibilities, and even estimated business value for the customer. It is obvious that the clearly visualized materials help our sales managers in the customer interface where they can now more easily present Valmet's solution. The visualizations also help in internal communications, thus improving the co-operation between different functions and units in roll services (Figure 11).

Figure 11. **Sales application for preparation in negotiating with different customer types**

The visualizations of different customer types and the possibility to prepare a targeted argument and negotiation order helps to focus on the most relevant topics. The visualizations also help the supplier to organize the negotiation strategy and reframe it during the negotiations if it turns out that the direction needs to be changed. During the negotiation the visuals help in agreeing about the particular steps of the deal with the customer. These ease the complexity of the negotiation and help to focus deeper into the task in progress, to remember what was discussed, and also to communicate to others.



MARJA LIINASUO, MAIJU AIKALA
VTT

Boundary objects affecting customer experience (CX) in sales and delivery

The supplier must pay attention to the documents and other material shared with the customer during the sales and delivery process. A good customer experience requires that the documents serve the objectives of both customer and supplier in each phase of the process. This is valuable also after the delivery.

The sales and delivery process is a good opportunity to build positive customer experience

Efforts to support and enhance a customer's positive experience should be started as early as possible. In manufacturing, the lengthy sales and delivery process constitutes a period during which the customer's experience is affected. From the supplier's viewpoint, it is important to establish a good customer relationship as it not only supports successful sales and the delivery process but also strengthens possibilities for more business, such as selling more machinery or maintenance services in the future.

Shared documents and other objects, referred to as boundary objects, contribute to mutual understanding and communication

We focused on strengthening mutual understanding and communication as a means to promote a positive customer experience. A customer's positive experience facilitates cooperation during the sales and delivery process, enhancing opportunities for finding appropriate solutions in decision-making situations. A positive customer experience strengthens the possibilities for future collaboration and shared business, such as ordering more machinery or services from the same supplier after the delivery process. The means to strengthen collabo-

ration was identified as the usage of documents and other materials used by both parties. These types of documents and objects are referred to as boundary objects. They are the kind of objects that are used by two or more different groups, satisfying the knowledge requirements of each of them. In order to better understand their role in the process, we also created a process description with the objectives of each party in each phase of the process. We interviewed several sales and delivery professionals in Valmet to discover what kind of boundary objects are used in the process and how well they serve in their function.

Identifying the boundary objects clarifies their roles relative to the objectives of both supplier and customer

A description of the sales and delivery process was created, as shown in Figures 12 (description of the sales process) and 13 (description of the delivery process), including the phases of the process as well as the objectives of both customer and supplier. Furthermore, the boundary objects relevant to each phase are described in the row in the centre of the figure. Process descriptions refer to successful processes. Thus, for instance, it is assumed that the supplier has the possibility to have deeper discussions (the phase Tailored Presentation) before the customer sends the bid, resulting in competition between suppliers (the phase Competition between Suppliers). It can be seen from the process description (Figures 12 and 13) that the objectives are different for the customer and supplier in the sales process but similar in the delivery process. This is reflected in the difficulty of the processes; it is harder to please a potential customer (in sales) than a customer (during delivery). Regarding boundary objects, we found that all the boundary objects used only for the project in question had served well in their role in delivering information from the supplier to the customer. Only a couple of permanently used documents needed some improvement. This was lucky, as once improved, they can be used several times without further work. The most important document was found to be the contract, in the sense that it was used in the process during several phases.

Mutual understanding and effective communication are among the key elements in good customer relationships

All in all, it is profitably to concentrate on documents shared with the customer (sales material, contract, testing documentation etc.) from the viewpoint of their effectiveness in conveying information to the other party. In this way, the customer understands the messages the supplier has and no misunderstanding will prevent the establishment of a good relationship, which is valuable to both parties.

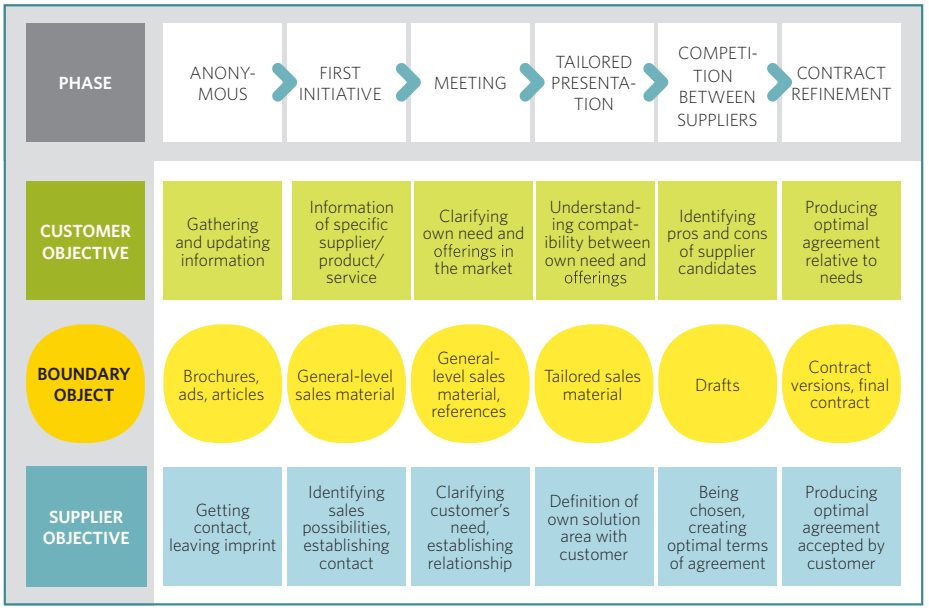


Figure 12. **Sales process presented as phases with corresponding customer and supplier objectives and boundary objects.**

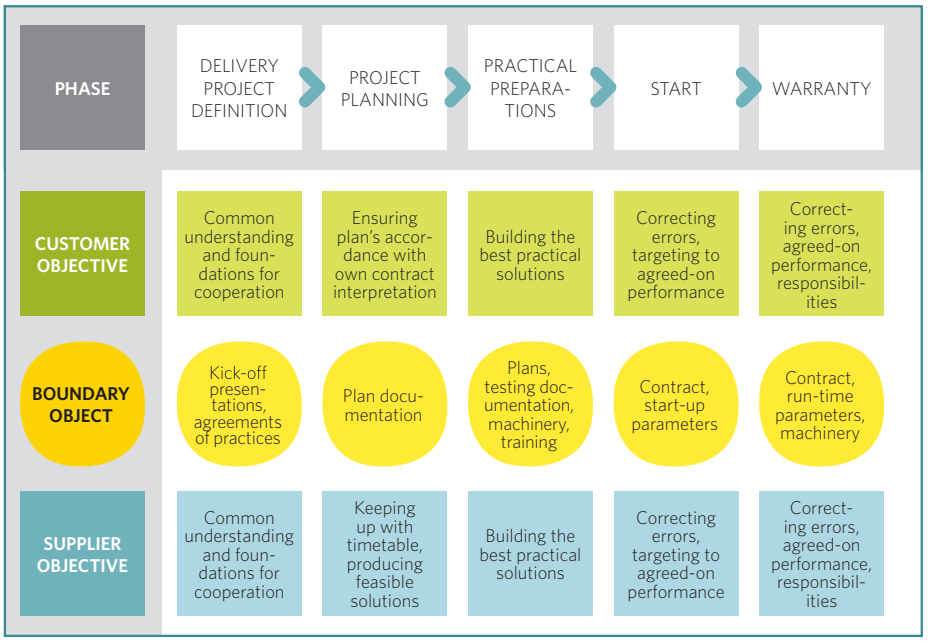


Figure 13. **The delivery process presented as phases with corresponding customer and supplier objectives and boundary objects.**

Learn more

Liinasuo, M. & Aikala, M. (2015). Boundary objects in sales and delivery process. European Conference on Cognitive Ergonomics 2015, 1-3 July 2015, Warsaw, Poland. To be published in ACM by autumn.

UX journey

SSAB

SEIJA JUNNO, SSAB

SSAB UXUS journey:
Towards business experience

Research for understanding the users behind the customers

Our UXUS journey was started as a journey with case studies conducted together with the Research and Development (R&D) department. Especially young engineers perceived that meeting customers and user visits was a necessity. During our project the R&D engineers were able to explore customers' reality in much more detail than the key customer managers are usually able to do. However, some challenges in understanding customers required extra effort, as engineers still communicate using their own terminology.

The information regarding working conditions of the actual user and the stereotypical user profiles were found to be valuable and inspirational for R&D.

These case results encouraged R&D to update their processes.

Encouraging R&D people to visit users and discuss with them was a big step towards developing a user-experience mindset.

Research for understanding the users behind the customers

Our UXUS journey was started as a journey with case studies conducted together with the Research and Development (R&D) department. Especially young engineers perceived that meeting customers and user visits was a necessity. During our project the R&D engineers were able to explore customers' reality in much more detail than the key customer managers are usually able to do. However, some challenges in understanding customers required extra effort, as engineers still communicate using their own terminology.

Figure 1. **Light and strong steel materials offer a big potential for the construction industry. The cost savings in a single building project may exceed 20 per cent. In addition, the stiffer material offers new opportunities for design (e.g. longer spans). However, the value chain must be provided with easy-to-use tools in order to help the parties realize the new possibilities.**

Encouraging R&D people to visit users and discuss with them was a big step towards developing a user-experience mindset.

Business directors as UX Activators

In the second UXUS year we had an **internal company forum** called User Experience (UX) activators. The group consisted of technology and marketing directors, all aiming towards better activity geared to user and customer experience in the company. The group's main tasks were to activate and support UX work as well as to share experiences and good practices within the company. The activators launched and

supported **new pilots and cases** in order to show the benefits of this kind of development work.

The work was started with an **internal audit**. During the early stages, we learned that basic understanding of the topic was already established, and the relevancy of the topic was seen as being of high importance. However, inside our company, there were no formal processes to support the work and no budget for the actions. In addition, the roles and responsibilities related to UX were unclear.

During the project, the activators had monthly meetings for one year, sharing experiences and activating each other as well as their own organizations. This was the second big step in changing the organizational mindset.

Real co-operation instead of information systems

In the later phases, we noticed that the voice of the customer and other stakeholders could indeed be heard in our company, but not always in the right place and at the right time. This implied that especially R&D should be connected more closely to the information flows regarding customer information. As a result, we challenged the traditional way of collecting and sharing information, and started to explore new procedures.

Why collect information into the company's own files?

Would it be easier to do the development work together?

Figure 2. **An intensive and open process with many players on the field – and even outside the field – resulted in a map of new roles and possibilities.**

New thoughts based on more active co-operation as well as the possibilities of the Internet of Things (IoT) were put on the table:

What is the business experience of each operator?

What is the role of the factory in the future and what is the role of material? How to utilize the huge amount of data for better production and maintenance planning and control? What kind of operations, operators and services are needed?

Novel results by combining perspectives

We developed a very useful and productive way to **co-operate with academic researchers**. Giving the same business challenge or topic to the FIMECC FUTIS and FIMECC UXUS researchers contributed to keen co-operation.

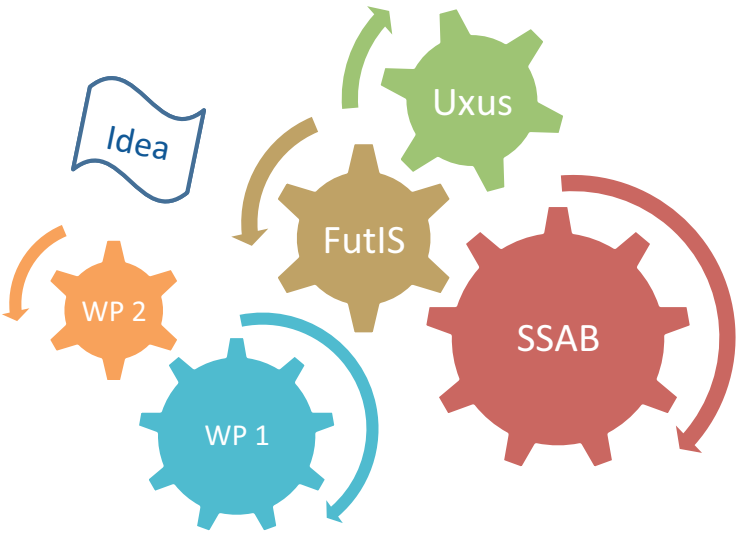


Figure 3. **Co-operation between Fimecc programs**

The different areas of expertise and different viewpoints created fresh topics and novel solutions.

However, reaching this goal takes time. The best results started to appear after several years of co-operation.

The business topics have included: 1) our roofing business, 2) use of high-strength steels in construction, and 3) smart materials and components.

Intelligent materials as a basis for new business models

Explorative and cross-disciplinary research in the field of IoT and intelligent materials revealed that in the near future, the material industry operators might be competing around the ability to provide, aggregate and leverage data, rather than simply on different product offerings and features. **The role of material** itself seems to be extending to become a 'message carrier'. This might demand more intensive and agile collaboration between different companies. In this setting, information sharing and combining may become a more fruitful practice than data protection.

New openings with good business experience

An important result of our UXUS journey has been the realization of **a novel way to carry out a research collaboration** in the Finnish innovation system. It is closely based on the earlier co-operation models, but functions more like an 'idea accelerator', and most importantly, it exists without separate theme silos. The new model can be described as a set of 'expertise gears' in which end users, customers, suppliers and strangers share and test ideas. It appears that the competences of this kind of ecosystem are nearly unlimited.

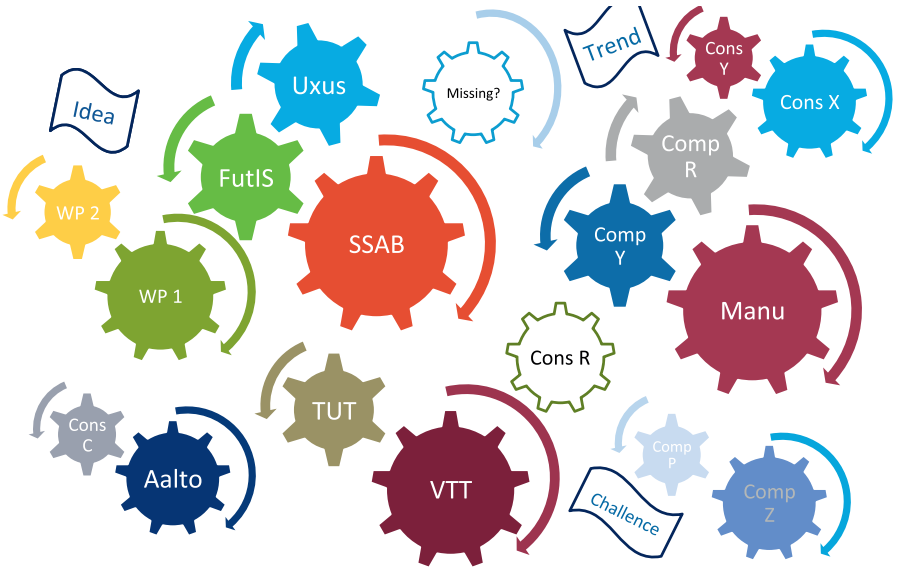


Figure 4. **New openings by joint research platforms between science and industry.**

As illustrated in the *picture*, the 'gears' rotate constantly, refining ideas and producing novel experiments, while being encouraged by the attractiveness of the business experience of each partner. This requires open-minded organizations and enthusiastic individuals willing to share their ideas. Each topic needs at least one champion driving the topic and arranging collaboration sessions. Frequent half-an-hour online communication works well; long workshops are reserved for more extensive sessions and synchronizing ideas. The rapid process keeps the ideas fresh and enables quick problem-solving whenever they may occur.

In my opinion we should get involved in the co-operation networks quite openly, especially if the network is heterogeneous. I believe in the theory according to which the innovations are created at the boundaries of competences and organizations. It is good to start with a small project to test the network performance. In the case of failure, there will be only a small dent. A dysfunctional network will not be functional at all in achieving comprehensive planning, given the different cultures and competences and trying to combine them in a new optional way.

So it is better to start a small test project in a heterogenous network and fail fast. If it is successful, the network can be extremely useful.

Mikko Veikkolainen, Kemppi

fimecc
FINAL REPORT 1/2015

UX journey

FIMECC UXUS

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UX expeditions

UX expeditions

The FIMECC UXUS research programme started in 2010 with the goal to enhance the Finnish metals and engineering industry's competitiveness by radically challenging present practices. The aim was to achieve differentiation from competitors by focusing on user and customer experiences – thus challenging the mindset in the companies (Nuutinen et al. 2011), starting more from an R&D focus but bringing company-wide impacts.

As illustrated throughout this publication, in the programme, participating companies and research organizations have worked together on various concrete cases, from different theoretical and practical perspectives, with multiple research questions, thus gradually extending the view of experience design. The programme is closing now, and we have summarized the key lessons learned from the expedition towards experience culture for the B2B metals industry in a poster (see Figure 1). The poster summarizes the main contribution in order to reach the industry-wide impact. In this article, we use the poster items to explain a set of activities we found to be important in preparing a company for the experience economy.

B2B companies are often far from the actual users, yet their customers are increasingly interested in improving the experience of the end users. As B2B companies increasingly focus on service business and/or providing whole solutions instead of one piece of a system, they need to take more responsibility for the UX. Many UXUS companies manufacture tools for their customers' employees, such as the forklift trucks by Rocla or the process control systems by Valmet Automation. The tool users appreciate good user experience, but the challenge in B2B business is to convince the buyer that improved UX is an important criterion in an investment decision (Sundberg & Seppänen, 2014).

The starting point for experience-driven operations is to **open the window to the customers' world** and learn to know their contexts, values, and experiences. There are various options for constantly collecting data on customers' and users' experiences, such as through UX sensors (see page 113). The more different the customers' lives are from one's own, the more important the open window is. **Visiting foreign contexts** to understand your customers or the end users of your products or services is often an eye-opening experience, and is required before you can understand and interpret the data from UX sensors. Data gathering alone cannot give in-depth understanding of the customers' world, but observations and interviews and other ways of empathising with the customer are needed. **Empathy** is required to

Figure 1. **Lessons learned from the expedition towards experience culture for the B2B metals industry** (poster available at **http://uxus.fimecc.com/sites/uxus.fimecc.com/files/ux_expedition.png**)

understand the values and experiences of people in the customer organization.

Although the users of B2B products are often far away, there are 'users' at each touch point: people in procurement, maintenance, fairs, websites, and social media, for example. Companies can use experience-driven design to improve **UX in touchpoints** and rethink the materials, services, and digital user interfaces in touchpoints. New touchpoints can be created to deepen the relationship with external stakeholders. All this means that the R&D department is not the only department that designs for experiences, but **everyone is in charge of the UX**. Every employee is a messenger and can improve the user and customer experience.

A concrete way to start experience-driven design is to set *experience goals for projects*. "Superior UX" or "Wow" is often set as the goal of product development, but goals like these are too vague as a starting point for design. A UX vision reflects the overall experience that the design team wants to facilitate for the user. UX vision is based on in-depth, empathic understanding of users and their work. UX vision should also be in balance with the company image and the characteristics of products and services valued by customers. Sharing the UX vision inside the organization helps in getting the design team committed and keeping the user point of view in everybody's mind throughout the design and development project. In this way, the UX vision can act as a guiding star during the design process and even further. To design for the best possible UX, UX vision should be further elaborated as clear, concise, and focused UX goals (Kaasinen et al. 2015). UX goals describe the kinds of experiences that a product, service, or system should evoke in the users. UX goals are based on thorough understanding of what the users want to achieve in their work, and how this could best be supported. Once the experience goals are agreed, it is much easier even for multi-disciplinary teams to jointly work towards a common goal. User experience goals often lead to specific design implications and technical requirements for the technology under development (Kaasinen et al. 2015). When dealing with feelings and experiences, **lively UX stories** are an informative and impactful means to explain why an experience goal was chosen. Measurable requirements are less preferred because measuring experiences before real-life use is challenging.

Since the goal of the FIMECC UXUS programme was to differentiate Finnish metals industry companies from competitors, the research lines also addressed how to create a **distinctive company image** through experiences that stem from the internal company culture (e.g. Nuutinen et al. 2013). We utilized brand personality research to bring out the humane side of heavy industry. Once the company image is clarified, it is easier to introduce **UX as a strategy** and use it

as a strategic tool to steer company operations. Company brand promise needs to be explicated through value argumentation (Väätäjä et al. 2015) in order to communicate clearly how improvements in user, customer, and brand experience will differentiate the firm in the eyes of its potential customers. **Company-wide experience goals** based on the brand promise provide a concrete starting point for designing consistent, brand-specific experiences at all touchpoints (Roto et al. 2015).

In order to achieve differentiation from the competition and to deliver experiences unique to the brand, the company needs to think out of the box and try out new ways of meeting the experience goals. This is not possible without a **culture of experimentation** that provides room to take risks, fail, learn, and try again. Futuristic 'what if' scenarios of the best possible experiences act as showcases that are effective in opening people's eyes. Publishing the showcases through different channels may attract a large audience and raise discussion. **Media visibility** forms the brand image in people's minds, and the experience showcases strengthen the unique brand image. All this leads to an organization that is able to use **UX as the competitive edge**.

What next? Although the UXUS programme is over, the UX work does not stop in the partner companies. As has been said, when UX is in the mindset of people in the company, they will make UX happen in the daily decisions. During the UXUS programme, we managed to raise experience topics on the table on many parts of the company, in some cases on a strategy level, so that they will be visible and not forgotten. We think this is the best outcome a programme like UXUS can come up with.

For Valmet, the UXUS project has been an eye-opener. The development of the customer experience is not only limited to physical products but can be applied to all aspects of business in which customers are involved. At Valmet, the UX expedition continues, especially on the customer interface where we are selling and providing services. The UXUS lessons will be visible in future communication materials and applications.

Juha Ojala, Valmet

By means of this UXUS research programme, Konecranes UX competence was lifted many steps higher. We have learned a lot through the in-house stories: how to work with UX goals, how much you can get from ethnographic customer research, and how holistic UX thinking spreads to all functions in the company. With all this gathered knowledge, UX has become a focus area at Konecranes.

Johannes Tarkiainen, Konecranes

We have learned two major things in UXUS: 1) Communicating experience calls for a rich variety of methods, allowing people to touch and feel. 2) The whole organization has to create a common understanding about the user's and customer's experience around the products. Today, we are on the way to an organization-wide UX mind-set. The next steps in the future will include implementing the UX goals in a more systematic way and building storytelling methods around UX Playroom activities.

Hannu Paunonen, Valmet Automation

A concrete next step is UX measurement: developing a measurement tool with which the UX difference between the old and new product can be evaluated. First, we plan to apply the UX goals and measures to European trucks, regardless of which part of the corporation they are designed in. Rocla continues to change the internal culture towards UX mindset. The work for better and better UX will never stop.

Kero Uusitalo, Rocla

Building a UX mindset is a big thing, it is really an expedition. During UXUS, in terms of mountaineering, we have travelled from village to base camp, where we are now – at the end of the programme - standing safely. We still have some distance to go in order to reach the summit. However, we are confident and excited, because now we know the route, we are familiar with our new equipment, and we have an excellent support network. The journey – implementation of UX goals - towards the summit is just about to begin.

Harri Nieminen, Fastems

Learn more

http://uxus.fimecc.com/sites/uxus.fimecc.com/files/ux_expedition.png

Kaasinen, E., Roto, V., Hakulinen, J., Heimonen, T., Jokinen, J. P.P., Karvonen, H., Keskinen, T., Koskinen, H., Lu, Y., Saariluoma, P., Tokkonen, H., & Turunen, M.. (2015) Defining user experience goals to guide the design of industrial systems. Behaviour and Information Technology 34(10), pp. 976-991, Taylor & Francis (2015).

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Final words

Taking a final look at the beginning of the programme, the products of the leading Finnish metals and engineering industry already represented high usability at that time. However, we recognized that there is plenty of unused potential in deeper understanding of users and customers, and in utilizing the understanding to benefit business targets and, increasingly, also societal targets. The articles in this publication, as well as the impacts already visible in participating companies and interest raised outside the programme, are convincing evidence that we were right. Bringing human and experiential aspects onto the strategic level in B2B industry has required, however, a significant leap in both research knowledge and companies' practices.

The central novelty value of this research is in making user and customer experiences a competitive advantage for the metals and engineering industry, and in developing approaches and methods for this – and sharing openly the steps taken during the UX journeys. The programme collaboration introduced more open, human- and customer value-centred approaches to the traditional product-driven business culture, and demonstrated their power. The research was multi-disciplinary and created new, internationally unique knowledge and competence in user and customer experience, as well as ways to tackle it through interaction technologies, design, collaboration, and innovation methods and practices, particularly but not exclusively in the B-to-B context. The results can also be exploited by other industries. The scientific publications only referred to in this publication are a good source for deeper exploration.

When thinking about starting UX explorations and your own UX journey, it is important to build a collaboration network. The writers of this publication are links to the FIMECC UXUS network and ambassadors of UX, CX, and BX knowledge. In addition, this UXUS community can serve as an example of a new kind of industry-research innovation practice, or practice of community (see e.g. Nuutinen et al. 2016[1]). However, an even more promising future avenue for spreading the impact rests with the members of this community as ambassadors of the new industry-research practice in innovation – and actors in the

1 Nuutinen. M. , Seppänen, M., Smedlund, A., Kaasinen, E. Seeking new ways of innovating in industry-research collaboration practice through openness, service logic, and learning community. To be published 2016 in Russo-Spena, T., Mele, C., Nuutinen, M. (Eds.) Co-innovation - Activity, Practice, Learning and Social Context of Innovation. Springer.

UXUS ecosystems. There lies real potential for redeeming the promise of renewing the Finnish metals and engineering industry, as envisaged in the programme plan – and even more.

Finally, based on our own experience, we would like to emphasize three points for planning and managing industrial research programmes in general (Nuutinen et al. 2016). Firstly, to seek approaches particularly supporting the construction of the new kind of innovation and business practice in addition to the subject (here, UX). This is in a core of creating competence platforms that will live after the programme ends. Secondly, openness in collaboration, networked or ecosystemic value co-creation in business thinking, and a learning community are good suggestions at this time, as general guidelines for managing an innovation programme. The ways of realising these in innovation practice should always be discovered in that particular context. Thirdly, dare to challenge current practices, and leave room and time for learning.

We wish you a very good journey of your own!

Maaria Nuutinen
Hanna Koskinen

On behalf of the whole FIMECC UXUS network

Appendix 1: List of UXUS publications

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User experience and usability in complex systems – Experiences and lesson learnt from the industry's expedition into the UX world

In spring 2010, a group of Finland's metals and engineering industry companies were looking for new ways to enhance their competitiveness. Together with a multidisciplinary group of researchers they shared the vision that industrial design and focusing on end users are the keys to reinventing a business, to coming up with innovative new products and services, and to boosting radical changes. They started a common learning journey in the FIMECC UXUS research programme (User experience and usability in complex systems, 2010-2015) and embarked on a quest for new knowledge. What does UX mean in the context of complex systems? What does it mean in the business-to-business context? How could user experience (UX) be utilised for competitive advantage?

This publication summarises the main lessons learnt in the programme. It describes the plethora of new opportunities that experience-based thinking presents and the new kinds of paths to innovativeness and possibilities to stand out from the competition that opens up. The articles give numerous concrete examples of steps to be taken and approaches that can be utilised. The publication invites the reader to share our experiences, to look for more information – and to start their own UX expedition.