



Together for a Better World. ABB.

Redefining the experience of Drive Composer Pro and the ABB development process.



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Summary

What happened during the course?

This project has been completed by an international team of students within the seven week long Experience Driven Design course led by Virpi Roto at Aalto University ARTS, Collaborative and Industrial Design program.

The course applies an 'experience-driven design approach in the early phases of product design in real life cases'. The aim of the course was to learn about the experience design processes theoretically but also practically giving the students an opportunity to work with several leading Finnish companies. From an academic and practical perspective the course taught students to "understand the principles of integrating experience design activities into an agile, iterative software development process".

The course collaborates with companies who act as clients for the student groups. These companies provided the design briefs for the collaborative projects. In addressing the project briefs, the goal of the design teams was to develop two design concepts, one applicable and one radical design, by defining experience goals and evaluating the resulting experiences with users.

The international team working on this project came together in mid February during the company's topic presentation day. The team was formed because the members selected the project brief presented by Marjukka Mäkelä about ABB's Field Engineers and Drive Composer Pro. The team includes members from Belgium, Canada and Denmark.

The team of students were excited to work on a project that placed an emphasis on the user experience rather than technology. They were particularly drawn to this project because it offered the ability to conduct extensive user research from various individuals in a large variety of contexts and that the project offered an interesting case that required extensive improvements.

The team's initial approach to this project was to conduct a broad research enquiry about field engineers, including

their motivations and desires as well as the drive composer tool itself. We then completed benchmarking with other competitor's programs. We conducted this research primarily through secondary research and user interviews. We explored the relationship between The Field and The Factory within the ABB Drives organisation. The polarisation between these departments influenced our direction.

In analysing the research we identified the diversity of the users and user needs of Drive Composer Pro and created personas and user journeys to understand these needs. After creating key insights in understanding the users, we established our experience goals. We used these experience goals to develop our two concepts.

After learning about the field engineers experiential relationships to their work and the tools that they utilise, we proposed three main experience goals, three minor supporting experience goals and two solutions. The proposed experience goals include challenge, competence and fellowship, which lead the team towards the proposed solution in applying these experiences to both an easily applicable solution and a radical concept.

The team iteratively developed two concepts in which they approached the experience goals from different perspectives. In developing the concepts they moved from sketching to paper prototyping to digital and back again. After each iteration they evaluated the concepts with different users.

Based on the users feedback and experience evaluations, they revised and refined their designs. They kept the experience goals in mind during the entire development and design phases of their process .

The team's first concept is called **Drive Suite: Upgrading the Navigation and Linking the Community** - it is an experiential redesign of the interface, navigation and Q&A features for the Drive Composer Pro software used by field engineers. They created this concept to facilitate experiences focusing first on competence, then challenge and finally fellowship.

Their second concept is called **ABB Development Community: Connecting the Field and the Factory** - this concept is a redesign of ABB's development process. They created this concept experientially first focusing on fellowship, then challenge and finally competence. For this concept they thought that a redesign of the user

engagement process could radically change the representation of user needs, wants and desires through developing a solution that facilitates a dialogue in the way user needs and requirements are implemented into the solutions that ABB offers.

At the end of the project they went back to their experience goals and evaluated their concepts based on these goals. The team created two concepts, one easily implementable and another that would radically redefine the user's representation in the solution development process; both of these concepts are manifestations of our experience goals in very different ways.



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Introduction

Experience Driven Design

This project report was developed by three MA students in Aalto University during the Experience Driven Design course. The goal of this report is to document our seven week design process from exploration until concept delivery. The report shows our complete process to the course evaluators as well as our clients at ABB Drives. In reviewing this report, both our professors and our client should be able to follow our process and understand the development leading to our design outcomes.

The Course

Experience Driven Design is a seven week course which introduces students to the “XD paradigm and interaction design in a product development process”. After completion of the course those involved should be able to:

- Apply experience-driven design approach in the early phases of product design to real life cases
- Build an interactive digital prototype
- Evaluate concepts with a focus on experience
- Understand the principles of integrating experience design activities to an agile, iterative software development process

In achieving these outcomes, Aalto University has partnered with several companies located across Finland to work with real industry problems.

The students involved in this course develop both applicable and radical solutions based on the brief from their client by defining experience goals and evaluating the resulting concepts' experiences.

Our teams client is ABB. ABB tasked us with delivering applicable and radical solutions that investigated the real needs of the the users, especially how the monitoring of ABB drives can be improved without losing Drive Composer Pro's advanced configuration options. For the radical solution ABB advised us to be as radical as possible.

Our team consists of three masters students from two different programs at Aalto University.

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The Client & The Brief

Together for a Better World

The Client

ABB is one of the world's leading engineering companies in power and automation technologies. ABB was formed in 1988 through the company merger of Swedish ASEA (1883) and Swiss BBC (1891). Today ABB operates closely with utility, industry, transport and infrastructure customers in roughly 100 countries around the world. They have about 135.000 employees and create around 36 billion revenue a year. Their mission is to help their customers use electrical power efficiently and to increase industrial productivity while lowering the environmental impact in a sustainable way. They offer a range of products within electrification, robotics and motion, power-grids and industrial automation. Some of the main products manufactured at ABB are the drives which are installed in many of today's electric motors. The drives sit between the electrical supply and the motor and are used to regulate the amount of power going into the motor. In doing so, drives help save energy and increase motor capacity.

Understanding the ABB Brand

To fully understand ABB and the goals of the company we looked into ABB branding materials. The value propositions as a corporate and an employer brand are created from understanding people, both their customers and employees. The value propositions from ABB help us understand **Why** people work at ABB and **Why** people rely on ABB's services. **Inclusive, Challenge yourself and Take the lead, work together** are the main focus area as they form a good base for community and open communication. Also how dealing with challenges starts from the individual employees by doing what they are best at but that they are not alone to lead the way in technology.

ABB Values

During our research we identified several of ABB's Values as a company.

—
“It's not about rules. But about developing and working with integrity. Integrity is about behavior”

“ABB is committed to fostering a culture where integrity is woven into the fabric of everything”

The other values that ABB consider to be important include responsibility, respect, determination, sustainability, low environmental impact, business ethics and innovation, and quality.

The Brief

ABB outlined the following goals for us to address as we approach the project.

—
“What are the real needs from the user point of view?”

“How can the monitoring be improved without losing Drive Composer Pro's advanced configuration options?”

Schedule

The design process

Exploration | Week 1-2

In the first two weeks of our project our team's objective was to understand the landscape of the problem. We completed secondary research, interviews, benchmarking, and context mapping. Additionally we received a software tutorial from the client and mapped the diversity of users needs.

Insights | Week 3-4

After completing initial research in weeks 1 and 2, we attempted to make connections in the research to develop key insights into the problems that exist in weeks 3 and 4. We started this by using affinity diagramming, persona-creation and user-journey techniques.

Experience Goals | Week 4

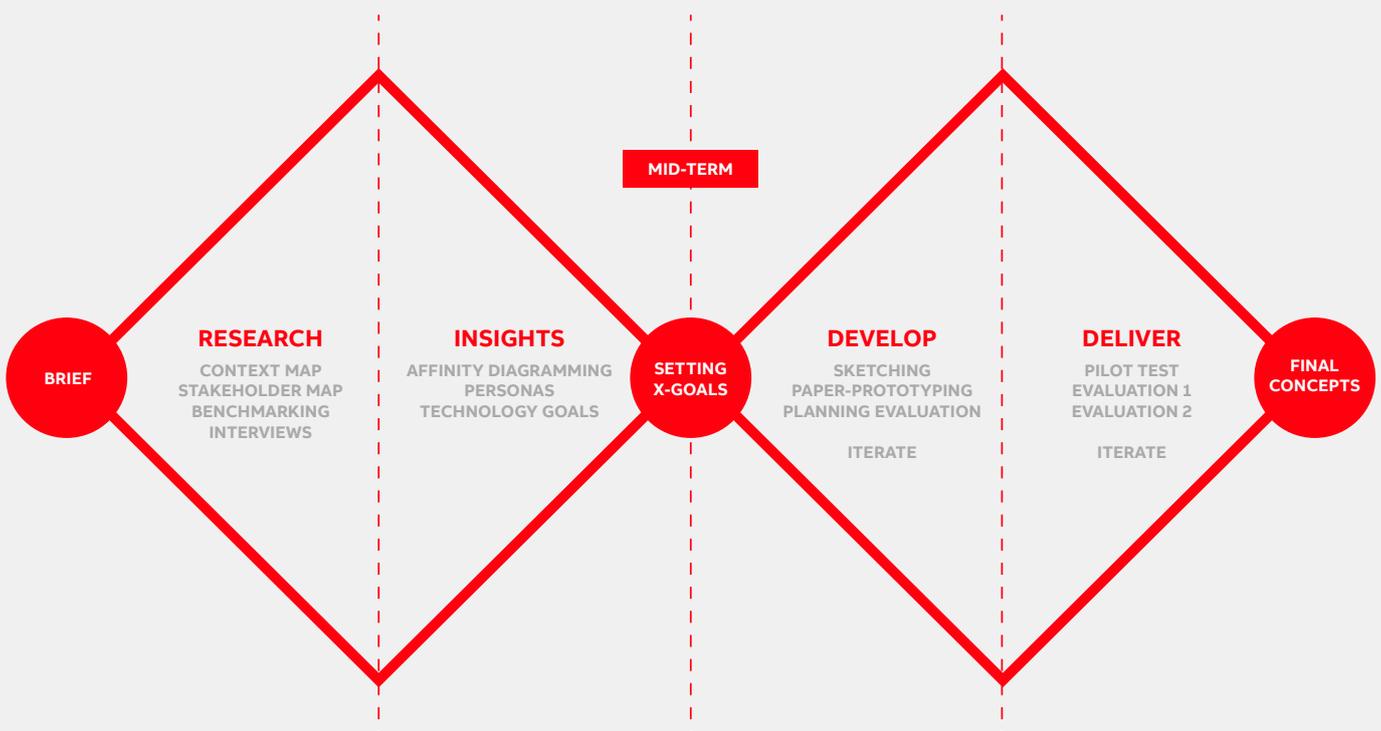
At the midpoint of the project we set our experience goals based on the research we conducted and the insights that we developed.

Develop | Week 5-6

In the development phase we set out to understand how to address our experience goals, to iteratively conceptualise our prototypes towards fulfilling those goals for our users, and finally to evaluate these experiences with the users. We also iteratively tested and refined our experience goals evaluation method during this period.

Delivery | Week 7

During the final phase of this project we finalised our prototypes and concepts based on all of our research, insights, experience goals and experience goal evaluation testing.



Research

Understanding the landscape

Understanding Drive Composer Pro

ABB provides a variety of software and user interfaces to facilitate use of their hardware products. In order to maintain, operate, monitor and troubleshoot the drives, field engineers working at ABB use the software Drive Composer Pro (DCP). When something goes wrong and causes trouble with a drive, field engineers equipped with a PC solve these issues by monitoring the drives behaviour through DCP. It has been noticed that the user expectations for usability and readability for this monitoring are not aligned with the current capabilities of DCP.

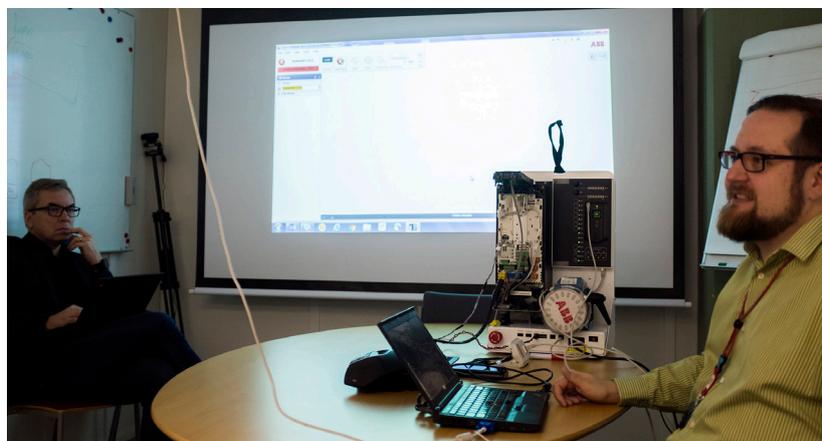
DCP is used when the user connects their laptop to the drive. The drives drivers are automatically installed on the PC. The PC is most commonly used by either connecting with a USB or Ethernet connection. DCP is used to monitor the current state of the drive through this direct connection.

The parameters, read from the drive itself, are at the core of this monitoring. These parameters are customized by the individual engineer in the field. Monitoring can be done in two ways; either through a graph view or through a diagram view. The graph should be able to show details down to the milliseconds as it helps the engineer find possible outliers. Further this amount of details are crucial when synchronising multiple drives. When monitoring the engineer typically set the scale of the graph manually but auto-adjustment as are available.

The configuration of the drives is done with the parameters and any trouble or errors are fixed typically by changing them, relying on the expertise of the field engineer on-site, however, this configuration can also be done off-site. While connected, DCP records all the data from the parameters. If the engineer cannot fix the problem, the data are exported as a support package that is then sent to technical support at ABB.

Software Tutorial at ABB Drives

During our first visit to ABB we were introduced to the DCP tool by Martti, former product manager of Drive Composer Pro. He took us through the many different features currently available within the tool. As Martti took us through the program it became evident just how complex the tool really is. Martti further pointed out several usability issues and directed our attention to specifically the monitoring features, but also the huge amount of customisation the users of the have available to them including the changing of fonts, sizes and colours. We also discovered that there are four levels of support within ABB Drives; the local sales contacts, the field engineers that goes on site to commission, monitor and troubleshoot drives, the technical support team who offers feedback to the field engineers and finally the R&D team who develops software tools such as DCP.



Software Benchmarking

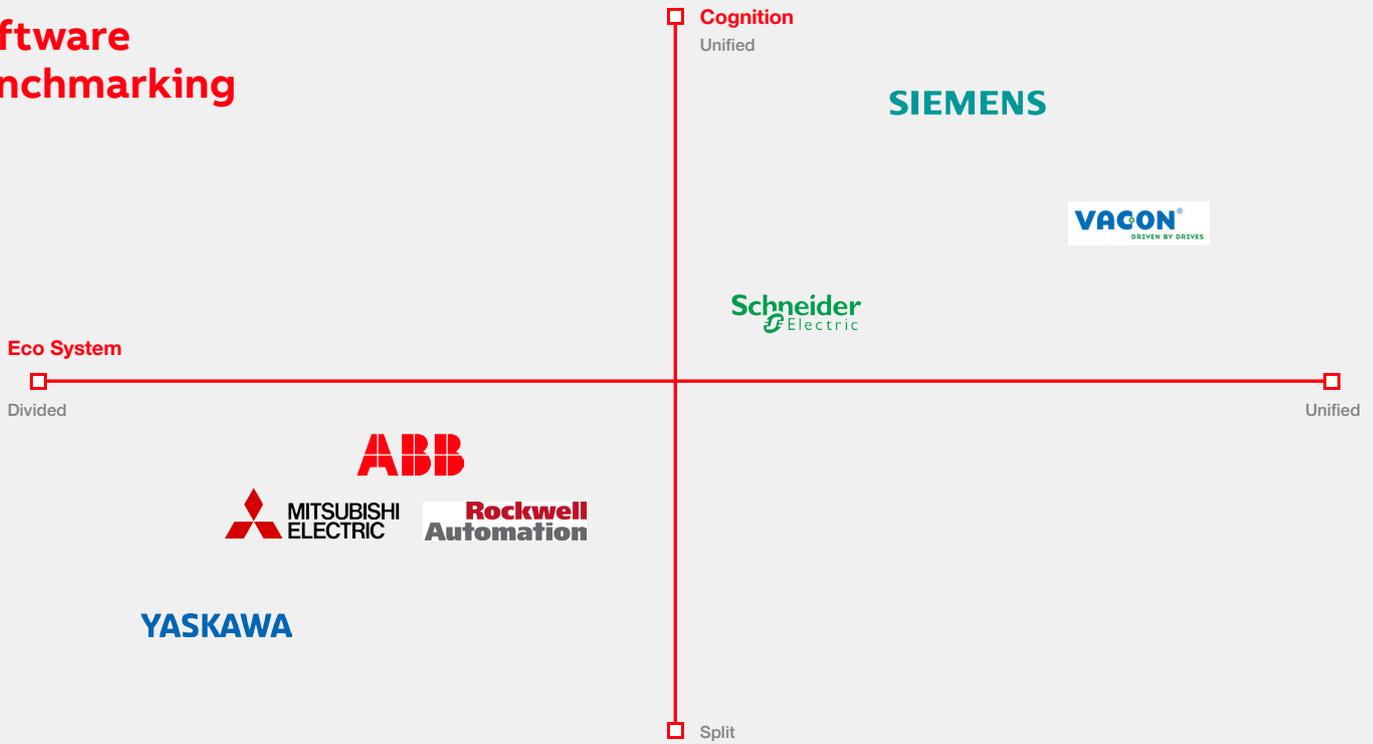
In addition to evaluating the DCP software and other drives softwares implemented within ABB, we evaluated different softwares from ABB's competitors. We evaluated these softwares in a variety of ways.

We investigated the different visual aspects and users workflows by viewing the competitors' software user manuals and instructional videos as we did not have direct access to the different softwares ourselves.

Thus our benchmarking research had to rely on these secondary information sources to create our own insights on what the real UX of these programs would be through our understandings of the varying features.

The key features that we noticed to vary in the different competitors drives software were cognition in the user navigation and the ecosystem through the unification of the suite portfolio. We considered the cognition to not only affect the user navigation but the impact of utilising a holistic approach in developing a cohesive, unified and task oriented user navigation. The second benchmarking evaluation that we conducted was about the portfolio unification within the software ecosystem. We found this to be a feature that was either very well developed or not considered. In understanding the different software portfolio unification, we noticed that if an overall software ecosystem was implemented by the software providers, the purpose of the different software products offerings would be more understandable.

Software Benchmarking



Research

Interview with users

Early on in our process, the representatives from ABB made it clear that we would be able to gain access to the users that we are designing for. We were able to secure interviews with two field engineers and one field engineering technical support. During the research phase of our project we were able to interview three expert users from ABB; Marco, Sampsa and Heikki.

Working out of Pitäjänmäki, Marco was our first interviewee. He is an engineer who works out of the ABB factory as technical support for the field engineers. When interviewing him we tried to understand not only his work, but his motivations and goals as well. The most interesting insight that we had about Marco was related to the communication between engineers in the field and Marco in technical support. He only receives calls when field engineers are confused and frustrated with either technical aspects of DCP or the drives themselves and after he assist them he rarely ever hears about how his work helps others. This is problematic because he does not feel like he is appreciated but also because he often does not know if his solution solved a problem correctly. When he receives a call for support, he first tries to listen to and understand the field engineers prob

lems. If he can not understand their problems from a verbal description he asks the field engineer to export a package from DCP so he can analyse it on his own computer. He will then try to visually analyse the file but if he requires more understanding, he finds a comparable drive within the factory and upload the parameters that the user has set. In that way he can recreate the settings of the field engineers in the factories and troubleshoot their problems from his office. Sometimes, however, it is still too difficult for Marco to understand the problems of the field from the head office so he must travel to the field to meet the field engineer and solve their problem onsite.

Sampsa was our second interviewee. He works out of an office in Vantaa but is constantly in the field. It was interesting to learn about the different locations that he could be working on drives in the field. His work in the field can range from commissioning new drives, maintaining newer or older drives with various software tools and monitoring all sorts of drives in locations from around Finland, various locations onboard vessels, and in Asian or Middle Eastern countries. It was a key insight to realise how many different software tools were part



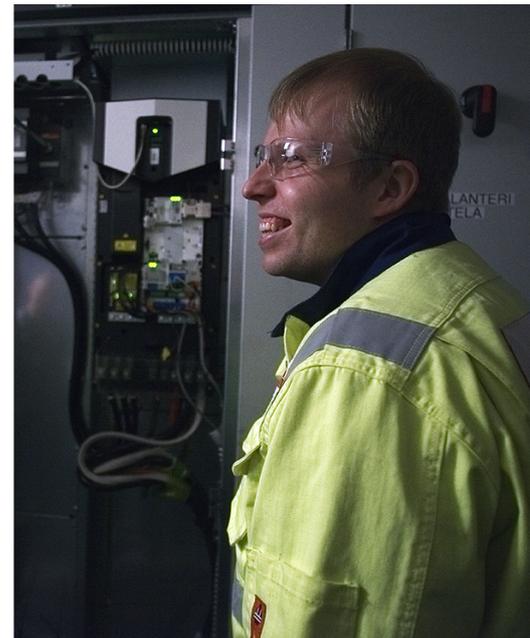
“My customers are ABB guys”

Marco - Tech-Support for Engineers



“It has to be challenging so i can learn new all the time”

Sampsa - Field Engineer



“It should show exactly what is happening!”

Heikki - Field Engineer

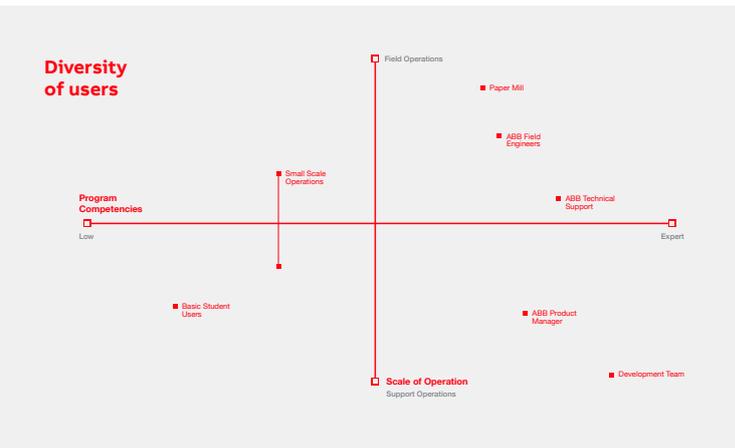
of his job to monitor drives as DCP was not the only tool he required for similar tasks involving varying drives. A different tool was required for slightly older drives and for other situations.

Sampsa gave us insight into the motivations of field engineers as well. He became a field engineer because he enjoys solving problems, learning new things and experiencing new places. He also let us in on the landscape and variation of demographics that work as field engineers. There are younger more technically competent engineers and older manually motivated field engineers.

We met Heikki in the Tampere train parking lot where he picked us up in his grey Audi. He took us to his office and then the Nokian Tyres factory and gave us some interesting first-hand insights into what it is like to work in the field where the industrial manufacturing takes place. He talked about the technical requirements of DCP when in the field. It is crucial for him to know exactly what is happening at all times and have very advanced control in his software.

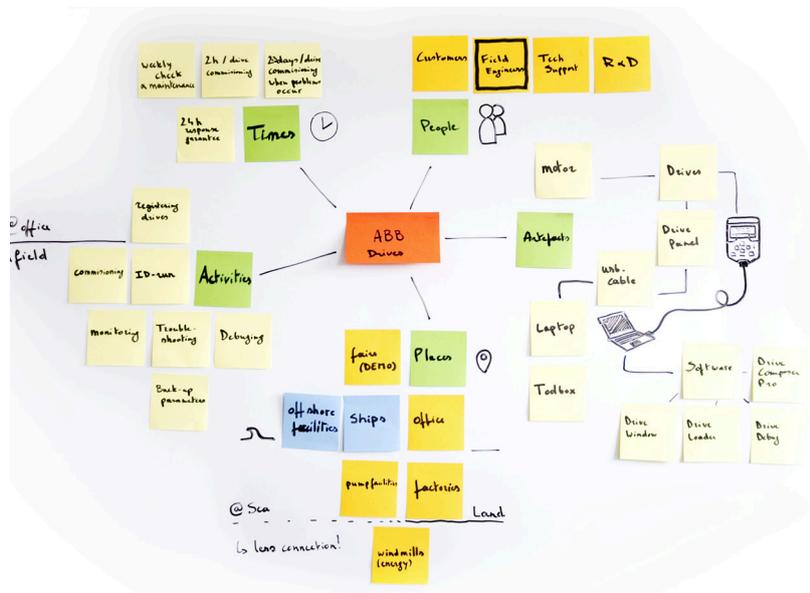
Diversity of Users

Through our background research, interviews and software tutorials we were able to gather information about the diversity of users of DCP that exist. With this information we created a two axis chart which compare the scale of the operations to the program competencies of the users. There are users on all quadrants of these axis which range from low program competency to expert and from support operations to field operations.



Context map

To get a better understanding of ABB drives and its commissioning software tools we explored the context in which they thrive. By doing so we could keep each of the stakeholders' needs in mind when designing for experiences and having all the means available where their current experience originates from and where a new experience can be implemented.



The most important part to understanding the context are the people involved in utilising the drives and the software tools. There are multiple stakeholders within the context of ABB drives. For our study the Field Engineer is our main target audience as they are in the brief. Then there are the customers, who have purchased the drives and installed them at their facilities. Third there is the tech-support who help out the field engineers with problems related to drives. Then there is the R&D team that is responsible for developing the software tools for commissioning and troubleshooting drives. We did not include Sales and sales support. Training and hardware development were also left out. Thus this does not cast a complete image but this diagram was used as a simplification. By including them into our evaluation, we found how the missing stakeholders would also benefit from our solutions and how they can continue to build upon our prototypes.

When troubleshooting a drive there are multiple tools required. Both physical and digital tools are taken into the field to maintain a drive. The main one is the laptop of the field engineer. The laptop carries the most operation power and software programs. It is the main tool to commission and troubleshoot drives. A USB cable is required for connecting the laptop to the drive panel. A small toolkit and backpack are taken along to carry these in.

The commissioning of a drive happens in different phases and in different places, for instance the registration of a drive can happen at the office as there is a fast and reliable internet connection. Then the field consists of two parts, which we differentiate from each other when there is a connection available or not. For instance when operating at sea a field engineer can not rely on a stable connection, but also in mines a good connection can be hard to come by.

The findings from the environment has often as a result that one activity which is rarely executed in the field and that is registering the drive. All the other activities are performed in the vicinity of the drive, or as close as pos

sible to where there is a direct connection possible in the field. This goes from the whole commissioning process, ID-run, monitoring, troubleshooting, debugging and backing up the parameters from the drive. This list is not fully exhaustive as contacting support and ... are left out.

Different schedules or episodes related to the activities with drives. Commissioning a drive can take from 2 hours up to 3 days depending on if the process runs smoothly or problems occur during the commissioning. There are weekly check-ups of drives to prevent damage and keep the electric motors running. If there is an issue with a drive there is 24/7 technical support available.

Insights

Analysing the research

Affinity diagramming

After conducting our initial research phase our team began the insights phase with affinity diagramming. We first took the information that we gathered through our research and contextual inquiry methods and broke the information up into individual statements. These statements were individual pieces of data that expressed a single idea.

We put these single ideas onto thematically coloured pieces post-it notes and sorted them. We mapped these papers with an affinity diagramming technique. Through affinity diagramming we made key insights into the different types of user typologies, software problems, motivations, personalities and technical requirements.

Personas

Based on the research phase of our project and our analysis of this information through our iterative approach to affinity diagramming we developed three fictional representations of the spectrum of users that exist for DCP. These personas manifested themselves in three forms: the experienced field engineer, the late career field engineer and the factory technical support engineer. In developing these personas we focused both on understanding experience driven aspects that may shape their attitude as well as on the users behaviours, goals and their pain points with the software. We also attempted to differentiate these fictional representations based on the professional dynamics that exist in their job roles based on experiences and competences that we understood from research.



Affinity diagramming in session. The post-its were later transferred to a wall for a better overview

Persona: Experienced field engineer



Characteristics

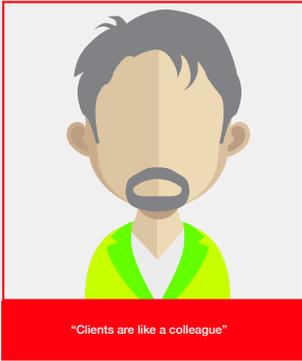
- Tech** ■■■■■■
- People** ■■■■□□
- Openess** ■■■■□□
- Learning** ■■■■□□
- Problem-Solving** ■■■■■■
- Travel** ■■■■□□
- Speed** ■■■■■■
- Pressure** ■■■■■■

Experience

- "Challenge me! I get bored easily."
- "Fast! I want to be over with it. The tools too needs to be fast."
- "When the client is happy, makes me proud."
- "I share my experiences with people I like."
- Uses a 14-15 inch laptop in the field.

The experienced field engineer likes to be challenged by his work and enjoys solving very complex problems that occur when in the field. He likes to work at a fast pace and complete his job quickly and efficiently, and are satisfied when his client is happy with the work that he has done. Whether he is working of projects internationally or in Finland, he enjoys seeing new places and meeting new people. He likes to share with knowledge with his field engineer colleagues, but only those he likes and knows well.

Persona: Late career field engineer



Characteristics

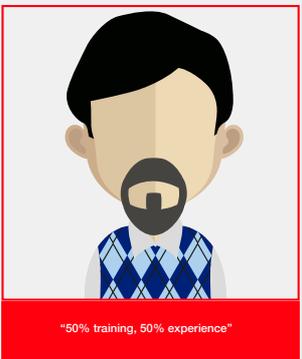
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Experience

- "Long days are the worst, it means I didn't get it fixed yet."
- "I don't like difficult clients."
- Works slowly.
- Technically challenged.
- "I like to avoid software all together."

The late career field engineer tries to avoid working on modern drives but likes to work on the older drives as they require time, focus and a great attention to small details. When he became a field engineer he was interested in understanding mechanical problems and solving them manually. Thus he tries to avoid software all together. Through his long engagement with his customers over the years, he sees them as a colleague, except when they are too difficult to work with.

Persona: Factory tech support



Characteristics

Tech ■ ■ ■ ■ ■ ■ ■ ■	Problem-Solving ■ ■ ■ ■ ■ ■ ■ ■
People ■ ■ ■ ■ ■ ■ ■ ■	Travel ■ ■ ■ ■ ■ ■ ■ ■
Openess ■ ■ ■ ■ ■ ■ ■ ■	Speed ■ ■ ■ ■ ■ ■ ■ ■
Learning ■ ■ ■ ■ ■ ■ ■ ■	Pressure ■ ■ ■ ■ ■ ■ ■ ■

Experience

- "If I can help the guys and make their life easier, I am happy."
- "I lack feedback from helping others. I get feedback if problems are not fixed, but only a few times when the problem was solved. I need to know if my help was effective/helpful".
- "I like to check out things in the field. There I understand the problem faster."
- I'm embarrassed when the software is slow."
- "Drive Composer is a powerful tool. It needs to be accurate down to the millisecond."

The technical support engineer works at the office supporting the field engineers when they have problems in the field. He became a technical support because he likes to solve technical problems and help others. Thus he is happy when he can help the guys in the field and make their life easier. However he often feels that he is not appreciated when he solves some of the difficult problems that the field engineers face and could not solve themselves. If possible he prefers to go into the field, as it allows him to understand the problems faster.

Technology goals

In developing an understanding of our users - the ABB drives field engineers, the drives software tools utilised in ABB by our users and ABB as a company, we identified several technology goals to consider while moving forward towards our experiential design solutions.

First, there are currently too many delays and gaps when the engineers are monitoring through Drive Composer Pro in the field. These delays and gaps directly affect the speed and efficiency of the software. Although it is not the primary goal of this project, the speed and efficiency must be addressed as it can be a real frustration for the users of the program.

Secondly, as a tool DCP needs to accurately and understandably show what is happening at all times in a way that is offers advanced control to the engineers. As the user's comprehension of what is happening in the program is critical, the understandability of DCP as a software needs to be improved, while making sure that it

keeps the advanced control that is currently available within the tool itself. To address this, any unnecessary customization in DCP could be eliminated as customization options such as font and font size are redundant and never used by the field engineers.

Finally, field engineers working for ABB use a huge variety of programs for monitoring older and newer drives. It is important to develop a better understanding of the differences between these different software tools. Navigation through the pieces of software should be consistent within all of the software products offered by ABB.

Although these are technology related goals, the consideration of them in our final design concept could not only affect hygiene factors within the design, but also affect the experience through interacting with the concepts as well. These technology goals we be considered in conjunction with the existing experience design goals.

Experience goals

Setting the experience goals

With the affinity diagram session and our three personas we identified a set of experience goals that will be used to drive our two design solutions forward.

Main experience goals

Drivers for our two design solutions

Competence: To experience that you are very capable and effective in your actions rather than feeling incompetent or ineffective.

Challenge: Testing abilities in a demanding task.

Fellowship: Friendship, communality or intimacy within the ABB field engineers community.

Minor experience goals

Supporting experience goals for our solutions

Stimulation: Get plenty of enjoyment and pleasure rather than feeling bored and understimulated by life.

Exploration: To investigate an object or situation.

Confidence: Mental strength to withstand with the situation and to have faith in one's own ability to complete a task correctly.

For the field engineers, competence is crucial when they work. The field engineers use their competences when working on complex problems in the field. When working on them it is crucial for the engineers to be very effective as they know how expensive their time is.

The challenge of solving a problem is a very important driver when field engineers work in the field. It allows them to learn new things all the time which is the most important part of their job. Further they like to use their heads to figure out how something works and in the act of problem-solving.

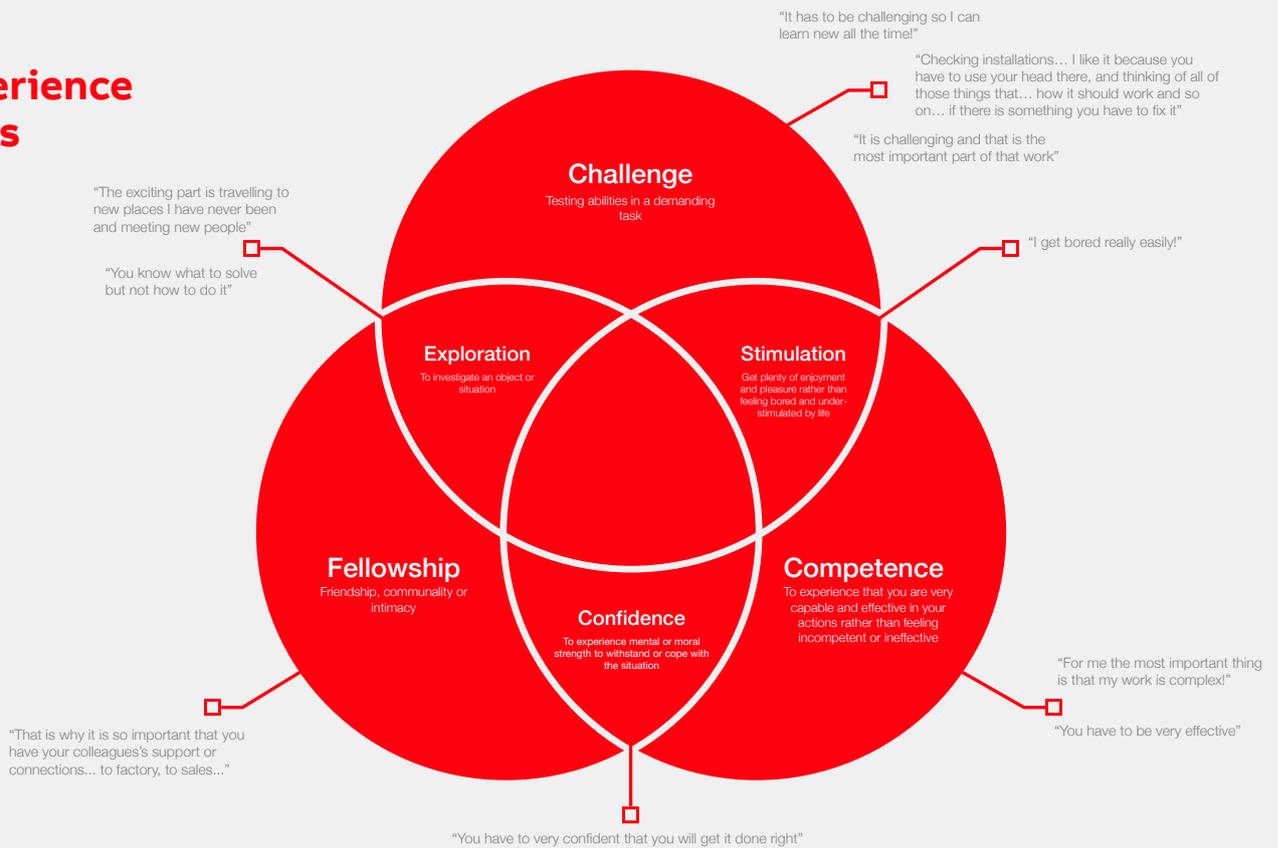
When working in in the field, it is crucial that they have their colleagues' support and a close connection to Factory (tech support) and even sales. There is a strong sense of fellowship (communality) between the field engineers as they rely on each other all the time should

they be facing issues and problems they cannot fix on their own.

Through competence and challenge we want to create stimulation as these engineers get bored easily or move on to other things if they do not get stimulation in the work that they do. Through challenge and fellowship we want to create exploration. When in the field the engineers typically know what to solve but do not know how to solve it. Thus they like the explore the problems that they face. Further they find traveling to new places and meeting new people exciting.

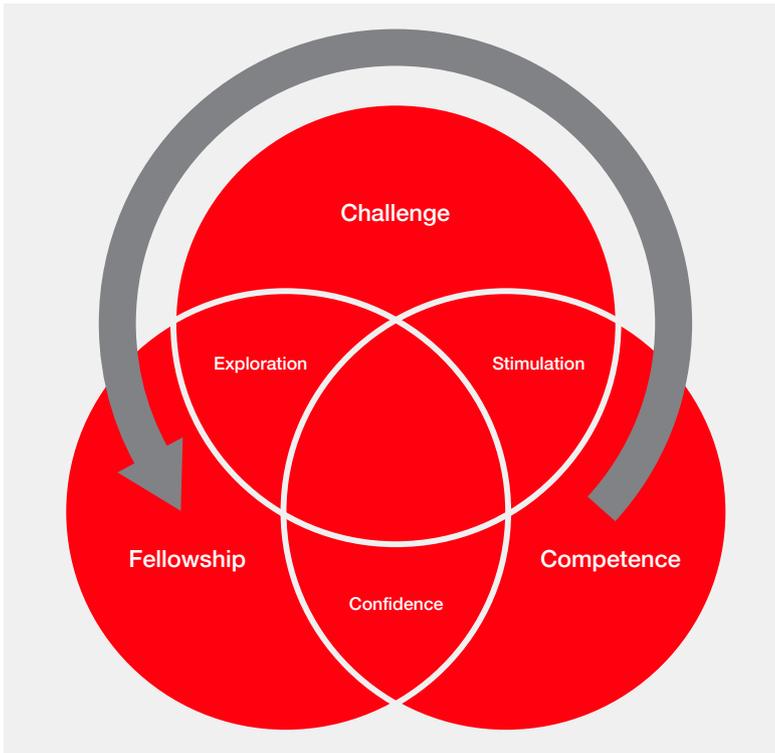
Finally through fellowship and competence we want to create confidence as the field engineers through their competences and close connection to each other, need to be very confident in their ability to get the job done right.

Experience goals



Develop

Applicable solution vs radical solution



— In designing our two concepts we defined how the two should vary from each other. In the applicable solution, through competence, we wanted to build stimulation and confidence for the challenges, exploration and eventually fellowship. In the applicable solution we started from the software.



— In the radical solution, through fellowship, we wanted to build a network of exploration and confidence that will lead to challenge, stimulation and competence. In this solution we started from the comradery of the field engineers.

Develop

Concept prototyping and evaluation

Evaluation methods

For the concept of the applicable solution we thus focused on a redesign (improved version) of Drive Composer Pro (DCP) to be used on a 15 inch PC laptop in the field. We wanted to create an improvement of the delays and gaps currently present in the program by providing informative feedback to the users. In other words the DCP program needs to provide a clear view of what is happening at all times. This should be done by making sure the users know where they are in a process and letting them know about any ongoing program features. Further should include improvements to the monitoring and parameter view, making it more usable and reduce clutter in the already limited available workspace.

We planned to evaluate our early concept ideas using scenarios, sketches and or early paper prototypes. The purpose of the evaluation was to evaluate the experience and usage of our prototypes focusing mainly on getting qualitative data feedback from ABB's experienced field engineers. We Planned to study the experience of snapshots during interaction or the experience of a task or activity such as using our suggested improvements of the monitoring and parameter features of DCP. We used the "All About UX" website to get an idea of what methods we could use. From its suggestions we choose the MAX method as we felt it covered both positive and negative emotions.

Planning evaluation and preparing paper-prototypes

In preparation for the pilot test Monday the 27th of March we met to create the design of the prototype we wanted to evaluate. We started by sketching out the steps which a field engineer typically go through when installing and commissioning an ABB drive on site. We created paper sketches for each step in the process,

showing only the necessary features. The idea was to lay out tasks and let the test participant navigate through them step by step with paper sketches (screens). After completing the tasks we would then use MAX (Method of Assessment of eXperience) to ask the participant to evaluate the experience of going through the different steps.



When carrying out the pilot test we realized that several sketches were missing in order to create a coherent flow through the prototype, however this was not the major problems we found. First of all it is worth noting that testing with participants without knowledge about drives and DCP was difficult as they lack the necessary context, which of cause was something we already expected.

Despite the fact that we did not get to the MAX evaluation part in the pilot test, the main problem we discovered quite early on was that this approach would be focusing too much on the usability of the prototype and its navigation, rather than exploring the experience of having a "task-oriented" approach to installing, commissioning, and monitoring drives. Further it was not allowing us to explore the experience goals as much as we would like. We rather wanted to challenge the experience aspects beyond just the interface.



We instead decided to follow a more scenario-based approach which we originally intended but did not succeed in with the first approach. Instead of asking the users to follow certain steps by interacting with the prototype like we did before, we created a scenario in which we would take them through the steps ourselves while explaining as we went through the paper-prototype sheets. We wanted to control the narrative and instead focus on the emotions (and experience) that the user had as we went through the scenes. Otherwise too much focus would be put on the missing UI sketches, should the participant press certain buttons that would lead to parts of the program (or UI) that we had not thought of. For the evaluations we used the original MAX cards and board but included extra cards in the emotion part matching our experience goals.



Evaluation Session 1 with Marco

We had our first real evaluation with Marco at ABB's main office in Pitäjänmäki. It took about an hour and a half, and Marco was first presented with the applicable solution material that we had prepared beforehand. First we took him through the paper-prototypes and then had a discussion about the different features, listening to and discussing his comments. Then he was asked to evaluate his experience of the new proposed concept using the prepared MAX cards and board. Finally we took him through our radical solution scenario and finished with general discussion.

Concept iteration based on the evaluations

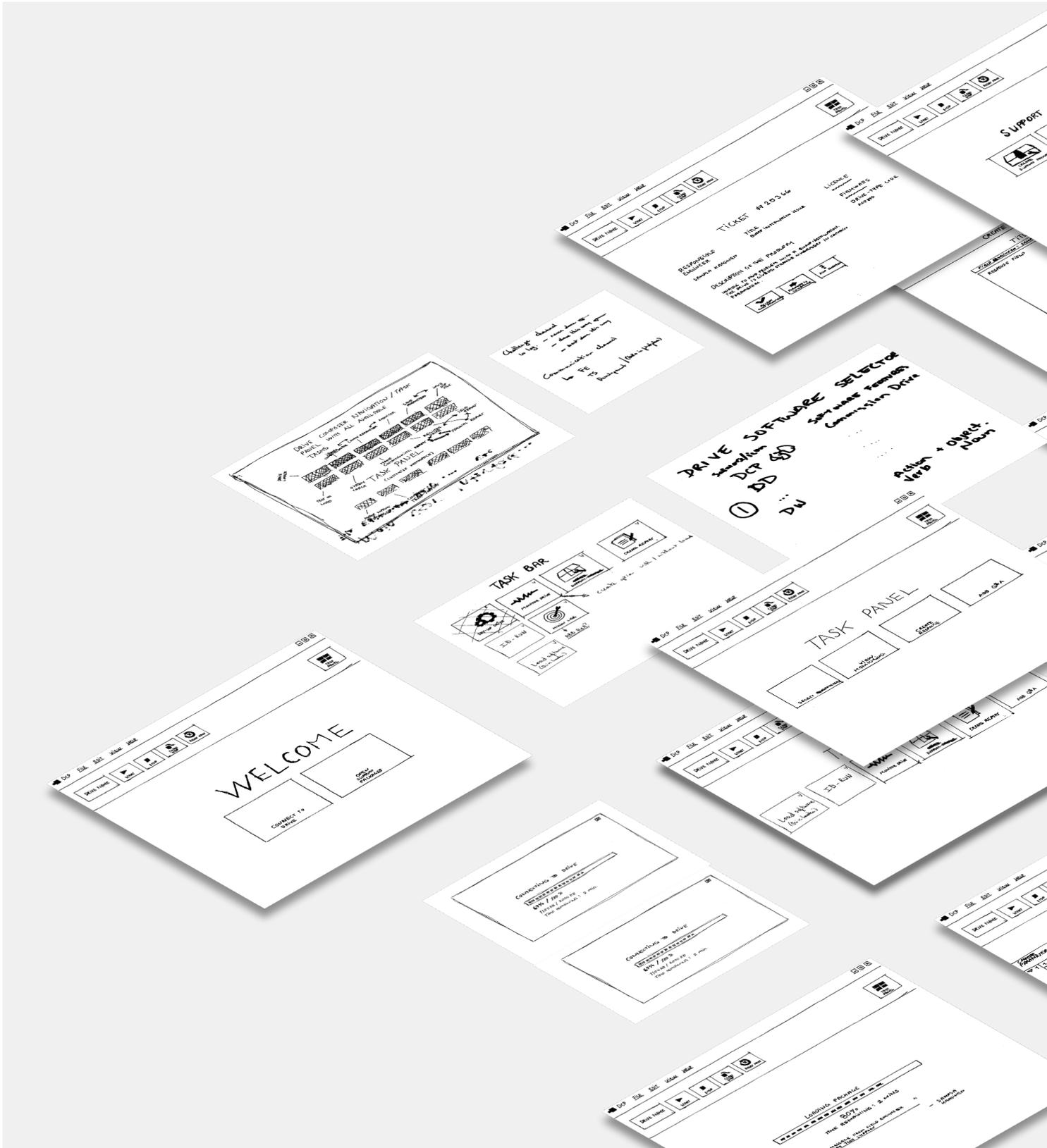
After the evaluation with Marco (tech support at ABB) it was clear that including ABB support directly into DCP was not ideal, as it is not exclusive to DCP. In ABB they have a support system for the entire range of ABB products called Salesforce, which are used by the technical support team sitting at ABB Factory and around the world. Thus feedback and tickets are perhaps not the right tool to integrate into DCP. However he suggested that it should be linked (to the data-base), perhaps through ABB Drive Suite which would work as a Software portfolio with all the drive software offerings from ABB. This feature should also have a confidentiality hierarchy level as the field engineers should not have access to the same information as the technical support.

He was also really happy with the ABB Q&A (problem information system) idea that we introduced as this is something they are actually in need of. However instead of having it as a list (as we had in our paper-prototype) he would like it to be "a living thing" and be more "interactive". The ABB Q&A could work as a problem-bank (data-base) where engineers at ABB can find information about drive problems within the organisation. This could improve the connection and communication between field engineers, factory and software developers as it would work as a place for sharing problems, asking colleagues, tracking current issues, tracking newly solved issues and for looking up old issues that the user had solved in the past (personalization). As DCP are used offline most of the time, it should be possible to download the data-base locally so the field engineers also have access to it on-site.

Further Marco mentioned that when he is working as a tech support he downloads the support package provided by the field engineers, loads it into his local DCP tool and then use it for monitoring (simultaneously) alongside a live drive. Therefore it should be possible to load both online and offline parameters for comparison. He also noted that for him the monitor window should always be on and should be moveable. Additionally he mentioned that in the current version of DCP it is only possible to open the entire support package, which can take a lot of time and slow the program down. Instead he would like to be able to open each file separately (e.g. only the monitoring file, or only the parameter file) which would reduce loading times. The engineers using the tool would feel less embarrassed in front of clients thus making them seem more competent.

Prototype development

The applicable solution prototyping process



Improving the MAX-evaluation

From the first evaluation it was clear that the MAX method in its original form was not reflecting the experience of the new suggested solution enough. It was focusing too much on ease-of-use, process usefulness and the interface of a prototype (low-fidelity) that was not at the right stage for this kind of evaluation. Further the cards available were too superficial and we were not able to dig deep enough using just them. The method was thus missing reflections on our experience goals despite the fact that we created several additional cards for the emotion category. Lastly the participant had a hard time relating to the cards.



To improve the evaluation for the next tests we decided redesign the MAX evaluation board. We created six sections, each evaluating one of our (six) experience goals. The text on the board used to guide the test participants were rephrased to compare the current version of the DCP-tool and with our design suggestions. For each section we also created five cards with wordings scaling from positive to negative. To evaluate for example how skilled (competence) the participant would feel when using our design solution we created the following cards: Over-qualified, capable (positive), effective, uncertain (neutral) and incapable (negative). To prepare for the next evaluation sessions we also improved our prototype and changed smaller issues based on Marco's feedback.

Evaluation session 2 with Patrik and Antti

In the second round we had a couple of evaluations with former field engineers now working in sales at ABB's main office. Patrik works in local sales as a product manager, where he mainly focuses on customer training. Antti is responsible for Original Equipment Manufacturer (OEM) sales where he acts as sales support for ABB customers' field engineers, which can be sometimes interpret as the same as technical support.

It was interesting to see ABB from a different perspective and we got many valuable insights that we could use to improve our concepts even further. We also found that



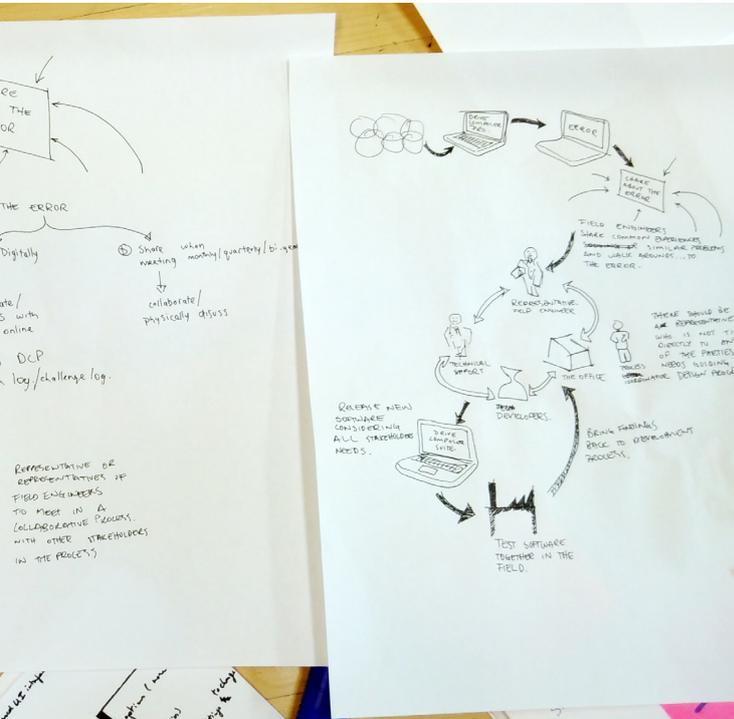
the new MAX evaluation cards we created proved really useful and valuable in evaluating the participants experiences of our two proposed concepts in relation to our experience goals. The participants had no problems describing their emotions using the cards and we had some really good discussions based on the cards that were chosen.



In evaluating the radical concept we realised that the ABB field engineers are just one of many groups related to ABB, who has requirements from software such as DCP. Thus just improving how needs and requirements from the ABB field engineers reaches the software development team would be too limited. Instead the radical concept should include multiple stakeholders from the ABB front-end (those who are in contact with ABB's customers on a daily basis) such as the field engineers, client contacts, project managers, OEM support and sales and various specialists. The ABB front-end knows the need of the customers and they have the highest levels of information which would give better input for the ABB software development team.

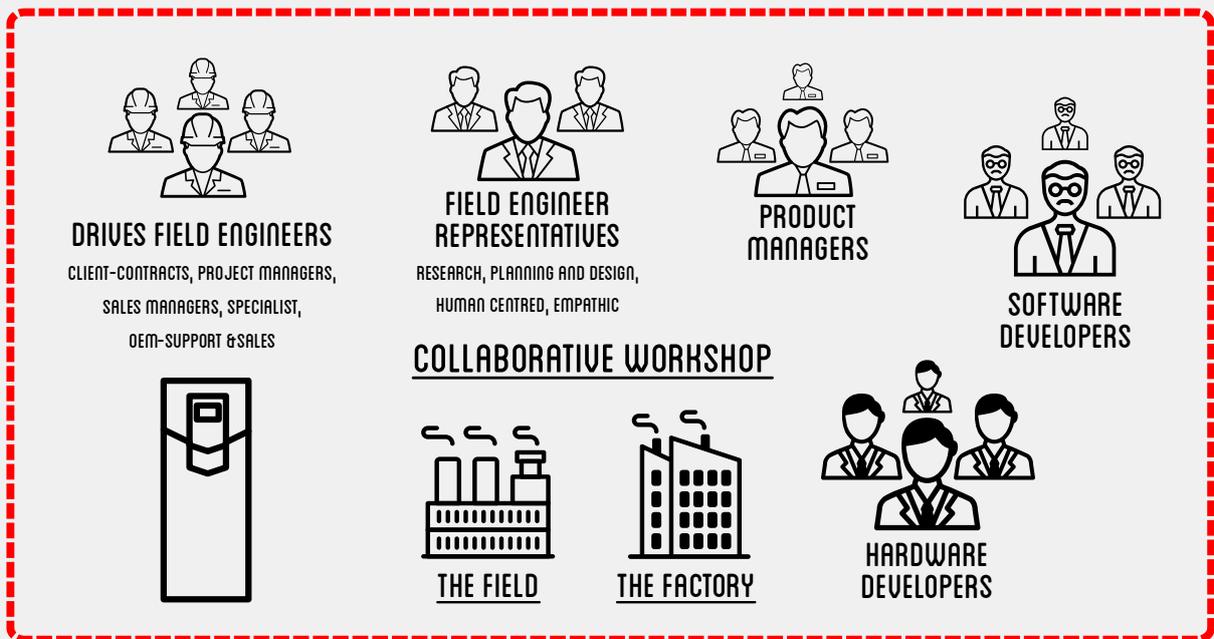
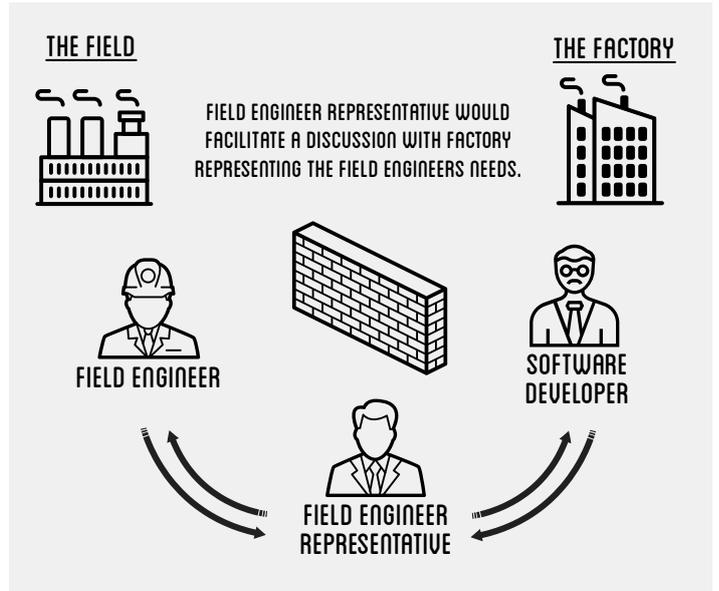
Develop

Radical solution concept development



01

02



03

01 First sketches from the radical solution idea generation

02 Second radical sketch iteration that was used at the final evaluations at ABB

03 One of the final concept sketches used in the presentation for ABB

Develop

Applicable solution evaluation results

Competence

—
 “I like this Q&A... it would be good to be able to go to Q&A to find it before contacting support.” (Patrik)

“Driven, because this seems to empower me for easier working with the customer”(Patrik)

“Capable, we need this tool” (Antti)

“Information in the same place would make it more efficient” and “I like the support that the Q&A gives” (Patrik)

Stimulation

—
 “The Q&A makes my job easier” (Antti)

“Driven, because this seems to empower me for easier working with the customer” (Patrik)

“I could monitor while accessing, going through Q&A myself, to check if the problem has occurred before. Really good thing” (Antti)

Challenge

—
 “Challenge accepted, I really like to help customers and this really could help me doing so” (Patrik)

“Okay, just easier if I have it” (Antti)

Exploration

—
 “Passionate about the learning through Q&A because if the training of my skills is made easier I would really feel very positively about it” (Patrik)

“It relates straight to the customer support and overall experience for the customer, of me, us and ABB in general and I am really driven about the concept of helping someone out” (Patrik)

“Slightly curious, doesn’t do that much, nothing new, it would just make my work easier. I have done so many. I have been on all the sites” (Antti)

Develop

Applicable solution evaluation results

Fellowship

—
“I can support colleagues in a better way” (Antti)

“I like the support that Q&A gives”
(Patrik)



Develop

Radical solution evaluation results

Fellowship

—
 “A strong sense of community because this could improve sales quite a lot, and show this is our process and we do this with our customers, that we are developing the features according to your request they become more interested in giving the information” (Antti)

“I would feel a strong sense of community because we are doing something together to help the customer” (Patrik)

Challenge

—
 “Challenge accepted, because I trust our R&D, they are capable guys so this would ease the process of delivering the customer needs and developing something real from the customer needs” (Patrik)

“Challenge accepted, when I think about the customers that are OEMs would have this, I am happy to gather them myself for my segment to have feedback for the SWD because I already have this big list for our features we need” (Antti)

“Stimulated because I can do something to really help the customer” (Patrik)

Competence

—
 “I would feel capable because I would be able to transform customer needs into something really profitable for the company and really helpful for the customer” (Patrik)

“Capable, if I can get my customers included” (Antti)

Exploration

—
 “Interested, because I am generally interested about the field in which I am working in” (Patrik)

“I am always hunting for new businesses for ABB, that is my main goal, to get new customers for ABB and this typically mean I need some development for the products or the software and I want those to be prioritised” (Antti)

Develop

Radical solution evaluation results

Stimulation

—
“I am excited of this mainly because... because I am basically doing the same thing and I am happy to see that someone else is doing it” (Patrik)

“Driven, if they get the information I’m not sure if they are excited to do it, but I would try to go for it” (Antti)

Confidence

—
“Confident, but not certain because it depends on how well the overall function work” (Patrik)

“I feel interested, but knowing our current SWD I am still not sure if it would make much difference or if they would listen to us” (Antti)

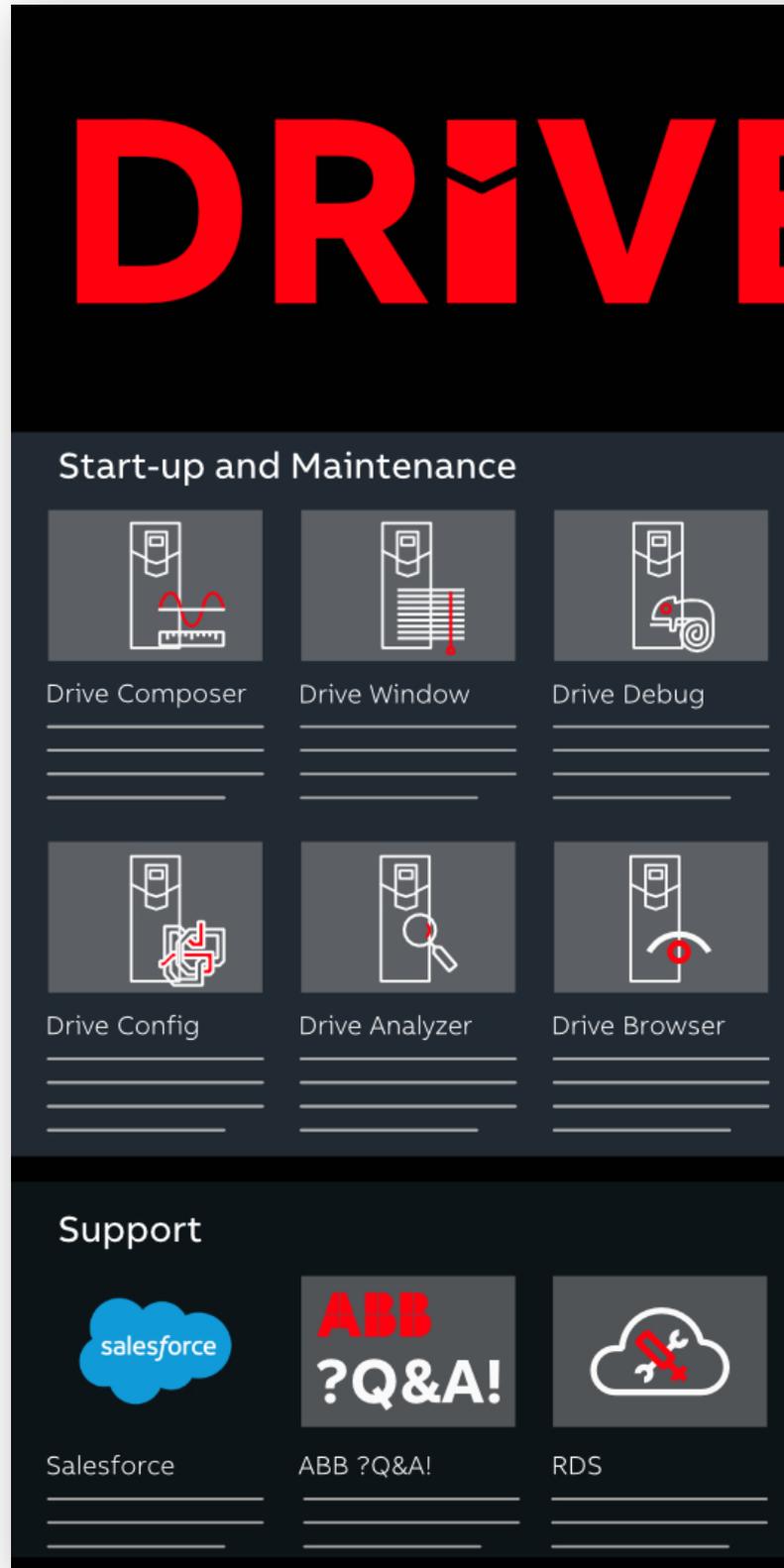


Final concepts

Applicable solution

ABB Drive Suite

The ABB Drive suite is the program launcher that includes all the drive programs offered by ABB. It gathers them all in one place, so the users does not have to go to many different places to find them. It gives a good overview of what each of the programs are used for. The users also has access to ABB Q&A, ABB SalesForce and On-line Remote Support, which are linked to the current ABB support databases. Navigation between the different programs makes importing, exporting and loading more of a unified experience. While transitioning from one program to the other, the loading time can be covered through fulfilling a task related to the next program. This solution relieves cognitive load from them and facilitates a more task oriented workflow. Not everyone has each single software available but this can be easily extended via the linked personal profile to load more licences and access to software programs and support.

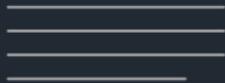




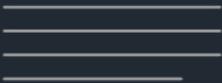
suite



Drive Loader



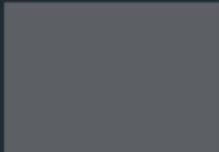
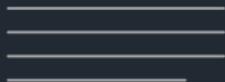
Drive Studio



Drive Monitor



Drive Install Base



Final concepts

Applicable solution

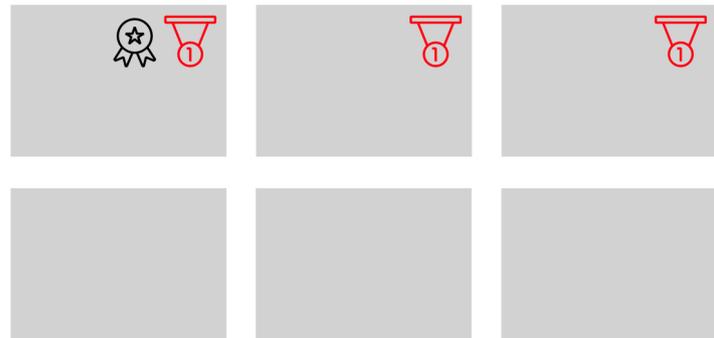
ABB Q&A

ABB Q&A functions as a problem and information bank on a global scale and gathers all information about drives in one place for the entire ABB organisation which can be extended to ABB's customers as well. The knowledge is centralised in this way so that everyone gets access to the content to transform the whole structure within ABB and their clients. Support is accessible at everyone's fingertips via searchwords, categories and cases they follow. The users' own resolved cases show-cases the tasks and problems they have resolved themselves. When solving many cases and issues within the same topic they become "experts" of these issues. This is where you as a user can collect badges and medals to showcase to others in which problem-solving area you are specialised. This also adds a gamification to the solving of problems as you are rewarded for solving issues. The system further alert these "experts" about new issues coming up within their expertise. In this way the users can support each other and create a stronger community. Also the cases that the users are interested in and want to see resolved can be followed, and they can actively help resolving them together. Further Q&A also shows newly discovered and resolved cases.

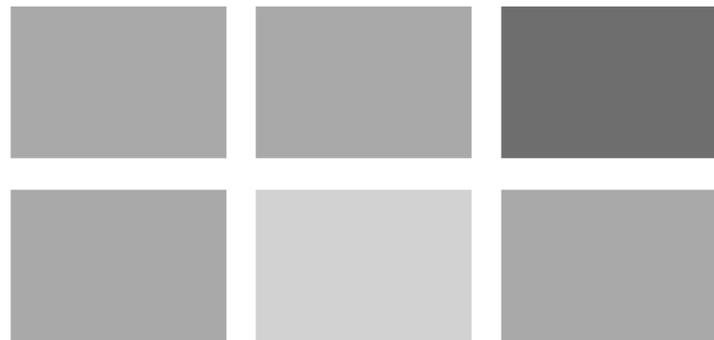


ABB ?Q

My Topics



Newly discovered Problems



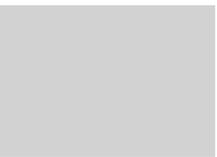
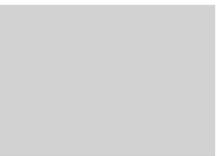
Categories



Q&A!



Following



Newly solved Problems



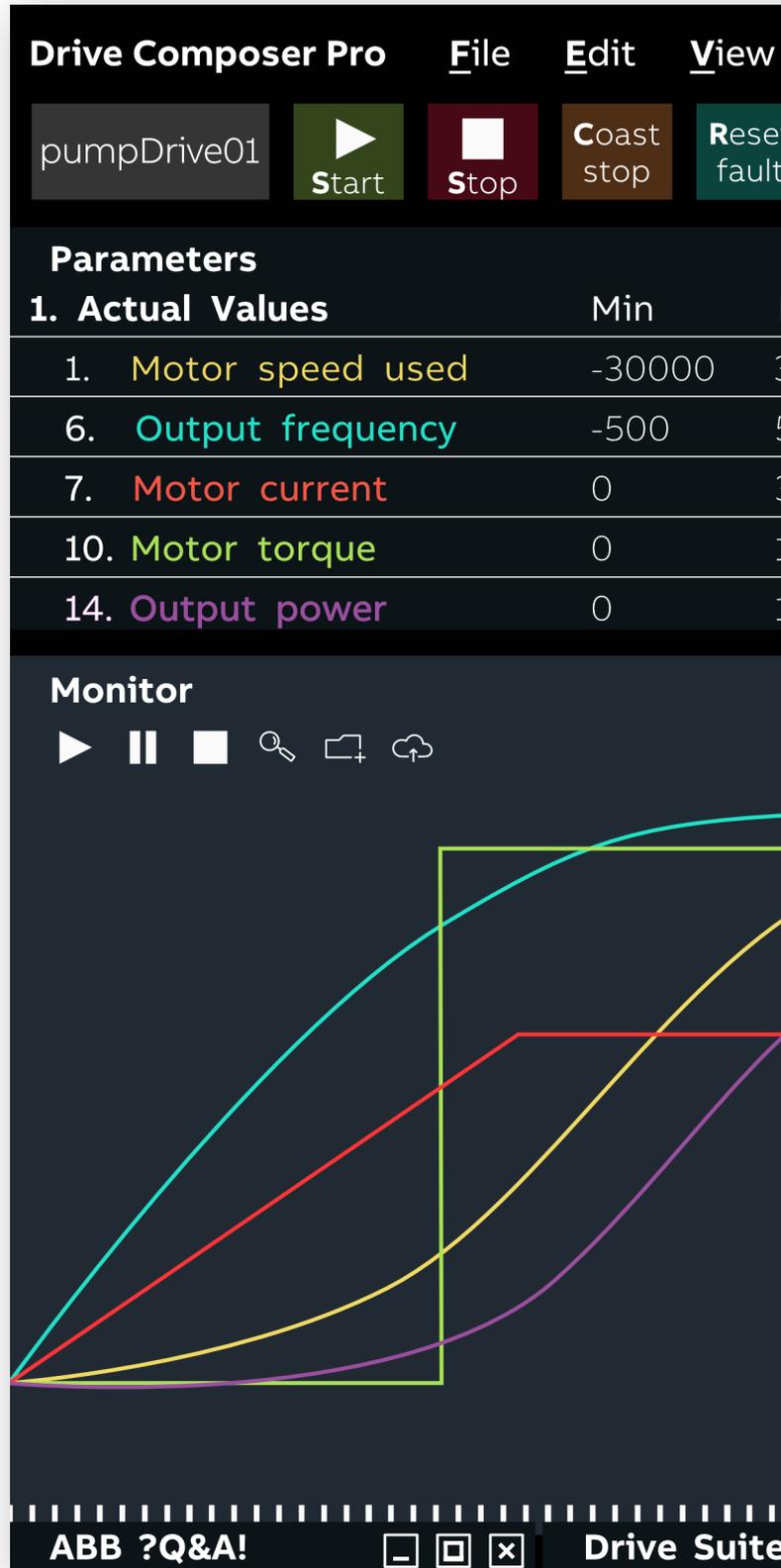
Ask a colleague

Final concepts

Applicable solution

Improved monitoring

We have also updated the monitoring view. Where you get access to the information of the signals only when required such as the mask filter for control words. There is a possibility to change the vision of the UI to day, night or high contrast view. Also snapping guidelines to intersections is made possible with a variety of tools that allow you to interact with the plotted graphs. This way reading out values from these points is made possible without having to calculate everything. Neither for the hexadecimal control words or intersections that lay in between data points. Task oriented interface, where you get to do this and that. Also making it more integrated with other parts of the ABB Drive Suite. Navigation to be improved through task orientation. Waiting time to be optimized with other tasks.



Help



ID run

Parameters

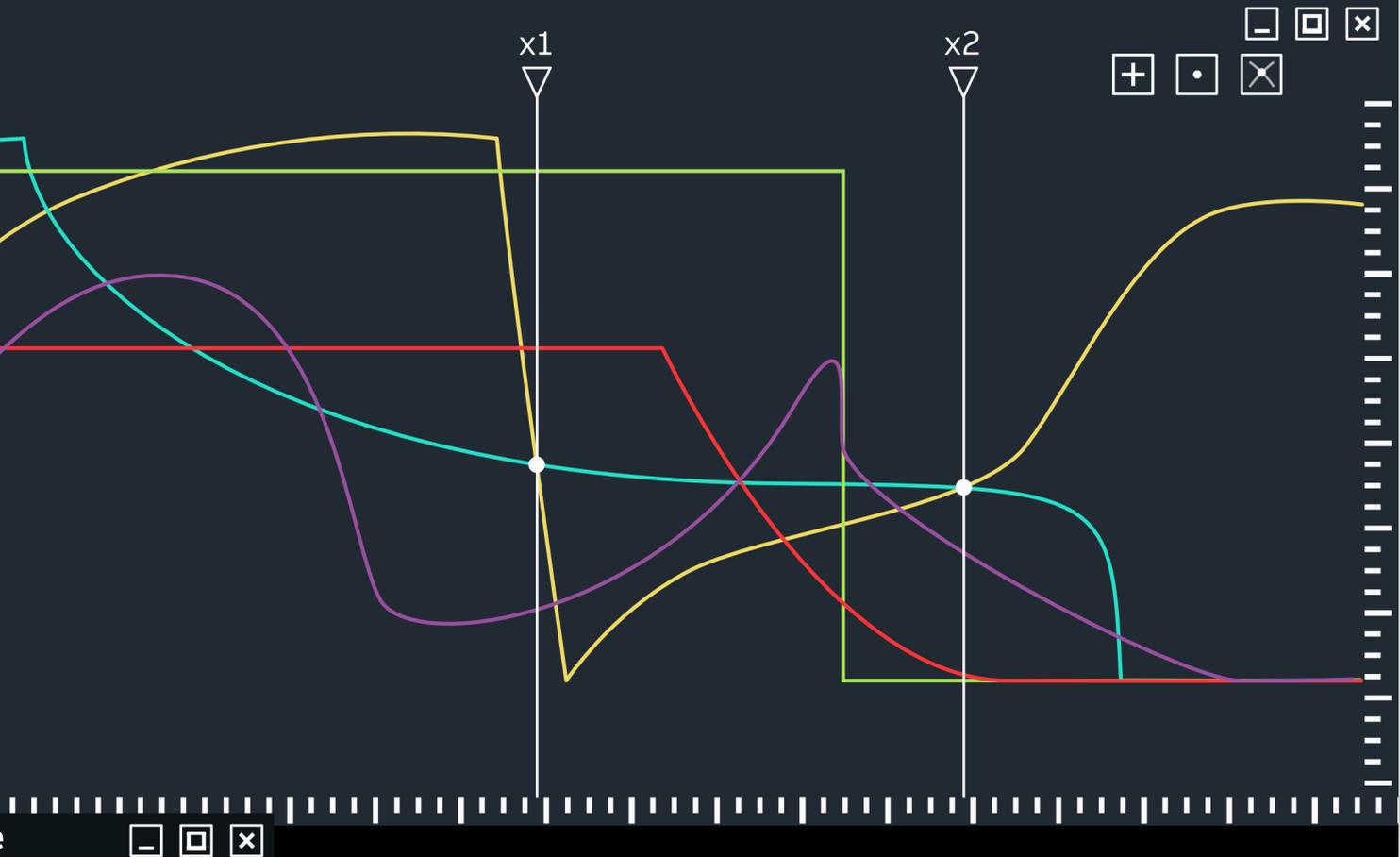
Monitor

PLC

DRIVE
suite



Max	y1	y2	y2-y1	x2-x1
30000	_____	_____	_____	_____
500	_____	_____	_____	_____
30000	_____	_____	_____	_____
1500	_____	_____	_____	_____
15000	_____	_____	_____	_____



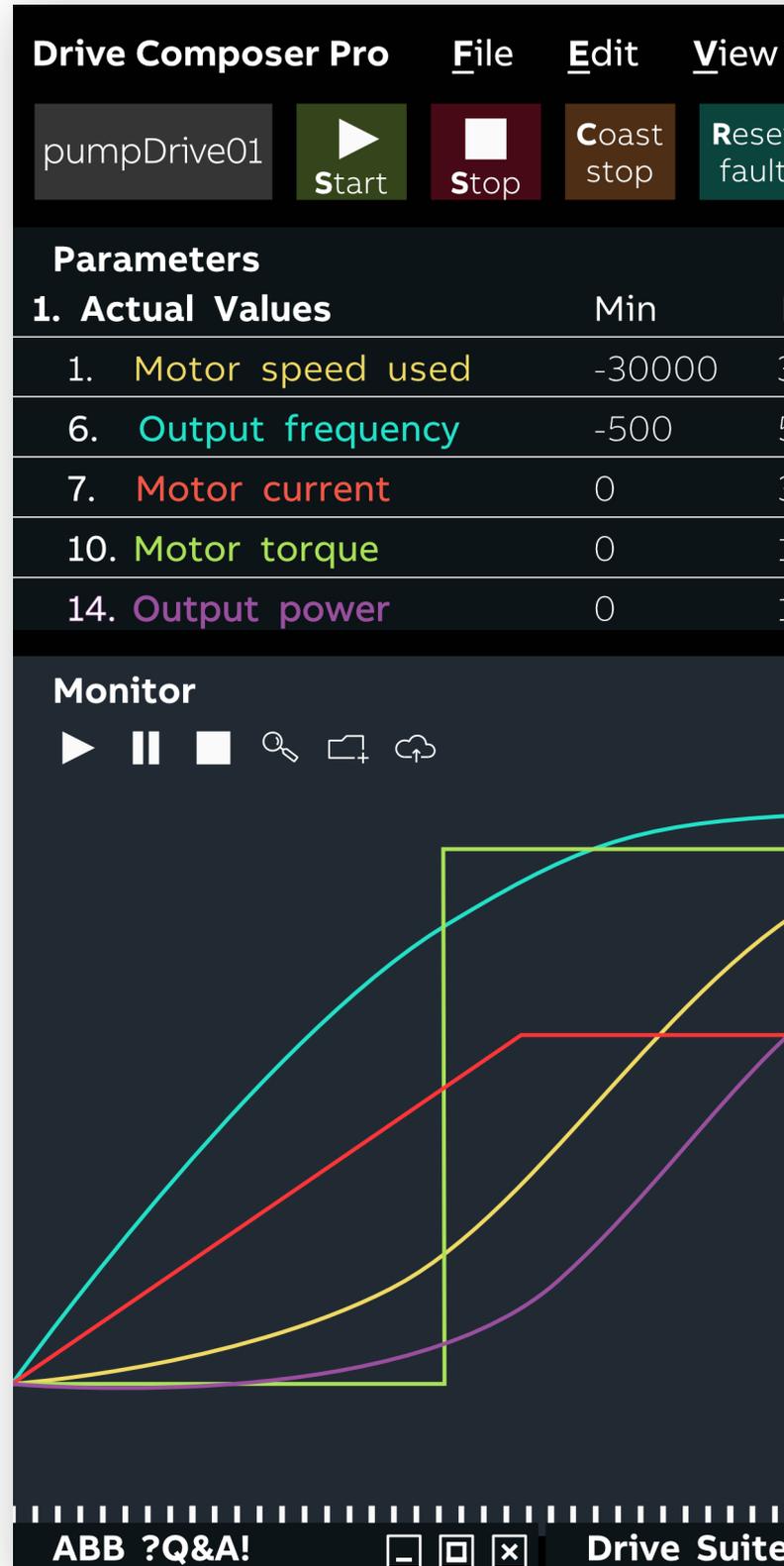
Final concepts

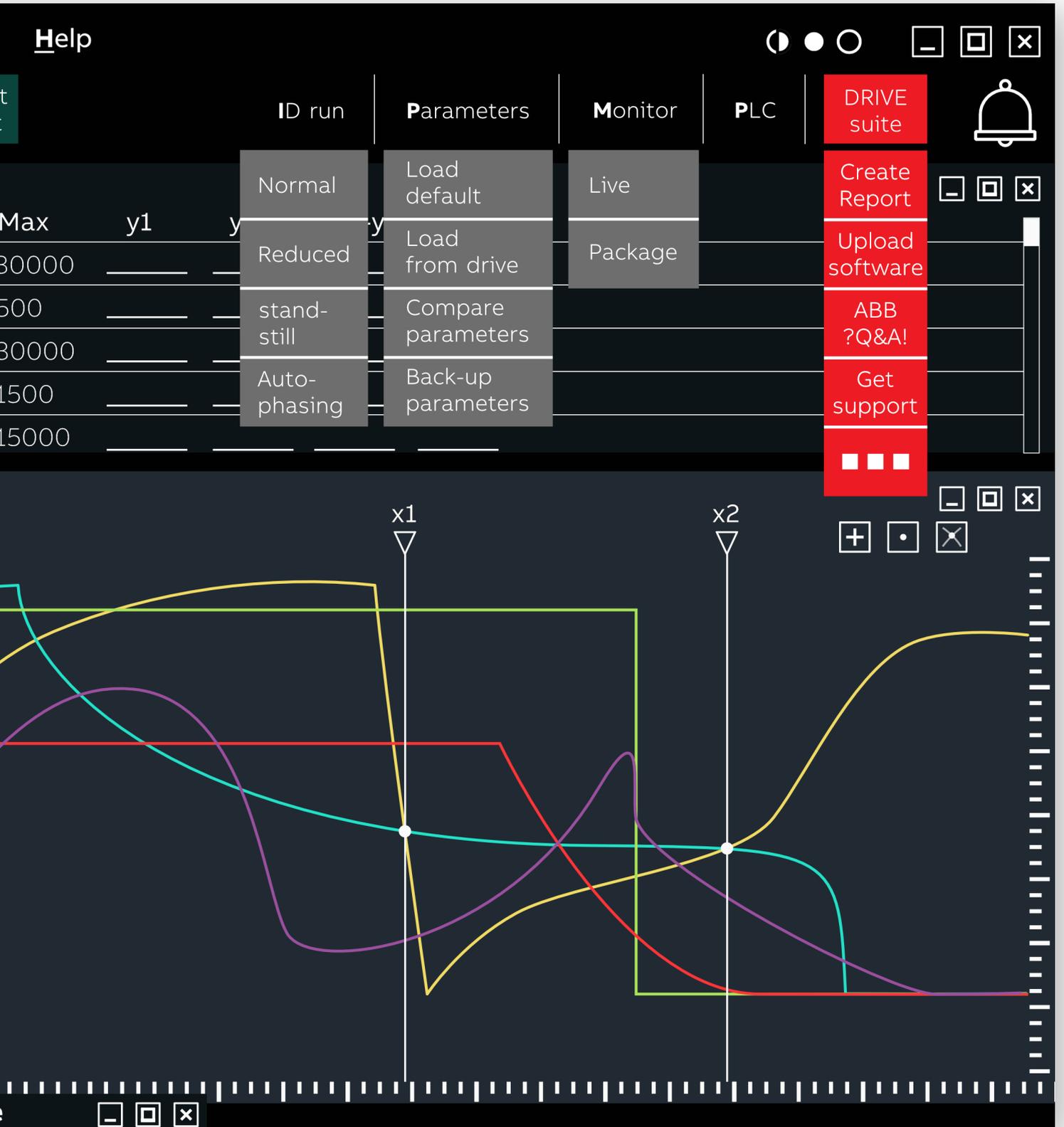
Applicable solution

The task-oriented interface

We chose to use a task panel to have the navigation more task orientated and that for each task the interface and tools are customised. This way space is saved to have a bigger view but also the right tools at hand. These task workspaces are in analogy to the personas in Affinity Designer and Photo. For instance the mask tool is only accessible when it is applicable for given signals that are being read in the monitoring view, so it is not taking space during all operations.

The task oriented navigation was also the reason to build the ABB Drive Suite. Here the whole software portfolio is accessible from one place. Each time clearly stated where for a software is used but also accessible for more trained users via keyboard shortcuts.





Final concepts

Applicable solution





Final concepts

Applicable solution scenario and workflow





Final concepts

Radical solution

ABB Development Community: Connecting the Field and the Factory

The second concept that we have developed for ABB is a radical proposal towards the ABB structure; the concept is titled **ABB Development Community: Connecting the Field and the Factory**. The solution aims to break down the disconnect that exists between the Field and the Factory and is centered around the a new position, the ABB Field Representative, that facilitates dialogue about development issues, both software and hardware, between those in the field and those in the factory. The role of this position would include the following duties:

- Understanding the needs of the field engineers and others in the field
- Holding workshops with field engineers to understand their needs and develop a sense of community among them
- Represent the interests of the users of the software and hardware in the field to the developers and others in the factory.

Currently there is a one-directional flow of information from the factory to the field engineers. In this way, whenever there is new software or hardware tool that is developed, it is pushed upon the field engineers. When it is given to them, they have no choice but to utilise it, however these pieces of hardware and software are developed without engaging the users. The developers are making software for the engineers in the field but they do not always understand the requirements that these users might have.

The one way dialogue that exists within ABB has developed over time. The structure within ABB has purposefully created a barrier in communication between the field and the factory. As one factory member discussed with us about the factory not wanting to hear from the Field Engineers. As Marco a technical Support field engineer at ABB said:

“There are layers of built up to obscure the flow of information from field engineers to the factory”

Field engineers do not find it valuable or desirable to talk to the factory directly either. As the field engineers' needs have not been considered and their requests are often ignored, there is a disconnect between the factory and the field.

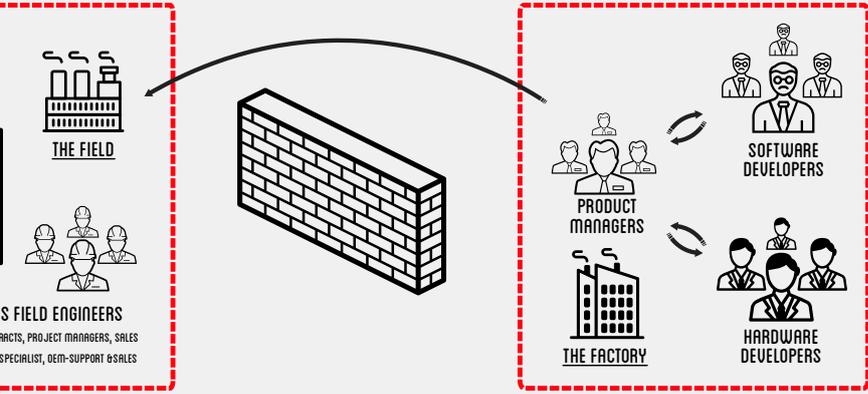
Our solution asks ABB to consider the creation of a new position in between the factory and the field. The individuals working in this position would provide a critical link to develop an understanding of the field engineers needs in the factory. This position would be able to pool the needs of the users and discuss these needs with the developers with minimal impact on the workflow of the developers. This solution would allow for better hardware and software to be developed for the users.

In developing this position and revising the organisational structure to allow the ABB Field Representatives to have a voice within the development, ABB would be able to develop better software for the users. We recommend the the ABB Field Representative would also be responsible for facilitating an iterative software development process.

In conclusion, there is a disconnect between the field engineers who are commissioning, servicing and maintaining drives for customers and the factory who are developing the software for field engineers and clients and also selling the drives. It has become clear to us that the software including Drive Composer Pro has not been developed for the primary users of the software - the field engineers or others in the field. If the factory introduces software that considers the working habits and workflows of field engineers they will be more driven, competent, stimulated and connected.



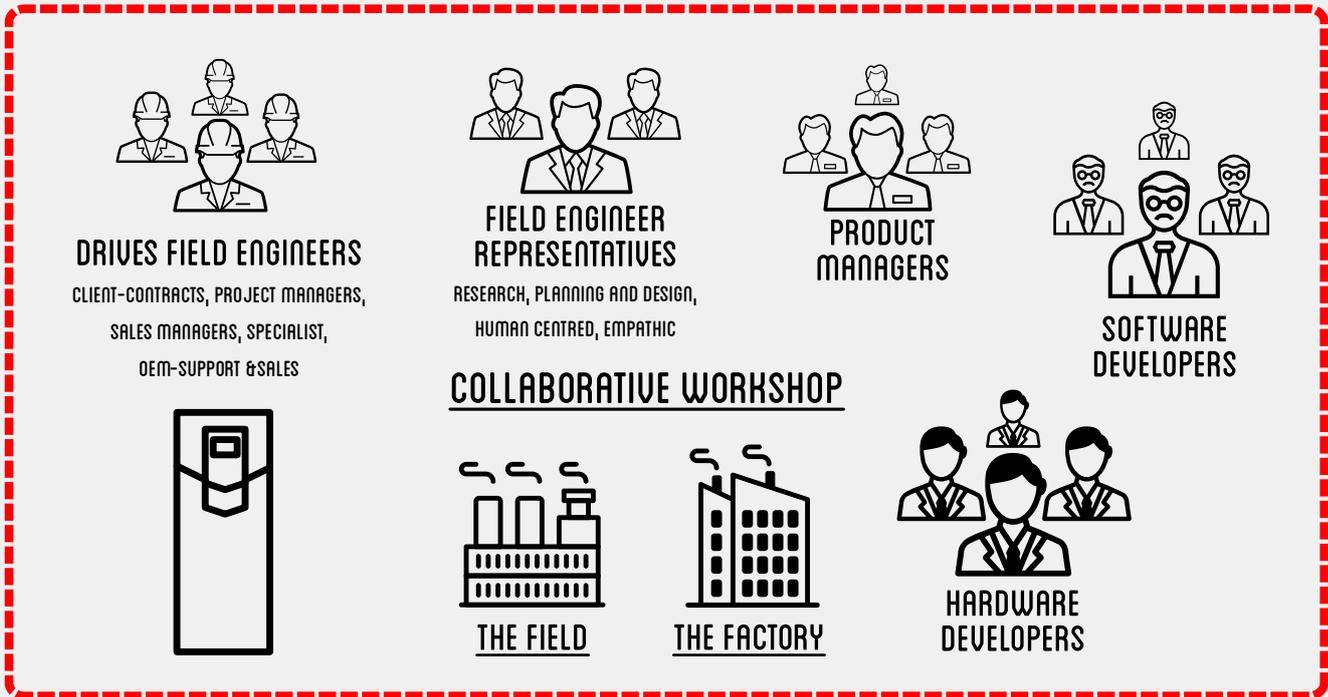
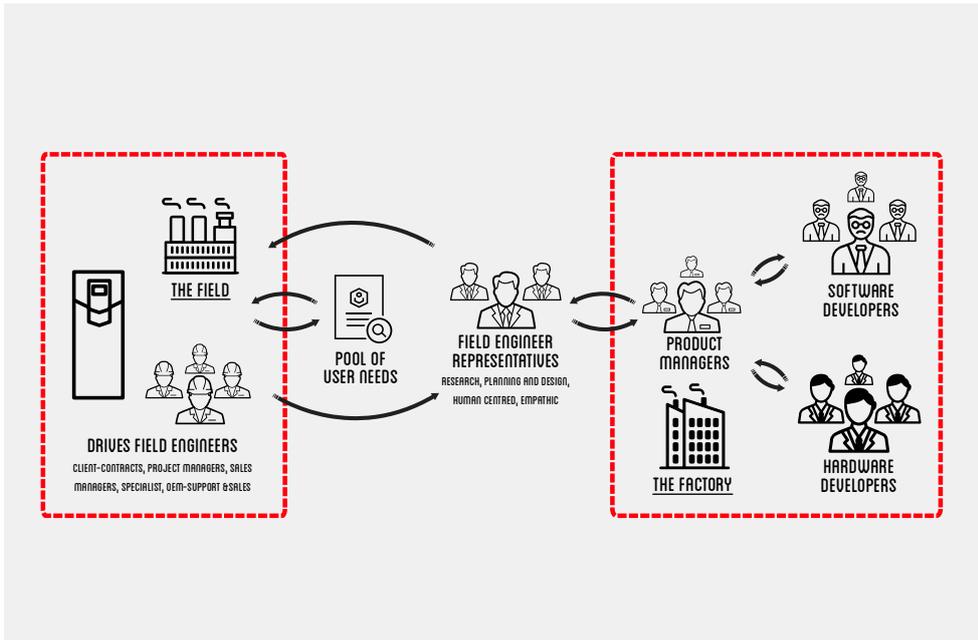
DRIVE
CLIENT-COMMUNITY
MANAGERS,



Iterate: The ABB Field Representatives would understand the field engineers needs and represent them in the iterative design process

Release: The ABB Field Representatives would advocate for the needs of the users during the software development phase leading up to the release

Test: The ABB Field Representatives would be able to test the results of the iterative software releases with the field engineers and gather feedback quickly from them.



Reflections

Reflections on the course and our project

How our understanding of experience-driven design grew on the way

It has been a very intensive seven weeks since we took this project on but along the way we have all learned a lot about experience design, ABB and their organisation as well as the world of field engineers and how their complex work processes. We all worked hard to make this project as successful as possible. Although it is different than other processes we have been involved in, each of us has enjoyed working with experiences as drivers for design rather than having the technology drive the project forward, which are so common in the field of design and software development today. Designing for experiences is not an easy task. Experience can be very hard to evaluate as they are so individual and unique to everyone. Having clear experience goals has helped our team to keep a broad focus on the holistic vision of the design towards evoking specific experiences; this has been helpful because sometimes these overarching goals can get lost in the design of digital services when they are not consciously kept in mind during the design process. We also found the customisation we did to the original MAX- evaluation method extremely valuable as it not only allowed us to evaluate the experience goals we set, but also helped our evaluation participants open up and to better express their personal experience of our concepts despite the fact that they were so low-fidelity. It was surprise how good insights one can get even with such a low-detailed prototype.

Our project compared to the proposed double-diamond process & schedule

Our design process is a very typical example of a double-diamond process. The first diamond was half of the process but was took up most of the time available, while the second diamond was, repeated multiple times to have a more agile development process. To be faster we could have reduced the time allocated to the first diamond, and then followed it up with a smaller second diamond to iterate designs faster in design sprints with the users. This would allowed us to be even more agile and inclusive with our design process. However the structure of the course might have prevented us from doing so. As mentioned the low-fidelity prototypes were

also very useful as research means to understand the users, their context and their tasks better. They allowed us to engage the users in an experiential way without them feeling too overwhelmed by a finished product which allowed them to comment and give honest feedback.

What were the challenges and successes?

Along the way we lost our Finnish speaking team member, which might have prevented us from understanding some of the nuances that our users would use during our interviews. While it challenged us in making our tools more understandable to our Finnish participants, it did not prevent us from delivering a great project. This, in fact, has only benefited for us as it forced us to not only use images and terms to describe emotions with less complicated jargon, but also choosing a method with a clear scale, which allowed the participants of our evaluations to better understand us and each other.

Establishing contact with both our client and the end user's was at times not easy and it took some time in between our different concept interactions to get ahold of these people to evaluate. This proved to our benefit in the end, as we had the time to shift our concepts between the tests and interviews, which meant that we got new insights each time and perfected our research method and evaluation approach. This too helped us in understanding the entire context and all aspects of the very broad PC program.

One issue we came across was that we built a task-oriented test scenario and because of this there was some misunderstandings within the evaluations of our early iterations. Additionally, for the first testing of our task oriented scenario we selected something more similar to a usability test than a qualitative experience evaluation. In creating a task oriented evaluations we utilised low-fidelity prototyping which allowed us to iterate and refine the prototypes quickly. This allowed us to refine the presentation during our evaluations to a scenario of a task-oriented workflow which allowed the users an experiential evaluation rather than a usability test setting.

How does this project compare to our earlier project experiences?

Designing both for experiences and for business to business, is different from what any of the group members have done before. For some of us our body of work has included experiential projects designed for consumer users. Others have had a focus on human centred and empathic design methodologies with a focus on designing holistic service systems. Additionally some of us have experience with designing for digital environments, communications and web use. This opens up a whole new field with a lot of potential to design for experiences. Experience driven design is a new approach that proves to be very desirable within this context as well as being feasible and valuable.

