Added Value of Product Registration

Tanja Kujala

Haaga-Helia University of Applied Sciences
Degree programme in Tourism and Hospitality Business
Specialisation: Experience Economy and Designing Services
Master's Thesis
2024

Abstract

Author
Tanja Kujala

Degree and Specialisation
Master of Hospitality Management
Specialisation of Experience Economy and Designing Services

Title of thesis
Added value of product registration

Pages and Appendix
89 + 22

The case organization Vaisala was interested in finding out whether there was a need for a product registration that would attract customers. More specifically, the elements of added value were under the scope of this development work. The work was framed so that only the end-users of the company's flagship product was under the scope. The initial idea came from the company's Customer Experience Program which set the objectives for a product registration study.

The aim of this development work was to identify the need and added value of product registration for end-users, and the optimal registration process that would benefit them. The product registration would also enable the organization to collect customer data and improve its services and processes.

The development work followed the principles of service design and its process model called Double Diamond which gave structure to the work. Various service design methods and tools were used along the process such as benchmarking, theme interviews, Affinity Diagram tool, How Might We? tool, customer personas and customer journey map. The ideation session provided the relevant ideas for prototyping. The final prototype summarized the whole development work into practical concept of a portal.

The order of this development work was first to investigate organization's operating environment, the product management and stakeholders involved in the project in order to have better understanding of the matter. The theoretical framework addressed the themes of value proposition, value co-creation, customer experience, customer journey and customer engagement. This theory basis provided understanding for what elements are needed when developing service concept for customers.

As a result, a prototype of a portal with value-added elements was created. The prototype includes features and functions which support customers in their internal processes by improving their communication and knowledge sharing. The outcome is an asset management tool for customers that enables case organization to support customers even better.

Keywords
Service Design, Customer Experience, Customer Journey, Added Value, Registration, Portal

Tiivistelmä

Tekijä
Tanja Kujala

Tutkinto
Palveluliiketoiminnan johtaminen ja kehittäminen (YAMK)

Opinnäytetyön nimi
Tuoterekisteröinnin tuoma lisäarvo

Sivut ja liitteet
89 + 22

Kehitystyön toimeksiantajana toimiva Vaisala oli kiinnostunut selvittämään, olisiko asiakkaat kiinnostuneita rekisteröimään Vaisalan tuotteitaan ja mitkä elementit siinä olisivat tarpeeksi houkuttelevia sekä toisivat samalla lisäarvoa asiakkaalle. Työ rajattiin siten, että vain yrityksen lippulaivatuotteen loppukäyttäjät kuuluivat tutkimuksen piiriin. Alkuperäinen ajatus kehitystyöhön tuli yrityksen Customer Experience Program -ohjelmasta, jonka pohjalta asetettiin työn tavoitteet.

Tämän kehitystyön tavoitteena oli selvittää, mitkä tekijät tuovat lisäarvoa loppukäyttäjille ja millainen olisi optimaalinen rekisteröintiprosessi heille. Tuoterekisteröinnin avulla organisaatio voisi myös kerätä asiakastietoa, jolla parantaa palvelujaan ja omia prosessejaan.

Kehitystyössä noudatettiin palvelumuotoilun periaatteita ja sen Double Diamond -prosessimallia, joka antoi työlle rakenteen. Prosessin aikana käytettiin erilaisia palvelumuotoilumenetelmiä ja -työkaluja, kuten benchmarkingia, teemahaastatteluja, Affinity Diagram -työkalua, How Might We? -työkalua, sekä työkaluja kuten asiakaspersoona ja asiakaspolku. Ideointisessiosta saatiin tarvittavat ideat prototyypin luomista varten. Lopullinen prototyyppi tiivisti koko kehitystyön käytännön konseptiksi asiakasportaalista.

Tämän kehitystyön järjestyksenä oli ensin tutkia organisaation toimintaympäristöä, tuotehallintaa ja tutkimukseen vaikuttavia sidosryhmiä, jotta asiasta saataisiin parempi ymmärrys. Teoreettisessa viitekehyksessä käsiteltiin seuraavia teemoja, kuten arvolupaus, arvon yhteiskehittäminen, asiakaskokemus, asiakaspolku ja asiakkaan sitouttaminen. Tämä teoriapohja tarjosi ymmärrystä siitä, mitä elementtejä tarvitaan kehitettäessä palvelukonseptia asiakkaille.

Työn tuloksena syntyi prototyyppi asiakasportaalista, joka sisältää lisäarvoa tuottavia elementtejä. Portaali sisältää ominaisuuksia ja toimintoja, jotka tukevat asiakkaita heidän sisäisissä prosesseissaan parantamalla samalla heidän sisäistä viestintäänsä ja tiedonjakoa. Lopputuloksena on asiakkaille tarkoitettu omaisuudenhallintatyökalu, jonka avulla toimeksiantajaorganisaatio voi tukea asiakkaitaan vielä paremmin.

Avainsanat
Service Design, Customer Experience, Customer Journey, Added Value, Registration, Portal

Table of contents

1 Introduction

The idea of this development work was to find a real-life business case that would need developing in the field of customer experience. It was considered important that the development work would provide useful information to the case organization. The development work supported the business trend of receiving vital customer insight in order to develop organization's processes, improve competitiveness and customer experience. The Finnish company Vaisala Oyj is commissioning party for the development work.

1.1 Objective

In the strategy, Vaisala has highly focused on a deep customer understanding. A customer experience program of the company was created to map the current state of the customer journey and its touch points. (Vaisala 2023c.) The professionals working with Customer Experience Program had done a ground work already and found pain points that would need to be developed further within the customer interaction. A one design sprint subject stood out as great challenge but without tight deadline. The working title was called "Registration of Vaisala products." There was need to increase the understanding on the end-users of Vaisala products.

> *"Registration of Vaisala products: We would like to increase the understanding and information about the end-users of Vaisala products. We should define a product "registration" process which would attract and bring value to users."*
>
> —Design Sprint topic of Vaisala Customer Experience Program

It was initially thought that by registering a Vaisala product it would enable a channel of interaction between Vaisala and its customers, and eventually it would ensure customer engagement, customer insight and better customer experience. It was also thought that the end-users would be the most potential to register the products, because they would use the products the most and they would need services and features that the registration would offer.

The objective of this work was to define does end-users have a need for product registration, and what added value can be offered to them by registering the product, and also what type of registration process should be so that it would attract users and bring added value to them. Especially the registration of the end-user would provide needed information to the organization and with that data the organization could develop its services and processes for the customers.

The case organization sells products also through middlemen like partners and distributors. Typically, a vendor or a distributor buys products from Vaisala and then sells them to end-users. The end-users can be any company from any industry sector that needs to measure parameters.

Usually, the vendor does the purchasing and installing of the product on behalf of the end-user. Due to the vendor being in the middle, the case company has not received data of all the end-users, because the middlemen do not share this information. With potential registration process the case organization would be able to get closer to the end-users and simultaneously to be able to provide value to the end-users.

The data and knowledge received from the end-users would be highly valuable for developing the service and competing in the selected markets. The purpose was to bring the case company and its customers together in order to create value for both parties. Received data and information can be utilized also in other projects and design sprints. The completed development work could be later applied to other development projects. The development work aimed to define and create a concrete registration process for the end-users of Indigo500. The registration process would mean a customer portal and the process to attract customers to signing up to the portal. The customer portal would work as interaction channel between the end-users and Vaisala. It is assumed that this will enable Vaisala to create added value for its end-users.

Here are the objectives that needed to be achieved through the development process. The objectives of understanding and receiving data of the end-users were achieved, but increasing customer engagement and improving customer experience are long-term objectives that will be achieved in the future with the insight of this development work.

The research problem is lack of deep understanding of the end-users. The case organization has not an adequate process for collecting customer data of the end-users. The objectives are to understand the end-users in more depth and to receive customer data of the end-users, which would provide insights of customer behavior and needs. The objectives are also to increase customer engagement and improve the customer experience overall. The design sprint for the Customer Experience Program is following. Would product registration create value for the end-users and provide solution for the objectives?

1.2 Research questions

Without the deep understanding of the customers' wants and needs the case organization does not have the qualified data of the customers to improve the services. The overall aim with this development work was to increase customer engagement and improve their customer experience and also extend the life cycle of the products. At first, the research questions were focusing more on product registration. The questions were modified to be more in-depth and depict more the need for understanding customers rather than asking directly about the registration.

The research questions were following:

- How do the end-users experience the service and their interaction with Vaisala throughout their customer journey at the moment?
- Which factors and elements would create added value to the end-users that could attract to product registration and to the use of a customer portal?
- What type of product registration process and portal would create added value to the end-user?

In the theory part of this development work, the term “customer” has been used generally, but term “end-user” is more descriptive for this development work. The reason for this is, that the case organization has different types of customers and large part of them are distributors and partners, so called middlemen that operate between case organization and end-users. At the beginning of this development work it was confirmed that distributors and partners as customers should be framed out. The relationship with them was too sensitive to include them with the project and ask them to provide information about their own customers or interview their customers, even though those were end-users of the case organization. The distributors and partners are very important customers for the case organization, it was therefore decided that it was best to focus only on the end-users who were direct customers. Originally this whole development was created to receive information and data from end-users that the case organization did not yet have, and this meant those end-users who had a distributor or partner in the middle. However, the end result of this development work could be scaled to broader audience and not only to the direct customers.

1.3 Structure of the work

The development work followed the principles and structure of service design process. Various service design methods and tools were used that provided concrete approach to the work, and also brought the customers closer in the developing process. The service design approach did not follow the traditional format of the thesis, since results were emerging as the process progressed. The final results in the chapter 8, are answering mainly to the research questions and covering the results of the final prototype. More on the service design approach and the used process model in chapter 3. The theoretical structure is based on the value creating elements and the customer experience elements. More on the theoretical framework is presented in the chapter 2.

The development work was framed to the end-users of only one product family, which was Vaisala’s flagship product family Indigo500. Practically this meant that a sample of Indigo500 end-users were invited to interviews, and the documentation of only that product was used in the discovery stage. Therefore, distributors and partners were framed out of the scope. In this development work, no distinction was made between existing customers and new customers, even though

customer data was collected from existing customers only. The outcome is intended to serve all Vaisala customers.

1.4 Case organization

The development work was made for case organization Vaisala Oyj. As part of its strategy, the case company has started to focus on the customer experience and its development. The company has already mapped the pain points in the customer journey of their customers and the company has been collecting data from customer feedback for instance.

The Finnish company Vaisala Oyj was established in 1936 by Vilho Väisälä. A few years earlier he found Russian radiosonde that used radio technology to get observation data of weather. He wanted to make a better version of it and later he finalized his innovation, and he sold the first radiosonde pieces to Massachusetts Institute of Technology (MIT). Today, Vaisala is known for its world class devices, measurement instruments and innovations that help people to observe their environment and use the received data to develop their own businesses. (Vaisala 2023a.)

Vaisala consists of two business areas, Weather & Environment, and Industrial Measurements. The company is a global leader measuring and providing accurate and reliable products and solutions for different environments. It enables customers globally to be better in decision-making, improve their safety and quality, but also increase their productivity. Vaisala's solutions can be found in weather forecasting business, aviation, life science, power & energy industry and in space. (Vaisala 2023b.)

Vaisala's flagship product is Indigo product family, which is a modular platform for transmitters and probes, as shown in the figure 1. This platform includes various transmitters and interchangeable smart probes that can measure different parameters, also in addition it contains a software that provides data monitoring. Any of the smart probes can be connected with any of the transmitters, but the probes can be integrated into other systems as well. This whole platform is built on top of Vaisala's sensor technologies. With the smart probes various parameters can be measured such as humidity, dew point, temperature, carbon dioxide, barometric pressure, vaporized hydrogen peroxide and moisture in oil. The accuracy and stability of the probes are world class, and they deliver high resolution and data everyone can rely on. (Vaisala 2023e.)

The undersigned works in the case organization, but joined the company only less than a year before the development work. Working in the commissioning company has made it easier to network with different stakeholders and to reach people for getting necessary information. This work has been a solo project with commissioning party providing verbal guidance when necessary.

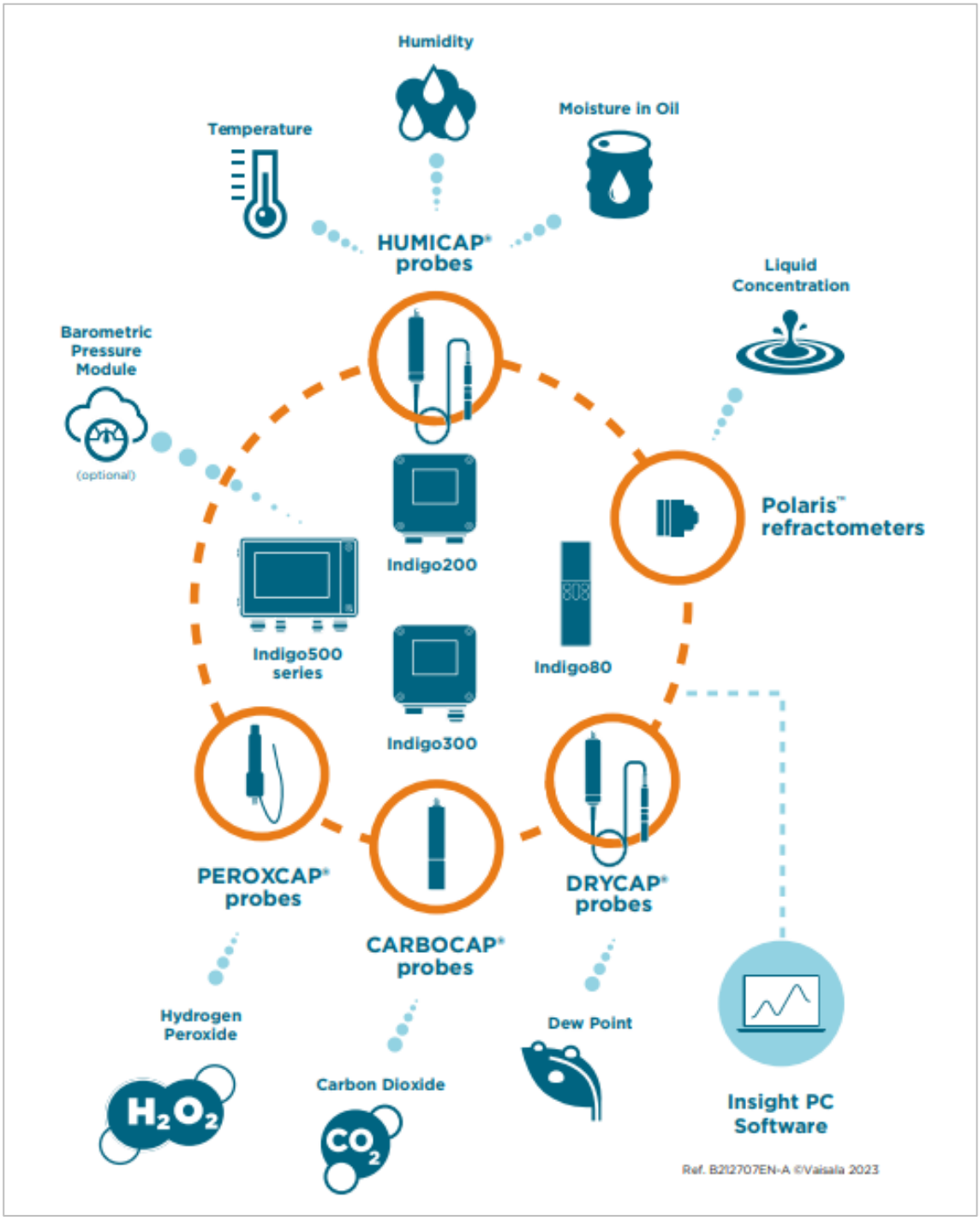


Figure 1. Indigo Platform (Vaisala 2023e)

For the reader, it's good to know the following aspects about Vaisala devices. The HMT300 series preceding Indigo devices are under ramp down and will be replaced by Indigo series by the end of year 2025. The Vaisala HUMICAP® is for measuring humidity and temperature and it is compatible with the transmitters (Vaisala 2023d).

2 Theoretical Framework

This development work is structured according to the service design approach and its stages. Before diving into the different stages in chapter 3.2, a theoretical framework has been presented to give theoretical basis for the development work.

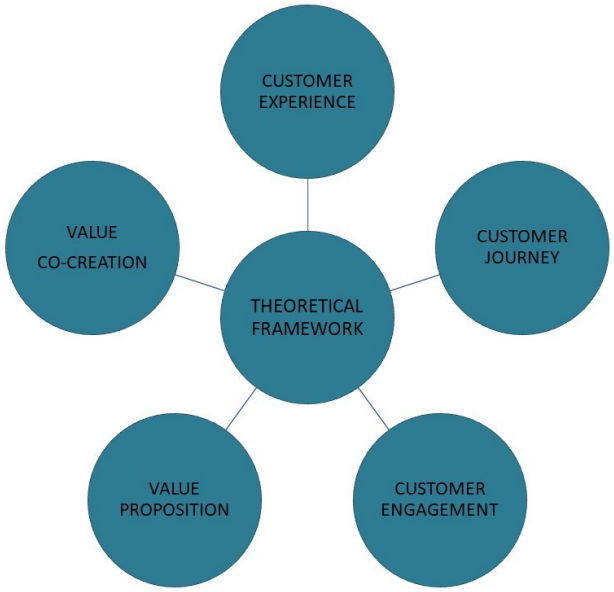


Figure 2. Theoretical framework of the thesis

As shown in the figure 2, the theoretical framework is based on themes of customer experience, customer journey, customer engagement, value creation and value proposition, for the customers and with the customers. Customer experience and customer journey are key concepts in this development work and therefore it is essential to understand them more in-depth. When designing new products, services and concepts for customer, it is important to know the customer better by knowing their experiences and journeys based on research. The customer engagement is also important theme when designing something that would improve the customer relationship and increase the customer loyalty towards the company. In many cases, the customer engagement have been put into practice by creating customer engagement portal for customers. The themes of value co-creation and value proposition are crucial when designing for customers, because designed concepts are useless without value for the customer. When designing a new product registration process, it is essential to know how customers would behave along the journey and what factors would influence their experience. It is essential to know how value is perceived and created in today's business.

All these themes have been studied extensively and from different angles around the world. There can be found a lot of scientific research journals, books and publications about the themes. Peer-reviewed journals have been used in this development work to maintain reliability. There are a lot of articles and journal blogs as in Harvard Business Review articles which are used in this development work. The themes of value and customer experience have been well established themes in marketing for a long time but those have also been in transition in the digital era. Those themes can be found in the core of every successful companies nowadays, and therefore their importance need to be understood.

There are not enough scientific research articles or publications on product registration to be included in the theoretical part. Instead in chapter 4.1, benchmarking method has been used to provide the best practices of product registration.

2.1 Value proposition

Marketing and customers' demand are shifted from goods-dominant view to more intangible goods and operant resources. Customers' needs are focused more on the offerings that create value to them. In this service-centered marketing, the companies are always trying to create better value propositions than others on the market. (Vargo & Lusch 2004, 1-5.)

A value propositions is one of the essential elements of business. It defines how the company stands out among its competition. A customer has expectations of its own about the receivable value and those expectations come from person's previous experiences, hopes, and needs as well as the company's communications and brand. The value proposition defines and describes the product and for whom it is intended. It describes the benefits for the customer and its differentiation factors – why it is unique. When company knows how the customer uses the product, it also knows, how to produce more value to the customer with the service. The value that the customer is experiencing is formed in interaction between the company and the customer through different channels such as in the customer service and in the digital platforms. (Tuulaniemi 2016, 33.)

To define company's value propositions, the following questions should be answered.

- What kind of value are we producing to our customers?
- What problem are we solving?
- What needs are we fulfilling?
- What type of product portfolio are we offering to each target group? (Tuulaniemi 2016, 34.)

In today's business, many companies have set strategic target to produce added value to the customers. The customer's perceived value is the relationship between benefit and price. As the price decreases or as the benefit increases, the value of the product increases. It can be said that the added value is the competitive factor. (Tuulaniemi 2016, 37.)

Many companies are announcing that they are producing added value to their customers, when in practice, they mean only creating value to their customers. Creating value is a fundamental task for every company and organization. In summary, *the added value* is the competitive factor which is basically done by decreasing the product's price or increasing the received benefit of the product and the experience. (Tuulaniemi 2016, 38.)

Service-centered marketing is viewed as continuous learning process which can be stated as following four components: company's core competence, its potential customers, customer relationships that co-create customized value propositions, and measure customer feedback to improve offering and performance. (Vargo & Lusch 2004, 5.)

2.2 Value co-creation

In value co-creation the customers are key players and they are creating value with the company directly or indirectly along the production or consumption stages. There are important components of joint value creation such as engagement, interaction, experience and self-service, but value co-creation is more than that, as it goes beyond the productions chain, all the way to consumption and value delivery chain. (Ranjan & Read 2016, 291.)

Traditional industrial services have been transforming due to new technologies, namely, industry 4.0 technologies. The term "industry 4.0" refers to the fourth industrial revolution (Vaidya, Ambad & Bhosle 2018, 233.) and it was created a bit over decade ago to illustrate the digitalization of manufacturing. This means the integrations of smart products, which causes changes in value co-creation. So called smart products are intelligent objects with integrated sensors and devices that are connected to the Internet. This enables suppliers interact with their customers remotely and boost collaborations and create new business opportunities. The suppliers are able to use smart products to improve their offerings and create value by collecting and analyzing customer's data. Thus, service providers and customers are collaborating in product-service systems so that they both are benefiting from it and co-creating smart services. Industrial services provide added value to customers' processes in business-to-business environments because the suppliers' knowledge improves and optimizes the production process performance of the customers. A lot of applications can be integrated in industrial services, such as training, engineering, after-sales services and solution services. (Bonamigo & Frech 2020, 412-413.)

According to SDL-logic (Service-Dominant Logic) value is always co-created with customer because basically suppliers need to work with customers to deliver the service. Therefore the value co-creation occurs in the customer interaction. The SDL-logic can be broadened to include the whole network of suppliers and customers, in which case this service system includes also other stakeholders. An inter-firm communication and mutual resources creates value, new innovations and opportunities in B2B environment. Service systems have transformed into smart service systems when they integrated versatile technologies and became smarter. Smart service systems includes four elements such as connected things, automation, people and organizations, and data and information interaction. (Bonamigo & Frech 2020, 412-414.)

To implement the opportunities of industry 4.0, the managers would need to prepare themselves for industry 4.0 challenges as well. For opportunities there are five themes that stood out from the findings of Bonamigo & Frech (2020) research study.

"Inter-firm collaboration" gives competitive advantage by providing access to shared resources, such as cloud-based platforms, IT systems, IoT, Big data, connecting organization, helping the integration and sharing resources. Also, partnerships between companies are possible even with long geographical distances (Bonamigo & Frech 2020, 416.)

In *"Creation of new services,"* opportunities can be generated with IoT and Big data, when data is collected and analyzed from smart products that are connected to Internet. The service providers get useful information with data analysis how customer are using their products. This can show the hidden needs of the customer that can be met by developing services. As an example, company selling products with sensors can provide service package for predicting maintenance needs (Bonamigo & Frech 2020, 416.)

"Mass customization of services and products" refers goods and services that meet the specific needs of the customer in larger scale. It improves the competitiveness of the companies because standardized service are not providing as much value to the customer as differentiated ones (Bonamigo & Frech 2020, 416.)

The opportunity *"enhanced performance of industrial services"* companies can monitor industrial equipment with IoT that improves efficiency of maintenance services. With IoT companies have access to real-time data on the status and condition of the equipment, so they can detect possible failures and make quick decision out of it. In this sense, the supplier can anticipate these situations with data analytics and provide better solutions for customers' needs (Bonamigo & Frech 2020, 416.)

The last opportunity *"long-term relationships with customers"* indicates that customers and supplier are working closely in the new industry 4.0 technologies. The smart products help to create value together and interact throughout the entire life cycle of the product. (Bonamigo & Frech 2020, 416.)

The challenges for value co-creation in industry 4.0 technologies' services are identified to be "development of new skills," "interoperability," "full guarantee of safety," "multiple stakeholder's management" and "scalability." The current workforce do not have the needed skills in industry 4.0 technologies and the companies would need to invest in communication technologies and also train their workforce to obtain data analysis competencies, for instance. It is good to highlight that soft skills are more important and those are great asset in creative thinking and interpreting data. The term interoperability refers transaction capability of different IT systems, standardization and compatibility of different devices. In demanding B2B industries, the IoT platforms should have seamless compatibility between sensors and machines. The incompatibility of information systems is a challenge in digital ecosystems and for the business development. There are well-known issues with data privacy in industry 4.0 technologies. Customer might believe that smart devices are risky because the supplier would have access to the information without consent of data privacy. There is no standardized regulation or governance of data ownership, and therefore it creates a challenge for value co-creation in B2B relations. (Bonamigo & Frech 2020, 418.) Also, Vaidya, Ambad & Bhosle (2018, 237) are confirming that cyber security is a larger issue as critical industrial systems need to be protected from cyber security threats when connectivity is increasing and standard communication protocols are used.

Multiple stakeholder's management refers to the challenge of several stakeholders having different goals and business models. This may cause conflicts and poor communication. The scalability means the platform's capacity to provide resources for application to work, especially when there are large number of users simultaneously and multiple devices connected parallel, which can lead to slow performance. The scalability is essential factor for virtual collaborative environments. To co-create value, the companies in industry 4.0 need scalable systems that are supporting all stakeholders and smart products at the same time. (Bonamigo & Frech 2020, 420.)

2.3 Customer experience

There has been many attempts to define customer experience. Harley Manning (23.11.2010) in his article in Forrester Research defines it as follows:

> "How customer perceive their interactions with your company."

The following three components useful, usable and enjoyable makes good customer experience. Only the customers of the company can tell if they have perceived the experience as according to

those components. The term interaction is defined also, so that when a customer and a company representative are having a two-way exchange. Whether it is website, call center, retail location, buying a product, using the product or email response. The customers are making judgements based on how their needs were met and how easy and enjoyable it was to do business with. Those moments define the actual customer experience. (Manning 23 November 2010.)

Creating great customer experience (CX) is complex process in today's business world which focuses more on adapting omnichannel environment. Research shows that distinctive customer experience comes from cross-functional co-operation between stakeholders. Responsibility for delivering a great customer experience cannot be provided only by the customer frontline, such as sales and customer experience team. Everyone across the organization should be involved in creating coherent customer experience and strategic functions should be included in each department. It requires a strong collaboration between CX team and product teams, which leads to customer insight to integrate all the way to the product development. The practical example to improve CX would be learning from customer feedback and sharing it more widely with all employees. (Hinds & Gupta 6.4.2023.) CX leaders have been trained to create and apply customer journey maps in development activities, but yet customers' need to follow specific values, such as diversity, equity, inclusion and climate change has not been taken into account in companies in general. (Nirell, L. 7.4.2023.)

There are multiple definitions of customer experience in the literature. One definition has been that the idea of "experiences" distinct from goods and services. A consumer purchases an experience to spend time and enjoy memorable events which a company stages for them in order to engage with them in a personal way. Other definition is that regardless of the nature and form of service exchange, all leads to customer experience. Customer experience is holistic in nature because customer is experiencing subjectively all the interaction with a company, including customer's cognitive, emotional, behavioral, social, sensorial, and spiritual responses. In general practitioners have come to agree that the whole customer experience is a multidimensional construct. (Lemon & Verhoef 2016, 70-71; Prorok & Kosicka 2021, 37.)

Companies are setting the focus of customer experience on the entire process that the customer goes through, and they are thinking how to manage and design each touch point. There are many theories and models about customer decision processes, where buying process are shown from need recognition to purchase, and to evaluation of the product purchasing. These models were made already in the sixties and those have gained strong foundation in customer experience management. (Lemon & Verhoef 2016, 71.) Customer experience management (CEM) can be

described more of a process-oriented than outcome-oriented concept, where customer's entire experience is strategically managed. (Prorok & Kosicka 2021, 37.)

In the definition of Customer Relationship Management (CRM), it has been argued that creating long-term relationship is no longer the main objective. Those long-term relationships are not automatically more profitable. In order to profit, companies can optimize the Customer Lifetime Value (CLV) that includes customer acquisition, customer retention and development strategies. This should lead to shareholder value creation. (Lemon & Verhoef 2016, 72.)

It is essential to understand and manage company's customer experience, and one key element to do this is the ability to measure and monitor customer reactions, especially their attitudes and perceptions towards the company. One approach is that the key objective of tracking touch points of customer journey is to develop an understanding of how those experiences can be enriched for the customers in so called "customer decision-making process." One of the measures of customer experience has been customer satisfaction as a concept that comes from the comparison between actual performance and customer expectations. This customer satisfaction (CSAT) measurement has been highly used in marketing sector, but nowadays Net Promoter Score (NPS) is the most commonly used. Both of these measurement approaches perform well in predicting company's performance, although the predictiveness differ in certain context. One good model as well is SERVQUAL, which helps to evaluate the customer experience in all aspects. These measurements provide great building blocks to overall understand better customer experience of the company. In addition, Service Blueprint offers great tool to map the customer journey of the company. Although this gives good picture of company's service delivery, it lacks the emotional aspects of the customer. Therefore, there should be better focus on customer experience that includes emotions and customer perceptions. (Lemon & Verhoef 2016, 71-72, 81.)

A customer centricity is essential strategic approach for companies. In the strategy it is important to align products and services according to the most valuable customers in order to maximize long-term value in the economy of customer. This has enabled the companies to be more prepared to design and manage customer experience over sectors. The companies have great tools to include customer centricity into their managerial work, such as Customer Personas and "jobs-to-be-done." The customer persona is fictional archetype that represents the ideal customer. All the characteristics are based on research and actual data collected from real-life customers. This tool, customer personas, has been used in design, developing work, brand managements and especially in customer experience management. With this tool companies can focus on customer segmentation that brings out the needs and experiences of typical customer. The other tool, "jobs-to-be-done" goes

deeper in the customers' lives and perspectives where companies can examine the circumstances that leads the customer to buy the product or service. (Lemon & Verhoef 2016, 73.)

An increased demand of Service Design has been significantly influenced by the importance of customer insight and customer experience as part of companies' strategic competitive factor. Nowadays we are operating in the era of customer, where companies, who have a deep understanding of their customers' needs and who can generate meaningful customer experiences, are the ones that thrive. The era of customer began around decade ago when services and products of companies started to be similar, and they could not distinct themselves from competition. The branding of company, managing of the distribution channels and the use of information technology would not guarantee a competitive advantage anymore. (Koivisto, Säynäjäkangas & Forsberg 2019, 20–22).

Nowadays customers have more power than before and there are more options to choose from. They can easily find different service providers and products on the Internet, compare them, and share their experiences. Because of this, the meaning of branding has decreased. Often these created brand images cannot be redeemed in the customer interaction. To master in the competition, the only option is to know the customers better and offer them genuinely superior customer experiences that differs from competition. This requires much from the companies. The customer and its needs should be prioritized in all companies' decision-making and operation. Also, the customer experience should be managed in the operations and the development should be customer-oriented. The customer experience should be exceeded in order to reach customer loyalty. The companies need to manage the details in their offered experiences and services. Finally, it is worth emphasizing that a positive customer experience can only be achieved through a positive employee experience. (Koivisto et al. 2019, 22.)

Today's customers have high expectations of services that deliver value and benefits to them. They want to have service solutions that predict their needs before they even realize the need themselves. The technical outcome of the service alone is not enough for the customers, but the experience of using the service has more important role. This is due to the fact that usually the outcomes are quite similar. The difference and the competitive factor comes from the experience of the service. (Koivisto et al. 2019, 22–23.)

The customers are also expecting that the services are comprehensible and easy to use. The services should save time and to be easily accessible. Also, shifting between different channels should be easy and seamless and the service experience should be joint regardless of the channel. The customers are expecting even more customized experiences, personal encounters, but also offers and incentives just for them. Their customer relationship should be appreciated, and

their encounters should be remembered. At the same time, the customers are even more interested in testing new services, and they wish to be surprised. (Koivisto et al. 2019, 23.)

2.4 Customer journey

In a service design world, a customer's process is called customer journey. It depicts all the stages from the beginning to the end, from awareness part to the perceived benefit of the service or product. Customer journey mapping brings a new dimension to the development and management of the customer journey because it highlights the customer experiences. All the customer activities, needs and feelings are depicted in the customer journey, and typically these are shown visually with drawings or animations. The customer journey consist of service moments and touch points which customers are experiencing. Those touch points can be physical or virtual environments. (Ojasalo, Moilanen & Ritalahti 2021, 74.)

It is believed that creating strong and positive experiences within the customer journey will eventually result in improvements, improving companies' performance in customer journey for instance. These improvements can been seen as improved customer loyalty and word of mouth. (Lemon & Verhoef 2016, 69.)

Nowadays companies should have strong understanding of customer experience and the customer journey. There is increasing focus on customer experiences because customers are now interacting with companies through myriad omnichannel touch points which results in more complex customer journeys. Customer experiences are more and more social in nature and other customers are influencing the experiences as well. The increase in potential touch points and lesser control over the experience are forcing companies to create multiple business functions, such as IT, service operations, logistics, marketing, and human resources. Also, external partners are included in creating and providing customer experiences. (Lemon & Verhoef 2016, 69.)

The customer experience is happening in many stages of the customer journey, from prepurchase to purchase and post-purchase. This process includes past experiences and external factors, so companies have control for only few touch points. The first stage is pre-purchase which includes all aspects when customer is interacting with company before the purchase transaction. This means need recognition, search, and consideration in customer behavior. The second stage is the purchase which includes overall customer interaction with the company's brand and environment, but also the purchase situation with transaction. This means choice, ordering and payment in customer behavior. This stage has received the most attention in marketing, how the service environment affects the purchase decision for example. It is good to pay attention that in this stage, customers

are experiencing myriad touch points in digital environments, also information overload and choice overload are relevant to consider. Those aspects can cause customers to reject the purchasing. The third stage is post-purchase which includes customer interactions with the company after actual purchase situation. In the customer behavior this means the usage of the product, post-purchase engagement and the service request to the company. The product becomes crucial touch point in post-purchase stage, and the focus is now on the consumption experience, return policies, repurchasing and variety selection. In the post-purchase stage, there are many trigger points that can lead to customer loyalty with re-purchasing where purchase process loops to the pre-purchase stage and customer is re-entering to consider the alternatives. (Lemon & Verhoef 2016, 76.)

With these stages in mind, what companies should do? Firstly, they should understand their own perspective of the purchase journey and then understand it from customers' perspective by identifying all the key aspects. Secondly, companies should identify the elements and touch points that exist in the journey. And thirdly, companies should identify those trigger points, the reasons, why customers want to continue the purchase journey or why they are abandoning the purchase journey. (Lemon & Verhoef 2016, 76.)

The customer experience touch points can be divided into four categories: brand-owned, partner-owned, customer-owned, and social/external/independent. The customer can interact with all of these at each stage of their experience. The importance of each touch point category might be different, and this depends on the nature of the product or service or the customer journey. Companies should first identify the most critical touch points of every stage of every customer. This can be done with the help of an attribution modeling for instance. When the touch points are identified, companies should define how they can influence the key touch points. (Lemon & Verhoef 2016, 76.)

It would be important that companies try to understand the broader reason for customers contacting the customer support and then identifying the root causes. The feedback loops should be managed to improve customer interactions both downstream and upstream from support case. The most challenging is not the single touch points of customer interaction, but rather service process siloes. For companies it is possible to manage the entire end-to-end customer journey and to achieve a state of improved customer satisfaction, decreased churn rate, increased revenue and better employee experience. To achieve the state, companies should incorporate the customer journey into operating models, and this can be done in four ways. First, companies should identify their key journeys. Second, understand and learn how they perform in every journey. Third, those journeys need to be redesigned and supported, and finally, the changes should be implemented in

an inspired way into employees daily routines. It can take years to change the culture, but it is worth of building this competitive advantage. (Rawson, Duncan & Jones. September 2013.)

Those companies who aim to transform the overall CX, would need to build road map for every journey that would map the entire process, and also to define the business impact and feasible ideas. In parallel, the companies should use customer and employee surveys, as well as operational data from different functions in every touch point. With this method, the performance can be assessed towards competition. The comparing can be done by using regression models to understand which journeys have the most impact on customer satisfaction. This can reveal unintentional practices. For example, many companies are charging for phone call to the technical support assuming that the extra cost would direct customers to more self-service options, but in practice it can lead to several callbacks and corrections on DIY mistakes. This can worsen the customer experience. (Rawson et al. September 2013.)

2.5 Customer engagement

In the past decade there has been a shift towards the customer and brand engagement. There are many definitions about the engagement, but the main objective is to clarify what are the elements that affects the customer attitudes and behavior beyond the purchase. One definition is that customer engagement is a mental state that can been seen when interacting with company. The level of engagement can be seen in the intensity of individual's participation with the company. There are different motivational drivers that leads to engagement, especially in the times of digital revolution and social media when customers can actively co-produce value, or even worst case scenario, be the destroyers of value. The customers have the power to be part of co-creation of customer experience and have a social influence through word of mouth and customer referrals. The customer engagement consist of four components; customer purchasing value, customer referral behavior, customer influencer behavior and customer knowledge behavior, which have value extractions consequences. (Lemon & Verhoef 2016, 73.)

The engagement is happening along the customer journey with its multichannel touch points. Those touch points are highly interactive providing multiple ways to engage with the company, so therefore it is crucial to involve customer engagement when developing customer experience. (Lemon & Verhoef 2016, 74.)

When creating distinctive customer experience, it should be contextual, personalized and engaging across the customer journey. It seems that many organizations, no matter of the size, are struggling with delivering customer engagement that is personalized. According to Harvard Business Review Analytic Services, several different factors are affecting this. The leaders are saying that

siloed data and outdated technology stack are holding them back of creating personalization. The companies are missing the much needed cultural change, new strategies, and organizational structure. This has led to poor communication and collaboration between stakeholders, resulting in a loss of customers and revenue. Also, failing with customer engagement comes from the fact that organizations do not share data-driven customer insights across the organization. Therefore customer data is siloed and difficult to exploit. The IT landscape of the organizations are easily fragmented, because data is located in different departments and on different databases, which are managed by different people. Companies have all this valuable data, but that is not being utilized for the companies benefit. It would be highly beneficial for customer engagement to share the customer data and customer insights across the different departments, so it would not be based on the role or function. (Peacock 2022, 2-5.)

Customer engagement can be defined as interaction and communication with customers throughout their customer journey, from acquiring, onboarding, supporting and retaining – so helping the customers to achieve the objectives. Nowadays the standard service is providing accurate and timely advice on company's products and services, which helps to get customer's respect and trust. Providing great customer experience goes beyond the great service, because customer engagement is more than just mastering one touch point. Companies need to align all the functions and siloes, and this means that customer service, sales, marketing teams and product management etc. build and manage together customer relationships across the customer journey. Great customer engagement is more proactive and not just reactive customer service. (Peacock 2022, 4.)

Organizations are using customer data for customer engagement by gathering feedback and identifying the areas that would need improving. The customer data can be translated into customer insight reports, which could be then easily shared to all functions of the company. When it comes to customer engagement, the communication should be tailored, and that can be mastered with new and improved customer engagement technologies such as machine learning, AI, data analytics and CRM. The messaging tools enable two-way conversations along their customer journeys. (Peacock 2022, 6.)

In order to master customer engagement, companies need to integrate customer-centric culture to all departments and to all employees by providing firsthand customer data for them. There are different ways to measure or track customer engagement efforts, such as Customer Satisfaction Score (CSAT). This metrics could be utilized even more by responding as soon as possible to customer feedback with personalized responses. This improves long-term customer satisfaction. The most common metrics are mainly showing the employee performance, and those alone are not enough to measure customer engagement. For customer engagement strategies, a cross-

functional participation and support from top management are the main ingredients. Of course, customer engagement requires the customer experience leaders to work with all departments. (Peacock 2022, 8-9.)

The future of customer engagement shifts traditional touch points to full-blown portals that works as multichannel hub, which allows seamless transition from e-commerce to many other digital interactions. With these digital interactions are referred to chatbots, kiosks, robo-advisors and other tools that especially younger generation want to engage with. (Lellouche Tordjman & Bertini 2023.)

Companies are now in great transition in the era of generative AI. When companies are learning the benefits of AI and how to create value with it, they need to bear in mind that there are risks if taken the wrong approach with AI enhanced customer experience. Research shows that AI can be huge asset boosting customer satisfaction when offering more personalized solutions and when utilizing it for better customer service. (Burns, Sankar-King, Dell'Orto & Roma 2023.) It is arguable that AI has strongly changed business environment and should be utilized in customer service functions. The subject would require a more in-depth study, and therefore is framed out of this development work. Customer engagement by registration is depicted more on practical level in chapter 4.1. of Benchmarking, where are different examples on how engagement can be practiced through product registration.

3 Methodological approach

In qualitative research the objective is to understand the phenomenon of the research problem, by defining the meaning and the purpose holistically. In practice, this means getting to know the factors of the phenomenon and giving space for users' perspective and experiences. In qualitative research the priority is deep analysis of opinions and cause effect relationships of them. Conclusions are made from more complex data, from interviews or observations for instance. Qualitative methods are more appropriate when there is a need to increase understanding of customers. (Tuulaniemi 2016, 144.)

This development work has followed the methodological approach of service design. Service design is the logical choice when designing services for end-users and identifying their needs. This approach provides practical and easy methods for also novice designers, as for the undersigned, and it enables to dig deeper into the root causes of the research problem. Service design has been often used when designing service for consumers or in tourism sector for instance. It can be used also when designing services in industrial sector, in business to business environments. After all, there are human beings at the end of the value chain.

3.1 Service design

Service design is the application of design processes and methods for the development of services. This service design approach provides clear process for designer and its methods and tools bring the service users into the center of the development. With the methods, it is easy to create tangible concepts and test intangible services. (Ojasalo, Moilanen & Ritalahti 2021, 38.)

Service design has become an increasingly popular methodological approach used in development work in companies and in public sector. The reason for the popularity is because of the companies' transition to more customer-centric approach and the focus of deeper customer understanding. Nowadays it is thought that all business is service business with service-dominant logic approach, and the purpose is to support customer's value creation. Service design provides clear and easy-to-use tools and methods that put the users of the service and product at the center. With the tools and methods, it is easy to prototype and test even intangible service concepts. (Ojasalo et al. 2021, 71.)

The purpose of service design is to apply design processes and methods to service development at all levels, including strategy, business models, service environment and customer frontline. The goal is to create user-friendly, useful, and desirable service experiences, but also impressive, efficient, and distinctive service concepts. Designing methods have been used previously, but only

until service design, the genuine and deep customer understanding, and customer experience have been included in the center of the development work. The characteristic of service design is user-centricity which is based on the deep and empathic understanding of users' and stakeholders' needs and hopes, and the actions and environment of them. (Ojasalo et al. 2021, 71–72.)

Service design allows companies to incorporate a concrete approach into their day-to-day business. It can be used to develop existing business models or create entirely new service innovation, and it brings more agile mindset to organizations. The business environment is constantly changing, requiring organizations to react rapidly. Service design can help organizations to gain competitive advantage at a strategic level. It provides a deep understanding of how organizations can support customers and what elements customers value. Best practice in business development is to combine service design methods with foresight methods. The idea is to receive in-depth knowledge of future trends and hidden needs of existing customers in order to build growth strategies. Bringing service design methods into day-to-day operations of companies at all levels will develop more customer-centric culture. Service design is often used to create new service concepts, digital services, or even customer-centric business models. (Ojasalo et al. 2021, 73.)

3.2 Service design process model

Design thinking uses term divergent thinking, which refers to broadening a perspective, and term convergent thinking, which refers to narrowing a perspective. Firstly, a wide range of options and possibilities are collected and later that perspective is narrowed down to make decisions. The (British) Design Council has created a design process model called Double Diamond, which has been applied in this development work, as shown in the figure 3. In its simplicity it gives structure for design projects. The process is divided into four stages: discover, define, develop, and deliver. In this model the first "diamond" describes the stage where discovering is happening. This means that a lot of data is gathered from the phenomenon and then the research problem is defined by narrowing down the data. After the definition, ideation can begin in the second diamond. After designers have lots of ideas, they need to select the best ones and start creating prototypes for testing. (Maula & Maula 2019, 187-189.)

Discover: In the first diamond, the discovery stage guides designers to understand the true problem by collecting information from people who are affected by the phenomenon. This includes discussions with the people and observing the people. (Design Coucil s.a.) In this stage a lot of information around the subject was gathered by discussing with internal stakeholders from product management, technical support, customer frontline and e-commerce. The benchmarking method provided good information on how best practices had been implemented in other companies. The theme interviews with end-users of Vaisala's Indigo500 gave a lot of deep insight how the Vaisala

brand, product and services were experienced in customer companies. Also, Customer Satisfaction Survey revealed the topics that caused customers to give feedback, both positive and negative.

Define: All the data and insight collected from the discovery stage needs to be defined as design drivers (Design Coucil s.a.) In this stage all this gathered information and customer data was narrowed down into design problems with Affinity Diagram tool (in chapter 5.1), and with How Might We? method (in chapter 5.2) the design problems were specified in even greater detail.

Develop: In the second diamond, developing stage is about creating ideas out of the defined problem. Usually in this stage there are brainstorming sessions or workshops to ideate with different stakeholders. (Design Coucil s.a.) In this stage, selected How Might We? statements helped to create ideas in an ideation session. The ideations session with internal stakeholders provided solutions for the design problems.

Deliver: This last stage means prototyping and testing different solutions with fast iteration style, improving the concept after feedback. (Design Coucil s.a.) In this stage, after Quick Voting method (in chapter 6.2) the best voted ideas turned into a website wireframe with Miro Board and the prototype was sent to end-users and internal stakeholders for testing via Figma tool.

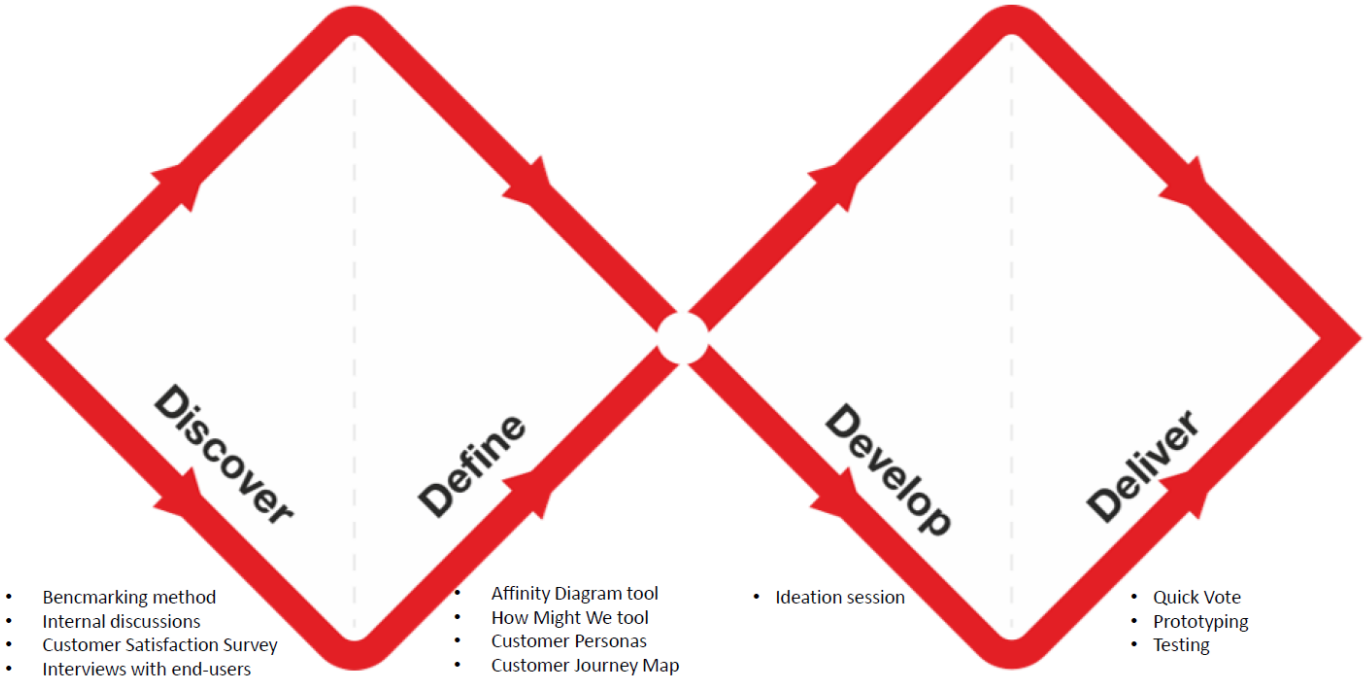


Figure 3. Adapted Double Diamond design process (Design Council s.a. CC BY 4.0 licence)

4 Discovery stage

Every development works begins with the understanding phase, which is also called discovering stage in literature. During the understanding phase, it is crucial to collect data of the issue to really understand the issue. There are many methods which can be used for data collection, such as interviews and observing. It is also very important to include the users with the development work, so that they are able to give their input. Without including them, it would not be possible to create various ideas from their perspective. (Ojasalo et al. 2021, 72.)

In the beginning of the service design process, it is important to gather extensively data of the customer understanding and the operating environment. Usually this takes the most time of the entire process, but it is the crucial part and worth the investment. The development process includes the understanding of the customer's situations, needs, behavior, and values for instance. During the discovering stage, usually the gathered data is factual information, such as research articles and books, but also empathic methods are highly valuable to gain in-depth understanding. (Ojasalo et al. 2021, 74.) In the beginning, it is very important to collect existing data and tacit knowledge from the company, by interviewing the employees of the company for instance (Tuulaniemi 2016, 145.)

4.1 Benchmarking

With a benchmarking method it is possible to learn from others, when comparing the development work with other company and pick the best practices. It is typical that with this method, you can learn from others and question your own practice. When picking the best practice from other companies, those practices can be creatively applied to own company. This part usually exposes company's weaknesses and then forces to create ideas to overcome them. The benchmarking is very useful method for improving the quality, productivity, and operational processes of a company. It can be an eye-opening to see how thigs are done in other companies, even in different industries. With benchmarking, the designers can compare companies' strategies, services, products, and policies. The benchmarking comparison can be done at another company's premises or virtually on another company's website. Internet works as a great source to receive basic information of markets. (Ojasalo et al. 2021, 43–44; Tuulaniemi 2016, 138–139.)

In this development work, the focus of benchmark is on self-service portals of other companies and also what has been written on blogs and articles in the business. Benchmarking method shows different kinds of practices, how business-to-business companies have engaged their customers through a customer self-service portal. Many companies are outsourcing the portal creation to consults, who are writing on how to create engaging portal and what it requires from the company.

Customer self-service portal is a website (or an application) that enables customers to function independently, to find information, to create support ticket, track progress of different function without help of human support. (CRMJetty s.a. a.)

The role of customer service portal in a company is important because it act as interaction channel between the company and its customers. It brings the customers closer to the company, and the company has control over how the relationship should be developed. The portal provides unified interface for communication, therefore messy email threads could be history. In that portal customer data is managed because customers can update their profile information by themselves. Pointless tickets can be reduced because all basic questions (FAQ) related to the products and services can be shared through the portal. The ticket monitoring can be simplified by handling them in a proper platform where all stakeholders have access. (CRMJetty s.a. b.)

The must-have features in customer portal would be following.

- ✓ An option suggestion according to the purchase and activity history.
- ✓ Cross-selling option can be made more visual.
- ✓ Quick query reports can be great help in cases where similar queries are coming from customers and support staff can address the issue by publishing an article from that issue.
- ✓ Data visualization provides a lot of deep insight of the customer actions. (CRMJetty s.a. b.)

The portal is a great channel for getting customer feedback, with that information company can develop the portal and train staff for instance. The listed features are more advanced ones, but the following basic features should be covered: secure login, knowledge base, product catalog, case deflection, interactive and informative dashboard and real-time notification to name a few. (CRMJetty s.a. b.)

Then the best practices would be following, a user interface (UI) which should be appealing and simple, and it should make it easier for a customer. Categorization helps the customer to find quicker solutions for an issue, or pain points that they are experiencing. Then non-categorized areas could be titled as FAQs. At some point personal support is needed and human interaction should be provided through the portal. Finally, customers should be able to unsubscribe the promotional emails from the portal. (CRMJetty s.a. b.)

There are several ways to engage customers, such as sharing in social media, which helps building customer engagement through interaction and marketing. Interviewing and listening customers and applying the learnings to strategic actions. Creating useful content of customers' perspective

(video tutorials etc.) to assist the customers. Rewarding loyal customers increases engagement and spreads the word of mouth. Managing omnichannel engagement by providing positive experiences is essential to company's success. (Gladly s.a.)

Industrial product customers are demanding better services, products and experiences in B2B environment. This demand comes from B2C environment. The B2B companies expects that they can buy where ever and whenever, and how they prefer. They also expect the experience to extend from evaluation to post-purchase. However many companies do not meet these kinds of needs. Companies should direct strategical actions to data and insights, channels of interaction, technology, and company's culture and skills. B2B companies are preferring personalization, seamless transactions, automation and customer life-cycle benefits. B2B companies are not reaching to same level as B2C companies, which are scoring better results in customer experience. Companies are lacking the capabilities of providing seamless omnichannel experience and this might be due to inconsistent channel execution. Companies need to assist customers to find information and provide support across all channels in order to acquire and keep customers. (IBM 2019.)

According to the survey respondents (IBM Institute for Business Value 2018, B2B Customer Engagement Study for 375 industrial product companies), 74% said that their top purchasing channels is through traditional in-person sales, and 68% said the top purchasing channel is through distributors and partners. Less companies are saying that their customers purchase directly from website, and even smaller group are using call centers or mobile devices. In marketing, they are engaging the customers mostly through search engines, buyer reviews for instance, but only one third are using digital assistants, mobile apps, or third-party website. Minor group is creating podcast or whitepapers for promotion. (IBM 2019.)

As an example, Hewlett Packard Enterprise was able to build a partner portal that their customers actually were motivated to use. Earlier the company noticed that their partner's interactions were bad after several different portal experiences, numerous online tools, and various login steps, so they decided to go under big transformations with the portal. This change has increased the portal utilization, improved the engagement from partners when self-service is increased and support tickets have decreased. This change has required reshaped channel strategy and financial commitment, and collaboration between internal departments. The question is why the partners are connecting with the company and what kind of tasks they want to complete in a platform. By understanding customers' needs and requirements it is possible to engage and encourage usage and adaption. With deep insight of the customer, the company can anticipate customers' needs before them. (Liferay 2018.) The HPE Partner Ready Portal for B2B customers was launched in 2022 with refreshed look and feel, simplified navigation and site integration. The new design based on the

received feedback from the partners. HPE got several suggestions and implemented features such as consolidated menu options, integrations and easy identification of Aruba assets, routine clearing of outdated content and information and of course improved user experience. The homepage includes features like news, promotions, events and webinars and “what’s new” section to highlight the latest. This portal is capable helping all partners regardless of their business application or location. (HPE s.a.)

Next is presented practical examples on how the registration option and registration process has been created in other companies. The registration process of companies Philips for B2C customers and then company ABB for B2B customers are presented with pictures. It was interesting to see how those differ and what functions are similar.

4.1.1 My Philips portal & Philips Store for Business

Company Philips has B2C self-service portal called My Philips which was available for testing. On the homepage of Philips, there is account icon on the top right corner to indicate option to create an account and to register a product. The benefits of the registration are mentioned before registering process. The benefits are extended warranty for selected products, spare parts for the selected products, and fast access to FAQ pages and to support. The account creation is mandatory before product registration. Firstly, a user needs to create the account and then verify the correct email with verification code that has been sent to the informed email address. The self-service portal itself is quite simple with few options in the dropdown menu. It includes “control panel” which after selecting greets the user with “Welcome, *user*” and gives option to register a Philips product. The menu includes “own products” which shows all the registered products. From “my orders” it is possible to see the orders made and order history with option to return a purchase. From “own account” the user can see personal information, account information, contact information and communication settings with option to order marketing notification and remove the account. The personal information and contact information shows the same form with option to edit birthday, address and phone number. Below are pictures of the My Philips account and its dropdown menu options, product registration process with product’s number or barcode, and finally picture of the benefits and additional features after product registration.

As a test, a household item was registered into My Philips portal. The registration process and the different features in the portal are compiled in the figures 4, 5 and 6.

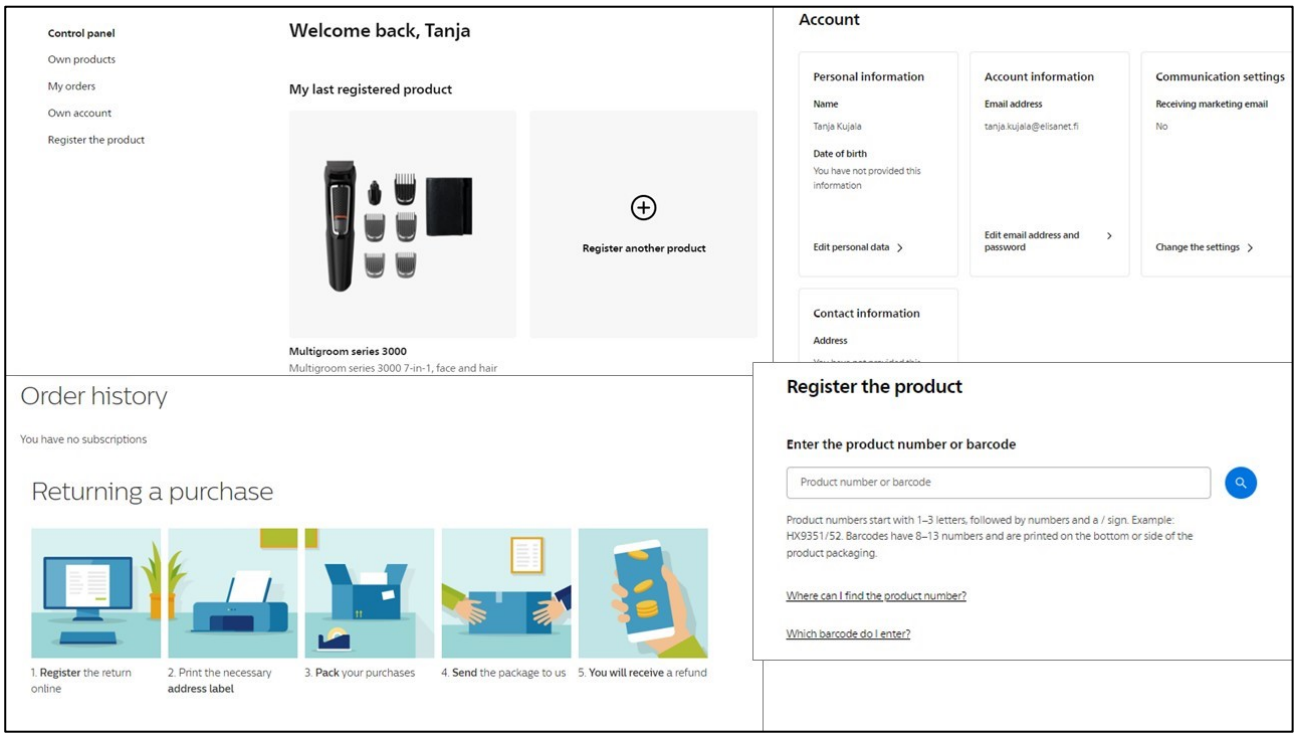


Figure 4. My Philips account (Philips s.a. a)

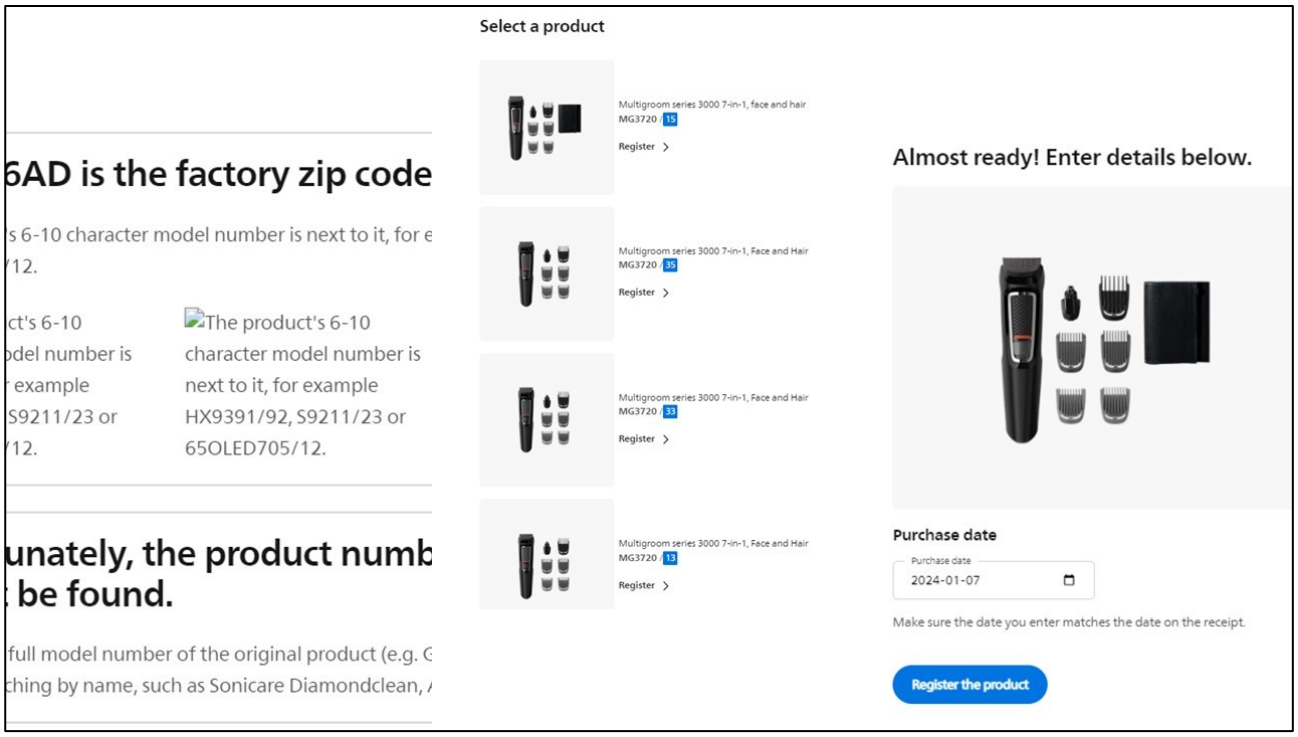


Figure 5. Product registration process of My Philips (Philips s.a. b)

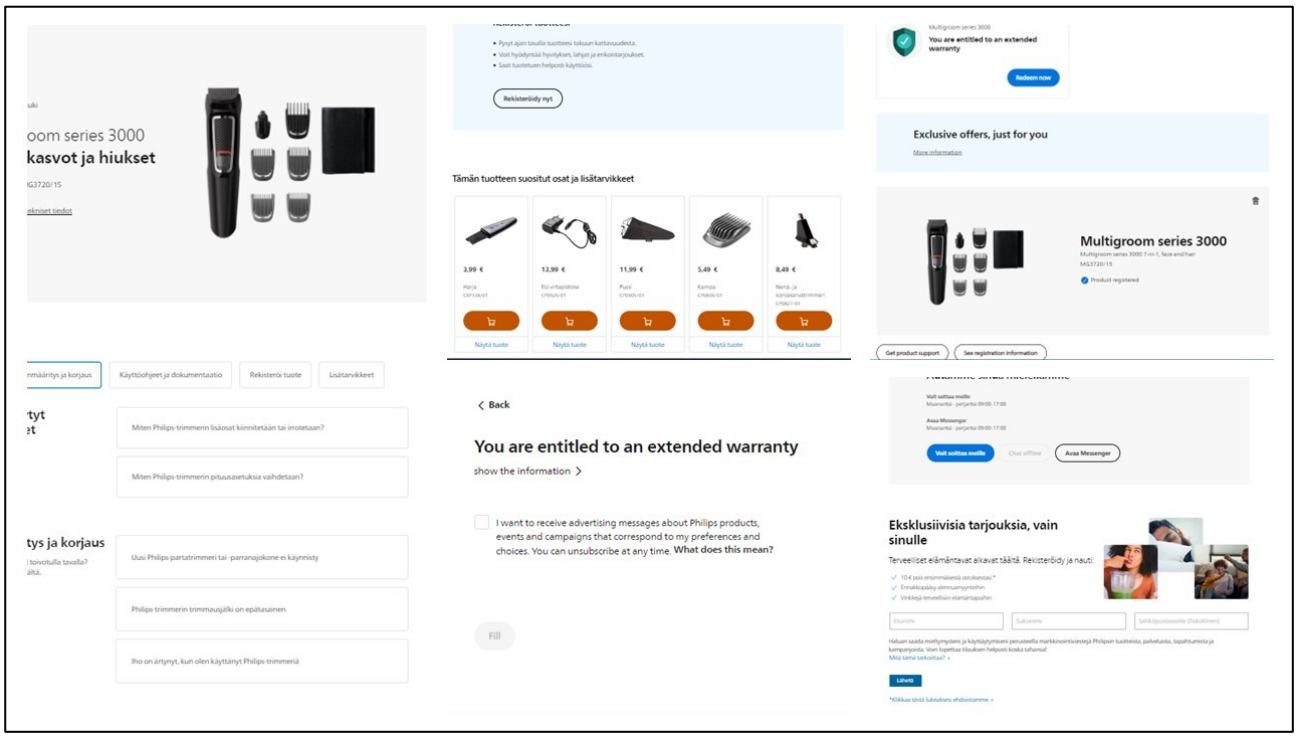


Figure 6. My Philips benefits & features (Philips s.a. c)

Before registering a product to the account, the account looks very simple and plain, and does not really provide appealing content. After registering the product it provides more product-specific content after clicking the product such as, extended warranty, FAQ section on the product category, compatible spare parts with just one click away from the shopping cart. Also, with one more click user can get product-specific troubleshooting and support and check the registration details. In addition on the same page, there are phone number and chat options to support, user manual in many languages, and promotion to order exclusive offers via email notifications. This portal seems to provide all necessary functions to users. As in the Figure 5, the product registration can be tricky, if the serial number is shown as incorrect. It can work fluently, if a user has just purchased the product and has the receipt in hand. In this benchmarking test, an old Philips product was registered without the receipt and the product model marking on the product had almost worn out. The timing of the registration would be ideal to do soon after purchase.

For simple household device, users are able to get a lot of information and support. This is the reason why B2C portal was selected as an example because consumer markets are demanding and companies are creating services for those needs. Philips has also created portal for B2B users, which is called Philips Store for Business. The company is marketing the portal as it helps customers to manage, optimize and grow business with Philips brand (Philips s.a. d.)

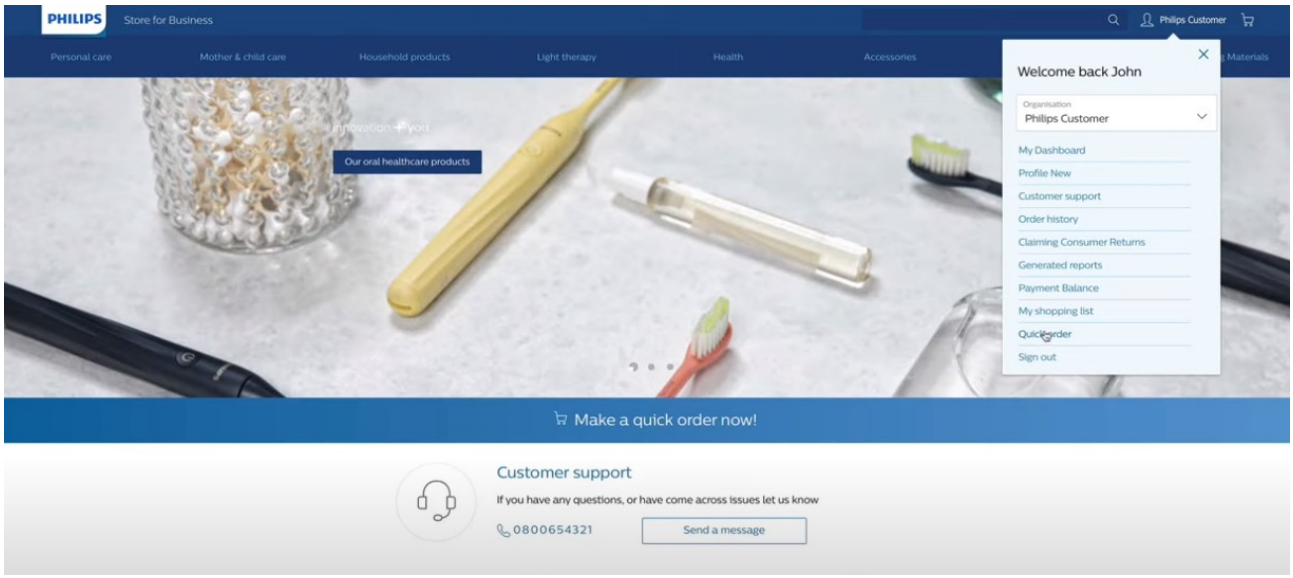


Figure 7. Screenshot from Philips Store for Business (Philips 18.11.2020)

Philips Store for Business portal has been created for B2B customers so they could improve their sellouts, stay more relevant in digital world. The portal is designed for customers so that they could have the best B2B digital experience in the industry. It provides easy access to Philips portfolio information and it works as order management tool. From the portal customers can receive exclusive promotions and marketing support for customer companies' sales. From the portal customer can see products and prices based on Philips agreement. Customers can see the real time availability of the products, do quick orders, and save the orders in shopping lists to repeat the purchase later on. Philips has updated the portal and added features such as order history, personalized customer dashboard, and order tracking. Customers can download marketing content and view financial information based on their products. Customers have quick access to a dedicated customer support hotline which can be contacted via a phone number and a web forum. (Philips 18.11.2020.) The dashboard and features are shown in the figure 7.

The demand in B2B environment comes from the B2C sector, because the consumers are used to quality standards in their private life and therefore demand at least same level in B2B sector. For this reason it was interesting to benchmark both B2C and B2B portals and find out that the B2B portal had more content in it which supports customers to manage their own work better.

4.1.2 MyABB portal

Company ABB has created MyABB portal for their B2B customers. The portal was created for shared view of the facility, both for the customer (e.g. facility manager) and for the ABB contract manager. The purpose is for planning maintenance work together, estimating the maintenance service and what spare parts are available. The various modules of the portal are designed for user's

needs and can be arranged by user's preferences. A valuable customer feedback has been utilized during development phase of the portal, so it consist of relevant content and functions. One function of the portal is that users can get an overview of the status of all installations, so it shows the life-cycle of the components in the facility. ABB has four different levels for the life-cycle status of the installations. *Active phase* offers full product support, spare parts and updates. *Classic phase* allows for updates with more limited options. *Limited phase* shows when it is time to replace the components before they reach the obsolete phase. *Obsolete phase* means that the component has reached a status where no guarantees can be made from ABB side. The portal's My Installations shows good overview and provides access to the installations and list that can be exported to an Excel spreadsheet. The user can view all the installations in a tree structure, where by clicking, the user can get various details of an installation. The user can see service history, planned maintenance, relevant spare parts and documents, and related trainings. The user can edit an installation tag (same as name or title) by own preference, it could be named the same as in the customer's facility for instance. If customer has multiple facilities, those are shown on a map with more details per site. The details shows ABB contact details, service contracts and shared documents. (ABB 28.10.2016.)

Upcoming recommended services provides proactively information of maintenance needs. The service contracts shows the scope and durations of each contract and other relevant documents. The portal helps customers to get a heads-up well in advance for upcoming service events. This ensures that the customer's facility performs always in optimal way. (ABB 28.10.2016.)

The benefits and the features are well presented on the ABB website. It provides 24/7 access to ABB, it improves asset performance, optimizes life-cycle management and boosts operational efficiency for the customers. (ABB s.a. a.)

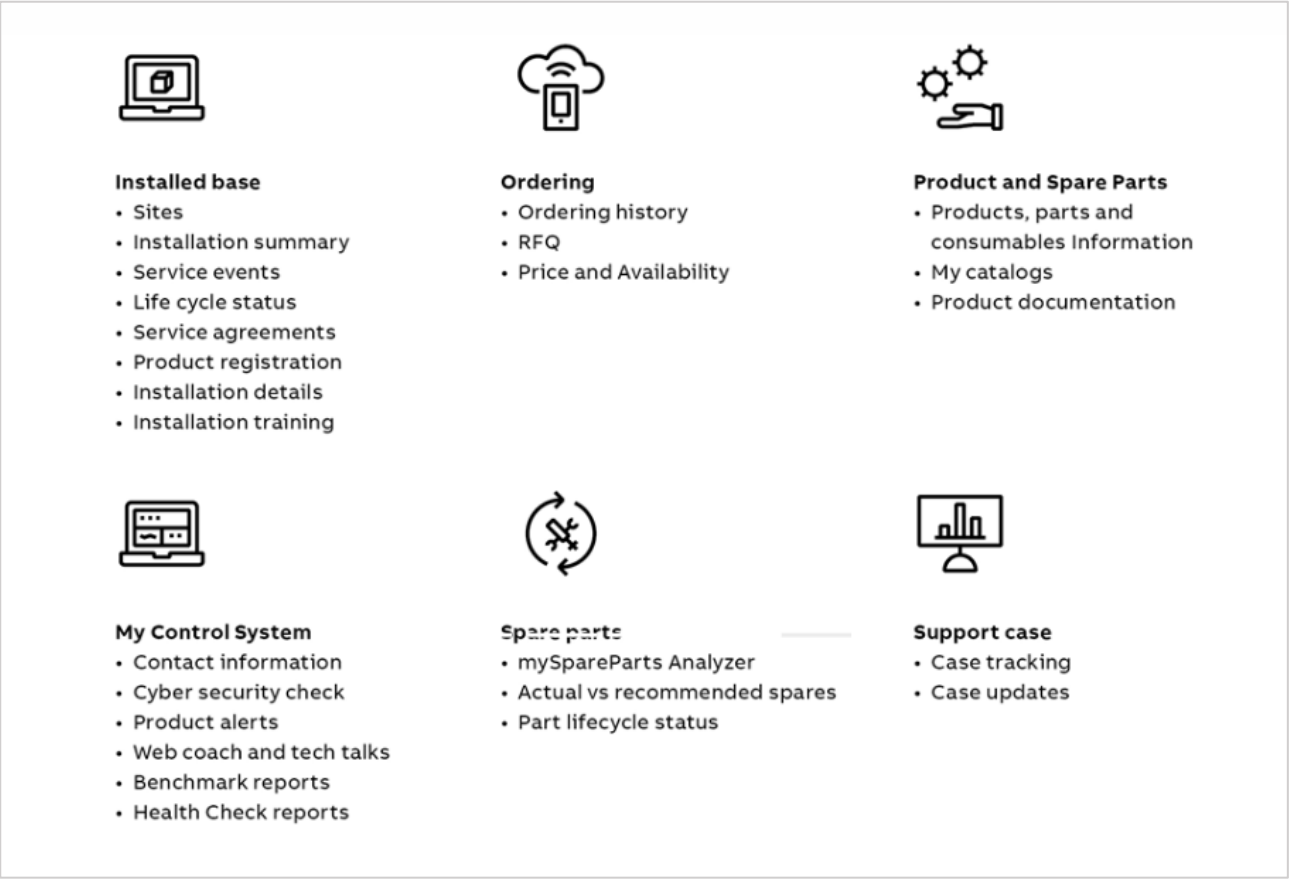


Figure 8. MyABB portal with functions (ABB s.a. a.)

The provided features in the portal are about possibilities to monitor and updated technical support cases and access to technical documentation. There is visibility to see spare parts inventory, warranties and status of products life-cycles. Also, there is seamless access to ABB's services through applications and widgets, such as products and spare parts from eCommerce capabilities. (ABB s.a. a.)

The highlighted benefits of the portal are about easy access with single-entry point to connect 24/7 with ABB. It gives a tool to manage products and spare parts life-cycle. The portal enables users to make short-term action resolution with long-term planning that improves operational efficiency. (ABB s.a. a.)

All the features and functions of MyABB are shown in the figure 8. The operational benefits of the B2B portal are shown in the figure 9, and the dashboard of the MyABB portal is shown in the figure 10.

Figure 9. MyABB portal with benefits (ABB s.a. a.)

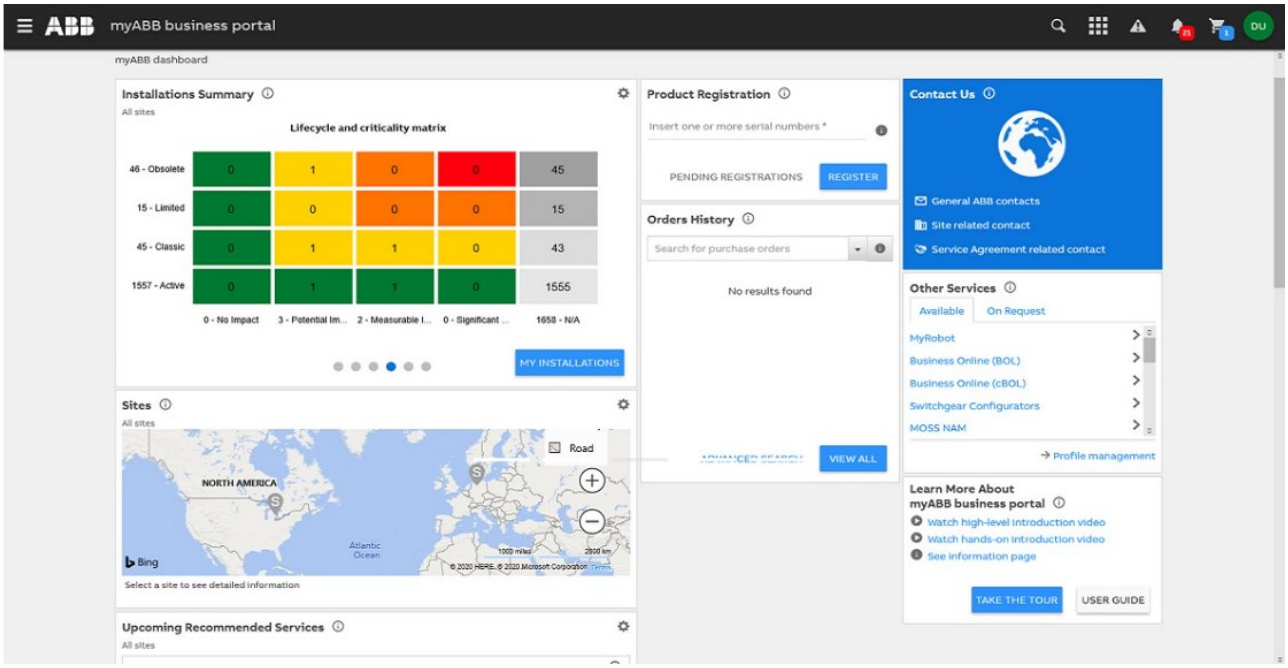


Figure 10. MyABB dashboard of the portal (ABB s.a. a.)

The sign-up phase is completed after few stages, when the customer has created the ABB account, confirmed the activation link in the email and when the ABB admins have set up and confirmed the account for the customer via email. (ABB s.a. b.) The registration (or sign-up) process with registration form are shown in the figures 11 and 12.

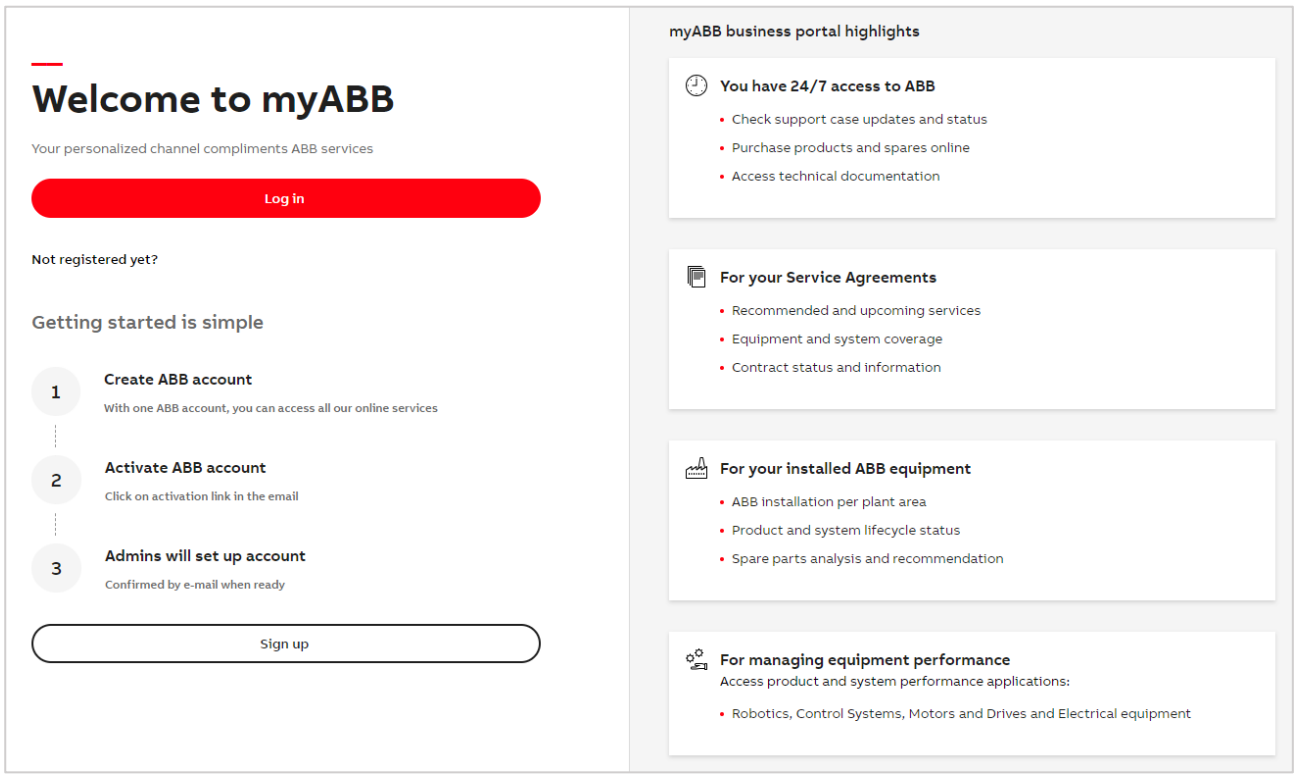


Figure 11. MyABB Sign-up process (ABB s.a. b.)

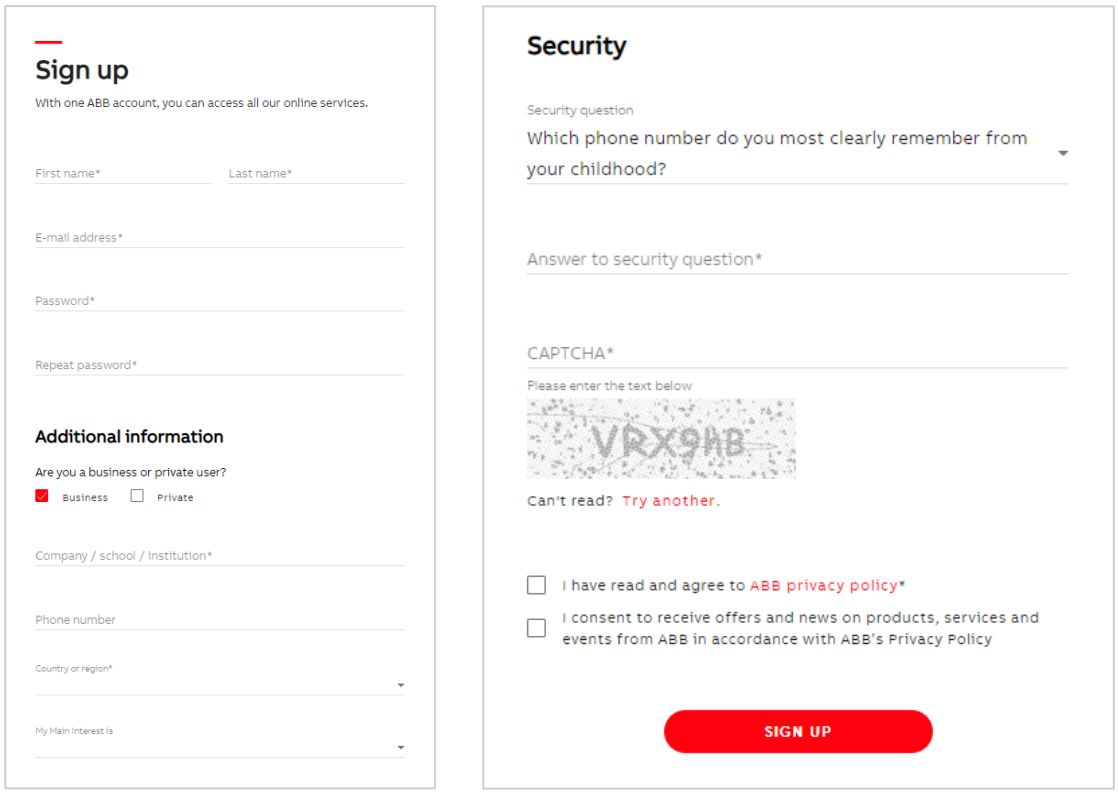


Figure 12. MyABB Sign up form (ABB s.a. c.)

4.2 Document Analysis

Various documents can be used as a good source when gathering information from the subject of the development work. The company's memos, annual reports, newsletters, website, and statistics for instance are great sources to compile data about current state. The analysis of documentary evidence is good method to gain additional viewpoints of the matter. (Ojasalo et al. 2021, 43.)

The document analysis can be used to supplement data from different sources, from interviews and observations for instance (Bowen 2009, 30.) It has been essential to gather a lot of background information of the case company, from its internal processes and from its employees. In the discovery stage there were multiple meetings and discussion with the employees which had a lot of good information around the topic. The internal meetings were kind of an open interviews with questions about the employees' work and knowledge. There were discussion with Service Manager of Technical Support team and with Product Manager of Product Management of Indigo500. These discussions are not treated as interviews, rather source of document analysis.

4.2.1 Technical support

A conversation with the technical support service manager provided a lot of information about after-sales support. Mostly customers would contact via email to helpdesk@vaisala.com, but also they are contacting by phone, through contact form or MyVaisala account. With the account it is possible to create a ticket that goes directly through Salesforce to technical support team. All the contact details are on Vaisala website, but those contacts are divided according to Industrial Measurements division or Weather and Environment division, and which country the customer is located. If the customer is calling to the technical support number, the support specialist are creating the ticket manually to the Salesforce. Quite often the situation is that the customer does not have the serial number of the product at hand during the phone call and then the support specialist needs to request the customer to send more details via email in order to get the necessary information for the ticket.

The technical support phone is available during office hours 08 – 17 EET in Europe and 9am – 5pm EST in USA, and only on weekdays. The whole EMEA region service is handled from Finland. In the USA they have own technical support group, who handles USA, Canada and Central America and South America regions. In China and Japan, the technical support is handled by the local sales organization, so that the customers can have service in their own language. Other Asian countries, Malesia, and Singapore for instance, are contacting Technical Support in Finland for creating support tickets. In these cases, the time difference is affecting to the reaction time for the tickets, because usually when the tickets are opened in Finland, it is already office closing time in that Asian country. It might be a day delay to the case. Quite rarely the Asian countries are contacting by phone, maybe

because of the language barrier. It is noticeable that there are less phone calls from EMEA region to Finland than the USA support team is receiving from USA region. This might be because everyone works in that same language and the Americans feel lower threshold to talk by the phone in English. Compared to German, French, Italians, and Spanish people, who generally do not have good English skills to explain their technical case. Therefore, most of the cases (95%) comes through email or MyVaisala account.

There are a wide range of cases that comes to technical support. The easiest case can be that the customer has lost his calibration certificate and requests the support to send a copy via email. The trickiest case can be that a customer in Germany is building some kind of a setup that is operated by drones, and they have Vaisala sensors for pressure and temperature measurement, and they are asking some formula for pressure compensation variation. Then they would send their own transformation formulas to Vaisala for review, and support would need to have support from Vaisala R&D department as well. This could take weeks to close the case. The average case could be that the customer's device is broken and it does not give any signal or there is an error message on the display. The technical support is asking additional questions for troubleshooting, so that the case would be solved remotely. With many cases, all the answers to the customer's questions could have been found by checking from manual and following the guidance, but for some reason, the customer has not understood their own setup or familiarized with the setup for instance.

According to the service manager they get a lot of those FAQ types of questions which could be dealt with by creating actual FAQ page for the most common topics or even by writing articles about the common topics. The user base is so large and there is a huge variety of applications for different process environments that it is hard to keep up with the cases.

When asking about possible product registration in the future, the service manager thinks that from technical support perspective it would be useful to know where the devices are located and there would be option to contact customers directly in case of recalls. There could be a marketing campaign, which promotes calibration services and other additional sales. According to the service manager, it might not be profitable to offer those extended warranty years for customers. Instead, the service manager would offer paid services, like service agreement, which would include extended warranty, yearly free calibrations and "premium" technical support with support number, and response time under two days. If the customer would not have premium package with Vaisala, they could still send questions via email, but there would not be promised response time. Also, they would not have option to call for technical support call center. The pricing of this premium service package could be still moderate because there are so many devices around the world, that if everyone would pay one hundred euros per year, it would be profitable turnover. Hypothetically, when customer buys

the product and the premium service package, he or she would register the product simultaneously to Vaisala's system. The technical support would directly see the customer profile, devices, and service agreement, when the customer would contact Vaisala. By registering a device, a customer would get a service package for 3-6 months for free, and extra year for fifty euros. In this kind of context, the registration would be excellent, because at the moment the technical support needs to check from the system, from the purchase orders, what the customer has purchased and what device they have in use. This takes a lot of time from support and from the customer as well.

The problem in the USA region is that there are so many incoming calls that someone should be talking with the customers all the time. Too often, the cases are not directly related to Vaisala's devices but rather the customer does not know how to use their own PLC system. Then Vaisala's support are helping the customer by finding the manuals of the PLC system from Internet and then investigating how the system works and teaching the customer how to install the device to that system. This service is not directly related to the Vaisala products, and therefore should be a paid service according to the service manager of technical support .

A hypothetical product registration should be integrated into device setup stage and the user interface should be very clear and easy. The user base should be considered as well that who would be the correct user in the company to register the device. Mostly the technical employees such as plant engineers install, repair, and perform calibrations on-site, and they are the ones who contact the most the technical support. Sometimes OEM customers contact support if the case is bigger, and their own customers (end-users) have made complaint. According to the service manager, it might not be a problem, if the end-user contacts Vaisala directly and not through the distributor. Of course, this should be discussed with the distributors first. A person installing a device could be outsourced company like mostly in the Life Science industry. In a process industry the person installing the device can be a plant employee.

In the future possible service levels such as premium service package would help to control the technical support. The technical support would have more information about the customers and their devices, and they could be able to provide efficient technical support by identifying the case to the specific device. Especially when the customers do not have the serial number when contacting support. The customer could have self-service elements such as easy path to manuals and troubleshooting independently.

4.2.2 Product management of Indigo series

In a conversation with Indigo500 product manager it became clear that the clientele of the product family is very wide, and customers are using the device in various purposes. The sensors of the

product family can be used for preserving rare books from humidity in desert region, or in manufacturing industry, or meteorology and aviation industry or even defense industry. The preceding devices before Indigo series were HMT series that have had large customer base. Compared to that previous series, Indigo has integrated Linux system which requires constant updates, and the features are complex. According to the product manager, the HMT series customers do not require those additional features that Indigo500 provides. Also, the Indigo devices are more expensive. This is good to consider when designing new concepts, like product registration. This mandatory change of the device series has been marketed from Vaisala side so that the maintenance would be easier as customers do not need to take the whole device off from the wall because they can just detach the probe from the transmitter. It is easier to just change the probes with spare probes and take them to calibration without outages. It is future-proof and designed for continuous development of protocols for instance. In Vaisala, the idea is to sell more after-sales services to customers, and online services could be harnessed for this. There could be features, such as “your device is broken, would you like to order a repair?” or “your device calibration is out of date, would you like to have an assistance?.”

It is good to mention that Asian markets are little bit different in the sense of customer preferences. Apparently they are quite conservative, safety-minded and prefer turnkey services, so that they do not need to make any updates etc. by themselves. They prefer that the middleman, distributor, would evaluate the need of upgrades and updates, and would also do all the installations for the customer. For example, in one customer case, they are using only milliamperes and they do not have any digital systems, even Modbus, in the factory. According to this specific customer the wireless options are not option because those are not reliable and those are very risky. Elsewhere the wireless option is essential and appreciated feature, so that the customers can check data remotely.

There are a lot of Indigo500 transmitters around the world. When reviewing the activity of software updates in those, it shows that less than 1% have updated their devices. To this day, Vaisala has been sending the newsletter about updates manually to distributors. Also, Vaisala has published the software updates on the website. The product manager reminded that there has been option for customers to receive yearly email notification about calibration, if they have selected the RSS feed.

From customer perspective it can feel complex and time consuming to configure a laptop to Indigo device and fix IP settings. It can be frustrating to the Vaisala sales and other parties to try to figure how the updates should be done. Every update can change customer’s own internal processes such as documentation and instructions because the documentations should be updated as well after every software update.

According to the product manager, distributors make up at least one-third of the Indigo customers. When Vaisala was promoting its online store to the distributors, they were not happy because they thought that their customers, the end-users, can now order directly from Vaisala and by themselves. In case of a problem the customers would still contact the distributor for assistance. The distributor has to make an effort, but it does not receive money from selling the spare parts for instance.

In Asia context, the customer interaction happens mostly through the distributor or services supplier for instance. If they would have sold Vaisala device to many customers and there would be some bug etc. the service supplier would prefer to handle the communication with the customers instead of Vaisala sending notification to the customers, our end-users. The service supplier would want to contact them in this sensitive matter and prepare a plan of how to proceed. It might be that this bug would not even concern the customer. Depending on the customer's environment, if constant notifications of updates are more of a burden than a support.

The product manager mentioned that the customers have replace their HMT series device to Indigo300, because of the HMT coming ramp-down and also because the customers do not need the additional features of Indigo500. In the Indigo300 there is only the basic features and only analogical option.

4.2.3 Customer satisfaction survey

Vaisala collects customer feedback in different ways. It is important to get feedback from customers on how they see Vaisala in general, how satisfied they are with the performance and what they consider important. Vaisala has Customer Satisfaction Program, which provides global overview on how Vaisala is valued and how the company has performed. This program delivers information to decision-making and also identifying key development actions for customer service. Also, with Vaisala's annual staff mirror survey, employees' perception and customers' expectations are compared to each other in order to see if there are some mismatches between staff perception and reality. The Customer Satisfaction Program consist of annual phone survey across the markets, monthly online survey where the feedback is collected from after-sales services such as technical support, calibration and repair. There is also ongoing feedback surveys from customer training, field services and project completion. (Vaisala, internal source 2023a.)

The Customer Satisfaction Survey (CSAT) is sent to customers automatically after a service case is closed in Salesforce. It covers the frontline, technical support, service center and field service processes. Vaisala is sending on average 35.000 surveys each year with 5% response rate, which is approximately two thousand responses per year. (Lu 27.11.2023.) It is good to highlight that only 5% have responded, so what is the reason why the other 95% have not responded to the survey?

This would require a separate case study of the problem. When the response rate is so low, the survey data cannot be primary source of customer insight, it can only support the other data from interviews. Vaisala Customer Service Feedback survey form (*adapted*, Lu 27.11.2023) is following.

Premier customer service is our goal at Vaisala. We want to make your service experience as easy as possible and we are continuously looking to improve.

Thank you in advance for your open feedback.

- *Overall, how satisfied are you with your Vaisala service? (0-10 rating)*
- We invite you to share your feedback on your experience with Vaisala (Open-ended)
- Vaisala made it easy for me to handle my issue (0-5 rating)
- What can we do to make it easier for you? (Open-ended)
- Thinking about this Service Case and the support you received, is there a Vaisala employee you would like to recognize as providing you with exceptional service? (Open text)
- Would you like a service representative to contact you directly regarding this Service Case? (Yes/No, for contact request)
- What are the topics you would like to discuss with Vaisala Service representative? (Open text)

Please fill in your contact information

First Name

Last Name

Job Title / Position

Company / Organization

Phone Number

Email

The survey results are not limited to only Indigo devices, because the survey did not provide information about the related product. With this overall survey result, it is good to know what is the current state of customer satisfaction and what features provide good scores and what features would need improvement. The results of the 2023 CSAT survey, covering the period January to October, are presented below. Only the first question of the form with option to rate service from 0 to ten is covered here in the figure 13. In total, figure 13 consist of 1748 responses out of which 1200 responses gave the highest score 10 “very satisfied. 250 out of total scored a 9, 161 out of total scored an 8, 33 out of total scored a 7, 30 out of total scored a 6, and 42 out of 1748 responses scored 5-2. Finally, 31 responses gave the lowest score 0 “very dissatisfied”.

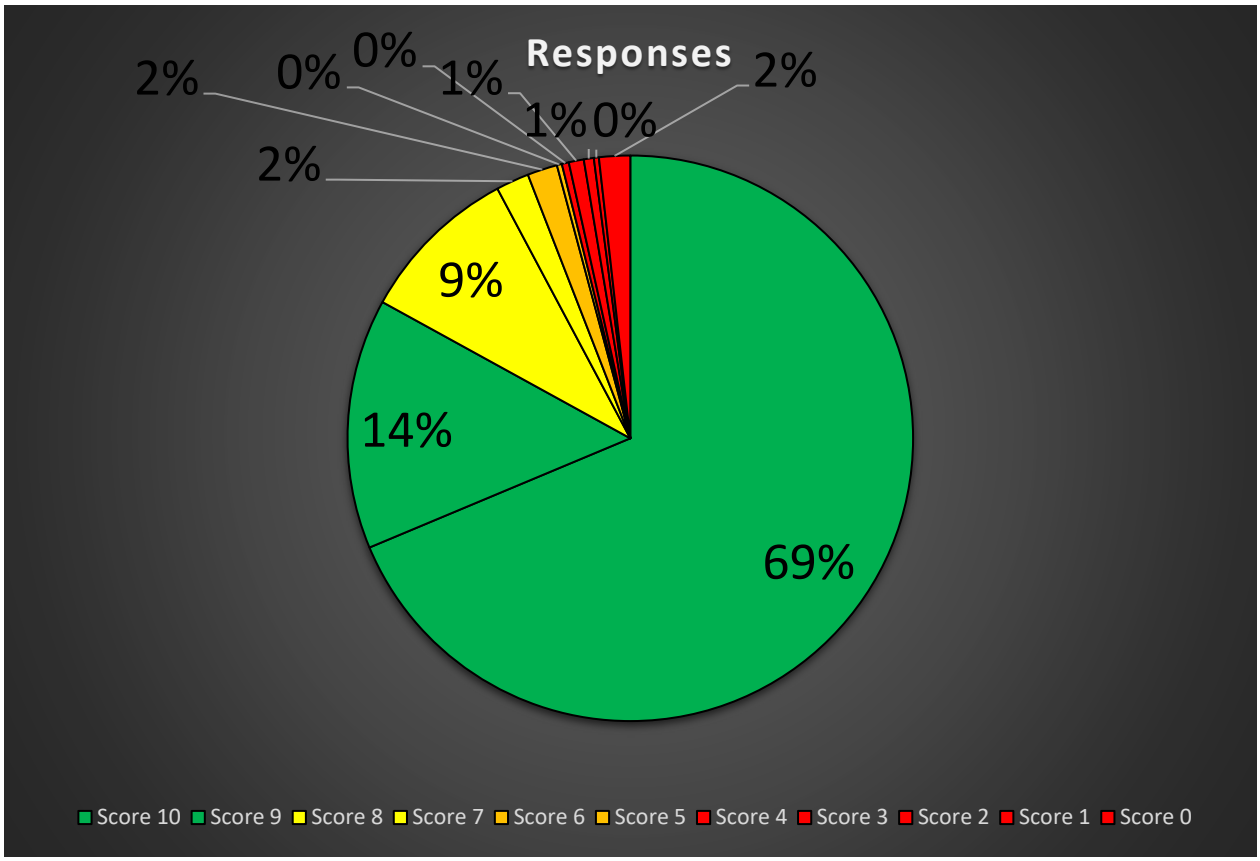


Figure 13. The responses of CSAT survey, between Jan 2023 - Oct 2023

According to the Figure 13, Vaisala has scored particularly good numbers on average from the responded customers and they are mostly very satisfied of Vaisala service. The customers also provided a lot of verbal feedback which needs to be taken into account, because those give more deeper insight what are the features that satisfy them and what does not. In the survey there were almost as much verbal feedback as the 1748 responses.

AI assistance, Bing Chat Enterprise, was tested to ease identifying the main themes of customer pains and gains from huge amount of verbal data. The verbal feedback is summarized below, both

negative and positive. The following text is AI generated from the verbal data but inspected by author of the thesis. The AI text is italicized text to clearly separate it from author's text. Although the text is based on hundreds of answers, the AI has written the text in first-person context in the section of Positive feedback.

Negative feedback

Slow and inadequate response: Many customers complain that they have to wait for a long time to get a reply from the support team, and sometimes they do not get a reply at all. They also say that the support team does not understand their questions, does not provide clear and helpful answers, and does not follow up on their requests. Some customers say they have to send multiple emails or reminders to get the information or quote they need. Many customers complain about the lack of communication, responsiveness, and professionalism from Vaisala's service team. They report that their cases were closed without resolution, their questions were ignored.

Poor product quality and compatibility: Some customers report that the products they received are not working properly, have errors, or are not compatible with their systems. They say that the products do not work as advertised, do not have proper instructions or manuals, or do not have the features they expected. They also say that Vaisala makes calibration errors, fails to deliver protocols, and does not provide proper guidance or support for their products. They also say that they have to pay extra costs or efforts to get the products calibrated or serviced. They also mention that the support team does not provide clear and complete information, such as installation instructions, documentation, delivery details, etc. Some customers also feel that the support team is avoiding their questions or shifting the responsibility to them in case of an issue.

Complicated and confusing ordering and delivery process: A few customers also criticize the online store for being broken, slow, and problematic. They say that they have trouble placing orders, uploading files, finding services, and changing information. Some customers say that they have difficulties in ordering, paying, or receiving their products. They say that the online ordering system is complicated and confusing, that they do not get the correct invoices or receipts, that they do not get the required documentation for customs clearance, or that they have to wait for a long time for the delivery or collection of their products.

Lack of direct and personal contact: Some customers say that they do not have a direct contact person at Vaisala, and that they have to use general email addresses or portals to communicate with the support team. They say that they prefer to have a phone call or a face-to-face meeting with a representative who can understand their needs and provide solutions. Some customers suggest that the company should improve its online ordering system, its website navigation, its

packaging, and its inventory of spare parts. They also request faster and more personalized service, such as phone calls instead of emails, and more information throughout the process.

Positive feedback

I am very impressed by the quality and speed of Vaisala's service. They handled my request with professionalism and courtesy and delivered the results in a timely manner. They were very attentive and helpful throughout the process, from the initial quote to the final delivery. I appreciate their positive attitude and responsiveness to my needs. I am very happy with the outcome and I would highly recommend Vaisala's services to anyone. Their helpdesk service is excellent, as they provide effective solutions in a timely manner and ensure customer satisfaction. They have exceptional service and support from every member of their team. They also customized the calibration certificates to meet my customer requirements, which was very good. The recalibration online service is easy to use and works very well. The instrument was calibrated and returned to me in a very short period of time, without any issues. The support engineer was polite, knowledgeable, and engaged, and he walked me through the configuration of the sensors. He was a pleasure to talk to. The customer service and tech support were very helpful and followed up with my questions. They also resolved the contract issue and returned the units in a timely manner. The staff was responsive, polite, and highly knowledgeable, and they provided one of the best customer service experiences I have ever had. They answered my technical problem quickly and precisely, and they made the process of sending back the probe for fixing easy and transparent. They have great service and easy online ordering process and booking system. They also provide helpful support to maintain and purchase new Vaisala products. I am very satisfied with this level of service and I will definitely use Vaisala's services again.

4.3 Theme interviews with the end-users

There are different types of interviews, and their purpose can be different. For example, theme interviews (semi-structured interviews) are good for those kinds of situations, when the interviewer does not want to control too much the interviewees with the questions. This is great option when it is not clear yet what are the things that the customers truly appreciate and what they need from the company. It is typical that with the theme interviews questions are planned carefully, but the order or form of the questions can vary. With the theme interviews it is possible to modify the later interviews if there occurs something interesting during the interview process that was not clear beforehand (Ojasalo et al. 2021, 41.)

When asking directly from customers what they want, they usually do not provide in-depth information about their needs and expectations. People rarely can imagine something that does not

exist yet, so that is reason it would be important to focus on people's daily actions, true motives, and unconscious needs (Tuulaniemi 2016, 73.)

It was clear from the beginning of the development work that end-user interviews would be the main source of in-depth insight. The development work was framed to include only end-users of the product family Indigo500. To narrow down the selection, the end-users were geographically determined to come from USA or Europe. It was considered that those would most probably response to the interview requests, and they would have language skills to go through long discussions.

The process of picking the interviewees was a little longer than expected. The undersigned thought initially that the interviewees could be selected from customer database. However, the commissioning party decided that the sales department would hand pick the interviewees behalf of the undersigned. Before the selecting, there was online meeting with the sales from USA and Europe. During the meeting, a presentation was given on the purpose of the development work and end-user interviews. To make it easier to hand pick the end-users for the interviews, the selected Vaisala customer personas were presented for them, so that they would know what type of end-users were in search in order to keep the right focus. Within two weeks after this, few of them provided contact details of the end-users, which were then contacted by introduction email. All of the end-users got same email message, including a background information about the interviewer, purpose and agenda of the interview, interview questions (attachment 1) and short introductions of Vaisala on Indigo500 product family.

The request were sent to eleven candidates, out of which three replied and agreed to participate to the interview. The interviews were held through Teams meetings, and they were recorded with transcription. During the interviews cameras were on and also the interview questions were shared on a slide. Also, modified Vaisala's customer journey map (attachment 2) with additional info was shown to them as a visual support during the questions about their own customer journey. The interviews lasted one hour each, as was promised to the interviewees.

All three interviews were held within two weeks and the recordings were transcribed shortly afterwards. Because they were in-depth interviews and included a lot of their own industry language and terms, those required more studying and investigating of the phenomena, especially the pharmaceutical industry and its abbreviations. In order to maintain anonymity of the interviewees, the recordings and transcripts were stored only in author's company computer and they were name coded by colors. No personal details or company indicators were revealed, as under EU GDPR.

The three interviews produced a lot of deep data, which was summarized separately below. In the chapter 5.1 of Affinity Diagram, all the interviews were analyzed together in order to see similarities and patterns for the definition phase.

4.3.1 The end-user from pharmaceutical industry

The first interviewee (16.10.2023) was from USA and working in global pharma company as engineering advisor. The work requires a lot of travelling to different sites of the company and working on the lines and working with isolator systems. The engineer works primarily with local isolator systems. The focus of the work is mainly on the development of the cycle in non-GMP laboratory, which is for supporting other work. The manufacturing is a separate phase and also in different location.

The engineer and the team has now been using Vaisala PEROXCAP® (*a sensor which is implemented in measurement probe that can be attached to Indigo500 transmitter, for example*) to measure vaporized hydrogen peroxide, temperature, relative saturation, and relative humidity. They have needed to get parameters like concentration, humidity, saturation, and temperature according to the interviewee. They have had competitor's sensors in use for a long time to try quantitatively look high level of hydrogen peroxide that they achieve in their cycle. As they started to do mapping, they started to replace the competitor's sensors to Vaisala's PEROXCAP®. The interviewee thinks that a lot of people are now doing the same in the pharma industry. When troubleshooting, it has been really helpful to see where the saturation is and where the concentration is throughout the system, and also to look at a distribution instead of just single point. Typically, the hydrogen peroxide concentration and self-saturation at that area are compared to the other areas.

At first they got few sensors for mapping their processes and with them they were able to detect some distribution issues with the cycle. After that they needed to scale the measuring, their automation group created an internal system to collect data directly off the sensors and bypassed the Indigo500 transmitter. The reason for bypassing the transmitter was that they needed more outputs than the transmitter had. Now with the 14 Vaisala sensors they were able to map the entire system and save time and be more efficient, because now the data is going straight to the computer through an automation system, instead of downloading the data first from Yokogawa data recorder device manually to data card.

The engineer prefers to have raw data in order to plot data, but they also have own internal data collection system, a program, which analyzes the data for them. They want to see the data in real time when they are running the cycle, but they also want to go back later to check the data history.

The goal is to have the safest drug production, and the cycles to be as effective when solving issues and mapping the entire system, but also to be able to kill all the BI's (*referred to as Biological Indicators*). Traditionally those biological indicators are put all over the isolator and checked the positives. In order to achieve effective mapping, the sensors should provide the most accurate measuring for the quality of the drug production and provide accurate data for paper record and reporting. The biggest need for them would be to get a sensor one day that goes through whole range, from very high to very low levels of hydrogen peroxide. When asking about it, the engineer said that the biggest risk for them would be losing data.

Their manufacturing site has a calibration standards group of their own, who do the evaluation of calibration need and calibration process. With competitor's sensors they have sent the sensors out for calibration every six months. They have had own special calibration procedure to get more accurate measurements and they have sent the sensors out for calibration, because the calibration have been difficult to do by themselves. Because they would do that rarely, they would also need to train people within the groups to do that at the site. They would bring the method in-house if it is possible and feasible. The engineer and the team does not have definite information how often the calibration should be done according to the Vaisala instruction. The engineer and the team does not have enough or proper information if they could do purge cycle for sensors by themselves at their site. There is no good program for that.

Their company uses also other Vaisala instruments and the company's instrument engineers felt more encouraged to use Vaisala's instruments rather than the competitors.' This PEROXCAP® is widely used in pharma industry and relative humidity sensors are also used all over the network. According to interviewee, it feels like Vaisala R&D understood their company's need of cycle development, because a lot of parameters are needed simultaneously.

The interviewee said that there has not been any issues in communication with Vaisala and Vaisala has always replied quickly. The engineer and the team have not heard anything negative from others within the company. It is good to mention that one of the isolator vendors in Europe was not aware of Vaisala PEROXCAP®.

In the pharma company, sensors are purchased through local vendor, who recommends new technologies and then introduced the PEROXCAP® and also installed the system. Every site will order supplies themselves, but they have purchasing department that processes the order further.

They have two sensors in each line, and fourteen pieces altogether installed at the site, but they are not tracking them location-wise. They do not have good program for "tracking" calibration, and they have many sensors. Local tracking of the sensors would be very useful, but global tracking

does not feel necessary. Tracking may not be useful for everyone, because it depends on the people how diligently people would update those, since they already have an own internal system, where the sensors have assigned reference number. It would be useful to have an easy access to necessary information. The engineer often needs to check the Vaisala website for manuals and information. They are not sure about the transmitter model for instance. They are losing things frequently and it would be good if some tool simplifies the process.

Traditionally they have wanted to do everything themselves in-house, but they would not have resources for that at the moment, so they should rely more on their vendors, and they could get things as a service package, from purchasing to installation and to calibration. This would be highly depending on the application of course. If they would do thigs by themselves, it would take more time, and at the end the vendors know the product better.

According to the engineer, they have been interacting with all the Vaisala's customer journey stages, from one to ten (Figure 3 or Attachment 2). *The awareness* stage was with help of the vendor, who introduced Vaisala. In *the evaluation* stage, Vaisala was involved as well and together with the vendor they brought sensors in for evaluation around four years ago. The next stages *quote and purchase, shipping and receiving,* and *the setup* (installation) was performed by the local vendor. During *the setup* stage both their internal and Vaisala's automation group were involved to create the automation software system with fourteen sensors. From *the use* stage onwards it has not been so systematic, because it has not been routine for them, even though they have been involved in those. With all of the rest stages *guidance and support, calibration, repair, updates and upgrades,* they have contacted their local vendor or the assigned Vaisala sales manager. According to the engineer, it would make more sense to interact directly with Vaisala after *the use* stage, when vendor has installed the system for them. Still there was a doubt that would they order directly from Vaisala or from vendor.

4.3.2 The end-user from timber industry

The second interviewee (19.10.2023) was from Finland and working in timber industry as maintenance engineer. The maintenance engineer has been working ten years in the company and recent years with automation and electrical devices. The normal work day includes checking emails, a lot of meetings, tours around the production site, but also remote work. The engineer is responsible for the overall maintenance, sourcing, and calibrations of the devices. Operators in the productions site are also using the Vaisala devices daily. Things that give some frustrations are lack of time and also non-functioning devices and systems, such as company's VPN for instance.

In their company, they have ten Indigo500 devices of which two per drying plant. Previously they have had Vaisala's HMT337 devices for measuring relative humidity in their wood drying process. In their company, they have taken Indigo500 for an experiment, but ended up purchasing Indigo300 devices, because they do not need the additional features of Indigo500. The need for replacing the HMT337 devices was because of the ramp down from Vaisala side and also there were some faults in the HMT337 which needed some repairing. Also, the display in Indigo300 was bonus feature that they liked a lot.

All the devices were purchased and installed by vendor which is wood drying systems manufacturer. The drying systems manufacturer has also created a program to calculate the humidity. The data goes from the sensors to the automation system and to PC control center, which is a local control room, where the company can view error messages and milliampere variables.

The main goal with their drying process is to get the wood moisture content to correct percentage. The need is to measure only the wet-bulb temperature in order to calculate the humidity. They have mindset to be at the cutting edge of the industry development. There is need to be more efficient, so in the future, fieldbus might be the next thing. It would allow them to get more measurements, because now two analogue outputs limit the measurements to two. With that system they would get other information as well such as, how long the device has been on, for instance. According to the engineer, a hardware manufacturer might prefer to have the capability to connect directly into an existing automation ecosystem, such as Siemens Profinet or Beckhoff TwinCAT, without the necessity to convert the analog signal first.

In the company's main drying plant, they have replaced competitor's devices to Vaisala's devices, but those were older series than Indigo. There they have outsourced maintenance services. Maybe that is the reason for selecting the older series of Vaisala devices? Or maybe it was familiar device for the maintenance team? In the other smaller drying plants, they might still have competitor's PT100 device with temperature sensor and they would measure and calculate the humidity percentage by wetting the wet rag.

The colleague of the engineer has used Vaisala online store for purchasing and praised it. The colleague has also used Vaisala maintenance services. The engineer has ordered supplies through Vaisala's sales manager and says that the service is good. The engineer thinks that the delivery of the Indigo device was surprisingly fast regardless of the component shortage. The engineer also thinks that the Indigo device looks great and it is easy to see everything from the display. The drying plant staff and the operators are using the devices daily and they would notify the maintenance engineer if there were something exceptional.

The biggest risk in the plant with the Indigo devices would be a situation, where the drying process would not be successful, and they could not get wood delivered out from the plant. They do not have temporary storage space if this kind of situation would occur. There are multiple devices in the plant and failure of one Indigo device would not stop the process.

The engineer prefers to do things self and in-house, because then there is better control of things and there is option to specify when ordering devices. As self-service, the engineer has done some exploring that which spare filters are correct and then gave those reference codes to Vaisala sales manager to order. Also, the engineer has searched the manuals from Vaisala website.

According to the engineer, the calibration of Indigo device is smooth, because it is possible to do it yourself and on-site, and you do not have to send packages to Vaisala or take the device off the wall. In that case, only the detachable smart probe (sensor) is field calibrated with PC. There is no time gaps if a spare sensor is attached to the transmitter meanwhile. The smooth calibration process might be the reason they replaced competitor to Vaisala. Other drying plants of the company might send the sensors to Vaisala for calibration. The maintenance engineer has good knowledge and process for the calibration, but if the engineer is not available or if the employees are changing in the company, they might outsource the calibration service. The company's mechanic had mentioned that it was faster to do calibration earlier with the older device, because you could do that on the spot, without using a laptop.

According to the engineer, some digital tool for device management would be good. With that tool it would be good to see all serial numbers, history data, changed spare parts and when the device has been taken into use, but also when and how the device is repaired. There could be option to mark own calibrations. It would be good if with that tool you could order maintenance, repair or spare parts with just one click. It would be good to have calibration notifications and regular maintenance notifications directly to email. The notifications would come to the contact person's email, who would normally be in charge of device management. This person could decide if the notification is critical or can it be postponed. This would work as "asset management system." It would be important that the tool's user interface would be clear, and it would navigate to correct manual by serial number for instance. You would no longer have to search for paper manuals.

According to the engineer, they have been interacting with all Vaisala customer journey stages. Vaisala brand has been familiar most likely before joining the current company. In *the evaluation* stage, they have been interacting with Vaisala sales about the Indigo device and made assessment before purchasing. In *the quote and purchase* stage, they have ordered calibration salts and filters for instance. The colleague has also ordered spare parts through the Vaisala online store, whereas the engineer has sent email to the sales manager. They have ordered spare parts and

sent devices for calibration, so they have had tracking and delivery in *the shipping and receiving* stage. They have interacted with Vaisala in stages *setup* and *use*, and their vendor has been involved with those stages as well, especially in setup. In the drying plant the engineer and the operators are using the devices daily. In the stage of *guidance and support*, the engineer has usually directly contacted the sales manager, but has been able to find manuals and user guidance from website. The engineer has been involved in *the calibration* stage, where the engineer has been doing that independently on-site, whereas the others are sending the sensors to Vaisala for calibration. They have sent the devices to Vaisala for repair, and they have purchased the spare parts in the stage of *the repair.* In the final stage of the customer journey, *the updates and upgrades,* they have upgraded the older device to Indigo.

4.3.3 The end-user from metal industry

The third interviewee (26.10.2023) was from Sweden and working in metal industry as process engineer. The engineer has been using Vaisala's products for measuring dew point and carbon monoxide for over 20 years. According to the engineer the work days are very varied and hectic, because of the travelling to different plants globally and because the plant is operative 24/7. The work includes purchasing and use of the Indigo devices and probes for process control and supervision. For working so long, 40 years in the company, the engineer has a lot of tacit knowledge and experience in metallurgy and annealing processes. The engineer started as an operator and studied metallurgy while working and now supervises and controls the processes, writes reports, conducts tests, and trains new staff. People like to ask a lot of questions and ask to make introduction to new employees at the plant for instance. The work includes a lot of travelling around the globe, and to make that less time consuming, the engineer tries to compile all the projects and all the necessary reasons to travel to certain location, and then spends longer time (weeks) there at once. The only thing that annoys while working in the plant is that sometimes some younger generation workers use their phone too much and it is a big risk if they are not concentrating to their surroundings. It seems that younger generation do not stay long in the company, and they are in just for the salary.

They contacted Vaisala 20 years ago, because they were interested in measuring the dew point inside the process. At first they had the HMT series and DMT series, but couple of years ago they were introduced to Indigo520 device and purchased one to test. After that they decided to replace all the HMT340 series devices to Indigo devices. Altogether they have now approximately fifty devices around the plant. The Indigo devices are good because they are easy to install, re-place, and send for calibration. Most of the devices are in annealing furnaces and some are used measuring nitrogen in process gas. They use the Indigo devices also to protect ABB instruments which are

very sensitive to moisture. They use this signal to automatically purge the ABB control system when the dew point is too high. Too high dew point would destroy the system and would be bad for the process. They use 4-20 milliamperes analog outputs and all dew point sensors are hooked up to the ABB control system.

The engineer goes to the device only if the range needs to be changed from digital output to 4-20 mA and this happens 1-2 times per year. All the data from sensors goes directly to the control system, so they do not need to see it from the device display. It is very important for them to see the trends and the measurements from the parameters for long time, so they can put the trends together and find patterns. The risk with Vaisala devices would be that if they would show wrong measures and the engineer or the operators would make wrong conclusions according to those measurements. If that would happen, they would scrap the finished material and rework on them. This would cost a lot of money.

The engineer is satisfied with the performance and accuracy of the devices, and the support received from Vaisala's sales engineer. They have had a long and good relationship with Vaisala, especially the communication and assistance with Vaisala's sales engineer. When asking if they prefer self-service, the engineer said that they can check e.g. manuals by themselves from website, but with bigger issues they will contact the Vaisala sales engineer. The bigger issue could be something that they do not understand how to proceed for instance. They prefer to talk to person that knows them and is able to visit the plant if needed. Also, they would not need to explain all from the beginning to a stranger.

They prefer the Indigo devices over the HMT devices, because those are easier to use and to change settings. According to the engineer there are not many problems or complaints about the work or Vaisala's products. There were some issues with the first version of the Indigo software. There was a software bug that caused the device to freeze when a code was entered, and in addition there has been a problem with the calibration of some devices. These issues were solved quickly by Vaisala and did not affect the company's work.

The engineer does not necessarily need to know that much about how the Indigo devices in work, but the bigger need is to know how to use the dew point value in the process management. The engineer also teaches and helps other operators and new employees to use the Indigo devices and checks the devices regularly. The work includes checking and comparing the dew point meters with a calibrated Vaisala handheld meter (Indigo80) every three months and sending the probes to Vaisala for calibration if needed. The engineer is interested in learning more about how to calibrate the devices by themselves on-site.

They have discussed with Vaisala sales engineer how to proceed to control the devices and the calibrations. It would not make sense that someone would come to the site for calibration process. They would be happy if it would be possible to do the calibration on-site, but according to the Vaisala sales engineer it is not possible to do field calibration on-site. They are happy that with Indigo device it became much easier to send only the probe for calibration, not the whole transmitter device. The sending and receiving process has been smooth, there has not been any problems. They have few spare parts just in case, which are good to use during the calibration process, when the original is out for calibration, and they want to receive data during this time. They have a group of instrument engineers who are responsible of calibrations and maintenance of Vaisala's and other's instruments. They have checked themselves the need for calibration with Vaisala handheld device and if the value is out of specification, they will send it to Vaisala for calibration.

According to the engineer they would be interested in a digital tool or portal that would help them manage the devices better, such as showing serial numbers, manuals, calibration certificates, and notifications. The digital tool for the device management would be helpful because they have so many devices.

According to the engineer, they have been interacting with all Vaisala customer journey stages. *The awareness* stage happened initially already decades ago, and because of that the engineer does not remember did it happen via email, website or at a fair. At this stage it is good to mention that they do not have any other brands than Vaisala. The Vaisala sales engineer showed Indigo device to them on-site and they tested that for a moment. This was part of *the evaluation* stage. After the evaluation of the Indigo device, they made *the quote and purchasing* for 15 units, and another 15 units the following year. The engineer is the one who is contacting Vaisala, but then purchase order is sent to their purchasing department that handles the process further. The engineer has been part of *the shipping and receiving* stage, where they got tracking order from Finland. They got notifications of the tracking process when the package was leaving and what is the estimated arrival time. The delivery and sending has been smooth. At first in *the setup* stage, they replaced the old devices to Indigo ones, and they bought and used adapter for the transmitter which was very easy. There was one issue while installing the software as mentioned earlier, so they contacted the Vaisala sales engineer for assistance. The very first version of the Vaisala software was not good. The engineer and the operators are mainly using the devices and checking manuals, so they are part of *the use* stage. In *the guidance and support* stage, they have usually contacted directly the Vaisala sales engineer. This person forwards the technical support related questions to Vaisala technical support, like with that software problem. The engineer is checking the need of *the calibration* by comparing calibrated Vaisala handheld meter to the probes and sends them to Vaisala for calibration if needed. They have experiences *the repair* stage as well, when

one of the devices was drowned in water, but that was their own fault. They have purchased spare parts in stock and replaced the broken ones. Mostly all interaction has happened with the sales engineer. In the final stage of *the updates and upgrades* they have upgraded their devices from the older HMT series to Indigo500.

5 Definition stage - the findings of customer insights

At this stage, all the collected data from various sources is thoroughly processed, analyzed and defined as design problems. It should be clearly defined what problem is solved and designers should be able to focus on solving right things, because it is not enough that things are done right. The purpose is to discover the customer perspective by combining all the information received from target group. The collected data must be used to identify issues which are relevant to a wider audience. The key thing is that how the information is used and processed in creating something valuable. (Maula & Maula 2019, 190; Tuulaniemi 2016, 154.)

The collected data is processed with service design methods and tools to help summarize and analyze the findings. The customer data was collected from internal sources (data analysis) and from theme interviews of end-users, and also general feedback from CSAT survey 2023. These are addressed more on the following subchapters.

5.1 Affinity Diagram

The Affinity Diagram is useful tool to organize large amount of data. Japanese anthropologist Jiro Kawakita created this already back in the 1960s. This designing tool requires creativity and intuition, and it is great tool after brainstorming session or if there is a lot of verbal data to analyze. The tool helps designers to find the relationships between the data attributes, such as opinions, issues, and problems, and it helps to organize them in related groups. (Haaga-Helia s.a. a.)

With the Affinity Diagram or Affinity Mapping designers can find similarities out of the data. There can be similar themes and topics in the data which can be organized into groups. They are then given a descriptive title and then rearranged into larger groups. Grouping highlights what is relevant to users. With Affinity Diagram, it is possible to display an overall picture of the findings and what are relevant to the user, but also to see where findings came from. (Tuulaniemi 2016,154; Suomidigi 2019.)

Customer insight has been gathered through internal discussions with technical support and product management, and from customer feedback and from end-user interviews. All relevant information, both from the customer perspective and from Vaisala’s internal processes was written on Post-It notes. The big windows were good place to spread all the notes and move them around as shown in the figure 14 and in the figure 15. The notes were mixed and grouped into themes and the results were recorded and photographed. It was important to re-create the groups with different logic, to ventilate them, and to find other themes. The second round confirmed that there were

themes that emerged in both rounds that had clear attributes of commonalities. These final results were recorded and photographed as well.

All this information was sorted and processed using the Affinity Diagram tool to find commonalities and to define them as design drivers. Eventually, two design drivers were identified which stood out from the data, and those were titled as “communication” and “information.” The next sub-chapters present the design drivers and the customer insights behind them, which are summarized results of Affinity Diagram.

The design drivers are the factors which are defined from the customer insights and which guide the design process. They help to keep the focus of the design and when they are well chosen, they work as common thread of the customer needs. The design drivers help to create user-driven concepts (Tuulaniemi 2016,156-157.)

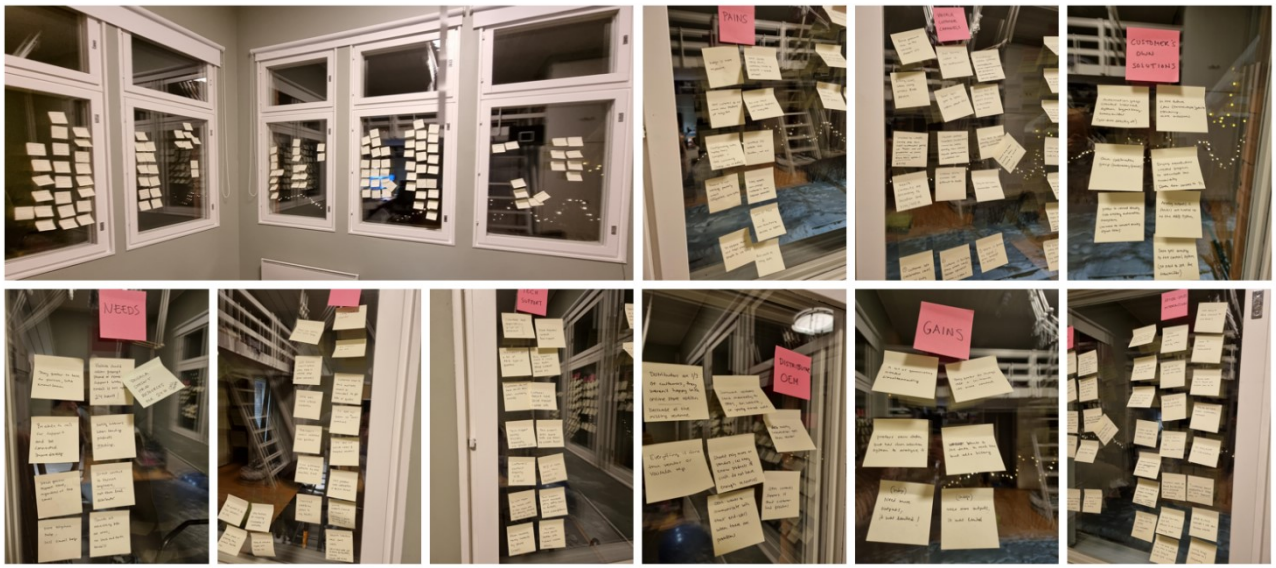


Figure 14. Using the Affinity Diagram tool, the first round

Figure 15. Using the Affinity Diagram tool, the second round

5.1.1 Communication

Customers have the need to be able to communicate easily with Vaisala. There had been some occasions where customers have suffered from bad communication with Vaisala representatives. A lot of communication between Vaisala and the customers happens through emails, whether the customer has sent a direct email or created support ticket in portal. After a phone call with technical support, they may send a follow-up email to the customer asking for more information to create a ticket. The customer would prefer more telephone service than sending emails back and forth. They would prefer to talk with someone who knows them. Due to time difference for instance, the customers are not able to receive support immediately when the issue is occurring. The customers might be located in places where calling is the only option. The downside for customers is that Vaisala's technical support phone number is only available on weekdays and during the opening hours of the Helsinki office. This will affect email response times outside the European region.

A one third of Vaisala’s customers are middlemen which act as distributors, vendors or OEM (Original Equipment Manufacturers). A large proportion of customers are purchasing their systems from vendor who is doing the evaluation for the devices. Vaisala’s devices and products are only small part of the whole system. This is the reason why customers’ first contact is their local vendor. After the installation of the system, the customers are contacting also Vaisala representative, such as sales manager or sales engineer. Also vendors are contacting Vaisala themselves if their customers, the end-users, have any issues with the devices for instance. The vendors or OEM wants to

communicate with their own customers in case of problems, because the relationship is sensitive. This happens especially in Asia region.

Customers want fast contact, easy information and a clear support channel. How this should be provided to the customer, depends on the customers' circumstances. It depends on the customers' internal processes, if they have resources to use self-service features or would they rather rely more on vendor's services. At the end, the vendors know more about the devices and about the installed systems. On the other hand, some customers would want to contact directly Vaisala engineers when problems occur and not interact with local distributor.

5.1.2 Information

Customers have the need to be able to find and receive information effortlessly from Vaisala. It is important for the customers to receive necessary information during the evaluation stage, and in many cases this information is provided from vendors' side, who is designing and building the control system of devices to the customers' premises. According to the customer satisfactions survey and the interviews it would be highly important for customers to have access to necessary information in the after-sales stage. The necessary information includes the relevant instructions, manuals, user guides and datasheets for instance. From customers' perspective, finding information has not been smooth, because it has been hard to follow instructions, user guide has been rather confusing when adding new device, or it has not been easy to find manuals for old sensors, or they have not had proper instructions or manual, for some reason. Also, the physical paper manuals might get lost in customer companies. Finding the correct information to specific devices has been time consuming and lack of time is something that all customers are struggling with.

When customer have access to manuals, training videos and relevant information, those should be updated versions. The customers consider checking manuals and information from Vaisala's website as a self-service. Those are basic things that they manage to do on their own, but in case of an issue or lack of time, they are looking for personal support. Solutions for their problems could be mostly found by checking from manuals or following the instructions. The customers do not have enough knowledge or courage to troubleshoot the issue on their own, so they are easily contacting the support. The self-troubleshooting should be easily approachable option for the customers.

The customers are not missing just manuals, but also basic information of their Vaisala products. They might not know the model of their transmitter or the serial number of the device. It is good to remember that in many cases the customers are seeing their control system in whole and not just Vaisala devices. In many cases the Vaisala devices are part of a large automation system, which are built from many different devices and software systems. This might be the reason why it is

frustrating for the customers or end-users to try to find information on specific device and its serial number for proceeding to creating support ticket.

Vaisala representatives are expected to be specialist of the numerous applications of each Vaisala products. Also, the Vaisala sales is trying to keep up with the products and updates, and they would also need to know how to use the devices in different applications. The technical support is spending a lot of their resources and time for checking customers' devices from Salesforce system to link the cases and the devices. A forum with common questions and answers would be useful both for customers and for technical support, because a lot of information is covered in Vaisala's manuals, but regular customer would be too lazy or busy to go through it, and because customers are asking a lot of FAQ types of questions from technical support, FAQ section on the Vaisala web-site could decrease vain support tickets.

According to customer satisfaction survey and customer interviews there is demand for some kind of useful portal/platform/digital tool to access information and support. With this hypothetical plat-form, customers could manage their devices better, to have all the information in same place. In there, customers could see the devices with serial numbers, related manuals, calibration certifi-cates, device history, all notifications, see available software updates, and they could also make their remarks that helps them to locally track the devices for instance. From the customers' side it was questioned that would people update or add info of devices into the portal. It would always re-quire effort on the customers' side to manage the devices, and it would be highly dependable on the people's motivation. In most cases, the customers already have an internal system that they need to keep up to date. The portal interface should be user-friendly, intuitive, and should motivate and support users.

According to Rathinam (2022, 2) when customers are buying something, they are researching it first. Consumers have more knowledge about their options nowadays, so companies would need to understand and support that. Companies should be supporters of providing information in all channels that customers are using, because customers want everything to be convenient and sim-ple. This turns interaction experience into delight because the customers are understood and their needs are met.

Customer service representatives are required to have a lot of knowledge and competence to as-sist customers. With the help of better technology and support logistics, such as AI and chatbots, they can have access to information they need to help the customers. The representatives can feel they can succeed in their work and provide quality service for the customers. Data of purchase or service history enables them to efficiently access to relevant information when customer is contact-ing about an issue (Rathinam 2022, 4-6.)

Company's support function is a distinctive feature of their service. When support representative is familiar with the customers and their history, they can provide information more effectively. For example, documenting previous interactions with customers helps with company's success in creating a seamless and delightful customer experience. It enables better customer data collection and helps to support the customers by identifying the common questions. It is a win-win situation when support team is freed from high-volume, low-value tasks. When the distractions are removed, then the support team can focus on solving the customers' problem. The customers then feel acknowledged and the support team feel that their work is meaningful. (Rathinam 2022, 6.)

5.2 How Might We?

How Might We (HMW) tool is used for framing and defining identified problems into insight statements. With these statements, it is easier to shift from problem conclusions to opportunities by reframing the statements as How Might We questions. The HMW questions help designers to articulate to which problems they want to solve. With the questions it becomes visible that there are variety of ways to solve the problem from different angles (Haaga-Helia s.a. b; Ideo.org s.a.)

In the previous sub-chapters, the design drivers were presented in more detail. The identified problems of this development work turned out to be themes of communication and information, and more specifically lack of them. Information is an abstract concept that consist of many different subconcepts, and therefore should be defined more precisely. For this reason, the HMW tool was chosen. Below there are customer insight statements turned into HMW questions.

Some cases were poorly handled with customer

- ⇒ HMW provide clear and informational resolution that reaches the customer?
- ⇒ HMW create more transparent process for the cases?
- ⇒ HMW assist Vaisala representatives to interact better with the customer?

Time difference is affecting the response times of technical support

- ⇒ HMW respond efficiently to customer cases regardless of the time difference?
- ⇒ HMW offer direct channel of interaction to customers in different time zones?
- ⇒ HMW sort the urgent cases from non-urgent cases?

There can be a lot of email messages sent back and forth to be able to create a ticket or solving the issue

- ⇒ HMW reduce the email chain messages between customer and technical support?
- ⇒ HMW assist a customer to prepare with the necessary information before contacting the technical support?

⇒ HMW provide better tools for technical support to create tickets at once?

Customers would find it useful to have a platform for an easy access to information

⇒ HMW provide an easy access to relevant information 24/7/365?

⇒ HMW collect all useful information into one place?

⇒ HMW make the platform appealing omnichannel for customers?

Customers need to find and receive information effortlessly from Vaisala

⇒ HMW provide optimal amount of information for customers?

⇒ HMW make finding information easy and intuitive?

⇒ HMW improve information transfer from inside Vaisala to customers?

Customers are missing the device information

⇒ HMW make sure the customer has the necessary information?

⇒ HMW create multiple options to get device information?

⇒ HMW guarantee that customers get the information regardless of the time and location?

Customers are asking a lot of FAQ types of questions from technical support

⇒ HMW direct the FAQ types of questions to one channel?

⇒ HMW reduce the FAQ types of questions via email?

⇒ HMW create the FAQ page that covers technical questions?

All these HMW questions showed that there could be many options and ancles to start innovating solutions to the design problem. This would work also as good check list when prototyping the concept and creating the features based on the customers' need. Many statements could solve other problems simultaneously. The best three HMW statements were "HMW provide an easy access to relevant information 24/7/365?", "HMW collect all useful information into one place?" and "HMW make the platform appealing channel for customers?". These three statements were rephrased into following HMW statement:

⇒ HMW motivate customer to register an Indigo product?

⇒ HMW enable an easy access to product-specific information through product life-cycle?

Eventually, this HMW statements were used in ideation session. More about the ideation session in chapter 6.1.

5.3 Customer Personas

Personas are a valuable tool in service design because they make it easier to develop a service from the customer's point of view. The personas are created from the received customer insight, and they are fictional characters that represents the typical customers and their behavior, motives and needs. The imaged representations includes demographical details and social characteristics such as name, age, education, profile picture, motto, and also customers' lifestyle, needs and motivations are important in description. (Ojasalo et al. 2021, 77; Prorok & Kosicka 2021, 44.) The personas are central method to summarize the customer insight and to find the motives of actions. A single finding can be relevant in the design process, but even more important would be discover a similar actions of larger group. When there are similar findings of larger group, it is safer to create solutions and services based on those. It is very critical for a company and for a designer to understand customers' everyday life. The customers' value creation can be summarized into form of customer profiles that direct the design and helps to understand to whom the service is designed for. (Tuulaniemi 2016, 154-155.)

In autumn 2023, the case organization Vaisala had created customer personas from typical existing customers. Altogether there were five different personas identified to represent the customers in different positions. These personas would represent all customers, within two business areas, and business units in them. Those personas were made for employees to use as a tool when designing products and services for instance. (Vaisala, internal source 2023b.)

Figure 16. Vaisala's customer personas (Vaisala, internal source 2023b.)

To support the end-user interviews, two personas were selected to represent the most typical end-user of the Indigo500 product family. Those were **Mark the Maintenance Engineer** and **Stefan the Technical Specifier**. The reason for selecting these personas was that those personas would be the ones using the Indigo products in their daily work, so they would have the most experience.

Those personas would also be the most potential to register their devices because they would be the ones needing the after-sales services, installing and calibrating the devices, so they would interact the most after the purchase. Vaisala's sales managers were able to select suitable interviewees for end-user interviews based on these customer personas.

After the end-user interviews and customer insights, the undersigned created persona who was a mix of the Mark the Maintenance and Stefan the Technical Specifier and had additional features from the collected customer insight. The persona was called **Erik the Engineer**, whose features would describe more the practical things based on the interviews. The customer persona Erik the Engineer is presented in the figure 17. The features were not generalized too much to high-level because then the focus of design in the development work could be lost. The created customer persona is presented also in attachment 3.

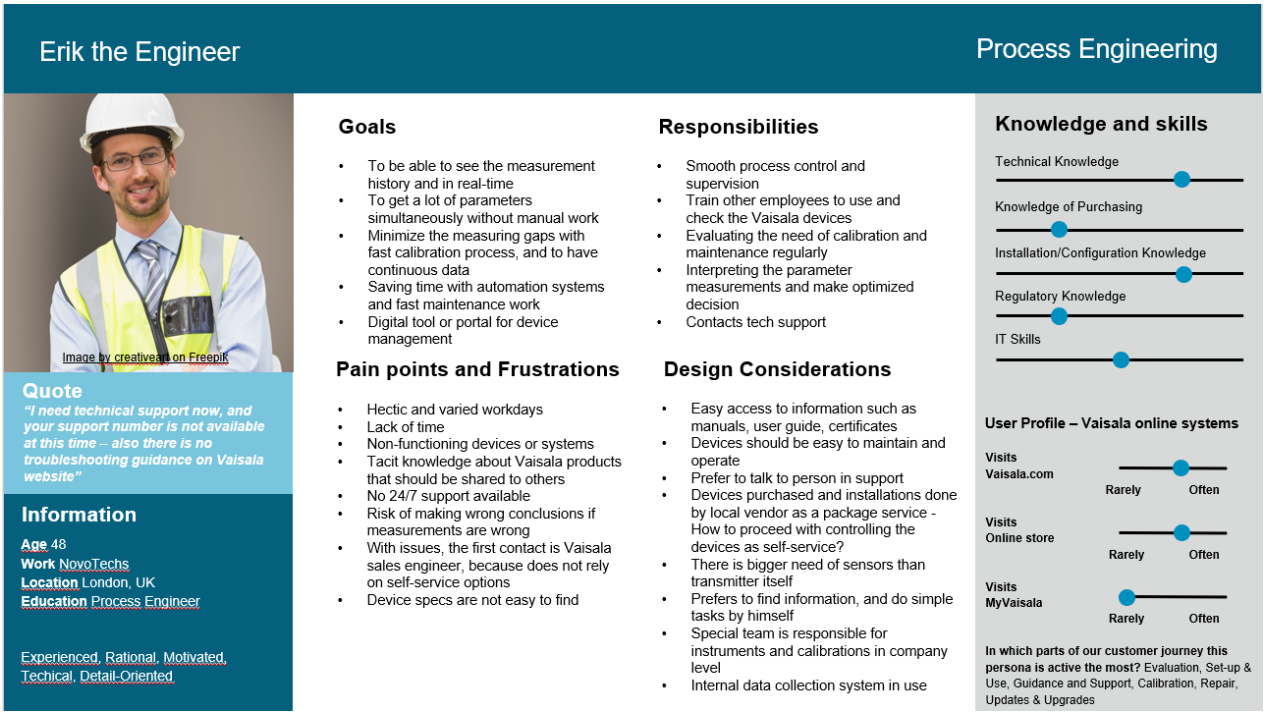


Figure 17. Created customer persona - Erik the Engineer

Erik the Engineer is an experienced professional, who works at the plant. He has many responsibilities, such as controlling and supervising the processes in the plant. He is the admin of the process control systems and therefore is providing training for other employees. He is in charge of the instruments and calibrations of the process functions. The instruments and devices are proving parameters to the process control system that he needs to analyze. His team needs to see data history and data in real-time. The goal is to get a lot of parameters at the same time without having

data measuring gaps in the process. Different digital tools provides more automated controlling and saves time for his team.

There are few things that causes frustration in his work. When work days are hectic and time is scarce, not functioning devices and systems are pain points. Also, searching relevant and helpful information about devices etc. can take too much time from the work day. He has a lot of tacit knowledge about Vaisala devices that also his colleagues should know in case he is not available. One problem is that there is no 24/7/365 technical support available, so the reaction time to the issues at the plant is too long for him. There is no quick-fix troubleshooting options for the users in case the technical support are not providing assistance in that moment.

Erik the Engineer prefers to talk to person in technical support cases. In simple troubleshooting cases and when seeking product related information, he can do it as self-service. Practically, he is involved in each stages of the customer journey, even though the local vendor might be assisting in the beginning. He trusts the personal support more and therefore prefers to contact Vaisala sales representative when needing information or support.

5.4 Customer Journey Map

The term customer journey is used to depict the customer's entire process in service design. It describes, also visually, all the experiences of whole journey, from the very beginning until the end. Mapping the customer journey creates new dimension in the development of organization's processes by highlighting the genuine customer experiences. Customer's activities, and both rational and emotional needs are depicted in customer journey. The customer journey consists of touch points, where the customer is interacting with the company physically or virtually. (Ojasalo et al. 2021, 73-74.)

The touch points can be verbal or non-verbal situations that a customer experiences. The customer journey is linear visualization of the main interaction stages with the brand that covers customer's intentions, motivations and goals. The customer journey stages includes the emotional dimensions related to each interaction. The mapping of the customer journey is ideal method to start measuring customer experiences, because it reveals the connections, gaps and dynamics between a customer and a company in the stages. (Prorok & Kosicka 2021, 45-46.)

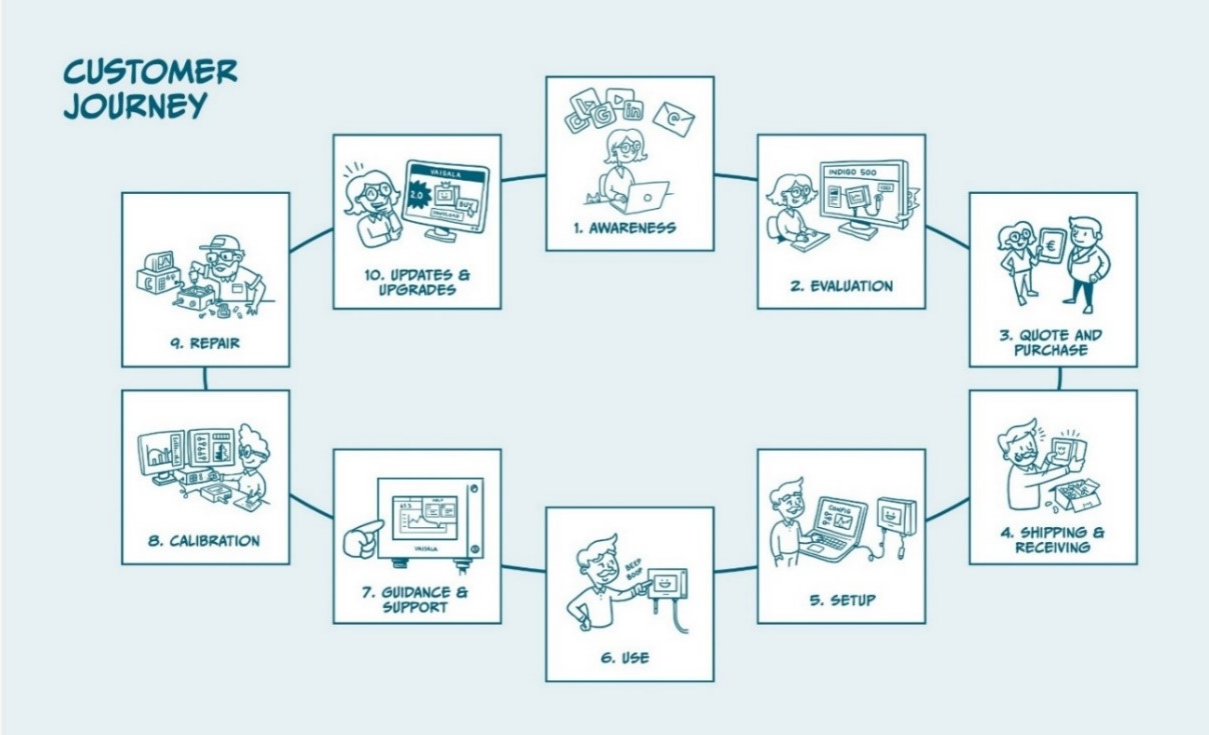


Figure 18. Vaisala's customer journey (Vaisala, internal source 2023b.)

In 2022, the customer journey map made by Vaisala is presented above in the figure 18. Vaisala had visualized the customer journey of a generalized customer. It depicts all the relevant touch points which a customer goes through from awareness to the end of product's life-cycle. It worked as convenient draft for the customer journey map of this development work, which was modified according to the received customer insights. The undersigned created a new customer journey, in the figure 19, which is based on the end-user interviews and depicts the current state of customer journey, and also it includes the product journey. The created customer journey map is presented also in attachment 4.

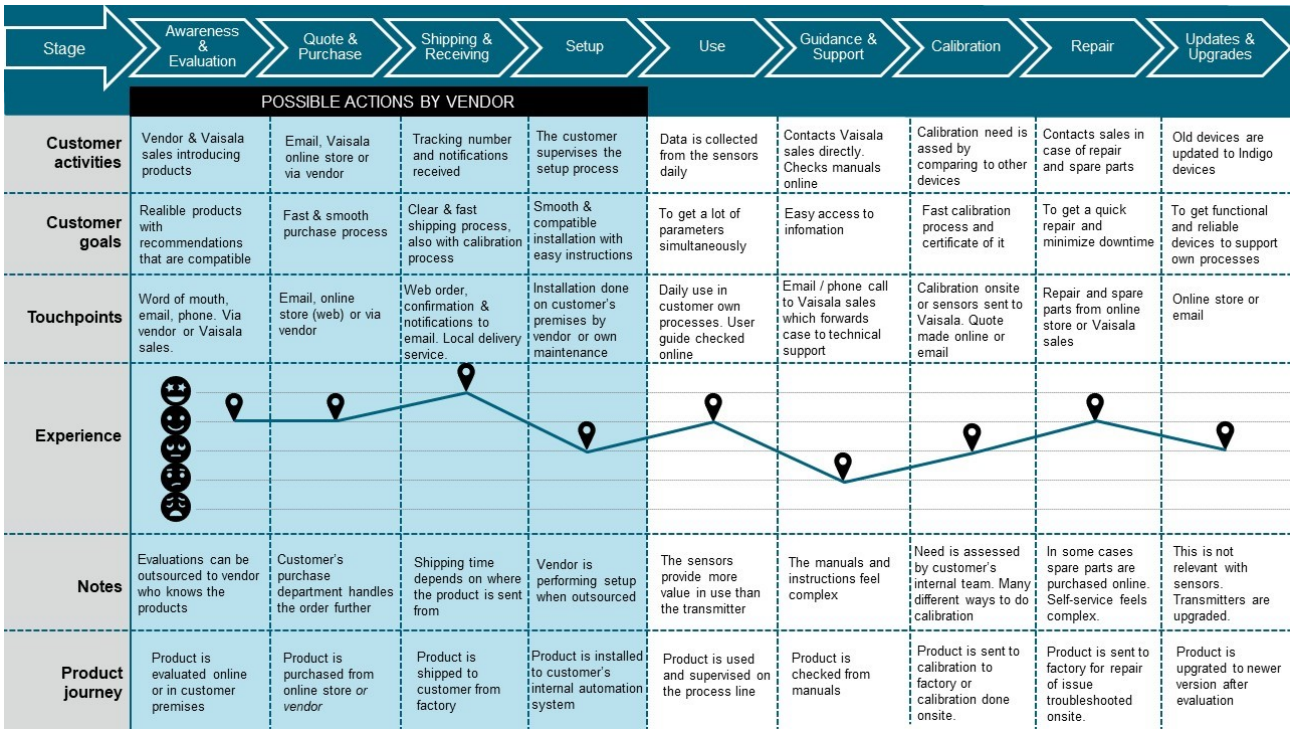


Figure 19. Created customer journey map

The created customer journey map, in the figure 19, highlights the actions of the customer persona, Erik the Engineer, but potential vendor as well. The local vendor might be involved in the pre-purchase stages, where the vendor introduces the Vaisala products to the customer. The vendor might be assisting the customer until the installation of the product. This is dependable on the application and industry of the customer. The customer might outsource the sourcing and installation of the product, because the local vendors are providing that as service package and building the whole process system in the customer's premises. The reasons for this is that the customer trusts the vendors professionalism, product knowledge and in the experience of system compatibility.

The interaction between customer and seller, whether it is vendor or Vaisala' sales representative, happens mainly via email. The customer company might have separate purchasing department who handles the purchase process after the purchase decision. The Vaisala online store is used when buying spare parts or smaller accessory. The customer does not have enough information or experience to buy correct products to their plant. The customer wants to rely on the product knowledge of the seller and shift the responsibility to the seller.

The customer has experienced the shipping stage very positively as is shown in the experience chart. As promised, the customer receives the products fairly fast and the customer receives notifications of the tracking. The customer is pleased to receive accurate information on the shipment

and estimation of the delivery, so that they can plan according to that. In the use stage, the customer less frequently physically touches or sees the product. The probe/sensor itself is creating the value the customer needs to manage their own processes. The probes are attached to customer's own automation system. When customers need guidance or support the experience chart shows the lowest score, because finding information and receiving support has not been made easy for them. When problems occur, they occur unexpected, and does not ask time or place. The customer would like to have support and relevant information at the hand and in timely manner. It is all about saving time and keeping up the continuous process. The same situation happens during the repair stage. It is easier for the customers to contact vendor or Vaisala sales representative than searching the information about repair process or instruction online.

The information about calibration and different options for it, are not clearly informed to the customer. The information depends on the customer's application, so the calibration information could be tailored to their needs. The different options are that the device can be calibrated only at Vaisala factory, or it can be done by other service provider or it can be done on-site at the customer plant. The calibration can be complicated purge cycle or the device can be calibrated self with other device, Indigo80 handheld device. Finally, in the updates & upgrades stage, the customers are changing the devices to newer version in order to keep up with the lates developments and make sure that they get high quality data for their own process management.

The customer journey also describes the product journey. It is good to know how many different stakeholders are needed across the journey for one device. A customer company recognize the need to purchase device for the first time or the vendor leads through awareness and evaluation stages. They could contact Vaisala by themselves or contact a vendor to assist, this depends on the application and if the device is going to be part of larger system. The stages until installation could be handled by vendor. Then the vendor is influenced by the Vaisala services and purchasing processes. How this shows to the end-user, is highly depending on how the vendor is operating in between. There are many users for the product, but Erik the Engineer is responsible for its maintenance and performance locally. He or separate instrumentation team would evaluate the products calibration need and would handle the process. Same goes with the repair process. In some situations Erik the Engineer is able to do troubleshooting on-site. The vendor might be involved once again when it is time to update or upgrade the devices or evaluate the need of that with the customer.

6 Development stage

At this stage different generative tools and methods are used that typically includes various stakeholders (Ojasalo et al. 2021, 75.) The purpose of ideating is to generate as many potential solutions as possible from the defined design problem. At first, a lot if ideas are generated without any criticism, in other words, quantity over quality. After generating large amount of ideas, then it is time to assess which ones are feasible in that framed setting. These ideation rounds can be repeated to get enough ideas. The more ideas there are, the more likely there are those that are relevant for the final solution. (Tuulaniemi 2016, 182.)

6.1 Ideation session

Brainstorming, ideation session or any other method to visualizing the design problems, solutions and ideas are important way to implement the design thinking among the internal stakeholders. This helps to see the current situation and desired state of customer experience and would be recommended to include more employees to ideation sessions. When involving internal stakeholders, it increases the employee engagement, but also makes them feel that they have impact on developing the company. In its simplicity, the ideation or brainstorming is for creating large amount of ideas to solve the design problem. (Prorok & Kosicka 2021, 47.)

Ideation is not an easy task for facilitator, because it is not just creating a lot of ideas together and pick the best ones. Participants should understand the backgrounds of all the ideas, because otherwise they end up picking their own ideas or the ones similar to their own. The participants could be disappointed to the end result of the ideation session, because they may not had enough time to delve deeper into others' ideas. Also, there should be enough time for discussion and together process further those ideas. Mostly the focus is on the ideation part, but at least important part should be convergence, choosing the most suitable ideas. One of the rules in ideation and brainstorming is that people should not criticize others' ideas. Still, people should be able to ask the reasoning and the logic behind the ideas. Otherwise it would be just superficial and short introduction of post-its. (Nummi 2023, introduction.)

A good facilitator is someone who can be neutral, impartial, who does not criticize or share own ideas. The facilitator should concentrate on the process and direct others to keep the focus. Also, the facilitator is responsible for planning and implementation, and should provide the best methods for the session. Finally the session should be completed with making the decision with the help of facilitator. (Nummi 2023, chapter 2.)

The undersigned held ideation session on 20th of December 2023 and worked as a facilitator. The invitation was sent to fifteen internal employees that works in technical support, marketing, customer service and development engineering. Eventually, seven employees participated to the on-site session in Vantaa HQ. Those seven represented teams in technical support, customer service, development engineering, digital engagement and visual content in marketing. For the session, a spacious meeting room was booked with a lot of whiteboards. The purpose of the ideation was introduced shortly in the invitation before the session day. It was mentioned that no prior preparation was needed from the participants and the session would be highly relaxed with some beverages in the beginning. The session was held in Finnish but notes were written in English. Due to tight schedule the session was booked for an hour. This required very thorough planning beforehand and learning how to facilitate.

The agenda of the hour was following:

8:50-9:00 Arriving to the meeting room

9:00-9:10 Beverages and warm-up exercise. 10 min

9:10-9:20 Design problem, customer journey and customer persona introduced. 10 min

9:20-9:40 Ideation for statements (revealed at the session). 20 min

9:40-10:00 Discussion and summarizing all the ideas together. 20 min

The warm-up exercise in the beginning was to wake-up the brains into creative mode and to loosen up the participants, and to create some relaxed discussion. After this, the purpose of the thesis, created customer persona and created customer journeys were presented. The persona and journey were printed to A0 size paper to the wall and also every participant had own A4 print of these. The participants got instructions that they should try to ideate to the How Might We statements written on the whiteboard, and they should write the idea clearly, so it is understandable later. Also guidance was, that during the ideation there should not be discussion. There were a clock showing the remaining time of ideation part. After introducing the background of the ideation session, it was time to start ideating from the How Might We statements which were (1) HMW motivate customer to register an Indigo product? and (2) HMW enable an easy access to product-specific information through product life-cycle? When the ideating part was completed it was time for discussion. Everyone presented their ideas and after that participants were having discussion about the various ideas and the deeper meaning behind them. The discussion part took most of

the time, therefore the voting part had to be handled afterwards. The compilation of whiteboards, instructions, agenda and post-it notes are shown in the figure 20.

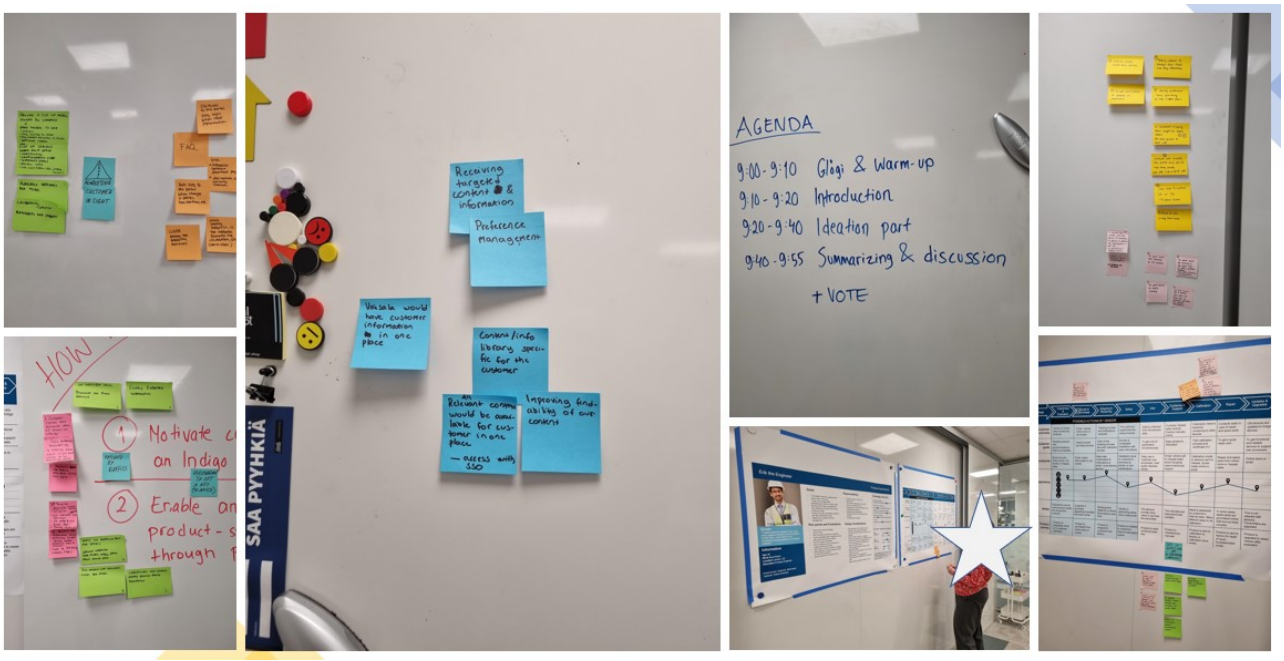


Figure 20. Ideation session 20.12.2023

6.2 Quick voting

Due to tight schedule of the session, a voting of the best idea was done after the session but within same day with Microsoft Forms. The participants received a link to voting via email. All seven participants gave their responses. All generated ideas, fifty-one pieces of post-it notes, were written as voting options to Forms. Everyone had chance to vote three options at most. There were one idea that got three votes and two ideas that got two votes. Here below, in the table 1, is the listing of the voted ideas and how the votes were distributed.

Table 1. Distribution of votes

Voted ideas	Votes
Easy automated registering, in ordering process select if you want devices to be registered under account	**3**
Automatic firmware/software update notifications	**2**
Tangible benefits of portal; calibration certificates, calibration intervals are adjustable with reminders	**2**
Access to continuously updated documentation library	1
Automated notifications on maintenance and calibration ease the work of customer and ensure reliable measurements	1
Calibration/ service reminders and updates	1
Customer creates once account where all devices are collected	1
List of serials under each serial : certificates/configuration code / warranty status/ recall info / life cycle status (EndOfLife. In prod. Discount)	1
Marketing (purposes)	1
Receiving targeted content & information	1
Status via installed base for serials. Service offering per model and/or serial from online store	1
The portal would be connected to the same hub as other customer systems (online store, e-learning, documentation)	1
The portal would store digital calibration certificates per products (automatically visible after calibration)	1
With application and product -specific notifications, customers hit the “sweet spot” in maintenance, as they do not want to calibrate for “nothing” either	1
All relevant content would be available for customer in one place – access with SSO	1
“Take some minutes now to register, save hours and money later in automated processes & reliable measurement”	1
Customer could see reports on their device maintenance history in the portal	1

The idea *“Easy automated registering, in ordering process select if you want devices to be registered under account”* was the most preferable idea among the participants. This idea would provide more value to a customer because the device registering would be handled on behalf of the customer already in the ordering process. The participants also liked the ideas that a customer would get *“automatic firmware / software update notifications”* after registering device and would get *“tangible benefits of a portal; calibration certificates, and calibration intervals are adjustable with reminders.”*

7 Deliver stage

This is the stage where the best ideas turns into a prototype. According to Tuulaniemi (2016,196.) the prototype means the original first version and in practice it is testing the service. This is essential part of the service design process, where the designed concept is tested with customers in fast iterative way.

7.1 Prototyping

Following the brainstorming or ideation logic, the prototyping is also providing visualized method for evaluating the selected solutions and their functionality. The prototyping options should be based on the ideas that have been generated from defined customer insights. The prototyping shows how the customers are experiencing the goods or the service, and what solutions should be focused on. The method is iterative process, where created proposed solution, the initial concept, is assessed on its capabilities and possible challenges. The method also helps to reduce misunderstandings and it can work as great tool for engaging internal stakeholders and presenting the concept. (Prorok & Kosicka 2021, 47-48.)

With service design, it is essential to practice experimental designing, where prototyping and visualizations are the key tools. With these tools created ideas and developed concepts of them can be concretized by using pictures, maps, sketches, and animation for instance. The prototyping methods illustrate abstract service situations for the test audience and the methods help to do fast iteration (Ojasalo et al. 2021, 72.)

The best three voted ideas were about saving customers' time and helping them to operate with minimum effort. According to the benchmarked registration options and voted ideas, the prototyped registration should at least include elements, such as

- ✓ Automated account creation at ordering stage
- ✓ Optional and easy checkbox for device(s) registration just before "order" button
- ✓ Highlighted benefits for the customer's organization (a product-specific information, documentation, certificates, manuals, optional selection of automatic notifications and reminders)

A customer might buy one or dozens of devices, therefore the registration process should serve various users, and provide automated registration process that bypasses the manual typing by the customer. Most of the companies require adding serial number information when registering a device, but this created prototype would be an advanced version because users would not need to search that device information and make an effort typing it manually. All necessary information of the device(s) would be added automatically when user selects the option.

Three new designed features with functions were presented. First there was option to register device(s) automatically in purchasing stage. This would make it easy for customers to link their purchased devices into a portal, where they could manage them and find product-specific information. Secondly, after logging in to the portal, there is an option to navigate the device settings through “My Device” and see all the devices with serial numbers, each categorized under device model. Every device has its own view with functions such as “add picture” and “edit the title,” see the related “notifications and reminders,” and see serial number linked information such as calibration certificate, configuration code, maintenance history, user manuals, documentation and many more.

Thirdly, “Notifications & Reminders” settings were presented. All notifications and reminders for all devices are automatically selected by default. A user has the option to easily remove the default selection of all notifications. The users can select specific notifications and reminders to specific devices. The users has option to customize the notifications and reminders according to their preferences, for example if they are interested to have an email and a portal reminders only from one HMP7 probe and its calibration intervals.

The undersigned prototyped for the first time and designed independently with the Miro Board. A UX designer, a colleague, helped to convert the Miro Board design to Figma tool for the testing part. The prototype was created using Miro board and its Website Wireframing components. Vaisala’s own website theme was copied to background. The used components and layout were imitated to some extent from benchmarked practices.

When prototyping, it was difficult not to fix all the emerged problems at once. There needed to be a focus on the new designed features but also functionality and seamlessness of the user interface of the portal. With this first prototype, as in the figure 21, it was most important to present the new designed features to the audience, rather than going too deep into designing the user interface. It was expected that the prototype would raise more questions, but that was essential to iterate the prototype further to correct direction.

Figure 21. Prototyping with Miro board, the first version

When the first prototype version was completed, the website wireframe from Miro was shifted to Figma design tool to modify it into a more presentable form behind the link, that could be then sent to interviewed end-users via email for testing and feedback. The first of the prototype is shown in attachment 5.

7.2 Testing

An email was sent to the interviewed end-users. Also, the participants of the ideation session received the link to the Figma prototype to give feedback. The new design features created from the ideas were described in the email. The following questions were presented to support feedback.

- Is it functional and intuitive?
- Is it appealing to use?
- Would this portal help you and your colleagues to manage the Vaisala devices better?
- Would you use it and do you think your colleague would use it (mostly the ones dealing with the devices)?
- Is it lacking something?
- What would you change in this portal, if anything?

The participants of the ideation session gave constructive feedback and comments according to those to the questions to the above. and very good points of the functionality. What if customer has already logged in with SSO into Vaisala online store? Would there be a text “Want to register these units under your account?” or ”Add these devices under your company account.” The existing customers have already user name of some sort for Vaisala channels. Previously, when the customers were asked to register again, it followed by a lot of negative feedback. Vaisala does not have access to information which probes are linked to which Indigo devices. Only the customer or user can have option to link those together according to their needs and preferences. In addition, it was pointed out that it might be useful for both the customer and the technical support, that customer could create “Factory1” and “Factory2” and then mark which devices are located in which factory. With the same function the customers could then link the probes and the transmitters as they are in their factories or plants. This would give a visual view of the location of the device. At the moment, the place where the device is delivered, is being marked into the system as a “place of installation.” For example, a buying customer can be German, but the device is located in the U.S. So, in case of repair process, the device is being first sent to Germany and then they would sent it to the Vantaa factory for repair. If the installation location would be accurate, the device should be sent to Boston directly, into the Vaisala service laboratory. This would save everyone’s time, shipping costs and customs fees. In Salesforce system there is an “asset” function that has been used. Every device sent from the Vaisala factory has a record of what has been done to it and what technical incidents it has had. This function is limited in the current MyVaisala portal, so only specific customers can see device history.

One feedback was that the first slide of the prototype could be simplified more as following.

REGISTER YOUR DEVICE(S) AUTOMATICALLY TO VAISALA DEVICE MANAGEMENT PORTAL

- **Product specific information, documentation and manuals**
- **Calibration certificates**
- **Calibration reminders (optional)**
- **Update & maintenance notifications (optional)**

Read more about the portal here.

Grant also your colleagues access to the portal! They will receive a verification and sign-in information via e-mail. You can add more e-mails in the portal later.

Positive feedback was given about the options to “add layout of the device location” and “add picture of the device or mounting location.” From the Vaisala point of view it would be interesting if those device locations could be analyzed or categorized someway. This feature could be added to the portal by attaching open-text field, where the user can write about the location if not willing to attach picture of the location. Good feedback was given on the device-specific view with different functionalities.

The prototype got feedback that it looked good generally and the positive thing was that the marketing material and webinar emails were an option for the user on the notification slide. Also, it was great that a user can manage own notifications.

One suggestion was that instead of adding emails to registration part, there would be an option to allow customer company emails to request access to the account. For example, everyone with “@novotechs.com” email addresses have access to the account after verification process. In registration part, there could be a mention about an option to make additional product-specific purchases such as agreements, maintenance, calibrations, accessories, refurbishments, etc. Also, from the “probe” page there could be a shortcut button to additional sales, at least for calibration and maintenance. There could be a shortcut button to product-specific additional sales same as “Support Request” and “Warranty Claim.” The option to add a layout in the “probe” page got good feedback. There could be an open-text field for customer to add own comments, such as “Process A” or “Drying plant measuring points X, Y, Z.” This function was possible for a single probe, but not available at system level. The prototype seemed very good for presenting the ideas and for further development. The additional sales feature on the portal could be promoted even more. It could potentially bring more revenue and decrease the admin resources in Vaisala’s order processing.

One of the interviewed end-users gave feedback to the prototyped product registration. It was unclear that if there was the information about the purchase, why user would need to log in to set up the device information. So why this information is not auto populated to the account? The prototype received good feedback of the feature having all the information in one place (e.g. certificates). The end-user thinks that if they are not ordering from Vaisala too often, they would likely forget their login credentials to the system. They would not want to spend time with each order to set something else up unless it can already be there. Since they order from different companies, it would not be easy for them to maintain accounts. The end-user feel that if all those companies have their own website with different login to an account, it is quite difficult to track. The account should be more user friendly so that it is already available for the customer once they order. The end-user would prefer to have certificates and other information sent via email, so they would not need to go into a system to retrieve it. Their company has own internal system to track any maintenance and

calibration check, and manage documentation and projects, etc. The end-user thinks that it might be useful to work with vendors, when they have shared accounts as already in some cases. The login process with password should be made very easy without different requirements compared to other accounts that becomes hard to track. The end-user emphasizes that they will continue to use Vaisala sensors because of the technical capabilities and they appreciate the good technical support and webinars, etc. This portal is nice-to-have and it is helpful to have easier access to documentation, but it is not critical.

7.3 Prototype 2.0

After receiving feedback of the prototype, it is reasonable to develop it even further according to the feedback. The second iteration round was much faster when only few features needed a little improvement, and there was no need to change the base of the prototype. The second prototype was modified to be simpler to use. The login part should not be too complex, so customer would only need their own email address. Single Sign-On (SSO) authentication should be handy for those customers that would not use the portal so often and could perhaps forget the credentials. For some, SSO is not a preferred option, therefore in the future there could be another option for customers, such as username and password.

In this prototype version it was made visual how existing customers could add their previously purchased devices into the account. When an existing customer is already logged in to Vaisala online store, the registration option could be promoted with pop-ups. The pop-ups could be used when the customer is doing the purchase in online store. Even for an existing e-commerce account customer with previously purchased devices, the device registration can be automated with just a few clicks. In practice this requires seamless transition between channels, from online store to portal.

In this version, the notification settings page was made simpler. The checkbox indicates which devices are selected and the category view can be expanded. This could be more useful in a case of dozens of devices. The marketing email is separated from other categories and needs to be selected separately because of consent to privacy policy.

The option to edit device settings was enhanced a little bit. The layout of the page was changed to more viewer friendly. The clickable buttons were adjusted according to categories such as *guidance*, *maintenance* and *product-specific accessories*. There is a button to navigate directly to Vaisala online store. There is more space to see notifications and own written notes, and view changes in the change log.

The transmitters and probes cannot be linked from Vaisala side, only customers can do this by themselves. This function was modified from the first prototype version and developed further with

“create a layout” feature. The customers can create their own layouts of their factory or plant, or preferred location, and link their devices with probes, and name the layouts. This function got gamifying elements. All customer’s Vaisala devices are automatically shown in their own categories. The customer can drag specific probe onto a specific transmitter in order to link them into a transmitter combination. This combination can be named and dragged into a layout such as company’s floor plan, e.g. This completed layout can be previewed on the "My Devices" page by hovering the mouse over the layout header. The final prototype is shown here below, in the figure 22 and also in attachment 6.

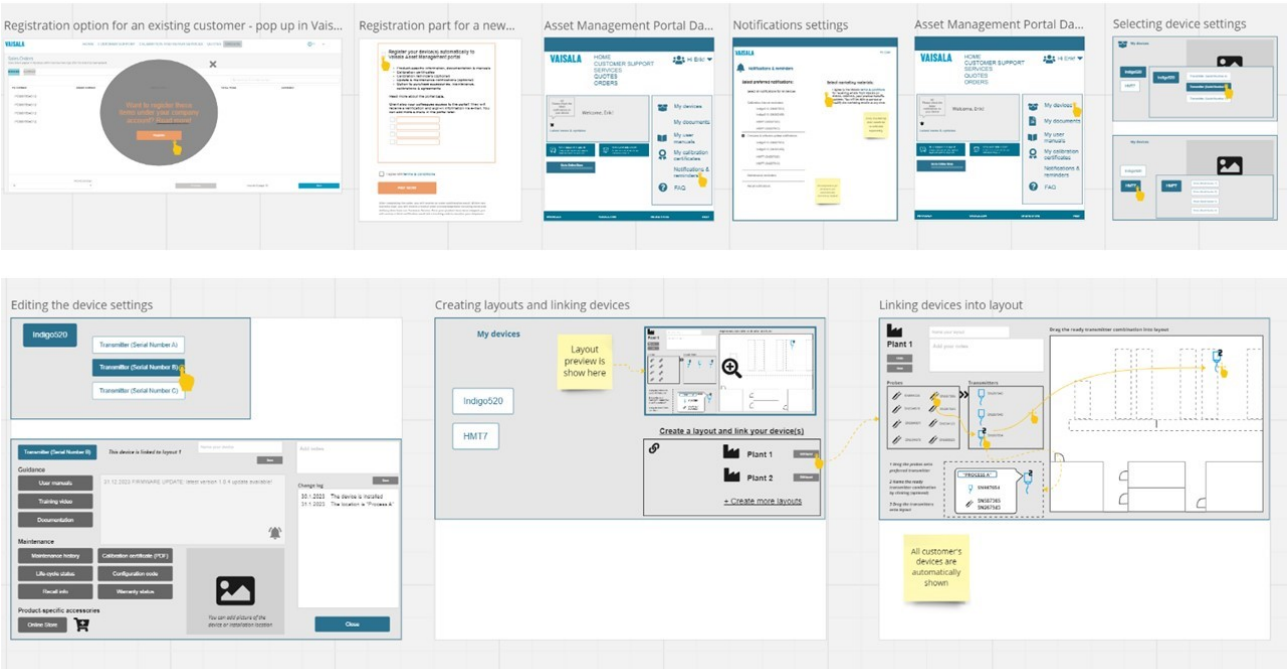


Figure 22. The final prototype created with Miro board

8 Results

The case organization Vaisala was interested in finding out whether there was a need for a product registration that would attract customers. More specifically, what would be the elements of added value in the process and in the customer portal, was under the scope of this development work. The development work followed the principles of service design and one of the process model called “Double Diamond” which gave structure to the work. Various service design methods and tools were used along the project. As is typical of service design results were generated along the process. The results enabled to proceed to the next stages in the design process. The most relevant results along the service design process are summarized in this chapter. The following research questions were asked in the beginning of this development work. In order to provide accurate results based on the end-users insights, only the data of the end-users interviews have been included in the first question.

How do the end-users experience the service and their interaction with Vaisala throughout their customer journey at the moment?

The end-users appreciate the quality of the devices and they are satisfied for the performance and accuracy of the devices. The service has been good and there has not been issues in communication. Vaisala representatives have replied quickly to emails and tracking of shipments have been fast and smooth. It seems that Vaisala has good reputation at least in those customer companies, because they have not heard any negative feedback from their colleagues. They feel more encouraged to use Vaisala devices over competitors. They mainly interact through vendor or Vaisala sales representative. The communication happens mainly through emails. In minor cases they might do things by themselves, such as checking manuals from Vaisala website or buying spare parts from Vaisala online store. It depends on the person, if he or she would use online store or contact Vaisala sales directly. They would like to do things like calibration in-house to save time and have better control, but calibration options and processes differ according to their applications. There has not been enough clear information what are their options to proceed with calibration. All the end-users feel that it would be useful for them to have a portal for device management, where they could see manuals and other device related information.

Which factors and elements would create added value to the end-users that could attract to product registration and to the use of a customer portal? What type of product registration process and portal would create added value to the end-user?

The objective of this development work was to find out if there would be a need for product registration and also which features would provide added value to customers. It was clear from the beginning that product registration would mean a customer logging into a portal to register a product. Therefore, the development work resulted in prototype of a portal that includes value-added elements. It should be stressed that product registration itself does not add value to the customer, on the contrary, the registration process itself is often perceived negatively. Therefore it is important to make the process itself as smooth and clear as possible. Value-added elements should be clearly and attractively marketed so that a customer does not abandon before and during registration and sign-in because of poorly executed process. The chance to register an existing devices should be offered in multiple places for an existing customer. For a new customer, the chance to register should be implemented in the purchasing stage, with just one click. The designed registration process had to be as smooth as possible, without requiring manual work from a customer. Therefore, the registration process was automated. This means that a customer does not have to find out serial numbers or search receipts, and do not have to waste valuable working time on the process. Especially when many customers could be dealing with dozens of devices.

Often when thinking about registering a product, the question is whether the product is valuable or expensive enough to be worth registering. As a result of this development work, these questions can be avoided as the portal itself is providing the added value with an important tool for managing their devices. The portal works as a tool for a customer company to improve time management and their internal communication and knowledge sharing. From the end-user interviews, it appeared that there were several persons involved with the Vaisala devices at some point and in some way along the product journey. In many cases, one person in the companies were in charge of these devices, but at the same time they were responsible for sharing the necessary information about the devices within the company. In the case of staff changes, this would mean an information gap. The result of the development work was a customer portal as a tool for a customer company that helps them to manage their devices better and improve their internal processes. The value-added elements are therefore elements that improve their internal communication and knowledge sharing, and reduce manual work.

The use of the portal can be scaled to meet the needs of all stages of the customer journey, but it will certainly be useful from the use stage onwards. Without dismissing the clarity of product manuals at the moment, however, it is worth noting that we people are different and learn in different ways. Therefore, it is good to provide a user of the product with all the help they need and when they need it, mostly in the use stage. Especially when products are used in various environments and applications. In the use stage, the portal can provide traditional user manuals, documentation, tutorial videos and contacts to technical support according to customer’s devices.

At the moment, customers contact the sales managers in case of problems, who forwards the case to technical support. This process is manual and slow. From the customers' point of view, it is easier to deal with a familiar person when they do not have to explain their application to a stranger. In addition, customers lack an opportunity to investigate a problem themselves according to instructions or to check frequently asked question in a FAQ section. When there is not clearly support available via self-service, it is easier to send an email to sales contact. This is not sustainable as it consumes resources from sales department and from technical support, and the process is not very scalable.

To summarize the results of customer insights, it is fair to say that the need for targeted information is unifying factor. The created customer persona, Erik the Engineer and the created customer journey of the persona highlights the importance of improving communication and information sharing for the customer interaction, value co-creation and customer engagement. From the end-user interviews, CSAT verbal feedback and even benchmarked portal emphasis the need for better information from the company to the customers. The internal discussions and the notes from ideation session confirms these result.

9 Conclusion

As mentioned in the theory, the value experienced by a customer can be created through the interaction in digital platforms. The added value is created with increased benefit or through product experience (Tuulaniemi 2016, 33-38.) Value co-creation can be achieved through engagement, interaction, experience and self-service (Ranjan & Read 2016, 291.) The end-users are managing multiple different devices, systems and programs in their daily work, therefore a portal to manage their devices could save their time and improve their internal processes when it comes to operating with Vaisala devices. The objective is not to add one more portal or digital tool to customers' lives, but to make things easier for them by providing all-in-one solution with the portal. The benefit comes from not having to figure out how to manage and share the device information within the company. The portal would be easy and user-friendly omnichannel platform that helps customers, but also supports Vaisala technical support and customer support to communicate with customers. This could improve the overall experience of using the device, customers could value the device more and engage more with it and more with Vaisala.

Companies in the industrial sector of industry 4.0 can add value by integrating their knowledge into customers' production processes (Bonamigo & Frech 2020, 412-413.) All three interviewed end-users felt that it would be useful to have an easy access to information such as manuals, certificates and device detail, e.g. The end-users appreciate measuring data, and it is important for them to see data of the device itself and to be able to analyze it. End-users could share Vaisala device information with their colleagues through a shared portal that provides access to the same information at all times. This would enable more efficiency to their internal processes and communication, and create added value for them. Also more information about the device itself and how it is functioning would provide added value for maintaining their assets. As Bonamigo & Frech (2020, 416) stated, these factors can lead to long-term relationships with customers.

The value creation opportunities are nowadays focusing on digital elements such as cloud-based platforms, data analysis of customer behaviors and remote monitoring. Companies can offer service packages to predict maintenance needs and detect possible failures, because they have access to real-time information on device status. (Bonamigo & Frech 2020, 416.) As in the theory and in the benchmarked examples, company like Vaisala can help customers to predict maintenance issues and provide more information on their assets. When the information is already there in the portal, it reduces the chances of unexpected surprises. The technical support department is able to provide faster and smoother service for customer without exchanging numerous emails about the case. The technical support could see most of the data in advance and solve the issue more efficiently. Still, there is always a need for personalized support, especially for more technical issues.

The interviewed end-users preferred to receive personalized service since they contacted Vaisala sales or vendor directly in the case of an issue. As Peacock (2022) has expressed that creating distinctive customer experience should be contextual, personalized and engaging across the customer journey and in addition, the communication should be tailored. The designed portal provides the product-specific information about the customer's owned devices. With these features the portal is aiming to reduce the need for technical support by providing more self-service functions. One very important feature was mentioned in the theory as well, but it was not included in the prototype, and it was the direct channel to technical support. This was omitted because the intention was to focus more on preventing technical support contacts by providing technical information. The technical support is highly valuable function to provide distinctive customer experience. It would be vital to provide customers a direct channel for support, regardless of time and place. For further development of the portal, a full product support and quick access to support hotline in all channels are recommended. The first point of contact could be handled with chatbot alone or with a mixture of chatbot and human support depending on the customer's questions in chat. This feature could be developed even further with generative AI.

In the beginning, there was the question that "would product registration create value for the end-users and provide solution for the objectives?" In the end of this development work this can be answered, yes it would! For a customer company it would work as the tool for managing assets and sharing information within a company. For Vaisala, the portal would be a solution to the objectives to increase customer engagement and improving customer experience. The portal would provide data of the end-users to the company and therefore the company could understand the end-users better.

9.1 Future development

The outcome and the development work as a whole provide great insights for the organization for further developments. In addition to the outcome, the reader will gain good theoretical knowledge for understanding customer experience elements. There is an increasing emphasis that responsibility of customer experience development should take place at every level of the organization, be it on a R&D department or a sales department. It was inspiring to get employees from different departments to participate to this thesis, especially in the ideation session. At the same time it revealed that some of the stakeholders were not aware of everything that had been done in the customer frontline or what other departments had done. There is definitely a need for more communication between siloes, so internal stakeholders could meet more and share their thoughts and experiences. For example, representatives of different functions such as customer service, technical

support, marketing and product management could meet on a monthly basis to share insights, which could lead to tacit knowledge sharing and improvement actions.

As it has been shown throughout the development work, the customer data is the most vital ingredient for improving customer experience. The customer data should be collected systematically by using different metrics. This function could be harnessed through the portal. The portal could show the basic customer information, the related products and how the portal has been used. The portal could provide customer data in even more detail. This data could be strategically collected, analyzed and shared in company-level with all departments and functions. Nowadays the customer data could be collected by using AI. With the help of AI, the data could be analyzed and utilized much faster to strategic actions. The next best thing could be utilizing Salesforce's customer service analytics to improve the customer experience, for instance.

In the future, it would be nice to see that all customer service channels could be found in same platform. This could reduce confusion of the services and device options, and make everything simpler for the customer. However, this should not mean that customer should register in order to get access to Vaisala's offering. Especially, forcing a customer to register before purchasing is not recommended, because customers want the purchasing to be as quick and smooth as possible, without any obligations.

To make the digital interaction more appealing for customers, the digital services could include more gamifying elements to attract usage and inspire younger generations. The younger generation refers to millennials, which have grown with the digital development and are including already those elements in their lives. Even enhancing the customer portal with installation instructions and training videos via Youtube brings more interesting content to customers.

9.2 Analyzing the development process

During this development work there were periods when the process did not progressed as it was initially planned. Despite the scheduling of the project in the beginning, few phases lasted longer than expected. In the discovery stage many things needed more time in investigation that it was initially planned, the interviews of the end-users for instance. It turned out to be complicated to reach end-users that would had purchased products via middlemen, such as partners and distributors. The situation was sensitive, because the partners had their own interest of keeping the customer information to themselves. The partners and distributors are essential stakeholders for the company, so therefore their customers were not contacted for this development work.

On many occasions during the process, the existing Vaisala's customer portal MyVaisala was causing confusion. From the start, in the development stage it made it difficult to frame the work

and to keep the scope without taking that fact into account. This request came from commissioning party already in the beginning. MyVaisala has some similar functions as in this development work and it has been developed simultaneously. The situation has been complicated by the question of whether the existence of MyVaisala could have affected the results during the process. It was good to note that apparently the end-users did not have the information about MyVaisala. Also, many internal stakeholders were not sure how MyVaisala works or how it has been deployed. In the beginning of ideation session it was highlighted to the participants that MyVaisala has been excluded from this development work and therefore should not be considered.

According to Ojasalo et al. (2021, 105) it is important in the qualitative research that the process is depicted precisely and the justifications of the interpretations are essential in order to show the reliability of the research. Throughout the process, the purpose has been to keep the process transparent, so that the reader can follow the progress and see the cause-and-effect relationships. Therefore, the internal discussion and end-user interviews were written as they were spoken. In addition, the persons participating to the internal discussions had the chance to inspect the writings before publishing. The end-user interviews were recorded via Teams and transcribed with Microsoft Word and those were stored only in company computer and titled with color coding. The files are destroyed after the thesis is published. According to Ojasalo et al. (2021, 105) the reliability of the results can be increased by using triangulation, in which a lot of different research methods and sources are used to investigate the phenomenon from different perspectives. This is typical practice in service design to use a lot of different methods, as it was done in this development work. The used sources were mainly written after year 2016, and the purpose was to include as fresh sources as possible (less than 5 years) in the theory parts of customer experience, customer journey and customer engagement, since those themes have been business trends in recent years.

The project was ambitiously estimated to be approximately one year because of studying and working full-time job at the same time. Especially after the autumn, it felt like a heavy combination to manage. Perseverance and strength of character helped to see this project through. The service design course of Haaga-Helia helped me to understand the process and also to accept the “fuzzy-front-end” phenomenon when things felt complicated. There were pros and cons to working alone with this project. I had to carry all the responsibility of the progress but also I could decide all most all things, such as the methodological approach, the subject, the schedule, all methods and tools, the theoretical framework, where and from whom to collect information, ideation, prototyping and testing. The only things that were partially decided for me was the handpicked end-users for interviews and the scope of the study. I think they were well founded decisions.

I had done only one service design project before this and it was with another student. I had the basic steps of the service design process fresh in my mind. The Double Diamond process model made it relatively easy for the beginner to break the project down into smaller parts, which naturally drive the process forward. The project and its theory base increased my knowledge of developing customer experience from within the company. It's important for me to be able to use the gained knowledge in future projects.

The idea of the thesis for Vaisala took place in January 2023 and the commissioning contract was signed in the end of February 2023. By the end of April 2023 the scope of the thesis and the core theoretical framework was confirmed. During this time, the internal stakeholders had been clarified within case company. Between August and September 2023, the interview process progressed from presenting the agenda to the sales managers, who then handpicked the candidates for the interviews. After the interviews in October 2023, the project really took off. After the interviews, the discovery stage turned into definition stage, where all the gathered data was analyzed and the core problems were defined. The ideation session was held in December 2023 and the final prototype was completed in January 2024.

The whole process have been great learning experience for me. Not only have I increased my knowledge of the service design world, but also I have increased my knowledge of business operations. I have learned the importance of networking and co-operation within a company. I have seen how all business functions are linked to each other and how they are all needed to manage change. I have realized how much collaboration and strategic actions are needed to improve processes. Yet, I am even more motivated to continue with the development work.

Acknowledgements

I would like to express my gratitude to everyone involved with this thesis.

I want to thank all the people taking part of this project,

those who guided me along the way,

those who enabled me to do this alongside work and

those motivated employees who joined the ideation and

who helped me prototyping.

Especially, I am forever grateful to my family who supported me along the journey.

Resources

ABB 28.10.2016. myABB – a shared view of your facility. Video. URL: https://www.youtube.com/watch?v=lHe_vqt_XZg Accessed: 11.1.2024

ABB s.a. a. myABB Portal highlights. URL: https://new.abb.com/service/myabb-business-portal Accessed: 11.1.2024

ABB s.a. b. Welcome to myABB. URL: https://myportal.abb.com/welcome?_ga=2.175585061.607298016.1614866405-1757683831.1594820993 Accessed: 11.1.2024

ABB s.a. c. Sign up. URL: https://www.usermanagement.abb.com/account/Register?returnUrl=https://myportal.abb.com Accessed: 11.1.2024

Bonamigo, A. & Frech, C. G. 2020. Industry 4.0 in services: challenges and opportunities for value co-creation. The Journal of services marketing. 2021. Vol.35 (4), p. 412-427. Emerald Publishing Limited. DOI:10.1108/JSM-02-2020-0073 Accessed: 12.12.2023

Bowen, G. 2009. Document Analysis as a Qualitative Research Method. Qualitative Research Journal, vol. 9, no. 2, pp. 27-40. https://doi.org/10.3316/QRJ0902027 Accessed: 15.10.2023

Burns, M., Sankar-King, S., Dell'Orto, P. & Roma, E. 2023. Using AI to Build Stronger Connections with Customers. 1.8.2023. Harvard Business Review. URL: https://hbr.org/2023/08/using-ai-to-build-stronger-connections-with-customers Accessed: 13.1.2024

CRMJetty. s.a. a. All You Need to Know about a Customer Self-Service Portal. URL: https://www.crmjetty.com/blog/how-build-a-customer-portal/ Accessed: 18.12.2023

CRMJetty s.a. b. Customer Self Service Portals: Must-have Features and Best Practices. URL: https://www.crmjetty.com/blog/customer-self-service-portals-must-have-features-best-practices/ Accessed: 18.12.2023

Design Coucil s.a. Framework for Innovation. URL: https://www.designcouncil.org.uk/our-resources/framework-for-innovation/ Accessed: 15.10.2023

Gladly s.a. How to Build a Useful Customer Engagement Portal. URL: https://www.gladly.com/blog/how-to-build-a-useful-customer-engagement-portal/ Accessed: 18.12.2023

Haaga-Helia s.a. a. Affinity Mapping. URL: https://www.haaga-helia.fi/fi/affinity-mapping Accessed: 20.10.2023

Haaga-Helia s.a. b. How Might We…? URL: https://www.haaga-helia.fi/fi/how-might-we Accessed: 9.12.2023

Hinds, R. & Gupta, S. 6.4.2023. Customer Experience Is Everyone's Responsibility. Harvard Business Review. URL: https://hbr.org/2023/04/customer-experience-is-everyones-responsibility Accessed: 17.12.2023

HPE s.a. HPE Partner Ready Portal: HPE Partner Ready Portal refreshed to better serve partner and customer network. URL: https://www.hpe.com/us/en/newsroom/fact-sheet/hpe-partner-ready-portal.html Accessed: 26.1.2024

IBM 2019. Standing out in business-to-business customer engagement. URL: https://www.ibm.com/thought-leadership/institute-business-value/en-us/report/b2b-customer Accessed 18.12.2023

Ideo.org s.a. How Might We. URL: https://www.designkit.org/methods/how-might-we.html Accessed: 9.12.2023

Koivisto, M., Säynäjäkangas, J. & Forsberg, S. 2019. Palvelumuotoilun bisneskirja. 2. painos. Alma Talent. Helsinki.

Lellouche Tordjman, K. L. & Bertini, M. 2023. High-Tech Touchpoints Are Changing Customer Experience. Digital article. 20.3.2023. Harvard Business Review. URL: https://hbr.org/2023/03/high-tech-touchpoints-are-changing-customer-experience Accessed: 13.1.2024

Lemon, K. N. & Verhoef, P. C. 2016. Understanding Customer Experience Throughout the Customer Journey. Journal of Marketing. Vol. 80(6). November, 69–96. https://doi.org/10.1509/jm.15.0420 Accessed:2.9.2023

Liferay 2018. How Hewlett Packard Enterprise built a partner portal people actually wanted to use…and delivered genuine value realisation. URL: https://www.liferay.com/blog/customer-experience/how-hewlett-packard-enterprise-built-a-partner-portal-people-actually-wanted-to-use-and-delivered-genuine-value-realisation- Accessed 18.12.2023

Lu, M. 27.11.2023. Customer Experience Manager. Vaisala. Personal communication. Vantaa.

Manning, H. 23 November 2010. Customer Experience Defined. Forrester. URL: https://www.forrester.com/blogs/definition-of-customer-experience/ Accessed 17.12.2023

Maula, H, & Maula, J. 2019. Design ja johtaminen. Alma Talent. Helsinki.

Nirell, L. 7.4.2023. 3 Ways Companies Get Customer Experience Wrong. Harvard Business Review. URL: https://hbr.org/2023/04/3-ways-companies-get-customer-experience-wrong Accessed: 17.12.2023

Nummi, P. 2023. Ammattifasilitaattorin käsikirja. Kirjapaino Bookcover Oy. Seinäjoki. E-Book. Accessed: 19.12.2023

Ojasalo, K., Moilanen, T. & Ritalahti, J. 2021. Kehittämistyön menetelmät – Uudenlaista osaamista liiketoimintaan. 3.-7 painos. Sanoma Pro. Helsinki.

Peacock, K. 2022. Future Proofing Businesses with Modern Customer Engagement. Sponsored content, 25.7.2022. Harvard Business Review. URL: https://hbr.org/resources/pdfs/comm/Future-Proofing%20Businesses%20with%20Modern%20Customer%20Engagement.pdf Accessed: 13.1.2024

Philips s.a. a. Sign-up. URL: https://www.philips.fi/myphilips/login#tab=sign-up Accessed: 7.1.2024

Philips s.a. b. Register new product. URL: https://www.philips.fi/myphilips#/register-new-product/form/MG3720_13 Accessed: 7.1.2024

Philips s.a. c. Product registration details. URL: https://www.philips.fi/myphilips#/my-products/productRegistrationDetails/68dc8c61-bfa9-49a6-962e-510923af12a3 Accessed: 7.1.2024

Philips s.a. d. Store for Business. URL: https://www.b2bshop.philips.com/philipsb2bstore-front/en/login Accessed: 7.1.2024

Philips 18.11.2020. Philips Store for Business (English). Video. URL: https://www.youtube.com/watch?v=ceI4ejP6I1E Accessed: 7.1.2024

Prorok, M. & Kosicka, I. 2021. Application of the Design Thinking Method in Customer Experience Management. Marketing Instytucji Naukowych i Badawczych 2021, Vol.42 (4), p.35-60. URL: DOI: https://doi.org/10.2478/minib-2021-0020 Accessed 14.12.2023

Ranjan, K.R. & Read, S. 2016. Value co-creation: concept and measurement. Journal of the Academy of Marketing Science. Vol.44, 290–315. URL: https://doi.org/10.1007/s11747-014-0397-2

Rathinam, P. 2022. Rethinking Customer Engagement in the Era of Delight. 28.10.2022. Harvard Business Review. URL: https://hbr.org/resources/pdfs/comm/freshworks/CRE3161_HBR_WP_Freshworks_Oct2022.pdf Accessed: 13.1.2024

Rawson, A., Duncan, E. & Jones, C. September 2013. The Truth About Customer Experience. Harvard Business Review. URL: https://hbr.org/2013/09/the-truth-about-customer-experience Accessed: 17.12.2023

Suomidigi 2019. Affinity Diagram -Tiedon jäsentely. URL: https://www.suomidigi.fi/ohjeet-ja-tuki/menetelmat/affinity-diagram-tiedon-jasentely Accessed: 20.10.2023

Tuulaniemi, J. 2016. Palvelumuotoilu. 3. Painos. Talentum Pro. Helsinki.

Vaidya, S., Ambad, P. & Bhosle S. 2018. Industry 4.0 – A Glimpse. Procedia Manufacturing. Vol. 20. 233-238. Elsevier B.V. URL: https://doi.org/10.1509/jm.15.0420 Accessed: 13.12.2023

Vaisala, internal source 2023a. Vaisala intranet. The Success of Vaisala Depends on Customers. URL: https://vaisalaworks.sharepoint.com/sites/vintra-customersatisfaction Accessed. 27.11.2023

Vaisala, internal source 2023b. Vaisala intranet. Customer Personas and Customer Journey Map. https://vaisalaworks.sharepoint.com/sites/vintra/SitePages/Customer-Personas-and-Customer-Journey-Map.aspx Accessed: 14.10.2023

Vaisala 2023a. Vaisala in Brief. URL: https://www.vaisala.com/en/vaisala-company/vaisala-brief Accessed: 2.9.2023

Vaisala 2023b. Business areas and customers. URL: https://www.vaisala.com/en/vaisala-company/business/business-areas-and-customers Accessed: 15.10.2023

Vaisala 2023c. Our strategy. URL: https://www.vaisala.com/en/vaisala-company/business/our-strategy Accessed: 2.9.2023

Vaisala 2023d. Humidity and Temperature Meter Series HMT330. URL: https://www.vaisala.com/en/products/instruments-sensors-and-other-measurement-devices/instruments-industrial-measurements/hmt330 Accessed 18.11.2023

Vaisala 2023e. Discover the Modular Indigo. URL: https://www.vaisala.com/sites/default/files/documents/VIM-GLO-EN-IND-INDIGO-Family-Brochure-B211909EN.pdf Accessed 23.11.2023

Vaisala 2023. Indigo Platform. Probes Transmitters Software Applications. Brochure URL: https://www.vaisala.com/sites/default/files/documents/VIM-GLO-EN-IND-INDIGO-Family-Brochure-B211909EN.pdf Accessed 23.11.2023

Vargo, S. L. & Lusch, R. F. 2004. Evolving to a New Dominant Logic for Marketing. Journal of Marketing. Vol.68 (January 2004), 1-17. URL: https://doi.org/10.1509/jmkg.68.1.1.24036 Accessed: 14.12.2023

Attachments

Attachment 1. Interview questions

Interview questions

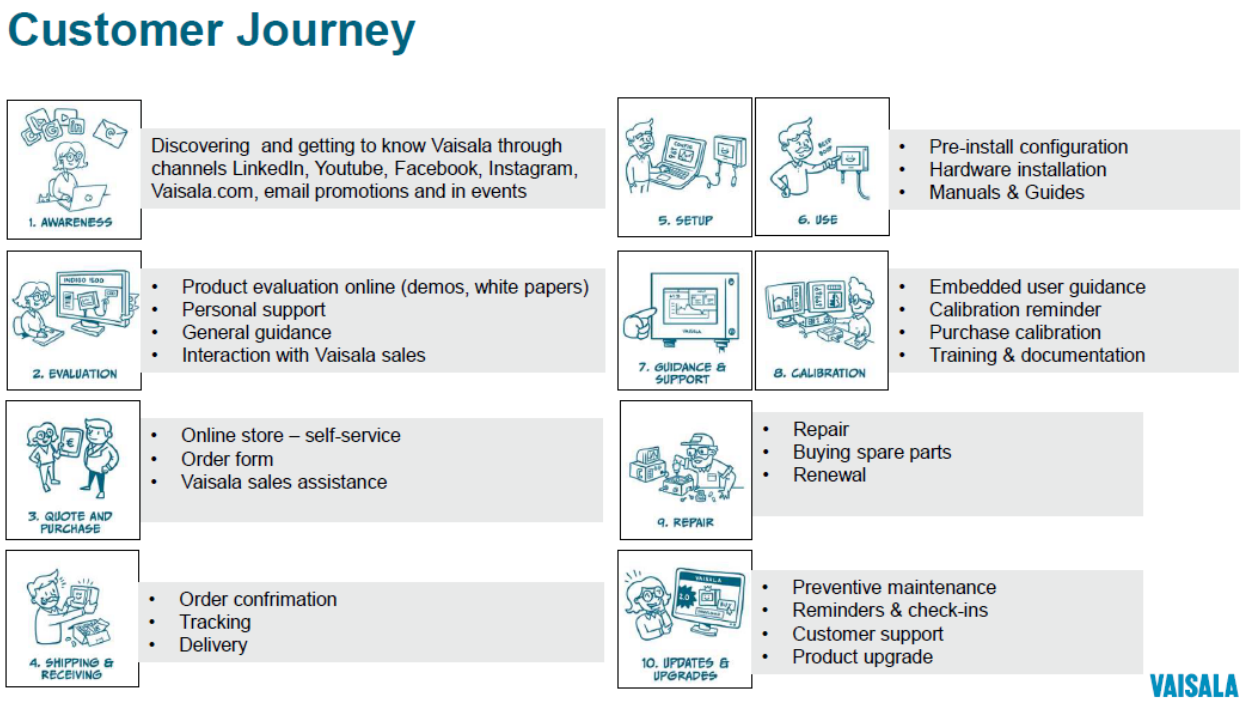
1. Would you introduce yourself; name, company, title/position
2. How long have you been working in the company and in that position?
3. Who have purchased the Indigo device and who are the ones that use the device?
4. What kind of knowledge and skills you need in your work (daily basis) ?

5. What is your normal day like, after you wake up to the time you end your workday *(note: remotely or on-site)*?
6. What are the things that annoys you or disturbs you during your day?
7. What are the biggest fears or risks in your work?
8. What are the things you want accomplis during your workday?

9. Please see the picture of the customer journey. *Next slide.*
   a) In which phases you have been part of during the customer journey?
   b) Would you decribe how you have felt during those phases?
10. Could you describe your latest experiences with every detail?

11. Would you rather do things by yourself (self-service) or have in-person assistance? What are the reasons for this preference?
12. When, where, and how do you use the Vaisala product?
13. What are the things that Vaisala product(s) solves in your work and company's processes?
14. What things/features would help you to use the device better?
15. What kind of feedback have you heard from colleagues about the device or Vaisala in general?
16. Bonus questions: Would some kind of digital tool assist you with device management?

Attachment 2. Modified Vaisala Customer Journey for interviews



Erik the Engineer

Process Engineering

Image by creativeart on Freepik

Quote

"I need technical support now, and your support number is not available at this time – also there is no troubleshooting guidance on Vaisala website"

Information

Age 48
Work NovoTechs
Location London, UK
Education Process Engineer

Experienced, Rational, Motivated, Techical, Detail-Oriented

Goals

- To be able to see the measurement history and in real-time
- To get a lot of parameters simultaneously without manual work
- Minimize the measuring gaps with fast calibration process, and to have continuous data
- Saving time with automation systems and fast maintenance work
- Digital tool or portal for device management

Responsibilities

- Smooth process control and supervision
- Train other employees to use and check the Vaisala devices
- Evaluating the need of calibration and maintenance regularly
- Interpreting the parameter measurements and make optimized decision
- Contacts tech support

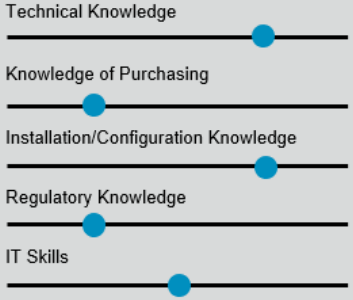
Pain points and Frustrations

- Hectic and varied workdays
- Lack of time
- Non-functioning devices or systems
- Tacit knowledge about Vaisala products that should be shared to others
- No 24/7 support available
- Risk of making wrong conclusions if measurements are wrong
- With issues, the first contact is Vaisala sales engineer, because does not rely on self-service options
- Device specs are not easy to find

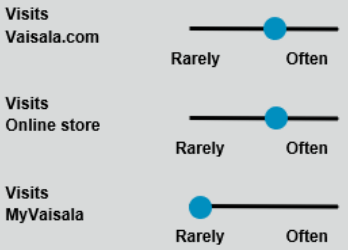
Design Considerations

- Easy access to information such as manuals, user guide, certificates
- Devices should be easy to maintain and operate
- Prefer to talk to person in support
- Devices purchased and installations done by local vendor as a package service - How to proceed with controlling the devices as self-service?
- There is bigger need of sensors than transmitter itself
- Prefers to find information, and do simple tasks by himself
- Special team is responsible for instruments and calibrations in company level
- Internal data collection system in use

Knowledge and skills

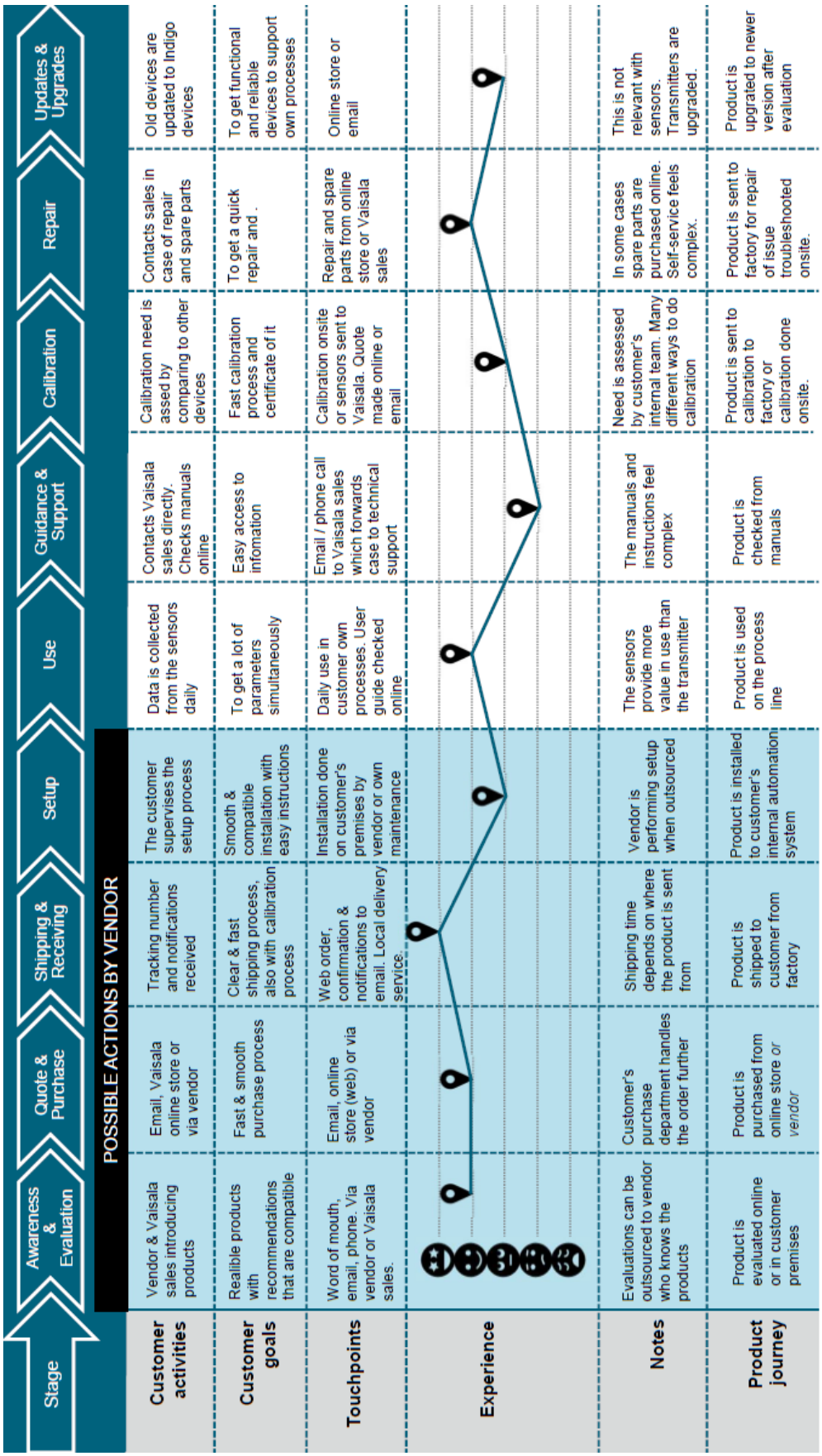


User Profile – Vaisala online systems

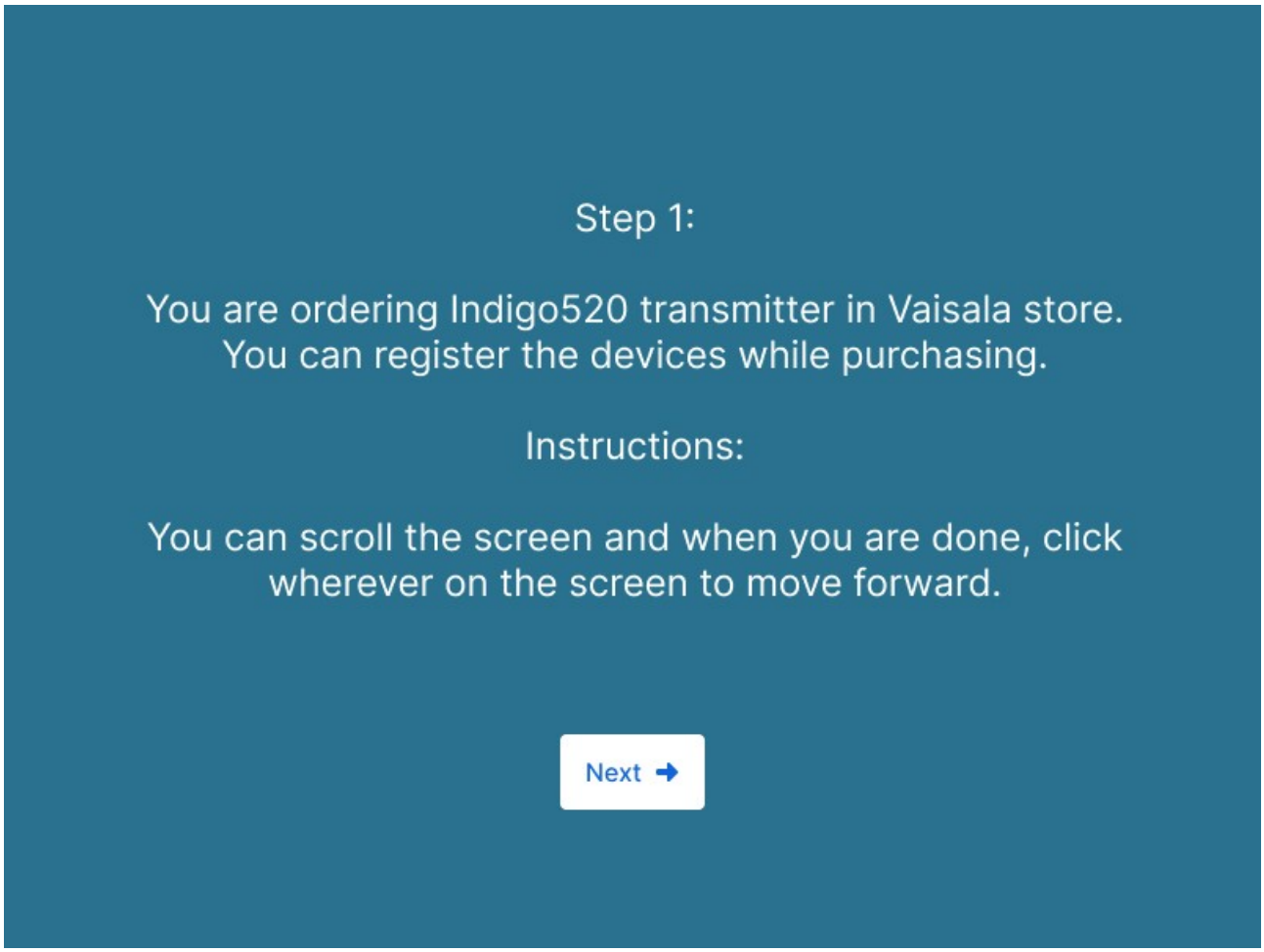


In which parts of our customer journey this persona is active the most? Evaluation, Set-up & Use, Guidance and Support, Calibration, Repair, Updates & Upgrades

Attachment 4. Created Customer Journey Map



Attachment 5. The first prototype “Product registration”



VAISALA
STORE

Verify/Edit

Your order

INDIGO520 Transmitter
Product Code: INDIGO520
Configuration Code: INDIGO520A2N9B2NAAN

Quantity: 1

Universal AC-Power (100...240 VAC), EUR Cord
Cable Glands for Two Probes
Probe Cable 3m
Standard mounting kit
Cable Gland Set, Plugged + All Lead-throughs
Standard
Multilingual Quick Guide
Display

Delivery 7 days

Subtotal	€1.339.00
Taxes	€321.36
Shipping	€0.00
Order Total	**€1,660.36**

Address Information

CUSTOMER INFORMATION **BILL TO** **SHIP TO**

NovoTechs
987654
Erik the Engineer
erik.engineer@novotechs.com
+35298765400
Londonstreet 432
56789
London, UK

ADDITIONAL NOTES

Payment Details

Credit / Debit Card Payment

Purchase order number

Please don't close/refresh this browser until you see that the order/quote is completed

☐ **Register your device(s) automatically and save time with free portal**

- **Product-specific information**
- **Product-specific documentation**
- **Product-specific manuals**
- **Your calibration certificates**
- **Optional reminders for calibration intervals**
- **Optional notifications for updates & maintenance**

After selecting this option, you can add more company users and welcome messages are sent to emails with verification & sign-in instructions! You can add emails in the portal later.

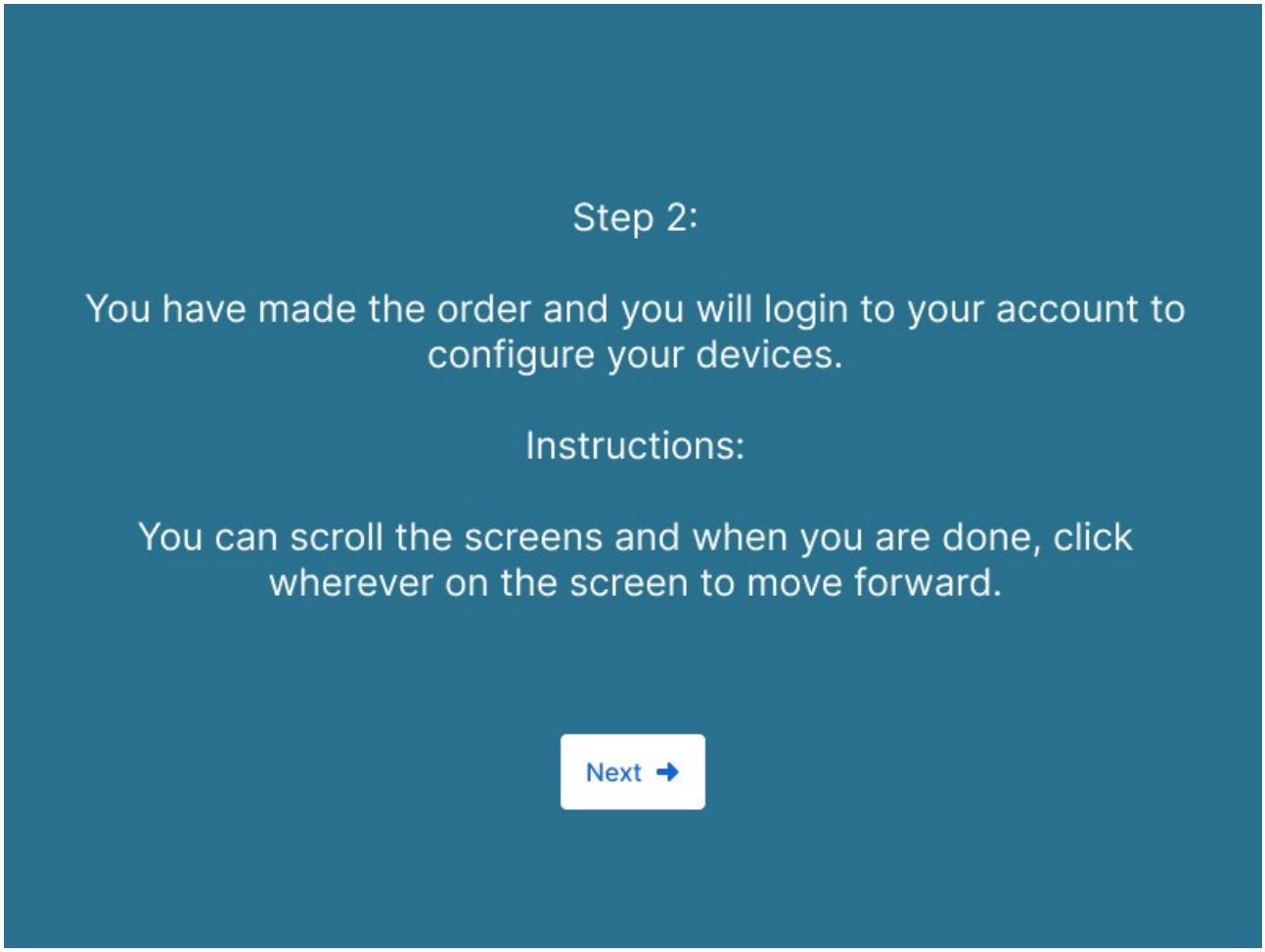
☐ @
☐ @
☐ @
☐ @

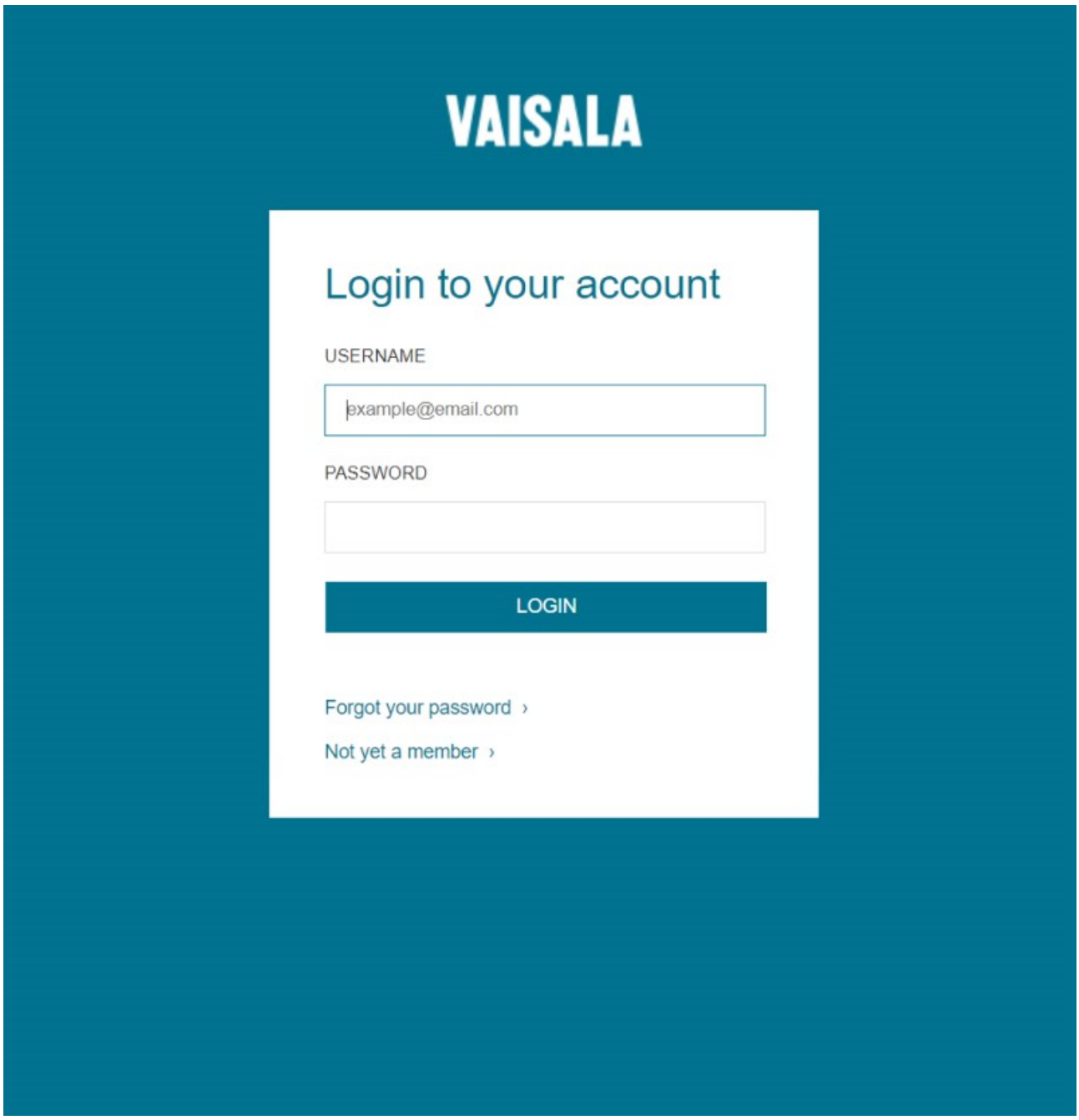
☐ I agree with **terms & conditions**

PAY NOW

After completing the order, you will receive an order confirmation email. Within two business days, you will receive a formal order acknowledgement including estimated delivery date from our Customer Service. Once your product have been shipped, you will receive a third notification email wit a tracking code to monitor your shipment.

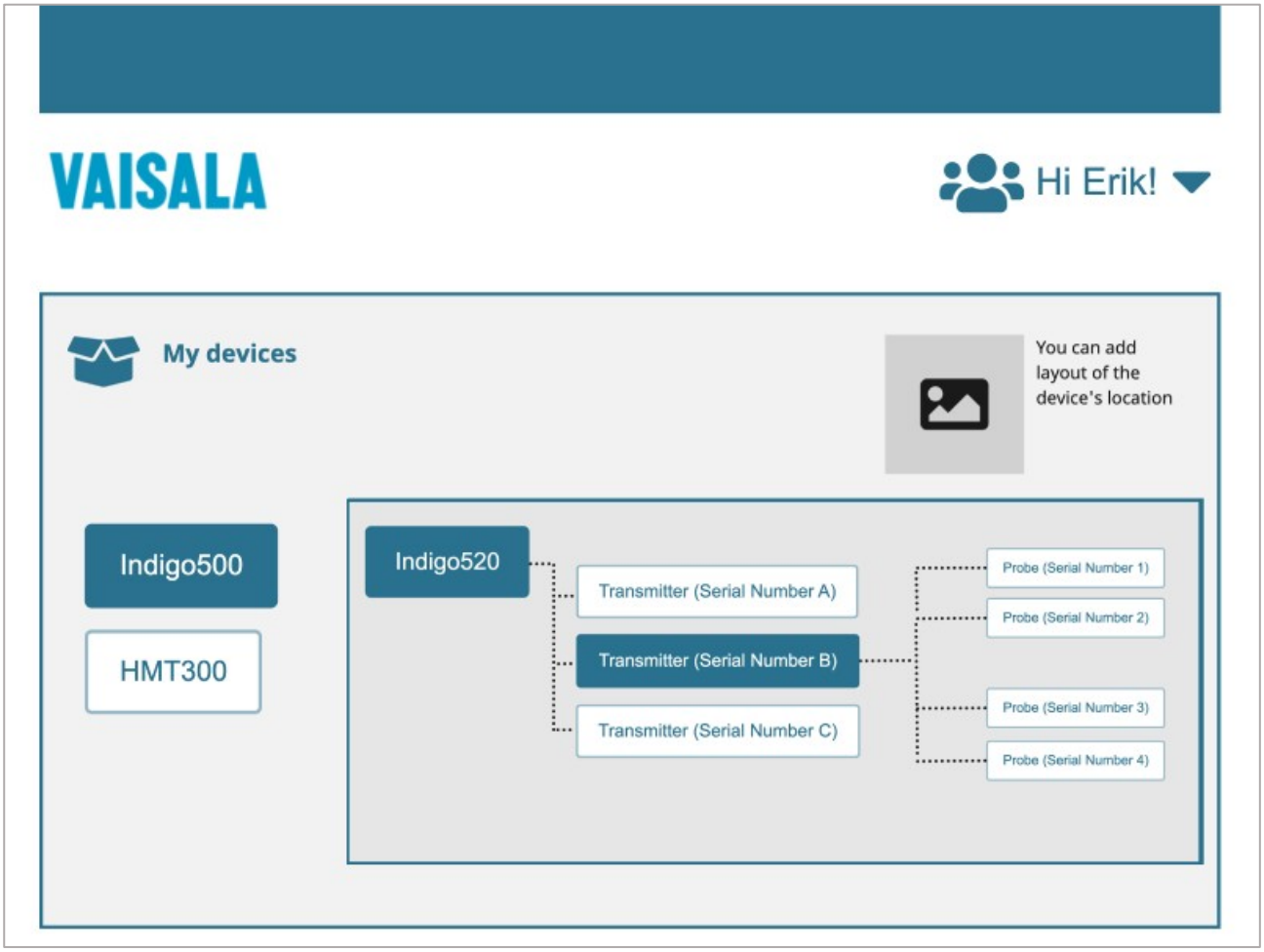
CONTACT GET SUPPORT MEET


Step 2:
You have made the order and you will login to your account to configure your devices.
Instructions:
You can scroll the screens and when you are done, click wherever on the screen to move forward.
Next

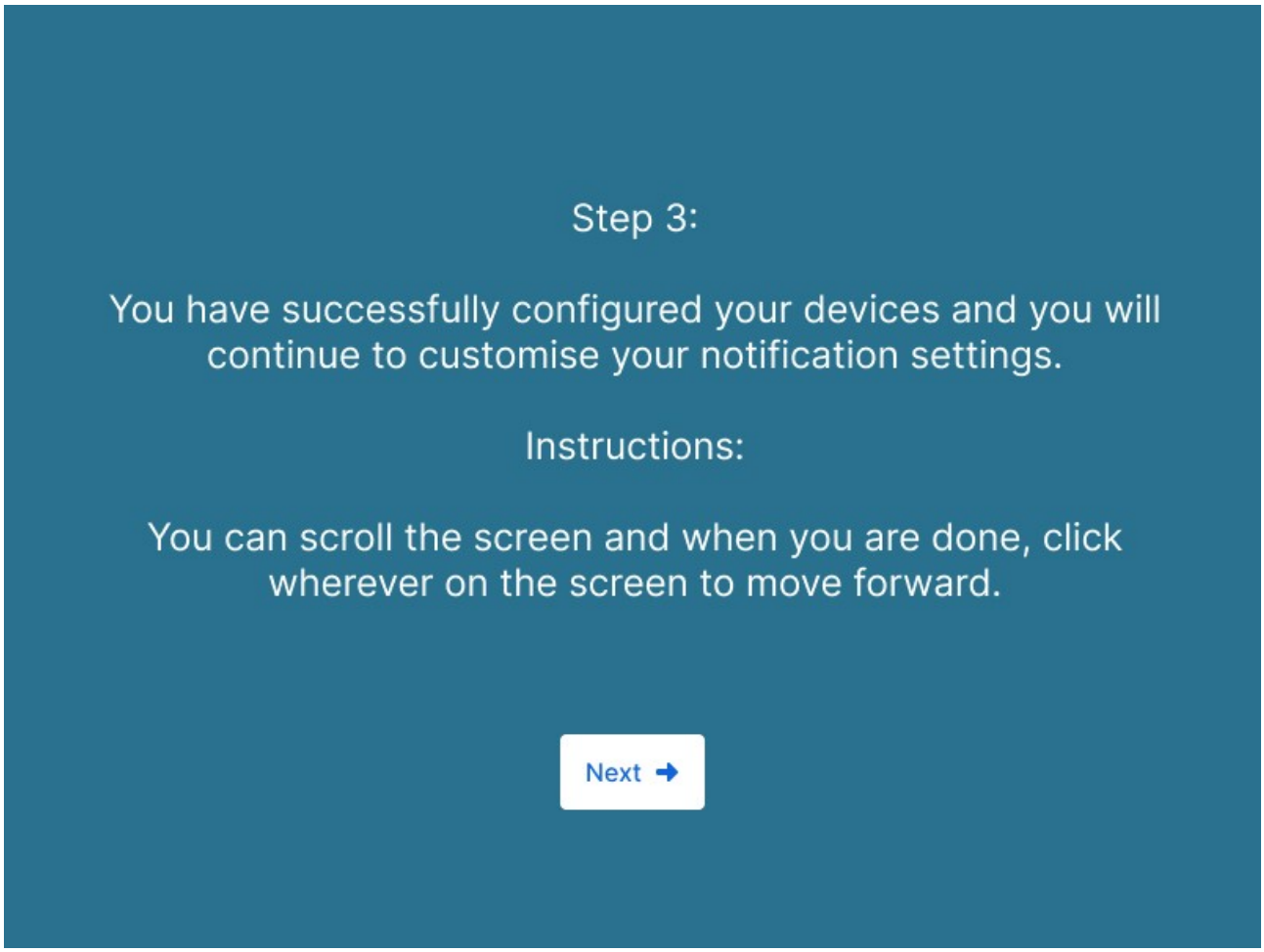

VAISALA
Login to your account
USERNAME
example@email.com
PASSWORD
LOGIN
Forgot your password ›
Not yet a member ›


VAISALA
HOME
CUSTOMER SUPPORT
SERVICES
QUOTES
ORDERS
Hi Erik!
Welcome, Erik!
What's up?
Latest news & updates
Read more
New support request
Create a new case for your support needs and technical questions
New warranty claim
Create a warranty claim and get instructions from us
My devices
My documents
My user manuals
My calibration certificates
Notifications & reminders
FAQ
MYVAISALA
VAISALA.COM
ONLINE STORE
MEET

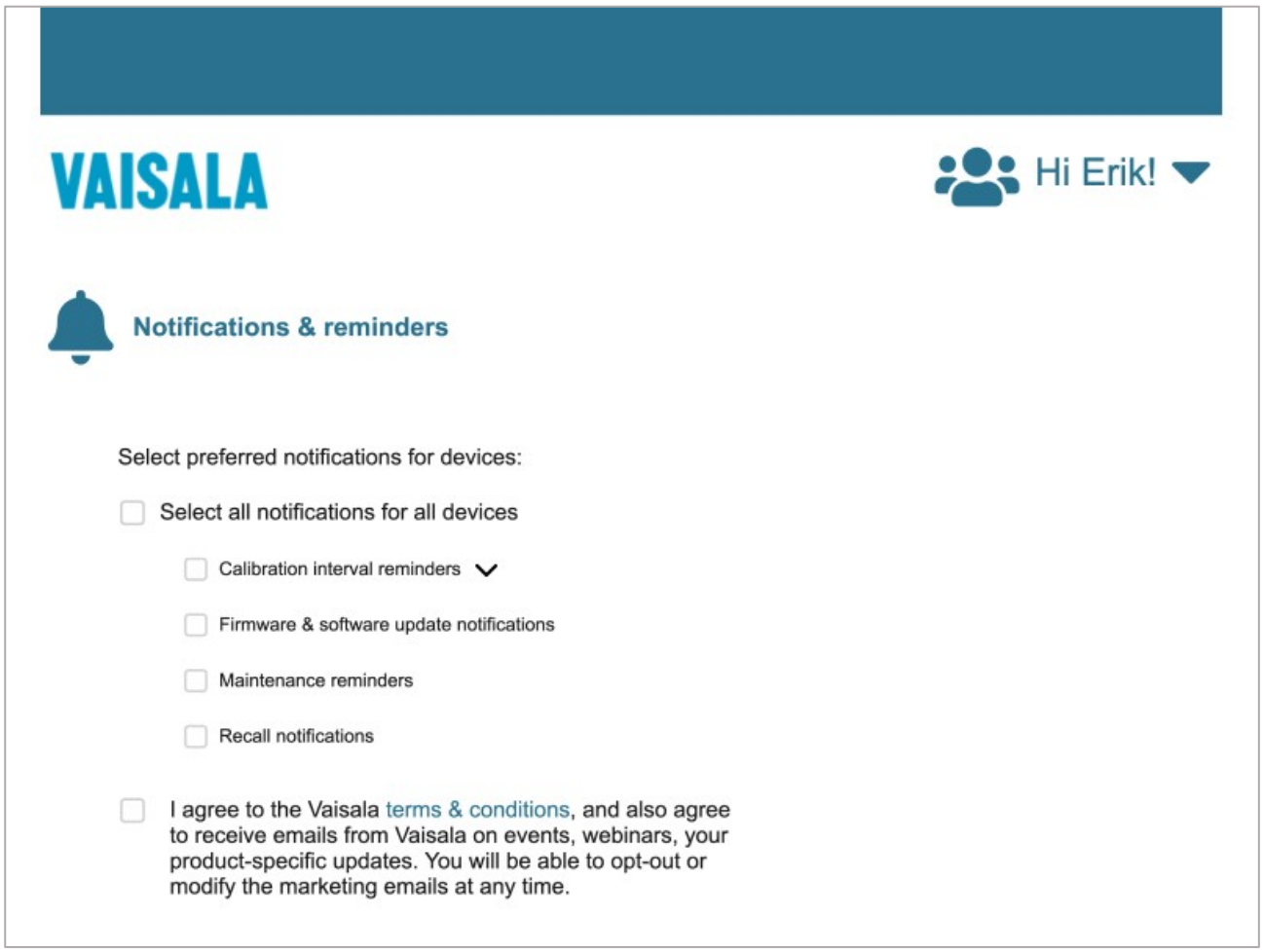

VAISALA
Hi Erik!
My devices
You can add layout of the device's location
Indigo500
HMT300
Indigo520
Transmitter (Serial Number A)
Transmitter (Serial Number B)
Transmitter (Serial Number C)

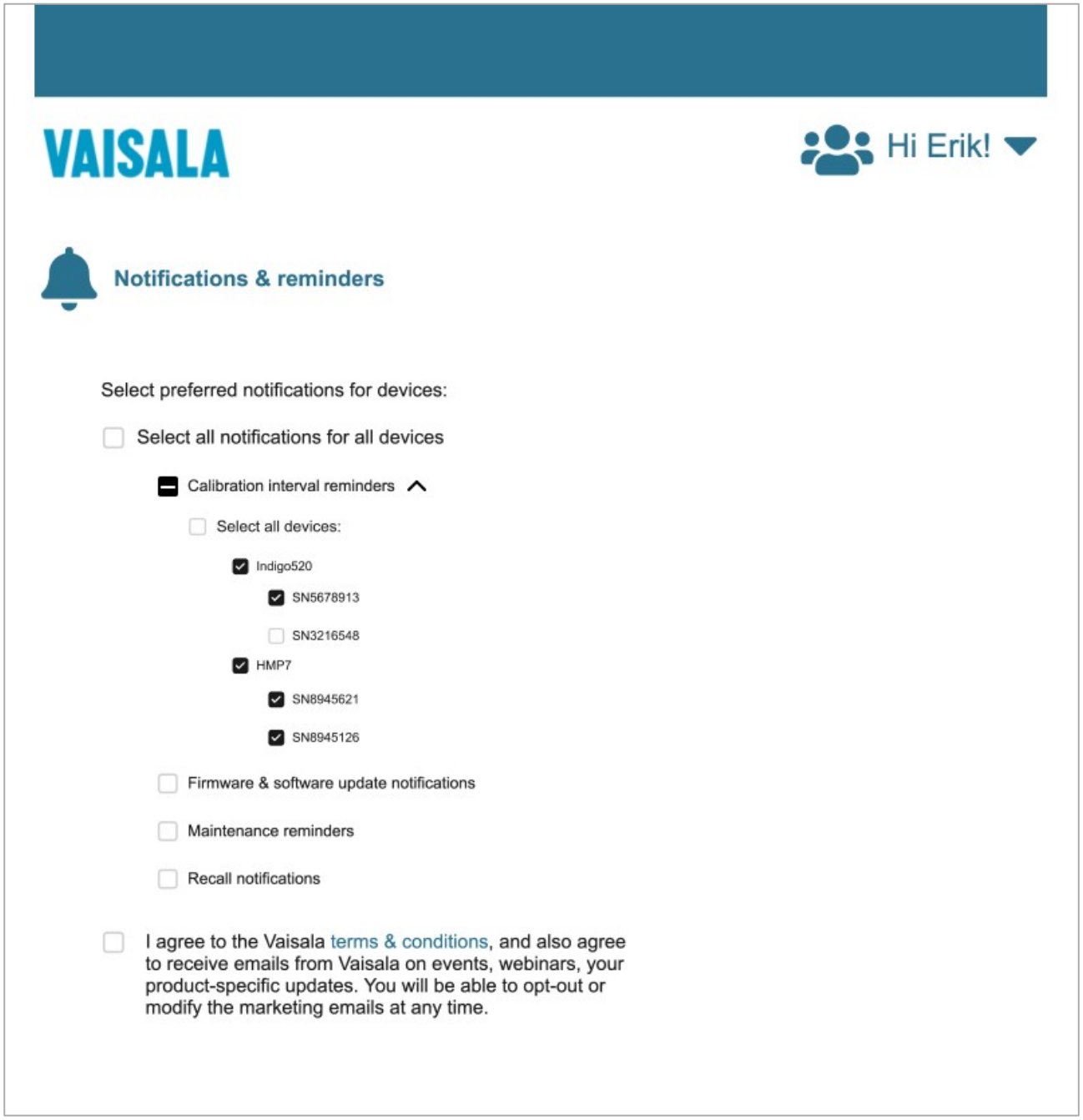

VAISALA
Hi Erik!
My devices
You can add layout of the device's location
Indigo500
HMT300
Indigo520
Transmitter (Serial Number A)
Transmitter (Serial Number B)
Transmitter (Serial Number C)
Probe (Serial Number 1)
Probe (Serial Number 2)
Probe (Serial Number 3)
Probe (Serial Number 4)

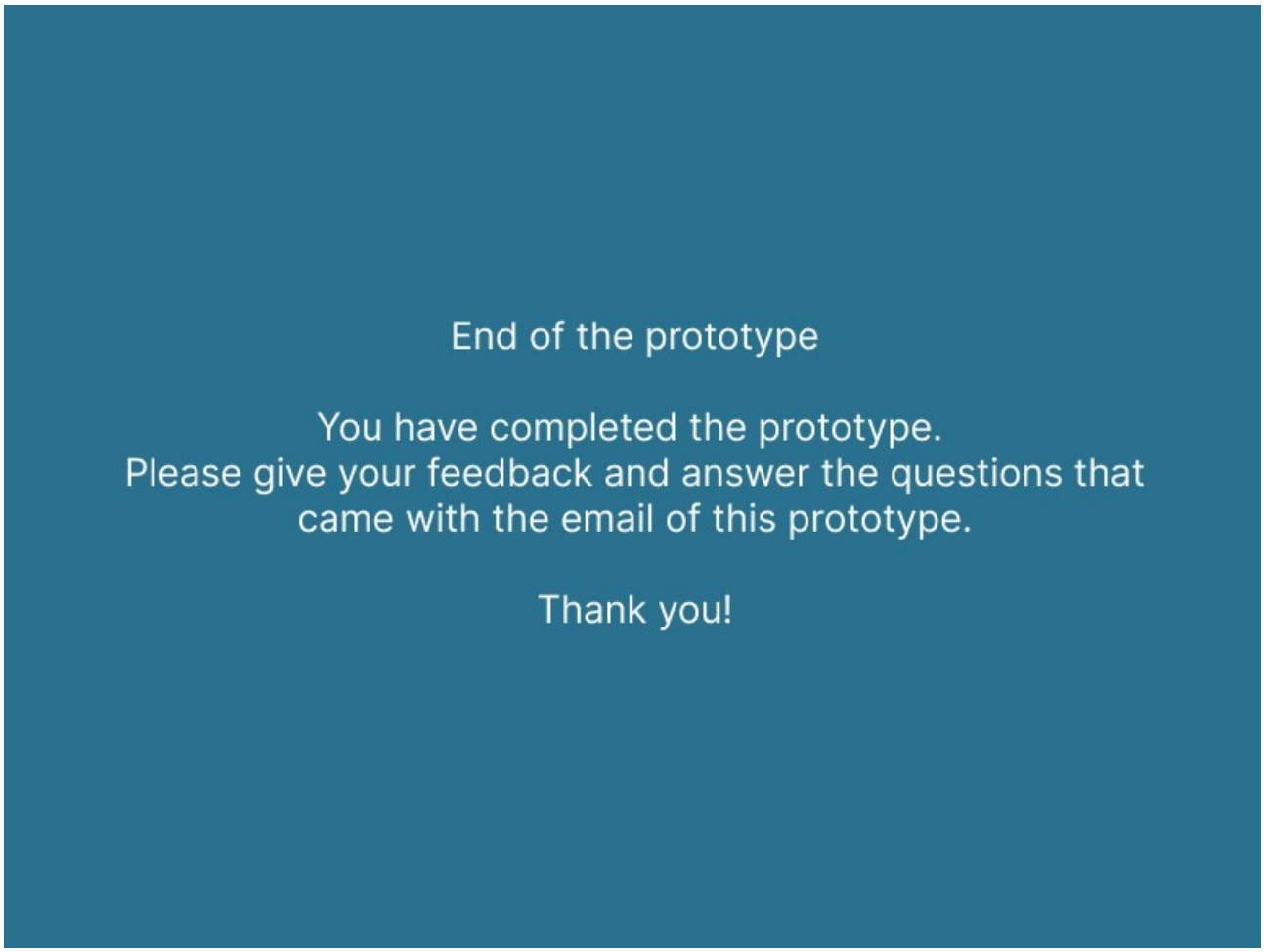

VAISALA
Hi Erik!
Probe (Serial Number 2)
Hi!
Please check the latest notifications for your device
Edit title
Save
The device is installed 30.1.2023
Add notes
Save
You can add picture of the device or mounting location
Calibration certificate (PDF)
Configuration code
Maintenance history
User manuals
Documentation
Training video
Warranty status
Life-cycle status
Recall info


Step 3:
You have successfully configured your devices and you will continue to customise your notification settings.
Instructions:
You can scroll the screen and when you are done, click wherever on the screen to move forward.
Next

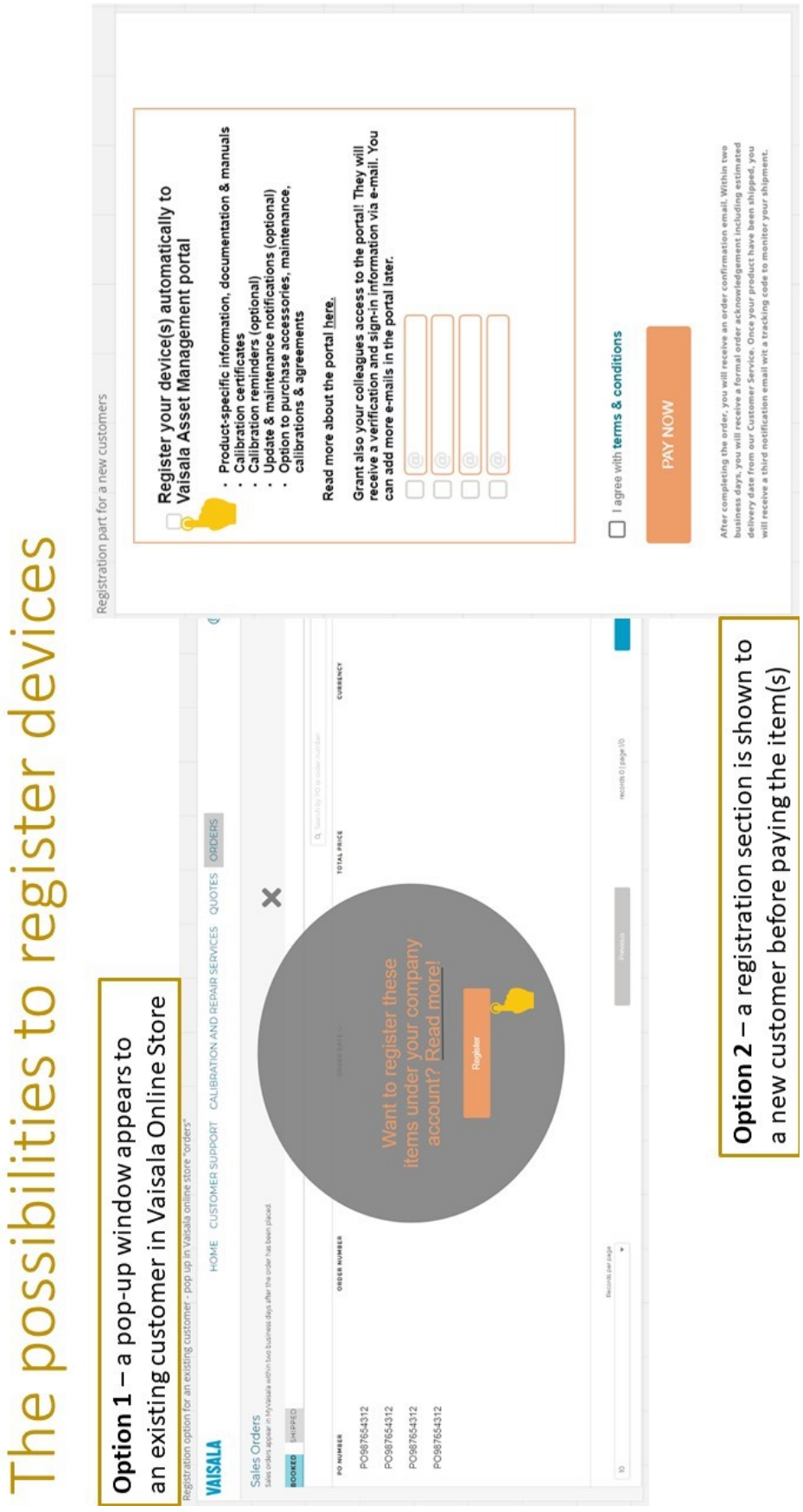

VAISALA
HOME
CUSTOMER SUPPORT
SERVICES
QUOTES
ORDERS
Hi Erik!
Welcome, Erik!
What's up?
Latest news & updates
Read more
New support request
Create a new case for your support needs and technical questions
New warranty claim
Create a warranty claim and get instructions from us
My devices
My documents
My user manuals
My calibration certificates
Notifications & reminders
FAQ
MYVAISALA
VAISALA.COM
ONLINE STORE
MEET


VAISALA
Hi Erik!
Notifications & reminders
Select preferred notifications for devices:
Select all notifications for all devices
Calibration interval reminders
Firmware & software update notifications
Maintenance reminders
Recall notifications
I agree to the Vaisala terms & conditions, and also agree to receive emails from Vaisala on events, webinars, your product-specific updates. You will be able to opt-out or modify the marketing emails at any time.

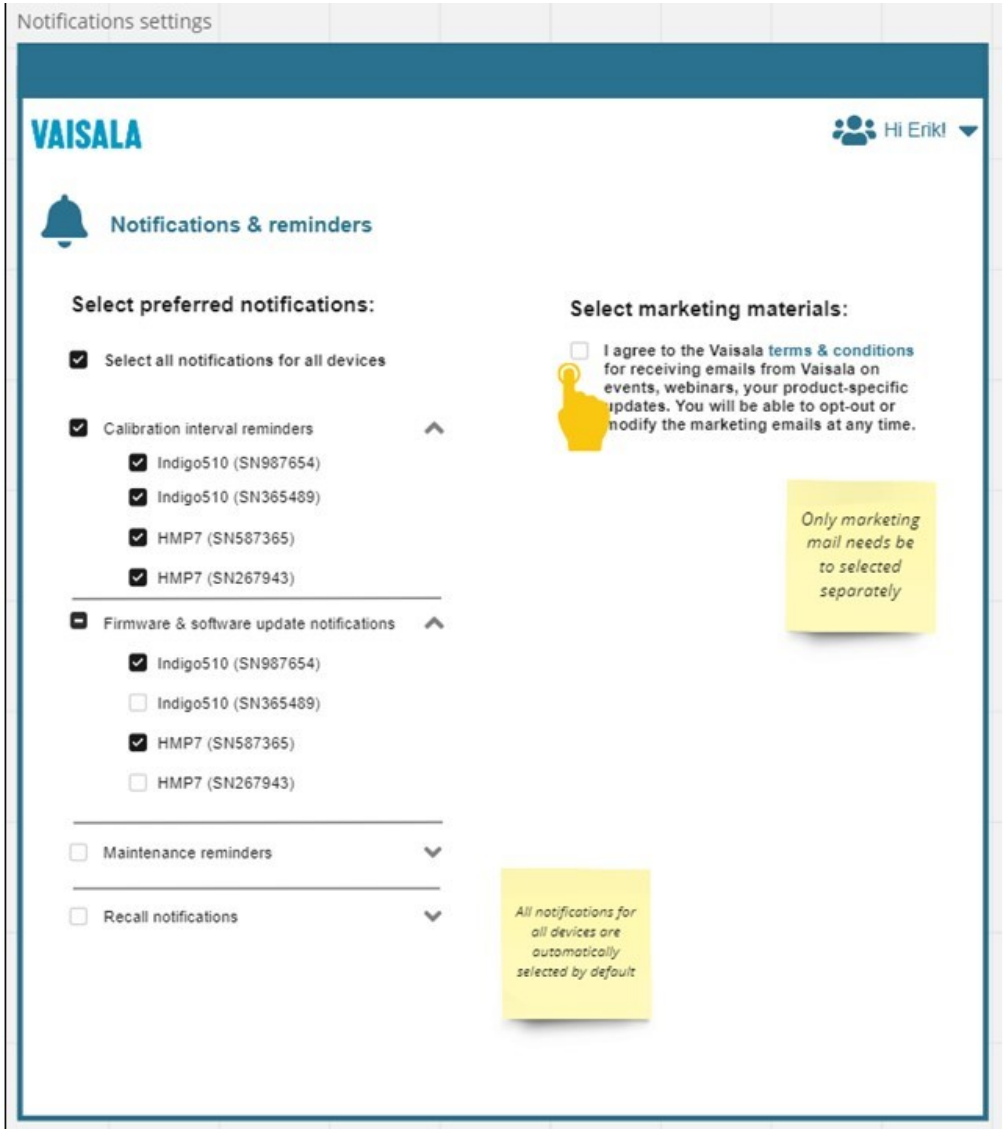

VAISALA
Hi Erik!
Notifications & reminders
Select preferred notifications for devices:
Select all notifications for all devices
Calibration interval reminders
Select all devices:
Indigo520
SN5678913
SN3216548
HMP7
SN8945621
SN8945126
Firmware & software update notifications
Maintenance reminders
Recall notifications
I agree to the Vaisala terms & conditions, and also agree to receive emails from Vaisala on events, webinars, your product-specific updates. You will be able to opt-out or modify the marketing emails at any time.


End of the prototype
You have completed the prototype.
Please give your feedback and answer the questions that came with the email of this prototype.
Thank you!

Attachment 6. The final prototype "Product registration"

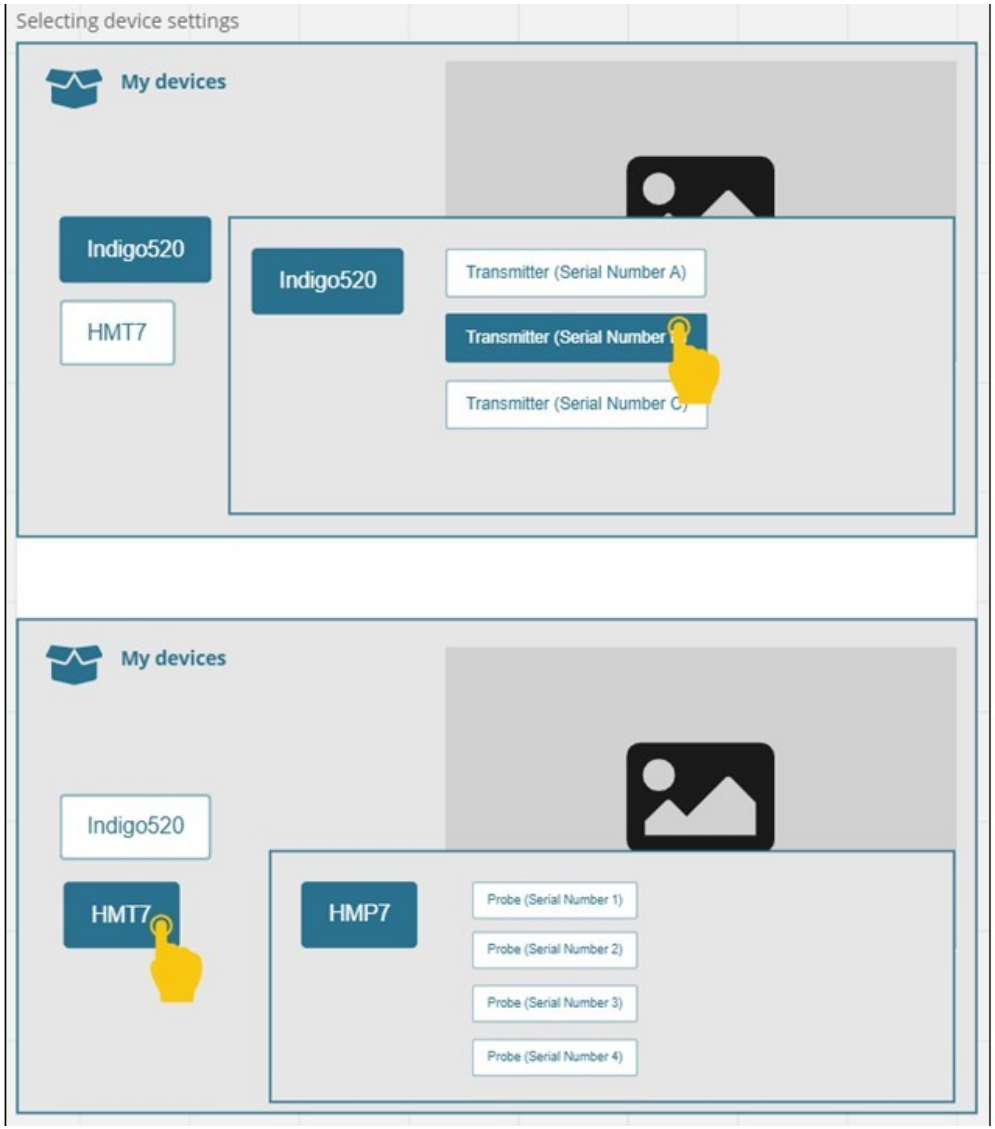


Navigation to *notification & reminders*



Navigation to *my devices*

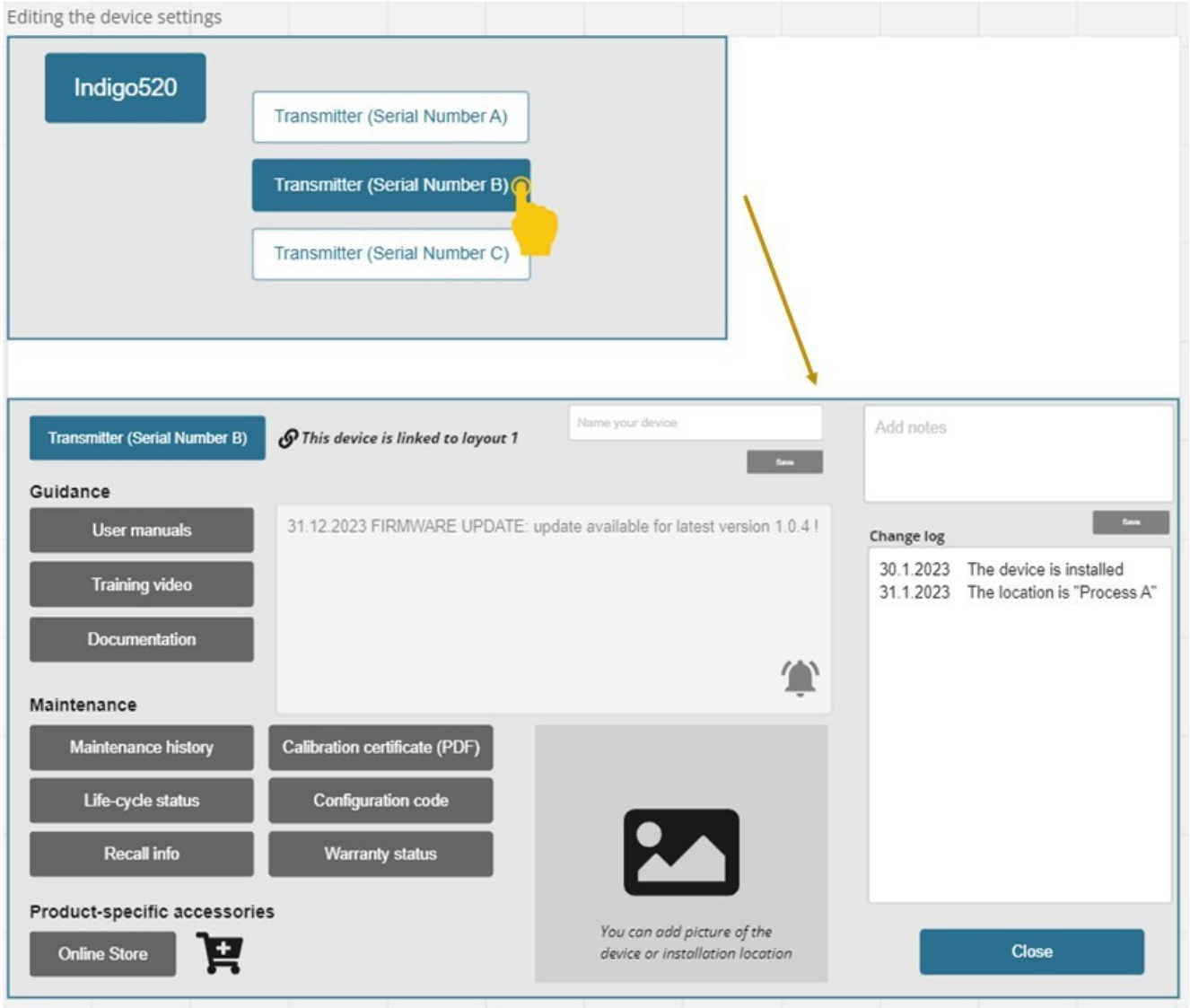
Devices are according to the category



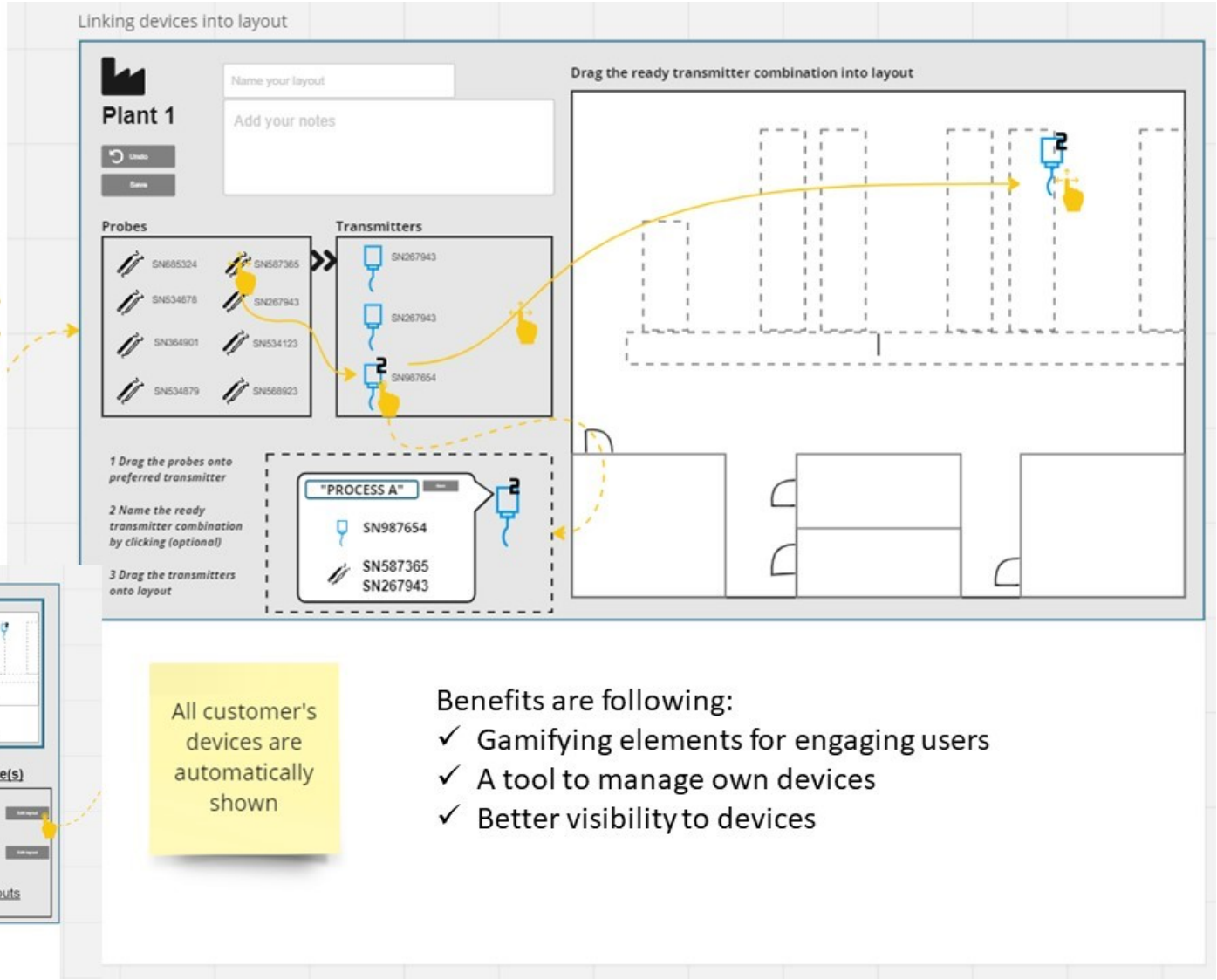
Viewing details for a single device

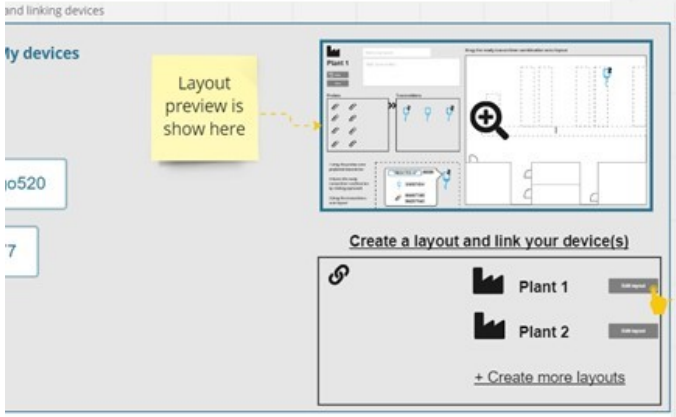
Benefits as following:

- ✓ Naming and making notes
- ✓ Change log information
- ✓ View notifications
- ✓ Access to relevant information
- ✓ Add preferred picture
- ✓ Navigation to online store



Option to link probes and transmitters into own layout





All customer's devices are automatically shown

Benefits are following:

- ✓ Gamifying elements for engaging users
- ✓ A tool to manage own devices
- ✓ Better visibility to devices