



Developing superior customer experience by improving Factory Acceptance test with Service Design methods and tools

Nida Iram

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Laurea University of Applied Sciences

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Service Design (SD) is well renowned in the modern business world as it provides excellent benefits for the organization as well as for end users. It is a well-established approach in business to customer (B2C) organizations but there is not much literature available about its applicability for business to business (B2B) organizations, especially in the heavy industry manufacturing sector. One major service of the heavy industry manufacturing sector, towards its customer is Factory Acceptance Test (FAT) which is about testing manufactured equipment with customers and other stakeholders.

In today's competitive business landscape, customer experience is a vital differentiator for customers. It is very important for organizations to offer a superior customer experience, to enhance their competitive edge, growth, and leading position. This research study delves into an exploration of SD methods and tools from a fresh and innovative perspective to devise a superior customer experience (CX) in a B2B heavy industry organization, in the context of FAT. The prime objective of the research study is to improve the FAT service for superior CX of the case organization with service design methods and tools.

In research study, research methodology is based on action research methods. An extensive literature review was carried out to identify suitable SD methods & tools according to the nature of this research case. Based on the literature review, suitable SD tools were selected i.e., personas, stakeholder map, service blueprint, customer Journey map, participant observation, participatory workshop and customer satisfaction survey. In this research study, data collections were done via qualitative and quantitative methods such as semi-structured interviews, participatory observations, notes, participatory workshops and surveys.

During the research study, personas and stakeholder maps were prepared to understand internal and external stakeholders of the FAT process. Then service blueprints for the existing FAT process of the case organization was prepared, for visualization of the FAT process as a sequenced process. Also, customer journey maps and customer satisfaction surveys were developed to get insights into customers' experience and perception about the current FAT process in the case organization. Then a participatory workshop was organized with major stakeholders of the FAT process, to overview the existing process, customers' perception and expectation, pain points and improvement ideas to develop a superior customer experience. The results were utilized to prepare new proposed service blueprints of FAT for improved process and to develop a superior customer experience. Another participatory workshop was organized to review and optimize the new proposed service blueprints of the FAT processes. These improved FAT processes are implemented in the case organization.

The value of this research study is to exhibit the vast benefits of Service Design methods and tools in heavy industry manufacturing organizations. It is concluded from the research study that Service Design methods and tools are very beneficial in heavy industry manufacturing organizations, doing B2B business, for process improvements as well as developing a superior customer experience for customer organizations.

Keywords: Service Design, Factory Acceptance test, Customer experience, Service Blueprint, Customer Journey map

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1 Introduction

Service design concept has been discussed in the research community since the early 1990s, but it is one of most emerging fields in last two decades. Many researchers have performed research studies on core concepts of service design and how it can be adopted in organizations for process/services development. It is an innovative approach to improve existing process /services or create entirely new services by service-dominant logic (Stickdorn and Schneider 2011; Junginger 2015; Curedale 2013).

In the modern business world, the competition is higher than ever. The customers have access to huge amounts of information due to digital and technological developments. They have multiple options to choose from as well as higher demands from product/service providing organizations. Even a “good service” is not enough in modern business era, to fully meet customers’ expectations. The business world has actually become a global village. It is very important for organizations to think out of the box, to achieve and maintain their competitiveness in the business world.

Modern organizations are adopting innovative concepts and solutions to achieve higher growth in their businesses. They have shifted their paradigm and business strategies from goods-dominant logic towards service-dominant logic. They have recognized the importance of co-creation and the value of delivering exceptional customer experience. In this context, service design can be considered an excellent approach for organizations to improve their processes and services (Stickdorn and Schneider 2011).

Even though competition is elevated, and customers have more choices but still it is very important for organizations to build long term customer relationships. The organization should focus on the customers’ emotional side of decision-making process that has direct impact on customer experience. Creating good customer experience assists the organizations to create emotional ties with customers, which in turn has positive impact on business growth (Gentile, Spiller & Noci 2007).

Customer experience is a very important aspect in today’s business world. The quality of customer experience is not only important to retain existing customers, but it also opens new channels for businesses. It is a very popular concept but still so many organizations neglect or do not put much effort into monitoring and improving customer experience. The prime objective of this research study is to improve factory acceptance test (FAT) service of case organization with service design methods and tools.

1.1 Business context and Research objectives

ABB is a global organization that operates in more than 100 countries and has over 110,000 employees worldwide. The organization has a diversified portfolio in modern and innovative technologies. It is comprised of four business units and various divisions under these business units. One business unit of ABB is Motion which includes multiple divisions. One important division of Motion business Area is Drives. The Drives division have multiple manufacturing factories around the world and one of them is ABB Drives factory in Finland.

This research study focuses on ABB Drives factory in Helsinki, Finland which serves its customers with various technological products related to Drives. The management of ABB Drives factory is very committed to improving its production operations and creating superior customer experience for its customers. One major stage of ABB Drives Factory, Finland offering is “Factory Acceptance Test (FAT)” which involves the testing of manufactured equipment with customers and other stakeholders. The FAT is done in both ways physically as well as remotely. There is a dedicated team who arrange and perform FAT with customers, with assistance of other departments.

The primary focus of this research work is to analyze existing FAT processes and how it can be improved by application of Service Design methods & tools, to create superior customer experience for ABB Drive Factory’s customers. The objective of thesis is to evaluate current FAT process & customer journey, so as to improve and standardize FAT process for superior customer experience in case organization with service design methods and tools.

1.2 Research questions

ABB Drives, Finland is a big organization and have multiple departments. It has good resources and working practices. Also, management has a strong focus and commitment to improve and maintain their product and services, according to the requirements of customers. Overall, they are offering good customer experience but aiming to create superior customer experience in their offerings.

One major service in ABB Drives, towards its customer is the factory acceptance test (FAT) service which consists of the testing of manufactured product and its features, before shipment from factory. FAT is arranged and performed by a dedicated team with customers and other major stakeholders. Before COVID-19 pandemic, these FATs are performed physically where customers visit ABB Drives factory in Helsinki, Finland. But due to COVID-19 pandemic restrictions, ABB Oy also developed a new approach for its customers, to perform remote FAT through digital platforms and technologies. It enables customers to avoid travelling and offers convenience to take part in FAT through digital tools. Now, post COVID-

19 pandemic, there are no more strict restrictions, still R-FAT is a popular solution for customers.

The FAT process is traditional, and ABB Management is committed towards future vision of physical and remote FAT for developing superior customer experience for its customers and this is main objective of this thesis work. In this context, the researcher is aiming to find solutions for following research questions.

RQ1: What service design methods and tools are suitable to understand & describe current FAT process and customer journey in FAT of case organization?

RQ2: How service design methods & tools support and improve FAT process in case organization to develop superior customer experience?

1.3 Thesis Outline

This master's thesis consists of five chapters. The first chapter presents the introduction of thesis and research questions of research study. The second chapter is based on a literature review about Service Design and Customer Experience. In the third chapter, research methodology and data collection process are presented. In chapter four, results, analysis and ethical aspects of research work have been presented. Finally, chapter five presents the conclusion of thesis research work.

2 Literature Review

2.1 Introduction to Service Design

Service design is a very popular approach in the modern world. In recent years, the paradigm has been shifted from goods-dominant logic towards service dominant logic significantly. A major aspect of service dominant logic is that services produce value-in-use for end users. The quality-of-service system and its recognition by end users is based on complete service system efficiency and performance all together. Through innovation & technological advancement, the complexity of service systems is increasing rapidly and there is a need for a dedicated design approach that covers the complete service development process. Service design (SD) is a very useful approach in this context. It was introduced as a disciplinary field of design at Cologne International School of Design (KISD) in 1991 and then the very first service design consultancy office was established in London as “live Work” in 2001 (Kuosa & westerlund 2012).

Stickdorn and Schneider (2011) presented that service design is more about the designing process rather than actual outcome of the process. They mentioned that outcome of a service design process can be in various forms such are service experience, operation process, organizational structure or even physical object.

Service design is an approach to understand human feelings, activities, wishes and motives and create efficient services for users' perspective. It is a multidisciplinary approach, and its interpretation can be done in various ways. The researchers from different fields and backgrounds interpret SD according to requirement of process and applicability in that particular field. Therefore, definition of SD can be done in different ways such as

“Service design is a design specialism that helps develop and deliver great services. Service design projects improve factors like ease of use, satisfaction, loyalty and efficiency right across areas such as environments, communication and products - and not forgetting the people who deliver the service.” (Engine service design 2010, cited in Stickdorn & Schneider 2011, 24)

Service design is very useful for new service creation or improving already existing services which will be more useful, valuable, and efficient for organization as well as service users. It provides strong understanding holistically about the entire service system and various actors involved in this process. Due to its multidisciplinary approach, it involves multiple methods & tools from other related disciplines (marketing, management, research, design etc.) and focus to produce valuable services from perspective of end users while making it beneficial for service provider also (Mager & Sung 2011).

2.2 Benefits of Service Design

In modern business world, Service Design is a critical aspect in success of organizations, and It should not be considered as a separate activity. According to Junginger (2015), organizations can achieve valuable benefits by adopting SD tools and methods in their process development, engagement and collaboration process. It will be very beneficial for developing organizational business as well as creating new opportunities.

Tuulaniemi (2011) presented that it is very important to keep balance between service provider and customer values in service design process. He also mentioned that SD methods enables great advantages for organizations in major parts of organizational process such as strategic decision making, improvement of internal processes, enhancing customer experience and innovation of existing/new services.

Service design has great benefits for developing and improving services, but it also offers significant advantages in strategic decision making, customer-oriented operations, internal process development and customer-service provider relationship. A summary of key benefits of service design is presented in the following table.

Benefits associated with SD core principles	Benefits associated with immediate actions	Benefits associated with sequence of actions
It creates deep understanding of customer, service provider and whole service environment (Stickdorn & Schneider 2012; Tuulaniemi 2011)	It enables bBrand to message in right touchpoints with end users (Tuulaniemi 2011)	It enables strong attachment with brand, service and service provider (Stickdorn & Schneider 2012; Tuulaniemi 2011)
It creates communication and collaboration environment (Stickdorn & Schneider 2012; Junginger 2015)	It enables to create new services development according to requirements & values (Tuulaniemi 2011)	It helps to aligning strategic decision making of organization (Tuulaniemi 2011; Junginger 2015)
It enables service visualization as a sequenced process (Stickdorn & Schneider 2012; Shostack 1982; Bitner, Ostrom & Morgan 2008)	It enhance the organizational process improvement (Tuulaniemi 2011; Junginger 2015)	It is very useful to Improve existing services of organization (Stickdorn & Schneider 2012; Tuulaniemi 2011; Shostack 1982)

Table 1: Key benefits of Service Design
(Adapted from Ali 2019)

2.3 Service Design Principles

Stickdorn and Schneider (2011) have presented that service design has five core principles which provides a philosophical framework. The principles are as follows.

- **User-Centered:** It presents that services should be perceived from the user's perspective. Customer participation is very important to successfully deliver any service. The main goal of service provider is to fulfill the requirement of end user and hence they should be at center of service design process.
- **Co-Creative:** It presents that service design process should include all stakeholders. The co-creation is very important in service design, for smooth interaction of all stakeholders in service provision. The involvement of customers in service provision provides essence of co-ownership which increases the customer loyalty and long-term relationship with service.
- **Sequencing:** It presents that services should be visualized as sequence. There are three transition steps in every service process such as pre-service period, actual service period and subsequent post service period. It is important to visualize the complete service process as sequence of interrelated actions, over a certain period.
- **Evidencing:** It presents that intangible services should be visualized as physical artefacts. Physical artifacts have significant importance in service experience as it can produce good events to memorize about service experience, even beyond service period. It enhances customer loyalty and long-term relationships.
- **Holistic:** It mentions the importance to consider entire environment of service. While designing a service, it is important to maintain a holistic view and consider the wider context about service process. Although the main focus is on end users, it is also important to consider environment of service provider and user as it will have significant effect on service process.

2.4 Service Design Process

The framework of service design process is presented in various ways by researchers and service design practitioners. Although different researchers used different terminology, name and number for various stages of service design process, but core ideology and process are similar in all models. The process mainly consists of stages such as problem understanding, capturing insights, innovating new ideas and then prototyping & implementing. It is highly recommended to not rely only on pre-defined process model, instead the process model should be adapted according to the requirement of case. The most famous and commons service design processes are presented as follows.

2.4.1 Moritz Model

Moritz (2005) mentioned that stages in the service design process are generally in chronological order but the process itself is highly iterative. He presented that service design (SD) process has six categories such as SD Understanding, SD Thinking, SD Generating, SD Filtering, SD Explaining and SD Realising. These six categories establish basic structure for developing a service design process, by providing an overview of various tasks in different stages of service design.

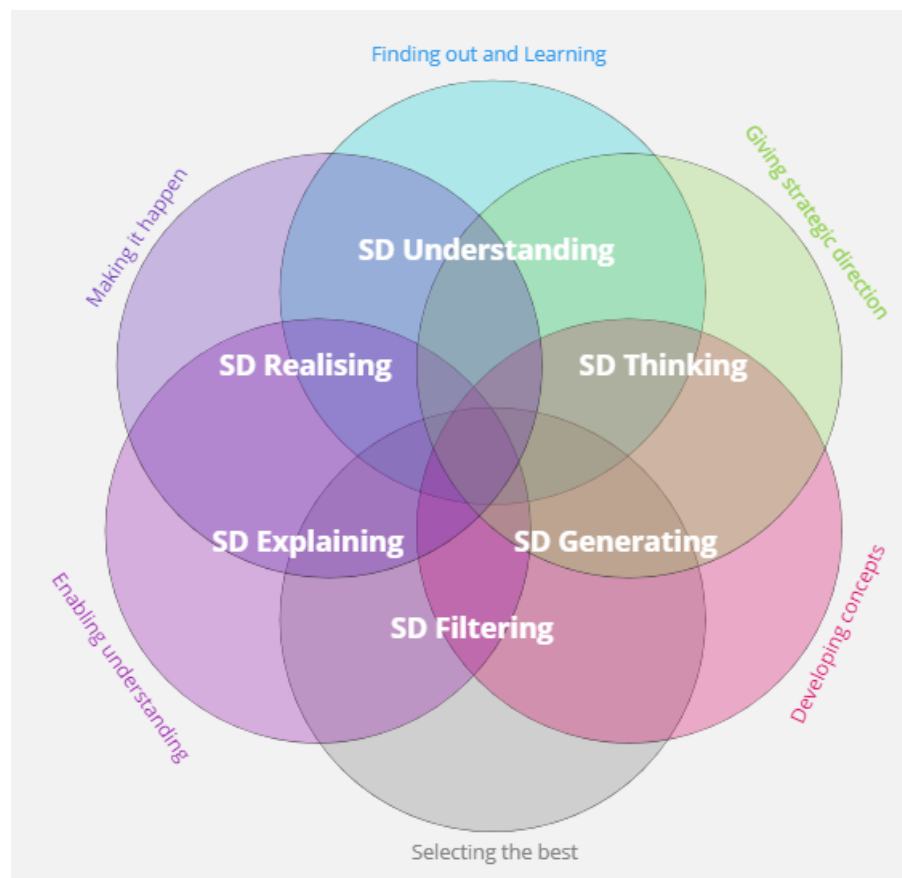


Figure 1: Categories of Service design
(Adapted from Moritz 2005)

The first stage “SD Understanding” is focused to research about user’s requirement, wishes and motivations to explore context and associated possibilities. The second stage “SD Thinking” is about establishing project scope, specifications and project framework. During this stage, the structure and direction of the project is established. The third stage “SD Generation” is about idea generation and alternative concept formulation. This stage is related to creativity in process. In fourth stage “SD Filtering” the evaluation of results generated in from previous stages is carried out, to identify best concepts and ideas. These selected ideas and concepts are further developed in the following stages. The fifth stage “SD

Explaining” is related to visualization of concepts and ideas. It includes mapping of potential scenarios to establish common understanding. The sixth and last stage in Mortiz’s model is “SD Realising”, During this stage, the selected ideas are specified, and prototyping is performed. At this stage, the service is ready for implementation.

2.4.2 Stickdorn and Schneider Model

Stickdorn and Schneider (2011) also mentioned that service design process is nonlinear and iterative in nature. They presented that service design process consists of four steps such as Exploration, Creation, Reflection and Implementation.

The first stage “Exploration” is related to identification of real problem. The main task here is to understand service organization’s goal strategies, to get insight of service providing organization and discover main problem from service providing company’s perspective as well as from customer’s perspective. Ethnographic research is very useful in this stage and findings are visualized.

The second stage is “Creation” which is a generative stage of service design process. During this stage, the insights from Exploration are visualized into new concepts and ideas. Different options are explored for identified problem and insight during first stage. These ideas and concepts are tested to identify mistakes and ultimately learn from them to develop best ideas. The key aspect at that stage is co-creation to develop a holistic concept by considering the whole touch point sequence including customer’s needs, motivation, expectations as well as service providing companies goal and expectations.

The “Reflection” is third stage which is related to prototype building and ideas testing that has been developed during previous stages. This prototyping and idea testing is carried out with customers in circumstances that are very close to reality. In this way, feedback from customers is gathered to improve the prototype, so that it will fulfill needs and expectations of stakeholders. The iterative approach of service design is utilized here to improve desired service, idea or prototype. One main challenge here is the intangibility of services. It is not possible to just put a service on table and ask customer’s opinion about it. Hence it is important for service designers to create emotional engagement with customers, to attain key insights and feedback from them.

The final stage is “implementation” where the change should be implemented. It is very important to get support from both management as well as employees to successfully implement change. All stakeholders should be involved early in the process for better implementation. In ideal scenarios, implementation of change should be followed by another iteration of service design process for evaluation of its progress, starting from exploration and following later stages of service design process.

2.4.3 Double Diamond Model

One very common service design process model is “Double Diamond model” which was developed by Design Council in 2005. It has visual representation as shown in Figure 2. This model has four distinct phases such as Discover, Define, Develop and Deliver. Every phase serves its dedicated purpose and provides input for the next phase. The first diamond consists of Discover phase and Define phase, which is utilized for problem understanding and to define area of focus. The end of the first diamond provides a design brief and reframed problem. The second diamond consists of Develop phase and Deliver phase which is used to explore, select, and implement solutions. (Design Council 2015; Penin 2018).

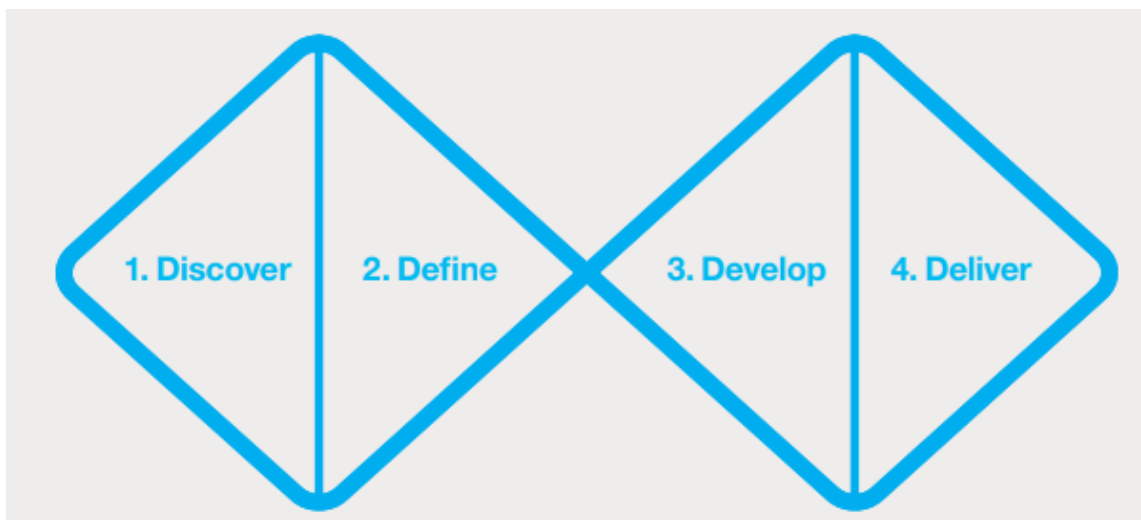


Figure 2: Double Diamond process
(Design Council 2015)

Design Council (2015) has explained objective, and purpose of Double Diamond model’s four stages as follows.

The first phase “Discover” is used to identify the problem, opportunity or needs. This phase is used to gather inspiration and explore user needs. During this phase, initial ideas are generated, and some boundaries of solutions space is defined for process. Both qualitative and quantitative research methods are used in this phase, to build a rich knowledge bank for the next steps of design process.

During second phase “Define”, the outputs of Discover phase are analyzed to structure these findings into reduced number of opportunities. It is about framing the design problem and developing a clear set of problem statements. The output of this phase presents a clear definition of fundamental challenge or problem to be considered in design process, in terms of a clear brief.

The third phase “Develop” is used to develop products or service for implementation. In this phase, the initial design brief is processed in an iterative process to develop, test and refine the product or service that is suitable for implementation.

The “Deliver” is the final phase of Double Diamond model where solutions are finalized and launched by final testing and evaluation. It is also important to consider in this phase that customer feedback mechanism should be in place.

Summary

Although various researchers and service design practitioners presented service design process with different names and different stages, the core concept is similar in all. The main idea of service design process is to understand customer, service provider, market situation, ideas generation, explaining processes and develop valuable service experience for people.

Comparing these service design processes by Mortiz (2005), Stickdorn and Schneider (2011), and Double Diamond model by Design Council (2015), it is very evident that all of these have similar philosophy. The comparison of different stages of these proposed service design methods are presented in Table 2.

Double Diamond process (Design Council, 2015)	Service design process (Stickdorn and Schneider, 2012)	Service design process (Mortiz, 2005)
Discover	Exploration	SD Understanding
Define	Creation	SD Thinking
		SD Generation
		SD Filtering
Develop	Reflection	SD Explaining
		SD Realising
Deliver	Implementation	/

Table 2: Comparison of stages in Service Design processes

The first stage of Mortiz (2005) “SD Understanding” is very similar to “Exploration” stage of Stickdorn and Schneider (2011) as well as “Discover” phase of Double Diamond model. The next three stages of Mortiz (2005), “SD Thinking”, “SD Generation” and “SD Filtering” has same purpose as “Creation” stage of Stickdorn and Schneider (2011) and “Define” stage of Double Diamond model. Moreover, the last two stages of Mortiz (2005) “SD Explaining” and “SD Realising” has similar purpose as “Reflection” stage of Stickdorn and Schneider (2011) and “Develop” phase of Double Diamond process. At end of “SD Realising” stage of Mortiz (2005), the service is ready for implementation, whereas implementation itself is carried out in

“Implementation” stage of Stickdorn and Schneider (2011) and “Deliver” phase of Double Diamond process.

Hence, all presented service design process have similar approach that service design process is iterative & non-linear in nature, always customer/end-user centered and involve all stakeholders in co-creation process.

2.5 Service Design Methods and Tools

A vast range of service design methods and tools are proposed by researchers and service design practitioners. Stigliani and Fayard (2010) presented that tangible objects can play a significant role in the service development process, when used as an intermediate tool or technique. Segelström and Holmlid (2011) also mentioned that utilization of service design tools have significant benefit to make abstract concepts and service experience in concrete form as well as represent invisible service structures as visible and tangible. Blomkvist and Segelström (2014) also advocated that service design methods can be used to represent a service which assists people to build cognitive interaction with offered service system. In this way, although, the outcome of service design process is not these methods and tools, but they serve as facilitator in service development process.

There are many service design methods and tools available for designers which are used in various stages of service design process such as participant observations, user journey map, service blue printing, storytelling, service safari, user shadowing, user personas, participatory workshop, brainstorming, design brief, experience prototyping, business model canvas and scenarios (Design Council 2015; Stickdorn, Hormess, Lawrence & Schneider 2018; Tassi 2009).

Here is a representation of some service design tools and method’s utilization at different phases of service design process.

2.5.1 User personas

User persona is usually hypothetical character which is used to represent information and attributes about similar people in a group. These are usually created in forms of sets that represent different needs of different users. User personas can be created in various forms, but the most common form of user personas contains combination of images and related text. It is important to consider that personas should be archetypes, not stereotypes (Design Council 2015).

Every persona act as a reference model for a certain group of users. It represents a user group based on clusters of need and behavior. It helps designers to focus on related patterns of target group, for which he is seeking to design. These are also known as human Archetypes, behavioral Archetypes and User Profiles (Tassi 2009). Service design tools

[Personas]). User personas are very useful for analysis, idea generation and service development. It offers valuable perspective in service design. An example of User personas is presented in Figure 3.



Figure 3: User Personas
(Design Council 2015)

2.5.2 Participant Observation

Observation is one general method in qualitative research. DeWalt (2015) mentioned that ethnographers use participation observation for data collection by observing and/or participating in common and uncommon activities of people in naturalistic settings who are being studied for research. In this method, involved people are aware that the researcher is observing them, unlike non-participation observation where researcher subjects are not aware of being observed.

This method is very useful for data collection as the quality of data is refined as well as quality of data interpretation is also enhanced. It enables us to understand the real actions of people as compared to what they communicate they do. The focus in this method is to obtain detailed insights of a specific activity such as behavior of users while interaction with service in their natural environment. It is also important to consider that participatory observation is not limited to observing people's body language, gestures, and what they are doing. It is also vital to note what they are not doing, to get key insights such as do they ignore some specific task or instruction (Stickdorn et al. 2018).

Meroni and Sangiorgi (2011) also mentioned the benefits and importance of participation observation. He suggested that participation observation has significant benefits to open diverse opportunities for innovation as it offers new forms of collaboration and shifts paradigm from traditional thinking approach about a problem.

2.5.3 Participatory Workshop

Participatory workshop is very popular tool in service design. It is represented by various names by researchers such as design workshop, co-creative workshop, interactive workshop, participatory workshop etc. but main idea is same that it is used to extract knowledge and opinions of participants about research topic in a collaborative and creative environment.

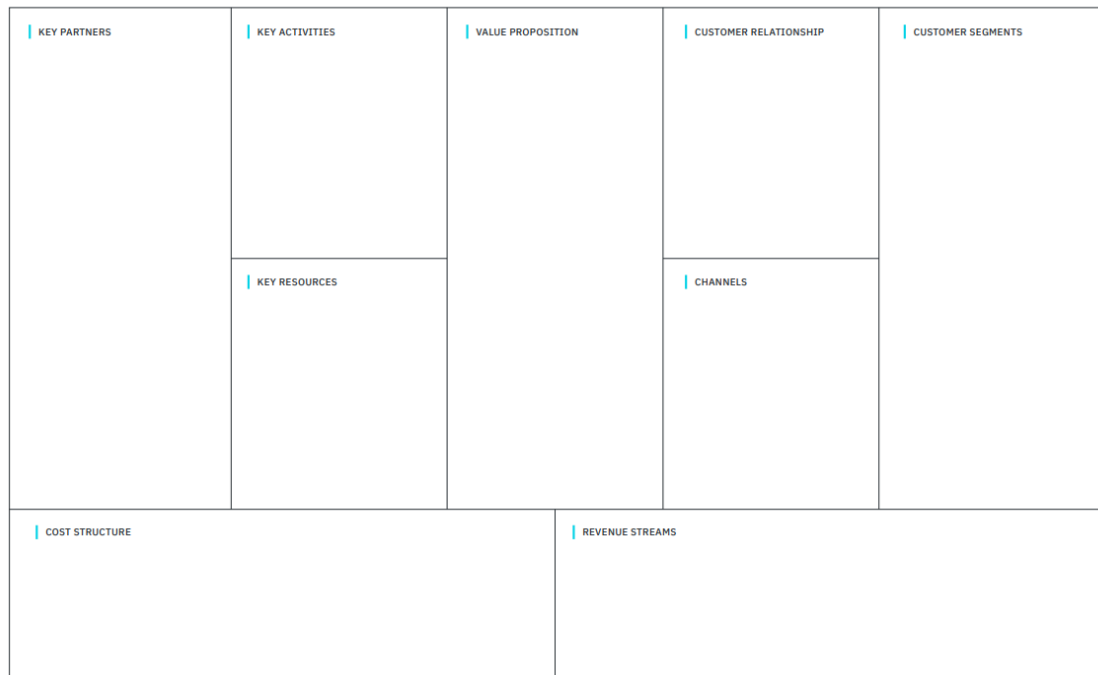
Miettinen and Koivisto (2009) presented that design work is an innovation method that is very useful for information collection through participation. Stickdorn and Schneider (2011) also mentioned that it is very effective to recognize opinions, point of views and knowledge or participants whole design process and its end result.

The successful and effective organization of participatory workshop is based on many factors. The participants of workshop should be selected from various backgrounds to ensure diversity. The work environment should be encouraging and collaborative. The location should be safe and comfortable. Scheduling should not be tiring or over-burdening for participants. The activities should be thought provoking and focused on the main goal of workshop. The researcher should act as facilitator. The core idea of participatory workshop is to explore feedback on selected service or topic from user's perspective (Pavelin, Pundir & Cham 2014).

2.5.4 Business Model Canvas

Business model canvas (BMC) is a very useful strategic management tool for designing and analyzing business models. It is used to generate a new business model or explain and improve an already existing business model. It is a high-level approach to rationale about key elements in business model of organization, how is creates, deliver and capture value. It provides a holistic view about business.

Osterwalder, Clark and Pigneur (2010) presented business model canvas as a tool to present logic of organization to deliver value and make profit. The business model canvas is made of nine building blocks such as customer segments, value propositions, channels, customer relationships, revenue streams, key resources, key activities, key partnerships, and cost structure. These building blocks takes into account four main areas of a business i.e., customers, infrastructure, offer and financial sustainability. An example of a business model canvas is presented in Figure 4.



sdt | www.servicedesigntools.org

Figure 4: Business Model Canvas template
(Tassi 2009. Service design tools [Business Model Canvas])

Fritscher and Pigneur (2014) mentioned that business model canvas enables companies for designing and improving business models. Its nine-building block presents key elements of company over a certain period of time. Business model canvas provides valuable benefits due to its simplicity, universality and focus on value proposition. BMC is very useful for understanding the entire business model, value proposition and customer segmentation of an organization.

Ojasalo and Ojaslao (2015) further developed BMC into service logic business model canvas to include service logic aspect in it. Service logic business model canvas is a modified version of Osterwalder et al. (2010) presented BMC which also include the principles of service-dominant logic and customer dominant logic. Service logic business model canvas also consists of nine building blocks, similar to the original BMC but placement of blocks is different, and each block is redesigned so to incorporate more service logic orientation. It is more iterative, and customer focused. An example of service logic business model canvas is presented in Figure 5.

<p>Key Partners</p> <p>From our point of view:</p> <ul style="list-style-type: none"> • Who are our key partners? • What are the roles of our partners? • What resources do we need from our partners? • How do the partners benefit from the cooperation? <p>From customer point of view:</p> <ul style="list-style-type: none"> • How does the customer experience our partners? • What kind of partnerships does the customer have and how should they be taken into account? <p style="text-align: right;">7</p>	<p>Key Resources</p> <p>From our point of view:</p> <ul style="list-style-type: none"> • What skills and knowledge do we need? • What other material and immaterial resources and tools are required? <p>From customer point of view:</p> <ul style="list-style-type: none"> • What skills and knowledge is required from the customer's side? • What other customer's material and immaterial resources and tools are required? <p style="text-align: right;">6</p>	<p>Value Proposition</p> <p>From our point of view:</p> <ul style="list-style-type: none"> • What value are we selling? • What are the elements of our offering? • What is unique in our offering? <p>From customer point of view:</p> <ul style="list-style-type: none"> • What value is the customer buying? • What are the elements of customer need? • Which customer's challenges and problems need to be solved? <p style="text-align: right;">2</p>	<p>Value Creation</p> <p>From our point of view:</p> <ul style="list-style-type: none"> • How is our offering embedded in the customer's world? • How can we facilitate the customer to reach their goals? <p>From customer point of view:</p> <ul style="list-style-type: none"> • How does the value emerge in customer's practices (also from mental and emotional experiences)? • How are the customer's long term benefits accomplished? <p style="text-align: right;">3</p>	<p>Customer's World and Desire for Ideal Value</p> <p>From our point of view:</p> <ul style="list-style-type: none"> • How do we get a deep insight and holistic understanding of customer's world (context, activities, practices, experiences), their future strategies, and customer's customers' world? <p>From customer point of view:</p> <ul style="list-style-type: none"> • Why does the customer buy? • What kind of benefits does the customer aspire? • Functional • Economic • Emotional • Social • Ethical • Symbolic • If there were no limits, what would be the customer desire for ideal situation and world? <p style="text-align: right;">1</p>
<p>Cost Structure</p> <p>From our point of view:</p> <ul style="list-style-type: none"> • What are the costs inherent in our business model? • What are our other sacrifices? <p>From customer point of view:</p> <ul style="list-style-type: none"> • What costs and other sacrifices are required from the customer? <p style="text-align: right;">9</p>		<p>Revenue Streams and Metrics</p> <p>From our point of view:</p> <ul style="list-style-type: none"> • What is our earnings logic and how is our financial feedback generated? • How can we apply customer value-based pricing? • What else valuable do we get than money? • What are the key performance metrics of our business success? <p>From customer point of view:</p> <ul style="list-style-type: none"> • For which benefits is the customer really willing to pay and how? • What is the financial value that the customer gets? • What are the key performance indicators of customer's business and how are we following them? <p style="text-align: right;">5</p>		
<p>Mobilizing Resources and Partners</p> <p>From our point of view:</p> <ul style="list-style-type: none"> • How do we coordinate multi-party value creation? • How do we utilize and develop partners and resources? <p>From customer point of view:</p> <ul style="list-style-type: none"> • How can the customer utilize and develop partners and resources? <p style="text-align: right;">8</p>		<p>Interaction and co-production</p> <p>From our point of view:</p> <ul style="list-style-type: none"> • How can we support customer co-production and interaction between us and the customer? <p>From customer point of view:</p> <ul style="list-style-type: none"> • What are customer's activities during the use and different use contexts? • What are the customer's mental models of interacting with us? <p style="text-align: right;">4</p>		

Figure 5: Service Logic Business Model Canvas
(Adapted from Ojasalo & Ojasalo 2015)

2.5.5 Service Blueprint

Service blueprint is a very useful visualization method to represent all activities and various functions of service system with customer-centric approach. It was introduced by Shostack (1982,1984) and later it was further developed by Kingman-Brundage (1989,1995). According to Holdford and Kennedy (1999), service blueprints are pictures or maps of service that enables all involved stakeholders to understand all different phases of service system such as designing, providing, managing and using service.

Fließ and Kleinaltenkamp (2004) mentioned that service blueprint represents a two-dimensional picture of a service system. The actions of service customer and service provider are presented in horizontal axis and differentiations of different area of actions are presented on vertical axis.

Bitner, Ostrom and Morgan (2008) have explained “Service Blueprinting” concept and its significant importance in user experience design and service innovation. The service blueprinting has five components such as actions of the customer, onstage/visible contact employee actions, backstage/invisible contact employee actions, support process and physical evidence. These fundamental elements can be adjusted according to the requirement of process. An example of service blueprint for Uber company is presented in Figure 6.

UBER SERVICE BLUE PRINT									
	SIGNUP PHASE		RIDE PHASE				POST RIDE PHASE		
EVIDENCE.	Appearance and ease of use of Uber Mobile Application (User)	Facebook pages, emails, Website, internet forums, television commercials	Push notification confirming booking	Push notification received for approaching ride	• Appearance of car • Appearance of driver • Appearance and cleanliness of car interior • Fresh of car interior • How old is the car • Push notifications received	• Quality of driving • Does the customer feel relaxed/safe? • Is the driver being erratic	Push notification received for completing ride	Payment amount communicated to passenger through SMS/ email/ Push notification	Ride/ Review request displayed on mobile app
USER ACTIONS.	Download Uber Application	Register as a passenger and connect credit card or paypal/ payment method	Request for a pickup	Text/ push notification received with driver details and status of the approaching ride	Passenger boards the car and commences the ride	Passenger rides to the intended destination	Passenger reaches final destination and completes the ride	Passenger makes payment for ride	Passenger rates the driver/ride according to his/her experience
FRONT OF STAGE EMPLOYEE INTERACTION/ UBER DRIVER.		Be accepted as a Uber driver partner after background check	Clean vehicle and services, prepare for ride requests Log on to Uber driver partner mobile app and make oneself visible	Reach the passenger location within the stipulated waiting time	Greet the passenger and start the ride on the mobile app	Turn radio on/ offer assistance Make polite conversation with the passenger if required Drive the vehicle safely and make the passenger feel comfortable	Make sure the passenger reaches safely to the destination End the trip on the mobile app Make polite conversation with the passenger if required	Collect payment for the ride from the passenger (collects all his/her belongings from the vehicle) Drive the passenger and make polite conversation	Rate the passenger for the ride Prepare vehicle for next ride Employee enters the details of the expense required for approval
BACK OF STAGE INTERACTION.		Creates passenger and driver profile Validate credit card/ payment method accounts for users and drivers	Identify location of the passenger and drop location Identify ride availability Communicate waiting time and price for the ride Communicate driver details to passenger and vice versa	Communicate driver details to passenger and vice versa Communicate status of approaching ride to the passenger	Communicate the confirmation of driver reaching the pickup location Communicate the commencement of the ride to the driver and passenger Communicate optimal travel route to the driver	Communicate start of the ride to passenger and driver Start payment process for the ride	Communicate end of ride with passenger and driver	Process payment for the ride	Communicate the passenger to rate the driver and vice versa
SUPPORT PROCESSES		Background checks on the driver Vehicle quality inspection	Record and maintain ride encounters, ride demand on routes, driver availability on routes	Record and maintain ride encounters, ride demand on routes, driver availability on routes	Keep track of waiting time, ride time, and route taken by the vehicle	Keep track of waiting time, ride time, and route taken by the vehicle	Keep track of waiting time, ride time, and route taken by the vehicle	Incorporate discount codes Calculate final payment amount for the ride	Record and update ratings and reviews for passengers and drivers

Figure 6: Service Blueprint example (Tassi 2009. Service design tools [Service Blueprint])

2.5.6 Customer Journey Map

A customer journey map is a visual representation of journey and experience of service that has been utilized by the customer/user. The journey map can be presented in multiple forms such as flowchart, map or other graphical illustration. The journey map includes all interactions of user with service. It is not limited to customer/user interaction with service provider but also identify key steps of user’s experience about service. It does not aim to present the actual structure of service, instead the main purpose is to present how customer/user perceive and interact with service. It enables to identify magic moments from user’s perspective where service provide value to user as well as present pain points for users where service parts need improvement (Design Council 2015; Meroni & Sangiorgi 2011).

Stickdorn et al. (2018) also mentioned that journey maps are very useful to visualize existing user experience, but it is also valuable to visualize potential future experience. It is structured in sequence of steps. The journey map can be prepared on various scales such as form high level map to present an end-to-end experience, or it can be detailed journey map to exhibit individual steps of a high-level journey map. An example of journey map of a global Japanese electronics corporation is presented in Figure 7.

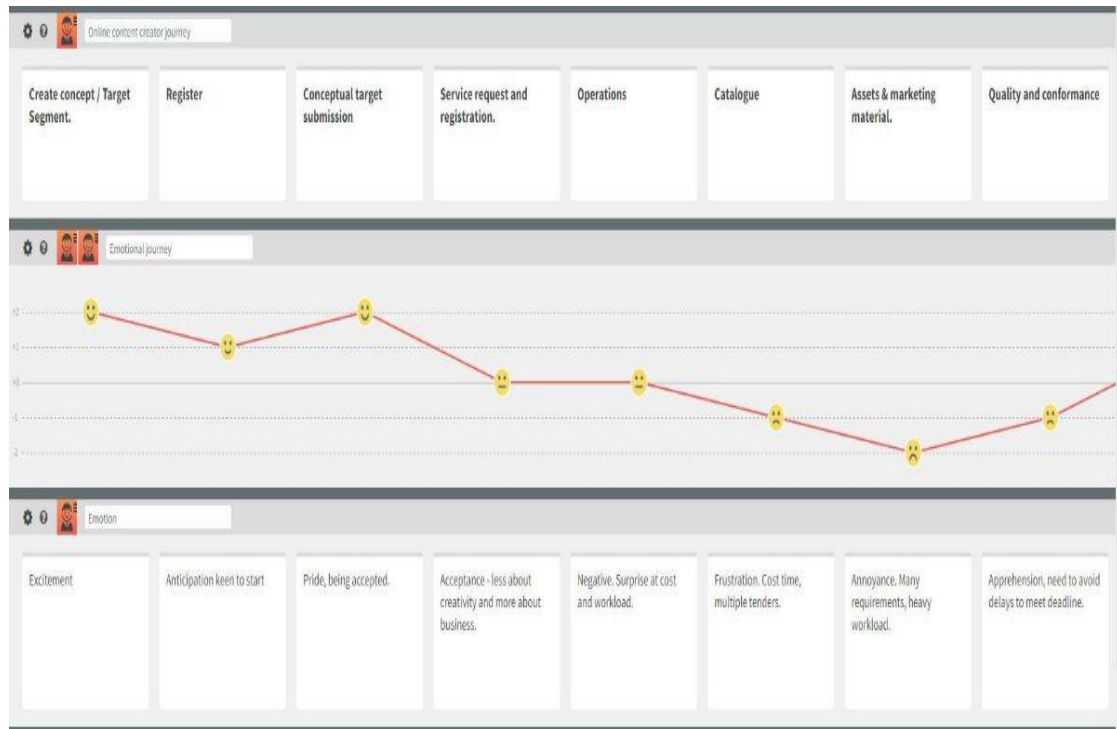


Figure 7: Customer journey map example
(Tassi 2009. Service design tools [Journey map])

2.6 Customer Experience

The concept of customer experience (CX) has gained significant popularity in the modern business world in recent years. It is a critical aspect for the success of organizations in today's demanding and competitive business world. CX is closely linked with customer satisfaction and their loyalty towards businesses. The concept of CX has gained great attention in research world to explore its influence on customer perception about product/services and overall experience with providing organizations.

The CX concept is complex, multifaceted, and holistic in nature and it has been defined in numerous ways by researchers. These definitions have verities of similarities as well as differences due to diverse background of scholars. Most relevant definitions of CX have been presented as follow:

“An experience occurs what a customer has any sensation or knowledge acquisition resulting from some level of interaction with different element of a context created by the service provider.”

(Gupta & Vajic 2000)

“A customer experience is an interaction of series between customer and a product, a company, or its representative that led to a reaction.”

(LaSalle & Britton 2003)

“Customer experience is conceptualized as the customer’s subjective response to the holistic direct and indirect encounter with the firm, and customer experience quality as its perceived excellence or superiority.”

(Lemke, Clark & Wilson 2011)

In modern business world, organizations are facing high competition in businesses, and it is increasing every passing day. The organizations have shifted their paradigm from goods-dominant logic towards service dominant logic as it is of great importance in today’s business world. Previously, the major goal of organizations was to increase shareholder value while emphasizing physical and financial assets. Therefore, many organizations focused on short-term growth and profits. But this paradigm has shifted significantly in last decade and modern organizations discard this accounting dilemma and embrace that organization’s strategy should not centered to profit making only but also consider the importance of co-creation and value creation for customers. Customer co-creation and value creation create significant positive impact on success of organization, and the growth of organization is 2.5 times faster than other organizations who don’t consider importance of customer value creation (Markey 2020).

The research on CX in service-dominant logic has further elaborated the definition of customer experience. The definition of CX in service context is presented as follow:

“The customer’s sensorial, affective, cognitive, relational, and behavioural responses and reactions to any direct or indirect contact with the service offering, across multiple touchpoints during the entire customer journey.”

(Jaakkola, Becker, & Panina 2022)

2.6.1 Importance of Customer Experience

Customer experience is considered as one major source for growth and competitive edge for organization in modern business era (Homburg, Jozić & Kuehnl 2017). It is very important to develop superior customer experience by organizations, to achieve happy customers as well as gain their loyalty toward business. It enables organizations to achieve and maintain market

leading position, by attaining a competitive edge on its competitors (Grewal, Levy & Kumar 2009; Kandampully, Zhang & Jaakkola 2018).

Vahtola (2020) has presented that CX happens when customers interact with product of service of organizations at different steps and various environments. It can be digital domain or a physical space. It is very important from organizational' s perspective to provide consistent and positive interaction with customers, no matter where the interaction occurs. The expectations and perception of the customer has a significant influence on CX, but it is also heavily dependent on organizations process throughout customer journey.

Puustinen and Saarijärvi (2020) mentioned that CX is always devised as subjective and holistic experience from customer's perspective. It is essential to consider CX as a phenomenon whenever there is economic exchange between people. Recently, CX emerged as a valuable tool to enhance customer centricity in organizations. However, the prime objective is not to please customers, but to offer best possible solution to customers.

According to Vahtola (2020), customers are becoming more demanding day by day and now the decision to select a product or service from an organization is heavily based on overall customer experience. Their expectations from the organization are high and to meet those requirements, it is vital to understand customer perspective and analyze their needs. The organizations should use real-time data and predictive analysis to create superior customer experience for customers, by solving issues for customers even before their encounter to these issues.

Customer experience is a very important aspect in service-dominant logic. The quality of customer experience is not only important to retain existing customers, but it also opens new channels for businesses. It is a very popular concept but still so many organizations neglect or do not put many efforts to monitor customer experience in real time and just rely on simplified methods such as Net Promoter Score (NPS). This is a big negligence that can severely harm the business and its long-term goals. These methods are simpler but do not present true insight into customer experience which can be misleading. The customer experience has many dimensions such as touch points, value creation elements (resources, activities, context, interaction, and role of customer) as well as emotions and cognitive emotions. These dimensions cannot be measured by a single data point. Today organizations acquire sheer volume of data from customers, but only data is not sufficient to get customer insights and customer experience analytics is also of great importance. Here also, digital transformation plays a vital role for organizations such as AI and Big data analytics to improve customer experience and extract true customer insights, for informed decision making for organizations (Zaki 2019).

2.6.2 Customer Experience formation

Usually, CX is considered as reaction of customers towards product/service providing organization and its created stimuli (Jaakkola, Helkkula & Aarikka-Stenroos 2015) but since beginning of twentieth century, co-creative nature of customer experience formation is emphasized. In recent times, CX has great influence from customers perspective and cannot be controlled only by organization.

CX is not an individual incident and cannot be considered as standalone entity. There are various aspects such as interaction of customer with product/services, touch points controlled by organization, external touch points beyond the control of organization, environmental factors, societal norms and social networks that constitutes formation of CX. (Trévinat and Stenger, 2014)

Hwang and Seo (2016) presented that there are two groups of factors that impact and moderate customer experience: internal factors and external factors. The internal factors mainly constitute demographic, social and cultural considerations whereas external factors mainly include service/product quality, physical environment, and employee characteristics. The CX of the same stimuli can be very different for different customers. Darboe (2022) has presented the framework of CX and related factors as shown in Figure 8. These interactions of customer with organizations devise the cumulative CX.

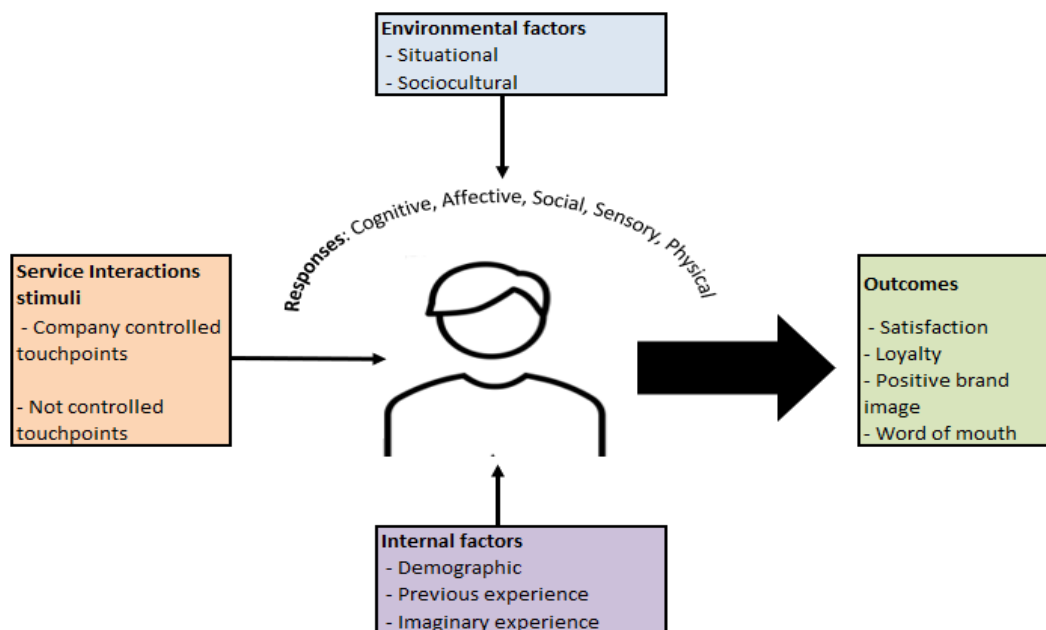


Figure 8: Conceptualization of customer experience.

Helkkula and Kelleher (2010) mentioned that CX is cyclic and interrelated as every individual got value perception through their cumulative experience. CX dynamically evolves and transforms along customer journey. CX formation is based on notion of certain important and defining interactions, known as “moment of truth”, throughout customer journey.

Beaujean, Davidson and Madge (2006) presented that when customers are experiencing these moments, they devote significant amount of emotional energy to the outcome, which enables organization to establish an emotional connection and make a favorable impression to customers. It is important for an organization to devise these critical interactions ‘right’ which in turn become beneficial outcomes for organization. Whereas some elements are merely minimum requirements of customers and have not much influence in creating superior customer experience and results.

2.6.3 Customer satisfaction

Customer satisfaction (CS) is sometimes discussed in parallel with CX or interchangeably with CX. Kotler (1999) presented that extent of product performance that matches with expectations of customer is considered as customer satisfaction. Palmer (2010) also considered that service quality and CS are essential elements of superior customer experience. CS is about fulfillment level of customer from a product or service that meet their expectations. It has significant influence in the modern business world as customer tends to opt for product and services that offer high value for customers, according to their perception. However, CX is constituted on various factors and CS is one of them (Hwang & Seo, 2016).

CS is about fulfillment level of customer from a product or service that meet their expectations. It has significant influence in the modern business world as customer tends to opt for product and services that offer high value for customers, according to their perception. There is no universal definition for customer satisfaction and there are many theories to explain CS. The most renowned theories about CS are Expectancy-Disconfirmation Paradigm (Oliver 2009) and the Value-Precept concept (Yuksel & Yuksel 2011).

Expectancy-Disconfirmation Paradigm theory:

This theory is presented by Oliver (2009) and mentioned that customers always make comparison of new service experience with a standard that they have developed about service. The satisfaction of customer is based on how well the new service meet that standard. The customer’s decision is based on their expectations, attitudes and expectations. The Expectancy-Disconfirmation Paradigm theory is presented in Figure 9.

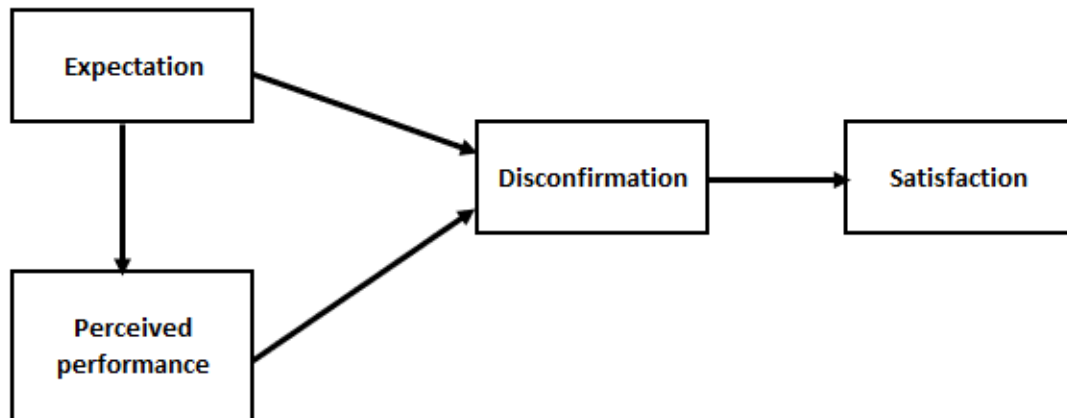


Figure 9: The model of the Expectancy-Disconfirmation Paradigm theory.

The Value-Precept theory:

The Value-Precept theory is presented by Yuksel and Yuksel (2011). This theory considered customer satisfaction as an emotional response which is triggered by customer's cognitive evaluative process. In this cognitive process, customers tend to compare perception of offer to their requirement, values and expectations. They usually create a judgment about service, its offered benefits, and outcomes even before making the decision of purchase. The CS is widely based on this comparison and the closer the service's performance matches the customer's expectations, the more likely they are to be satisfied with the outcome.

Generally, both theories have similarities about presenting customer satisfaction and its direct relation to customers' perception and expectations.

2.6.4 Importance of Customer satisfaction in B2B context

Customer satisfaction for superior customer experience in Business to Business (B2B) context has significant importance as high customer satisfaction leads towards higher brand loyalty which is a sustainable competitive advantage (Kotler & Pfoertsch 2006).

B2B transactions and relationships are diverse and complex in nature. Customer satisfaction in B2B is of great importance and has unique features. In B2B transactions, both seller and customers are organizations therefore customers are also considered as partners in these transactions. It is very different that Business to customer (B2C) transaction as their customer is one person who makes decision of buying form selling organization. Whereas in B2B, a chain of management is involved in decision-making process such as top executives, Sales/purchasing management and technical management. Each of them has their own interests and motivation in this decision-making process.

Kotler and Pfoertsch (2006) mentioned that buying process has eight distinguished stages such as Problem recognition, General idea description, Product specification, Search for and evaluation of potential suppliers, Proposal solicitation and analysis, Supplier evaluation and selection, Order-routine specification, and Performance review. Every step has its own requirements and importance. Wilson (2008) also mentioned that the buying decision-making process in B2B customers is more conscious and demanding as business customers are more rational and consider various aspects in decision-making process.

Due to these facts, customer satisfaction measurement in B2B context is not straight forward, rather it is a complex process. The modern business world is heavily globalized and based on a customer-driven economy. The B2B customers are more informed, demanding and have high expectations due to high competition and availability of various options to choose from. It is very important for organizations in B2B sector to achieve competitive edge, by offering product/services for highest customer satisfaction. It is presented in Microsoft (2018) that 95% of customers mentioned that good B2B customer service is a very important factor that has significant impact on customer loyalty level of a company. It is also mentioned that 61% of customers discontinue their business transactions with brands that offer poor customer experience. Hence, it is very important for B2B organizations to measure customer satisfaction and improve it to achieve growth in their businesses.

2.6.5 Customer satisfaction measurement

Customer satisfaction measurement is very important, especially in B2B transactions due to high stake involvement. Although it is not straight forward to directly measure customer satisfaction like other business indicators such as revenue stream but there are multiple tools and matrices for measuring CS. Czarnecki (1999) mentioned that customer satisfaction is based on overall behavior of consumer, and it is not possible to get reliable information by using only a single measure. Therefore, it is important to use multiple satisfaction measures to evaluate integrity and accuracy of results.

Evangelos and Yannis (2010) presented that business organizations have multiple sources to collect information about customers, by utilization of research methods, operational data, marketing and sales data etc. The most common research methods for obtaining information about customer satisfaction are customer surveys, customer visits, customer panels and mystery shoppers etc.

The CS measurement can be mentioned in two categories: direct measurement and indirect measurement. The direct measurement system is where data is collected directly from the customers by various methods such as customer satisfaction survey, customers' semi-structured interviews and customer complaints etc. The organization can use these methods according to their requirements. The second category, indirect measurement system, is

where information is collected from other system data such as sales data and website visitor rate etc. It is very beneficial for organizations to utilize both systems together to get real insight about their customers (Evangelos & Yannis 2010).

There are various tools for measuring customer satisfaction level such as the Customer Satisfaction Score, Net Promoter Score, Customer Effort Score, Customer Churn rate, Customer Retention rate, etc. (Morgan 2019). The organization can use these tools according to their requirements.

Lee and Phillips (2021) mentioned that the customer satisfaction score (CSAT) is a very useful and renowned tools for measuring average satisfaction level of customers. It is based on simple question in various form that “How is your experience with company?”. The answer to this question has a scale, ranging from unsatisfactory, unsatisfactory, satisfactory, very satisfactory. The more positive answer reflects higher satisfaction score from customers. Morgan (2019) also presented that it is most commonly used metric due to its simplicity and adaptability to any interaction of customers with organization. The questionnaire is simple, and organizations get quick feedback from customer about their offerings and related customer experience.

The customer satisfaction measuring process can be developed by utilization of suitable tools and methods, according to the requirement of organization. In this process, it is important to consider that it aligns with general principles of conducting a market/customer survey as well as adopting the key rules of continuous improvement in business organization. The data collection process may vary according to various customers, their perceptions, and expectations but general principles should remain unvarying throughout the process. The main process steps of designing and implementing a customer satisfaction process are mentioned in Figure 10 (Evangelos & Yannis 2010).

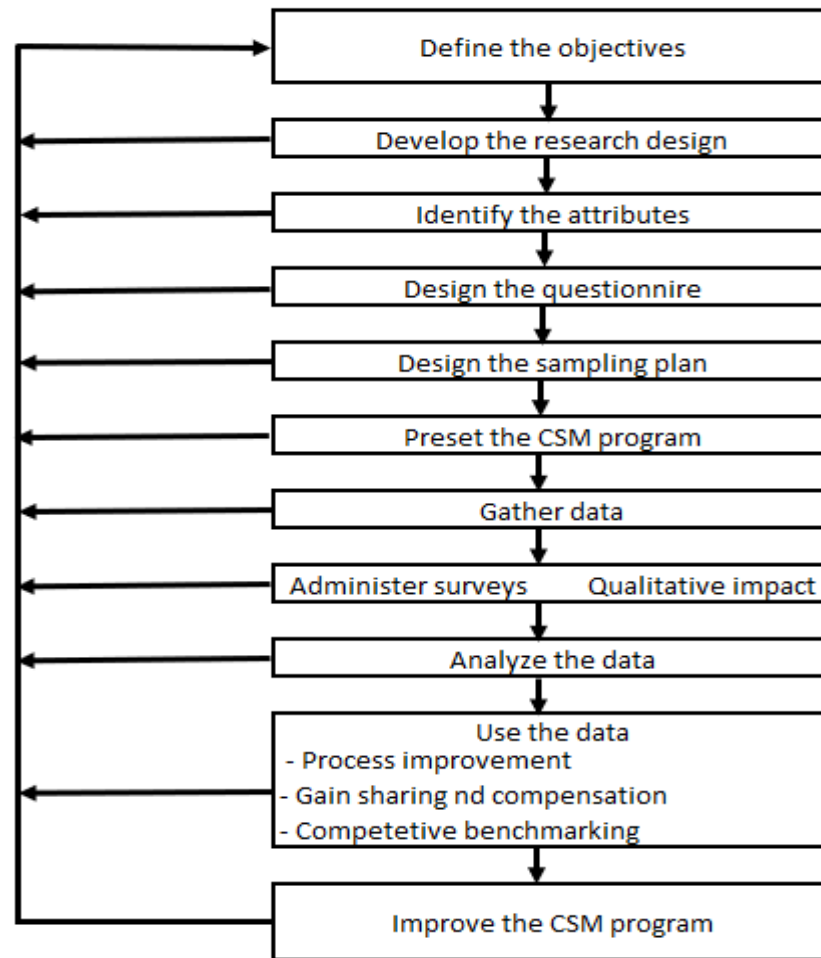


Figure 10: Customer satisfaction measurement process

3 Research Methodology

3.1 Case Description

ABB is a leading organization to offer innovative technologies and solutions in fields of electrification, automation and digitalization. It is a Swedish-Swiss industrial corporation, with headquarter in Zurich, Switzerland. It has a strong presence in the global market by establishing operations in more than 100 countries. It has four business areas: Electrification, Motion, Process automation and Robotics & Discrete automation. All these business areas have various divisions (ABB 2023).

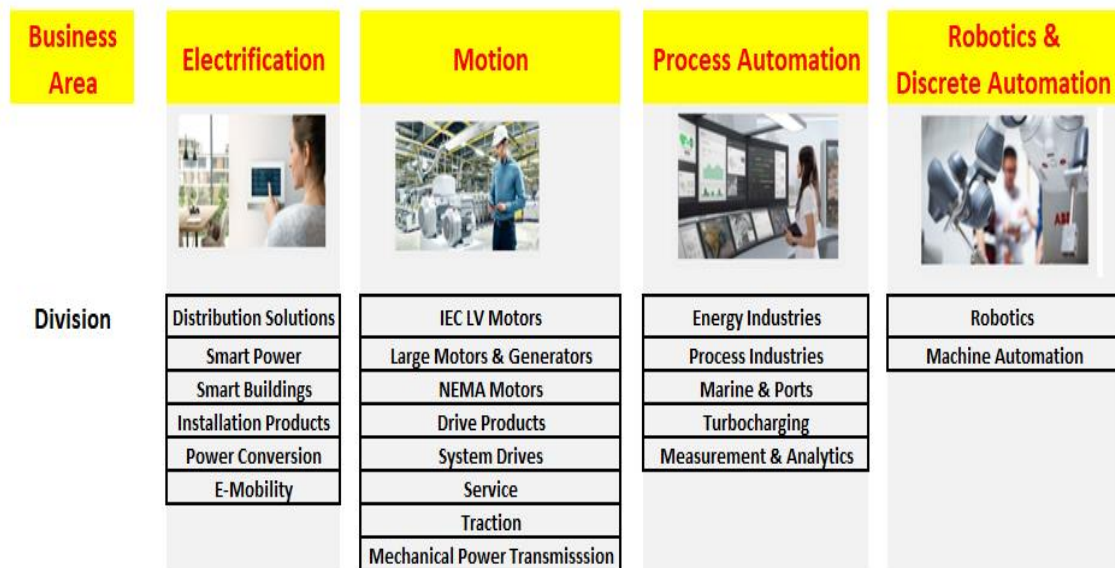


Figure 11: ABB Business Areas and Divisions

ABB has strong presence in Finland, and it has production facilities in various cities of Finland such as Helsinki, Vasa, Porvoo and Hamina. ABB Drives, Finland is a key production facility in Helsinki city, which comprises of 27000 m² area. It has two major local division: Drives and Motion Services (ABB Oy 2023).

The case organization of this thesis is “ABB Drives, Finland”, which is located in Helsinki. ABB Drives is global technology leader that offers world class single drives, drives systems and drive packages to various industrial segments such as process industries, infrastructure & utility, transportation (marine) and renewable energy. In recent years, ABB Drives has shifted their paradigm toward service-dominant logic and acknowledged the importance of co-creation and superior customer experience. They are continuously transforming their offerings to create superior customer journey for their customers throughout (ABB Drives 2023).

In manufacturing organizations, one important component of quality control process is “Factory Acceptance Test (FAT)”. It involves the testing of manufactured products and its features, before shipment from production factory. FAT is normally done in the presence of customers and in demanding segments, classification/inspection agencies are also involved in FATs, such as in Marine segment, related Marine Classification society is also involved in FATs.

FAT is also one major phase of ABB Drives offering toward its customers. Traditionally, when Drives are manufactured in ABB Drives Finland, the customer and related inspection body was invited to join the FAT in test field of ABB Drives Factory, Helsinki Finland. Then in the presence of the customer, FAT is done according to agreed agenda. But to cope with

restrictions to COVID-19 pandemic, ABB Oy also developed a new approach for its customers, to perform remote FAT (R-FAT). It enables customers to avoid travelling and offers convenience to take part in FAT through digital tools. Now, post COVID-19 pandemic, there are no strict restrictions, still R-FAT is a popular solution for customers. due to ease and cost efficiency

This research study is focused on analyzing and improving FAT (both physical FAT and remote FAT) process in ABB Drives, Finland, to create superior customer experience for ABB Drives' customers.

3.2 Research progression

This research study is based on action research method as it offers extensive benefits for theoretical as well as practical point of view. Action research method is utilized for specific situations, and it is not required to produce universal knowledge. It is very effective for complex problems and presents extrapolation of wide context. Actions research is a very effective research method for complex issues in organizations (Coughlan & Coughlan 2002).

In empirical studies, there are two general categories of methods such as quantitative methods and qualitative methods. Quantitative methods usually rely on statistical analysis whereas qualitative methods utilize interpretative research. The objective of qualitative studies is to get insights and understand considered topic. The research work can include several cases or only one case (Hirsjärvi, Remes & Sajavaara 2007). It is also mentioned by Palmer (2010) that qualitative methods are preferred in studies where focus is on process improvement and customer experience as they are multi-dimensional and situation specific in nature.

In the action research method, the researcher focuses on comments of participants in research and then adjusts the theory accordingly. This is very similar approach to service design concepts where the focus is on active participation of end-users in co-creation process. Therefore, action research methodology is considered for this research thesis. Moreover, this research work considers once specific target organization (case organization) and including multiple organizations in research work would be not add additional benefits in this research work.

Extensive actions research is a five-stage cyclic process. These stages are diagnosing stage, action planning stage, action taking stage, evaluation stage and specifying learning stage. It is not mandatory to use all stages in all actions research process and can be chosen according to requirement of process (Susman and Evered 1978). The cyclic process of actions research is presented in Figure 12.

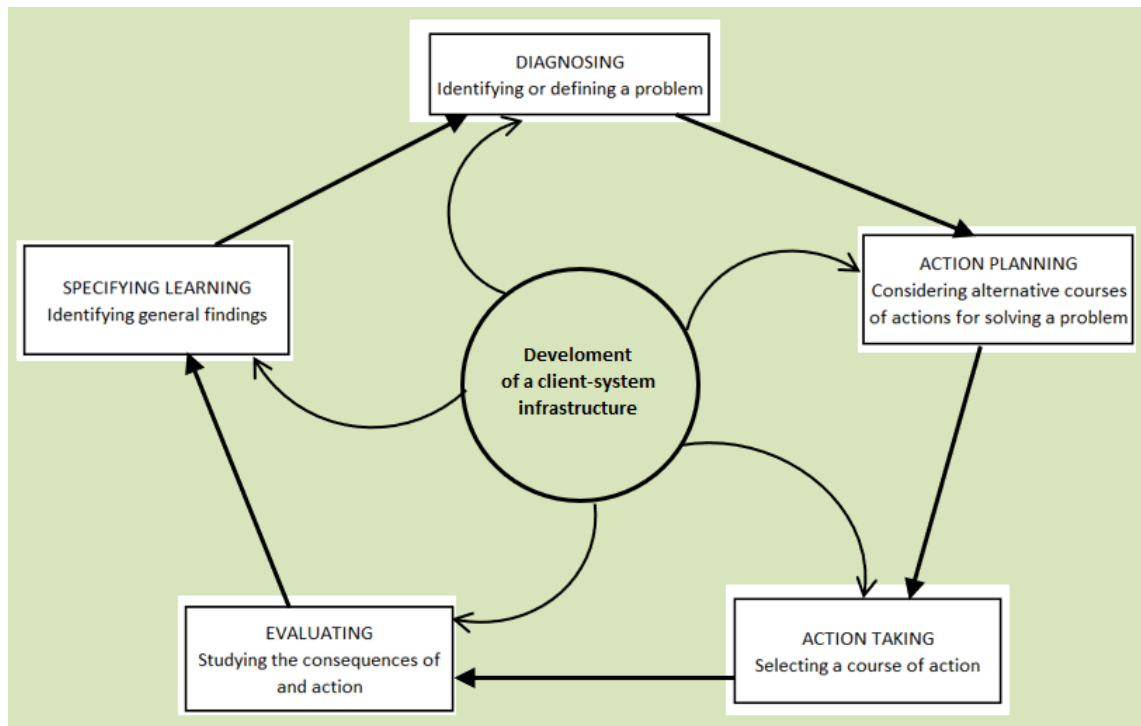


Figure 12: Cyclic process of action research

In this research study, the researcher has utilized action research structure, presented by Avison, Lau, Myers and Nielsen (1999) which consists of three stages: problem diagnostic, actions intervention and reflective intervention. It is very useful for this research study as it is possible to perform two stages simultaneously. The researcher has merged planning stage with literature review and performed it before and during problem diagnostic stage. The researcher also performs evaluation during each stage of the research process. Figure 13 presents the structure of empirical study in this thesis work.

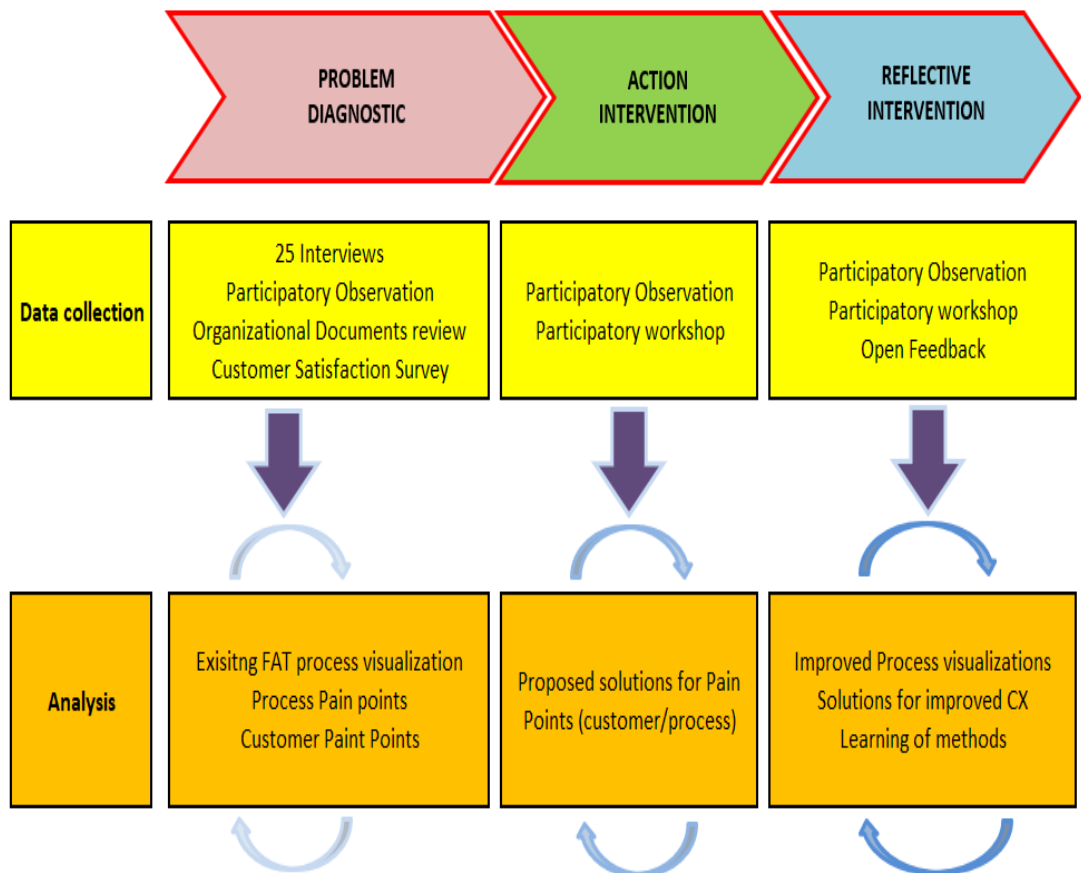


Figure 13: Research process overview

In qualitative research, the most typical methods for data collection method are Interviews, observations, text analysis, surveys and transcribing. Depending on the process requirement, researchers may use one method or a combination of several methods.

In this research study, researcher has uses multiple methods for data collection such as semi-structures interviews, participatory observations, organizational documents review, participatory workshop, customer satisfaction survey, open feedbacks, and comments. The data collection and analysis are done iteratively at each stage. This whole process is completed in one transaction and the process flowchart is presented in Figure 14.

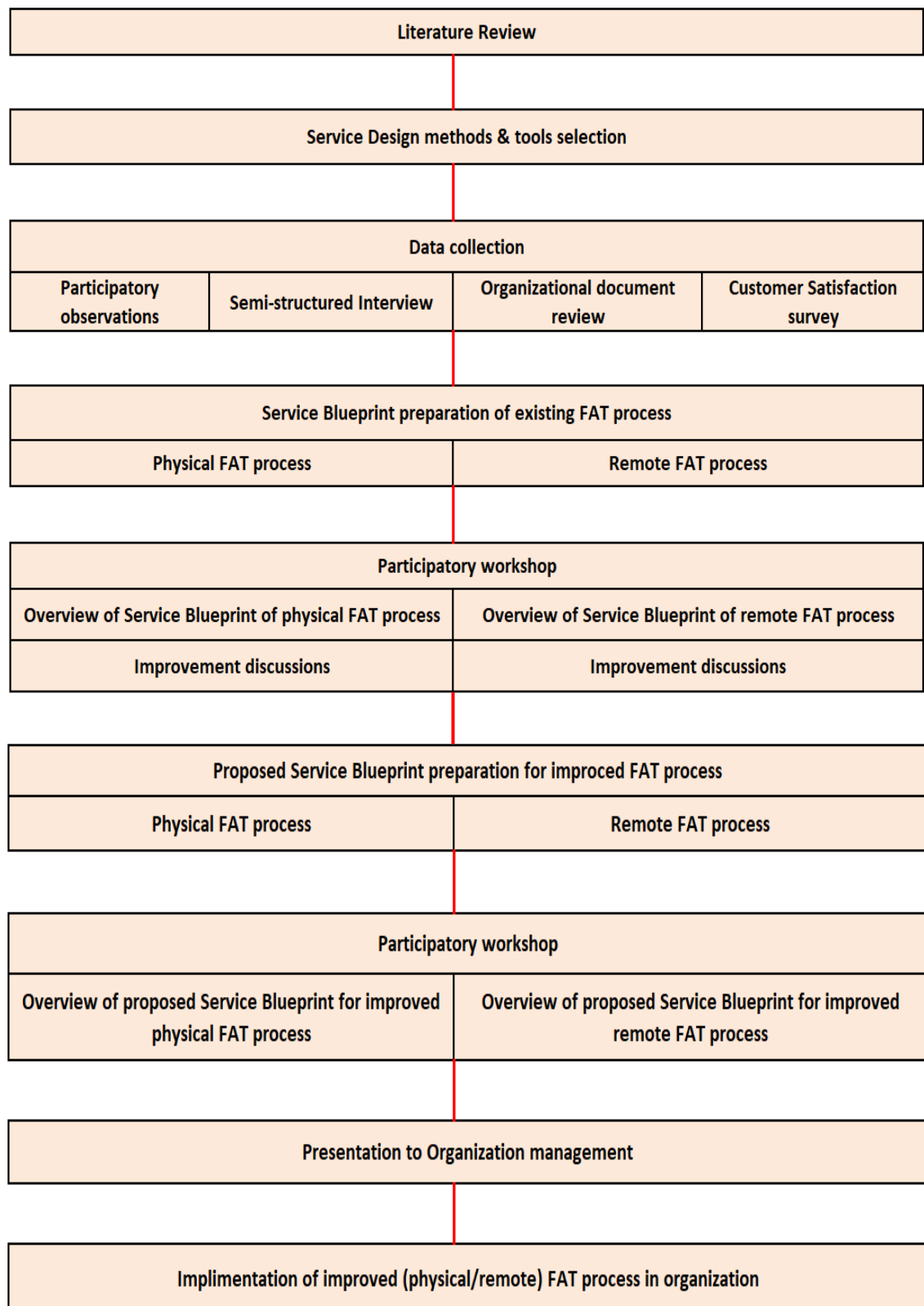


Figure 14: Research process flowchart

3.2.1 Phase 1: Problem Diagnostic phase

The first stage of this research study is problem diagnostic. For this purpose, the researcher had firstly reviewed organizational documents (Work instructions, process manuals, responsibility matrix etc.). The organizational documents review was very helpful to understand standard operation procedure, major stakeholders their responsibility in FAT process of ABB Drives, Finland.

The researcher was performing as thesis worker in case organization, and she had done participatory observations of 6 physical FATs and 8 remotes FATs, to get insights about actual process of FAT. During these participatory observations, researcher got opportunity to meet and discuss with customers as well.

Then researcher had done semi-structured interviews with major stakeholders involved in FAT process (both physical and remote). The interview process involved various departments of case organizations such as Sales Support department, Project Management department, Engineering department and Test-field department etc. as well as customers in FATs. These interviews were also very helpful to understand existing working practices from people who were performing these FATs. The interview details are mentioned in Table 3.

Department	Participants	Designation	Professional Experience
Sales Support	12	Sales Support Manager	10-25 years
Project Management	2	Project Manager	2-15 years
Engineering	2	Lead Engineer	10-15 years
Test Field	3	Test Engineer	5-15 years
Customers	6	Project Managers/Sales Manager/Engineers	5-25 years

Table 3: Interview process details

The interviewees were selected from various departments who are involved in FAT, but the majority of interviews were done in Sales Support department with Sales Support Managers as it is their prime responsibility to arrange and perform FATs. The interviews were semi-structured in nature, to leave room for more detailed questions, based on discussions during interviews. The interview questions were not shared with interviewees before interview meeting, but general agenda was shared in invitation. The length of the interview was approximately 60 minutes.

The researcher also performed Customer Satisfaction survey, to get insights from customer's perspective and how they perceive FAT process in ABB Drives, Finland. The list of targeted customers was provided by organizations. The customer satisfaction survey was prepared in MS Forms and data collection was done online. The questionnaire in survey was based on 15 questions. The survey was sent to customers via email, along with a cover letter that explained background and purpose of survey. This survey was very helpful to understand customer's viewpoint about physical and remote FAT process of ABB Drives, Finland.

The prime objective of organizational documents review, participatory observations, semi-structured interviews of stakeholders and customer satisfaction survey was to get insights and visualize existing process of physical and remote FAT in ABB Drives, Finland, as well as to identify process and customer pain points for improvements. Based on these insights, the researcher prepared the Service Blueprint of existing Physical FAT and existing remote FAT process.

3.2.2 Phase 2: Action Intervention phase

The next phase was the action interaction phase, where researcher had utilized output of problem diagnostic phase and prepared Service Blueprint of existing process of physical FAT and remote FAT. Then the researcher arranged a participatory workshop. All major stakeholders (Sales support Department, Project management department etc.) were invited in this workshop where researcher had presented prepared Service Blueprint to workshop participant for their review and comments. The researcher performed as a facilitator during participatory workshop, noted comments and feedback of participants. It was a very constructive discussion, and many good ideas were discussed among participants. Considering notes, observation and ideation from action intervention phase, the researcher had done analysis and prepared proposed Service Blueprint for improved physical FAT process and proposed Service Blueprint for remote FAT process. Then again, one participatory workshop was arranged with major stakeholders to present findings, pain points, analysis, SD tools, proposed solutions & benefits, and proposed Service Blueprint of improved FAT process, for both physical as well as remote FAT in ABB Drives, Finland. The discussion in the workshop was very constructive and head of Sales Support department approved to apply these proposals to FAT processes in ABB Drives, Finland.

3.2.3 Phase 3: Reflection phase

The next phase was the reflective phase, the new proposed service blueprint of P-FAT and R-FAT were implemented in ABB Drives Finland. Although the majority of proposed solutions were implemented in FAT processes but there were certain proposals that had been started to implement but take time before complete implementation. The researcher had done

participatory observation during numerous FATs in which new proposed solutions and done informal discussion and took feedback from various stakeholders about new FAT processes.

4 Results and Analysis

4.1 Evaluation of suitable SD methods and tools.

The first focus point of this study is to determine suitable SD methods and tools to improve factory acceptance test, both physical as well as remote FAT, in case organization. There are two research questions as mentioned in chapter 1. The first research question is:

RQ1: What service design methods and tools are suitable to understand & describe current FAT process and customer journey in FAT of case organization?

There are various SD methods and tools available for service designers. It is important to choose the most appropriate SD tools according to requirements and practicality of focused case. These tools should be chosen as per required characteristics, stage of process, nature of case and design interventions. There is no hard and fast rule how to choose SD methods & tools, and Service Designers are free to choose various SD tools as well as utilize different mixtures of SD tools according to nature of case study.

The researcher has conducted extensive literature review to identify suitable SD methods and tools according to the nature of this research case. The SD tools for this case should be suitable for visualization of organizational process, customer journey as well as for improvement of overall process for superior customer experience. In this research study, the researcher has utilized categorization of Tassi (2009) for categorization of SD methods and tools, present in table 4.

Service Design Tools categorization (Tassi 2009)	
Design Activities	Co-designing Envisioning Testing & Prototyping Implementing
Representations	Texts Graphs Narratives Games Models
Recipients	Stakeholders Professionals Service Staff Users
Contents	Context System Offering Interaction

Table 4: Service Design Tools categorization

Based on Literature review and Tassi (2009) categorization of service design tools, the following SD tools have been selected for visualization of organizational process and improvement of process for superior customer experience in this research study.

- Personas
- Stakeholder map
- Service blueprint
- Customer Journey map
- Participant observation
- Participatory workshop
- Customer Satisfaction Survey

Persona is a powerful tool to understand, empathize with and design based on customer-centric approach. It is representation of target users, their needs and goals. It provides valuable insight in the service design process, enhances user experience and assists in designing more effective and impactful services. It is very helpful to get a deeper understanding of target users, empathize with their expectations and requirements. It enables service designers to focus on users throughout the design process. These are also instrumental in creating user/customer journey maps, to visualize complete user experience. (Design Council 2015; Stickdorn & Schneider 2011; Tassi 2009. Service design tools [Personas]). Considering the importance of Persona tool, it is selected to understand customers of ABB Drives Finland which are major stakeholders of FAT.

In order to understand a system/service for improvement, it is of most importance to understand the role of various stakeholders in the system/service. For this purpose, a very useful service design tool is stakeholder map. It is very useful for visual representation of system/service where multiple actors are involved. There are multiple ways to present stakeholder maps such as in table form or by drawing concentric circles and placing stakeholders in the circles organically (Giordano, Morelli, Götzen & Hunziker 2018; Stickdorn & Schneider 2011; Tassi 2009. Service design tools [Stakeholder map]). For case study, it is selected to visualize various stakeholders in Factory Acceptance test and what are their role and importance in system.

One major step in this research study was to visualize the complete process of Factory Acceptance test in the case organization. The suitable SD tool for visualization of FAT process in case organization should meet four criteria, based on Tassi (2009) categorization. These criteria are graph representation, design process suitability, taking into account all stakeholders and interaction content. One most appropriate tool for such a purpose is Service blueprint. It is used for visualization of function and activities of complete system/service as well as it provides reliable information about involved stakeholders and their respective role

in system/service (Fließ & Kleinaltenkamp 2004; Holdford & Kennedy 1999; Shostack 1984; Tassi 2009. Service design tools [Service Blueprint]). Considering the usefulness and practical benefits of Service Blueprint, it is selected for visualization and improvement of FAT process in case organization.

The Service Design process is customer centric and there are various tools available for understanding customer requirements, wishes and expectations with system/service. One excellent SD tool for this purpose is Customer Journey map. It is a crucial tool for understanding and enhancing customer experience. It is a visual representation of interactions and touchpoints of customers with system/service and provides key insights about their expectations, experience and pain points. It is very useful to understand system/service from customers' viewpoint. It enables service designers to understand customer experience, identify pain points & opportunities and enhance customer centricity. It is a very powerful tool to improve customer experience, build loyalty and tailor services according to customer expectations. (Fließ, Stieger, & Rüegg-Stürm 2019; Meroni & Sangiorgi 2011; Stickdorn et al. 2018; Tassi 2009. Service design tools [Journey map]). The prime focus of this research study is to improve the FAT process in case organization for superior customer experience and Customer Journey map is a very suitable SD tool in this context. Therefore, researcher has selected this tool in this research study.

Participatory observation is a very common tool in qualitative research. It is used to collect data by participation and observation in usual activities of case system/service, in realistic settings. It is a beneficial tool in ethnographic research that enhances understanding of real actions of people (DeWalt 2015; Meroni & Sangiorgi 2011; Stickdorn et al. 2018). The researcher was not a part of case organization before starting this research study but during this research study she was working as Thesis worker in case organizations. It provides an excellent opportunity for researcher to participate in actual FATs and observe ground realities in this research case. She had done participatory observations of various physical FATs and remote FATs, to get insights about actual process of FAT. During these participatory observations, researcher got opportunity to meet and discuss with customers as well. In addition to participatory observation, the researcher has also conducted semi-structured interviews with major stakeholders in the FAT process.

One major aspect of the Service Design process is co-creation. The participatory workshop is a widely used tool for co-creation. It is an organized event to extract key insights about topics of workshop. In Service Design process, this workshop is very popular and referred to by various notations in literature such as design workshop, participatory workshop or interactive workshop. It is used for information collections from participants, their viewpoint and opinion about design process outcomes through various activities. The activities should be thought provoking and focused on the main goal of workshop. The researcher should act as facilitator.

The core idea of participatory workshop is to explore feedback on selected services or topic from user's perspective. One major advantage of participatory workshop is that it provides a platform for iterative design and rapid prototyping. (Miettinen & Koivisto 2009; Pavelin et al., 2014; Stickdorn and Schneider 2011). Considering the importance of participatory workshop for co-creation, the researcher has selected participatory workshop for this case study. It enables collaboration and co-creation between various stakeholders through interactive exercises, discussions and group activities where participants contributed their diverse perspectives, knowledge, and expertise for case study.

Service Design is a systematic approach to innovate new services or improve existing services for meeting customer expectations. It revolves around co-creation and involvement of end-user/customers in co-creation process is of vital importance. The co-creation process with customers, organizations are able to create services which are truly resonate with expectations of customers and develop superior customer experience. In the Business to Business (B2B) context, customer satisfaction is a vital aspect of superior customer experience. It is very important for growth and the competitive edge of organization in the modern business world. High customer satisfaction leads towards superior customer experience as well as gaining the loyalty of customers towards the service provider (Homburg et al., 2017; Kotler 2006; Kandampully et al., 2018). In B2B context, customer satisfaction measurement is of great importance but measuring customer satisfaction is not a straightforward process. Customer satisfaction can be measured by multiple tools such as customer surveys, customer visits, customer panels and mystery shoppers etc. (Evangelos & Yannis 2010; Lee & Phillips 2021; Morgan 2019). Considering the globalization of ABB Drives' customers, the researcher has selected customer satisfaction survey to measure customer satisfaction with FAT process in this case study.

Based on comprehensive literature review, the researcher has chosen above mentioned SD method & tool and applied it to the case study for improving FAT process to develop superior customer experience.

4.2 Visualizing and Improving FAT process for superior customer experience

The second focus point of this study is to improve FAT process for superior customer experience development through suitable SD methods and tools, both physical as well as remote FAT, in case organization. The second research question is:

RQ2: How service design methods & tools support and improve FAT process in case organization to develop superior customer experience?

After selection of suitable SD methods & tools for this research study, the researcher has utilized these tools to prepare case specific tools for organizational process.

4.2.1 Problem Diagnostic

The FAT service in ABB Drives, Finland is a complex process where various internal and external stakeholders are involved, where some stakeholders are involved multiple times. Also, it is important to consider Physical and remote FAT individually due to their own process and requirements.

The overall physical FAT (P-FAT) process of ABB Drives, Finland can be considered in three phases: Pre-Phase, During-Phase and Post-Phase. The Pre-Phase consists of steps such as scheduling FAT with customer. The During-Phase includes all activities performed on actual FAT date, when customer visits to witness FAT in test field of ABB Drives Factory, Finland. The Post-Phase includes all activities, after departure of customer and before shipment. The physical FAT process is presented in Figure 15.

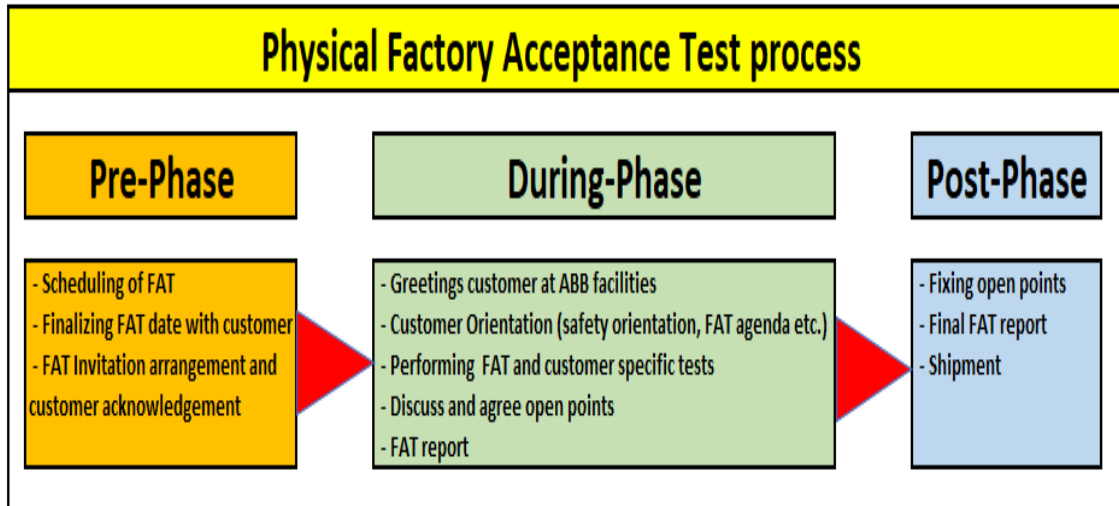


Figure 15: Physical Factory Acceptance Test process

The overall process of Remote FAT of ABB Drives, Finland can also be considered in three phases: Pre-Phase, During-Phase and Post-Phase. The Pre-Phase and Post-phase of R-FAT is similar to P-FAT, but During-phase is different as here the customer is not physically available in test field of ABB Drives Factory, Finland. Instead, digital technology and tools are used to present the equipment, its functions and other features to the customer. The remote FAT process is presented in Figure 16.

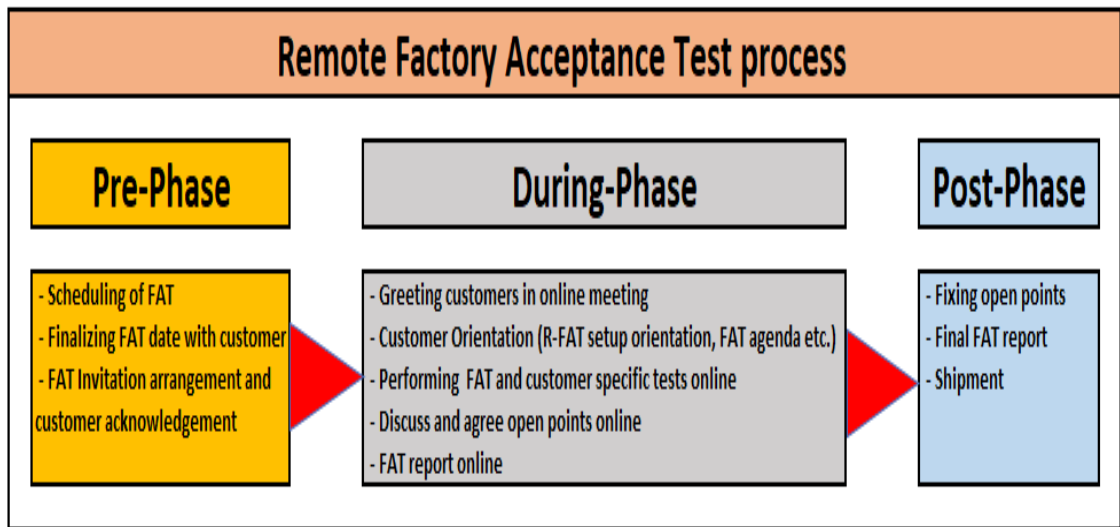


Figure 16: Remote Factory Acceptance Test process

Although, management of ABB Drives, Finland is extensively committed to offer high quality products and service, with improved customer experience but it is high time to moved ahead from traditional working practices and utilize modern information technologies, advance customer service tools and digital transformation to devise superior customer experience in FAT (both physical and remote) process of ABB Drives, Finland.

Hence, it is important to analyze the present process of Physical and Remote FAT in ABB Drives, Finland and how to improve Factory Acceptance test with Service Design methods & tools for superior customer experience. The researcher has selected suitable SD methods & tools for this research study and then prepared case specific tools, based on participatory observations, semi-structured interviews, customer satisfaction surveys and reviewing of existing process document in case organization.

4.2.1.1 Customer Personas

Persona is a service design tool that is utilized to represent information and attributes about similar people in a group. The ABB Drives, Finland servers mainly ABB's other business units which are serving to end-customer organizations. In this way ABB Drives, Finland has direct sales relation with ABB's other business units and indirect sales relations with end-customer organizations. There are two major customers of ABB Drives, Finland:

- Customer A
- Customer B

ABB Drives division is a global technology leader and its local sales units in every country are serving industries, infrastructure and machine builders with world-class drives, drive systems

and packages. Their local sales units are “customer A” of ABB Drives, Finland. They serve customers, partners and equipment manufacturers to improve energy efficiency, asset reliability, productivity, safety & performance, by offering superior technology, a global footprint and application expertise. The persona of customer A is presented in Figure 17.



Figure 17: Persona of Customer A of ABB Drives, Finland.

Whereas “Customer B” supports industries that address a range of essential needs - from supplying energy and water to manufacturing goods and transporting them to market. Through automation, electrification and digital technologies, it helps customers in industry, transport and infrastructure improve the safety, efficiency and sustainability of their operations. The persona of customer B is presented in Figure 18.



Figure 18: Persona of Customer B of ABB Drives, Finland.

The ABB local sales Unit and ABB Process Automation Units interact with end-customers but during FAT, the end customer is also presented.

4.2.1.2 Stakeholder map of FAT

Stakeholder map is a Service Design tool, to represent various individuals and groups involved with a particular system. The selling process of ABB Drives Finland has once major stage which is “Factory Acceptance Test (FAT)” which presents the testing of manufactured equipment with customers and other stakeholders. FAT is done in both ways physically as well as remotely. There is a dedicated team who arrange and perform FAT with customers, with assistance of other departments. In order to understand involvement of various stakeholders in FAT process, the researcher has prepared stakeholder map of FAT process in ABB Drives, Finland which is presented in figure 19.

FAT Stakeholder Map

C-E => Customer Engineer
C-PM => Customer Project Manager
C-SM => Customer Sales Manager

DSM => Drives Sales Manager
D-En => Drives Engineering

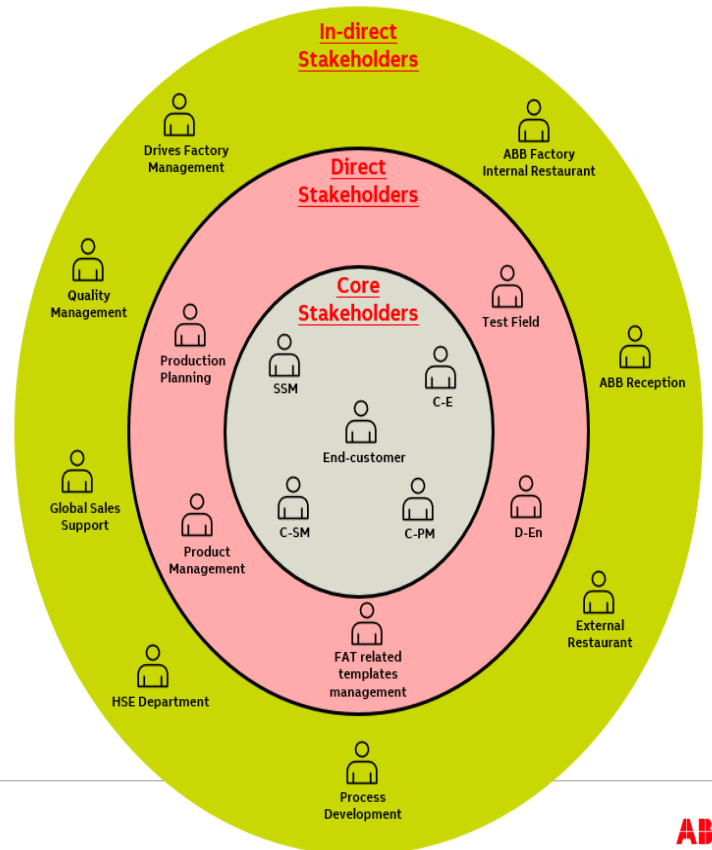


Figure 19: Stakeholder map of FAT process in ABB Drives, Finland.

4.2.1.3 Service Blueprint of Physical FAT in ABB Drives

Service Blueprint is an excellent tool for visualization of current processes of Physical and remote FAT process in case organization. The overall P-FAT process of ABB Drives, Finland is divided in three phases: Pre-Phase, During-Phase and Post-Phase. This division is based on corresponding activities and the nature of steps in the whole FAT process. The service blueprint of P-FAT is shown in Figure 20.

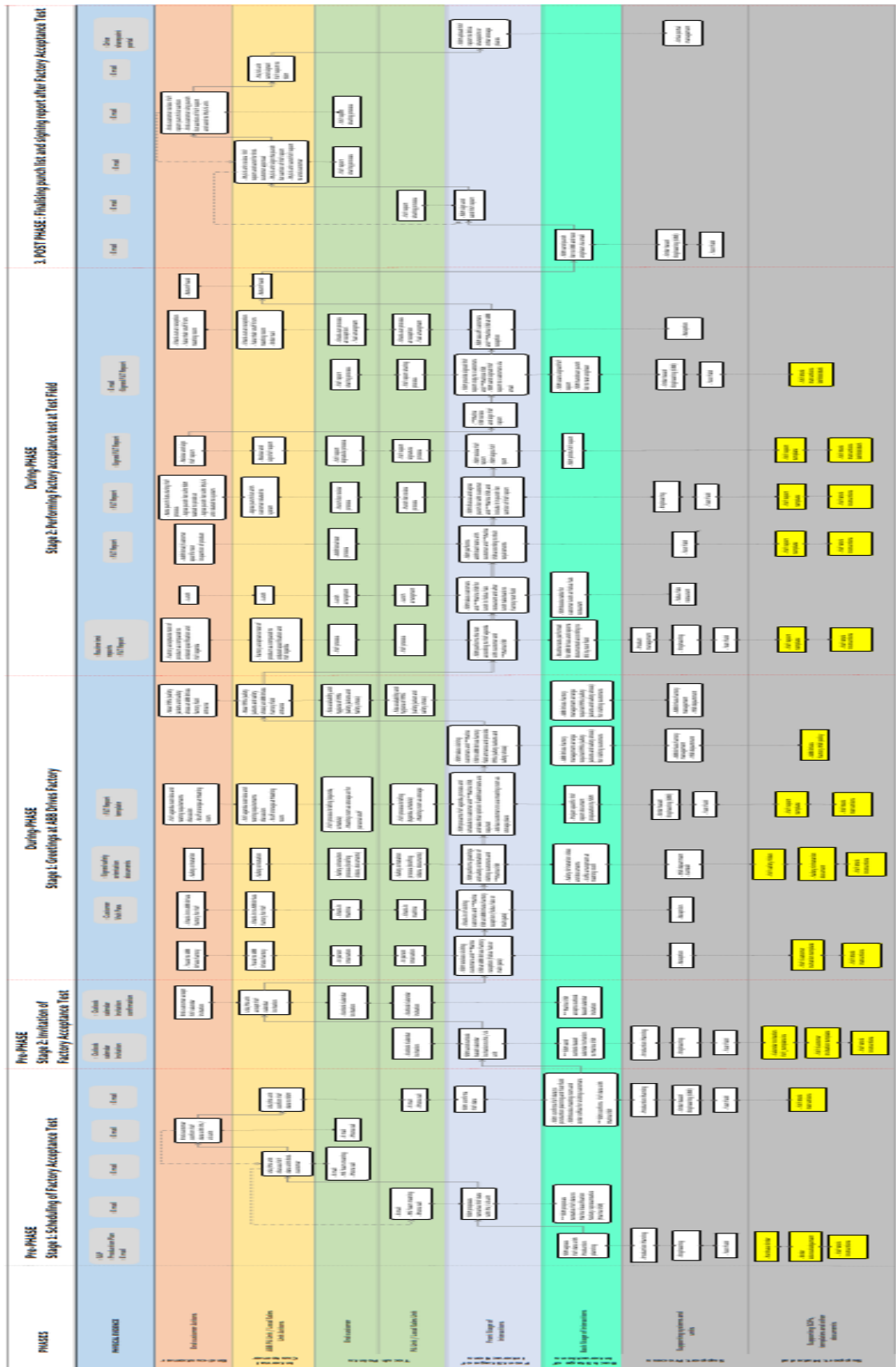


Figure 20: Stakeholder map of FAT process in ABB Drives, Finland.

There are three phases in P-FAT process as Pre-Phase, During-Phase and Post-phase. The P-FAT service blueprint is further divided into four figures to enlighten these phases respectively. The service blueprint is adjusted according to case study, and it has 10 rows. The first row mentions the phase of process. The second row mentions the physical evidence involved in each step. As there are two layers of customers involved i.e., Internal customer and end-customer (product destination organization), the third and fourth row presents internal customer actions and end-customer actions at each step respectively. The next two rows (fifth and sixth) present the touch points associated with internal customer and end-customer. The seventh row is associated with front stage interactions whereas the eighth row is related to backstage interactions. The last two rows present supporting process and supporting documents of FAT process.

Pre-Phase: Scheduling Phase

This is the first phase of the FAT process where scheduling of FAT is discussed and agreed with internal stakeholders of ABB Drives, Finland as well as with external stakeholders. This phase has two stages. This phase is mainly lead by Sale support Manager (SSM). In the first stage, he involves all internal stakeholders to find appropriate dates for FAT of specific sales order. Then SSM proposes these FAT dates to internal customers which are serving to end-customer organizations. The internal customer discusses and agree FAT dates with end-customer and give confirmation to SSM. It is an iterative process as if proposed dates are not suitable for customers, then FAT dates are reconsidered to find suitable schedule for FAT process. All this communication between SSM and internal customer as well as with end-customer organization is done via Emails or MS team calls.

Once suitable dates for FAT are agreed, then the second stage of pre-phase is creating official invitation to all internal and external stakeholders. This is also done by SSM who prepares outlook calendar invitation and sends it to all stakeholders. This outlook invitation has also pre-defined documents as attachments that contain practical information for customers (travel details, address, contact information, general FAT agenda etc.). The SSM also books the meeting room and made other practical arrangements for FAT scheduling. In this phase, there are multiple supporting processes and support documents are involved as mentioned in the service blueprint. The pre-phase of P-FAT process in prepared service blueprint is presented in Figure 21.

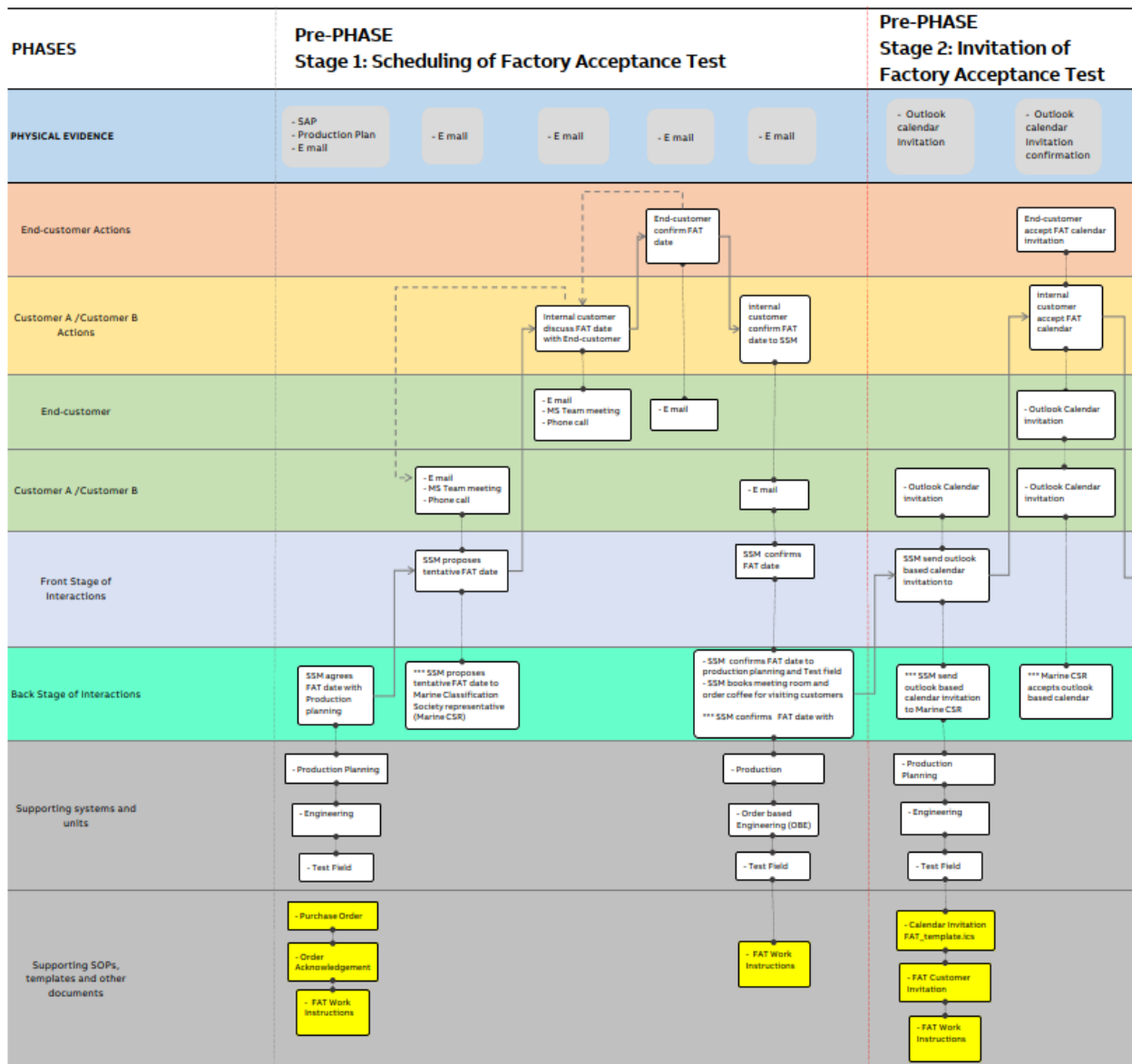


Figure 21: Pre-Phase of P-FAT process

The service blueprint part of Pre-Phase reveals that it is entirely manual process and all communication of various stakeholders is done via emails. Also, this communication is saved in personal emails and if relative SSM is not available then it is quite difficult to trace back the status of FAT scheduling agreement. There is no dedicated platform to store all this information. It is also noted that although there are certain templates available for outlook calendar invitation but FAT invitation to customer is mostly done in own style by various SSM. In addition to that, the document attachments with invitation are not standardized and every SSM has its preference for FAT invitation. Although the existing process serves the purpose but to create superior customer experience, it is required to standardize the scheduling and invitation process of FAT in case organization.

During-Phase: Greeting and performing FAT

This is the second phase of the FAT process which represent all steps involved on the day(s) of actual FAT when customer visits test field of ABB Drives Factory, Finland, to witness the FAT process. This phase is further divided into 2 stages.

The first stage is about greeting the customers and taking them to the test field factory floor. The SSM receives the customers at ABB Drives factory and assists them in check-in at reception. Then SSM takes customers to an already booked meeting room where they SSM performs safety orientation with customers. Then they review the FAT agenda and discuss if some additional tests are required to be done during FAT. After that SSM and customers move towards factory and at factory entrance, they wear personal protective equipment (PPEs) such as safety jackets and safety shoes. Then they reach the test field of ABB Drive factory. The stage 1 of During-Phase is shown in Figure 22.

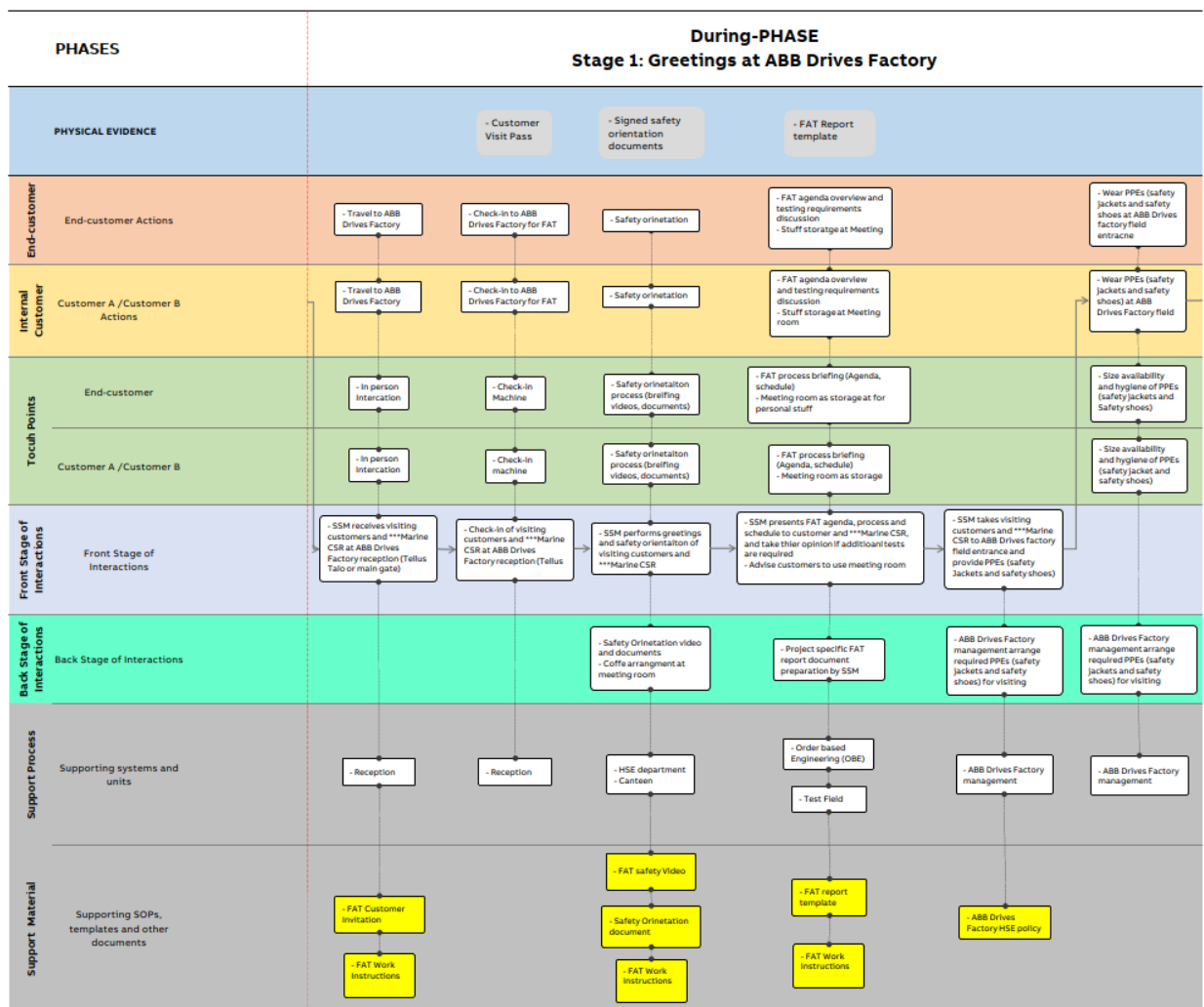


Figure 22: During-Phase of P-FAT process (Stage 1)

It is identified in stage 1 of During-Phase part of service blueprint that certain improvements in this stage can enhance and improve customer experience. The safety video in orientation process is solely focused on safety instruction but it does not have any introduction or layout of ABB Drives Factory in Finland. After safety orientation, one document is signed by customer to acknowledge that he has received safety orientation. This document is stored in personal folders of SSM and there is no dedicated storage system to store/retrieve this document for frequent visitors. Another observation was that customers store their luggage/personal items in meeting room which is not locked and unattended during FAT at test field. There are no separate lockers for customers' stuff near reception. The PPEs are available at factory entrance, but their arrangement can be improved (various size sections, different racks for used/unused etc.)

The next stage of During-phase involves all tests done in FAT process at test field with customer to witness and approve. There are multiple tests according to sales product as well as customer specific tests. The SSM utilizes one general FAT report template to record the progress of test during FAT. One important section of this FAT report is "punch list section" where all punches, comments and observation during FAT has been listed. After all tests are done, SSM prepares FAT report, print and reviews it with customers, especially punch list section. The customers review hard copy of FAT report and sign it. Then SSM scans this signed FAT report and sends it to all stakeholders via email. He also hands over one copy to the test engineer for punch list fixing. Then SSM accompanies customers back to reception and see-off customers. Stage 2 of During-Phase is shown in Figure 23.

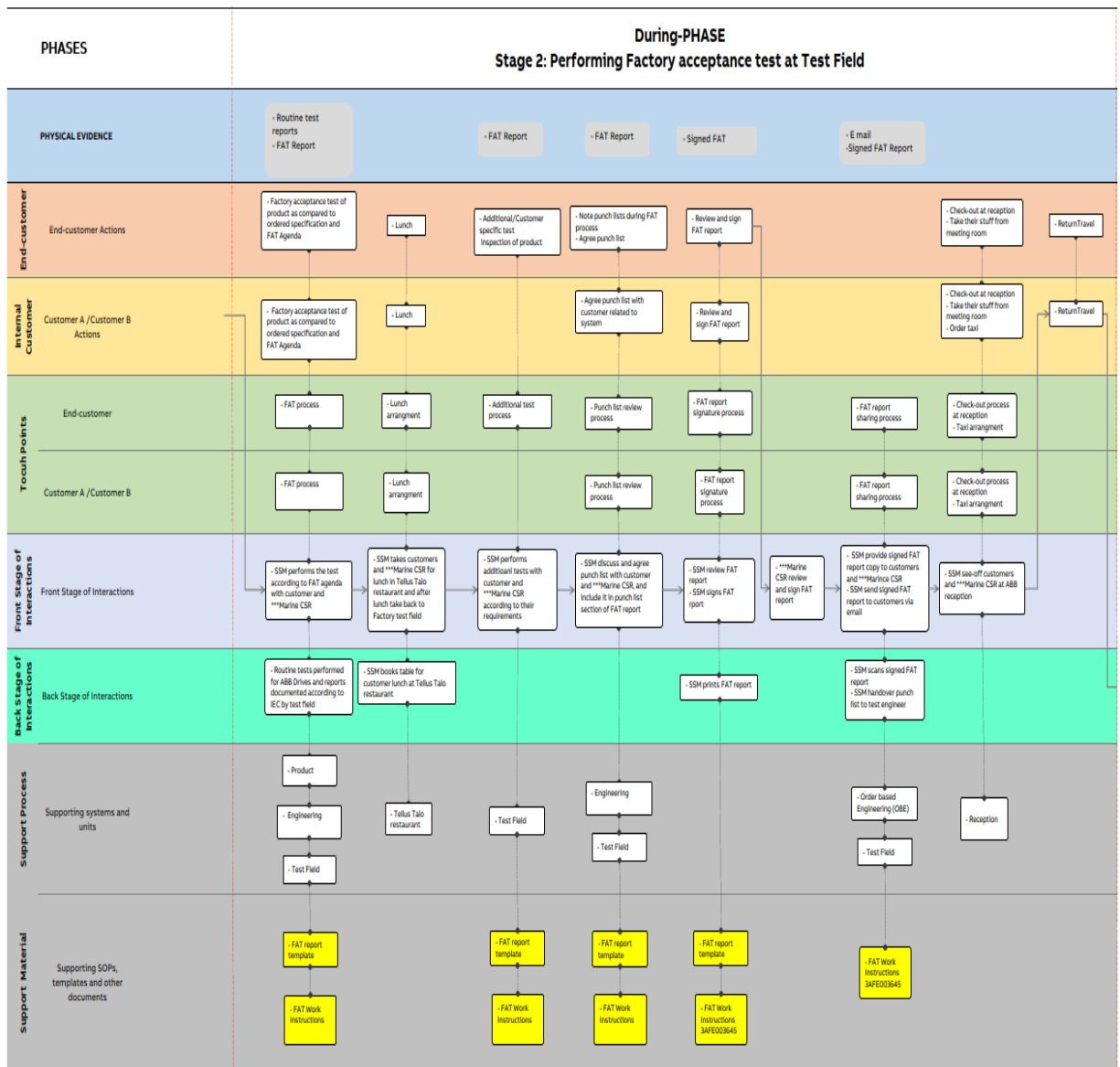


Figure 23: During-Phase of P-FAT process (Stage 2)

Stage 2 of During-Phase part of service blueprint also requires improvements to develop superior customer experience. The FAT report has various sections and based on inputs from stakeholders, these sections require update. The exact details cannot be shared here due to confidential information, but this has been thoroughly discussed and improved in case organization. It is also noted that FAT report preparation, punch list creation and acknowledgment signing of FAT reports is a manual process, where SSM prepares FAT report on local disk, prints hard copy, sign hard copy, get it signed by customer, scan this report and send via email to stakeholders. There is not a digital portal to create, sign and distribute digital FAT reports with internal as well as external stakeholders and avoid all these manual steps.

Post-Phase: finalizing punch list and distributing final FAT report

This is the last phase of the FAT process which consists of fixing the punch list, comments and observation during FAT tests. After FAT day, the SSM sends all details for fixing discussed and agreed punches to all stakeholders (Engineering, Test field). The test engineer fixes all punches accordingly and then confirms to SSM about status. This communication is done via email or via personal interactions.

Upon fixing all punches, SSM sign the punch list section and send final FAT report to internal customer who then share this report with end-customer for approval. The communication between SSM and customer is done via email. FAT report is signed by customer after approving all changes and then SSM saves final FAT report in central document portal. Then equipment is transferred to the packing section for shipment. Figure 24 presents Post-Phase of P-FAT.

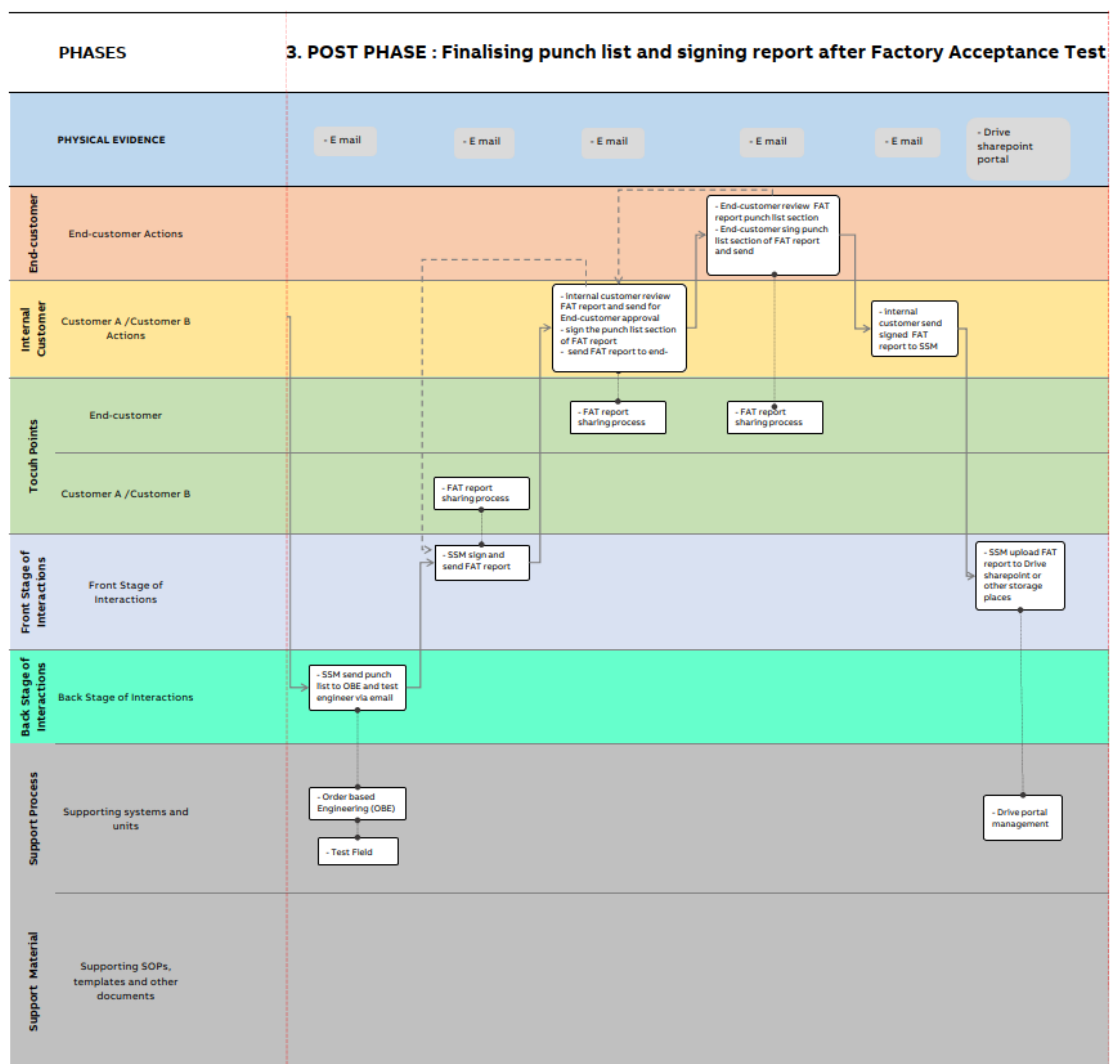


Figure 24: Post-Phase of P-FAT process

The Post-Phase involves one very important step of FAT i.e., punch list distribution with internal stakeholders, fixing punch list, generating & sending final FAT reports to customers for their acknowledgement and finally store the FAT at dedicated storage place. It is identified that SSM does manually performs the punch list distribution with internal stakeholders and feedback to SSM about fixing of punch list is given manually (Email or personal interaction). There is no dedicated system for punch list management. Also, the process of final FAT report to customer is manual and done via emails. The final FAT report is also stored with SSM folders and no proper traceback process is there.

4.2.1.4 Service Blueprint of Remote FAT in ABB Drives

The process of P-FAT has certain similarities with the process of R-FAT but still these are major differences in execution of P-FAT and R-FAT. Therefore, a separate service blueprint for visualization of R-FAT process in case organization is prepared. The overall R-FAT process is also divided into three phases: Pre-Phase, During-Phase and Post-Phase. The Pre-Phase and Post-Phase of P-FAT and R-FAT are similar, but During-Phase is entirely different in P-FAT and R-FAT. The R-FAT service blueprint presents three phases. It is further divided into four figures to enlighten these phases respectively. In R-FAT service blueprint, a similar approach has been considered as P-FAT service blueprint. The complete service blueprint of R-FAT is shown in Figure 25.

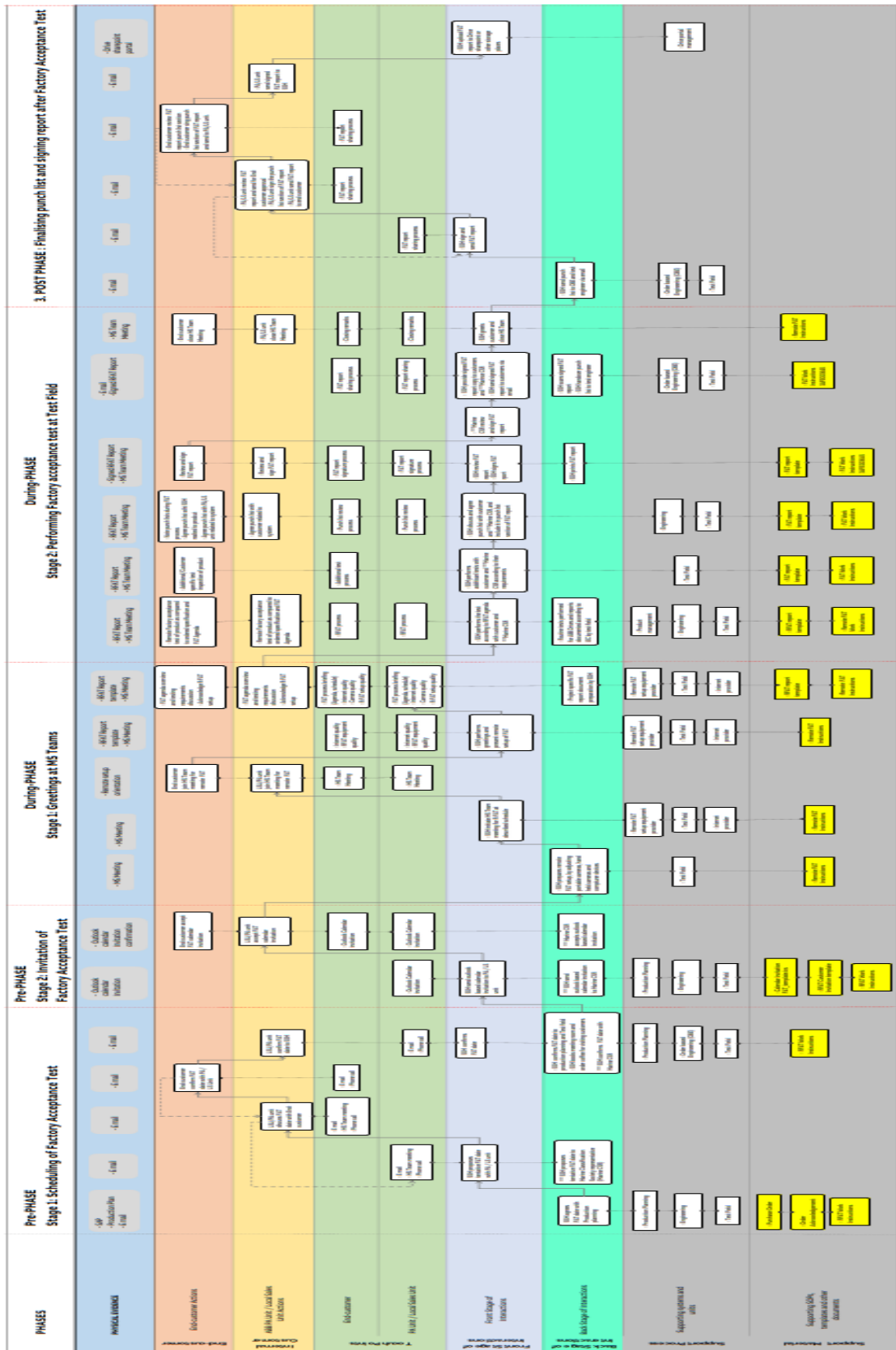


Figure 25: Post-Phase of P-FAT process

Pre-Phase: Scheduling Phase.

The Pre-Phase of P-FAT and R-FAT is similar which consists of scheduling FAT with internal stakeholders of ABB Drives as well as with external stakeholders. This phase has two stages. This phase is mainly lead by Sale support Manager (SSM). In the first stage, he involves all internal stakeholders (production planning, Engineering, test field department etc.) to find appropriate dates for FAT of specific sales order. Then SSM proposes these FAT dates to Internal customers which are serving to end-customer organizations. These units discuss and agree FAT dates with send customer and give confirmation to SSM. It is an iterative process as if proposed dates are not suitable for customers, then FAT dates are reconsidered to find suitable schedule for FAT process. All this communication between SSM and internal customer as well as with end-customer organization is done via Emails or MS team calls.

Once suitable dates for FAT are agreed, then the second stage of the pre-phase is creating official invitation to all internal and external stakeholders. This is also done by SSM who prepares outlook calendar invitation and sends it to all stakeholders. This outlook invitation has also pre-defined documents as attachments that contain practical information for customers (travel details, address, contact information, general FAT agenda etc.). The SSM also books the meeting room and made other practical arrangements for FAT scheduling. In this phase, there are multiple supporting processes and support documents are involved as mentioned in the service blueprint. The pre-phase of R-FAT process in prepared service blueprint is presented in Figure 26.

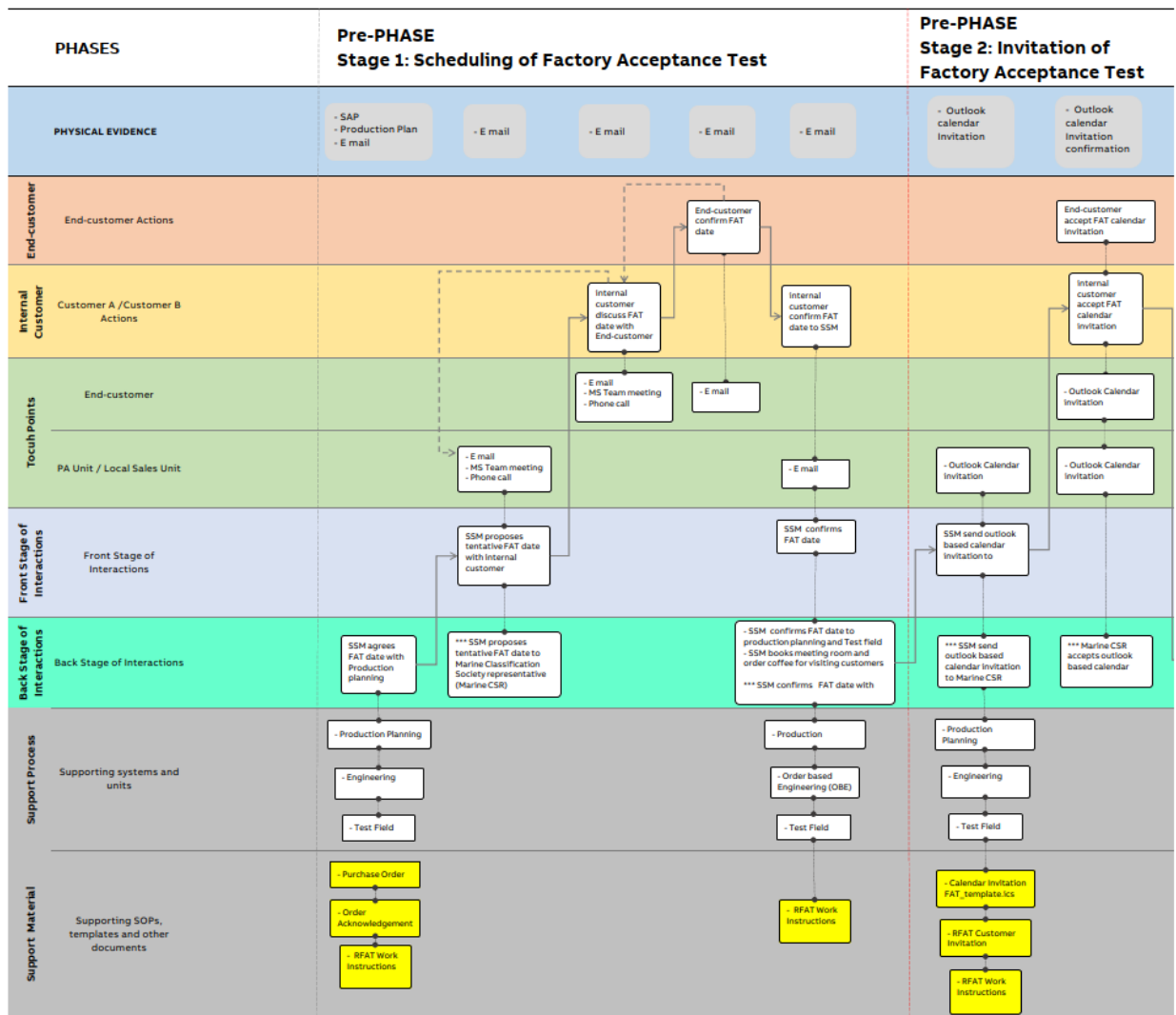


Figure 26: Pre-Phase of R-FAT process

As the Pre-Phase of P-FAT and R-FAT are similar, the identification of certain points for improvement are also similar as mentioned in P-FAT Pre-Phase section.

During-Phase: Greeting and performing FAT remotely

The During-Phase of R-FAT is very different from P-FAT as in this case customer is not present physically to test field of ABB Drives Factory in Helsinki, Finland. Instead, Digital equipment and tools are utilized to perform FAT remotely. This phase is divided into 2 stages.

The first stage is about connecting the customers via digital communication software and ABB uses MS Team for this purpose. This stage is initiated with backstage actions where SSM prepares remote FAT setup, by connecting & adjusting portable cameras, handheld cameras, computer and other digital devices. Then SSM initiates the MS team meeting at an agreed

schedule. When all stakeholders join MS team meeting, SSM greets customer and shortly brief about remote FAT setup/cameras. As the customer is not physically visit test field therefor safety orientation is brief in this case. Then they review the FAT agenda and discuss if some additional tests are required to be done during FAT. The stage 1 of During-Phase is shown in Figure 27.

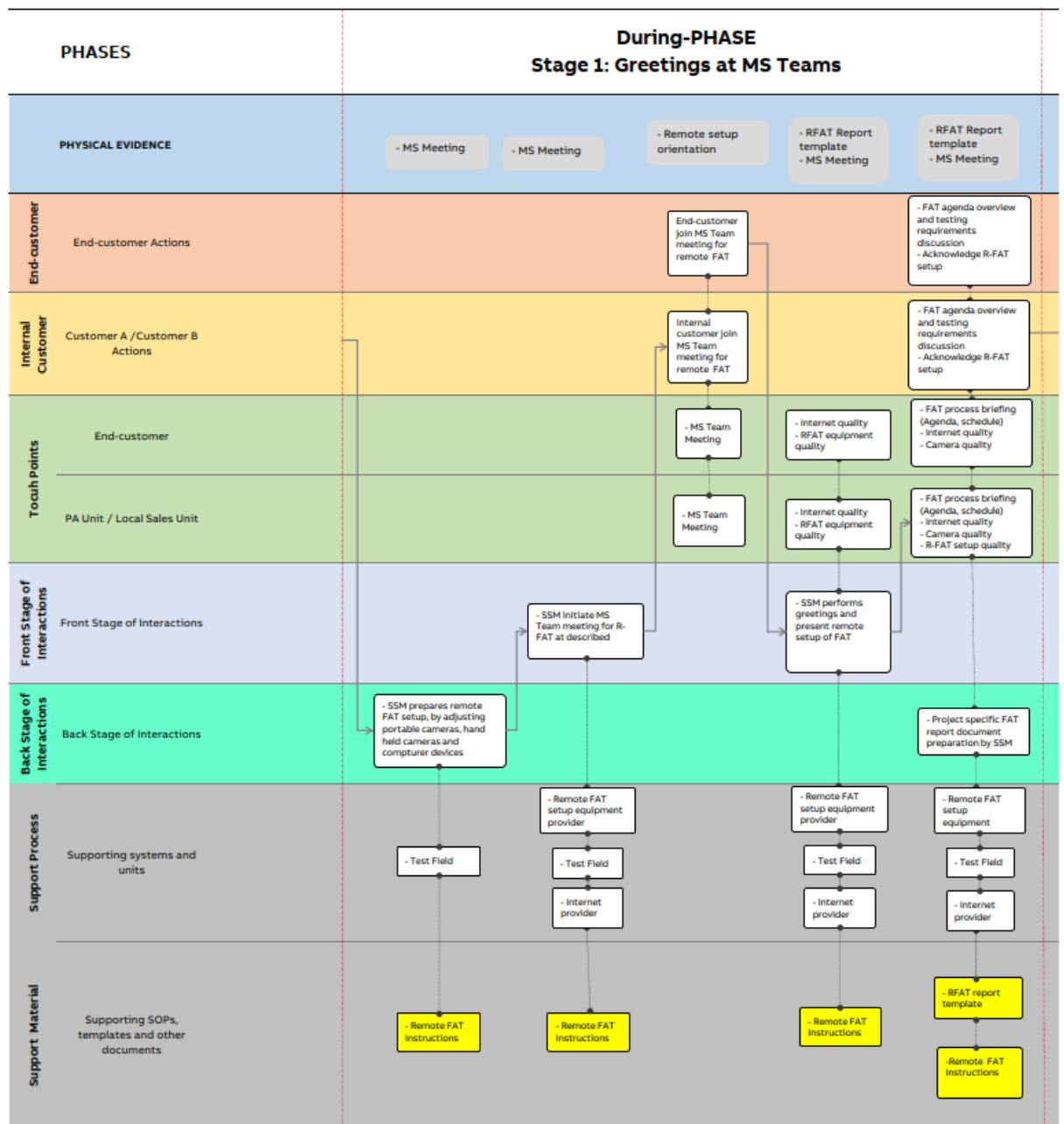


Figure 27: During-Phase of R-FAT process (Stage 1)

In R-FAT, stage 1 of During-Phase part of service blueprint is of great importance. The customer experience is greatly dependent on digital tools, internet speed, camera quality and communication software, used in remote FAT setup. The researcher has identified that to

some extent, remote FAT setup is also based on SSM working style. It takes time and effort to organize remote FAT setup as there are not pre-defined fixed cameras in the test field. Also, the quality of handheld mobile cameras is not a good source of video communication. Some SSMs prefer to use a couple of cameras and handheld mobile camera for remote FAT whereas other SSM has practice to use advance digital equipment such as HoloLens, in addition to other cameras. It is also observed that internet signals at test field drops sometimes which is a negative impact on customer experience. There is no introductory video for R-FAT setup and ABB Drives Factory R-FAT process. As all communication (audio and video) is done digitally therefore it is very important to utilize modern digital equipment for standardized R-FAT setup, to develop superior customer experience.

The next stage of During-Phase involves all tests done remotely in FAT process at test field with digitally connected customer to witness and approve. There are multiple tests according to sales product as well as customer specific tests. The SSM utilizes one general FAT report template to record the progress of test during FAT which is shared with customer via screen sharing. It is a manual process as report is on local storage of SSM. One important section of this FAT report is “punch list section” where all punches, comments and observation during FAT has been listed. After all tests are done, SSM prepares FAT report and reviews it with customers, especially punch list section. The customers FAT report and approve it. Then SSM prints the FAT report, signs it and scans this signed FAT report. Then he shared this report via email or MS team with the customer, who prints it, signs it, scans it and then emails it back to SSM. Then SSM sends this report to stakeholders via email. He also hands over one copy to the test engineer for punch list fixing. This all signing and report sharing process is manual and depends on SSM’s working style. Then SSM greets the customer and close MS team meeting. Stage 2 of During-Phase is shown in Figure 28.

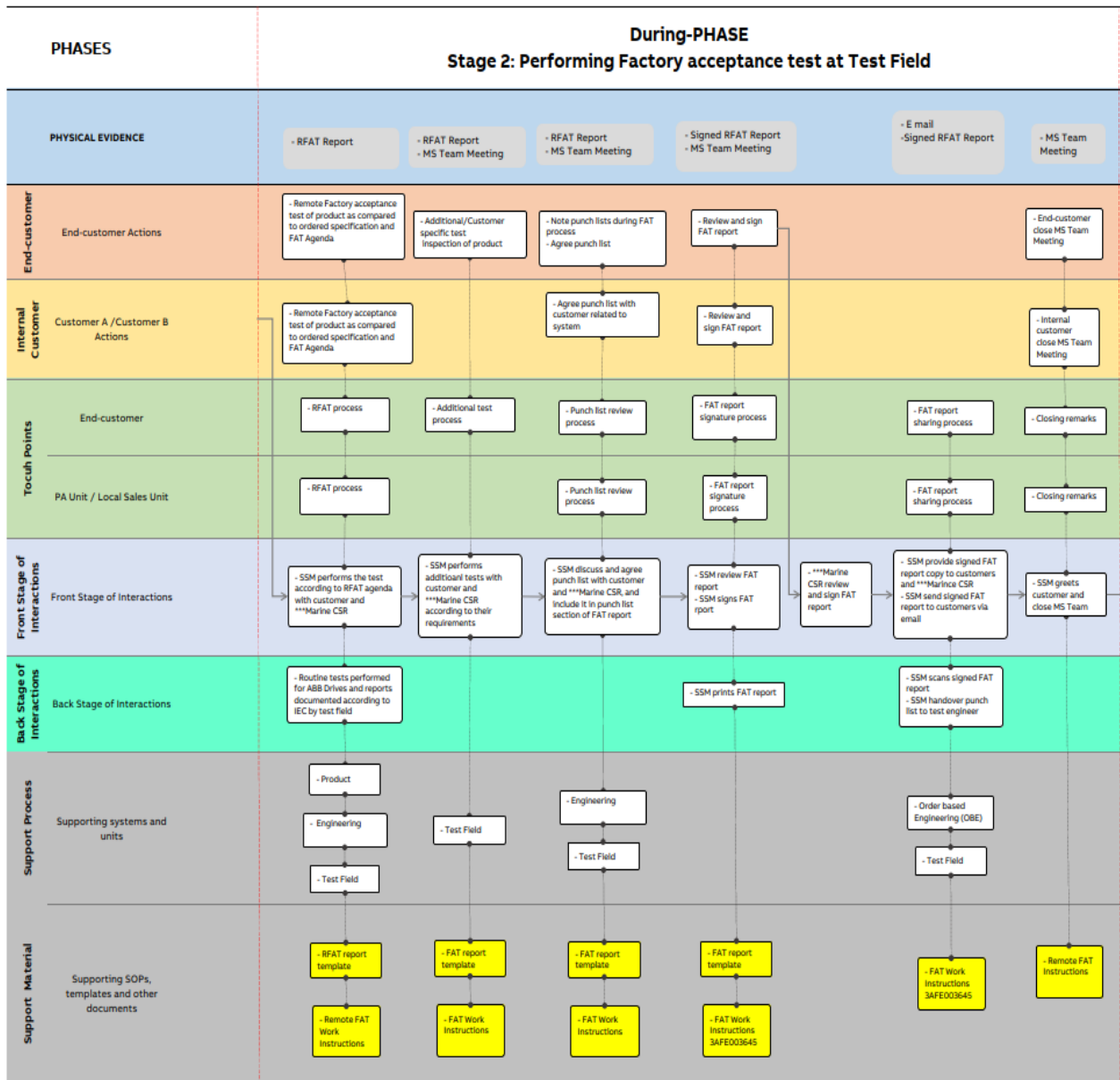


Figure 28: During-Phase of R-FAT process (Stage 2)

It is noted that Stage 2 of During-Phase part of service blueprint requires extensive improvements to develop superior customer experience. The most important aspect is R-FAT setup, digital tools, quality of cameras and quality of internet network. The FAT report has various sections and based on inputs from stakeholders, these sections require update. The exact details cannot be shared here due to confidential information, but this has been thoroughly discussed and improved in case organization. It is also noted that R-FAT report preparation, punch list creation and acknowledgment signing of FAT reports is a manual process, There is not a digital portal to create, electronically sign and distribute digital FAT reports with internal as well as external stakeholders and avoid all these manual steps.

Post-Phase: finalizing punch list and distributing final FAT report

The Post-Phase of P-FAT and R-FAT is also similar, which consists of fixing the punch list, comments, and observation during FAT tests. After FAT day, the SSM sends all details for fixing discussed and agreed punches to all stakeholders (Engineering, Test field). The test engineer fixes all punches accordingly and then confirms to SSM about status. This communication is done via email or via personal interactions.

Upon fixing all punches, SSM sign the punch list section and send final FAT report to internal customer who then share this report with end-customer for approval. The communication between SSM and customer is done via email. FAT report is signed by customer after approving all changes and then SSM saves final FAT report in central document portal. Then equipment is transferred to the packing section for shipment. Figure 29 presents Post-Phase of R-FAT.

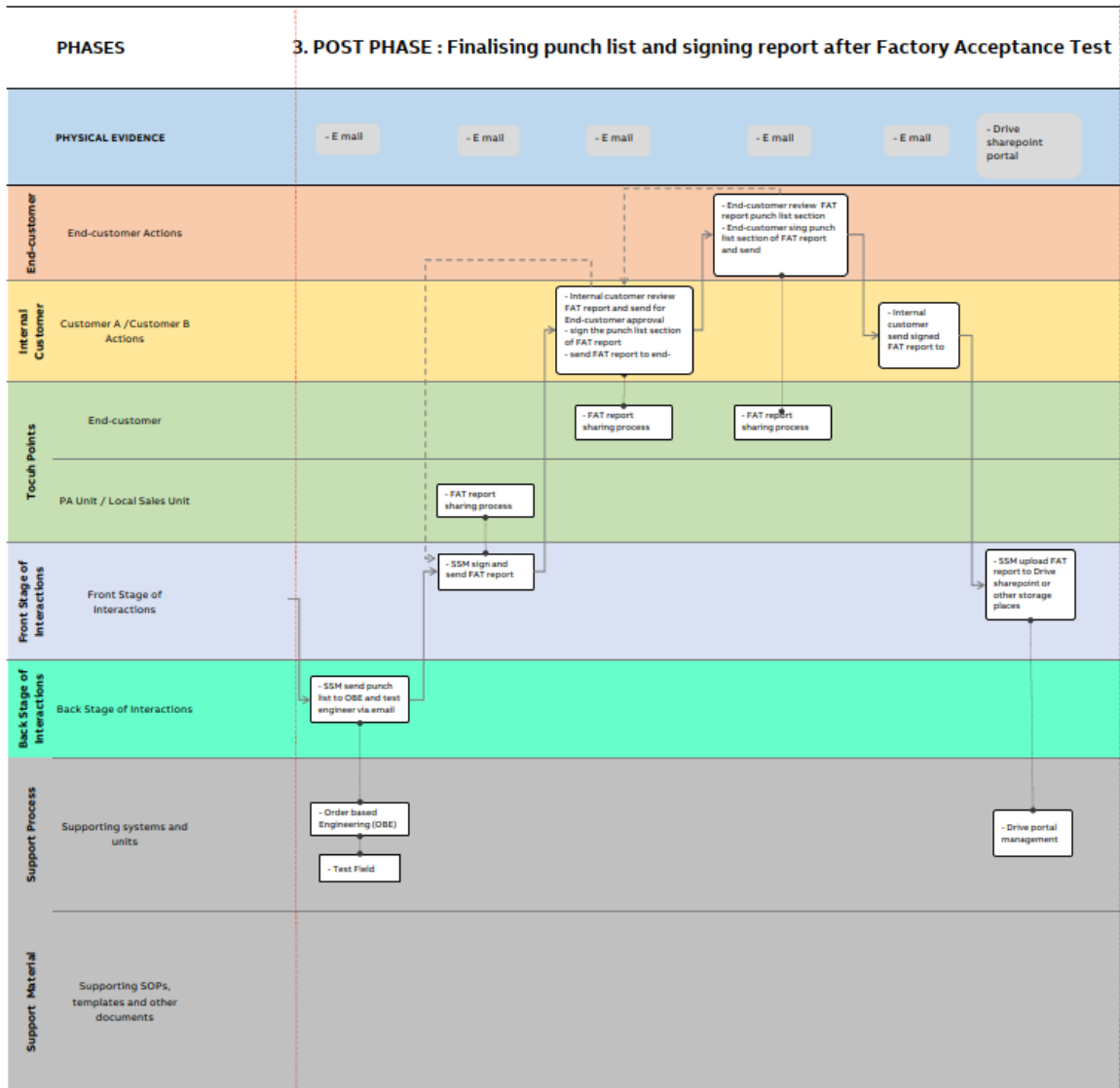


Figure 29: Post-Phase of R-FAT process

As the Post-Phase of P-FAT and R-FAT are similar, the identification of certain points for improvement are also similar as mentioned in P-FAT Pre-Phase section.

4.2.1.5 Customer Satisfaction Survey

Co-creation is very important in the modern business world as the customer role has been changed from isolation toward more informative and connected. To create superior customer experience, the customer opinion, requirements and wishes must be considered in the service development process. Keeping this in view, the researcher has devised “Customer satisfaction survey” for P-FAT and R-FAT process separately and distribute these to major customers of ABB Drives Finland.

The survey was administered to a diverse sample of customers from various demographics and segmentations to ensure a representative response pool. The surveys were based on 5-point Likert scale, ranging from “Strongly Disagree” to “Strongly Agree” and it had 4 sections. The first section was about information on the customer segment. The second section contains questions related to the Pre-Phase of FAT process. The third section was based on questions about During-Phase of FAT Process. The next section four had questions about Post-Phase of FAT process. In the end, there was a section for customers’ comments about their thoughts and expectations. The main idea of these surveys was to get customers’ insights about P-FAT and R-FAT process.

The responses of surveys were tabulated and subjected to statistical analysis. It is identified through analysis that the majority of customers (approx. 74%) reported satisfaction being “Agree” or “Strongly Agree” with P-FAT processes and dissatisfaction levels “Disagree” or “Strongly Disagree” were relatively low (approx.12%). Almost 14% responses were mentioned as “Neutral”. In the R-FAT process survey, also majority of customer reported satisfaction (approx. 71%) being “Agree” or “Strongly Agree” with R-FAT processes and dissatisfaction levels “Disagree” or “Strongly Disagree” were relatively low (approx.17%). Almost 12% of the responses were mentioned as “Neutral”.

The customer satisfaction surveys offered valuable insights into customer perceptions, allowing for the identification of key areas for improvement in P-FAT and R-FAT processes. It is noted that although customers are satisfied with many processes of P-FAT and R-FAT, there is a need of improvements to create superior customer experience in FAT process.

4.2.1.6 Customer Journey map of FAT (Physical and Remote) in ABB Drives

Service Design empowers co-creation by involving customers in the service development process and customer journey map is an excellent tool for businesses/service providers to understand and improve their customers’ experiences throughout entire process. The overall

P-FAT and R-FAT process in ABB Drives is divided into three phases: Pre-Phase, During-Phase and Post-Phase. Therefore, it is also vital to understand from customers' perspective how they experience FAT during these phases.

These customer journey maps are very beneficial to visualize and analyze every touchpoint that customers encounter during complete FAT (both physical and remote) at ABB Drives Finland. It allows you to step into customers' shoes and understand interactions from their perspective.

The customer journey map is adjusted according to case study, and it has 13 rows. The first row mentions the phase of process. The second row mentions the customer journey step at each phase. As there are two layers of customers involved i.e., Internal customer and end-customer (product destination organization), the third and fourth row presents internal customer actions and end-customer actions at each step respectively. The row fifth and sixth presents the thoughts and expectations of internal customer and end-customer at each step. The next two rows (seventh and eight) present the touch points associated with internal customer and end-customer. Then the next five rows (ninth to thirteen) are associated with customers feeling about each step during customer journey in FAT process. Due to confidential information, certain portions of customer journey maps are hidden.

It is also revealed from customer journey maps that although the present P-FAT process and R-FAT process is satisfactory with the majority of customers but in order to achieve superior customer experience, there is still room for improvement. The customer journey map of P-FAT is shown in Figure 30 and customer journey map of R-FAT is presented in Figure 31.

4.2.2 Action Intervention

4.2.2.1 Participatory workshop

The next stage of this research study is action intervention stage where the researcher has organized a participatory workshop with major stakeholders of the FAT process. In this participatory workshop, researcher has utilized observations of his participations in FATs, notes and findings in semi-structured interviews, service blueprint of existing process of P-FAT & R-FAT, customer journey map and customer satisfaction survey results.

The participatory workshop was organized in the afternoon, and it comprises of 4 hours. The schedule of the workshop was planned to meet availability of major stakeholder and to avoid interruption in daily routine work. Overall, twenty participants were invited from various stakeholder groups to keep diversified participation. From invited participant, eighteen participants joined this participatory workshop.

The workshop consisted of two sessions and one ten-minute coffee break. The agenda of workshop had five segments: briefing of workshop purpose, SD tools (Customer personas, stakeholder map, Service blueprints of existing process) review for P-FAT and R-FAT processes, SD tools (Customer journey maps, customer satisfaction survey results) review for customers' perception and expectation, discussion about pain points and improvement ideas and then summarizing for closing the workshop.

The researcher performed as facilitator in this participatory workshop. The location and environment of the workshop was considered carefully so that it will be relaxing and comfortable for participants. The communication of participants was very good, and they expressed their opinion in constructive way. It was very beneficial for research study as it enables effective discussion about root cause of pain points, improvement ideas and their practical implementation. The researcher collected notes, observations, and suggested solutions during this workshop. This data is used for further analysis and improvement of FAT process for superior customer experience.

4.2.2.2 Improving FAT process in ABB Drives for superior customer experience

The researcher has used collected notes, observations, feedback, improvement ideas and suggestion from previous stage to analyze how process of P-FAT and R-FAT can be improved to create superior customer experience. In addition of quality of ideas, it is also important to consider the practical implementation of improvement ideas.

Considering all these aspects a new proposed service blueprint is prepared for physical FAT process, and a new proposed service blueprint for remote FAT process. The proposed changes

in existing FAT process are highlighted (red text) in new proposed service blueprint for better visualization. The proposed changes are discussed in following sections.

New proposed Service Blueprint of Physical FAT in ABB Drives

The new proposed service blueprint of P-FAT process in ABB Drives, to develop superior customer experience is presented in Figure 32.

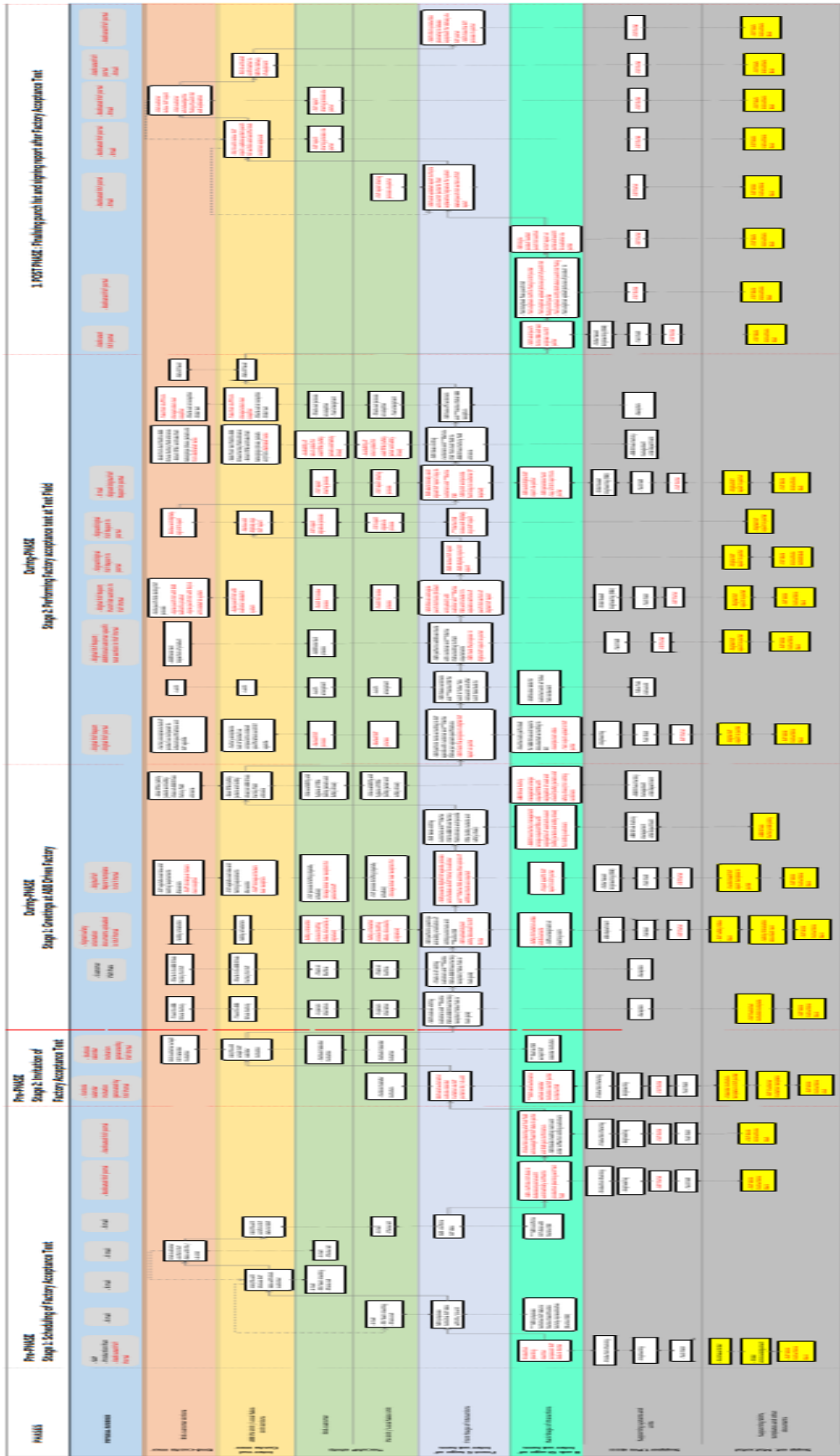


Figure 32: Post-Phase of R-FAT process

In the new proposed service blueprint, the P-FAT process is also divided into three phases as Pre-Phase, During-Phase and Post-Phase. This service blueprint also has similar 10 rows, like service blueprint of existing P-FAT process in ABB Drives. The new proposed service blueprint is further divided into four figures to enlighten these phases respectively.

Proposed Pre-Phase: Scheduling Phase

In Pre-Phase, which is related to scheduling of FAT, most activities are repetitive and done manually by SSM. The complete scheduling process is manual, and all communication is done via emails. It is Difficult to trace back, if person is not available especially in Marine projects where classification societies are invited as well as there is no common platform to store this information. Also, customer experience is different with different SSMs as they sent information and related document attachments according to personal working style. Every SSM uses its own preferred template of invitation, when generating official outlook invitation manually. Also, it is time consuming process to get all communication manually via emails.

To create superior customer experience, it is very important to standardize scheduling and invitation of FAT, irrespective of SSM working style. It should be on same pattern, with all standard attach documents. The process should be automatized for repetitive steps which not only increase time efficiency but also provide space to focus on other important aspects. Also, there should be dedicated digital portal for FAT, which is used to store all these information and generate these automatic tasks easily. The Pre-Phase of the new proposed service blueprint of FAT process is presented in Figure 33.

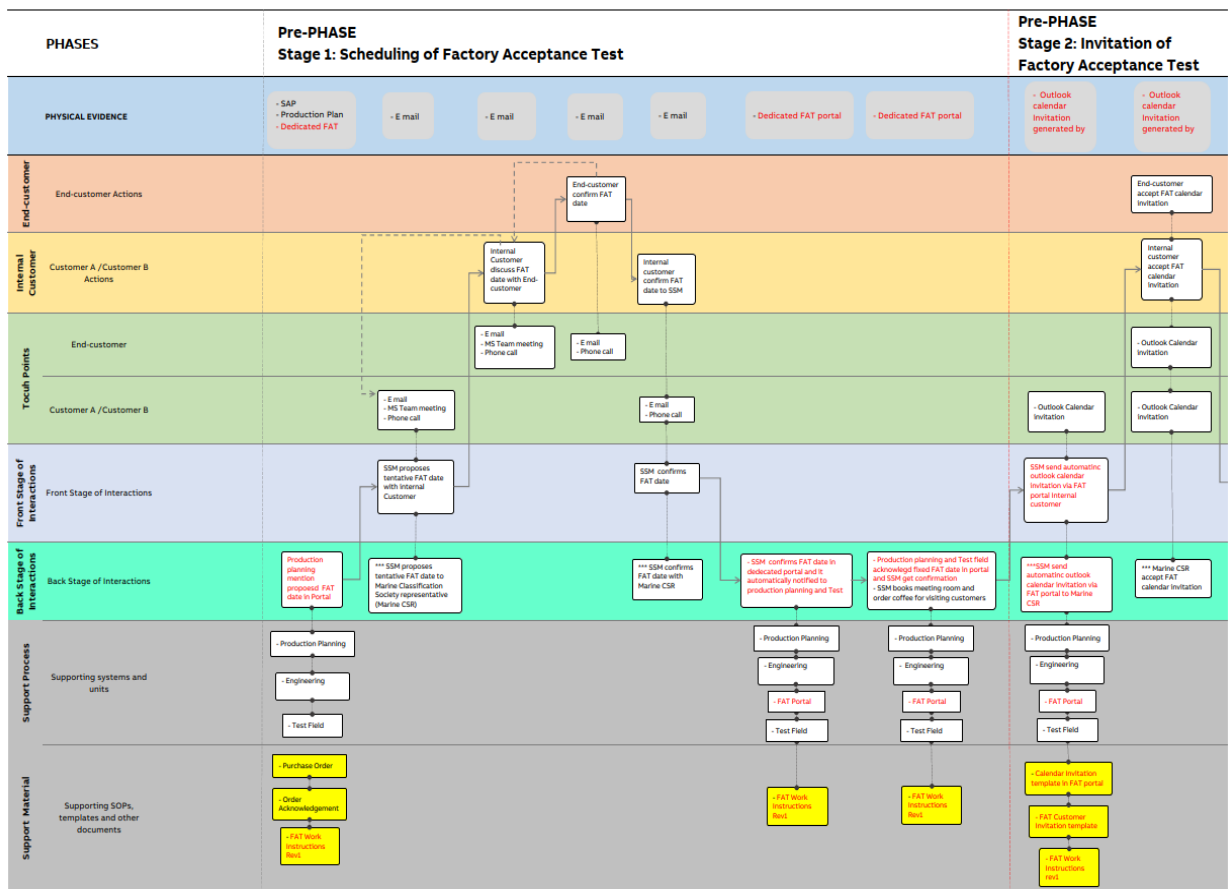


Figure 33: Proposed Pre-Phase of P-FAT process

It is proposed that all internal communication should be done via a dedicated FAT portal where all steps are listed, and every internal stakeholder acknowledges their related task by marking completion/waiting for completion. It will be very helpful to remove manual communication and information will be stored at a dedicated portal for future retrieval. There should be a process management tool in FAT portal to track the process of FAT. It will help to reduce manual communication/work as well as eliminate of risk of missing steps for FAT arrangements.

Also, Outlook calendar invitation process should be automatized through this portal. The SSM should fill basic information such as sales order number, receipt email addresses, FAT method (Physical or remote) and then portal automation will perform rest of repetitive tasks such as generating outlook calendar invitation from template, attach standard documents to calendar invitation and send to intended recipients. In this way there will be enhanced superior customer experience as there will always be a standard invitation with standard attached document, sent to customers. It will also reduce workload on SSMs and increase efficiency in Pre-Phase of FAT process. It is also proposed that standard work instruction of P-FAT should be updated according to the newly proposed Pre-Phase of P-FAT process.

Proposed During-Phase: Greeting and performing FAT

The second phase of P-FAT is During-Phase which involves all steps on the day(s) of actual FAT. In P-FAT, the customer visits physically test field of ABB Drives Factory and witness the FAT. This phase is divided into 2 stages where the first stage is about receiving and taking customers to test field factory floor and second stage comprises of performing FAT agenda in test field. Stage 1 of During-Phase of the new proposed service blueprint of P-FAT process is presented in Figure 34.

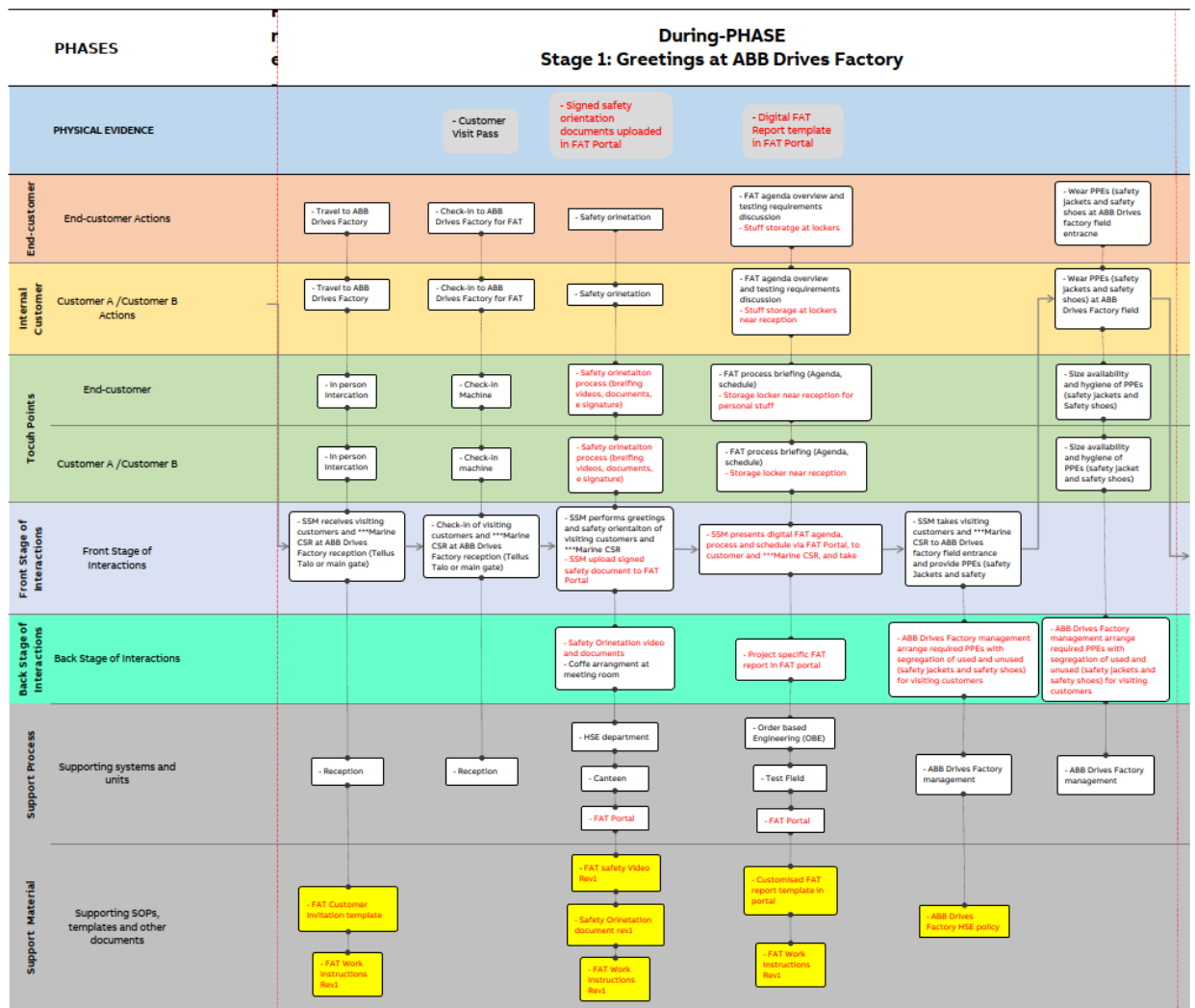


Figure 34: Proposed During-Phase of P-FAT process (Stage 1)

It is proposed that safety orientation process shall be updated. The present safety orientation video is good but for superior customer experience, it should be improved and add more information such as the introduction of ABB Drive factory, factory layout, emergency exit on layout, emergency phone numbers etc. It is also proposed that safety orientation forms should be signed electronically and stored in dedication digital FAT portal. It should be considered that safety orientation should be valid for 3 months period for frequent visiting

customers so that they don't have to repeat the same process again and again. It is especially very beneficial for Marine classification representatives who visit almost 5 to 6 times per month to ABB Drives Factory for FATs. In this way, there will be a record of frequent visiting customers in dedicated FAT portal and can be utilized to identify frequent visitors.

One proposal is about PPEs at factory entrance. Although there are various sizes of PPEs are available but there is no proper segregation. It is proposed PPEs should be arranged properly, with segregation (according to size, used/un-used/, internal and external stakeholders). It is also proposed that there should be separate space for customer jackets/shoes which is not available in the present setup.

It is also proposed that there should be locker/storage places near reception so that customers can store their luggage/stuff in the locker, instead of open meeting rooms. These proposals will be beneficial to improve customer experience which their visit to ABB Drives Factory in Finland and should be included in standard work instruction document of P-FAT.

The next stage of During-Phase of P-FAT is comprising of all tests done in FAT process at test field. Stage 2 of During-Phase of the new proposed service blueprint of P-FAT process is presented in Figure 35.

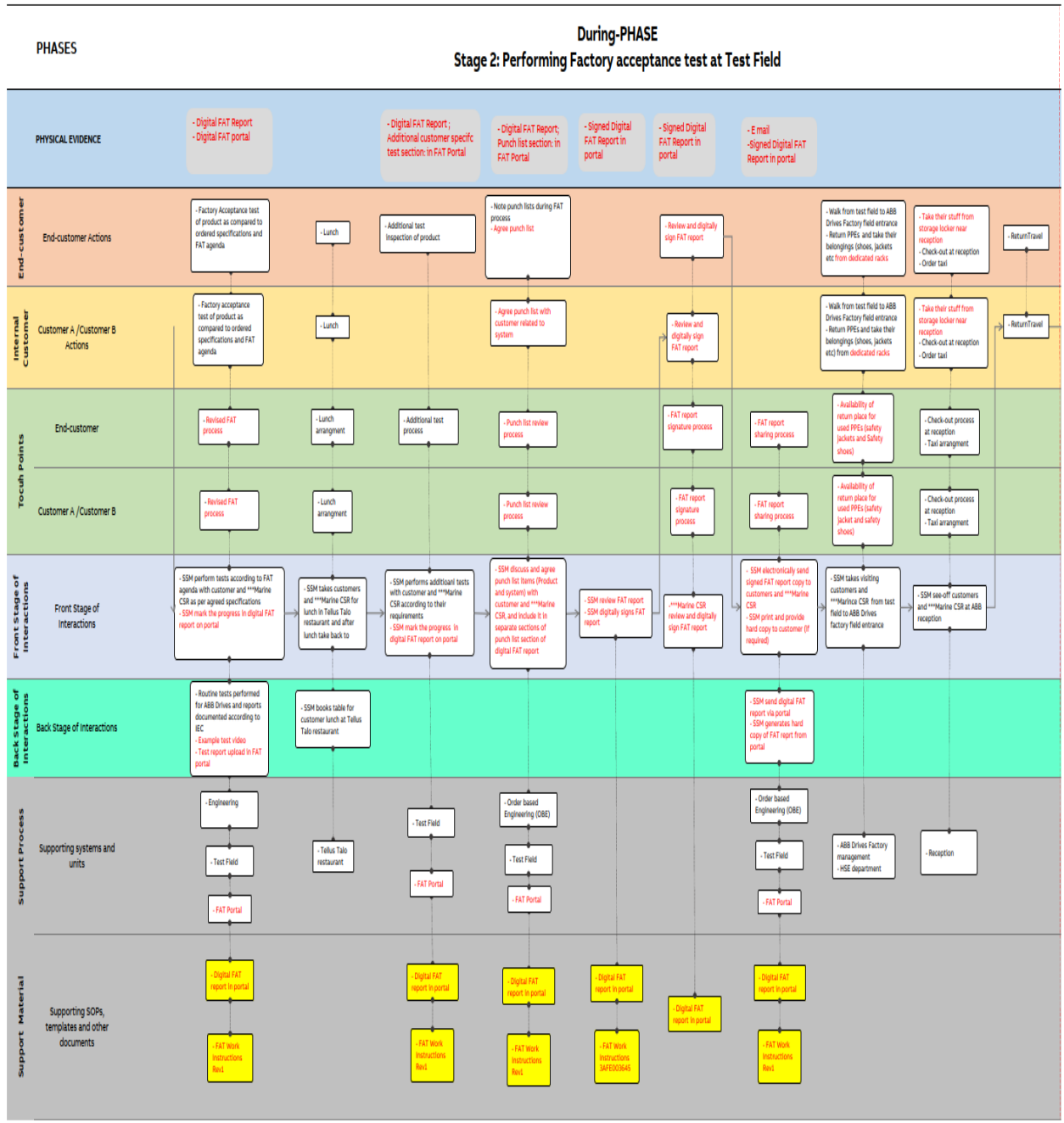


Figure 35: Proposed During-Phase of P-FAT process (Stage 2)

The tests in P-FAT are done according to FAT report. It is proposed that the FAT report should be improved to improve the customer experience during these tests. The researcher has proposed an updated FAT report to Drives management. This proposed updated FAT report is highly appreciated by Drives management but due to confidential information about FAT tests, the details are not shared in this thesis.

It is also proposed that instead of manual FAT report, the SSM should use digital FAT report from dedicated FAT portal. It will be beneficial in many ways such as online tracking of FAT reports with customers, possible to update FAT report on spot and no need to print paper

copy of FAT report. The punch list is a very important section of FAT report, and its management will be much easier in digital FAT report. There should be a possibility to E-signature of this report, to avoid manual work and improve customer experience.

The digital report should be generated, saved, and distributed via a dedicated FAT portal. In this way, the FAT reporting process will be digitalized, reduced manual work, avoid waste of paper and enhance record keeping for future prospects. It is also very beneficial for lessons learned and avoid similar mistakes in upcoming projects.

Proposed Post-Phase: finalizing punch list and distributing final FAT report

The Post-Phase is the last phase of FAT and also very important phase as it involves punch list point fixing, approval from customer, final FAT report signature and distribution. In existing process, it is quite manual process as SSM distribute FAT report manually with all internal stakeholders, to inform outcome of FAT performed with customer and especially punch list point for fixing. It is done by handing hard copy of FAT report to major stakeholders or via email. There is no dedicated place to store this FAT report. Also, the punch list management is done manually, and test engineer confirms about fixing of punch list items verbally or via email to SSM. There is no tracking and recording of this process. It is also noted that there is no E-Signature possibility, electronic distribution of FAT and dedicated portal for storage of FAT report.

To improve the process and customer experience, it is proposed to redesign all this phase by digital transformation. There should be a dedicated FAT portal which contains digital FAT report. The punch list section of FAT report should be shared with all major stake holders via digital portal and tasks will be assigned to respective departmental personals. Once they complete the punch lists, they should mark the completion in portal and attach fixing evidence (picture etc.) for customer sharing. It will be very beneficial to create superior customer experience, providing them with evidence/solution of punch list items completion.

It is also proposed that distribution of FAT reports should be done via a digital FAT portal, with the possibility of E-Signatures. It will not only reduce the time and efforts for customers as well as improve the efficiency of the process.

One proposal is also about creating series projects under one tree in dedicated FAT portal so that lesson learned will be application to all repeat projects in same series. The Post-Phase of the new proposed service blueprint of FAT process is presented in Figure 36.

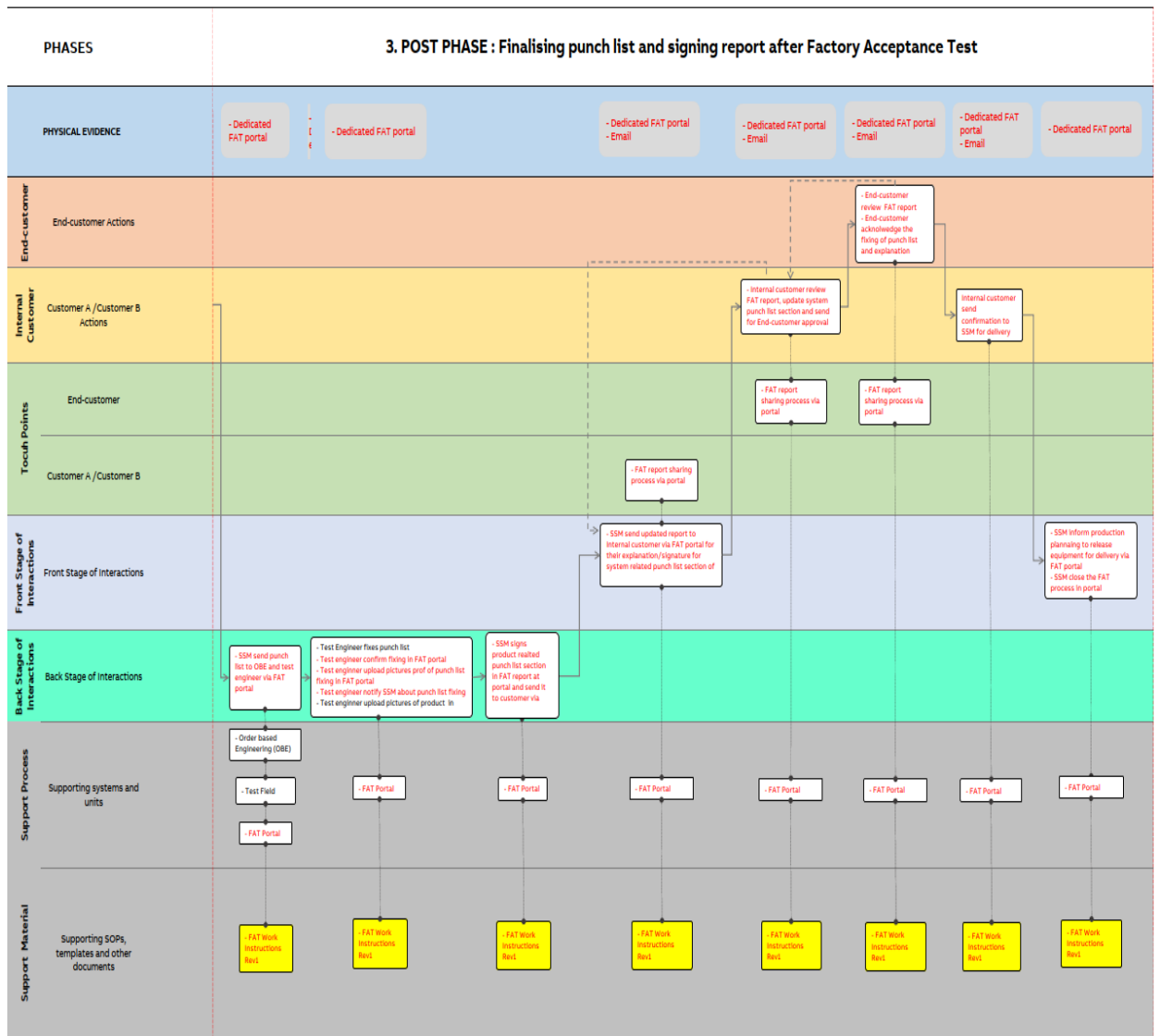


Figure 36: Proposed Post-Phase of P-FAT process

New proposed Service Blueprint of Remote FAT in ABB Drives

The new proposed service blueprint of R-FAT process in ABB Drives, to develop superior customer experience is presented in Figure 37.

In the new proposed service blueprint, the R-FAT process is also divided into three phases as Pre-Phase, During-Phase and Post-Phase. This service blueprint also has similar 10 rows, like service blueprint of existing R-FAT process in ABB Drives. The new proposed service blueprint is further divided into four figures to enlighten these phases respectively.

Proposed Pre-Phase: Scheduling Phase

The Pre-Phase of R-FAT is similar to P-FAT. Therefore, pain point identification and proposed solution for improving R-FAT process for superior customer experience is same as described in P-FAT’s proposed Pre-Phase. For R-FAT, the Pre-Phase of the new proposed service blueprint is presented in Figure 38.

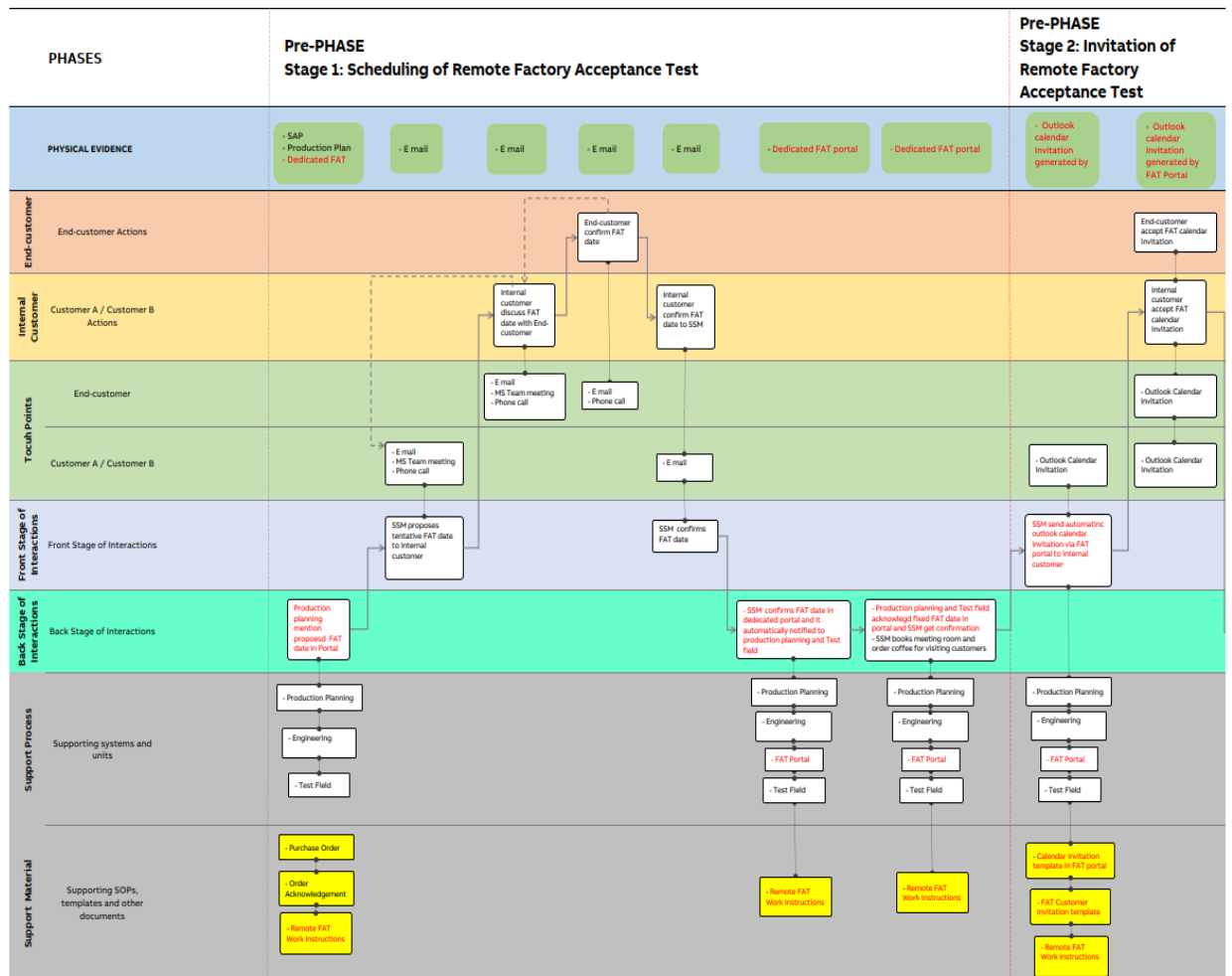


Figure 38: Proposed Pre-Phase of R-FAT process

In addition to other proposed solutions, it is also proposed to prepare dedicated documents (standard work instruction, outlook invitation etc.) for the R-FAT process. It should not be mixed with P-FAT documents.

Proposed During-Phase: Greeting and performing FAT

The During-Phase of R-FAT is very different as compared to P-FAT. It is performed virtually where customers do not visit ABB Drives factory, instead digital communication tools are used to perform R-FAT. This phase is distributed in two stages.

In the first stage, remote FAT setup is prepared which mainly includes setting up the cameras (portable, handheld, HoloLens etc.) in test field, preparing computer for MS Team meeting & other necessary digital equipment for remote FAT, greeting customer at MS team meeting, provide information about remote FAT agenda. Whereas the second stage is about performing FAT agenda in the test field, via digital equipment. Stage 1 of During-Phase of the new proposed service blueprint of R-FAT process is presented in Figure 39.

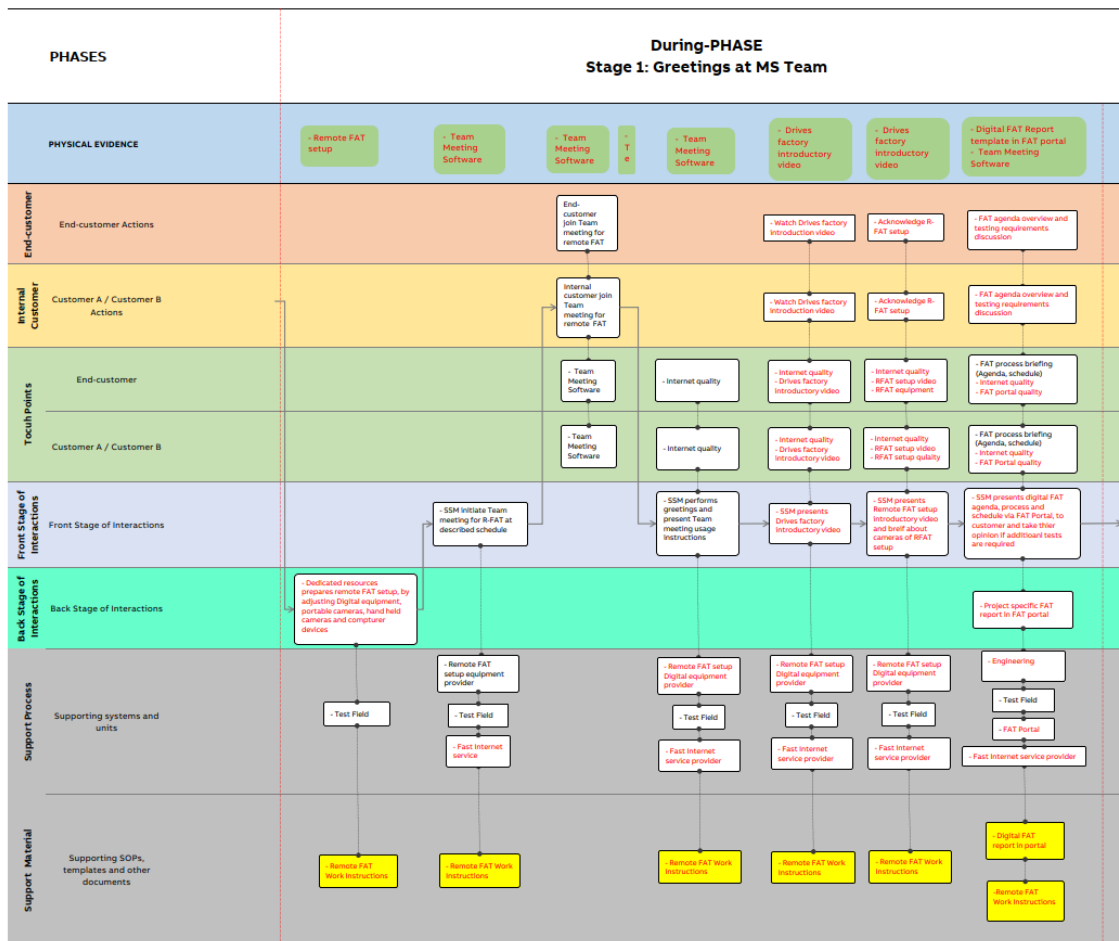


Figure 39: Proposed During-Phase of R-FAT process (Stage 1)

It is proposed to create an orientation video about Drives Factory, remote setup and other practical information. It will be very beneficial for customers to understand how remote setup is organized and which camera is used for what purpose.

During R-FAT, the customer experience is highly dependent on remote FAT setup, digital equipment, quality of cameras and how they are arranged. It is proposed that there should be fixed cameras in the test field so to avoid the hassle of setting up a camera for every R-FAT. It is also observed that some SSM used handheld mobile phone camera as moving camera during FAT process, but its video streaming quality is not very good in this case. Therefore, it is proposed to use dedicated modern high-quality cameras for R-FAT so as to create superior customer experience with good quality video streaming. It is also essential to have the availability of fast (5G) internet in the test field, which will be dedicated to the R-FAT process.

The next stage of During-Phase of R-FAT is about performing FAT agenda remotely in the test field. Stage 2 of During-Phase of the new proposed service blueprint of P-FAT process is presented in Figure 40.

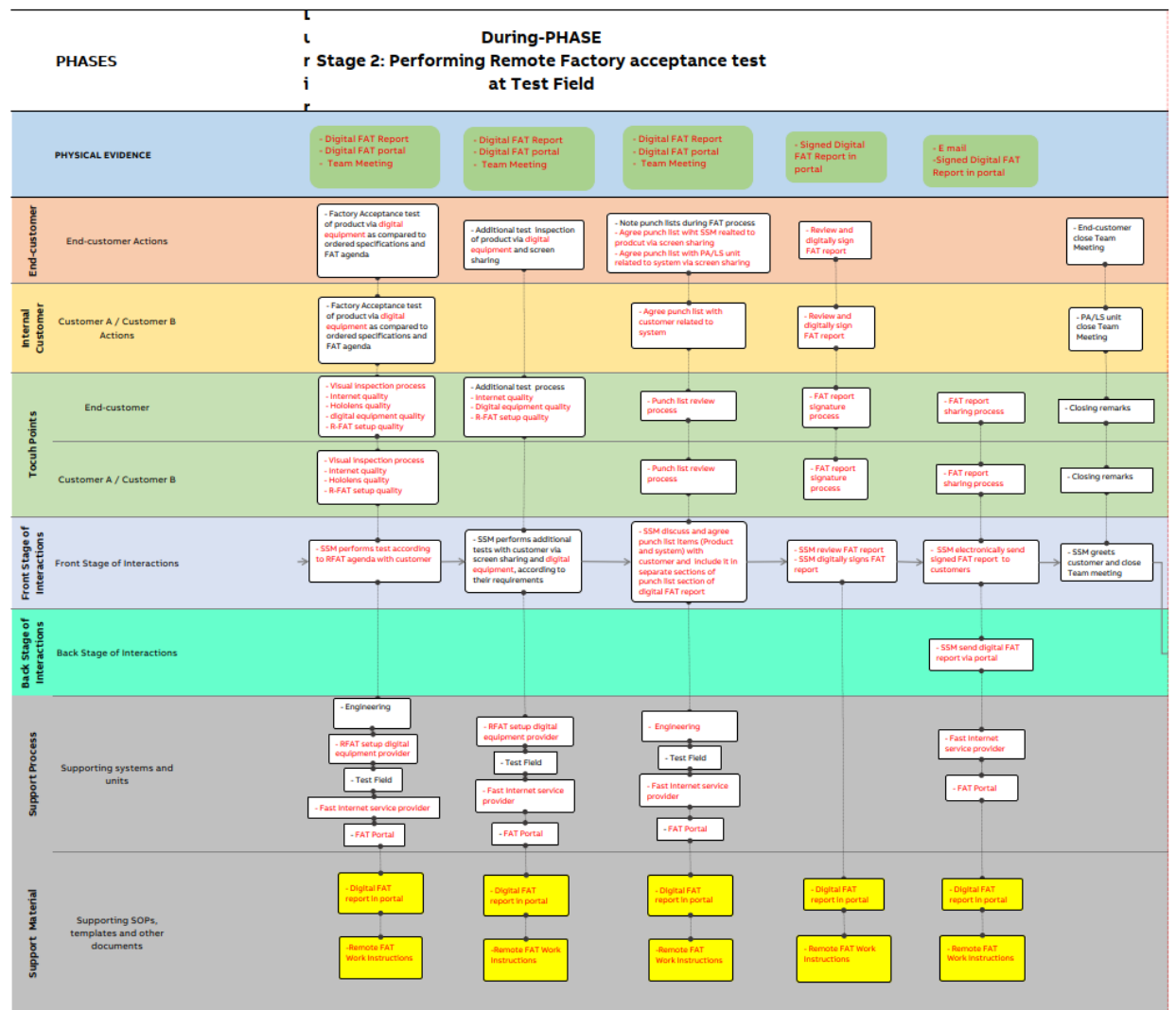


Figure 40: Proposed During-Phase of R-FAT process (Stage 2)

The R-FAT tests are currently conducted based on the existing FAT report, but there is a proposal to enhance the customer experience during these tests by improving the FAT agenda and report. The researcher presented an updated version of the R-FAT report to ABB Drives management. However, as the FAT tests involve confidential information, the specific details of the proposed updated report are not disclosed in this thesis.

It is also proposed to utilize a digital FAT report accessible through a dedicated FAT portal. Implementing this digital approach offers numerous advantages, including online tracking of FAT reports with customers, the ability to update reports in real-time, and the elimination of paper copies. The punch list section, which holds significant importance in the FAT process, can be managed more efficiently using the digital format. Additionally, incorporating E-signatures in the report can streamline processes and enhance the overall customer experience.

To enhance customer experience, it is also suggested that the process of generating, saving, and distributing the digital FAT report should take place through the dedicated FAT portal. This digitalization of the FAT reporting process reduces manual work, minimizes paper waste, and improves record-keeping for future reference. Moreover, it facilitates the sharing of valuable lessons learned, contributing to the prevention of similar mistakes in future projects. Overall, adopting the digital FAT report approach presents a practical and forward-looking solution to optimize the FAT testing process and develop superior customer experience.

Proposed Post-Phase: finalizing punch list and distributing final FAT report

The Post-Phase of R-FAT is similar to P-FAT. Therefore, pain point identification and proposed solution for improving R-FAT process for superior customer experience is same as described in P-FAT's proposed Post-Phase. For R-FAT, the Post-Phase of the new proposed service blueprint is presented in Figure 41.

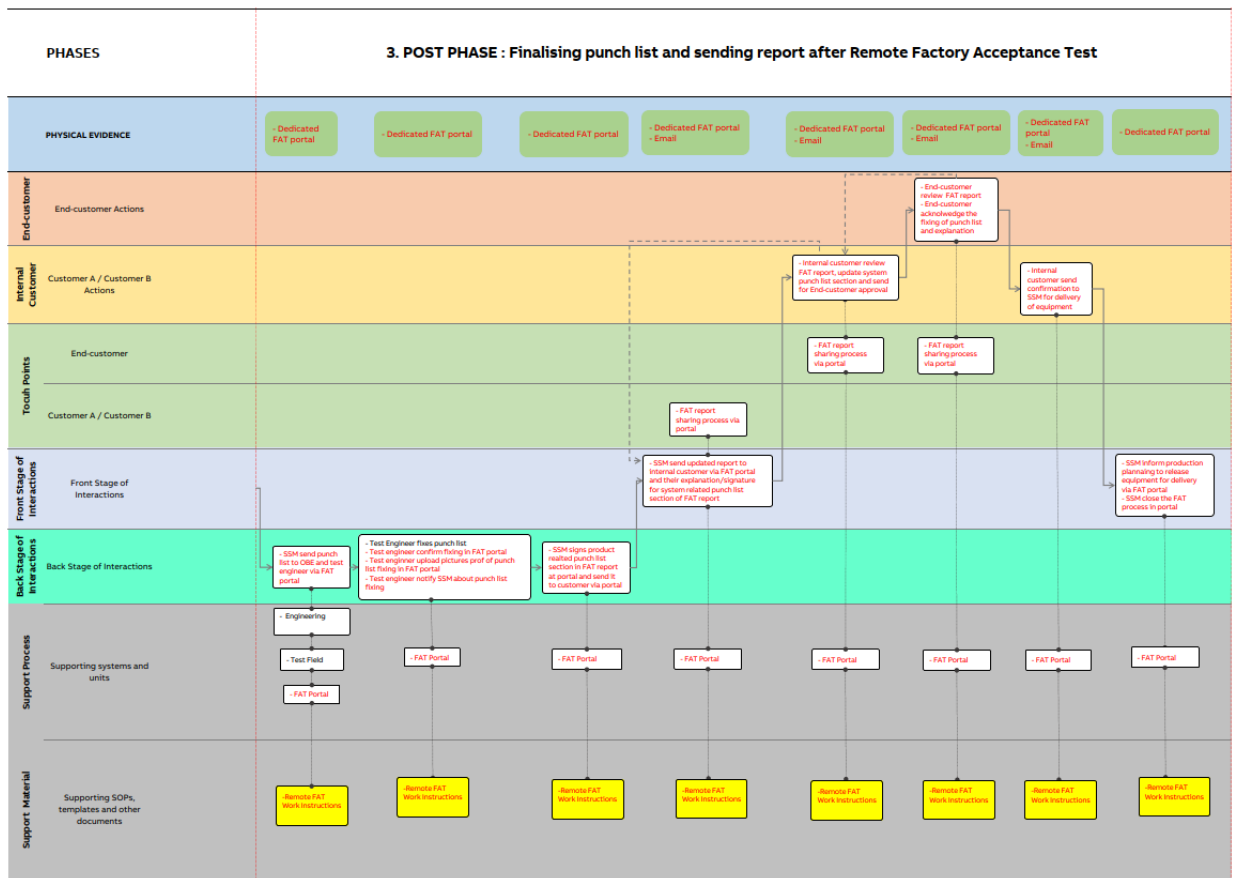


Figure 41: Proposed Post-Phase of R-FAT process

In addition to other proposed solutions, it is also proposed to prepare dedicated documents (standard work instruction, outlook invitation etc.) for the R-FAT process. It should not be mixed with P-FAT documents.

Summary

The summary of new proposed solutions to improve P-FAT process & R-FAT process and develop superior customer experience are presented as follow:

- Revise and improve P-FAT process documents.
- Prepare dedicated R-FAT process documents separately.
- FAT tests should be revised and improved.
- Digital FAT portal should be developed and used for P-FAT process as well as for R-FAT process.
- The Digital FAT portal should have an automatized function to generate standard invitation for P-FAT and R-FAT.
- The Digital FAT portal should have an embedded process management tool to track the process steps of P-FAT and R-FAT.

- Task management and tracking should be done via digital FAT portal.
- Punch list management, distribution and tracking should be done via digital FAT portal.
- Digital FAT reports should be used, with the possibility of E-Signature and digital distribution to all stakeholders.
- A dedicated document management system should be used to store all FAT-related documents.
- For R-FAT, a dedicated remote setup should be used which comprised of high-resolution cameras, HoloLens, modern handheld cameras and connected to fast dedicated internet.

4.2.2.3 Participatory workshop about proposed improved FAT process

Based on analysis, The researcher has prepared new proposed service blueprints of P-FAT and R-FAT processes respectively. The researchers then arranged one participatory workshop with major stakeholders of the FAT process. In this workshop, these new proposed service blueprints were presented to participants.

This participatory workshop was also organized in the afternoon, and its duration was 3 hours. The agenda of the workshop was to overview the new proposed service blueprint and discuss their practical implementation. This workshop was very beneficial, and all participants took active parts to review new proposals. Based on feedback from participant, new proposed service blueprint was adjusted and then ABB Drives management approve to implement these new proposed service blueprint of P-FAT and R-FAT in ABB Drives Factory Finland.

4.2.3 Reflection

The ABB Drives management appreciate the results of research study and approve to implement these new proposed service blueprint of P-FAT and R-FAT in ABB Drives Factory Finland.

This research study utilized various service design methods and tools to gain in-depth insights into the organizational process, identify pain points and gaps for improvement and proposed solutions to improve FAT process in case organization for superior customer experience. Although majority of proposed solutions are implemented in FAT processes such as document update, safety orientation videos update, PPEs segregation, FAT reports update etc. but there are certain solutions proposal that has been started but will take time before implementation such as dedicated digital FAT portal, punch list management etc.

The FAT process in Drives of ABB Finland is updated according to proposed new service blueprint and the researcher has participated in various FATs which are based on new

proposed solutions for participatory observation, take feedback from various stakeholders of FAT process and participated customers. It was identified that new P-FAT and R-FAT processes are greatly appreciated by internal and external stakeholders and they are also highly motivated about upcoming solutions such as digital FAT portal.

4.2.4 Limitation and Future work

The prime objective this research study is to analyze and improve FAT (both physical FAT and remote FAT) process in ABB Drives Finland, to create superior customer experience for customers, through suitable service design methods and tools.

Although the proposed solutions in new service blueprint of P-FAT and R-FAT are greatly appreciated by ABB Drives Management and they have started implementation of majority of proposed solutions in FAT processes but there are certain solutions such as “Digital FAT Portal” implementation in FAT processes which requires long term efforts, finance and implementation strategy. Due to limitation of timeframe of this research study, it is not possible to observe implementation of these long-term solutions and their effect on process improvement and customer experience, therefore in reflection phase, the researcher has observed and took feedback about only those solutions that has been applied already in FAT processes. In future it will be beneficial to implement the completely new proposed service blueprint in P-FAT and R-FAT processes and monitor its effectiveness.

Another limitation of this research study is that it is based on one iteration. It would be very beneficial if there will be multiple iterations of co-creation with customers to optimize the processes of P-FAT and R-FAT and develop superior customer experience.

4.2.5 Ethical aspects

This thesis has been done within an organization where many internal and external stakeholders were involved in this research study. The researcher has considered ethical recommendations for thesis writing (Arene 2020) and responsible conduct of research & procedures for handling allegation misconduct in Finland, throughout this research study process (TENK 2019).

The researcher has signed thesis agreement with case organization. Considering neutrality of research study, the researcher does not have conflict of interest, both with case organization as well as external stakeholders. Moreover, interviewed stakeholders were previously unknown to researcher.

The data collection process involves sensitive and personal data, therefore researcher ensured that ethical considerations were diligently addressed about data collection according to data privacy regulation and ethical guidelines (Arene 2020; TENK 2019).

The researcher has taken consent of internal and external stakeholders orally before starting interview and participatory workshops. During interview process, the researcher provided a comprehensive overview of research purpose. The participants were assured that any data, insights or information derived from these conversations would be anonymized and only would be used for research development aims of this research study.

The researcher has also considered the guidelines from Arene (2020) and TENK (2019) while conducting the participant observations, participatory workshops and survey in this research study. The consent was collected from internal and external stake holders before starting the survey. It was also ensured to follow data privacy regulation and ethical guidelines in survey process.

As this research study and results contain confidential information about case organization, therefore the prepared Service Design tools were simplified, to omit confidential information before including this thesis. At the end of research study, complete service design tools, results and conclusion are handed over to management of case organization.

5 Conclusions

This research study has two prime objectives: Identify and select most suitable service design methods and tools to understand & describe current FAT process & customer journey in FAT of case organization, and how service design methods & tools support and improve FAT process in case organization to develop superior customer experience. There is a vast range of service design methods & tools available for the service design process. It is crucial to carefully select SD methods and tools according to specific requirements, practicality of focused case and desired goals of SD process.

Therefore, the first focus of researcher was to evaluate what SD method and tools are most suitable for this case study. To ensure the best fit for this case, the researcher conducted an extensive literature review of SD methods and tools.

It is revealed that persona is a powerful tool to identify requirements of focused customers of case organization. The FAT process in case organization is a complex process which involves numerous internal stakeholders from various departments of case organization and also external stakeholders from customer organizations. It is concluded that stakeholder map is an excellent tool to visually represent different stakeholders and their role in FAT process of case organization.

To improve FAT process, it is also crucial to understand the existing process and results of research study revealed that Service Blueprint is an excellent tool for visualization of FAT (Physical and Remote) process and involvement of all stakeholders in this process. Considering the practical benefits and usefulness of the Service Blueprint, it was selected for visualizing the FAT process within the case organization.

Co-creation can be considered as backbone of service design process, and it is very important to consider customers' perspective and insight in service design process, for superior customer experience. Considering this aspect and from literature review, it was concluded that customer journey map, customer satisfaction survey and participatory workshop are very suitable tools for this case study. Customer journey map provides a visual representation of interactions and touchpoints of customers with system/service and provides key insights about their expectations, experience and pain points. Also, customer satisfaction is a vital aspect of superior customer experience, and it is identified that one very good tool for this purpose is customer satisfaction survey.

It is also concluded from results of this study that participatory workshop is very beneficial for co-creation, ideation, exploring improvement solutions and taking feedback on selected topic of workshop. The researcher has used participatory workshop for reviewing and ideation

of improvement solutions in existing FAT processes as well as to review and optimize proposed improvement solutions of improved FAT process for superior customer experience.

After selection of suitable SD methods and tools, the next focus was to improve FAT (Physical and Remote) process in case organization to develop superior customer experience. The actions research method is used to identify improvement gaps, customer pain points and expectation for superior customer experience. Based on results of these, prepare new proposed service blueprint for P-FAT and new proposed service blueprint of R-FAT process is prepared and presented to ABB Drives' Management.

The results of research study are highly appreciated by ABB Drives management, and they approve to implement these new proposed service blueprint of P-FAT and R-FAT in ABB Drives Factory Finland. These proposed solutions have been implemented in case company and significant improvements in FAT (Physical and Remote) have been noticed already. It would be intriguing to conduct a long-term follow-up on the case organization, to assess the benefits resulting from the implementation of the proposed FAT (Physical and remote) processes and its long-term impact on customer experience.

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Appendix 1: Semi-structured Interview guide

- Introduction of research study and topic
- Ethical aspects of research process
- Overview of current working process
 - Would you please explain current working process of Physical and Remote FAT process in Drives.
- Main questions
 - What are steps in Physical and remote FAT process.
 - Describe the role on internal stake holders in Physical and remote FAT process.
 - Describe the role on external stake holders in Physical and remote FAT process.
 - Describe the role on customer in Physical and remote FAT process.
 - What channels/modes of communication are used in Physical and remote FAT process.
 - What tools, equipment and technologies are used in Physical and remote FAT process.
 - What are front stage actions and backstage actions in Physical and remote FAT process.
 - Describe your role in whole process of Physical and remote FAT.
- Brainstorming for Improvement ideas:
 - What are most promising features of Physical and remote FAT process.
 - What are common pain points in Physical and remote FAT process.
 - What are the methods and working practice are in placed to rectify these common issues.
 - How would you like to participate in the process to improve it.
 - What changes/improvements you would like to do in the current process.
 - How would you like to implement these changes/improvements.
- Interview closing:
 - Wrap up discussion?
 - Did I miss anything?
 - Is there anything you would like to mention/discuss with more?
 - Is there anything you want to ask from me?
 - Thanks

Appendix 2: Customer Survey - Cover Letter

The survey will take approximately 11 minutes to complete. We at ABB Motion System Drives are pleased to survey your satisfaction regarding our Factory Acceptance Test (FAT) for cabinet-built single and multidrives. It will help us to improve our systems and devise superior customer experience in future.

We value your privacy and understand the importance of keeping your personal information confidential. Your responses to this customer satisfaction survey will be used solely for research and analytical purposes to improve our products and services. Your responses will not be shared with any third-party organizations and will only be viewed by authorized personnel within our company.

We assure you that your anonymity and confidentiality will be maintained throughout the survey process. By proceeding with this survey, you consent to our privacy policy and understand that your responses will be used solely for internal purposes. If you have any concerns or questions regarding our privacy policy, please contact nida.iram@fi.abb.com.