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Improving The Order Handling Process Of Inventory Access

Case: ABB Oy, Drives Service

Helsinki Metropolia University of Applied Sciences

Bachelor of Engineering

Industrial Management and Engineering

Thesis

2.3.2016

Author Title	Risto Vitikainen Improving the order handling process of Inventory Access
Number of Pages Date	70 pages + 6 appendices 2 March 2016
Degree	Bachelor of Engineering
Degree Programme	Industrial Management and Engineering
Specialisation option	Supply Chain Management and Business
Instructor(s)	Janne Matilainen, Process Owner Harri Hiljanen, Lecturer
<p>The goal of this study was to identify the non-value-adding activities in the order handling process of service product and evaluate the current state of the process. The process was investigated from the customer service team's perspective in the client company. Secondly the goal was to provide recommendation for how to improve the particular process. This study was mainly conducted in the fall of 2015 and in the winter of 2016. The research method used in this study was participant observation and informal meetings and interviews. The author has worked closely with the Inventory Access service product for the last two years.</p> <p>In the modern world, companies have numerous different tools and theories to evaluate and define their processes and products. For example with the help of the business process maturity model, volume-variety matrix and value stream mapping, companies are able to detect the flaws and inefficient factors in their processes. In addition the use and adopting of lean-thinking and principles makes the discovering of non-value-adding activities easier, which leads to more efficient and cost-effective operations. In this thesis the Inventory Access service product was analysed, among other things, with the help of previously mentioned models and theories. The findings supported the improvement of the order handling process of the service product.</p> <p>The conclusion was that the current state of process was challenging and vulnerable to errors. Manual repetitions in the operations greatly increased the workload of customer service team. Wasteful actions in the process were highlighted and appropriate recommendations given accordingly. The research and the current state analysis of the process provided useful information. It was found that the effectiveness of the process can already be increased with small incremental improvements. Availability of product and presales information, contract and agreement documentation, lack of automation and the upkeep practices of the service product were found to be the most challenging. Also the operating principle of the service product in general appeared to be a factor that makes the automatization of order handling a challenge.</p>	
Keywords	BPM, service, service products, lean, process, process improvement, current state analysis

Tekijä Otsikko	Risto Vitikainen Inventory Access -tilauskäsittelyprosessin kehittäminen
Sivumäärä Aika	70 sivua + 6 liitettä 2.3.2016
Tutkinto	Insinööri (AMK)
Koulutusohjelma	Tuotantotalous
Suuntautumisvaihtoehto	Tilaus-toimitusketjun hallinta ja liiketoiminta
Ohjaajat	Process Owner Janne Matilainen Lehtori Harri Hiljanen
<p>Insinööriyön ensimmäinen tavoite oli löytää arvoa lisäämätöntä toimintaa yrityksen erään palvelutuotteen tilauskäsittelyprosessista ja arvioida prosessin nykytilaa. Prosessia tarkasteltiin yrityksen asiakaspalvelutiimin näkökulmasta. Toiseksi insinööriyön tavoitteena oli tarjota kehitysehdotuksia löydettyjen puutteiden ja haasteiden perusteella. Insinööriyö tehtiin pääosin vuoden 2015 syksyn ja talven aikana. Tutkimusmenetelmänä käytettiin osallistuvaa havainnointia ja epävirallisia haastatteluja. Tutkimuksen tekijä on työskennellyt tiiviisti palvelutuotteen parissa viimeiset kaksi vuotta.</p> <p>Yrityksillä on nykypäivänä käytettävissään lukuisia työkaluja ja teorioita prosessien ja tuotteiden tilan määrittämiseksi. Muun muassa prosessinkypsyysmallin, volyyymi-moninaisuusmatriisin ja arvovirtakartan avulla yritys kykenee havaitsemaan tehokkaasti puutteet ja kehitystä vaativat kohteet prosesseistaan. Lean-ajattelun ja periaatteiden avulla yrityksiä on mahdollista havaita hukkaa aiheuttavat tekijät toiminnastaan ja näin parantaa yrityksensä kustannus- ja operatiivista tehokkuutta. Insinööriyössä Inventory Access -palvelutuotteen nykytilaa arvioitiin muun muassa edellä mainittujen teorioiden ja mallien avulla. Saadut tulokset edesauttoivat palvelutuotteen prosessin kehittämistä.</p> <p>Johtopäätöksenä oli, että nykyinen toiminta ja prosessi ovat alttiita virheille. Palvelutuotetta on haastava tarjota, ja prosessi sisältää paljon manuaalista työtä, mikä kasvattaa yrityksen asiakaspalvelun työkuormaa. Hukkaa aiheuttavat toiminnot prosessissa tuotiin esille ja kehitysehdotukset tarjottiin niiden mukaisesti. Prosessin tutkimus ja nykytila-analyysi toivat käyttökelpoisia tuloksia. Huomattiin, että prosessin tehokkuutta voidaan nostaa jo pienin parannuksin. Tärkeimmät kehityskohteet ja ehdotukset parantamista varten löytyivät muun muassa tuotteita ja tilaamista koskevien tietojen saatavuudesta, tilausprosessin automaation puutteesta, sopimusdokumentaatiosta ja laskutustavasta. Palvelutuotteen yleinen toimintaperiaate osoittautui myös osaltaan tilauskäsittelyn automatisointia vaikeuttavaksi tekijäksi.</p>	
Avainsanat	Prosessijohtaminen, prosessikehitys, palvelu, palvelutuote, lean, nykytila-analyysi

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Abbreviations

SAP	ERP System
BOL	BusinessOnline
VSM	Value Stream Map
BPM	Business Process Management
BPR	Business Process Reengineering
CMM	Capability Maturity Model
DMS	Document Management System
OTD	On Time Delivery
DM	Discrete Motion
RMA	Return Material Authorization
BOM	Bill of Materials
PM	Preventive Maintenance
OPEX	Operational Excellence
LABB	Local ABB Sales Unit
RDSC	Regional Drives Service Center

1 Introduction

Business today, especially large organizations with complicated service products, are relating that there is only so much their IT system can achieve in improving their business operations. Even if the overall operations are effective and efficient, it is becoming increasingly difficult further to improve the overall operating efficiency and customer service effectiveness to the extent necessary to meet customer and shareholder expectations at a rate faster than the competitors. Even Bill Gates, the ultimate advocate of technology, notes that automation is only effective when applied to efficient operations. (Jeston & Nelis 2006: 12)

Improvement is not success or failure dependent, it is not product or industry dependent, and it is not a program or customer dependent. Improvement is always necessary, especially in today's competitive global economy. Too many executives view improvement as a response to something bad, and if things are okay, then there is no need for it. This strategy has never made sense because it freeze-frames organizations, people, learning and development, processes, and performance. It is a guaranteed strategy that nothing will improve. The fact is, that every enterprise needs to make improvement as important as booking an order, paying vendors, and closing the books every month. So every customer needs to make improvement both real and real-time to the customer and its own bottom line. (Burton & Boeder 2003: 7) There are various ways to improve processes. This research focuses on how and why ABB Oy, Drives Service should improve their order handling process of the Inventory Access service product.

The research method used in this study was participant observation and informal meetings and interviews. For the last two years I have been working closely with the suitcase team and the Inventory Access service product.

1.1 Background

ABB Oy, Drives Service is, among other things, responsible for the aftersales operations of the factory. The unit provides products and services for a certain product group. Among other things the customer service team of the company is responsible for the co-

ordination of customer orders, management and updating of customer information and contracts.

The company has identified one service product to be challenging and laborious to provide. This thesis focuses on creating a current state analysis and on giving recommendations on how and why to improve the particular process.

1.2 Study Goals and Scope

The purpose of this bachelor's thesis is to provide process owners and managers with a good overview of why the Inventory Access service product operation and process should be improved. This thesis strives to give a general view of the current state of the process and to find non-value-adding activities within the process. In addition this study aims to give recommendations on how to improve the particular process.

The subscriber company of this study is ABB Oy, Drives Service. The subject of this study was chosen by the former customer service manager and myself, because it was noted that the service product is difficult to buy and produce as the demand for the service product has grown.

The first part of this study concentrates on a literature review of the theories of business process management, lean and service product delivery. The second part consists of an overview and evaluation of the current state of the service product process and operation. The second part also aims to answer the main research question: what are the non-value-adding activities and why is it essential to improve the process? The third part focuses on providing recommendations on what should be done in order to improve the process and how should it be done.

1.3 ABB Group

ABB is a leader in power and automation technologies that enable utility, industry, and transport and infrastructure customers to improve their performance while lowering the environmental impact. The ABB Group of companies operates in roughly 100 countries and employs about 140,000 people. (About ABB, 2016)

ABB's operations are organized into four global divisions, which in turn are made up of specific business units focused on particular industries and product categories. (About ABB, 2016)

The Discrete Automation and Motion division provides products, solutions and related services that increase industrial productivity and energy efficiency. Its motors, generators, drives, power electronics and robotics provide power, motion and control for a wide range of automation applications. The leading position in wind generators and a growing offering in solar complement the industrial focus, leveraging joint technology, channels and operations platforms. (About ABB, 2016) ABB Oy, Drives Service is a part of the Discrete Automation and Motion division.

Electrification Products offers products and solutions suitable for multiple low- and medium-voltage electrical applications from residential home automation to industrial buildings, including modular substation packages, distribution automation products, switchgear, circuit breakers, measuring and sensing devices, control products, wiring accessories, and enclosures and cabling systems designed to ensure safety and reliability. (About ABB, 2016)

Process Automation Products, systems and services are designed to optimize the productivity of industrial processes. The solutions include turnkey engineering, control systems, measurement products, life cycle services, outsourced maintenance and industry-specific products (e.g. electric propulsion for ships, mine hoists, turbochargers and pulp testing equipment). (About ABB, 2016)

The Power Grids division is the world's leading supplier of power and automation products, systems and service solutions across the power value chain of generation, transmission and distribution serving utility, industry, transportation and infrastructure customers directly and through channel partners. The division is focused on addressing key areas such as the integration of renewable energies, growing network complexity, grid automation, and microgrids. This division also offers a full range of consulting, service and asset management solutions based on a lifecycle approach. (About ABB, 2016)

1.4 ABB Oy, Drives

ABB Oy, Drives is located in Helsinki, Pitäjänmäki and is a part of the global ABB Group. ABB operates in more than 30 locations in Finland, with the biggest plant concentrators located in Helsinki, Vaasa and Porvoo. The Drives department in Helsinki employs almost 1000 people. (ABB Lyhyesti, 2016)

The ABB Oy, Drives business unit is globally in charge of the sales and marketing of the drives together with research and development. ABB Oy, Drives provides a wide range of DC and AC drives. These are used among different industries and applications. By adjusting a motor's rotation speed with a drive, the energy consumption of the motor can be reduced by 50%. (ABB Lyhyesti, 2016)

2 Service

Services are economic activities offered by one party or another, usually employing time-based performances to bring the desired results in recipients themselves or in objects or other assets for which purchasers have responsibility. In exchange for their assets, a service customer expects to obtain value from access to labour, goods, facilities, networks, professional skills and systems; but they do not commonly take the ownership of any of the physical aspects involved (Lovelock & Wright 2007, p.6.)

A service is an activity – a process or a set of steps (unlike a product which is a physical element) – which involves the assistance of a customer (or user) or something belonging to them, where the customer is also involved, and plays some role (co-production), in the service process.

From the operation's point of view, the service provided is the service process and its outputs which have been designed, created and enacted by the operation using its many input resources, which includes the customer, where the customer also has a part in the service process. (Johnston, Clark & Shulver 2012: 17)

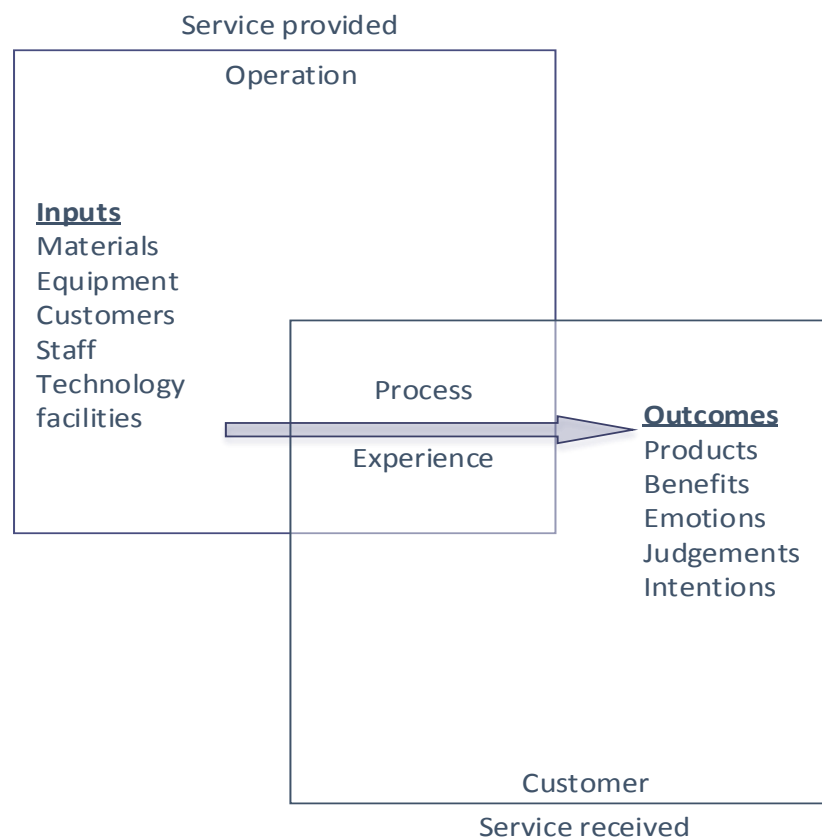


Figure 1 Service provided and received (Johnston, Clark & Shulver 2012: 7)

2.1 Service Value

To understand value, the costs to the customer have to be weighed against the benefits customer perceives in the service. The profits are not just the touchable profits but also the intangible feelings and thoughts resulting from the experience, such as a feeling of well-being or being recognised in a public place. Value, therefore, does not necessarily mean a low price. Value is the customer's assessment of the benefits of the service weighed against all the costs involved. (Johnston, Clark & Shulver 2012: 51)

The task for operations management is to find a balance between maximizing the value for customers and doing it cost effectively; that is, striking a profitable or in-budget balance between

- maximising the benefits to the customer
- minimising the financial and sacrificial costs to the customer, and
- minimising the costs to the organisation.

The service concept is therefore a key device than can communicate the set of benefits (tangible 'products' and psychological experiences) to the customer in order to demonstrate the true value of the service. An operation provides and builds value by playing a part in the supply chain: adding value to the supply chain to create its services and value to its customers. (Johnston, Clark & Shulver 2012: 51)

A major competence has to harness a company to create a basic value for the customers - where the customer-view decides whether or not a core value exists. It does not matter if the customer does not understand which competence is bringing him the value. An example of the bottom line value is the know-how of a car manufacturer in the construction of an engine. (Becker & Meise 2003: 89)

The concept of value combines quality and total cost: $\text{Value} = \text{Quality} / \text{Total cost}$. The qualitative relationship here emphasizing the direct influence of quality and the inverse effect of total cost on value, but the precise relationship is usually more complex. Fortunately to be effective at improving value at system level, one does not need to be concerned with these relationships for each improvement effort. (Langley, et al. 2009: 217-218)

According to Langley, et al. (2009), leaders can develop an effective approach to improving value by balancing improvement efforts in three categories:

- Eliminating quality problems that arise because of a failure to meet the expectations of customers
- Reducing costs significantly while maintaining or improving quality
- Expanding customer expectations by providing products and services that customers perceive as unusually high in value.

(Langley, et al. 2009: 218)

2.2 Service Product Variety

According to Johnston, Clarke and Shulver (2012) the first step in designing and managing service processes is to understand the mix of 'runners', 'repeaters' and 'strangers' which the process has to deal with.

Runners are standard activities usually found in high volume operations. From the operations point of view the demand of the runners can easily be forecasted, because usually they are predictable and the operations of runners are efficient because of good process control and automation.

Repeaters can also be seen as standard activities but they are usually more complex than runners and they occur less frequently. Repeaters may be created by ad hoc approaches than by design, when an organization grows and the range of its offered services expand. This may lead to situation in which the process that was made to handle quite a few activities, is now required to do much more than it was designed to. Usually repeaters have lower volume compared to runners so they have no process automation and often absorb more resources

Strangers are rare activities and they are most likely one-off activities. New service introduction may give rise to stranger activities in the first instance, which usually will migrate to repeaters or runners as service volumes increase. Strangers are the least efficient and indeed the most difficult processes for operations managers to deal with because: their demand is hard to be forecasted, the required resources to deal with demand is hard to be estimated and they do not have defined processes.

However, an organisation that is used to dealing with strangers will be much more flexible and adaptable than one that is used to dealing with repeaters or runners. (Johnston, Clark & Shulver 2012: 195-196)

2.3 Types of Processes: Volume and Variety

Processes in operations can range from producing a very high volume of products or services to a very low volume. Also they can range from producing a very low variety of products or services to a very high variety. Usually two dimensions of volume and variety go together. Low-volume operations processes often have a high variety of products and services. Thus there is a continuum from low volume-high variety through to high volume-low variety, on which we can position operations. (Johnston, Clark & Shulver 2012: 93)

Volume-variety matrix (figure 2) is a useful tool for service process design.

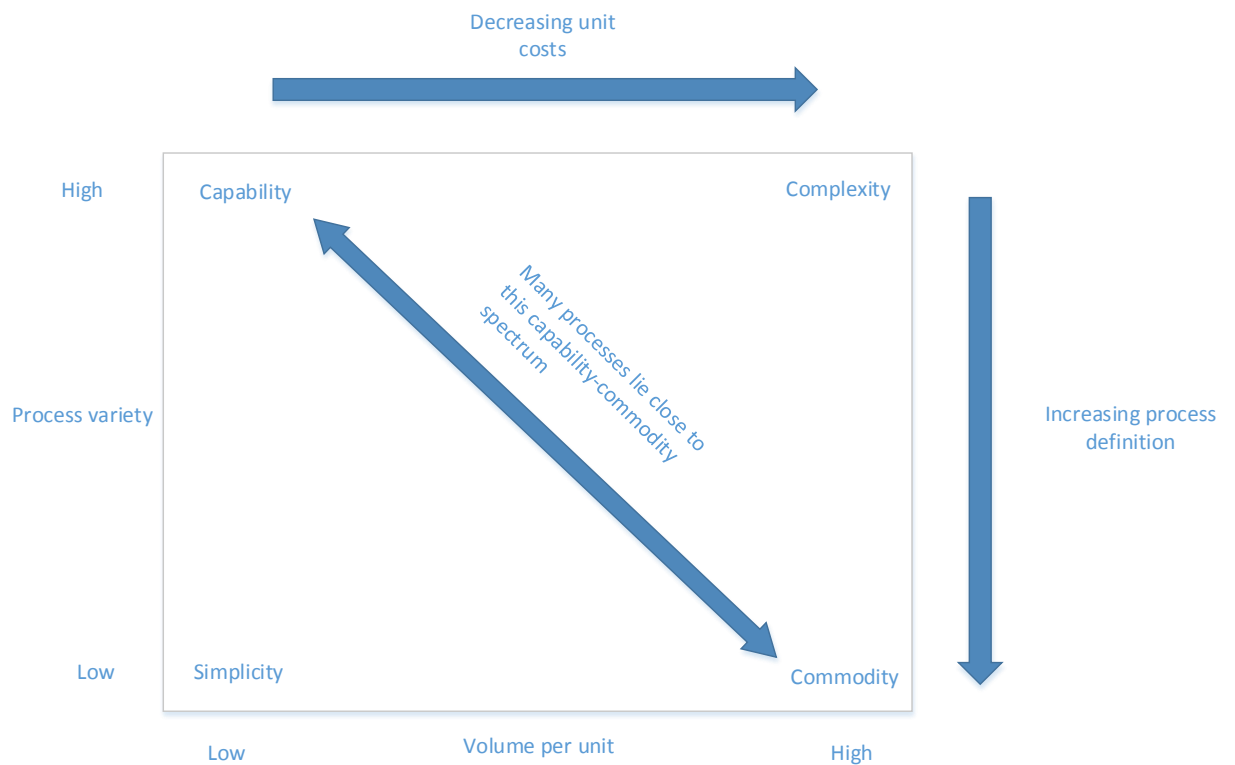


Figure 2 Volume-variety matrix (Johnston, Clark & Shulver 2012: 197)

Explanations of the different process types are found below.

2.3.1 Capability Processes

Processes that lie in the top left-hand corner of the volume-variety matrix (figure 2) are typically focused on providing a capability for their customers or users, rather than a 'prepared' service. As such they do not have a clarity of service concept that characterises high-volume consumer services, but they have much more flexibility to change service outcomes, customer experience and service delivery processes. These processes are more suited to managing strangers than runners (Johnston, Clark & Shulver 2012: 197-198). An example of this type of service includes: an organisation that adapts their capabilities to satisfy a wide range of customer needs, traditional professional services and companies that sell their creative ability.

A key task for all these organisations is to ensure that they maintain their skill base. The firm of lawyers must ensure that it retains its capability to deal with employment or patent law, just as a business school must employ professors of the major management disciplines. A number of attributes generally apply to this type of service operation:

- The service concept is based on the provision of a particular skill set or knowledge base.
- This capability frequently resides with specific individuals, and may be lost to the organisation when the individuals leave.
- Few processes are documented, partly because there is no consistency in types of activity performed, and partly because the individual service providers may resist what appears like an attempt to impose controls on their autonomy.
- Many professional services are in this category, moving further down to the diagonal towards commodity as volume and standardisation increase.

(Johnston, Clark & Shulver 2012: 197-198)

2.3.2 Commodity Processes

Commodity processes are ideal for runners. These operations are exemplified by high-volume consumer services. The service concept for these organisations is of necessity

clear and relatively rigid. This particularly applies when service must be delivered across several service locations, by a wide variety of service employees.

Whereas capability operations offer 'solutions' to their customers, commodity operations are much clearer in their definition and marketing of the service concept. They will tend to compete on their ability to provide consistent operational quality at a competitive price. One of the most significant service dimensions will frequently relate to the availability of service, through the absence of physical queues or through rapid telephone response. Examples of these service operations include: multi-site services, centralised communication-based services and equipment repair services. (Johnston, Clark & Shulver 2012: 198)

Central tasks for the majority of these operations include:

- maintaining consistency of service delivery to ensure that customer expectations are met across all encounters
- managing standard service in such a way that individual customers still feel that they are not just numbers
- providing an appropriate level of service and managing resource productivity to tight targets.

Contrasts with the attributes of capability services are as follows:

- The service concept is translated into a series of tightly controlled processes, with little opportunity for deviation from standard activities.
- Capacity is generally defined, with an emphasis on developing flexibility to deal with rapid changes in demand
- Activities are typified by runners, with an increasing proportion of repeaters as the organisation seeks to differentiate through mass customisation.

In contrast to capability operations, the central task of managers in commodity operations is to create a planned environment where the various activities of its constituent parts can be carried out as efficiently and consistently as possible. (Johnston, Clark & Shulver 2012: 198-199)

2.3.3 Operating in Complexity and Simplicity Area

Complexity processes. Processes in the top right-hand corner of figure 2 are attempting to provide high-volume services that are capable of great flexibility. Processes in this area, sometimes referred to as ‘mass customisation’, attempt to provide the customer with whatever they want, however they want it and wherever they want it at an affordable price. One example of this is telephone and internet banking which, although not providing the complete range of banking services, provide a wide range of services, 24 hours a day, every day of the year, accessible from any telephone or computer, and at little cost.

Any operations wishing to push their processes in this direction need to think very carefully about the technology and skills required to operate effectively, and profitably, in this area. (Johnston, Clark & Shulver 2012: 201)

Simplicity processes. The issue here is that the operation is unlikely to be operating as efficiently as it might because it has a low volume. This could mean that either resources are underutilised or the organisation is unwilling at this stage to invest in process technology to decrease unit costs. However, this position could suit a small niche player, such as microbrewery that produces very small quantities of a single beer for consumption in one or two outlets, or a corporate lawyer with just one or two clients. It is likely that the margins earned by these niche players far outweigh any operational inefficiencies.

However this position (in the bottom left-hand corner of figure 2) could be employed by large or small organisations as a pilot or as a start-up operation. (Johnston, Clark & Shulver 2012: 201)

2.4 Profiling Processes

Figure 3 summarizes the key points from the preceding sections in the form of a chart to assist operations managers to locate their existing processes on the capability-commodity spectrum and to determine whether action needs to be taken to make appropriate adjustments. The figure illustrates the profile for a motor insurance provider, showing the difference between its direct operation, providing policies to individual users, and its support for insurance brokers. (Johnston, Clark & Shulver 2012: 199-200)

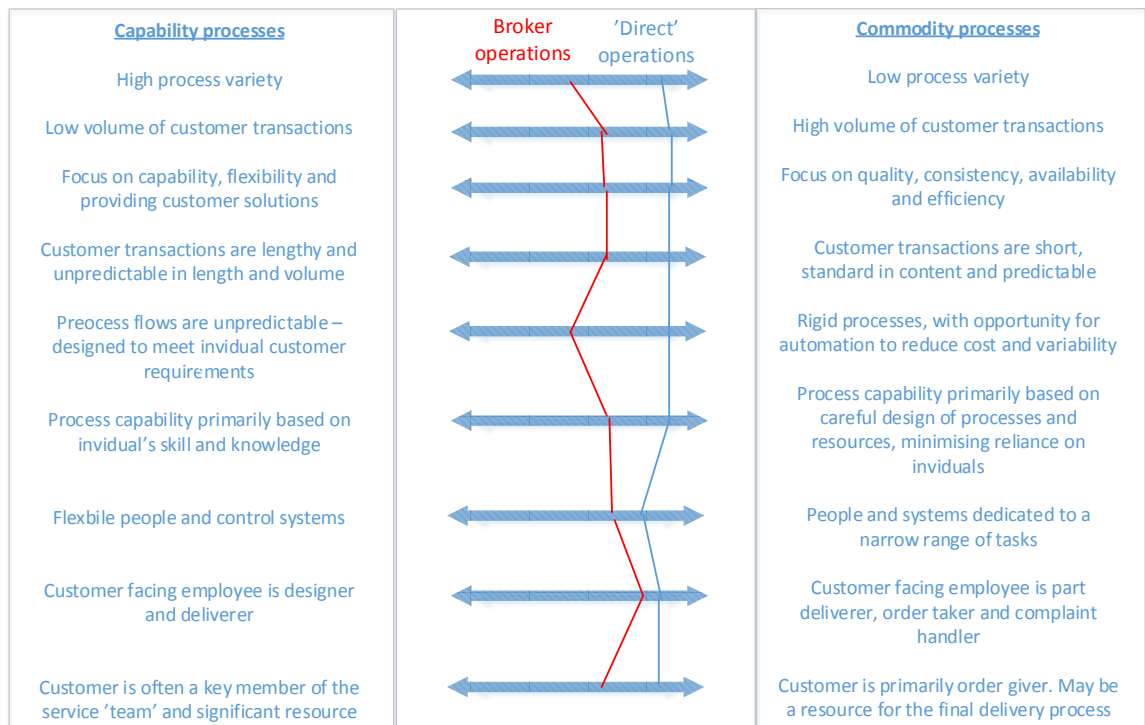


Figure 3 Capability-commodity profile for motor insurance process (Johnston, Clark & Shulver 2012: 199)

Use of this profiling approach identifies the potential mismatches to be addressed by service managers. These frequently arise because the service task has changed, whereas the delivery processes have not evolved to meet the new requirements adequately. For the insurance company in figure 3, a shift from broker operations to direct operations may well mean that the processes are more flexible than necessary and some staff may be overqualified for their new duties.

This move would almost certainly mean a significant change in management style and, of course, a change in the priorities among the key performance indicators utilised. The direct operation would probably concentrate on fast response and low cost, while broker operations would place more emphasis on flexibility and personal service.

It should be understood that using a volume-variety matrix or the capability-commodity profile to compare and contrast processes in totally different service sectors is of limited value. It is almost meaningless to compare a small firm of corporate lawyers (capability) with a restaurant chain (commodity). It is more helpful to compare different process types within the same sector. (Johnston, Clark & Shulver 2012: 200)

3 Business Processes

The business processes play the major part and are the core points of the process-oriented organization design. While business processes deal with the execution and coordination of company's assigned tasks, organizational structures separate the company into partial sections. Business processes and organizational structure must have linkage between each other in order to achieve the goals. Core components of a task are those factors that create the key elements of a functional process. An activity and/ or a function is a working step which has to be executed in order to render a service. (Becker & Kahn 2003: 4)

A business process is a special process that is directed by the business objectives of a company and by the business environment. Essential features of a business process are interfaces to the business partners of the company, e.g. customers, suppliers. (Becker & Kahn 2003: 4)

Whenever any organization attempts to satisfy its customers' needs it will use many of its processes, in both operations and its other functions. Each of these processes will contribute on some part to fulfilling customer needs. The company decides to reorganize its operations so that each product is produced from start to finish by a dedicated process that contains all the elements necessary for its production. So customer needs for each product are entirely fulfilled from within which is called an 'end to end' business process. (Slack, Chambers & Johnston. 2007: 15)

3.1 Process Improvement

Every organization need to understand that every successful improvement requires that change also occurs. But it is also good to understand that not all changes lead to improvement. The understanding of the principles of improvement and the focus on change leads to successful improvement efforts.

Improvement has to be based and observed on the given criteria. In other words, improvement is a useful concept when it is defined by characteristics such as more efficient, more effective, faster, easier, less expensive and cleaner. Sometimes it is enough to

observe the impact of a change on these characteristics, but usually it is best to document the impact. (Langley, et al. 2009: 15-16)

According to Langley, et al. (2009) there are five fundamental principles of improvement:

1. "Knowing why to improve.
2. Having a feedback mechanism to tell you if the improvement is happening.
3. Developing an effective change that will result in improvement.
4. Testing a change before attempting to implement.
5. Knowing when and how to make the changes permanent (implement the change)."

A challenge faced by all managers is how continually to improve and develop their processes and their customer's experiences, ensure that the outcomes are real improvements and that there is a culture that is supportive of service and change. Improving the operation is about taking what exists and developing it. Innovation, on the other hand, looks for what is not there, i.e. what is new. (Johnston, Clark & Shulver 2012: 30)

Slack, Chambers and Johnston (2007) identified two major factors on the way in which operations choose on their improvement priorities:

- The need and preferences of customers;
- The performance and activities of competitors

Consideration of customers' needs has particular significance in shaping the objectives of all operations. The fundamental purpose of operations is to create goods and services in such a way as to meet the needs of their customers. What customers find important, therefore, the operation should also regard as important. The role of competitors is different from that of customers. Competitors are the points of comparison against which the operation can judge its performance. (Slack, Chambers & Johnston. 2007: 589)

3.2 Approaches to Improvement

Once the target of improvement has been decided, an operation must consider the strategy and approach it desires in order to reach the improvement goal. Two particular strategies represent different, and to some extent opposing, philosophies. These two strategies are *breakthrough improvement* and *continuous improvement*. (Slack, Chambers & Johnston. 2007: 594)

Breakthrough improvement assumes that the improvement occurs only through a major and dramatic change in the way the operation works. The introduction of a new, more efficient machine in a factory, the total redesign of a production system and introduction of a new and better order handling process are all examples of breakthrough improvement. The impact of these improvements is relatively unpredictable, unexpected and represents a step in the change in practice. Such improvements are rarely inexpensive, usually they require high investments, often disrupting the ongoing workings of the operation and frequently involving changes in the product/service or process technology. (Slack, Chambers & Johnston. 2007: 594)

Business process reengineering is often associated with as a type of breakthrough improvement. A well-known radical approach to improvement and change is **BPR**. BPR is about the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in performance.

According to Johnston, Clark and Shulver (2012) the main principles of BPR involve the following:

- **A cross functional approach.** In the context of BPR, organizations need to approach the improvement from the cross functional perspective, because in many cases process and operations cut across the organizational silos and boundaries. Only by cross-functional procedures and operations, organizations can radically redesign their processes.
- **Out-of-the-box thinking.** Business process reengineering is supposed to be radical and so it needs radical thinking in order to be successful. Old habits and thinking need to be questioned in order to allow total redesign and change to occur in the company.

- **Simplification.** BPR attempts to discard **wasteful** activities and focuses on simplicity and logical ordering. However, the often significant use of IT to enable radical changes can create a source of complexity that can undermine improvements.

Implementing BPR requires the formation of a team of professionals with a skilled individual to coordinate action. It requires a clear understanding of the current state, supported by process mapping. Redesign is then a core feature for the team, involving both visioning and detailed concern for measurements and control, to ensure not only the effectiveness of the new process but also its improvement. (Johnston, Clark & Shulver 2012: 331)

Continuous improvement, is based on principle that improvement can be made with more and smaller incremental improvements. Continuous improvement has a great advantage over BPR, smaller improvements can be followed and executed relatively painlessly compared to large ones. (Slack, Chambers & Johnston. 2007: 594-595)

Continuous improvement means improvement in small, incremental, continuous steps that can be placed in the context of a number of tactical initiatives. Small and daily improvements in business will eventually grow into large gains. (Burton & Boeder 2003: 72)

Continuous change involves modest but continual changes to an existing process, whereas step-change seeks radical changes – indeed the total redesign of the existing process coupled with a significant improvement in performance. The benefits from small, successive continuous improvements are expected to be attained over a long period of time, unlike radical change which aims to create major improvements in the short to medium term. Continuous incremental improvement involves everyone in an organization and the changes are driven by them, this requiring little senior management time and effort, unlike radical change which is usually driven by senior management champion requiring substantial management time and effort. (Johnston, Clark & Shulver 2012: 323-324)

W. Edwards Deming's teachings for continuous improvement consisted of three principles:

- **Customer satisfaction.** Companies should always focus on fulfilling customers' needs and it should be the main principle. Organization must have the mindset towards putting the customer first and manage employees to do so in their daily basis.
- **Management by facts.** Made decisions have to be based of scientific facts. Employees have to collect and present data to management for righteous decision making. Organizations should aim for formal data gathering and analysis inside the whole company.
- **Respect for people.** Quality improvement programs creates environment where all employees are encouraged for self-motivation and for creative thinking. Employees ideas are heard and respected and they are supported.

(Fitzsimmons & Fitzsimmons 2008: 146)

3.3 Process Measurement

According to Slack, Chambers and Johnston (2007) performance measurement is: the process of quantifying action, where measurement means the process of quantification and the performance of the operation is assumed to derive from actions taken by its management. Performance here is defined as the degree to which an operation fulfils the objectives at any point in time, in order to satisfy its customers. Some kind of performance measurement in a prerequisite for judging whether an operation is good, bad or indifferent. Without performance measurement, it would be impossible to exert any control over an operation on an on-going basis. (Slack, Chambers & Johnston. 2007: 582)

Measurement plays an important role in focusing people on particular aspects of the business. In many organizations, the objects that are measured are considered important while the elements not measured are deemed unimportant. Wrong measures motivate people to do the wrong things. Developing appropriate measures, making better use of existing measures, and improving measurement systems can lead to improvement throughout the organization. (Langley, et al. 2009: 380)

Process performance measurement is just about measuring the in- and outcomes of the process. In the essence it is the quantification of input such as working hours, or an output such as costs, or for example how many customers were dealt with within a day. Performance reporting is the way managers, staff or systems, report this information. It usually involves some sort of graphic display, with some analysis as to how the measure performs against some agreed objectives. (Johnston, Clark & Shulver 2012: 227)

Processes have to be constantly managed and measured on ongoing basis in order to ensure their solid performance. The measured criteria need to be linked to higher-level organizational objective to ensure that the processes and operations are set towards to correct goal. In addition, the people involved in these particular processes should be evaluated by their performance. (Jeston & Nelis 2006: 232)

For example the five generic performance objectives include the following: speed, quality, cost, flexibility and dependability. They can be broken down into more detailed measures, or they can be aggregated into 'composite' measures, such as 'customer satisfaction', or 'operations agility'. These composite measures may be further aggregated by using measures such as 'achieve market objectives', 'achieve financial objectives' or 'achieve operations objectives'. The more aggregated performance measures have greater strategic relevance in so much as they help to draw a picture of the overall performance of the business. The more detailed performance measures are usually monitored more closely and more often, and although they provide a limited view of an operation's performance, they do provide a more descriptive and complete picture of what should be and what is happening within the operation. (Slack, Chambers & Johnston. 2007: 583)

3.4 Business Process Management

Many people are still confused about constitutes BPM, which is not surprising when the BPM community itself has not yet agreed on a common definition and approach. BPM is all about the efficient and effective management of business processes – people are at the center of business processes, so they should be made part of the solution. (Jeston & Nelis 2006: 8)

According to Jeston and Nelis (2006) many of the analysts and commentators define BPM as a technology or an automation tool but when BPM is observed from a common-sense view it is clearly more than that. BPM is about management of business processes. With this simple statement in mind and the organization as the primary focus, Jeston and Nelis suggests that BPM is: *The achievement of an organization's objectives through the improvement, management and control of essential business processes.* (Jeston & Nelis 2006: 11)

Process management has to be seen as a part of normal management. It is important that managers and leaders understand that there is no finish line for improvement; improving processes is continuous process that needs to be maintained

3.4.1 BPM Main Drivers and Triggers

Identifying of the trigger events is the first step of defining processes. The identifying of trigger events in particular processes is critical and it usually requires viewing them from an external perspective. Companies need to see and understand their business processes from their customer's perspective

Trigger events can be seen as “moments of truth.” These are the events in which the customer is in contact with the company and forms first impression of the company's quality of service. These events are not necessarily positive or negative themselves, but the sum of all interactions creates the experience positive or negative. One negative moment can outplay every other positive customer moment. . Identifying these trigger events will lead to the most critical processes. (Jacka & Keller 2002: 73-74)

Jeston and Nelis (2006) have categorized (table 1) some of the likely drivers and triggers that may cause an organization to consider BPM as a possible solution, looking at these

drivers and triggers from organizational, management, employee, customer, supplier/partner, product or service, process and IT perspectives.

Table 1 Drivers and triggers that causes an organization to consider BPM (adopted from Jeston & Nelis 2006: 17)

Category	Drivers and triggers
Organization	<ul style="list-style-type: none"> • High growth • The need for business agility • Objectives are not being met
Management	<ul style="list-style-type: none"> • Lack of reliable or conflicting management information • The need for the introduction of a sustainable performance environment • The need to create a culture of high performance
Employees	<ul style="list-style-type: none"> • The wish to increase employee empowerment
Customers/suppliers/partners	<ul style="list-style-type: none"> • Low satisfaction with service • Long lead times to meet requests • The need for a true end-to-end perspective to provide visibility or integration
Products and services	<ul style="list-style-type: none"> • Lack of business agility • Poor stakeholder service levels • Products or services are complex
Processes	<ul style="list-style-type: none"> • The need for provision of visibility of process from a end-to-end perspective • Processes change too often or not at all • Lack of clear process goals and objectives • Quality is poor
Information technology	<ul style="list-style-type: none"> • A view that IT is not delivering to business expectations

However, companies should not over-automate processes to the extent that the organization loses sight of the need for people involvement. (Jeston & Nelis 2006: 16)

3.4.2 Business Process Management Maturity

The stage how advanced different organizations are in their Business process management development, can be evaluated with the BPM maturity model. The concept 'maturity' has been created for a number of management approaches as a way to determine on which state the organization is on its BPM journey. (Jeston & Nelis 2006: 299)

Maturity models have been designed to assess the maturity, i.e. competency, capability, level of sophistication, of a selected domain, based on a more or less comprehensive set of criteria. Therefore, BPM maturity is a tool that can assist organizations in becoming more successful with BPM, resulting in the achievement of greater operational and business performance benefits. In addition, the increased success of BPM adoptions will contribute to positioning BPM as an enduring management practice. According to Jeston and Nelis, maturity models can be used for three purposes: (2006: 300)

1. As a *descriptive* tool enabling an 'as-is' assessment of strengths and weaknesses.
2. As a *prescriptive* tool enabling the development of a roadmap for improvement.
3. As a *comparative* tool enabling benchmarking to assess against industry standards and other organizations.

3.4.3 A Typology of BPM Maturity Stages

Paulk et al. (1993:5) stress that improved maturity results "in an increase in the process capability of the organization". The core for many maturity models has been the Capability maturity model (CMM), where the organizations' maturity is evaluated on a five-point Likert scale, in which the number '5' represents the highest stage of maturity.

The comparison of low and high maturity in figure 4 helps to define the inclusiveness and scale of BPM maturity. The idea of comparing low and high maturity derives from Paulk et al. (1993), who presented such a comparison to facilitate the understanding of the concept of process maturity. The proposed BPM maturity model adopts the five maturity stages of COMM in an attempt to differentiate various levels of development of a BPM initiative. (Jeston & Nelis 2006: 301)

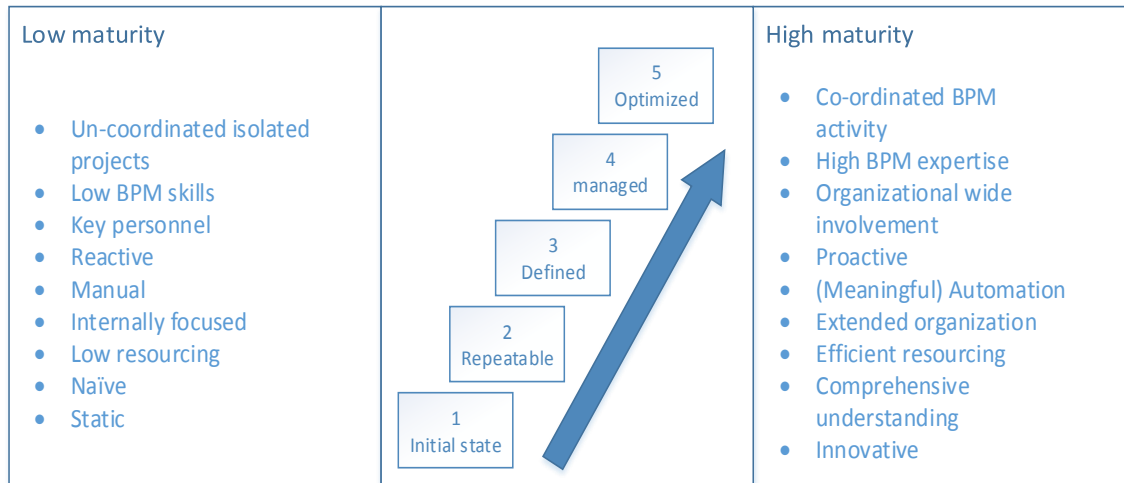


Figure 4 Comparison of low and high maturity and the five maturity stages (Jeston & Nelis 2006: 301)

Jeston and Nelis (2006) define the BPM maturity stages as follows.

Stage 1: Initial

An organization with BPM maturity stage 1 will have made very few or unsuccessful attempts towards BPM. Usually, such an organization may display characteristics just as: ad hoc approaches, individual efforts, limited scope of BPM initiatives, minimal employee involvement and high levels of manual interventions and work-arounds.

(Jeston & Nelis 2006: 302)

Stage 2: Repeatable

- An organization with BPM maturity at stage 2 will have managed past making first BPM solutions and will be starting to build up BPM capability and increase the process oriented thinking. Usually organizations at stage 2 display characteristics like: first documented processes, increased involvement of executives and top management, extensive use of simple process modeling with simple repositories and increased reliance on external BPM expertise

(Jeston & Nelis 2006: 302)

Stage 3: defined

An organization with BPM maturity at Stage 3 will experience increased momentum in its journey to develop BPM capability and expand the process oriented thinking within the organization. Typically, such an organization may display some combination of the following characteristics: focus on the management of the early phases of the process lifecycle, a combination of different process management methods and tools, more extensive use of technology for delivery and communication of BPM and less reliance on external expertise.

(Jeston & Nelis 2006: 303)

Stage 4: Managed

An organization with BPM maturity at stage 4 will relish the benefits of having BPM firmly adopted in the strategy of the organization. Typically, such an organization may display some combination of the following characteristics: exploration of business process controlling methods and technologies, widely accepted methods and technologies, integrated process management purposes, process orientation as a mandatory project component and continuous extension and consolidation of process management initiatives

(Jeston & Nelis 2006: 304)

Stage 5: Optimized

An organization with BPM maturity at stage 5 will relish the benefits of having BPM firmly adopted as a major part of both strategic and operational management within the organization. Usually, this kind of organization may display characteristics such as: process management being a part of managers' activities, accountabilities and performance measurements, established business process lifecycle management and wide acceptance and use of standard methods and technologies

(Jeston & Nelis 2006: 304)

According to Jeston and Nelis (2006) BPM maturity contains six core factors which are critical success factors for business process management. These points have to be correct in order for the organization to be prosperous with BPM. (Jeston & Nelis 2006: 305)

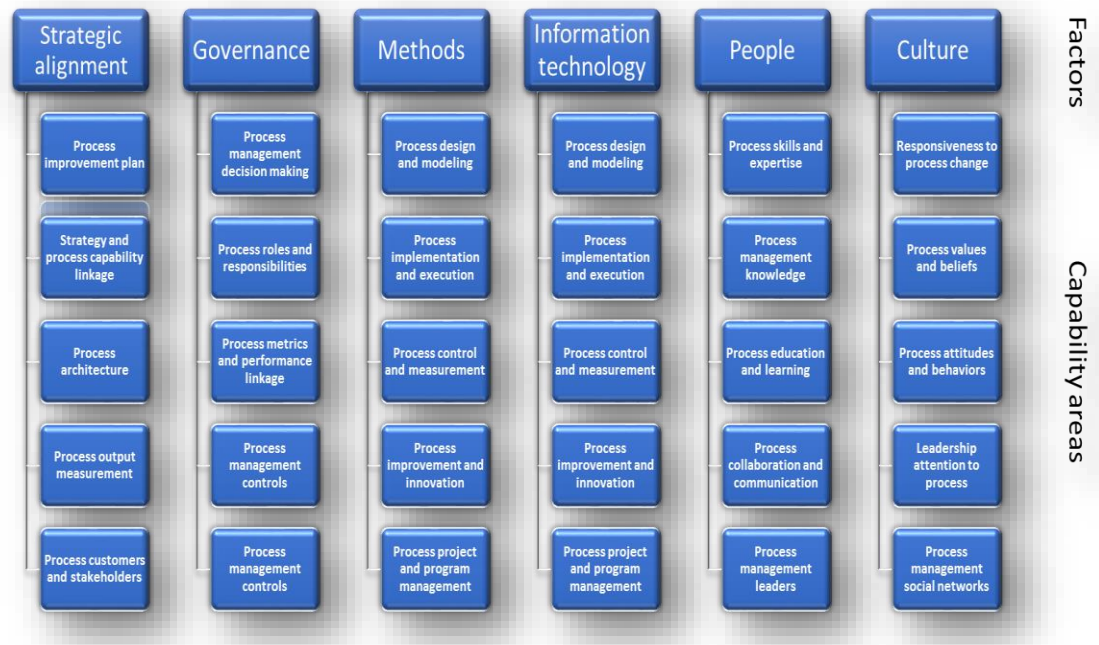


Figure 5 The BPM capability areas (Jeston & Nelis 2006: 308)

As a part of BPMM, **Strategic alignment** is characterized as the strict linkage of organizational preferences and enterprise processes allowing continual and adequate action to develop business performance. There are five principle capability areas that need to be measured as part of an assessment of strategic capabilities, as they relate to BPM

In the Business Process Management, **governance** creates relevant and lucid accountability, decision making and processes to design operations. From the traditional perspective, a focus is on the decision-making processes and its related roles and responsibilities.

In Business Process Management, the **methods** have been described as the factors and procedures that support and allow coherent process actions. An advantage of associating the method capability with a specific process lifecycle stage is the resultant ability to assess methods that serve a particular purpose, rather than all methods purely relating to business process management.

In the context of BPM, **information technology** means the software, hardware and systems that facilitate and endorse process activities.

People refers to the factor that comprises the human resources. While the information technology factor covered IT-related BPM resources. The people factor is defined as the individuals and groups who continually enhance and apply their process skills and knowledge to improve business performance.

Culture means the collective values and beliefs that shape process-related attitudes and behaviors to improve business performance.

(Jeston & Nelis 2006: 308-313)

4 Lean

The key philosophy of lean operations is relatively linear to understand – it means moving towards the reduction of all waste in order to develop an operation that is faster, more dependable, produces higher-quality products and services and, above all, operates at low cost. (Slack, Chambers & Johnston. 2007: 466)

Lean improvement has been defined as “a systematic approach to identifying and eliminating waste (non-value-added activities) through continuous improvement by flowing the product at the pull of the customer in pursuit of perfection.” A lean approach focuses on continuously reducing waste in operations and in products and services and continuously enhancing the value submission to customers. (Langley, et al. 2009: 463)

Lean strategy and structure is about alignment of the organization’s lean initiative to customer requirements. The strategy of improvement enables organizations to deploy the right methodologies to the right opportunities and eliminate the non-value adding waste. In time, lean becomes part of the DNA of the business so that the lean methodologies and tools are institutionalized across the value stream. (Burton & Boeder 2003: 101)

The word lean means different things to different people. At the strategic level, lean is business philosophy. Lean is also used to refer to a set of practices and principles to eliminate waste. Finally, lean is used to describe specific lean tools. (Burton & Boeder 2003: 101)

According to Flinchbaugh and Carlino (2006) the five lean principles are:

1. “Direct observation of work as activities, connections and flows;
2. Systematic waste elimination;
3. Establishing high agreement of what and how;
4. Systematic problem solving;
5. Creating a learning organization.”

Each principle carries its own meaning and a set of behaviours. However, their essential value lies in how they work together. It is important to note that these principles have no sequential order. They are continually at work and guide how an organization’s personnel reach and respond to the event around them. (Flinchbaugh & Carlino 2006: 3)

4.1 Kaizen

The main lean objective can be expressed as ‘meet demand as fast as is need and do it with perfect quality and without waste’. Organizations in their current state can be far away from such ideal, but the lean philosophy describes that every organization can reach such a state over time. Without such beliefs to drive progress, lean supporters claim improvement is more likely to be transitory than continuous. This is why the concept of continuous improvement is such an important part of the lean philosophy. If its aims are set in terms of ideals which individual organizations may never fully achieve, then the emphasis must be on the way in which organization moves closer to the ideal state. The Japanese word for continuous improvement is **kaizen** and it is a key part of the lean philosophy. (Slack, Chambers & Johnston. 2007: 474)

Kaizen is gradual, incremental, and continual “improvement” of activities so as to create more value and less non-value-adding waste.

- “*Continuous improvement* means improvement in small, incremental, continuous steps that can be placed in the context of a number of tactical initiatives. Daily improvements in small amounts carried out in every job and function of the business eventually accumulates into very large gains.”

(Burton & Boeder 2003: 72)

The benefits of applying kaizen have been well documented across many organizations. Process improvements resulting from kaizen events are realized from conducting both planned kaizen events as well as daily kaizen super blitz events. Application of kaizen to daily quality defects in processes, equipment, and products results in a sustainable continuous improvement process focused on both corrective action and prevention activities.

The key benefits of institutionalizing kaizen include for example the following:

- Provides an environment where workers will think about solutions to problems in their daily activities.
- Institutionalizes the processing of continual adjustments into the daily scheme of the organization.
- Eases the identifying the needs and problems of a particular process.
- Emphasizes solutions of common sense and cost-effectiveness.

(Burton & Boeder 2003: 75)

4.2 Lean Thinking

Lean thinking is generally held to have originated through the work of Toyoda and Ohno at the Toyota Motor Company in Japan. The Toyota production system has been studied and copied throughout the world by both manufacturing and service companies which wish to reap the benefits of reduced costs as well as an organisational culture that believes in the possibility of continuous improvement throughout the supply chain.

The essence of lean thinking is to find what adds value for the customer and to remove all other non-value-adding activities in a process. The objective is to ensure that the customer, or the task being carried out on behalf of the customer, flows through the system as quickly as possible, without non-productive waits, thus reducing cost and improving customer satisfaction. (Johnston, Clark & Shulver 2012: 331-332)

From the **external** point of view lean thinking creates an environment that foresees customer needs and positions the organization to take action through a designed operating philosophy. In addition adapting lean thinking helps organizations to: fulfil customer's needs and create operations that are hard to be replicated by competitors, provide higher profitability, product margins and stock prices and creates more cost-effective organization in general.

From the **internal** point of view the benefits of lean thinking include the following: allows organization to view customers, suppliers and the internal organization as a single entity. Helps people and systems to create strategy into basic operations, makes the organizational structures simpler across the business processes and leverages creativity of employees.

It is important to note that the benefits are attainable for both convergent and divergent types of organizations. (Burton & Boeder 2003: 104-105)

Companies should value finding and resolving small problems as well as large ones. It is not that small problems are as significant as larger ones. A part being late, the equipment being down, or a person not following standard work instructions do not seem as valuable to work on as a defect that affects a customer or a budget shortfall. However, the overall impact of thousands of ignored small problems outweighs the impact of just a handful of large problems. Also, when a problem first occurs, organizations do not

know in advance whether the problem will deliver a major or minor impact. A lean organization does not wait to see how far the problem will go. The problem is solved before it has a chance to get out of hand. (Flinchbaugh & Carlino 2006: 18)

4.3 Eliminating Waste

Arguably the most significant part of the lean philosophy is its focus on the elimination of all forms of waste. Waste can be defined as any activity which does not add value. Two simple devices are commonly used in lean improvement. (Slack, Chambers & Johnston. 2007: 470)

Waste is defined as any process that adds time or cost but does not add value. The primary focus of kaizen events is identifying and driving out wastes from processes. So often kaizen events are limited to only production areas within the organization. Those organizations that choose to conduct kaizen events for production and administrative functions enjoy greater benefits in terms of waste elimination. (Burton & Boeder 2003: 76)

Toyota identified seven core types of non-value-adding activities in business or manufacturing processes, which are described below.

1. **Overproduction.** Early production or producing greater amount than is required.
2. **Waiting.** Idle workers and unnecessary waiting times.
3. **Transportation or conveyance.** Unnecessary moving of work in process (WIP) in a process.
4. **Overprocessing or incorrect processing.** Production of too low or high quality products than is needed.
5. **Excess inventory.** Overproduction may lead to excess inventory which leads to other wastes.
6. **Unnecessary movement.** Unnecessary movement performed by employees during production is identified as a waste.
7. **Defects.** Production of faulty parts or products.

(Liker & Meier 2006: 35-36)

Although developed for manufacturing operations, they all apply to many service operations, particularly those that have factory-like back offices, and those that have the supply of physical products as part of the concept. It is also worth applying Ohno's classification to the service process, considering customer as the unit of material. This would encourage thinking about the cost to the customer in time or money when dealing with a particular service provider. A reduction in cost for the customer would almost certainly equate to an increase in value, which is the essence of lean thinking. (Johnston, Clark & Shulver 2012: 332)

4.4 Value Stream Mapping

Value stream mapping is a specific flow diagram which is commended for lean improvement projects. This diagram identifies value-adding activities and helps in searching the non-value-adding activities in a process. The VSM approach not only illustrates the process flows but also the information flow in the process. A timeline is displayed at the bottom of the process map, showing the processing time for each operation and the transfer delays between operations. The timeline is used to point the value-adding elements, as well as wasted time. (Langley, et al. 2009: 415)

Value stream mapping (also known as 'end-to-end' system mapping) is an effective way to understanding the flow of material and information as an object has value added as it travels through a process, operation or supply chain. It illustrates 'production' path from beginning to end. It does not only demonstrate direct activities of creating products and services but also 'indirect' information systems that support the production process.

VSM is an effective tool for organizations to recognize waste and find the root causes of it. Value stream mapping includes four-steps which help to identify waste and provide recommendations how to streamline the activities in the process.

1. Identify value stream to map.
2. Map the physical process and information flows that are crucial in order that process can occur. (Current state map).
3. Diagnose the problems and suggest changes that improves the process (Future state map).
4. Implement the changes.

(Slack, Chambers, Johnston. 2007: 471)

A value stream map has two main components. The first component is the flow of materials through transformation processes to produce the finished goods or services. The second component is the flow of information to support the transformation process for the finished goods or services. The benefits of value stream mapping are limited if information flows are not included in constructing the value stream map. It is important to note that there are ranges of wastes that are not accounted for in the value stream map, and these wastes should not be ignored as opportunities. (Burton, Boeder 2003: 109-110)

According to Burton and Boeder (2003) value stream mapping provides the following benefits. It can:

- Show linkages and connections information flow and material flow.
- Identify sources of waste in the value stream.
- Provide common language for talking about the processes.
- Form the basis of an implementation plan to identify and eliminate waste.
- Allow identification of non-value-added steps, lead time, distances traveled, and amount of inventory for a process.

(Burton, Boeder 2003: 110)

5 Research Methods

In this chapter the used research methods and reasons for choosing it are presented. Because this thesis focuses on a certain process, it was quite clear which method to choose. The research method used in this study was participant observation, meetings and informal interviews.

Qualitative research is an attempt to comprehend phenomena in their uniqueness as a part of a specific context. This understanding is an end in itself, so that it is not attempting to foresee what may happen in the future, but to comprehend the nature of that setting and in the analysis to be able to communicate that faithfully to others who are interested in that setting. The analysis strives for depth of understanding. (Merriam 2014: 14)

Observation is a major means of collecting data in qualitative research. It offers a first-hand account of the situation under study and, when combined with interviewing and document analysis, allows for a holistic interpretation of the phenomenon being investigated. It is the technique of choice when behaviour can be observed first-hand or when people cannot or will not discuss the research topic. (Merriam 2014: 136)

Participant observation, for many years, has been a major player of both anthropological and sociological studies. In recent years, the field of education has seen an increase in the number of qualitative studies that include participant observation as a way to collect information. Qualitative methods of data collection, such as interviewing, observation, and document analysis. (Kawulich 2005)

I have been working closely with the Inventory Access service product for the last two years. Participant observation and informal interviews were found to be efficient research methods for this study, because I was already familiar with the thesis subject.

6 Current State of Inventory Access Order Handling Process

6.1 Defining Inventory Access

Inventory Access is a service product offered by ABB Oy, Drives Service to ABB's local business sales units (LABB's) around the world. The business idea of this service product is to lease spare parts for a certain type of frequency converter. The product ensures availability of spare parts and quick service to the end-customer in the field. The spare parts can be used by local ABB field service engineers, by ABB's partners or in some cases even by the end customer. In general, the spare parts are placed in a suitcase to provide mobility and ease the access to spare parts in the field. There are multiple different variations of the product to match customer needs. Every suitcase has a different content of spare parts to provide maintenance or repair for a certain type of frequency converter.

In the essence Inventory Access is:

- A leasing contract between Drives Service and the LABB.
- A contract with which availability of standard spare parts is guaranteed.
 - Does not include ambiguous parts. ("The ambiguous parts" refers to items that are not standard stock items.)
- During the contract period The Drives Service updates the suitcases if the product range changes.
- LABB / RDSC pays a yearly fee for the parts during the contract period.
- The spare parts remain in the ownership of ABB Oy Drives Service during the contract period
- If the customer uses a part from the suitcase, replacement part is ordered at its normal purchasing price
- If a part has been used in repairing a drive under warranty, the LABB places a warranty order for the used part.
- After the 5-year minimum contract period the customer can choose either to purchase the suitcase, return it to ABB Oy, Drives Service or continue the contract with a reduced yearly fee.

In special cases when customer needs cannot be met by a suitable suitcase, it is possible to make an individual quotation for loose spare parts contract. The quotation and list of recommended spares are made by the sales support team. The customer informs the type of device for which he desires to have spare parts for or he can also provide a list of parts to be included into the contract. According to this information the sales support team gives a quotation for the customer (case by case).

The customer service team of the company is responsible of maintaining and handling the Inventory Access operations, this includes invoicing, stocktaking, managing the contracts, handling orders and customer inquiries. Currently customer service team has designated one full time employee to be the person in charge for the whole process. The Inventory Access process has an owner but currently he is mainly resourced on developing the other contract based services the company has.

In perspective of service product variety, Inventory Access product and process can be seen as 'repeater' (Johnston, Clark & Shulver 2012: 195-196). Orders for Inventory Access are standard activity but occur less frequently than for the other products and services that the company has to offer. Orders are handled only by a few designated employees in the customer service team, due to the complexity of order handling procedures. Process and procedures were also originally designed to handle relatively small business but it is now expanding.

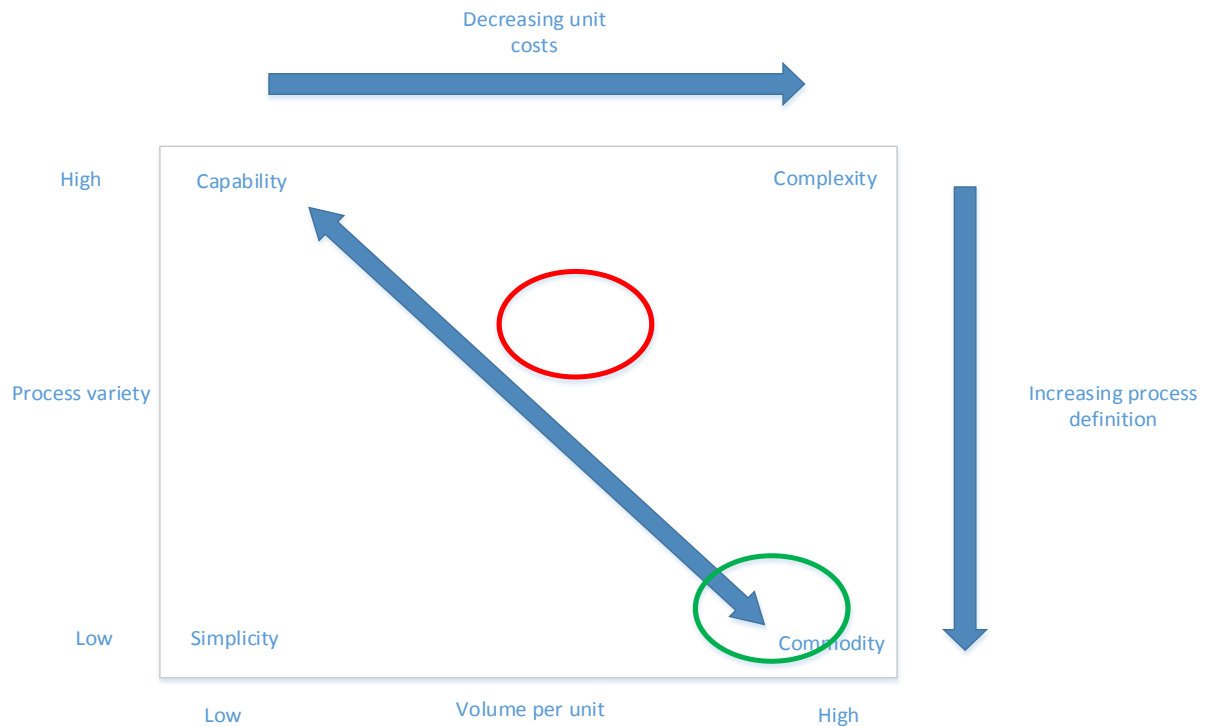


Figure 6 Inventory Access and standard spare parts Volume-variety matrix (Adapted from Johnston, Clark & Shulver 2012: 197)

When comparing the Inventory Access product and process (marked in red) to the standard spare part sales (marked in green) in the volume-variety matrix, Inventory Access can be seen much more complex and less frequently occurring. Inventory Access service products are relatively cheap for the customer, complex to handle for the company and the process variance is on a higher level. From the perspective of the service product variety, the standard spare part sales can be seen as a typical 'runner' (Johnston, Clark & Shulver 2012: 195-196).

6.2 Current State of Inventory Access

At present, the Inventory Access order handling process and the whole operation is handled manually from orders to invoicing, meaning that there is no automation in any part of the process. The orders are received by email, the part lists of suitcases are in Excel form, orders are placed manually into SAP, contracts are maintained in a network drive, Invoicing is made manually twice a year and so on.

Inventory Access is not a global service product of the company. There is no assigned service product manager for Inventory Access. In a way the product is not a part of the service and product portfolio and there are no key performance indicators placed for it. The performance is not measured in any way.

The management of Drives Service has decided that Inventory Access operations will continue and they will not be run down but the current way how operation is handled is not sustainable. The Inventory Access business started as a small operation, which was intended for a few customers only. From a few dozen of active contracts, the number of contracts has expanded to a few hundred of active Inventory Access suitcase contracts. But even when there are hundreds of contracts and the number is still growing, the way how things are operated is still the same as when there were only a few contracts. This has led to an unsustainable and laborious process which is creating big problems with the service product.

The yearly net order intake from 2010 to 2015 is illustrated below. The readings illustrate the growth and downturn compared to the previous year's profits.

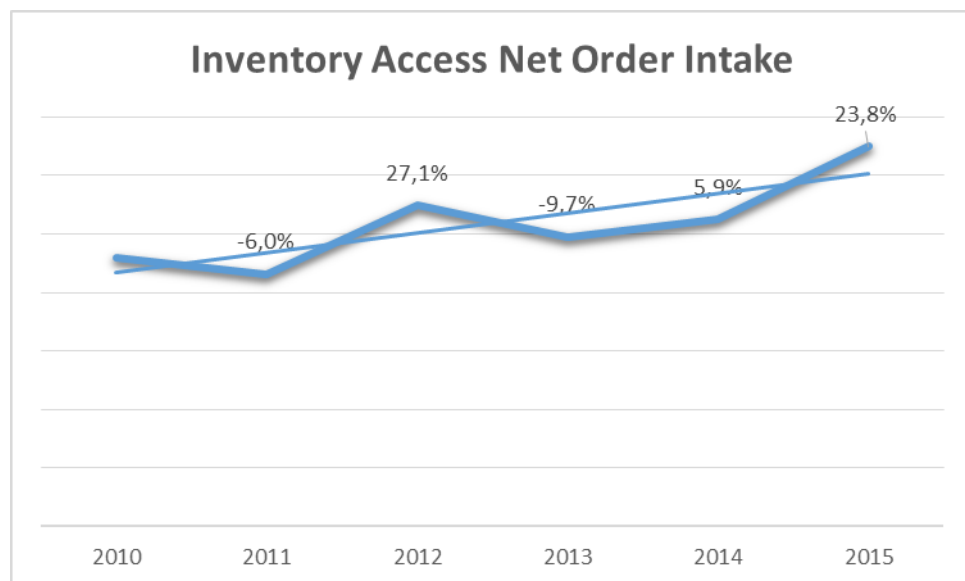


Figure 7 Inventory Access Net Order Intake 2010–2015

Probably the main reason why Inventory Access is overlooked and there are no resources to develop, it is that every sealed contract and delivered suitcase raise the value of inventory. As the idea of the product is that the spare parts are leased to customer and they stay in the ownership of ABB Oy, Drives Service leads to the fact that the value

of the inventory increases. In ABB's next level strategy the company aims for pushing capital efficiency which also means inventory reduction. At the same time the company aims for driving white collar productivity, speed, quality, cost and enhancing customer service. From the Inventory Access perspective none of this is currently happening.

Some of the customers are not satisfied with the quality of the products. Originally, suitcases included cells which surrounded and protected the parts inside the case. The most recent versions of Inventory Access products may not include the cells or even a suitcase at all. The person who originally designed and engineered the layout of suitcases is no longer working for the company. The information about which product does not include cells and/or a suitcase is found in the Inventory Access price list. But still the lack of cells often comes as an unpleasant surprise to the customer.

To clarify, below there is a picture of one suitcase which includes cells and one which does not.

Below (figure 1) is a picture of one suitcase which includes cells which protects and keeps parts in place during transit.



Figure 8 Photo of a Suitcase (Infopankki 13 / 13.14)

On the left the middle cell is in place and the cover plate is on the upper cell. On the right the middle cell and the cover plate of the upper cell has been removed.

In the following figure (figure 9) one can see a suitcase which does not include cells.



Figure 9 Photo of a Suitcase without cells

As one can understand, the layout of some of the suitcases should be redesigned to meet customer needs.

6.3 Process Walkthrough

This section aims to give a brief picture of the current way of how the order handling process of Inventory Access is executed. The current order handling and upkeep of the Inventory Access process are executed in a laborious and old-fashioned way. The goal is not to describe the process in detail, but to give a picture of how Inventory Access process is being carried out. See the Appendix 1 (Presales and handling of new suitcase order) which visualizes the process on a high-level.

6.3.1 Presales and Actions Before Placing an Order

Currently the information about Inventory Access is very difficult for customers to find, for example, information about availability of suitcases, how to order or content of the suitcases. It would make sense to put this information online to ease the workload for the customer and to the Drives Service customer service. Currently all Inventory Access related information is asked for and provided by email case by case. As the Inventory Access operation is being maintained by one single person, there is not always time to take action immediately. This easily leads to prolonged lead times and customer dissatisfaction.

In most cases, customers choose to have a standard suitcase and it fulfils customer needs, but in some cases, loose spare part agreements are desired. In these cases, the sales support team of Drives Service is needed to provide a quotation to the customer, which seems to be the only element that causes variation in the process. (See Appendix 2 for visualization of the inquiry process).

If the customer is already familiar with how and what to order, they will send a purchase order by email for the desired suitcases. It is crucial to check out that all the needed information is given on the order. It is agreed that Inventory Access products are solely offered to ABB DM units. ABB DM units are able to offer the products further to other ABB units, partners or in some cases to end customers. (See appendix 3 for illustration).

Once the order and customer information has been verified, one needs to acquire the part lists for the desired suitcases from SAP DMS, if one has not obtained them in the earlier steps of the process. Because part lists are updated time to time by product managers and the most recent version is uploaded into SAP DMS, it is mandatory to acquire them from there. The part list also works as an appendix of the Inventory Access agreement, as a subcontract for an individual suitcase, so it is needed to treat it accordingly suitcase by suitcase. (See the Appendix 4).

6.3.2 Handling and Delivery of Order

All the other products and services that Drives Service has to offer can be purchased and ordered from a browser-based system BOL (BusinessOnline). Once an order is handled in BOL it will be transferred automatically to FISAP where the order can be altered and displayed. For Inventory Access this is not currently possible, since there is no developed order type for it. Every order received needs to be manually placed to SAP. Every suitcase order placed into SAP can include only parts of one suitcase, since the generated reference number works as a serial number for an individual suitcase. For example, if the customer has sent a purchase order for five suitcases, the person in charge needs to create one order per each suitcase and each suitcase requires its unique part list.

Currently every product included in the suitcase needs to be inserted into SAP order row by row, because the bill of materials is not maintained in SAP and for inventory management reasons and also the transaction type used for creating the order does not support the use of the suitcase id code.

When the order has been placed into SAP one needs to attach the reference number of the order to the part list of the suitcase. After these part lists are saved into the Inventory Access contracts folder, which can be found in the network drive. The part list also includes information about the contract period and prices of an individual suitcase. This information is crucial when invoicing takes place. The record for every contract is maintained in the network drive. Every customer has its own folder, where the part lists are placed. In addition one copy of the part list is sent to the warehouse by email to accompany the suitcase delivered.

The promised delivery time for a suitcase is four weeks from the day when the order is placed. The OTD and delivery information are being followed from the Excel file located in the network drive. The customer service writes down the order related information e.g. serial number of the suitcase, the customer number, the type of suitcase, the wished delivery date. After the suitcase is delivered, Drives Service suitcase will team sign the date when the delivery took place and if there were any problems with the delivery. For a detailed flowchart see Appendix 5.

6.3.3 Contracts and Invoicing

After the suitcases have been delivered, Inventory Access person in charge needs to check that the contract information on the part list is correct, e.g. if the delivery date has changed, the contract period needs to be altered. In addition to the part list agreement attachments, every customer has his/her own agreement document where all their active suitcases are listed. This document needs to be updated accordingly when new suitcases have been delivered to the customer. These documents need to be signed by the sales and marketing manager and the customer.

The prices of the suitcases are listed in the Inventory Access suitcase pricelist which is annually updated. The invoicing takes places twice a year. The minimum contract period for the suitcase is five years and after this the customer has to decide if he/she wishes to continue leasing the suitcase with a lowered price, buyout the suitcase or return it back

to ABB Oy, Drives Service. The billing information is maintained in an Excel file located in the network drive. When a new suitcase is delivered to the customer, the billing chart needs to be updated accordingly. Invoicing is done manually in FISAP.

In addition, stocktaking for every suitcase is performed annually. This is done by comparing the Excel part lists and inventory balance in SAP. After this the stocktaking list is sent to the customer for comparison, to check that the inventory balance matches between the customer and ABB Oy, Drives Service. This thesis does not include deeper investigation or actions towards the stocktaking process.

6.4 Challenges of the Process

Inventory Access process is experiencing problems and challenges almost in every field in its current state, laborious and under-resourced way of handling the operation is causing decreasing customer and employee satisfaction, not to mention the costs and quality of service.

The following main challenges can be detected from the current process:

- 1. Availability of information.** Almost in every case when a customer needs information about the prices, availability and other information regarding Inventory Access the information is acquired from the suitcase team by email. As the operation is already under-resourced, this causes increased workload to the customer service and also to the customer. This leads to prolonged lead time in order processing, loss of business opportunities when customer interaction cannot be done accurately and customer dissatisfaction.
- 2. Dense and laborious order handling and documentation.** The current way of handling Inventory Access orders is not up-to-date, as the process is basically done manually from beginning to end. Placing the orders manually into SAP and maintaining documentation in Excel files does not meet the requirements of the operation. Manual and complex practice is vulnerable to errors and employee fluctuation. In its current state the costs do not meet the benefits of the business. This causes vulnerability to errors, long delivery and order handling times, variance in the process and customer dissatisfaction.

- 3. Contracts and invoicing.** In addition to manual order handling, also invoicing and maintaining of contracts are executed manually. Invoicing is performed twice a year; the first instalment between May-June and the second instalment in November-December. The billing data and the list of active contracts is maintained in an Excel file. Because the yearly fee of suitcases changes after the first five years and there is no mandatory minimum for how long a customer needs to continue contracts, these facts cause fluctuation in the prices and the contract lengths which makes automated invoicing challenging. In addition the maintaining of contract data needs a more effective way to be handled than Excel files and paper copies. Monitoring of contract lifecycles from Excel files is laborious and vulnerable to flaws. The problems in invoicing and handling of contracts causes variance in the process, loss of information, vulnerability to errors and time is consumed in non-value-adding actions.

6.5 Evaluation of the Current Process

This section aims to evaluate and compare the current process against the models and the theories introduced in chapters 2-4. The goal is to find and address the flaws in the process with known process improvement and current state evaluation tools.

6.6 Value Stream Map

The purpose of the value stream map is to indicate waiting times and non-value-added activities in the process. Information about how much time is consumed in every step of the process was studied and collected with the process owner and the person in charge of Inventory Access. In addition, estimation of time consumed in warehouse operations was collected from the warehouse personnel. Even if this study does not focus on improvement of warehouse operations, the logistics perspective was crucial for the value stream map.

A sampling of 10 Inventory Access orders was collected in order to create the VSM. The goal was to find the average processing time of an Inventory Access order. Because in its current state there is big amount of variance in the process and some of the customers are not familiar with the process, the cases vary a lot from each other. The purpose was to collect sampling of orders from different customers and countries.

Order sampling is illustrated in table 2 below.

Table 2 Order sampling for VSM

Amount	Order no.	Country	Customer contacted	From first contact to received order (days)	Customer purchase order date	Delivery date	Total (days)	How many suitcases in the PO
1	1066666	Australia	10.6.2015	1,00	11.6.2015	15.7.2015	35,00	1
2	1037471	Switzerland	18.3.2015	6,00	24.3.2015	21.4.2015	34,00	3
3	1049541	Spain	20.3.2015	27,00	16.4.2015	27.5.2015	68,00	4
4	1028681	Netherlands	2.3.2015	0,00	2.3.2015	30.3.2015	28,00	1
5	955984	United Kingdom	5.8.2014	1,00	6.8.2014	9.9.2014	35	1
6	1026163	South Korea	3.2.2015	0,00	3.2.2015	19.3.2015	44	9
7	1110512	Italy	6.10.2015	6,00	12.10.2015	26.10.2015	20	1
8	1018877	Indonesia	20.1.2015	15,00	4.2.2015	25.2.2015	36	3
9	1101047	Taiwan	15.9.2015	1,00	16.9.2015	15.10.2015	30	2
10	1051863	Serbia	13.4.2015	17,00	30.4.2015	15.6.2015	63	4
Days				74,00			393	29
Average				7,4			39,3	2,9

Table 2 shows that the lead time of orders which differ a lot from each other. The promised delivery time of the suitcase is four weeks from order. In this sampling customers ordered approximately three suitcases at a time and on average it took 39,3 days from the first customer interaction to the order delivery. In many cases the transaction started when the customer made an inquiry about the available suitcases or their prices, which eventually led to the purchase order. Some of the customers placed orders fairly quickly and for some it took longer. On average it took 7,4 days from the first interaction to the moment when the customer sent the purchase order to the suitcase team.

The value stream map of the process is represented below in figure 10.

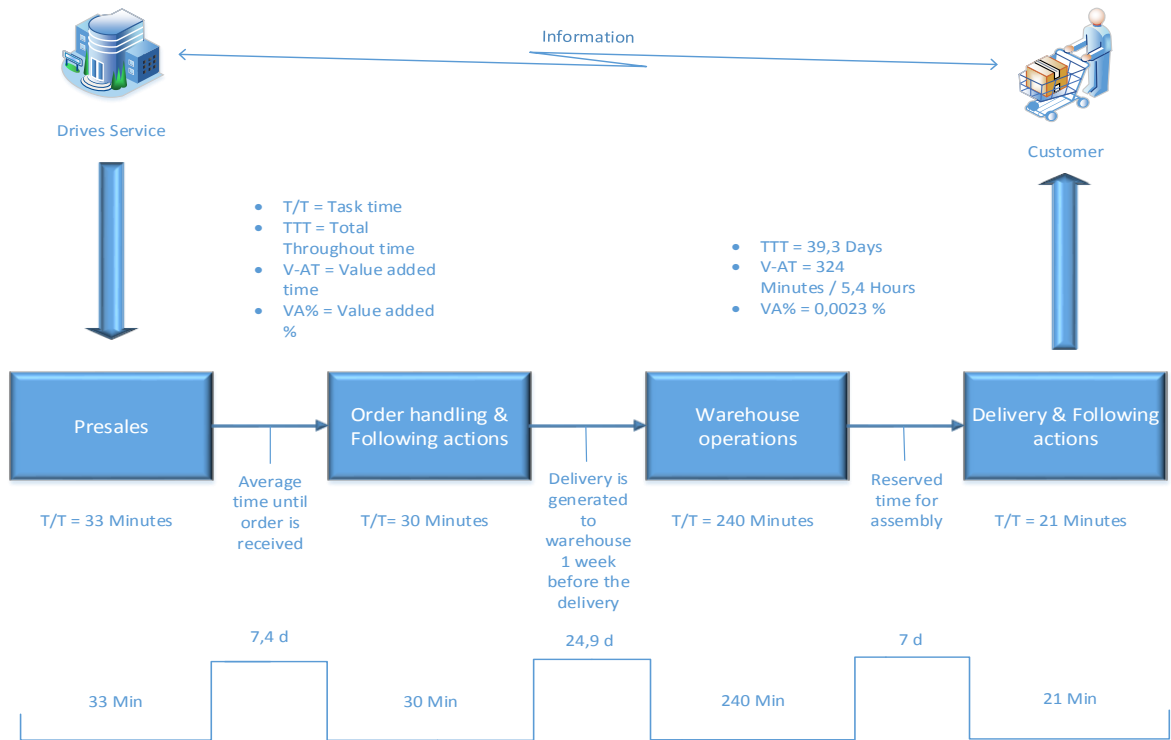


Figure 10 Value Stream Map of Inventory Access process

The time spent in every step of the process was estimated with designated persons, except the events which take place in the warehouse (picking, assembly, delivering etc.). The value stream map illustrates a situation where the customer orders one suitcase as Inventory Access. The assumption is that there is no excess workload in the warehouse. Inventory Access cases may vary considerably from each other, so the average time spent is estimated roughly in some parts.

Phase	Action & duration (in minutes)	
Presales	Customer inquiries IA information	5
	Quotation given	15
	Customer sends order	5
	Check order information	2
	Find correct part list revision	3
	Save part list as customer specific	3
Order handling & following actions	Create Consignment Fill-Up order	18
	Modify & save part list to network drive	4
	Send part list and inform warehouse	2
	inform customer about order & send confirmation	2
	Add order information to IA delivery Excel file	2
	Warehouse IA specific tasks0	2
Delivery	Warehouse delivery tasks	13
	Update invoicing	4
	Update paper contract appendix	4

Figure 11 Measurements for VSM

The actions which are executed in every phase are described in the section 6.3.

The presales phase takes time depending on how familiar the customer is with the product and what kind of service/ information he needs. For example the customer may need a loose spare part quotation from the sales support team. The estimate was that it takes approximately 33 minutes to complete the presales phase.

As stated before, it took approximately 7,4 days from the first contact to receive the actual order.

The order handling and following actions phase takes about 30 minutes depending on the case.

As the company has promised, that Inventory Access order is delivered in about four weeks from the order. This procedure is followed almost in every case. The order waits in the system approximately 24,9 days before the picking list is generated to the warehouse.

Warehouse operations take roughly 240 minutes depending on what kind of suitcase is ordered. The suitcases may differ in many ways from each other. For example: how many parts they include, parts that require software uploading and so on. so one can see that the average consumed time is hard to estimate.

It has been agreed that the Inventory Access orders which include less than five suitcases the picking list will be set to be generated one week before the delivery takes place. There is a guideline set that there should be one day's time reserved to pick and pack one suitcase. As in the VSM, one week is reserved for warehouse operations.

Delivery and following actions task time is estimated roughly to be 21 minutes. This includes delivery of complete suitcase from the warehouse and the actions that need to be done by the suitcase team. For example: updating the contract and sending it to the customer for signing and so on.

The following calculations are based on the value stream map in figure 10.

- Total throughout time = 39,3 days
- Value added time = 324 minutes / 5,4 hours
- Value added % = 0,0023%

The value stream map illustrates that there are huge waiting times between the steps in the process, as in this VSM the assumption was that every action is seen as value adding time, which they most certainly are not. There are many actions in the process which should be re-engineered and automated. The gaps, the waiting time and the process variance could also be greatly reduced with small improvements. This value stream map greatly highlights the problems and the challenges in the process which were introduced in the previous chapter.

6.7 Maturity of the Inventory Access Process

When evaluating the Inventory Access process from the perspective of the business process management maturity model, introduced in chapter 3. There are similarities with the points of a low maturity stage. When roughly comparing the company's overall pro-

cess performance against the maturity model, one can see that there are clear similarities with a high maturity stage. Compared to the revenue and the profits that the company's other services and products provide, Inventory Access business is not that remarkable but it does not mean that the process and performance should not be improved. The company is performing excellently providing its other products, such as spare parts and services, which covers the major part of the unit's business.

It is good to take into consideration that the capability maturity model is also used to evaluate the business process management maturity of a whole organization in general, but parts of it can be adopted to evaluate a single process also.

In figure 10 the maturity stage of Inventory Access is marked in red and the company's process performance in general is marked in green.

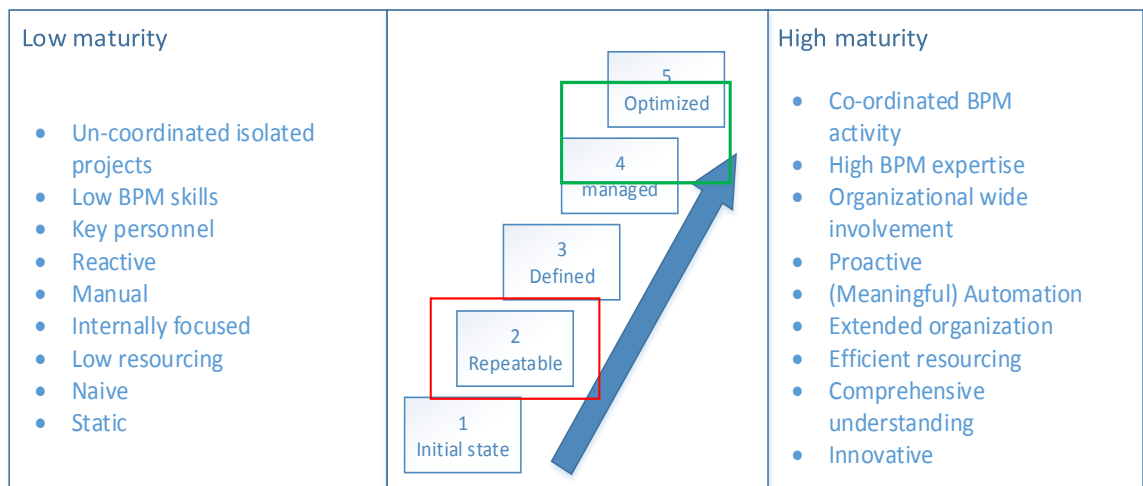


Figure 12 Maturity stage of Inventory Access and the company (adapted from Jeston, Nelis 2006: 301)

Comparing Inventory Access to the maturity stages, introduced in chapter 3, one can find the following similarities with the low maturity stage:

- **Manual** – High levels of manual interventions and work-arounds.
- **Low resourcing** – Process and operation is lacking assets to perform satisfyingly
- **Naive** – Simple and unsophisticated. Performance is not measured and minor will to improve.
- **Static** – Process and way of handling the service product showing little or no change towards improvement.

In this maturity scale, Inventory Access operation and process could be placed at the second stage (repeatable). The process is documented and it has a process owner but resources and assets for improvement are scarce. Looking at the process and procedures it seems that in the past, Inventory Access was only meant to be a temporary resolution to satisfy a few customers, yet the business expanded but improvements for this process were overlooked. When compared to the company's other service products and offerings, their processes have been continually improved.

Currently, the business has low manager involvement. There should be a defined goal and performance measurement for the service product. The change for the better cannot happen without the involvement of managers and executives. Since the business is still growing, even if the service product is not marketed in anyway, the company should take steps towards cutting the costs by improving the process.

Recently the managers have shown signs of interest to improve and research the Inventory Access business. It should be noted that even if Inventory Access business is raising ABB Oy's inventory value, it is a product that many customers desire. As long as the service product is in active phase, the company should improve its performance and make it easier to provide.

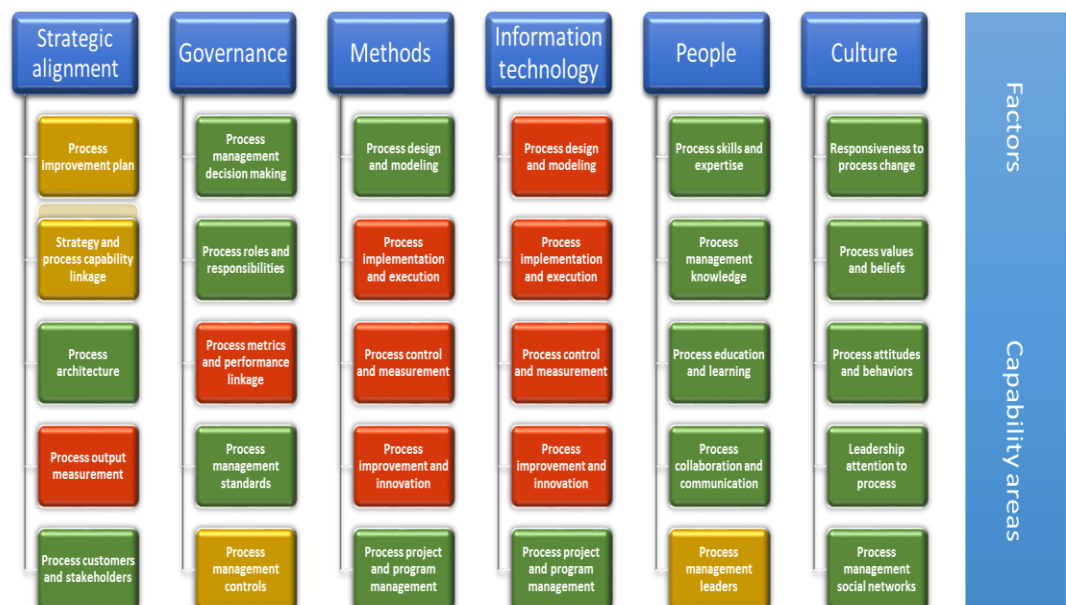


Figure 13 The BPM capability areas evaluation. (Adapted from Jeston, Nelis 2006:308)

Strategic alignment. The company aims for pushing capital efficiency, which correlates to inventory reduction. At the same time the company aims to drive white collar productivity, speed, quality, cost and enhancing customer service. Strategic alignment outlines how process aligns with the company's overall strategy. As one can see there is a conflict between Inventory Access and the company's strategy. The company has to constantly weight which one is greater evil: to provide service product efficiently with improved processes, even if the inventory value raises or provide it with laborious and costly procedures and still the outcome with inventory value is the same. The settlement which satisfies both the company and the customer has to be found.

Governance. Processes must have a direct linkage with strategic goals. There must be courage to invest in improving the process to provide products and services as efficiently as needed. Process measurement is a critical factor in order to control and improve it.

Methods. The current process has been modelled and documented, but the plans for next step in its lifecycle are left behind. There are methods and procedures for its next level transformation, but the resources in order to reach the improvement are scarce. Measuring Inventory Access business could provide vital information for the company, for example why and what to improve. There are many ongoing improvement and innovative projects for many other processes in the company. If there is no will to improve the process, it should be just shut down.

Information technology. The company is using modern systems and meaningful automation for its products and services that cover majority of its business. The involvement of people has not been forgotten. For inventory Access the information technology and lack of meaningful automation has become a bottleneck. It is no longer sustainable and efficient to practice this scale of business with outdated ways of documentation and order handling. Manual routines increase the workload and create unnecessary costs for the company and to the customer.

People. People that are designated to operate Inventory Access on a daily basis have a good knowledge about how Inventory Access works and what should be done in order to improve it. The process has a skilful process owner who has the will and the expertise to do what is needed but in order to accomplish results, more resources are required. Currently the process owner is resourced mainly on other contract based services and time for Inventory Access is scarce.

Culture. The company has consensus and expertise for improvement. Programs and projects for improvement are executed on an ongoing basis, for example there are many ongoing projects for operational excellence (OPEX). There is a strong attitude towards process oriented thinking and willingness to question the existing practises. In addition to operational excellence projects, every team of the company has ongoing projects for continuous improvement.

As a conclusion, one can see that the major problems for the Inventory Access process are the Information technology and methods on how the business is being executed. The features of company's existing software's and systems should be implemented for this business also. Lack of measuring the business makes it harder to control and improve. Inventory Access should be valued in the same way as any other product the company has or at least there should be a desire to operate it efficiently. If there is no desire to do any actions towards improvement, the company should just ask itself, why are we still running the Inventory Access business? Even if the Inventory Access business is not probably that significant compared to the other company's products and services, the company should value finding and resolving small problems as well as large ones.

7 Improving the Inventory Access Process

This chapter suggests which actions should be taken in order to make the Inventory Access process more efficient. These findings were found with stakeholders and performers of Inventory Access service product. The key objective is to find and point the steps in the process which create waste and do not add value to the product. In addition the objective is to shorten the process' total throughout time.

It has been noted that the nature and mechanics of Inventory Access makes it hard to produce and its very nature makes it hard to be automated. This chapter tries to find solution for how to provide meaningful automation for the process, without creating unreasonable costs for the company. One can see that with small improvements, efficiency can be increased by decreasing the total throughout time of the process.

The aim is to provide recommendations and produce improved process model for the order handling process. This research does not focus on the warehouse operations of the process. The improvement phase will be researched step by step with the help of the value stream map (introduced in current state analysis chapter).

Providing the service product in this scale has appeared to be a challenge for the company. Inventory Access may require more dramatic and major changes in the way the operations works, but this thesis aims to find a solution with smaller incremental improvements.

Due to limitations of the subject this thesis does not provide deeper discussion of the technical solutions of SAP and BusinessOnline in subject of automating the order handling process, although these changes would benefit the process.

7.1 Presales

Currently information about Inventory Access is mainly hidden from the customer and it is only accessible for the customer when asked for by email. This Information such as suitcase availability, ordering information etc. With small improvements the presales phase can be made remarkably more efficient. The task time of this process step can be reduced by making the vital information more accessible for the customer. The company

has a couple different databases and channels where information about Inventory Access could be uploaded to.

Information about the inventory Access could be uploaded and maintained in BusinessOnline (BOL) or SharePoint. By making the information more accessible to customer through different channels than email, the workload of the customer service team would be significantly reduced, company would be less vulnerable to employee fluctuation (less dependent to have designated persons for Inventory Access) and it would make the product easier to order.

For example information listed below should be uploaded to SharePoint or BOL:

- The most recent pricelist
- List of standard suitcases
- Content of standard suitcases (Excel form)
- Inventory Access principles and information how to order
- Template of Inventory Access contract for new customers
- FAQ Section

Because Inventory Access is solely offered to the Discrete Motion (DM) units only, the information about it should also be restricted from customers that are not allowed to see it. For example the system could identify the customer by the customer number if one is allowed to examine the Inventory Access database or not.

In the best case scenario, the only occasion when a customer contacts the suitcase team by email in the presales phase, is when the content of any standard suitcase does not fulfil the customers' needs. In this particular situation the sales support team of Drives Service is contacted for a loose spare part quotation. These ambiguous items (loose spare part quotations) are the only factor that cause variance in the presales phase of the process.

As the part lists and content of the suitcases are updated time to time and in these occasions customers need to return the old and receive the new parts for their suitcases. In future this information about the required actions could be announced to customers through BusinessOnline. The revision update deliveries and returns could be handled

through BOL with specific Inventory Access- / warranty order type. For example the customer places order for updated parts in BOL and RMA form is automatically generated to the customer for returning the old parts back to ABB Oy, Drives Service.

In addition, currently the suitcase team needs to search for the latest revision of the suitcase part list from SAP DMS case by case and then the part list is used as the contract for the particular suitcase. It is very time consuming to maintain the contract data in separate part lists. For example the contract data and list of active suitcases could be maintained in a single customer-specific file instead of an individual Excel file for every single suitcase.

As illustrated in the value stream map (figure 8) it takes about 7,4 days from first customer contact to order received. By making the information available online for the customer both the task time and total throughout time of process can be greatly reduced and efficiency is increased. Because the suitcase team is currently under resourced and inquiries increase the workload, by making the information available online would also reduce the probability of losing business opportunities. For Inventory Access dependency on resources and vulnerability to employee fluctuation can be reduced with comprehensive productization and more standardized processes.

Recommendations for presales phase include:

- Arrange the Inventory Access information available to customers
 - BusinessOnline / SharePoint
- Quit the practice of using customized part lists as contract attachments
 - Aggregated list of suitcases per customer (for stocktaking purposes).

7.2 Order Handling and Following Actions

The key for Inventory Access improvement is to find the non-value-adding activities from the process. One of the time consuming tasks in the process is the unnecessary processing of the suitcase part lists. Some of the customers have said that they find the part list inside a suitcase useful, but it is not required as a contract document. The current practice of attaching contract information to the part lists does not add value to product or for the customer. When creating Inventory Access orders, the suitcase team is required to send the part list to the warehouse personnel who accompanies it with the suitcase delivery.

Especially for Inventory Access cases when the customer orders multiple suitcases at the same time, the handling of the part lists is really frustrating and time-consuming task. the suitcase team is required to copy and paste the same contract information template to part lists over and over again to multiple files and customizer information to each part list.

Instead of unnecessary emailing and processing of part lists between the warehouse and customer service, SAP could be modified to generate specific part list straightly to the warehouse. For example once the delivery and picking order for the suitcase is generated to warehouse, SAP also automatically prints out the suitcase part list.

One of the big challenges of Inventory Access process is the creation of order itself. The operating principle of Inventory Access makes automated order handling solution challenging to find as there are many factors that needs to be taken into consideration.

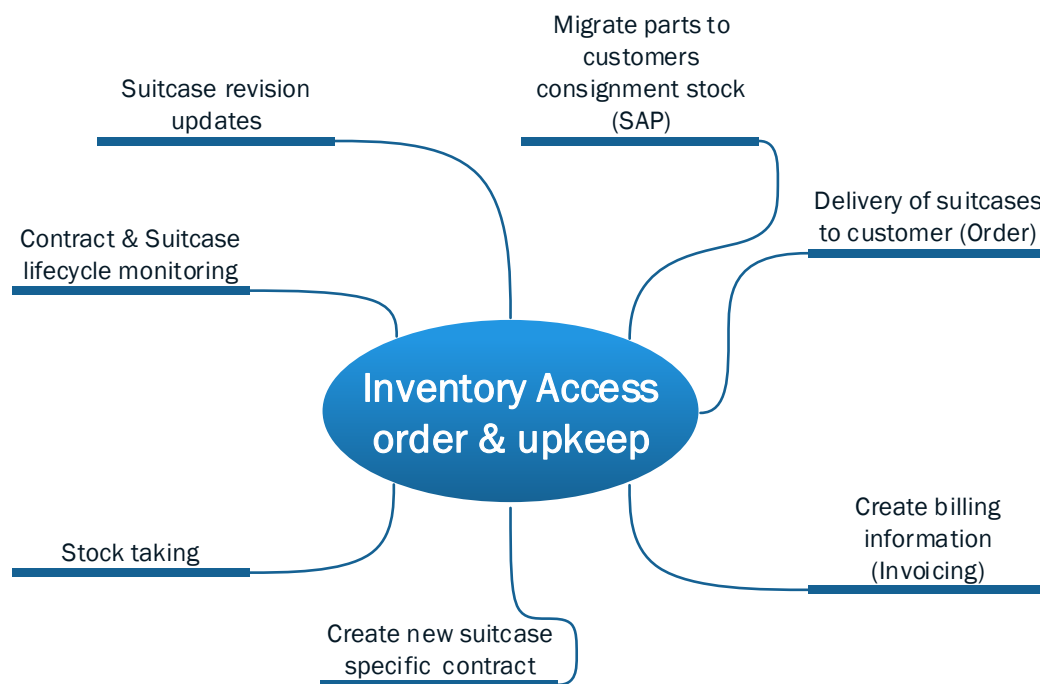


Figure 14 Facts to be considered before automating the process

Inventory Access is different from any other service products that the company has. No other service product works with the same principle that the parts are concretely leased to the customer and delivered to their premises. This is one of the factors that makes automated order handling a challenge. The order delivery itself is not a problem but the

question is how to automatically execute the following actions: transfer the goods to customers' consignment stock, create/ update customers' contract, create the billing information, handle revision updates for suitcases when product range changes, challenges in yearly stock taking et cetera.

There are a couple of challenges in implementing the Inventory Access process to SAP and BOL, because delivery of goods is just a fraction of the process. Roughly there are three factors that need to be fulfilled.

1. Create order/ delivery for goods
2. Migrate ordered parts to the customer's consignment stock
3. Create automatic invoicing according to the new order and contract.

From a technical perspective the upper level of process could follow a path as illustrated in figure 15.

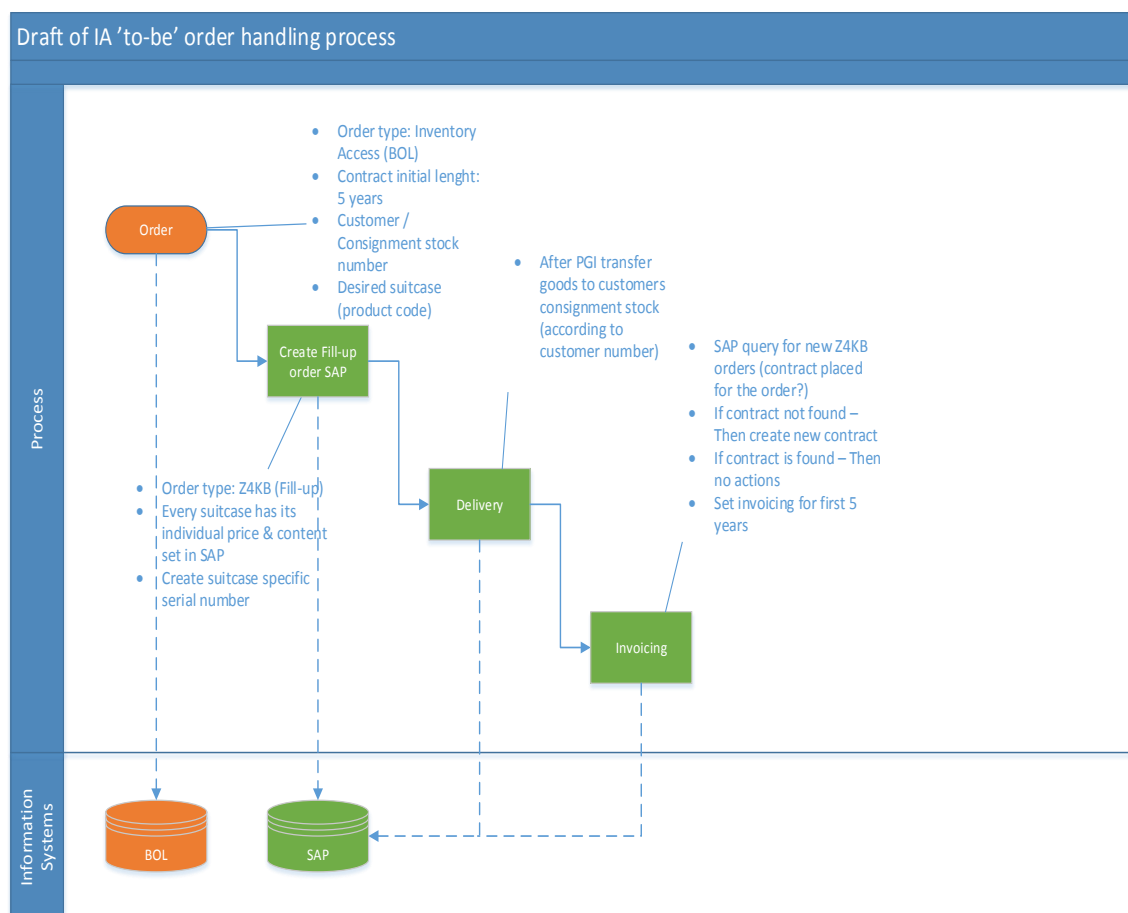


Figure 15 Draft of IA 'to-be' order handling process from a technical perspective

Currently it is not possible to order suitcases through BusinessOnline and the only way to order the service product is by email. When the suitcase team creates the suitcase order for the customer, the content of the suitcase needs to be copied and pasted from Excel file to the SAP order. The most recent part list needs to be downloaded from SAP DMS for order by order so the practice is really time-consuming.

In order for SAP to generate suitcase part lists straight to the warehouse, the company needs to start using material codes for individual suitcases. Otherwise SAP cannot identify which part list needs to be generated.

From the perspective of sales and order handling it could be efficient to maintain and upkeep part lists in SAP instead of Excel files. Individual material numbers should be created for all available suitcases in order to ease identification of the products. For example in SAP DMS correct suitcase part lists are sometimes hard to be found. One can find multiple different revision versions of same suitcase and unexperienced employee can easily pick incorrect part list for a particular order.

For clarification, in the figure 16 one can see a piece of a suitcase part list.

ABB		Service Suitcase - Expert				
ABB		ACS800-104D ACS800-104				
Department						
Distribution limited		ABB internal and certified channel partners use only				
Upper, mid or lower level	Description	Type	Code	Qty	Stocktaking	Difference
L	CHARGING CONTROL	xxxxxx	xxxxxx	x		
L	CONTROL PANEL	xxxxxx	xxxxxx	x		
L	CURRENT TRANSDUCER	xxxxxx	xxxxxx	x		
L	FAN POWER SUPPLY	xxxxxx	xxxxxx	x		
L	FIBRE OPTIC CABLE 2 X 2000MM	xxxxxx	xxxxxx	x		
L	FIBRE OPTIC CABLE 2 X 3000MM	xxxxxx	xxxxxx	x		
L	FIBRE OPTIC CABLE 2 X 5000MM	xxxxxx	xxxxxx	x		

Figure 16 Piece of suitcase part list

Recently product managers of the company started to create individual material numbers for suitcases to SAP. Technically this means that one can search for particular suitcase and its content (Bill of Materials) with its material number. This also allows customers and employees to inspect suitcases from BusinessOnline but currently not place order for them.

In cases when the customer wishes to purchase a suitcase instead of leasing it, there should not be great challenges to make this possible via BusinessOnline. For the standard sales situation the purchasing of suitcase should be made as easy as buying standard spare parts, because in these cases special actions or documentation are not needed. Currently these orders are also handled manually by the suitcase team, even when automated solution is possible to be executed.

For stocktaking and revision update reasons, all the parts that the suitcase includes need to be listed part by part on the order. This is the main reason why Inventory Access orders cannot be placed with a single material number, because all the parts that suitcase order includes needs to be visible in FISAP. This is why the suitcase material code cannot work in the same way as other kit items that the company has to offer. For Inventory Access orders, the suitcase material code needs to be developed in a way that SAP understands to scatter the Bill of Material to order.

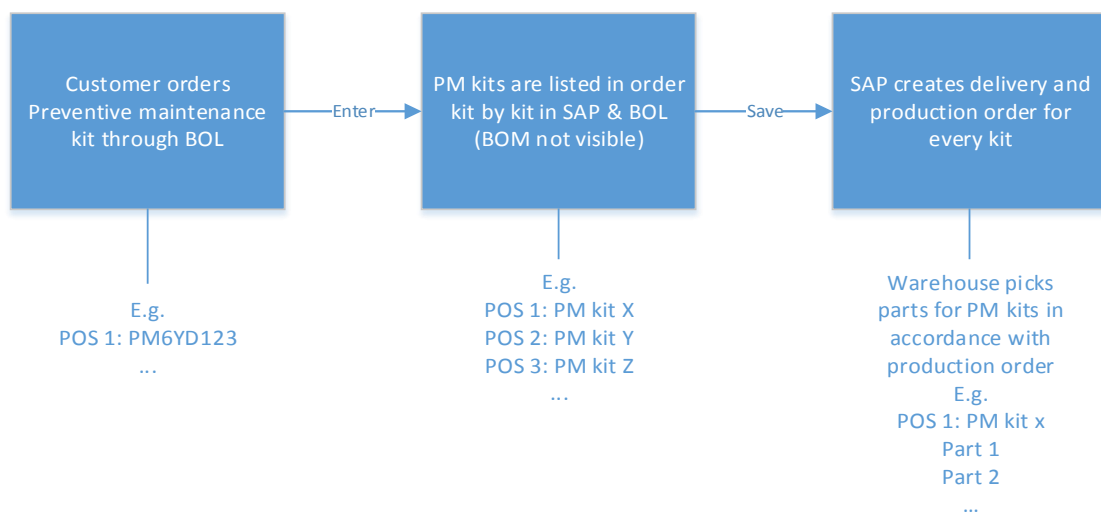


Figure 17 PM Kit material code

In the picture above (Figure 17) is illustrated how Preventive maintenance kit is ordered and how it works in SAP. The point is that content of kit is not scattered for the order, because it is not needed for this standard product. Warehouse personnel knows which items to pick for the particular kit with the help of production order which is generated for every kit. From the production order warehouse personnel can see the Bill of Material (BOM) of particular kit.

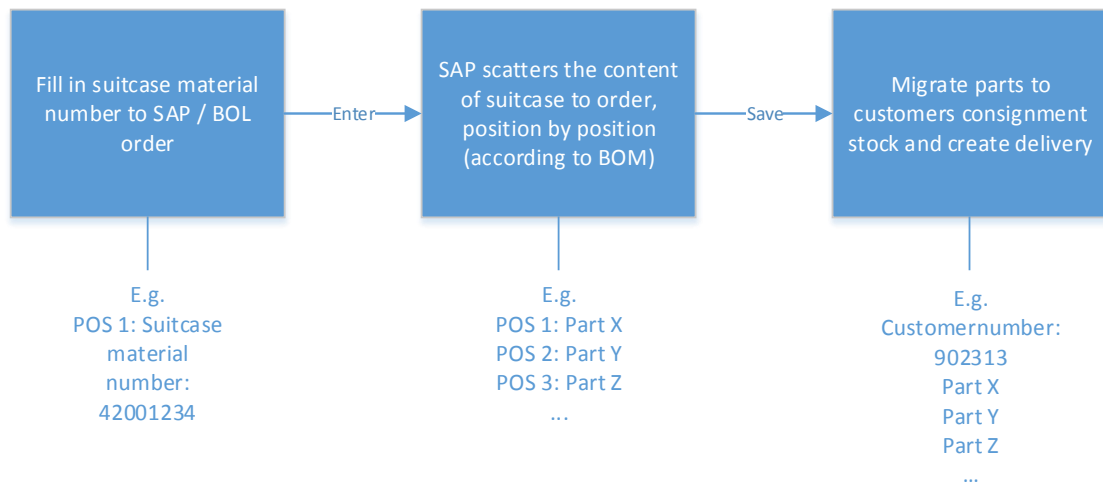


Figure 18 Suitcase material code

Figure 18 illustrates how the suitcase material code could work in FISAP. The key point is that the content of the suitcase (BOM) needs to be scattered to the SAP order so that the parts on the order are migrated to the customers' consignment stock, in order to enable more accurate and easier revision updating and stocktaking.

Recommendations for order and documentation phase include the following:

- Modify SAP to generate the suitcase part list straight to the warehouse
- Quit the practice of tailoring part lists order by order
- Maintain product information in SAP, instead of Excel files in DMS
- Develop functional individual material codes for the suitcases
- Allow purchasing of the suitcases through BOL
- Send the order confirmation to the customer from SAP.

7.3 Invoicing and Upkeep

As the number of active suitcase contracts are increasing, the current way of how invoicing is executed is becoming very laborious. The invoicing is performed twice a year; the first instalment in summer and the second instalment by the end of the year. The invoicing phase is creating big variance in the process for the customer and also for the suitcase team.

In the Inventory Access terms and conditions has been stated that the contract's minimum length is five years. After five years the customer is able to cut off the contract whenever he wishes. The customer is able either to: return the suitcase to ABB Oy, Drives Service, buy out the suitcase or continue the contract with a lowered early fee. In the terms and conditions there should be a term which states that the cancellation of the contract is possible only at the end of the invoicing period. Lifecycle and the yearly fee of active contracts vary a lot from each other and this variance makes an automated solution for invoicing especially challenging.

In addition, when the invoicing is carried out, the Suitcase team needs to update the Inventory Access billing chart in which the billing and the contract information is maintained. Every new suitcase contract needs to be updated to the chart suitcase by suitcase. Instead of updating billing chart only when invoicing is made, the chart could be updated every time when new suitcase contract is made. As long as the invoicing is made manually, regular updating of the chart could decrease the throughout time of the invoicing process.

In order to decrease variance in the process, the operating principle needs a few changes. The company should consider does the returned parts from the old suitcases add any value for the company and the key points like how big proportion of the returned parts can be used or sold again, how much the processing of returned material costs for the company etc. It should be considered if it were more efficient that in the future after the mandatory contract period, the customers would not be allowed to return the old suitcases back to ABB Oy, Drives Service. The only option would be either to continue the contract with a lowered yearly fee or buy out the suitcases.

The processing of returned Inventory Access material increases the workload of both the warehouse personnel and the customer service. Because the content of suitcases vary

considerably from each other, every returned suitcase needs to be inspected case by case for usable material. For example some of the suitcases may include material which can be sold or used again but for most suitcases the content is just scrapped.

Also when the suitcase revision updates take place, the customers need to return some of parts back to the ABB Oy, Drives Service. The information which parts needs to be returned comes from the product managers of the company. In the future it should be decided in first hand if the company even has use for the parts that have to be returned. Some of the customers are able to scrap the old parts in their own site and the return might not be needed at all. Inventory balances just has to be taken into consideration and modified accordingly if customers scrap parts themselves. For example some of the customers are certified Drives Service Workshops (DSW) who are in specific cases authorized to scrap and recycle material themselves without returning it back to ABB Oy, Drives Service.

In addition there should be a mandatory minimum for how long the customer needs to extend the contract after the first contract period. In this way the suitcase team would not be required to monitor contracts as frequently and automated solution for the invoicing would be easier to achieve. From the customer point of view, it would be effective to create contract type to the SAP which automatically updates itself within coordinated boundaries. For example after the first contract period customer would be required to purchase the suitcase or extend the contract for another three or five years. Excluding suitcases that are drawing near obsolete phase. It should also be taken into account if it was easier to invoice customers once a year instead of twice a year.

From the customers perspective it would be a great feature that the customer would be able to examine their personal Inventory Access contracts and the consignment stock levels online. For example it should be studied if the customers Inventory Access stock levels and the active contracts could be uploaded to the SharePoint. In this way the customer would be able to analyse their personal Inventory Access data in real-time. This would also make the stocktaking process much easier, since the Suitcase team would not be required to send the Excel spreadsheets to every customer time after time.

The future objective for Inventory Access order handling and invoicing is that it could be automated in some way. There is probably no sense to solely automate the invoicing process. The company has developed invoicing transaction to SAP for Inventory Access

contracts, but it has not been used so far. The SAP transaction was stated to be not very efficient for the process. In its current state the Inventory Access automated invoicing solution would still require a person to monitor it regularly.

Recommendations for invoicing and upkeep phase include the following:

- Evaluate if the returned material create value or waste for the company
- Allow customers to scrap the old suitcase parts on their site, in the case of the revision material return
- Allow cancellation of the suitcase contracts allowed only in the specific points of time
- Set mandatory minimum length for contract extension
- Invoice suitcases once instead of twice a year
 - Especially for automated solution standardized invoicing is mandatory
- Upload customers' Inventory Access data to SharePoint

7.4 Value Stream Map of the Future State

In the best case scenario Inventory Access order handling would happen in BusinessOnline or in a similar kind of system but with small improvements the throughout time of the process can be decreased. The estimated time measurements of the future state VSM are illustrated in figure 19.

Phase	Action & duration (in minutes)			
Presales	Loose spare part quotations	xx		
	Order handling & following actions	Check order information	1	
		Find correct suitcase material number / part list	1	
		Create Consignment Fill-Up order	16	
		Update aggregated part list	2	
		Add order information to IA delivery Excel file	2	
		Warehouse IA specific tasks	2	
		Delivery	Warehouse delivery tasks	13
			Update invoicing	4
			Update paper contract appendix	4

Figure 19 Estimated measurements for future state VSM

One major change for Inventory Access could be done for the presales phase. If Inventory Access information was available online, the suitcase teams' workload would not be increased with order-related questions. In the best case scenario the presales phase would be lucid, except if the customer required a loose spare part quotation. At best the only occasion when the customer contacted suitcase and sales team would be when a loose spare part quotation was needed.

Another time saving change compared to current state is the renunciation of the suitcase part lists. The processing of the part lists has been found a very time-consuming and non-value-adding activity in the process. With the use of an aggregated part list and functional suitcase material numbers, the time consuming activity can be fixed. In addition time can be saved if SAP is adjusted to print suitcase part lists straightaway to the warehouse.

The value stream map of the future state is illustrated in figure 20.

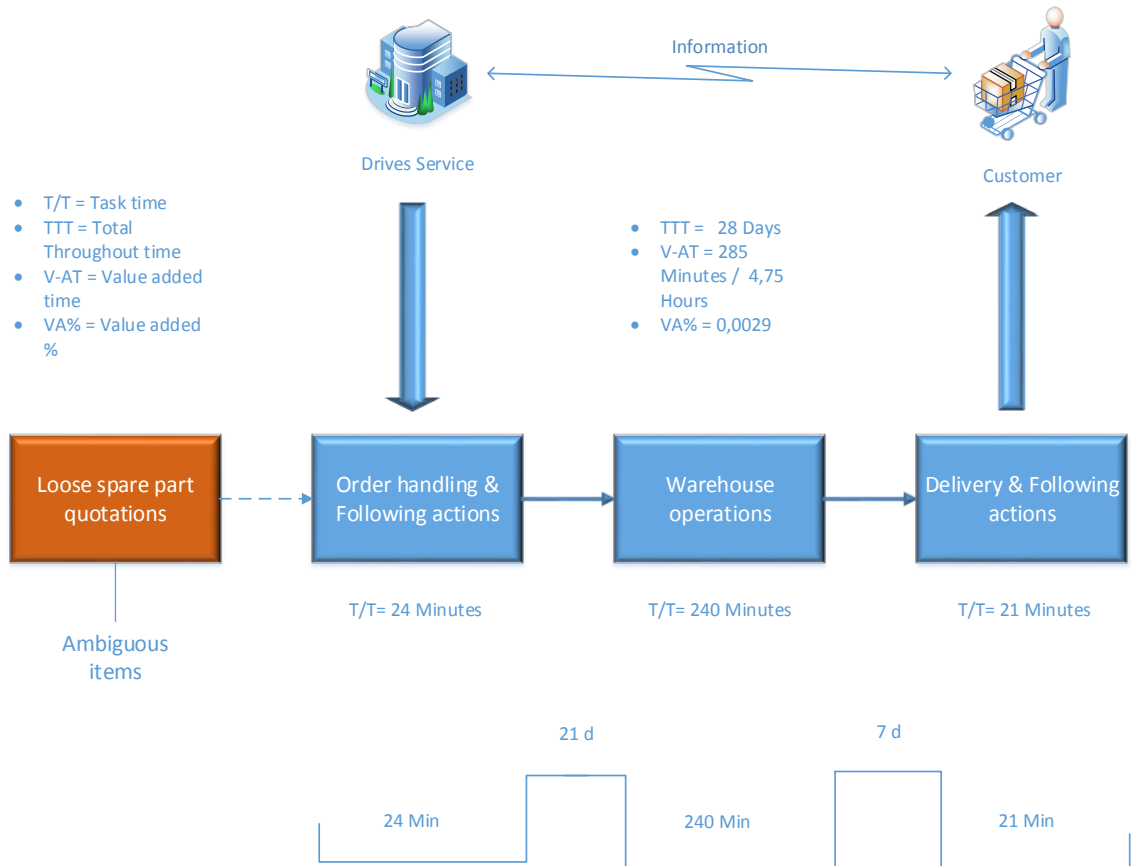


Figure 20 Value stream map of future state Inventory Access process

One of the major changes is the possible lucid presales phase. With the introduced changes also the task time of the “order handling and following actions” phase can be reduced. The ambiguous items in this case mean loose spare part quotations, which cause variance to the standard delivery process.

8 Results

This chapter aims to deliver the answer to the research questions and how the results were achieved. Also further development ideas are presented.

The goal of this study was to identify the non-value-adding activities from the Inventory Access order handling process and to evaluate the current state. The process was investigated from the customer service teams' perspective of ABB Oy, Drives Service. Secondly the goal was to give proposals to the company on how and why the process should be improved in order to make the process and the operations more effective.

It was found that overall the service product is difficult to buy and produce. Operations are inefficient and customer and employee satisfaction is low. The resources are strained and cannot be distributed, limiting growth and increasing vulnerability.

The first goal was accomplished by studying and conducting a general literature review of the subject. With the help of the literature and theories of the subject, I was able to find comprehensive ways to evaluate and study the Inventory Access process. The review showed that there are some steps in the process which are not adding value to the product. The current way of providing the service product is laborious to and it has some old-fashioned practices in operations. It was found that there are numerous steps in the process which can easily to be automated in order to increase effectivity to the process. At the moment the process and operations are too dependent on designated persons and it is vulnerable to employee fluctuation. The value stream map was a good tool to identify that the throughout time of the process is too long and it needs to be reduced.

As can be seen from figure 21, for example the presales phase of the current process can easily be made more effective with small changes.

As is		To be	
Customer inquiries IA information	5	Loose spare part quotations	xx
Quotation given	15	Check order information	1
Customer sends order	5	Create Consignment Fill-Up order	18
Check order information	2	Update aggregated part list	2
Find correct part list revision	3	Add order information to IA delivery Excel file	2
Save part list as customer specific	3	Warehouse IA specific tasks0	2
Create Consignment Fill-Up order	18	Warehouse delivery tasks	13
Modify & save part list to network drive	4	Update invoicing	4
Send part list and inform warehouse	2	Update paper contract appendix	4
inform customer about order & send confirmation	2		
Add order information to IA delivery Excel file	2		
Warehouse IA specific tasks0	2		
Warehouse delivery tasks	13		
Update invoicing	4		
Update paper contract appendix	4		

Figure 21 As is and to be state comparement

In its current state the Inventory Access process can be seen as a capability process. The service product orders and maintaining are handled by designated employees even if the order volume is not that high. Old-fashioned and laborious procedures force the company to operate in such a challenging way. The objective would be that the orders and contracts could be handled by any member of the customer service team. Inventory Access requires a simpler and more developed way of operation.

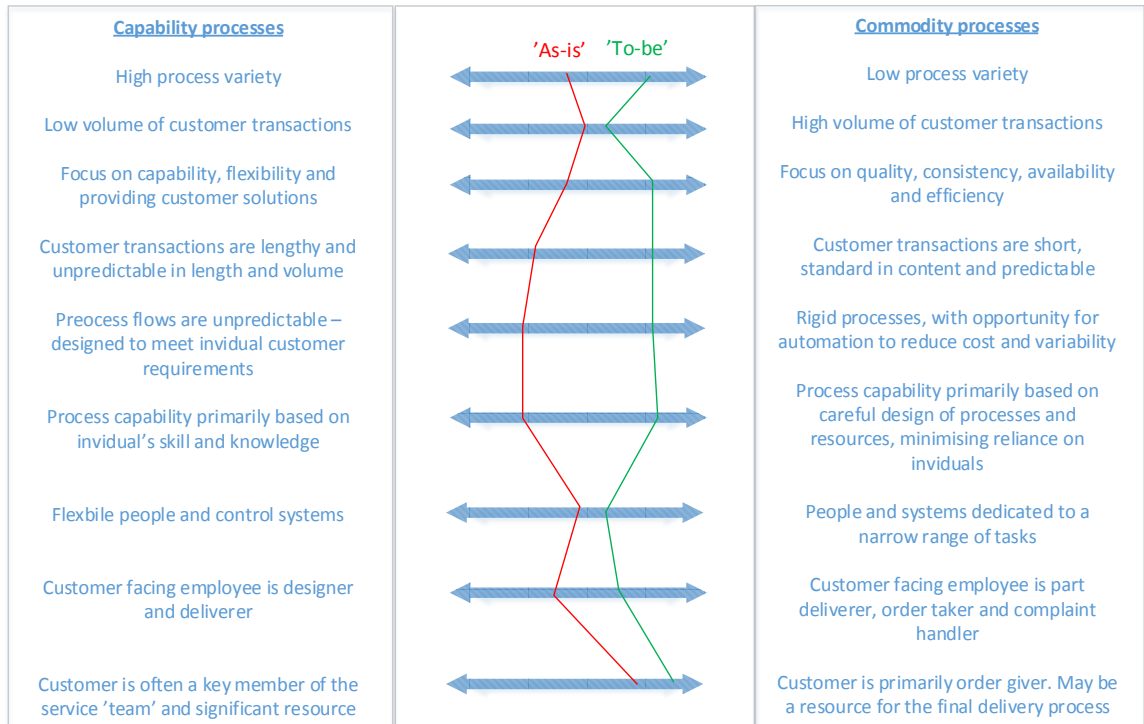


Figure 22 Inventory Access 'as is' and 'to be' comparison with Capability-commodity profile (Adapted from Johnston, Clark, Shulver 2012: 199)

'As-is' and desired 'to-be' situations are illustrated in figure 22.

The demand for this service product has been increasing steadily, so the need to improve becomes greater. It was identified that the very nature of the operating principle of Inventory Access makes it challenging to be automated. There are many functions that need to be taken into consideration when an automated solution is to be executed, such as contracts, invoicing and suitcase updating needs to be revised in a way that an automated solution will not be too vulnerable to errors. With proper productization and more standardized processes the product can be provided effectively.

The company's next level strategy aims for reduced inventory value which is problematic because every leased Inventory Access suitcase raises the inventory value of the company. The company should find an agreeable solution for what to do with the service product from a strategic perspective. Inventory Access could be much more profitable if the internal operations and processes were more developed and modern.

In the best case scenario Inventory Access no longer needs a designated team or persons to provide the service product. The aim is that every team member of the customer service team is able and has the knowledge to handle and provide Inventory Access orders. But in order to achieve such a state, the process requires meaningful automation in a way that it does not require constant monitoring and manual repetitions. **The better productized and standardized the Inventory Access is, the less support and manual repetition it needs.**

The future of the service product is currently very volatile and actions need to be taken. It should be considered if the operating principle of Inventory Access should be entirely changed. There have been ideas that instead of leasing the parts, the company could sell the parts instantly and provide a contract of extended warranty, this way ABB Oy, Drives Service would be responsible for updating the parts for the duration of the contract but they would not be in the ownership of ABB Oy. In addition the need for stocktaking would disappear and the service product would be easier to provide. It must be considered what does the customers want and implement the changes accordingly.

Some of the presented ideas should be first tested with a single customer and see how they adapt. For example use of the aggregated part lists, once a year invoicing and changes to the material returning policy affects the customer, so these functions need to be piloted before the overall implementation.

9 Conclusions

The goal of this study was to identify the non-value-adding activities from the Inventory Access order handling process and to evaluate the current state. The company should cut out the presented non-value-adding activities from the process as soon as possible. These presented defects cause unreasonable and unnecessary costs for the company. By improving the internal performance and operations the effectivity and profitability can be increased, without speaking of the customer and employee satisfaction.

Some of the presented recommendations can be achieved with relatively small effort, but they would provide meaningful improvement for the internal performance. Some of the proposals which this study provided have to be studied more deeply and what kind of impact they have on the Inventory Access service product has to be investigated. For example from the customer's perspective, the declining the option of returning old suitcases back to ABB Oy, Drives Service could be efficient for the company but it would change the operational principle of the service product remarkably.

In conclusion this study gave a comprehensive view about Inventory Access and its current state. This thesis provided an inclusive overview of the problems and pointed out the major non-value-adding activities in the process, and gave a clear picture for the company about what actions need to be taken towards improving the process. ABB Oy, Drives Service can use this study as a help when considering improvement for the particular process. The first step to improve this process is to measure its costs and benefits. In its current state the Inventory Access service product is not providing as much value as it could. ABB will continue with these results as they see fit.

My opinion about the product is that the actions towards change should be taken as soon as possible. Compared to other service products that the company offers, Inventory Access is not that large scale business that it should require designated persons to operate it. The direction of the results and findings of this thesis were useful, but they could have included more technical analysis and modelling about how to automate the order handling process and what kind of savings the changes would provide for the company. This thesis answered the research questions accordingly and the goal was achieved.

References

ABB Lyhyesti 2016. <<http://new.abb.com/fi/abb-lyhyesti>>. (15.1.2016)

About ABB 2016. <<http://new.abb.com/about>>. (15.1.2016)

Becker Jörg, Kugeler Martin, Rosemann Michael. 2003. Process Management: A Guide for the Design of Business Processes. Germany: Springer-Verlag, Berlin

Burton Terence T, Boeder Steven M. 2003. The Lean Extended Enterprise: Moving Beyond the Four Walls to Value Stream Excellence. J. Ross Publishing, Inc.

Fitzsimmons James A, Fitzsimmons Mona J. 2008. Service Management: Operations, Strategy, Information Technology. McGraw-Hill Companies Inc.

Flinchbaugh Jamie, Carlino Andy. 2006. The Hitchhiker's Guide to Lean: Lessons from the Road. USA: Society of manufacturing Engineers.

Jacka J. Mike, Keller Paulette J. 2002. Business Process mapping: improving customer satisfaction. USA: John Wiley & Sons Inc., New York

Jeston John, Nelis Johan. 2006. Business Process Management: Practical Guidelines to Successful Implementations. Great Britain: Elsevier Ltd.

Johnston Robert, Clark Graham, Shulver Michael. 2012. Service Operations Management. United Kingdom: Pearson Education Limited.

Kawulich Barbara B. 2005. Participant Observation as a Data Collection <Method. <http://www.qualitative-research.net/index.php/fqs/article/view/466/996#g2>>. (15.1.2016)

Langley Gerald J, Moen Ronald D, Nolan Kevin M, Nolan Thomas W, Norman Clifford L, Provost Lloyd P. 2009. The Improvement Guide: A Practical Approach to Enhancing Organizational Performance. USA: Jossey-Bass

Liker Jeffrey K, Meier David. 2006. The Toyota Way Fieldbook: A Practical Guide for Implementing Toyota's 4Ps. McGraw-Hill Companies Inc.

Lovelock Christopher, Wright Lauren. 2007. Services Marketing: People, Technology, Strategy, 6th ed., Upper Saddle River, NJ: Prentice-Hall,

Merriam, Sharan B. 2014. Qualitative research: A Guide to Design and Implementation. Wiley.

Slack Nigel, Chambers Stuart, Johnston Robert. 2007. Operations Management. United Kingdom: Pearson Education Limited.

IBM Lotus Notes. ABB Internal database. 2015

Interviews & meetings:

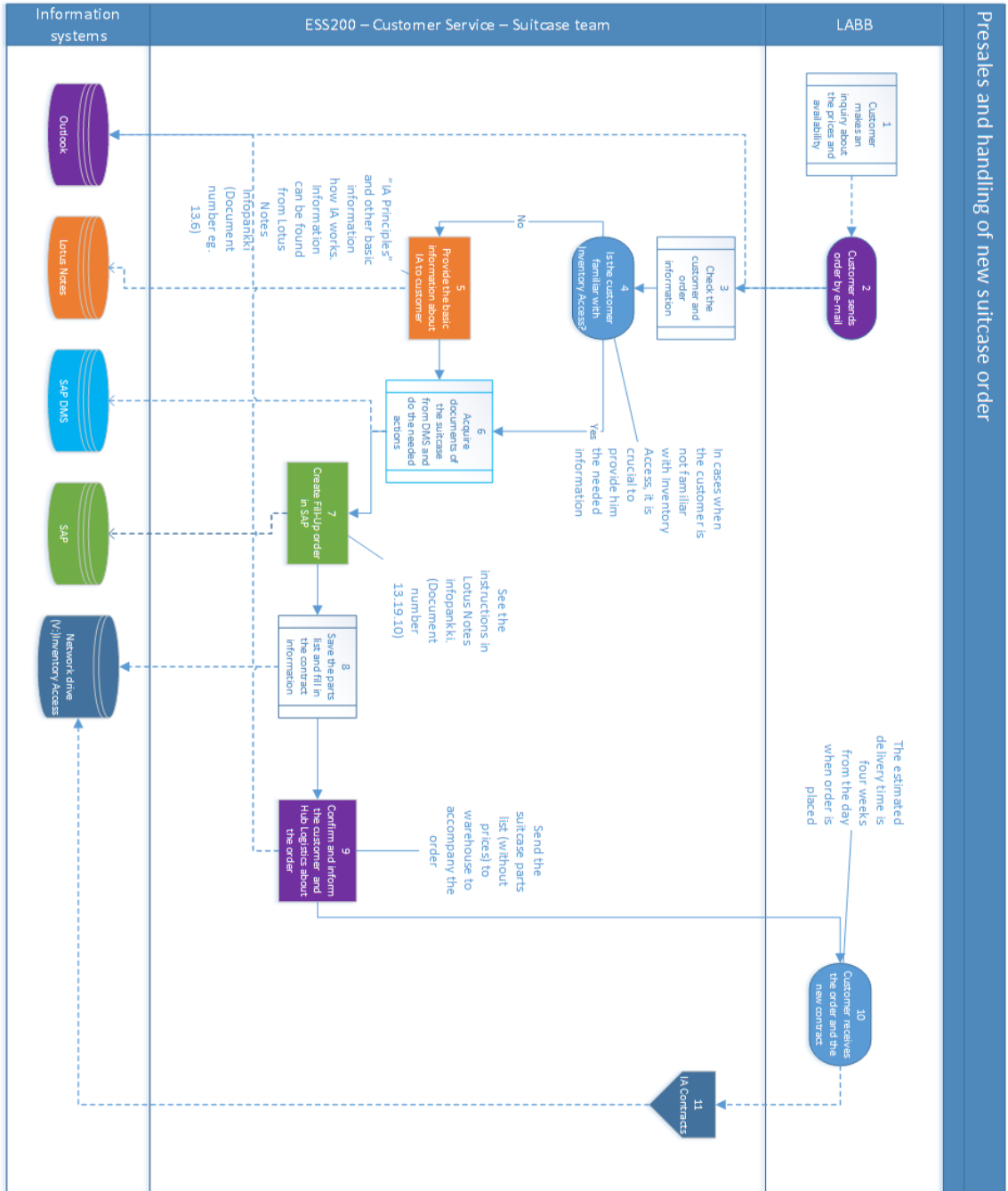
Matilainen Janne 2015. Process Owner. ABB Oy, Drives Service. Meeting & informal interview: December 2015.

Matilainen Janne. Process Owner, Jenni Ohraluoma. Development Specialist 2015. ABB Oy, Drives Service. Meeting & informal interview: October 2015

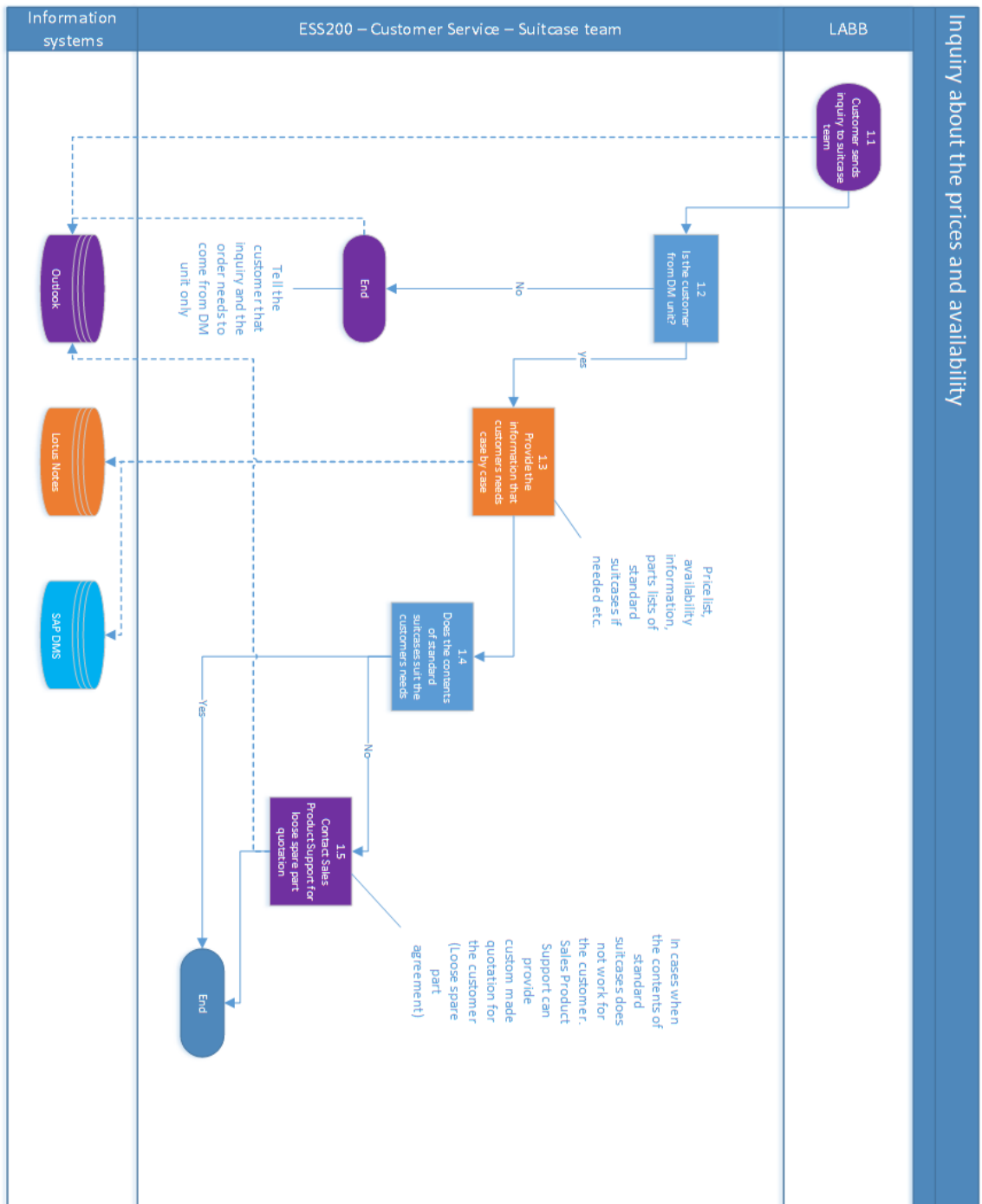
Tommi Nyysönen. Sales Manager, Jenni Ohraluoma. Development Specialist 2015. ABB Oy, Drives Service. Meeting & informal interview: September 2015

Matilainen Janne. Process Owner, Jenni Ohraluoma. Development Specialist 2015. ABB Oy, Drives Service. Meeting & informal interview: July 2015

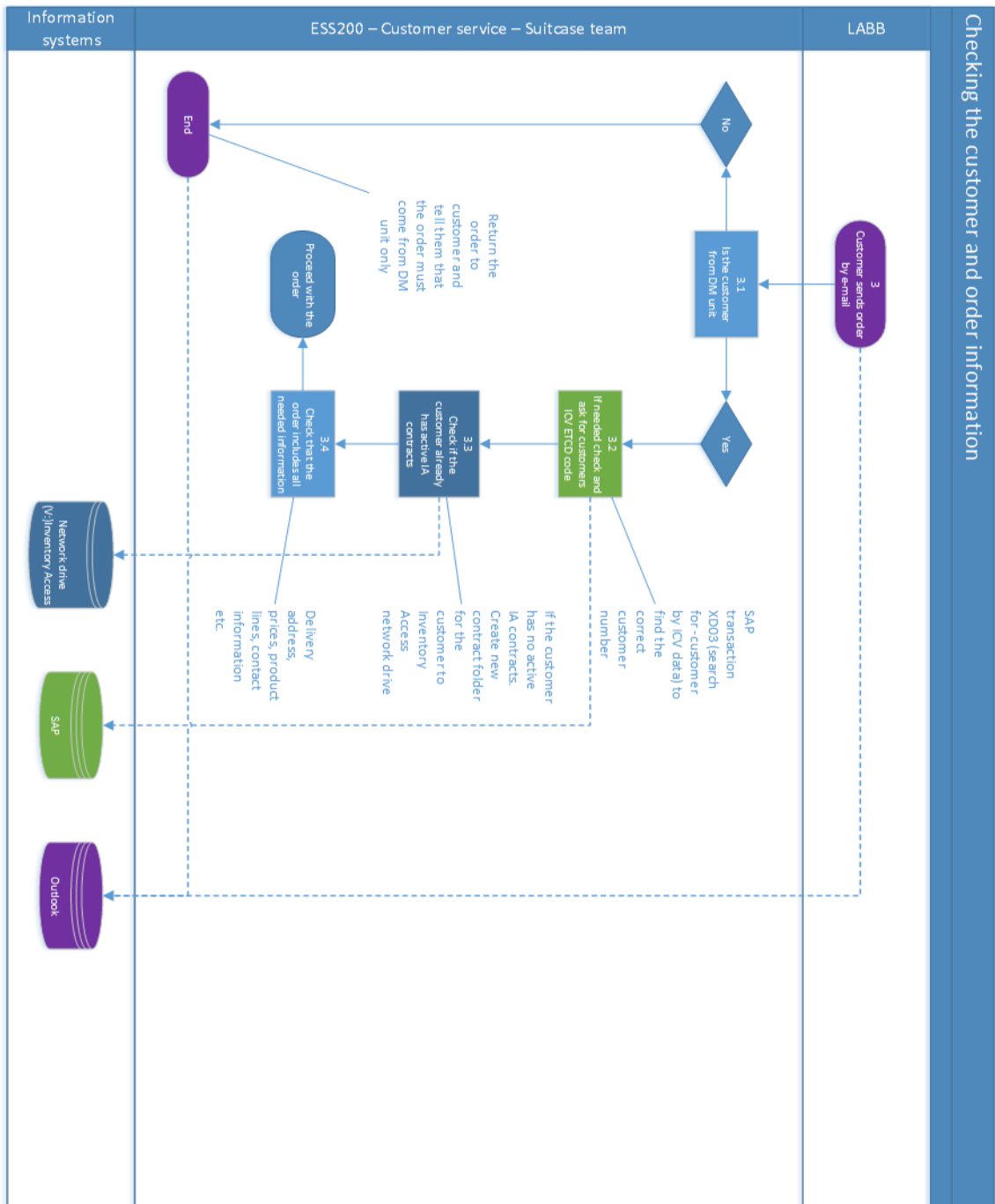
Appendix 1: Presales and handling of new suitcase order



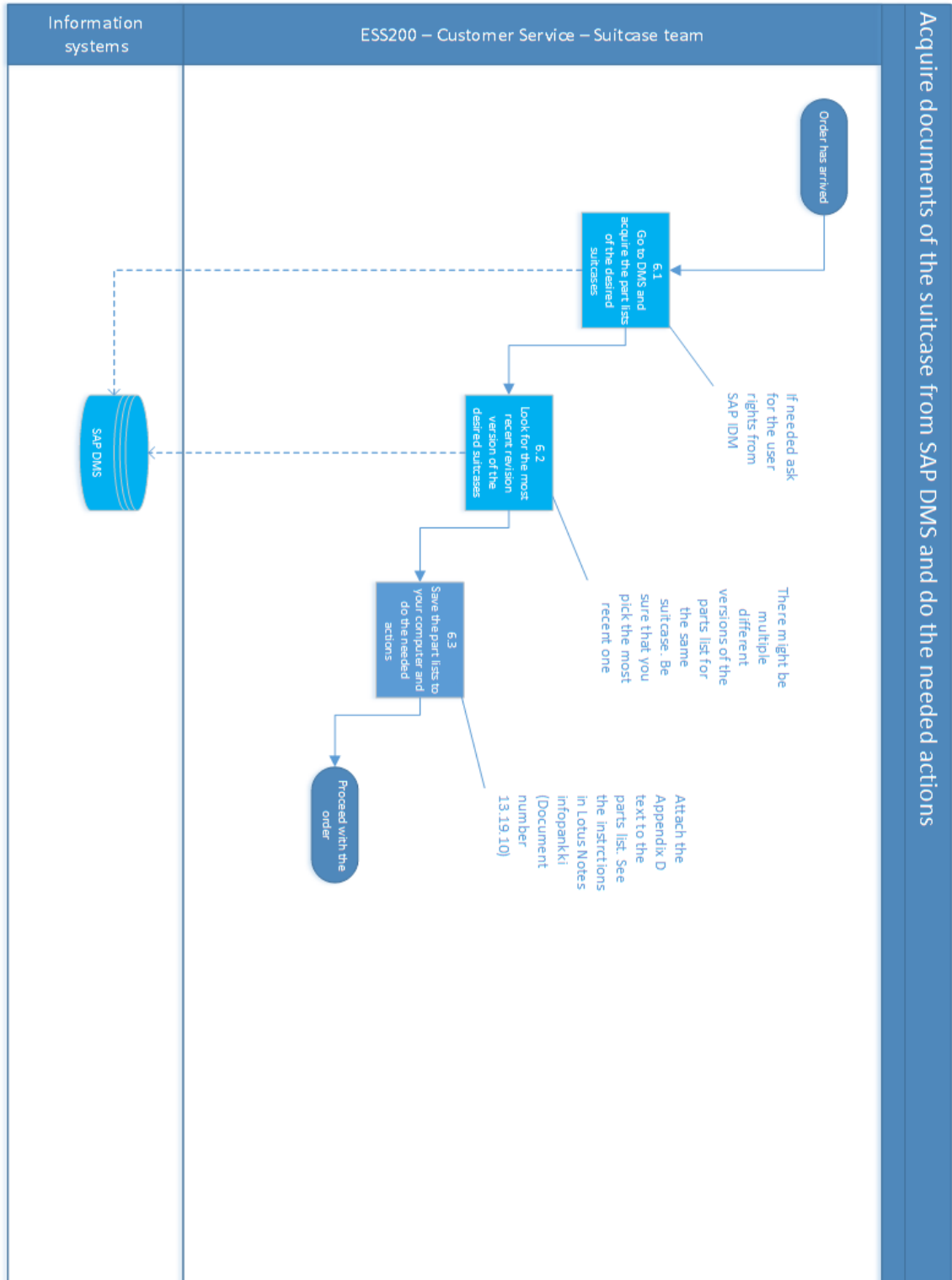
Appendix 2: Inquiry about the prices and availability



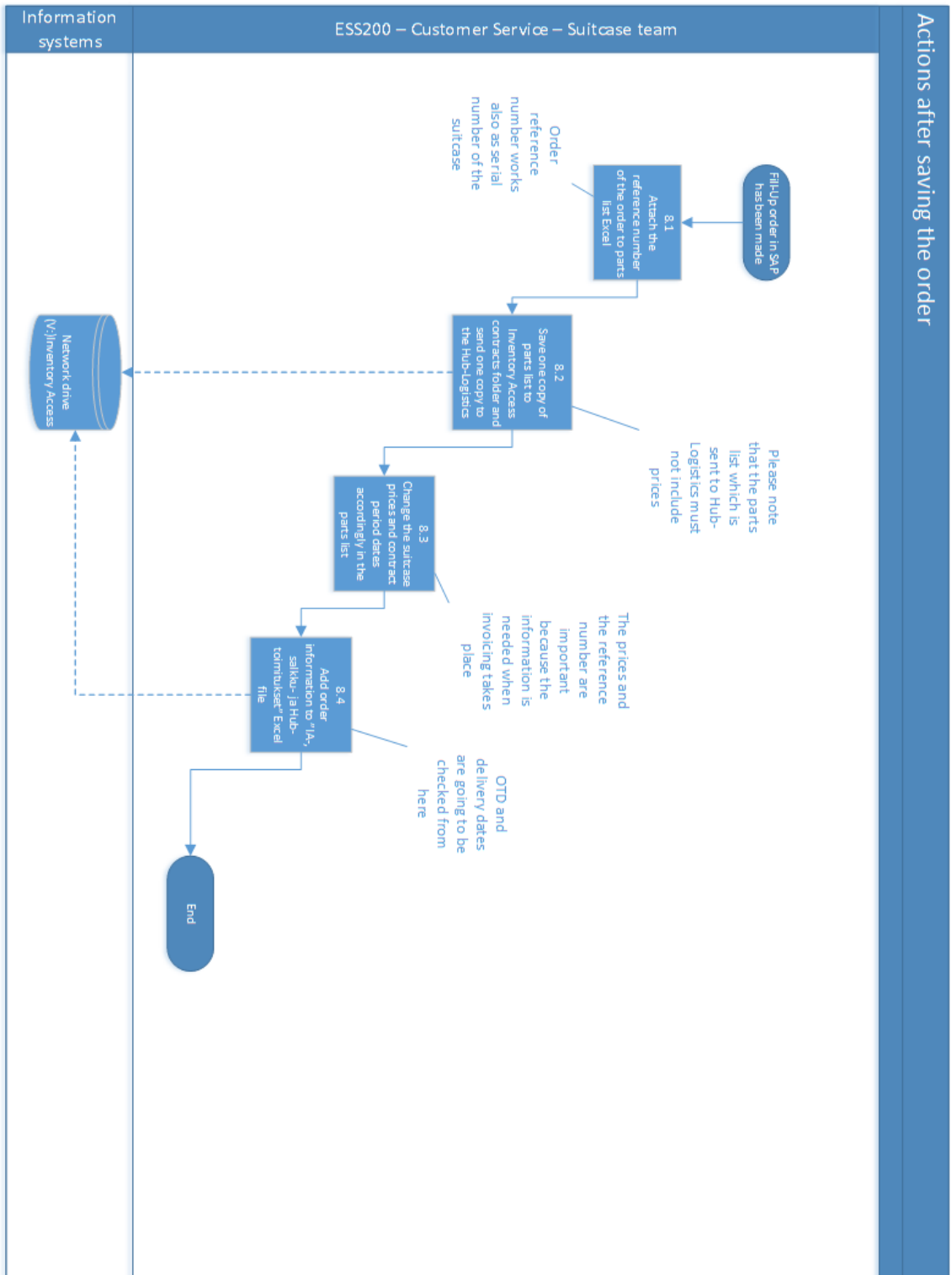
Appendix 3: Checking the customer and order information



Appendix 4: Acquire documents of the suitcase from SAP DMS and the following actions



Appendix 5: Actions after saving the order



Appendix 6: Inventory Access contracts

