Transition to total service solution:
Managing challenges in service development to expand a product lifecycle

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Abstract

Total service solutions may reduce 30-40% of the total product lifecycle cost for a customer. The installed base of capital goods frequently exceeds the annual flow of new products by 10 to 100 times which indicates that total service solutions, also late in long lifecycles have a huge potential for providers, customers and society.

The paper identifies 23 possible challenges when a provider of complex hardware with long operation time enters a transition process to develop total service solutions in order to expand the product’s lifecycle. Each challenge is connected to the major phases in a transition process towards total service solutions. The challenges are exemplified with detailed findings from a case regarding how they can be handled.

Keywords: Transition process, expanding product lifecycle, total service solutions, service innovations, service offering development, industrial product-service systems.

1. Introduction

Services in the aftermarket involve a huge potential for many firms. The installed base of capital goods frequently exceeds the annual flow of new products by 10 to 100 times (Wise & Baumgartner, 1999). This makes innovations in late phases of the product lifecycle important (Isaksson et al., 2009). According to Sakao et al. (2011) service solutions may reduce 30-40% of the total product lifecycle cost for a customer. Services also have a great impact on nations’ gross domestic product (GDP). Existing statistics is limited, but Canada is one of the exceptions. The expenditures on maintenance in Canada averaged about 6 percent of the GDP between 1961 and 1993 (Edgerton, 2008). This makes maintenance an aspect important enough to pay great attention to.

Many long life products have a huge installed base which implies a huge market for maintenance, repair and overhaul (MRO). In the United States the installed-base-to-new-unit ratio for civil aircrafts was 150 to 1 at the end of the 1990s and 22 to 1 for locomotives. At the same time the rail industry spent less than $1.4 billion a year on new locomotives but $28 billion a year maintaining and operating their locomotives and related infrastructure (Wise & Baumgartner, 1999). Hence, the maintaining and operation of long life products’ installed base is of great importance.
Previously, many airlines had their own in-house MRO operations, but since deregulations in the 1970s new independent suppliers have emerged to offer lower cost services. Established airlines responded by outsourcing MRO or by offering the services also to other airlines. In this environment with great competition new service solutions are developed, and so called product-service solutions (PSS) have emerged in several sectors (Johnstone & Dainty, 2009).

A range of design methodologies and tools exist for PSS, but there is a lack of critical and in-depth evaluation of their performance in practice. There is need for evaluating a wider adoption of PSS practices, organizational transitions and also to assess value for both provider and customer (Baines et al., 2007). Further it has been identified that there is a need to identify where and when firms generate, evaluate, and realize various types of service innovations, relating to e.g. service modularity, and the need to balance cost-efficient operations and standardized processes with customization and flexibility. Late in a long-lived product’s lifecycle the product (tangible good) is more or less fixed and the term “total service solutions” (TSS) is better suited to the current study than the PSS-concept.

The management of cultural shift from maximizing unit sales to selling performance is still an under-researched area (Sakao et al., 2011). Hence, there is a need to further investigate the hands on adoption of total service solutions. An analysis of possible challenges, opportunities and possible solutions regarding the late phases for a long life product is needed.

1.1 Purpose

This paper focuses on service development in a capital goods industry with long product lifecycles, more specifically aircraft services. This context implies that the hardware is fixed and that operations are strictly regulated for safety reasons.

The purpose of this paper is to analyze challenges, opportunities and possible solutions when a provider of complex hardware with long operation time enters a transition process to develop total service solutions in order to expand the product's lifecycle. More specifically, the purpose is to understand where and when challenges and opportunities might occur in a transition process from a MRO provider to a total service solution provider and possible success factors regarding how a provider can handle those challenges and opportunities. This is specified in three research questions:

RQ1: What major challenges and opportunities occur in the transition process?
RQ1: When in the transition process do the major challenges and opportunities occur?
RQ2: How can a provider handle the challenges and opportunities?
2. Theoretical framework

2.1 Expanding on maintenance repair and overhaul

Early in a product's lifecycle there are great opportunities to use new technology and processes to support the reduction of system downtime and thereby adding customer value. In this phase of the lifecycle the challenge is to be able to add customer value at the same time as the costs for MRO are minimized (Candell et al., 2009). However, the conditions are different for a product that is late in the lifecycle. The good is already produced and therefore the possibilities to change it are limited. And for an aircraft produced in the 1960s the maintenance can be rather expensive. During the early 1960s American airline operators maintenance cost accounted for 20 percent of total operations cost or 35 percent of the flying costs (Edgerton, 2008).

When operating old long life products several practical aspects have to be considered. The technology used is old, the material could be aged and wearied out, and it might have been designed with other aspects in focus than what is common today (the environmental issue was probably not one of the main aspects). Further, drawings might be missing, components obsolete and software developed in obsolete language and tools. According to Edgerton (2008) another aspect is the frequency and costs of maintenance, repair and overhaul. In many branches the improvement of time between overhaul (TBO) has been significant during the 1900th century. In the early 1920s the TBO for an airline engine was approximately 50 hours. At the late 1920s the same figure was 150. One of the early jet engines J-47 started at a TBO of 50 hours in the early 1950s but in the middle of the 1950s it was improved to 650. During the late 1950s the DC-3 had a TBO of 1500 hours. In 2008 the TBO could be as high as 50,000 hours (Edgerton, 2008).

In several areas of businesses there is a change towards more service content. Product-service solutions can be divided into three main categories, product-related services, use-oriented services and result-oriented services, see for instance Tukker (2004). The aerospace industry is one example on were those classifications can be applied. New services like for instance consultancy, logistic management or fleet management are added to the MRO. The highest degree of commitment is delivering total care, availability at a fixed price (Candell et al., 2009). The customer is offered a “total service solution” and in principle the customer is required only to submit operation plans and to pay the bill.

Several concepts and models for managing aftermarket business exist in the literature. Some examples are integrated solutions, product-service systems, functional sales, solutions etc. (Windahl & Lakemond, 2010). Miller with colleagues defines solutions as “Integrated combinations of products and/or services that are unusually tailored to create outcomes desired by specific clients or types of clients” (Miller et al., 2002). The definition by Miller is close to the current subject. However, to specify even further, the term total service solutions will be used in this paper.

2.2 Transition to total service solution

The execution of a transition in order to implement a successful and deliberate service strategy brings three fundamental requirements. The first is a comprehensive understanding of the market, including customer needs, market potential and future service trends. The second is that all areas affected are involved in the development process. The third is that the entire procedure (strategy analysis, development, implementation and monitoring) is systematic and transparent (Gebauer et al., 2005).

When providing total service solutions, the solution offered to the customer could be
solved customer problem, increased value (economical, social or environmental) or ability to focus on the operations enabled by the solution. An example on the latter is that an aircraft operator buying a power by the hour solution from Rolls-Royce does not have to be concerned about MRO and the availability of the aircraft engine (Nordin & Kowalkowski, 2010). Strategically reorientation for the provider towards total service solutions can be proactive, reactive or a combination of both (Kowalkowski, 2006). The incentives for the provider to move toward service solutions could be e.g. untapped markets, higher growths and margins, and a potential to become a strategic business partner (Nordin & Kowalkowski, 2010). Further, the reason for moving towards service solutions could be that such solutions even out the cyclicality of revenues (Wise & Baumgartner, 1999; Oliva & Kallenberg, 2003).

To support service offering development Kindström & Kowalkowski (2009) propose a four stage framework. The stages in the framework are market sensing, solutions development, sales and delivery. However, to match the findings below, in this paper the delivery phase is divided into two phases, implementation and improvements.

Starting with market sensing, a comprehensive understanding of the market involves understanding customer requirements and trends. Market sensing is a continuous process which not only involves sensing the customer. Also consultants, contractors, etc. can be of interest (Kindström & Kowalkowski, 2009). It is also important for the provider to understand the consequences of a changed business and relationship. Transitions to service strategies often make the offering more intangible and difficult to evaluate, which decreases the market transparency and increases a customer’s perceived purchase risk (Fang et al., 2008; Bowen et al., 1989).

The solution development has several similarities to product development. More or less the same steps are used but those are executed with more coordination, customer involvement, and with more cross-functional and intra-organisational elements (Kindström & Kowalkowski, 2009). This implies that understanding the customer process is important. However, perhaps even more important is to design a customer friendly and pedagogic process which is easy for people to learn (Edvardson, 1997). The framework developed by (Kindström & Kowalkowski) also implies that internal coordination is even more important in solution development compared to product development. According to Engwall (2002), transition projects (in general, i.e. not TSS specific) have to be set in relation to previous occurrences, simultaneous activities and to future plans. It also has to be set in relation to standard operating procedures, traditions, and norms of its surroundings. Reasonable the theory regarding transition projects in general is applicable also regarding total service solutions.

The sales activities can be rather complex due to difficulties visualizing the value created. Companies rarely put effort into tangible actions for commercialization and scale up. Instead, service technicians and service champions can play an important role complementing traditional salesmen (Kindström & Kowalkowski, 2009). According to Gebauer et al. (2005) relationship marketing involves three different dimensions, external, internal and interactive marketing. External is directed towards making promises, internal toward enabling promises and interactive towards the management of critical interfaces. The provider needs to establish an ongoing relationship and continued communication with the customer and the employees need to have the right mindset. According to Kindström & Kowalkowski (2009) customers often use the service provider’s reputation and identity when evaluating the offerings. Offering the customer social benefits are important as a complement to technical and economical benefits (Kindström & Kowalkowski, 2009). Still, pricing should be done on the basis of availability and operating risks (Gebauer et al., 2005).

The phases implementation and improvement (delivery) of total service solutions shows great differences compared with product delivery. Services are created in connection with the
customer, an infrastructure needs to be in place, and the business is people intensive with
great focus on relations (Kindström & Kowalkowski, 2009). Service providing organizations
require different organizational processes, cultures, leadership, and structures than
product/manufacturing organizations (Fang et al., 2008). Consequently solution providers
tend to have independent divisions that make and sell goods and/or services separately
(Windahl, 2007; Tuli et al., 2007).

2.3 Service productivity

An important aspect of the transition into a successful and deliberate service strategy is
increased value for both provider and customer. Value is connected to efficiency and
productivity and this imply a need for awareness of those aspects. In the area of aircraft
systems and probably most other areas to, effectiveness could be a function of performance,
availability and lifecycle cost. The performance depends on the current system, but
availability and costs are rather generic. The availability (capacity) depends on i.e. the
maintainability (turn-around time, etc) and the fleet size. The lifecycle cost depends on the
acquisition cost, the life support cost and possible upgrade cost (Candell et al., 2009).
Focusing on the execution of the services and its productivity, several of the factors
mentioned by Candell et al (2009) interact and a great amount of interaction between
provider, customer and possible partners is needed.

In more general terms service productivity can be defined as a function of internal
efficiency, external efficiency and capacity efficiency. Internal efficiency is the cost effective
use of resources. Here, dependent on the actual service process, even the customer’s resources
could be included. The external efficiency of the output is how the service quality is perceived
by the customer. The capacity efficiency is dependent on the quantity produced and the
demand from the customer. If the demand matches the supply, the capacity efficiency is
optimal. With a greater demand, the capacity is still utilized to a full extent, but quality might
be affected. With a lower demand, the capacity efficiency is lower than optimal (Grönroos &
Ojasalo, 2004). In a transition from a MRO and spare part provider to a total service solution
provider it is important to understand the consequences regarding productivity. The service
provider will not be able to produce service only at back office in isolation from the customer.
There will probably be an increased focus on external and capability efficiency due to that
those factors are rather uninteresting in a good-centric industry (Grönroos & Ojasalo, 2004).

3. Method and case

The paper is based on an ongoing case study within a service division with 110 employees.
The division is a part of a large product-based, high-technology corporation with
approximately 10,000 employees. The actual case study focuses on a total service solution for
an installed base consisting of 80 aircrafts and surrounding equipments. The development of
the aircraft system started 1958 and the aircraft have been in operation since 1964. The TSS
for this system was implemented during 2009. Except the TSS in the chosen case, the division
has two other TSS and these have been in operation for several years. Also a fourth TSS was
contracted late in 2010. The case was chosen mainly on criteria; long product lifecycle, a
focus on service development for the company’s installed base, and transitional challenges.

The case is mainly based on interviews executed 2010-2011, which were recorded and
transcribed by the same person who did the interviews. Valuable background information
concerning the division and its businesses is available to the researcher, since he was an
employee at related divisions during the years 2001-2009. The analysis was mainly performed
by identifying patterns, in an iterative process derived from the literature and comparing with
similar cases reported elsewhere. The actual case is the first in a planned range consisting of both broadening with other cases and follow up on the cases.

4. Empirical results

4.1 Market sensing

The providing corporation in the case consists of both a military and a civil part. The military part has few customers, where the Swedish government with its allied organizations is the most important for them.

In the case there have been discussions between the main actors regarding the actual aircraft system for several years. Actually, the actors also discussed another, greater and more modern and complex system; however for that system there has not yet been a transition to a total service solution. According to the case, the main challenge for the provider in the market sensing phase was to balance the investments according to the intended outcome and to clarify intentions on different activities. It was mentioned that a single-mindedness and great endurance was necessary for succeeding. Much time and money was spent on investigations with fuzzy intentions.

According to the interviews, the major reason for the customer to move in this direction is financial. The aim is to reduce the costs for the services with 30% and to gain better predictability of expenses. However, the intension is also a part of a greater picture, a change of the complete operation. The Swedish Air Force is moving from a “just in case operation” to a “mission oriented operation”. To enable this, there is an aim of disengage economical resources for the changed core operations. Here, the aircraft system from the 1960s was intended to be a pilot-case for the more modern and complex aircraft system.

There were three major incentives for the provider to move towards service solutions. The first was to extend the product lifecycle. There was an enounced threat of closing the system that had been in operations since 1964. The second was an aim of having a leading role in the transition toward the changed operations for The Swedish Air Force. The third was to obtain experiences and references of total service solutions operations. There was a strategic decision to expand the total service solution operations, both to gain scale economy advantages, and to win new market shares and thereby increasing the turnover.

4.2 Service solution development

In the case a completely new offering concept suitable for both the old and the more modern platform were developed by the provider closely together with the customer. The customer decision regarding the newest and most complex aircraft platform is still default. However, for the older system a preliminary concept was agreed after roughly 5 years. During the lengthy discussions, it become more obvious to the provider that a similar concept and business model from a parallel division was successfully in operation since the middle of the 1980s. The older concept was used for two minor businesses, but still the basics of this concept could be reused in the more extensive business.

Consequently to that the concept already was in use, the actual development was to refine and structuring the concept. The providing organization and the parallel division with two similar businesses were integrated and the new division relays very much on a six armed Work Breakdown Structure (WBS). The WBS was developed for the new business, but based on the former two businesses. This WBS has a great importance throughout all the phases in each of the businesses. It is applied to the current business in focus through activating or
inactivating each cell in the WBS. Statement of work, calculations, and organization are connected to each cell and the managers in the case express great satisfaction for this way of working.

The concept also needs to be applied with relevant data. One challenge identified concerns the problem of getting access to relevant data from the customer, to analyze this data and to achieve an agreement with the customer on how to interpret this data. This includes data regarding operations, maintenance, repair, and overhaul and also data specific for the follow-up of regulations and certificates. In the case the aim of accessing and interpreting data from the customer systems carried great problems.

4.3 Sales

Although the transition in the case was partly customer driven, the provider experienced a lack of readiness in parts of the customer organization. Many of the stakeholders were skeptical to the new business concept. There were different views regarding outcomes in terms of possible losses of individual jobs and positions in the organization. This has resulted in lengthy negotiations with meager monetary results. As a reaction, management at the provider connected the sales activities to short-term profits. It was emphasized during the interviews that in a situation with partly lack of readiness, the choice of project manager at the customer is of great importance.

The provider has noted the importance of transparency when searching for mutual incentives, related to predictable cost savings. The provider claims that they exposed to the customer (and vice versa), more or less everything relevant except the exact calculations behind the price. There were great discussions between the actors regarding what the actual uptime did cost as performed in the old deal. The judged uptime cost differed with approximately a factor 2-3 between the customer and the provider. When finally agreed, the uptime cost was closer to the provider’s original calculations than to the customer’s.

In the case, the provider had little influence on the choice of counterpart for discussions at the customer organization. The provider did several attempts to have a direct contact with the end user, but this was not always considered positive by the customer. According to the interviews, not all of the end users requirements were attended to during the negotiations. One example is that the end users require more aircrafts available for their operations than agreed on.

4.4 Implementation

The corporate created a new division by merging the actual business with an existing division containing two similar but minor businesses. The main reason for the structural changes was to create an organization with unique competences for total service solutions. This involved competences in areas as commercial, contract negotiation, law, human issues, technology management, technology bookkeeping, certificates, etc. The challenge of managing the front offices was a greater challenge than the provider expected. Minor but still time consuming issues like; who is responsible for work environment issues and for waste harmful to the environment? How to get access to a front office located in a military complex and how to solve information technology (IT) issues in this environment? Those issues were solved through creating the role “facility manager” and through a very close relation to the customer.

In the case there was a limit for the implementation of six months. Spare parts had to be purchased from the customer and put into the provider’s storage. Routines should be settled and the new way of working established and up and running. Several stakeholders were involved in the transition. Other internal divisions, external subcontractors and also the
customer were considered by the provider as important stakeholders in the implementation process. The provider realized that a new mindset had to be implemented in the organization and this was done mainly by top-down information and control. The provider judged transparency, sensitivity and flexibility in the communication as keys to approach the customer and end user in the transition process.

In the actual case there was a great challenge in implementing new and changed regulations according to authority requirements within the transition period of six months. The provider obtained increased responsibility from being an “aircraft system” certificate holder to being an “aircraft material system” certificate holder. This brings added responsibility regarding weapons, equipment for the pilot, support systems etc. Further, the business concept included responsibility to support three wings (air force flotillas). One of the wings is the provider itself. The other two are within the customer organization. The basics are that all the relations and the way of working should be described in the operations management systems (OMS) and in the certificates. It was emphasized during the interviews that it is of great importance that all responsible actors are confident in the clarification of the structure and distribution of responsibilities. All the heads of- wing, engineering, design, quality, and also the managers accountable have to be comfortable. All in all approximately 15 certificates are involved in the case and very much time was spent on solving the certificate issues. One of these issues was handling an external subcontractor that was losing its certificate due to the changes. Another issue was that the customer became a subcontractor of weapons to the provider.

In the case great focus was set on implementing an enterprise resource planning system (ERP). This was judged necessary for controlling an efficient flow of components through the complete journey from aircraft to maintenance site and back again. Further, the contract stipulated that the provider should change computer system and moving the data from the customer system within 18 months. The change of computer system to the ERP system was delayed due to great complexity which called for an intermediate solution not optimized for the operations.

4.5 Improvements during the delivery phase

Control was mentioned by the interviewees as the key for success in the continuous improvement and cost reduction. The key performance indicators (KPI) mentioned are in the areas of uptime and availability. However, it was also mentioned a continuous focus on profitability, risk mitigation and incidents that might threaten the certificates. One example on combining profitability and the KPIs is that the provider used an opportunity were the customer ordered some new functionality on the physical product. In connection to the modification, the provider took the opportunity to replace components that carries high maintenance costs.

In the case 80 aircrafts are planned to be reduced to 35 within a 2-3 years of period. This reduction implies a great opportunity to reusing components from aircrafts not in use. Further, the invested maintenance in each component has a time-limit. All this makes the fleet management very important for the profitability and each individual aircraft has its own plan. It is also important for the profitability that the contracts with the subcontractors are flexible enough to enable interrupting component maintenance, when the demand declines. Five divisions act as internal suppliers with unfixed prices and volumes which enables the division in lead to stop the maintenance whenever needed. Also two major external suppliers are involved in the business. Here the main provider’s strategy is to have a long term relation rather than optimizing revenues and risks on a short-term perspective. Further, it was mentioned as important that management is clear on that changes on the physical product are
allowed only if they are motivated by; authority requirements, financed customer requirements, or could be calculated as an investment. “Nice to have” should not exist in successful service solution businesses.

It was mentioned that by winning new businesses the turnover increases, risks decreases, and scale economy advantages increases. Scale economy advantages were gained basically through sharing human resources, equipment, and buildings back office. However, one of the interviewees speculated on future possibilities to share human resources between the businesses also at the front offices. Further it was mentioned that total service solutions are risky in the sense of being “digital”. Either you have the business or you don’t. If the provider should lose one of the minor businesses it would affect approximately 40-50 persons.

5. Discussion

5.1 Market sensing

The literature mentions solved customer problem, increased value or ability to focus on the operations as incentives for the customer to approach total service solutions. In the case, the major incentive for the customer to move in this direction was financial. However, the intension is also a part of a greater picture, a change of the complete operation. Most likely more cases with financial and changed operation as main incentives can be found if looked for. Regarding the provider’s incentives for moving toward total service solutions, it could be untapped markets, higher growths and margins, a potential to become a strategic business partner or to even out the cyclicality of revenues. In the case, all of those were true. However, it should be mentioned that for the actual product it was also to extend the product lifecycle.

Challenge 1: Understanding the great picture as well as details.

According to the theoretical framework it is important to understand the customer’s requirements and the consequences of a changed business and relationship. The empirical results indicate that total service solution procurement actually might be a mutual learning process between the organizations. The case also indicates that it might take long time and involve great complexity. Reasonably, the extended time, complexity, mutual learning and being a part of a greater picture is valid in many other TSS procurements, but contingently not all.

Challenge 2: Endurance towards mutual learning.

In the market sensing phase the main challenge for the provider was to balance the investments according to the intended outcome and to clarify intensions on different activities. It is reasonable to assume that generally, the management of many strategically important pre-sales activities are less criticized than other projects and managed with weak budget limitations, especially if the activities are in parallel with a greater pre-sales activity as in this case.

Challenge 3: Balancing investments against outcome.
5.2 Service solution development

According to the theoretical framework all relevant functions should be involved in the development and a transparent procedure should be used. Further, the general project part of the framework claims that the project has to be set in relation to previous occurrences, simultaneous activities and to future plans. In the case the development was made by the provider closely together with the customer. The first parts of the development was also done close to a similar business for another aircraft platform. During the process it become more obvious to the provider that a similar concept was in use already. Further, a new contract that is suitable for the concept has been signed later on. Consequently, the case verifies that pre activities, simultaneous activities, and post activities have to be considered during the development. It also indicates that the theory is correct regarding that the process should be transparent and that relevant stakeholders should be involved in the development.

Challenge 4: Considering relevant pre-, simultaneous- and post activities.

According to the theoretical framework service businesses require different organizational processes, cultures, leadership, and structures compared to manufacturing businesses. The development has to be set in relation to standard operating procedures, traditions, and norms of its surroundings. In the case, a generic six armed WBS was developed. From this the statement of work, calculations, and organization are connected to each cell. According to the managers this way of working is successful for them, which shows that a rather uncomplicated method can be the best solution. The important thing is that the way of working is suited for the organization.

Challenge 5: Creating a generic and uncomplicated concept structure.

The case also shows that getting access to relevant data from the customer, to analyze this data and to achieve an agreement with the customer on how to interpret this data can be difficult. This information is crucial and the problem has to be addressed early during the development.

Challenge 6: Access to and agree on relevant data.

5.3 Sales

According to the theoretical framework strategic reorientation for the provider towards total service solution can be proactive, reactive or a combination of both. In the case the transition was partly reactive but lack of readiness at the customer organization resulted in lengthy negotiations. As a reaction, management at the provider connected the sales activities to short-term profits.

Challenge 7: Timing, perseverance and handling lack of customer readiness.

The framework also state that sales activities can be complex, rather ad-hoc and that service technicians along with service champions can play an important role. In the case four experienced persons constituted a team of service champions with a great responsibility.

Challenge 8: Early decision on an experienced service champion team.

Further, the framework indicates new critical interfaces and an ongoing relationship. In the case, direct contact with end users was not always considered as positive by the customer. Service technicians did play an important in communication but this was not enough, not all of the end users requirements were taken care of during the negotiations. In the case it was
also identified that the choice of customer’s project manager is important, but the provider had an almost non-existing opportunity to influence on whom to negotiate with.

Challenge 9: Controlled use of service technicians where managers not have access.

Challenge 10: Securing the end users requirements.

Challenge 11: Influence on whom to negotiate with.

In the theoretical framework it was emphasized that pricing should be done on the basis of availability and operating risks. In the case availability and risks were important, but also uptime costs. The judged uptime cost differed with a factor 2-3 between the customer and the provider. In the discussions to agree on the cost the provider exposed more or less everything except the exact calculations behind the price to the customer.

Challenge 12: Early agreement on the actual costs with the old conditions.

4.4 Implementation

According to the theoretical framework the implementation of a total service solution tends to be accomplished in independent divisions. In the case a new division was established to create unique capabilities for total service solutions.

Challenge 13: Creating a centre of excellence for total service solutions.

The theoretical framework points out that service are connected to people intensive operations with great focus on relationships. In the case, a new mindset was to be implemented through top-down information and control. When applying the new mindset externally, the provider focused on transparency, sensitivity and flexibility. A need for a new mindset is judged as general applicable in implementation of a total service solution.

Challenge 14: Implementing a new mindset.

According to the theoretical framework the implementation aims at having infrastructure, processes, cultures and leadership in place for the operations. In the case great efforts were done to implement an ERP system. It is reasonable to assume that a support system for controlling flow and logistics is important in most cases.

Challenge 15: Securing a support system for controlling flow and logistics.

In the case, managing the changed conditions for the front offices was experienced as more difficult than expected. This is judged reasonably as a commonly occurring incident.

Challenge 16: Managing front offices.

In the case a lot of efforts were made to put regulations according to authority requirements into the OMS. Depending on business this might not be relevant in other cases. However, securing that all responsible actors are confident in structure and responsibilities ought to be generally applicable.

Challenge 17: Implementing new or changed external regulations in e.g. OMS.

Challenge 18: Securing that all responsible actors are confident in structure and responsibilities.

Further, there was a deadline of six months for the implementation in the case. The time limit was experienced as tight and depending on case it is reasonable to assume that most transitions have rather tight deadlines.

Challenge 19: Tight time limit.
4.5 Improvements during the delivery phase

In the theory service productivity was defined as a function of internal efficiency, external efficiency and capacity efficiency. In the case internal efficiency was discussed in terms of detailed fleet management, unfixed prices and volumes at internal suppliers, and sharing resources between the different businesses. It was also indicated that efficiency regarding the external suppliers was somewhat toned down in favor for long term relations.

Challenge 20: Creating flexibility for enabling cost reductions.

The theoretical framework indicated that there should be an increased focus on external and capability efficiency due to the transition towards a total service solution. This has been verified in the case. The provider has great focus on external efficiency in the shape of uptime and availability and these aspects are treated as KPIs.

Challenge 21: Focus on uptime and availability.

Regarding the capacity efficiency a detailed fleet management was judged as a key. An overarching plan for the fleet existed as well as individual plans for each aircraft. The fleet was planned to be dimidiated and this opened up for cannibalizing between the aircrafts.

Challenge 22: Optimizing the fleet.

The theory also mentioned that the customer might suggest new product designs and applications on old products. In the case the provider used an opportunity were the customer ordered some new functionality on the physical product. In connection to the modification, the provider took the opportunity to replace maintenance intensive components.

Challenge 23: Using requirements for new functions as a lever to lower costs.
6. Conclusions

This paper describes a case demonstrating that it is possible to successfully develop and operate a total service solution in order to expand a complex hardware product’s lifecycle. Leastways this is possible on a short-term and on a medium-term perspective. Regarding a long-term perspective a follow up study is required for evaluation. Further, a future study should also analyze under what conditions a successful transition can be done.

In the paper 23 possible challenges have been identified. Most of the challenges can be turned into opportunities depending on situation. Each challenge described is connected to the major phases in a transition process and the challenges are exemplified with detailed findings. Some of the detailed findings are generally applicable and other should be used as an indication of possible occurrences.

6.1 Major findings

The first major finding is some details regarding management of new and old stakeholders, the human beings. A new mindset is needed and due to increased focus on relations; learning, influencing, perseverance, agreeing, tailoring, transparency and feeling confident becomes more important.

The second is the opportunity of service modules. One way of combining a standardized way of working with customization and flexibility is to use service modules in the shape of a generic WBS. The WBS is applied to the relevant business through choosing WBS-cells and adding detailed information into the chosen cells.

Thirdly, the term delivery used in the framework is of course correct, but could be somewhat misleading. Instead “implementation” and “(continuously improved) delivery” as two phases is suggested.

The fourth finding is probably the most important, at least in the specific type of business environment studied. Here, it is greatly important to secure regulations, requirements and responsibilities in e.g. an OMS and that all responsible actors are confident in the chosen structure and description of responsibilities.

The fifth major finding is the importance of control and flexibility. It is important for the customer satisfaction but also for being able to manage the fleet and suppliers towards high productivity and cost reductions. And if the product (good) is planned to be gradually reduced, cannibalizing can be a great opportunity.

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