

MASTER

Blueprint design of service dominant enterprise architecture for Canon Business Services

Maurya, K.

Award date:
2015

[Link to publication](#)

Disclaimer

This document contains a student thesis (bachelor's or master's), as authored by a student at Eindhoven University of Technology. Student theses are made available in the TU/e repository upon obtaining the required degree. The grade received is not published on the document as presented in the repository. The required complexity or quality of research of student theses may vary by program, and the required minimum study period may vary in duration.

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain

Department of Industrial Engineering and Innovation Sciences
Department of Mathematics and Computer Science

Blueprint design of service dominant enterprise architecture for Canon Business Services

Kritika Maurya

In partial fulfillment of the requirements for the degree of
Master of Science in Business Information Systems

Supervisors: prof.dr.ir. Paul Grefen (TU/e)
dr. Boudewijn van Dongen (TU/e)
Paul Verleg (Océ Technologies)

Eindhoven, February 2015

Abstract

Nowadays services are dominating the economies of the world and are becoming an important part of strategic thinking of business organizations. Services are no longer treated as a separate category for strategic mission and planning but rather an all pervasive part of it. Most of the business organizations today are more or less involved in a combination of providing goods with services. The transition marked evolution of servitization concept, which is described as how companies initially considered themselves to be in “goods” or “services” (e.g. automobile or insurance), and then moved to offering goods combined with closely related services (e.g. products offered with maintenance, support, finance). This creates service-dominant business markets requiring high levels of agility. Thus, there is a need for a structured way to design business in a service-dominant context.

The project is carried out at the Strategic Business Unit (SBU) based at Océ Technologies in Venlo, Netherlands. The Strategic Business Unit (SBU) which is a part of Canon Business Services (CBS) is focused on developing and growing the business service of value added outsourcing of document processing on a global level together with the Canon Sales Organizations.

Blueprint of the architecture for service innovation in CBS is designed in this project using BASE/X as a reference framework. BASE/X is the acronym for Business Agility through Service Engineering in a Cross-Organizational Setting, which will support the efforts of dealing with the agility of service-dominant business, the complexity of solution-oriented business (value-in-use) and multi-sided business models. BASE/X is based on a structure of stable and flexible layers composing a pyramid (from top to bottom the layers are: Strategy, Business Model, Service Compositions and Business Services).

The design of the conceptual blueprint structures the business aspects of value added outsourcing of document processing services in one framework. With BASE/X as a reference framework and through a number of design steps, it proposes an enterprise standard architecture for CBS which will be a blueprint for the organization of value added outsourcing of document processing services, helping in the composition of new services and consequently supporting the agility in service-dominant business.

Keywords: BASE/X framework, Service Dominant Architecture, Servitization, agility,

Acknowledgements

This document is the final result of my graduation project which completes my Master's degree in Business Information Systems at Eindhoven University of Technology. The research was carried out at the Information Systems group of the Department of Industrial Engineering and Innovation Sciences with the support of Océ Technologies in Venlo, Netherlands. Throughout the course of this project I met and collaborated with many professionals from academia and the industry and they deserve my appreciation for the help and support they provided during the project.

First, I would like to express my sincere gratitude and appreciation to my main thesis supervisor Paul Grefen. Paul taught me how to be structured in my thinking which I believe is a valuable learning for my career. He always had a good and simple story to explain me how things work. It was really a pleasure for me to be guided by Paul for my graduation assignment.

Next, I would like to thank Paul Verleg, my supervisor from Canon Business Services (part of Océ Technologies, Venlo, Netherlands), who gave me the opportunity to conduct this research project. Paul always provided the right support so that I could realize my ideas and also inspired me on how to make the project more interesting and challenging. I am deeply thankful to Paul for spending time sitting with me for discussion on the project, helping me understand concepts and put things on the right track. Without his continuous help, this project would not have been completed in the way it did.

I would like to thank Boudewijn van Dongen for being member of my graduation committee.

Special thanks to all the members of SBU team. I am deeply thankful to everyone from the team for supporting me in the project with the discussions and being available for the validation of my results. Without this support the results would have been much more difficult to achieve.

A word of thanks also goes to Konstantinos Traganos for helping me in writing the report and discussing the ideas. Kostas thanks for listening to my worries and helping me with everything that I asked.

Last but not the least special thanks to my husband for his unconditional love and support in the complete journey of Masters Study. A warm thanks to my family members for their encouraging support to keep moving ahead in life.

Kritika Maurya,

Eindhoven, February 2015

Contents

1.	Introduction	9
1.1.	Project context	9
1.2.	Problem description	10
1.3.	Research questions	11
1.3.1.	Research question 1	11
1.3.2.	Research question 2	11
1.3.3.	Research question 3	12
1.3.4.	Research question 4	12
1.3.5.	Overview of research questions	12
1.4.	Scope	13
1.5.	Approach and outline	13
2.	Service Dominant Enterprise Architectural Framework	15
2.1.	Criteria to select the framework	16
2.2.	Frameworks studied	16
2.2.1.	Service Oriented Architecture (SOA)	16
2.2.2.	Business Process Management	17
2.2.3.	Combination of SOA and BPM	18
2.2.4.	BOAT	20
2.2.5.	BASE/X	21
2.3.	Criteria and BASE/X	23
3.	Canon Business Services as a Service Provider	24
3.1.	Service Dominant Enterprise Architectural Framework for CBS	25
3.1.1.	Step 1 Strategy to Service Modules	26
3.1.2.	Step 2 Strategy to Business Model	31
3.1.3.	Step 3 Business Model to Service Composition	34
3.1.4.	Step 4 Service Modules to Service Composition	36
3.2.	Results	37
3.3.	Conclusions	37
4.	Case Study – Invoice Processing	38
4.1.	Application of BASE/X to invoice processing service	39

4.2.	Step 1 Strategy to service modules	40
4.3.	Step 2 Strategy to Business Model.....	51
4.4.	Step 3 Business Model to Service Composition.....	54
4.5.	Step 4 Service Modules to Service Composition	55
4.6.	Results.....	60
4.7.	Conclusions	60
5.	Alignment between disciplines	62
5.1.	Mapping of organizational structure of CBS into BASE/X framework	62
5.2.	Results.....	64
5.3.	Conclusions	64
6.	Stage gate model	65
6.1.	About the stage gate model.....	65
6.2.	Stage gate model for CBS	67
6.2.1.	Description of stages and gates from the stage gate model of CBS	70
6.3.	Classification of service innovation ideas	78
6.3.1.	Service innovation idea related to strategic change.....	78
6.3.2.	Service innovation idea related to changes in business model	79
6.3.3.	Service innovation idea related to changes in service composition	79
6.3.4.	Service innovation idea related to changes in service module.....	80
6.4.	Processing of categorized idea through stage gate model.....	81
6.4.1.	Strategy related idea	81
6.4.2.	Business model related idea	81
6.4.3.	Service composition related idea	82
6.4.4.	Service module related idea	82
6.5.	Results.....	82
6.6.	Conclusions	82
7.	Validations	84
7.1.	Evaluation through workshop	84
7.2.	Conclusion from workshop	87
7.3.	Evaluation through interviews	87
7.4.	Conclusion from interviews.....	89
8.	Conclusions.....	91

8.1.	Research Conclusions.....	91
8.2.	Limitations	92
8.3.	Future work.....	93
8.4.	Reflection.....	93

List of figures

Figure 1.1	Stage gate model [11]	12
Figure 1.2	Thesis outline	14
Figure 2.1	BPM Lifecycle	18
Figure 2.2	Relationships between BPM and SOA [20].....	19
Figure 2.3	Wheel model for BOAT [22]	20
Figure 2.4	BASE/X framework with separation of concepts.....	21
Figure 2.5	Connections between the layers	22
Figure 2.6	Platform pyramid supporting the framework [23].....	22
Figure 3.1	Guideline sequence for business level pyramid [26].....	26
Figure 3.2	Strategy to Service Modules	26
Figure 3.3	Service-Dominant Strategy Canvas [26]	27
Figure 3.4	Template to check granularity of service modules [3]	28
Figure 3.5	Abstract details of a Service Module [3]	29
Figure 3.6	Service module anatomy.....	29
Figure 3.7	Business Catalogue Blueprint.....	30
Figure 3.8	step 1 from Figure 3.1	31
Figure 3.9	Step 2 Strategy to Business Model.....	31
Figure 3.10	Service Dominant Business Model Radar [26].....	32
Figure 3.11	Meta model to describe the elements of the business model [26].....	34
Figure 3.12	step 2 from Figure 3.1	34
Figure 3.13	Step 3 of service composition identification	35
Figure 3.14	An overview of step 3 Figure 3.1	36
Figure 3.15	Service Modules to Service Compositions.....	36
Figure 3.16	step 4 from Figure 3.1	37
Figure 4.1	End to end Invoice Processing Service [32]	39
Figure 4.2	Service-Dominant Strategy Canvas for Invoice Processing Service	41
Figure 4.3	Derivation of service modules from strategy canvas	43
Figure 4.4	Service modules with right level of granularity linked to service dominant strategy canvas for invoice processing.....	46
Figure 4.5	Abstract details of service modules	47
Figure 4.6	Service catalogue for service modules for invoice processing	49
Figure 4.8	Business Model Radar for CBS for invoice processing service for MO.....	53
Figure 4.9	Mapping of co-production activities to service module elements	54

Figure 4.10 Business process model for invoice processing.....	57
Figure 4.11 Business process model for enriched invoice processing.....	58
Figure 4.12 Business process model for automated invoice processing	59
Figure 5.1 Overview of alignment of disciplines in the BASE/X framework	63
Figure 6.1 Format of stage gate model [36].....	66
Figure 6.2 Stages and gates [37]	67
Figure 6.3 Team wise overview of stage gate model of CBS [11].....	67
Figure 6.4 Overview of stage gate model for CBS [11].....	69
Figure 6.5 Stages in the stage gate model of CBS [11]	70
Figure 6.6 Gate 1 from idea stage to concept stage[11]	70
Figure 6.7 Gate 2 from concept stage to design stage [11].....	72
Figure 6.8 Gate 3 from design stage to Pilot (Implementation) stage [11]	74
Figure 6.9 Gate 4 from Pilot (Implementation) stage to Pilot Operation (Test) stage [11]	76
Figure 6.10 Gate 4 from Pilot Operation (Test) stage to market launch stage [11]	77
Figure 6.11 List of category of service innovation idea according to the layers of business pyramid of BASE.X.....	81

List of tables

Table 2.1 summary of frameworks over the criteria.....	23
Table 4.1 Benefits to the customer with the invoice processing service [32]	38
Table 4.2 Service Modules from Figure 4.2.....	42
Table 4.3 Granularity check for the service modules	44
Table 4.4 Service modules with right level of granularity.	45
Table 4.5 Service contracting details for service modules	48
Table 4.6 Chapter from service catalogue of CBS with details for service domain of preprocessing documents.....	50
Table 4.7 Concrete value-in-use for invoice processing service.....	51
Table 5.1 Disciplines of CBS and their responsibilities [35].....	62
Table 5.2 Mapping of guideline sequence with the teams of CBS SBU	64
Table 6.1 Mapping of elements of Figure 6.2 with Figure 6.4.....	69
Table 6.2 Relation between activities of gate 1 and BASE/X.....	70
Table 6.3 Relation between activities of gate 2 and BASE/X.....	72
Table 6.4 Relation between activities of gate 3 and BASE/X.....	74
Table 6.5 Relation between activities of gate 4 and BASE/X.....	76
Table 6.6 Relation between activities of gate 5 and BASE/X.....	77
Table 7.1 Summary of answers received for question 1	85
Table 7.2 Summary of answers received for question 1	85
Table 8.1 List of papers on BPM.....	98
Table 8.2 List of papers on SOA	99
Table 8.3 List of papers on BPM and SOA	100

Table 8.4 List of papers on servitization.....	101
Table 8.5 Service catalogue for Assessment Service	104
Table 8.6 Service catalogue for Validate data	104
Table 8.7 Service catalogue for Import file	105
Table 8.8 Service catalogue for Extract Index and Classify.....	105
Table 8.9 Service catalogue for Deliver Documents.....	106
Table 8.10 Service catalogue for Archive Documents	107
Table 8.11 Service catalogue for <i>Content based indexing</i>	107
Table 8.12 Granularity check for assessment service	109
Table 8.13 Granularity check for Prepare Document.....	109
Table 8.14 Granularity check for Capture image.....	110
Table 8.15 Granularity check for Validate data	110
Table 8.16 Granularity check for Import image	110
Table 8.17 Granularity check for Improve quality	111
Table 8.18 Granularity check for Extract, index and classify	111
Table 8.19 Granularity check for Deliver documents	111
Table 8.20 Granularity check for Archive documents	112
Table 8.21 Granularity check for Manual validation	112
Table 8.22 Granularity check for Content based indexing	113
Table 8.23 Automated approval workflow	113

List of abbreviations

BASE/X	Business Agility through Cross-Organizational Service Engineering
BOAT	Business, Organization, Architecture and Technology
BPM	Business Process Management
CBS	Canon Business Services
EA	Enterprise Architecture
SBU	Strategic Business Unit
SDEA	Service Dominant Enterprise Architecture
SOA	Service Oriented Architecture

1. Introduction

This graduation project is carried out at the Strategic Business Unit (SBU) of Canon Business Services based at Océ Technologies in Venlo, Netherlands as a part of the Master of Science program Business Information Systems at Eindhoven University of Technology (TU/e). The Strategic Business Unit (SBU) which is a part of Canon Business Services (CBS) is focused on developing and growing the business on a global level together with Canon Sales Organizations.

The project is performed at the Information Systems (IS) research group of the Industrial Engineering and Innovation Sciences (IE&IS) Department of TU/e. This project is directed towards research direction of the IS group focusing on the shift of asset oriented organizations towards a service dominant business environment.

This first Chapter introduces the project by explaining the context of the thesis in Section 1.1, stating the problem in Section 1.2 and setting the research questions in Section 1.3 from the problem statement. The scope of the project is defined in Section 1.4 and finally, the approach and the outline of the thesis are presented in Section 1.5.

1.1. Project context

Nowadays services are increasingly shaping the economies of the world and are becoming an important part of strategic thinking of business organizations. Services are no longer treated as a separate category for strategic mission and planning but rather an all integral part of it. It is no longer valid for either industries or individual corporations to keep distinctions between goods and services or assume that they can do one without the other. Most of the business organizations today are more or less involved in a combination of providing goods with services. This change is partly due to the fact that customer needs are shifting from the old and outdated focus on goods or services to integrated “bundles” or systems providing the services in the lead role [1].

The shift marked the evolution of the servitization concept, which is described as how companies initially considered themselves to be in “goods” or “services” (e.g. automobile or insurance), and then moved to offering goods combined with closely related services (e.g. products offered with maintenance, support, finance) [2]. Servitization can be defined as “the increased offering of fuller market packages or “bundles” of customer focused combinations of goods, services, support, self-service and knowledge in order to add value to core product offerings” [1][2]. This form of servitization is considered for this project.

A good example of servitization is the music industry where physical means like CDs and DVDs are replaced by services offering music experience, e.g. Spotify¹. This type of move from product oriented to service oriented creates service-dominant business markets where services are the basic mechanism for interaction. The service-dominant business market is characterized with service-dominant business

¹ www.spotify.com

paradigm which is a style of defining and implementing business models of the service provider such that the following three characteristics apply [3]:

- Value-in-use is the main entity that is exchanged (traded),
- This value-in-use is encapsulated in a set of services, and
- These services are offered to a market through a service delivery mechanism.

The service-dominant business paradigm is a way of thinking about doing business that uses the service-oriented paradigm as an underlying way of thinking about delivering business value [3]. The service-dominant business paradigm places a high demand on the agility to the service providers, who must be able to adapt dynamically to changes.

CBS entered into the service industry of value added outsourcing of document processing. With this “servitization” shift CBS recognized the need to be capable of adapting to changing business requirements of fast-paced and competitive global business environment.

1.2. Problem description

In order to succeed with “servitization” organizations face a broad range of challenges that requires taking a holistic approach to the business and address all elements of the business model [4]. Servitization brings in the need for organizations to be agile to cope with dynamism in service-dominant business markets.

Agility here is the ability of an organization to sense changes in the business environment and respond efficiently and effectively to the change [5]. Nowadays user demands changes rapidly and therefore organizations must be adaptive to the changes. Agility helps in coping with the rapidly changing demand and customer requirement.

Enterprise architecture (EA) supports to have alignment of strategic and business dimensions to gain agility and assurance in delivering values of the service [6]. So a coherent description of enterprise architecture in an organization not only provides insight, but also enables effective communication among stakeholders and guides the change process [7]. Thus application of EA empowers organizations to be agile and also to improve communication between stakeholders.

More over enterprise architecture when combined with service dominant business paradigm also helps business organizations to be innovative in order to cope with the rapid market changes. So EA is a gaining popularity as a tool which can help business organizations to be more agile, integrated and aligned [8] [9].

CBS recognizes the need to be agile and innovative in adapting to the market and environmental changes in the field of value added outsourcing of document processing. This need of CBS can be fulfilled by implementing an enterprise architectural framework that covers the existing service deliveries and also considers service innovation for CBS. This business interest and motivation is

encapsulated in the problem statement. Therefore the main problem to be solved in the scope of this project is:

“How Canon Business Services can be “Always Better” in service innovation projects?”

Based on the above stated problem statement we set our goal of this project as:

Design blueprint of service dominant enterprise architecture for Canon Business Services to be “Always Better” in service innovation projects?

1.3. Research questions

To achieve our goal of the project we split the problem statement into several research questions for which solutions will be partial solution to the problem statement. Answer to the individual research questions when combined together will give a solution to the problem statement of *“How Canon Business Services can be Always Better in service innovation projects?”*

1.3.1. Research question 1

CBS aims to have a modularized concept in its services to improve reusability. Concept of modularizing the services will enable an efficient service development by improving the reusability of existing services or parts of services.

The ideology of modularization here is similar to a Service Oriented Architecture (SOA) based Enterprise Architecture for composite application. A SOA based composite application is a set of related and integrated services that support a business process. The application satisfies some particular aspect of the business combining both automated and manual processes as a composition of services and business processes. However, since many of the services composed by that application may in fact be reused assets from other composite applications which may result the application to be more of a slice through a set of intersecting applications [10].

In this research question, we want to find out how CBS-SBU can modularize its services that can help in making composite service offering which can be slices from other intersecting service offerings.

So we frame here the research question 1 as

RQ1 - “How CBS can modularize its services that can be broken into reusable chunks?”

1.3.2. Research question 2

As a service provider for value added outsourcing of document processing, CBS wants to be flexible in extending services as the volume and complexity of document changes for its customers. Thus CBS wants to have a mechanism of providing a scalable growth path of services to customers with capability of handling the changes in volume and complexity. So we frame here the research question 2 as

RQ2- “How CBS can ensure to provide scalable service offering in the field of value added outsourcing of document processing?”

1.3.3. Research question 3

Strategic business unit (SBU) of CBS consists of three disciplines, namely business development, service development and strategy and research. Currently the three disciplines face a problem of not having common understanding in goals. This brings in the challenge of how the three disciplines can be aligned towards the common strategic goal that will improve the operational excellence of CBS. So we frame the research question 3 as

RQ3- “How implementation of Enterprise Architecture based on service dominant business paradigm can improve the alignment between disciplines in CBS?”

1.3.4. Research question 4

SBU currently follows a stage gate model as shown in Figure 1.1 for its service innovation projects. The stage gate model encapsulates an innovative idea from the initial phase of idea generation to the final phase of market launch of business service based on the idea. The stage gate facilitates checks with respect to various criteria to find out the feasibility in continuing with the service innovation idea for CBS-SBU.



Figure 1.1 Stage gate model [11]

The stage gate model currently is a “one size-fit all” model which makes it cumbersome to process simpler service innovation idea. Thus the time to process a simpler service innovation idea is almost the same as the time needed to process a complex service innovation idea. The challenge here is to find out how we can shorten the idea to launch trajectory in the stage gate model for simpler service innovation idea. So we frame the research question 4 as

RQ4- “How CBS can accelerate time to market for service innovation business ideas?”

1.3.5. Overview of research questions

In this chapter we first listed the main problem statement of the project as “How Canon Business Services can be “Always Better” in service innovation projects?” This problem statement was further broken down into four research questions (RQ) which are listed below:

- RQ1 - How CBS can modularise its services can be broken into reusable chunks?

- *RQ2* - How CBS can ensure a scalable service offering in the field of value added outsourcing of document processing with geographical growth?
- *RQ3* - How implementation of Enterprise Architecture based on service dominant business paradigm can improve the alignment between disciplines in CBS?
- *RQ4* - How CBS can accelerate time to market for service innovation business ideas?

1.4. Scope

CBS currently offers a number of value added outsourcing of document processing services such as digital mailroom service², invoice processing service etc in various geographical regions of world. But CBS currently has no EA that can help CBS in better operations for the value added outsourcing of document processing. This project will help CBS to have guidelines on how EA can be implemented for an improved operation of value added outsourcing of document processing services to its customers.

The operational ambition of this project is to design a blue print of service dominant enterprise architectural framework that solves the problems in research questions from Section 1.3. The blue print will explicitly show the steps that can be followed by CBS for covering all its value added outsourcing of document processing in future.

Given the time frame of six months for the project, the blue print of the architectural design will use invoice processing service as a case study. To limit the scope of this project, we assume that CBS - SBU is an invoice processing service provider. Thus the blue print of the design will not cover the details of other value added outsourcing of document processing services offered by SBU of CBS. Details of invoice processing service are explained in Chapter 4.

1.5. Approach and outline

In order to achieve the goal of the project, we divided the project into following phases:

- Phase 1- Preparatory phase
- Phase 2 – Design phase
- Phase 3 – Case study
- Phase 4 – Validation

Goal of phase 1, preparatory phase is to study literature on available service dominant enterprise architectural framework to find out the state of art and to select the reference framework to design the blue print of the architectural framework. Thus phase 1 can be split into phase 1a and phase 1b. Phase 1a is aimed at conducting the literature study and studying the service delivering landscape of CBS. Phase 1b is aimed at setting the criteria to select one or more than one framework that can be used as reference framework to solve the problem statement stated in Section 1.2. Details and outcomes of phase 1 are presented in chapter 0.

² http://en.wikipedia.org/wiki/Digital_mailroom

Goal of phase 2, design phase is to design the blue print of the architectural framework that can be applied to CBS. The outcome of phase 2 is step by step guideline that can be followed for designing an architectural framework for the service dominant business of CBS – SBU. Details and outcomes of phase 2 are presented in chapter 3.

Goal of phase 3, case study is to apply outcome of the design phase to invoice processing service to answer the research questions mentioned in Section 1.3. Details and outcomes of phase 3 are presented in chapter 4, 5 and 6.

Goal of phase 4, validation phase is to get the solutions to the research questions from Section 1.3 evaluated by the stakeholders. Validation phase will be conducted with a workshop on what is enterprise architecture and why is it needed, how CBS can implement an enterprise architecture, what are the benefits of enterprise architecture to CBS and its customers. We will also explain the problem statement, research question and their solutions in the workshop. Solutions to the research questions from Section 1.3 will be evaluated by taking feedback from audiences by asking them to fill in questionnaire. After the feedback we will further evaluate the solutions by conducting interview sessions with service developers from SBU. Details and outcomes of phase 4 are presented in Chapter 7.

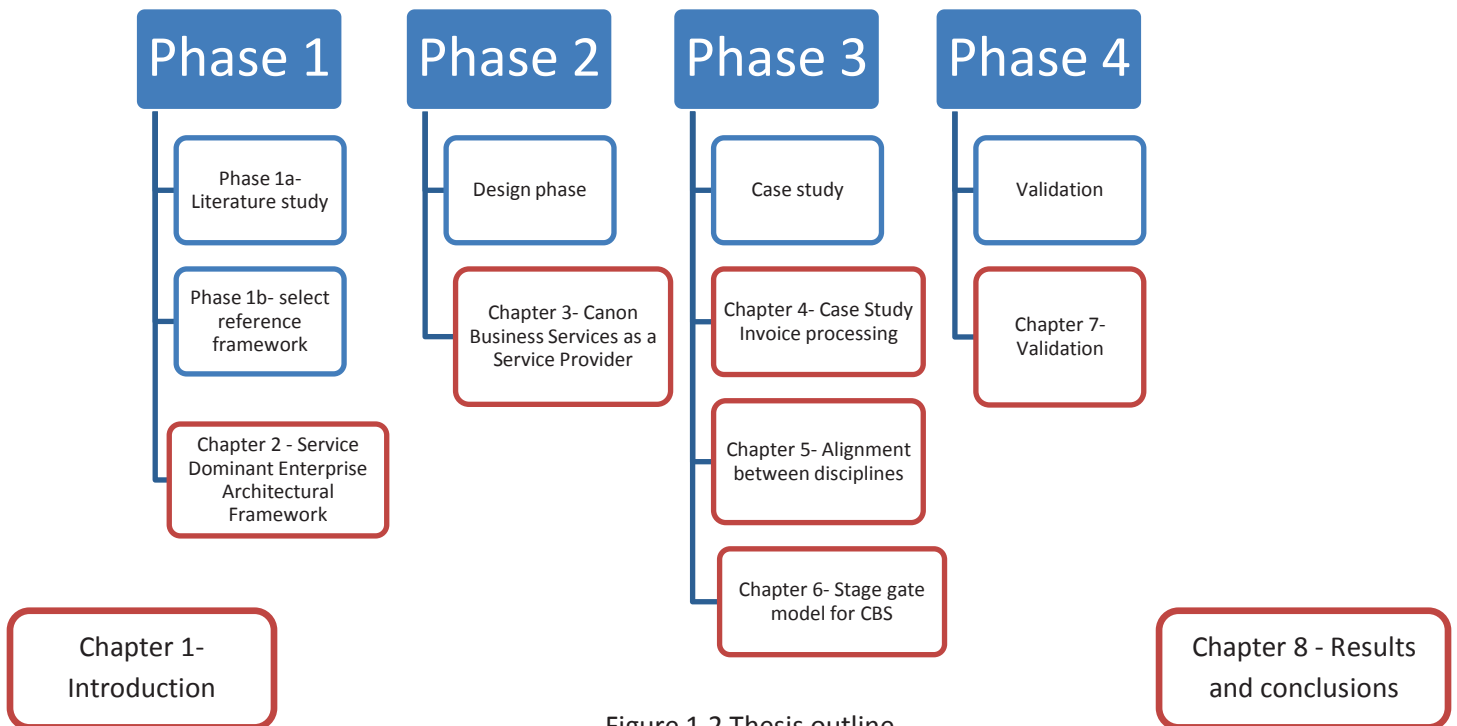


Figure 1.2 Thesis outline

2. Service Dominant Enterprise Architectural Framework

In this section of the report, we first discuss about service dominant organizations and then about application of enterprise architectural framework for service dominant organizations.

Many product oriented organizations are currently extending their business to value-added services. In this context, “servitization” means that organizations try to find an optimal combination of products and services to make profit in the business. An example of this is the combination of selling a photocopier together with a maintenance contract, paper, software and functionality for document management. This changing trend of adding value to core corporate offerings through service is visible in almost all industries.

High amount of profit generated with service delivery is bringing more and more organizations into servitization [12]. According to a survey of the Association of German Equipment Manufacturer, the profit margin of equipment averages at 1%, while services, such as maintenance, installation and process supporting services, on average provide a profit margin of more than 10% [13].

The shift into “servitization” is also bringing challenges for service offering organizations in managing (possibly multiple) delivery channels, staying aligned with their business strategy and keeping a track of their service providing capabilities. This brings in the need for a tool that can solve these problems.

There is an increasing interest for using EA to get supported for defining business strategy and providing a long-term, unified view of business processes and systems for delivering services. Enterprise architecture (EA) essentially aims to provide a blueprint for the effective utilization of organizational resources while pursuing to be more agile, integrated, and aligned. EA has become a popular tool which is used to help organizations to be more agile, integrated, and aligned [8].

Enterprise Architecture (EA) descriptions are formal descriptions of an information system, organized in a way that supports reasoning about the structural and behavioural properties of the system and its evolution. A definition of enterprise architecture is “a coherent set of descriptions, covering a regulations- oriented, design oriented and patterns-oriented perspective on an enterprise, which provides indicators and controls that enables informed governance of evolution of enterprise and success” [14]. Enterprise architecture can help organizations to successfully execute strategy in their transformation processes of “servitization”.

Building an effective foundation for an executable EA has following prerequisites [15]:

- The operating model on how the company will operate with the necessary level of business process definition, integration and standardization for delivering services to customers.
- A long-term view of a company’s processes, systems and technologies so that individual projects can build capabilities and not just satisfy immediate requirements.

The above findings from the literature brought us to the conclusion that an enterprise architectural framework that supports service dominance will help us in solving the problem statement and research questions from Section 1.2 and Section 1.3.

2.1. Criteria to select the framework

Based on research questions in Section 1.2 and Section 1.3 and finding of the literature study, we set following five criteria to select a reference framework for the project. To set the criteria, we looked into the characteristics of business of CBS-SBU and the organizational structure to deliver the services.

- i. *Service dominant business* – As CBS – SBU is a service providing organization, we choose this criterion to be specific to enterprise architectural frameworks that are focused on service dominant industry.
- ii. *Manual processes enhanced by automation*– CBS – SBU operates with collaboration of team of people from various disciplines such as business developers, service developers and strategy consultants at different operational level and from different global regions. Thus we set this criterion to ensure that the enterprise architectural frameworks must support parts of the services can be manual actions that are enhanced by automation.
- iii. *End to end process execution* – The services that are provided by CBS – SBU are aimed to capture end to end process of the customer. So we set this criterion to opt for enterprise architectural frameworks that enables to capture the end to end process execution.
- iv. *Enabling technology* – The services provided by CBS-SBU has technologies that support customer’s business operations. So we select this criterion to keep our search focused on enterprise architectural frameworks that consider the use of technology at operational level.
- v. *Cover strategic aspects of “what” and “how” of a service dominant business* – This criterion is set to ensure that the reference enterprise architectural framework should align business strategy and its supporting knowledge and technologies for business services in one framework.

2.2. Frameworks studied

Based on the criteria listed in Section 2.1 we select following frameworks. A list of articles that were found relevant can be found in Appendix A: . In the next sections, we discuss each of the selected frameworks briefly.

2.2.1. Service Oriented Architecture (SOA)

SOA can be defined as a business-centric IT architectural approach that supports integrating your business as linked, repeatable business tasks, or services [16].

The need of service oriented architecture rises with the requirement of a mean to align the business goals with Information Technology (IT) to get better business outcomes. An architectural design that is derived from the dynamic business goal is a more easily adaptable system and it reacts faster to the ongoing market changes. Such an architectural design also aids in monitoring the state of the business and analyzing what improvements should take place in the business design. This transforms the use of architectural design in a business from merely being a part of the business to an aiding tool that supports the business to be more efficient and more agile to the market changes. The practice of

deriving the information system framework from the business goals and business design is called Service Oriented Architecture (SOA). In practice, SOA is an architectural approach [10].

We could not find how it can facilitate manual processes enhanced by automation. Moreover we also found that SOA cannot help in putting the strategic aspects of the business and technical aspects together. We found that SOA fits in the criteria of a suitable framework for service dominant business, end to end process execution and enabling technologies for delivering the services.

2.2.2. Business Process Management

Business process management (BPM) includes concepts, methods, and techniques to support the design, administration, configuration, enactment, and analysis of business processes [17]. BPM is based on the fundamental concept that each product or services that an organization provides consists of a series of activities. The series of activities are the business processes.

At the organizational level, the knowledge of business processes is important to understand how the company operates. The knowledge of business process is also essential to design and maintain the information system of the organization. In today's world when the businesses are competing on global level, it is very important to be quick in responding to the market changes and remain competitive. In this view a business process based information system is not only useful in creating new products with new functionalities but also in recognizing need for adaptation to existing functionalities in response to facilitating to the new market requirements.

Business processes are mainly the activities that are performed by humans or systems or a combination of both. By structuring these activities in workflow models, companies can get insight into their business process. This insight makes monitoring and reviewing the business processes easier and companies can also identify the problems in advance and solve them before the problem gets critical.

BPM also treats the possibilities to address exceptions. In this way exceptions become an acceptable part of daily business. BPM is also useful in setting KPIs for the organization and also managing people for the contribution they make towards the quantity and quality of work they do [18].

BPM operates in cyclical phases that are organized in an iterative process called BPM lifecycle [19]. Thus BPM lifecycle is an iterative process that covers all aspects of BPM.

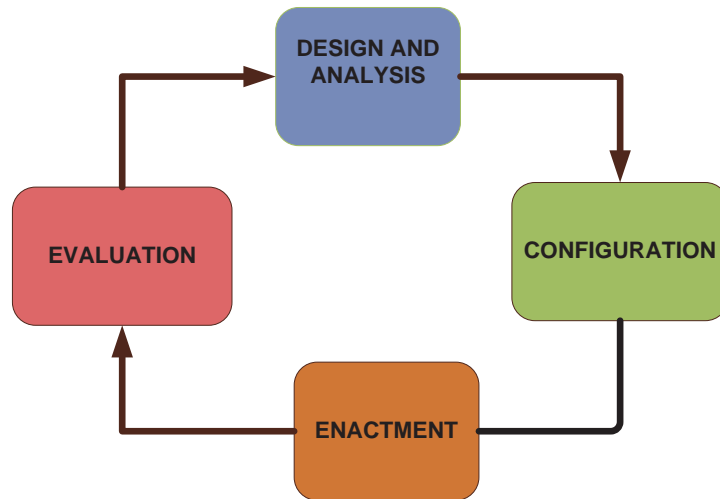


Figure 2.1 BPM Lifecycle

Figure 2.1 consists of the following phases:

- **Design and analysis:** In the design and analysis phase, the existing business process are captured and visualized in a process model
- **Configuration:** In the configuration phase, the designed business process model is implemented in an executable process language and deployed in a business process management system.
- **Enactment:** In the enactment phase, the business process is enacted with actual run time and the process activities are performed according to the constraints specified in the process model.
- **Evaluation:** In the evaluation phase, quality of the business process model is evaluated by using process mining techniques on the execution logs and monitoring the business activities with a goal of identifying desired improvements.

In the context of this project, BPM facilitates value added outsourcing of document processing of CBS-SBU in the aspects of having manual actions enhanced by automation and supporting end to end process execution with enabling technologies. On the other hand, we could not find out details on how BPM will help CBS-SBU to cover strategic aspects of “what” and “how” of the service dominant business.

2.2.3. Combination of SOA and BPM

SOA and BPM are independent research initiatives, but they both aim to make businesses agile. On one hand BPM helps in creating process models, automating the business processes in the form of invoking business services and SOA aids services that a business can deliver. The process models in BPM show the complete process flow of the services that can be offered to the customers and practice of BPM helps the management to identify the processes that should be made agile. In this part of the report, the idea of coupling SOA and BPM will be explored.

There are some common objectives between BPM and SOA [20]:

- SOA and BPM enable the businesses to be agile. This means that the organization can react quickly to changing business circumstances. Because the businesses compete in a global level so they need to be fast in responding to the advancements that their competitor is making. With SOA and BPM, incorporating such changes is easy because the services are loosely coupled and bringing in a few changes does not require a complete restructuring in the organization.
- In a traditional system, implementing a new business requirement means replacement and/or redevelopment of the existing business information system. Whereas with SOA and BPM principles, an addition of a new business requirement mean coupling new modules to the existing business information system.
- With BPM and SOA business processes executions are automated from end to end and includes transactional activities, system activities and human activities. This enables the management of the organization to have loop feedback mechanism to predict costs, implementation time and service delivery time.

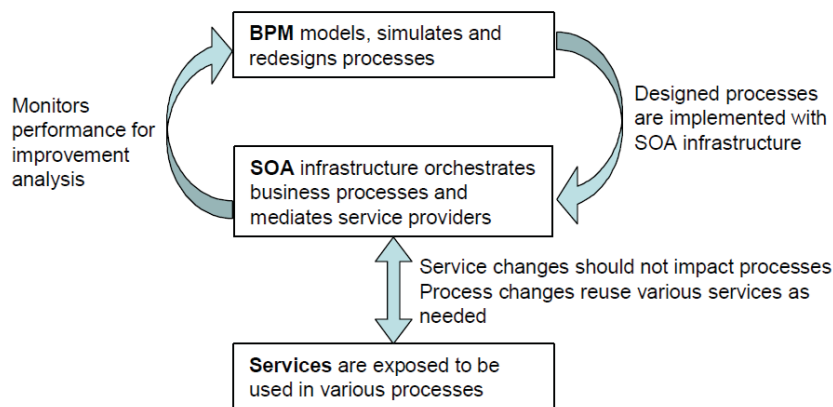


Figure 2.2 Relationships between BPM and SOA [20]

Figure 2.2 shows a cyclical relationship between BPM and SOA [20]. The main motivation for organizations behind implementing SOA is to provide a loosely coupled integration platform that allows application instances to change and evolve without affecting the core integration platform itself. Similarly any modifications to the process that require different applications to communicate should neither affect the integration platform nor the application instances that are part of the running environment. Creating this process/service independence will facilitate alignment between business process management and actual enterprise implementation (Figure 2.2). New and changed processes modeled in the BPM solution could be integrated in the application infrastructure more rapidly because the SOA solution decouples the designed process from the specific implementation of particular applications that has a communication protocol through a specific integration solution [20].

In the context of this project, combinational framework of BPM and SOA does not facilitate an architectural design that covers strategic aspects of “what” and “how” of the service dominant business of CBS-SBU.

2.2.4. BOAT

BOAT framework provides a structured analysis and design of e-business scenarios. BOAT stands for Business, Organization, Architecture and Technology [21].

BOAT framework enables to develop e-businesses by integrating several development stages into one spiral model. The framework supports a cyclical design of the e-business which means that after the last step (Technology), the cycle goes back to a review round to demonstrate the impact of the previous choices and to check the increase in the added value of the business proposition. Thus, the BOAT framework prescribes a continuous business development model. The four aspects of the framework namely Business, Organization, Architecture and Technology are explained in Appendix B: .

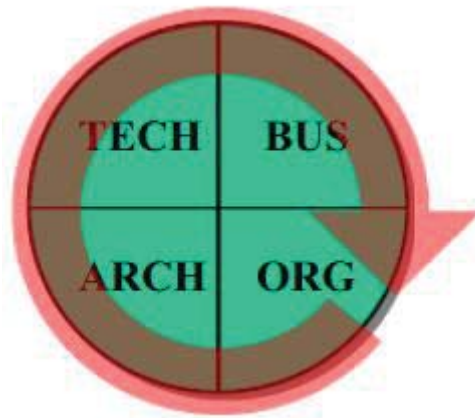


Figure 2.3 Wheel model for BOAT [22]

In the e-business field, the relation between business and technology is not a linear relationship. As we have seen before, business ‘pulls’ technology development by stating new requirements, but technology also ‘pushes’ business by offering new opportunities. So BOAT framework aligns the aspects of Business, Organization, Architecture and Technology such, that we get more cyclical dependency between the aspects as shown in Figure 2.3. With the wheel model, we can make two important observations [22]:

1. A development process can start at each aspect of the model. For example a new organization structure in the O aspect, may trigger for a new e-business scenario.
2. An e-business development process does not end after one cycle around the wheel, but is rather a continuous process of adjustment to new business and technology contexts.

We considered BOAT framework as a candidate for literature study because it aligns four aspects of Business, Organization, Architecture and Technology together so it covers strategic aspects of what and how of a service dominant business. But we found that BOAT framework does not explicitly support manual actions enhanced by automation. So we did not select BOAT framework.

2.2.5. BASE/X

BASE/X stands for Business Agility through Cross-Organizational Service Engineering. BASE/X framework introduces a structure to develop service oriented business in an agile environment. The model has two stable layers and two agile layers [3]. The framework introduces a pyramid structure which has a layered separation between business strategy, business models, service compositions, business services, and their implementation in state-of-the-art automated service management platforms Figure 2.4 . The application of the framework and its tools leads to a well-structured management of the complexity of service-dominant business and also a shorter time-to-market of new business models [3].

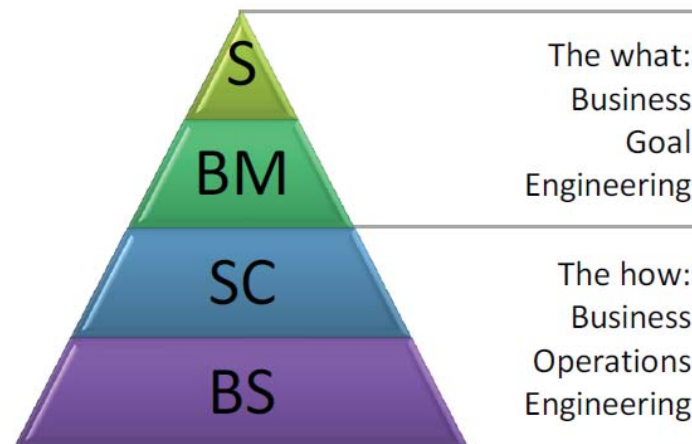


Figure 2.4 BASE/X framework with separation of concepts

The framework (Figure 2.4) first of all keeps a distinction between business goal engineering and business operations engineering [3]. The business goal engineering consists of the business concepts of business strategy and business models. Business strategy which is the topmost layer of the pyramid shown with S, defines the identity of an organization and hence is planned with a long term vision. So the business strategy is considered to be the stable part of the framework.

Business models is the second layer in the pyramid from the top shown with BM, specify the business operations in the dynamic markets, and hence they keep changing frequently.

Business operations engineering (Figure 2.4) consists of two concepts of business implementation, namely service capabilities and service offerings. Service capabilities is the fourth layer in the pyramid from the top shown as BS, is relatively stable in time because it evolves with the identity of a service according to the business strategy. Service offerings are dynamic because they evolve with the dynamics of the market of the service. The bottom most layer shown as BS, represents the encapsulated services that the organization can perform for its customer.

The top and bottom layers namely business strategy layer and business services layer of the pyramid are the stable layers and the two middle layers namely business model and service composition layers are the agile layers.

Figure 2.5 shows the connection between layers in the framework. As the business services and the business strategy are the most stable layers so the business services are derived based on the business strategy of the organization. Therefore business strategy and hence the business services does not change frequently in a business and they are planned with a long term vision. The blue color blocks in the figure represent the external parties. Figure 2.5 shows that service compositions is a combination of in-house services and also services from external parties.

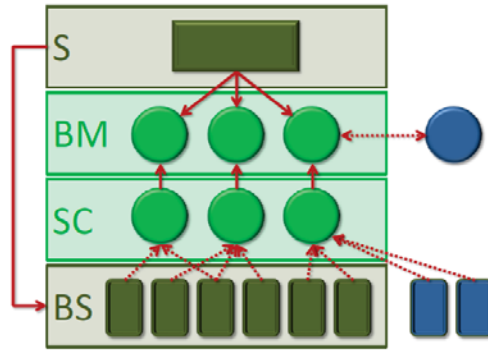


Figure 2.5 Connections between the layers

For actual implementation of the business services, the pyramid requires a back end support from business applications (organization level) and further the organization level pyramid requires support from the platform level pyramid as shown in Figure 2.6 [23].

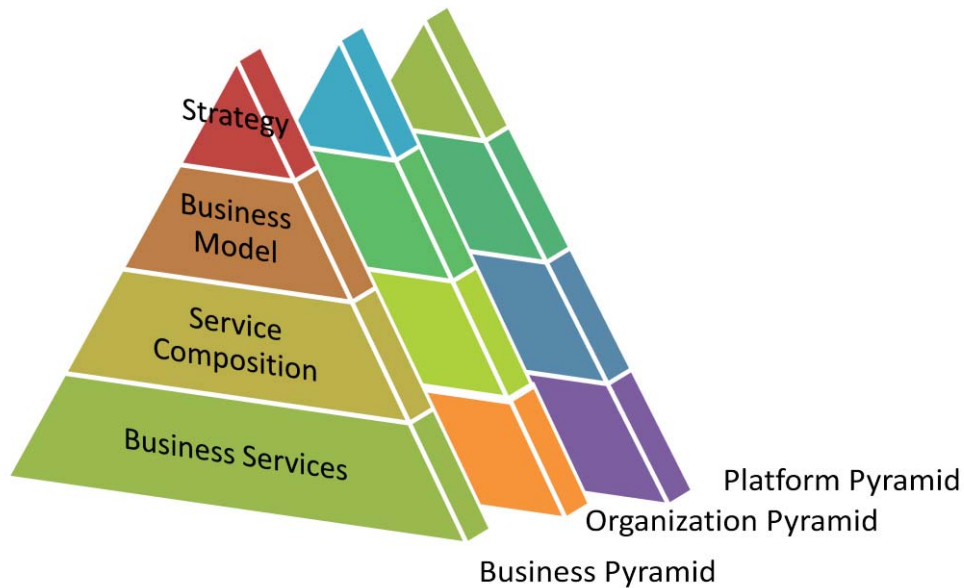


Figure 2.6 Platform pyramid supporting the framework [23]

In the context of this project, BASE/X provides us with a framework fits in all the criteria that we selected to choose a reference framework. It is explicitly developed for service oriented businesses, business level pyramid covers the strategic aspects of what and how of a service dominant business and

business level pyramid when extended to organizational pyramid and platform pyramid facilitates manual processes enhanced by automation, end to end process execution and enabling technologies to deliver services. Thus we chose BASE/X as our reference framework for this project.

2.3. Criteria and BASE/X

We selected BASE/X framework because it fits into all the criteria set in Section 2.1. Below we explain which criteria were not satisfied by which framework.

- Service dominant business - As this was one of the main search criteria while searching for existing frameworks so all selected frameworks satisfied this criterion.
- Manual actions enhanced by automation - Framework of SOA and BOAT could not satisfy this criterion because SOA does not make explicit consideration into manual processes for operationalization of business processes. And BOAT framework also failed on this criteria.
- End to end process execution- All the selected frameworks could satisfy this criterion.
- Enabling technology - All the selected frameworks could satisfy this criterion.
- Covers aspects of “what” and “how” of a service dominant business- This criterion was only satisfied by BOAT and BASE/X framework because all other frameworks that we studied does not look into strategic aspects of the business.

Table 2.1 summary of frameworks over the criteria

Criteria \ Frameworks	SOA	BPM	Combination of SOA and BPM	BOAT framework for e-business	BASE/X framework
Service dominant business	Yes	Yes	Yes	Yes	Yes
Manual actions enhanced by automation	No	Yes	No	No	Yes
End to end process execution	Yes	Yes	Yes	Yes	Yes
Enabling technology	Yes	Yes	Yes	Yes	Yes
Covers strategic aspects of “what” and “how” of a service dominant business	No	No	No	Yes	Yes

Looking at Table 2.1 we see that we get only BASE/X framework that could satisfy the criteria set in Section 2.1. So we decided to select BASE/X framework as our reference to design the enterprise architectural framework for CBS-SBU.

3. Canon Business Services as a Service Provider

Canon Business Services has a global presence and is a leading provider of Information and Business Process Outsourcing Services. CBS provides value added document services to customers who have number of documents ranging from 10,000 to 50,000 per year. The Strategic Business Unit (SBU) of Canon Business Services has expertise in handling all types of inbound and outbound mails, invoices, claims documents, order documents and different types of forms. CBS-SBU brings in the value to the customer by reducing the cost and time of processing the documents and also minimizing the error in processing the documents.

CBS offers services to manage multiple types of documents in different formats and workflows, especially those that go through various processes in the organization. In such cases companies often end up in a document processing method where costs are hidden, unmanaged, and uncontrolled. This haphazard approach to manage the document life cycle drains capital, impedes employee productivity, and reduces shareholder value [24]. This is where services from CBS provide solutions to such problems.

Failing to treat business documents as vital assets and to manage them throughout their useful life cycles can lead to [25]:

- Diminished document utility
- Decreased business efficiency
- Increased operational risk and cost

Following types of documents can be outsourced by customers to CBS for management of their life cycle [25]:

- Documents that are used often
- Documents that are used simultaneously
- Documents that need to be retrieved fast
- Documents that include metadata
- Documents that include handwritten text, printed text, forms, barcodes, and/ or checkboxes

Next to the common solutions that can be realized with the service offerings of Document Outsourcing, Canon Business Services also provides following differentiating solutions [24] :

- Consultancy service with Value Discovery assessment of the as-is situation for the customer
- End-to-end process management of document generating documents with full ownership and control of technologies, software platforms, and services
- Invoice Processing service with customer business process management
- Flexibility and capability to design, implement, and operate ad hoc solutions and services for specific customer needs
- Hybrid and complete document outsourcing solutions

- Pay-per-use model for document management services.

In this chapter of the report we will explain why CBS needs service dominant enterprise architecture then we will present a sequential guideline in Sections 3.1.1 to 3.1.4. In Sections 3.2 and 3.3 we will discuss the results and conclusions.

3.1. Service Dominant Enterprise Architectural Framework for CBS

At this moment, the SBU team of CBS wants to have a framework that can help in putting the business aspects as well as the organizational aspects together in one framework. In the current scenario, services offered to customers are not completely modularized. Services are developed in the form of kits which are a collection of knowledge about how service can be delivered to the customers. Services being not organized in modules reduce reusability in developing and delivering new services.

As we discussed in Sections 1.3 about the problem statement and the research questions, in this section of the report we will first present a step by step guideline on how BASE/X can be applied to CBS. Here we will provide partial solution to research question 1, research question 2 and research question 3 of the problem statement from Section 1.2. Answer to research question 1 and 2 can be found in Chapter 4, research question 3 can be found in Chapter 5 and research question 4 can be found in Chapter 6 respectively.

We introduced the framework of BASE/X in Section 0. Now we will present a step wise guideline on how layers of the business level pyramid of BASE/X, Figure 2.6 can be developed. Here onwards, the lowest layer of BASE/X Figure 2.6 will be renamed to service modules because the term business service from BASE/X has conflict in terminology within CBS. Figure 3.1 provides a four step guideline sequence for the layers of the business level pyramid from Figure 2.6 which is supported by the following set of tools [26].

- *Service-Dominant Strategy Canvas*: This tool helps to set the strategic directions on how to do a service delivering business with Service-Dominant mindset [26].
- *Service-Dominant Business Model Radar*: This tool helps to design business models focusing on the concepts of the service delivering ecosystem and the value proposition of the services to be delivered to the customers. It defines how the stakeholders of the business ecosystem participate in co-creation of value proposition of the services to be delivered and the cost–benefits distribution within the business ecosystem [26].
- *Service Composition Blueprint*: This tool sets the composition in the terms of the customer by using the service modules defined in the service catalogue [26].
- *Services Catalogue*: This tool enables the classification of specified service modules as a catalogue. Catalogue can be used managing the service modules identified at the strategic level [26].

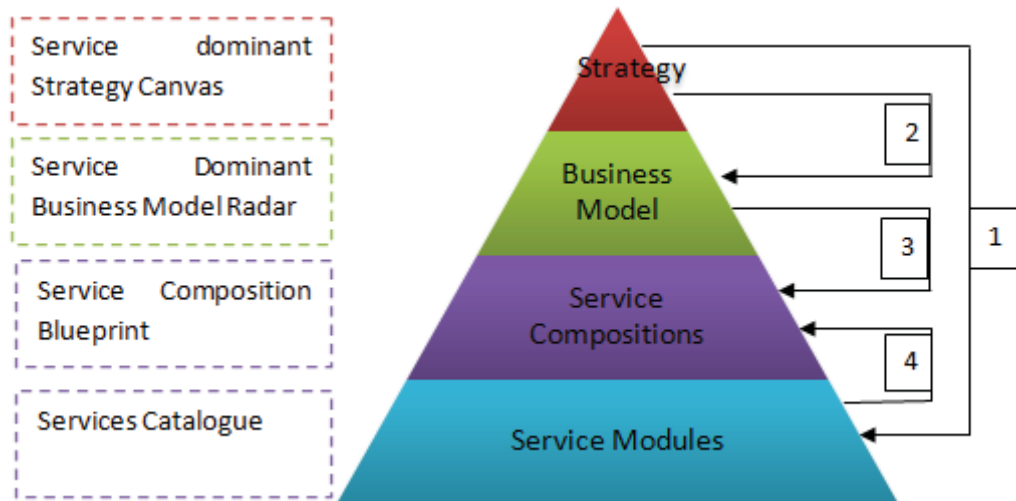


Figure 3.1 Guideline sequence for business level pyramid [26]

In the upcoming Sections 3.1.1to 3.1.4 we will see how to complete design process for each layer of the framework by using the above set of tools.

3.1.1. Step 1 Strategy to Service Modules

In order to complete step 1 of Figure 3.1 we use the tools of business strategy canvas and services catalogue (shown in Figure 3.2). Step 1 of connecting the strategy layer to the layer of service modules is further broken down into smaller steps which are listed below.

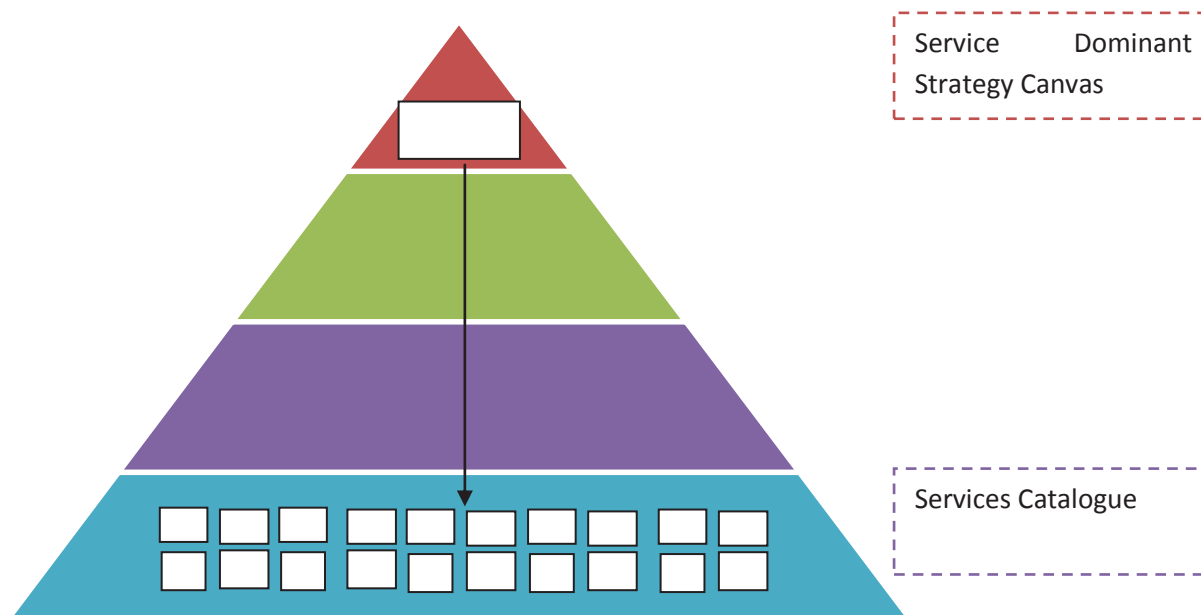


Figure 3.2 Strategy to Service Modules

Step 1.1, Fill in the service dominant strategy canvas

Here we use Service-Dominant Strategy Canvas (Figure 3.3) to define the strategy of the service delivering organization in terms of the value-in-use, service ecosystems, and collaboration management [26][3].

- *Value-in-use* sets the service delivering goals to potential customers.
- *Service ecosystem* defines the set of possible partners to achieve the selected service delivering goals.
- *Collaboration Management* category encapsulates the market relationship elements between inside–out the organization and outside–in the organization.
- Label *core* in Figure 3.3 indicate the distinctive traits of the service provider, which are developed internally. Label *enriching* relationships are the opportunities available outside the organization to increase business value.

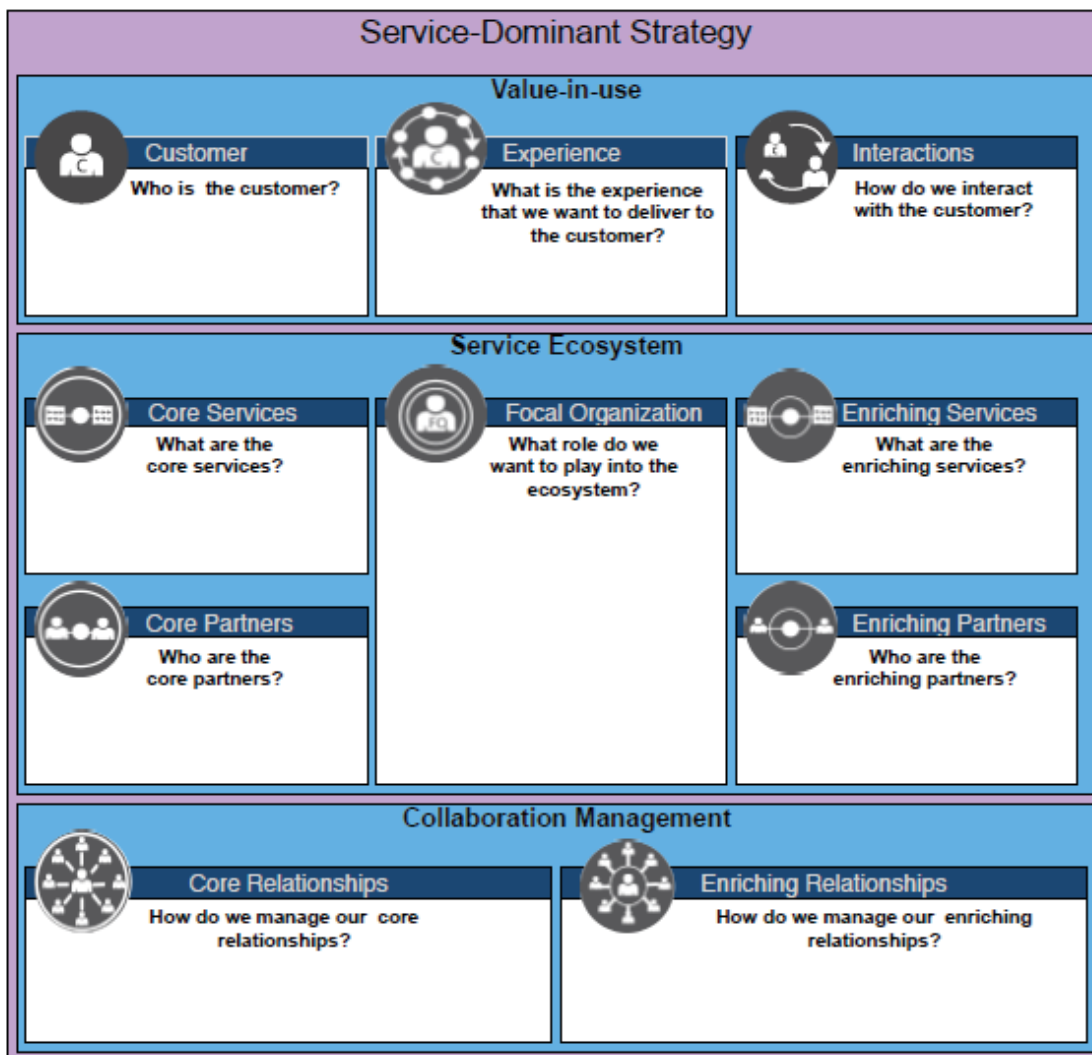


Figure 3.3 Service-Dominant Strategy Canvas [26]

Step 1.2 - Identify service modules from core services and enriching services of service dominant strategy canvas

Core services are the services that add a distinctive trait to the value proposition of the service delivered whereas *Enriching services* are the services that provided an added value to the core services. In this step we identify the core service modules and enriching service modules.

Step 1.3 - Perform granularity check for identified service modules

In this step we check the granularity of the identified service module in step 1.2. The check is performed on the class of why, what, who and when as shown in Figure 3.4 with corrective actions in case of failure [3]. After this check we get a set of service modules with right level of granularity.

Class	Name	Criterion	If fails
Why	Right Context	Does the service fit in the context of the defined business strategy?	Redesign service
	Right goal	Does the service transform the state of the customer perception of the value-in-use?	Delete as business service, consider as building block service
What	Right Size	Is the service easily combinable in multiple service compositions?	Too large: split up service Too small: combine Services
	Right Scope	Isn't there any functional overlap with existing service(s)?	Re-scope service(s)
Who	Right Actor	Is there a clear single actor (role) performing the service?	Split up service per actor
	Right beneficiary	Is there a single beneficiary (role) for whom the service is performed?	Split up service per Beneficiary
When	Right Start	Is there a clear starting point in time for the execution of the service?	Scope service down to delimited period
	Right End	Is there a clear ending point in time for the execution of the service?	Scope service down to delimited period

Figure 3.4 Template to check granularity of service modules [3]

Step 1.4- Fill in the abstract details of input, output and business service functionality for each business service building block

After we have the service modules at right level of granularity from step 1.3, we fill in the details of input, output and the functionality that the service will perform.

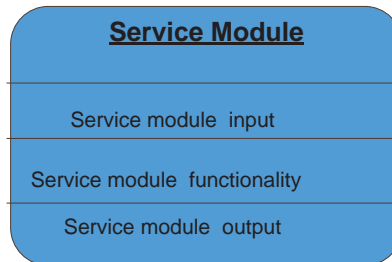


Figure 3.5 Abstract details of a Service Module [3]

Step 1.5 - Fill in the details of service contracting conditions, resources and the function performed for service modules

In this step we define the structural details of the service modules in terms of following [3]:

- Contract – here we define the parameters for service level agreement and financial agreement for the service module for the quality of service parameters (QoS).
- Functions- service module functions are the processes that the service module performs to bring in the change of state to the input parameters.
- Interface- Interface here is the collection of functions that work together to deliver the functionality of the service module.
- Business resources- they are the resources needed for execution of service module to perform its functionality.
- Physical resources are part of the asset world and the service is located in the service world.

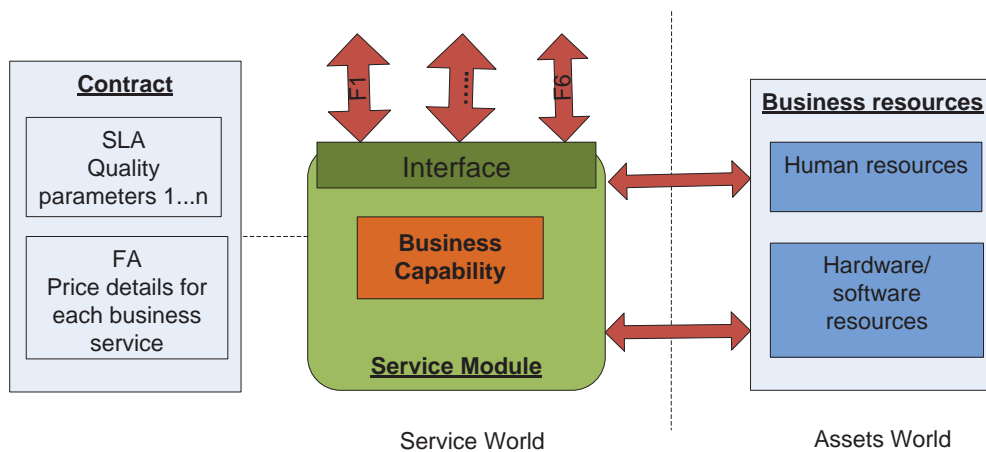


Figure 3.6 Service module anatomy

Step 1.6 - Arrange service modules into service catalogue

The identified services from the Service-Dominant Strategy Canvas are specified in a Service Catalogue blueprint. Figure 3.7 shows the service catalogue which has the specifications of service modules that can be collected in repositories. Business Service Catalogues are repositories that capture the service modules of a service delivering organization [27] [26]. Within Business Service Catalogues, we can further organize service modules in subsets referring to the most relevant areas of business capabilities that can be owned and governed independently within the organization [27]. We call these subsets as *Services Domains* [26].

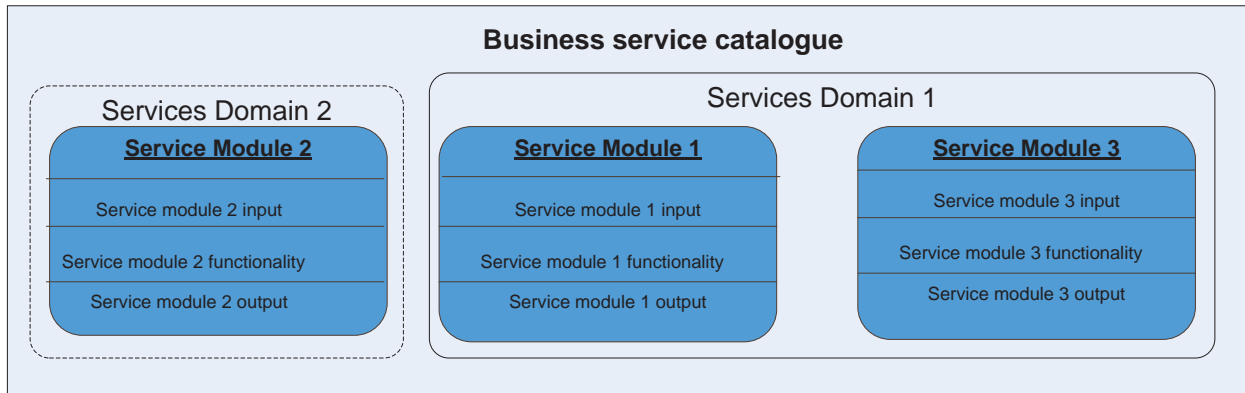


Figure 3.7 Business Catalogue Blueprint

Figure 3.8 gives an overview of the steps that we take to complete and link the layers of strategy and service modules.

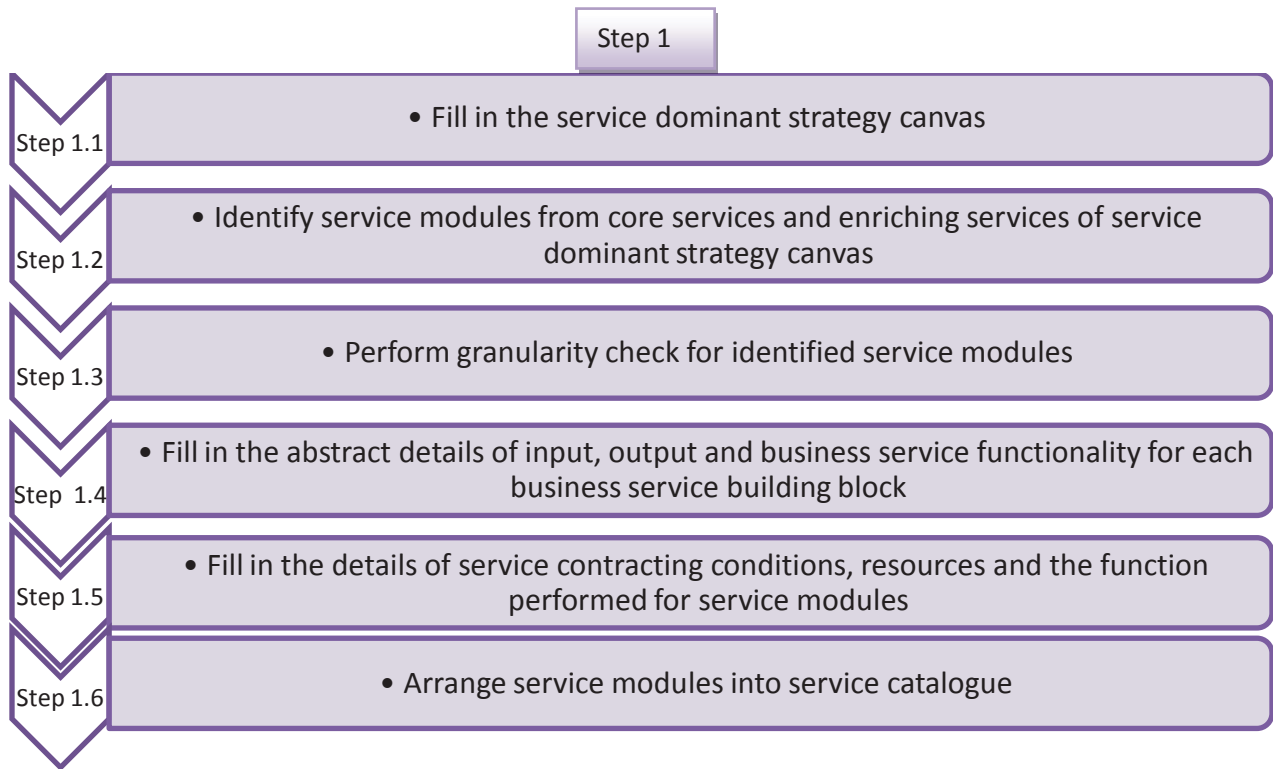


Figure 3.8 step 1 from Figure 3.1

3.1.2. Step 2 Strategy to Business Model

In this step we develop a tool to design business models that follows the service dominant strategy. This tool is called Business Model Radar and is represented as a circle in the second layer from top in the pyramid of Figure 3.9.

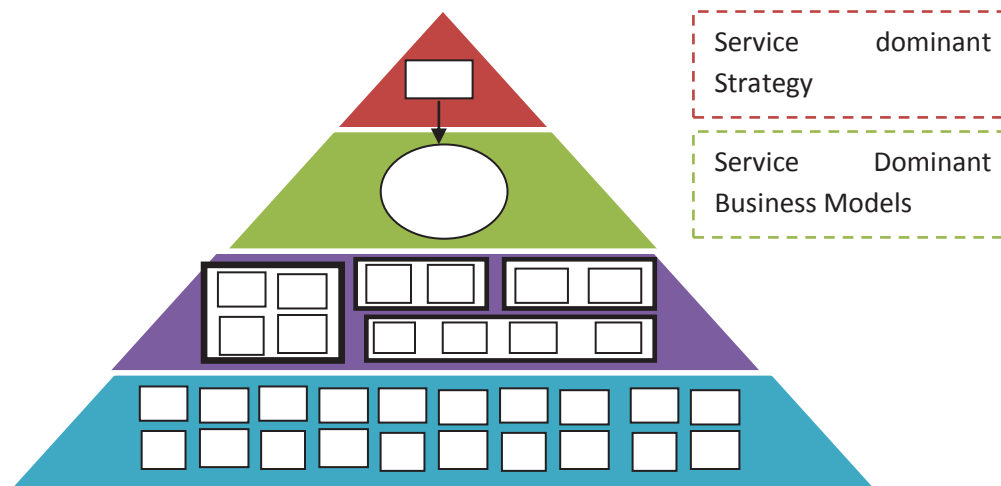


Figure 3.9 Step 2 Strategy to Business Model

Step 2.1 - Split the abstract value in use from the strategy layer into concrete value in use to be delivered to customers

From a service-dominant logic, we say that a service is for the benefit of the service consumer. Hence, a service should deliver value-in-use to the service consumer [28]. The term service here refers to the process of doing something beneficial for and in conjunction with some entity. The strategy layer of the BASE/X pyramid defines the identity of a service delivering organization in terms of the value-in-use of the services to be delivered. The value-in-use of the services delivered is co-created with the customer, the service ecosystem by defining the role of the service delivering organization, the high level services, and the partners that co-create the value-in-use with the service delivering organization. The Service-Dominant Logic emphasizes value as co-created by multiple actors, rather than viewing value as created by a single actor [26].

Concrete Value Co-creation proposals from the directions set at the strategic level are further developed as business models by using the tool Service-Dominant Business Model Radar. In this step we define a set of business models required to execute the strategic directions of value-in-use set in Step 1 [26].

Step 2.2- Prepare business model radar for each value in use to be delivered to the customer

In this step we will elaborate on how we can prepare the business model radar with value-in-use as the central element.

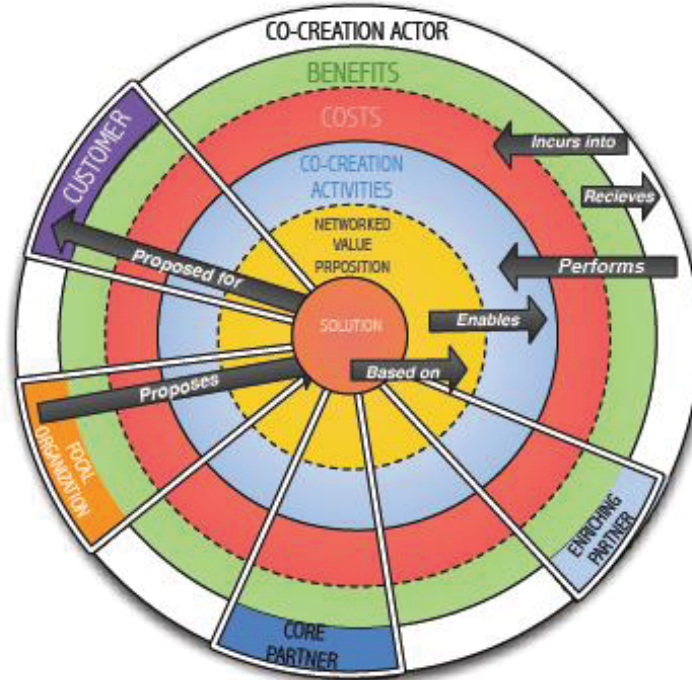


Figure 3.10 Service Dominant Business Model Radar [26]

Figure 3.10 represents the business model radar which consists of the following elements [26]:

- *Solution*: At the center is the value proposition of the services delivered which is co-created together with the customers and the partners. The element of Value Co-Creation Proposition is defined as *the proposed co-creation of value in terms of the solution to the customer's problem*.
- *Co Creation Interactions*: The second inner circle represents the co-creation management that represents how the value proposition of the value-in-use is achieved. The value co-creation management is divided by a dotted line to represent its two elements: *networked value proposition* and *co-creation activities*. Co-creation interaction is placed closer to the center, because it relates directly to what the actors provide the value in the co-creation activity. The co-creation activities are placed afterwards. The Co-Creation Interaction element *defines a value proposition to co-create the value with co-creation actors in a solution for the benefit of the same or another actor(s) within the ecosystem*.
- *Co-Creation Activities*: Co-creation activities are the strategic elements of Service Flows, Knowledge Sharing, and Service Integration. It is a bidirectional and empowered interaction between the service provider, customer and the co creation partners.
- *Cost*: The circle of cost is focused on financial expenses that an actor incurs. The Cost element defines the financial and non-financial expenses of the co-creation actor participating in the value co-creation of the service.
- *Benefits*: The circle of Benefits is placed in between the Co-Creation Management and Co-Creation Actors pillars to relate the exchange of Benefits–Cost to the Co-Creation. The elements of Benefits *define the financial and non-financial gains of the co-creation actor participating in the value co-creation*.
- *Customer*: Customer element defines the role of the co-creation actor as a customer that participates actively in the solution or experience.
- *The Partner* element defines the role of co-creation actor as a partner that participates actively in the solution or experience.
- *The Company* element defines the role of co-creation actor as a Company that sets the business model structure and participates actively in the solution or experience.

Figure 3.11 presents a meta-model to describe the relationships between the elements of service dominant business model radar. Figure 3.12 gives an overview of the steps followed to design the business model radar as per the service dominant strategy.

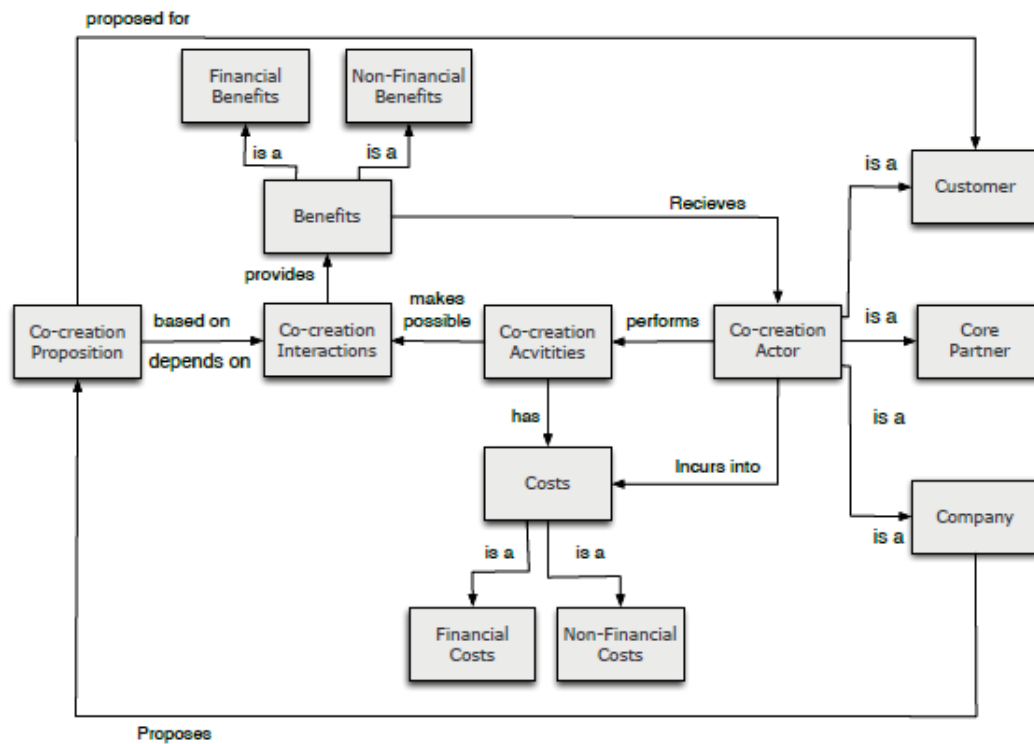


Figure 3.11 Meta model to describe the elements of the business model [26]

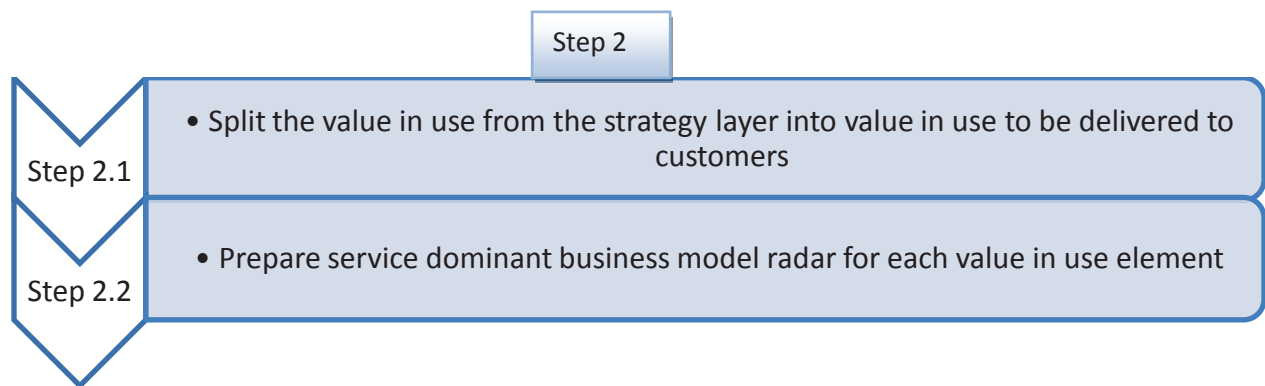


Figure 3.12 step 2 from Figure 3.1

3.1.3. Step 3 Business Model to Service Composition

In Service-Oriented Architecture, the concept of service composition is based on the design principle of the separation of concerns, which suggests breaking down a big problem into smaller pieces. At the business level, these pieces are the Service Modules which can be combined and coordinated into a composition for solving a larger problem [29]. The term “service” as defined by Lusch and Vargo in

Service Marketing reflects the process of doing something beneficial for an entity and in collaboration with that entity [28].

By merging the SOA and Service Marketing perspectives, Service Compositions can be defined as the combined application of Service Modules for solving a customer's problem. This combination is achieved by defining the interaction of service modules as a business process, where each service modules represents a partial solution to the complete customer problem [26].

To identify Service Compositions, we need to develop a usage scenario of the service composition. This is usually captured in a use case, also known as a service case. Therefore, Service Compositions can be identified from the service cases defined by a business process model [26].

In this step the costs, benefits and co-creation activities towards the customers are identified from the business models from step 2 Figure 3.13. The business models are used to define a set of Customer-focused Service Compositions to show operationalization of the business models defined in Step 2.

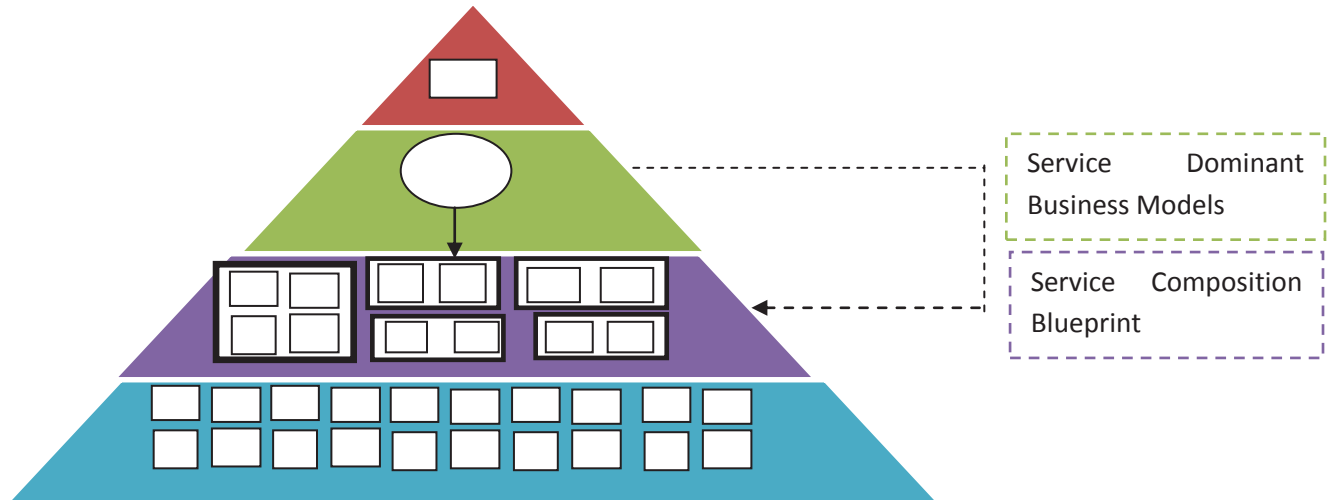


Figure 3.13 Step 3 of service composition identification

Step 3.1- Link the co production activities to the service modules – here we link the co-production activity with the service modules from the set of business model radar from step 2.

Step 3.2, Define Service Case scenarios- with the information about customer's costs and benefits and customer's co-creation activities, we identify service case scenarios. Service cases scenarios are the use cases in which we identify the service compositions using the service modules [30]. We show the service case with business process models.

Figure 3.14 gives an overview of steps to be followed to link the business model radar and the service compositions.

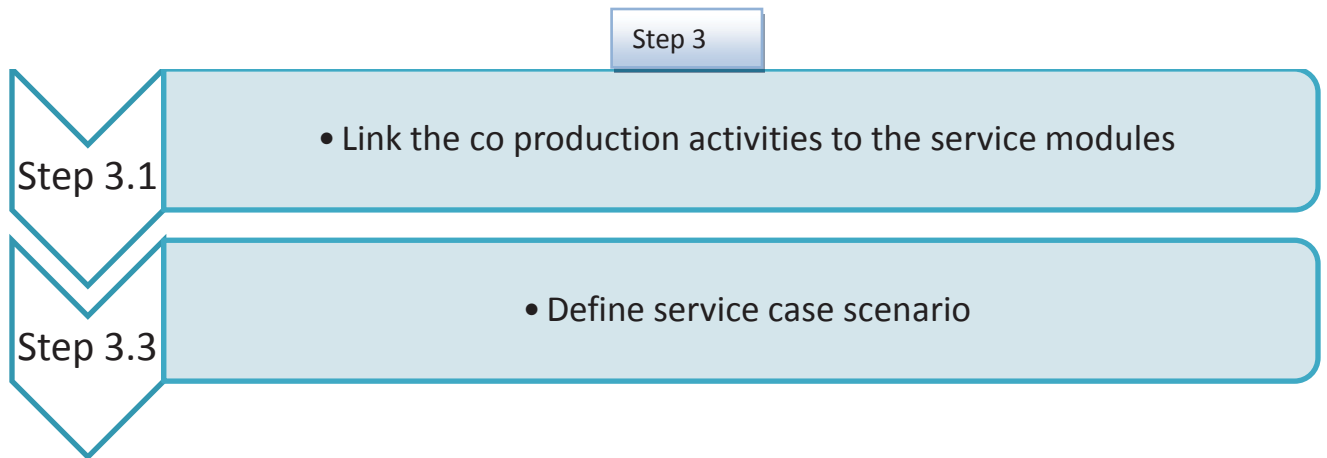


Figure 3.14 An overview of step 3 Figure 3.1

3.1.4. Step 4 Service Modules to Service Composition

Step 4.1, Identify the service modules to be invoked for the service case scenarios- In this step we identify which service module should be invoked and in which order to deliver the value-in-use for the service case scenario in step 3.3.

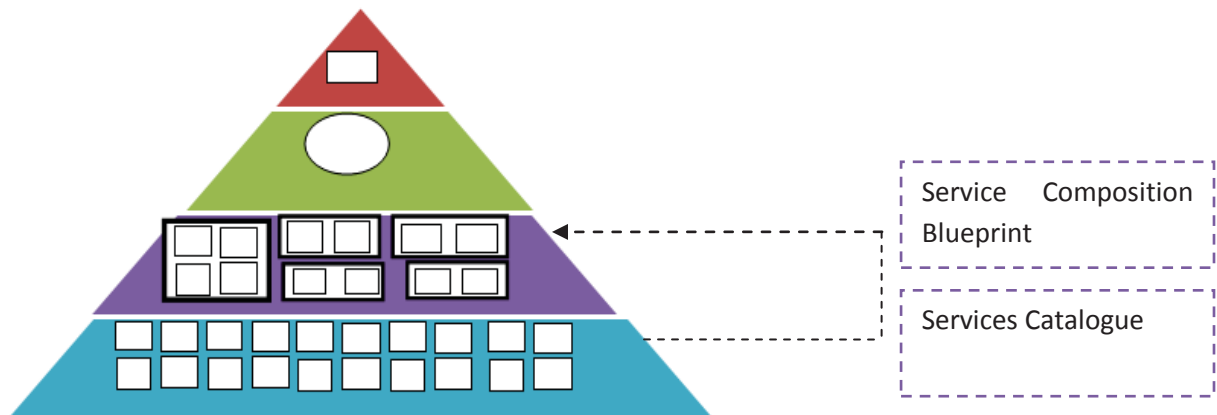


Figure 3.15 Service Modules to Service Compositions

We select the service modules from the Business Service Catalogue that enable the operationalization of the value-in-use for the customer within the identified Service Composition from the Business Model. The matching Service Modules are selected from the Service Catalogue and then incorporated in the Service Composition Blueprint.

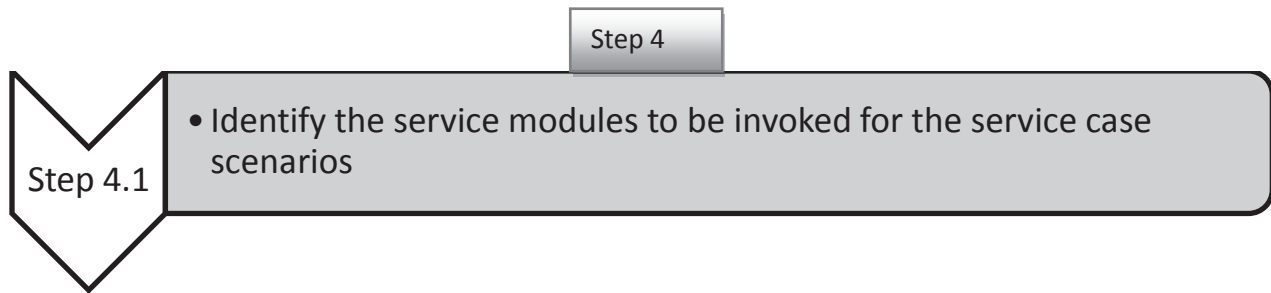


Figure 3.16 step 4 from Figure 3.1

3.2. Results

The step wise guidelines presented in this chapter show the steps that CBS can follow as a recipe to apply BASE/X to its service landscape.

In

Figure 3.6 we split the contract into two parts namely Service Level Agreement (SLA) and Financial Agreement (FA) for separation of concerns between service development team and sales team. Main reasons to split the SLA and FA are:

- SLA defines the levels that the service can meet, these levels of service are expressed in terms of parameters and metrics upon which penalties and liabilities are to be enforced on the violator party. The parameters and metrics are defined in Quality of Service (QoS). QoS parameters may include response time, availability, throughput, latency [31]. Quality of Service is defined as “the collective effect of service performances, which determine the degree of satisfaction of a user of the service. The quality of service is characterized by the combined aspects of service support performance, service operability performance, service integrity, and other factors specific to each service” [31].
- Financial agreement lists the costs of the service modules and the penalties if QoS of SLA are missed.

Here splitting the contract into SLA and financial agreement is useful for separation of concern at an abstract level.

3.3. Conclusions

In this chapter we prepared a step wise guideline on how layers of business level pyramid from BASE/X can be filled in. We provided a four step action sequence that can be followed. These steps will be applied to our case study of invoice processing in the next chapter to show how these guidelines can be used in practice. In Chapter 4 of the report we apply the steps 1 to 4 on Invoice Processing Service of CBS.

4. Case Study – Invoice Processing

In this section of the report we will see how to apply the steps from previous section to Invoice Processing which is one of the value added document outsourcing services of CBS. We selected Invoice Processing Service as a case study candidate for this project because the service is developed by the service developers from the SBU team. So information on the design choices made in the service is available to compare how Invoice Processing Service can be developed with the steps from Section 3.1. Also CBS is having customers for invoice processing service, so information on challenges that the SBU team is facing in delivering the service is also available. Invoice processing service is suitable to compare how the proposed architectural design improves reusability of service modules and the capability to offer scalable services to customers.

Invoice processing involves the handling of incoming invoices from arrival. Invoice processing service addresses following challenges for customers [32]:

- Paper based invoice processes are slow, error prone and costly
- Companies spend considerable time entering invoice data into ERP system
- Slow invoice process results in late payment penalties and no opportunity to obtain early payment discounts
- Difficulty accessing invoice data caused by lost or misfiled invoices
- Excessive paper storage costs
- Wrong invoice data in ERP system results in many inbound and outbound calls with suppliers
- Electronically received invoices are handled differently than paper-based invoices, adding complexity and cost

Customer gets following benefits with the invoice processing service [32]:

- Reduce invoice processing costs and streamline processes
- Pay invoices on time
- Receive early payment discounts
- Avoid late payment penalties
- Maintain positive supplier relations

Table 4.1 lists the benefits of invoice processing for customers in terms of productivity and efficiency, reduced cost for processing the invoices, improved control on the processing of invoices, lower risk and improved compliances in processing the invoices.

Table 4.1 Benefits to the customer with the invoice processing service [32]

<p>Increased productivity and efficiency</p> <ul style="list-style-type: none"> • Faster and more efficient processing of invoices • Immediate access to invoices • Automatic validation against Accounts Payable system 	<p>More visibility & control</p> <ul style="list-style-type: none"> • Automation of recurring and pre-approved invoices • Digital invoice handling to increase status and cash flow visibility • Real time dashboard and reporting for better cash control
--	--

	<ul style="list-style-type: none"> Automated Accounts Payable pre-coding, routing, and matching to eliminate manual errors Continuous status overview of all invoices in progress
<p>Lower cost</p> <ul style="list-style-type: none"> Automation of recurring invoices to work on exceptions only Digital invoice handling to eliminate manual inefficiencies 	<p>Improved security & compliance</p> <ul style="list-style-type: none"> Digital invoice handling to eliminate manual processing risks Automated account coding joined up with ERP to avoid mistakes Line invoice status visibility to track deadlines and avoid payment penalties Secure digital invoice storage to meet compliance

In Figure 4.1 digital invoice processing (offered by CBS) is compared with manual processing of invoices (at the customers site). We can see that overall processing time taken by manual invoice processing is more than digital invoice processing because in manual invoice processing the steps are performed manually. Another difference to be noticed is that, that the approval of invoices is a sequential process in manual invoice processing whereas digital invoice processing automates the approval process with a parallel workflow. Also in digital invoice processing, digital invoices can directly go to the step of analysis, extraction and validation whereas manual invoice processing handles digital as well as paper invoices in the same way.

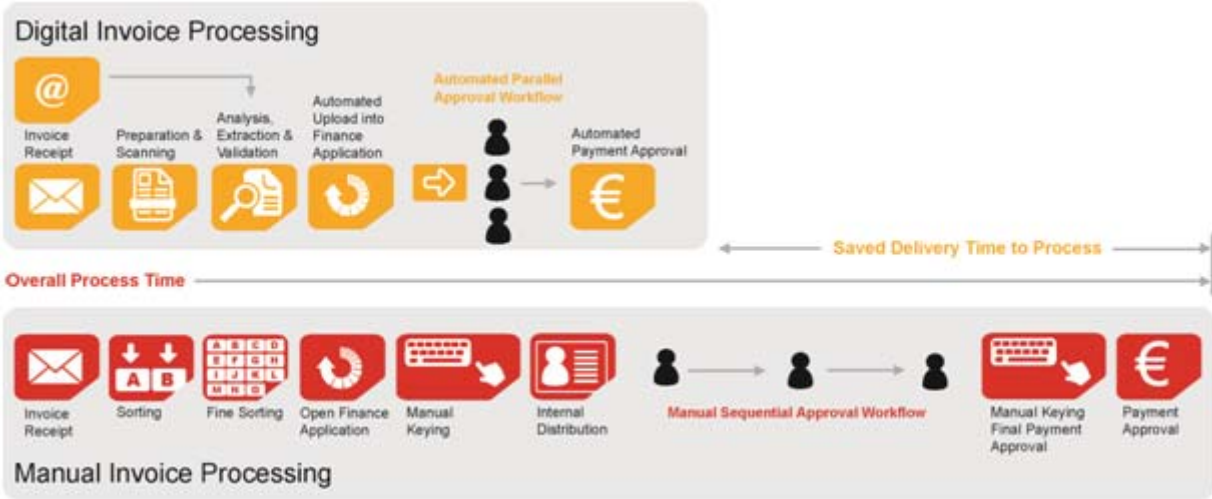


Figure 4.1 End to end Invoice Processing Service [32]

4.1. Application of BASE/X to invoice processing service

We will follow the sequential steps defined in Section 3.1 to apply BASE/X framework to invoice processing service. One of the main challenges is to find relevant information to fill in the layers of business level pyramid of BASE/X. Here we assume that CBS provides only invoice processing service because in the given time frame of the project it was not feasible to fill in all the layers of BASE/X framework for the complete service domain of CBS. Our aim is to conceptually execute the steps we

define in Section 3.1.1 to Section 3.1.4. So we decided to assume that CBS only provides invoice processing service to conceptually execute the steps and evaluate them with the domain experts from the SBU team in the given time frame.

4.2. Step 1 Strategy to service modules

Step 1.1, Fill in the service dominant strategy canvas

- Value in use:
 - a. Customers – Invoice processing service is targeted on customers who have at least inbound and outbound flow of 10,000 structured documents per year.
 - b. Experience- CBS delivers the experience of being a one-stop-shop for invoice processing with improved efficiency in handling invoices and reduced cost for processing invoices. Also customer gets the flexibility to scale up to get advanced versions of value added optimized invoice processing.
 - c. Interactions- Interactions between CBS and its customers are for consultancy services which are also sales focused and as an orchestrator of service delivery.
- Service Ecosystem
 - a. Core Services- core services of CBS for its customers are to process the multi channel inbound invoices, analyze invoices to extract relevant information and to provide delivery and archival services for invoices.
 - b. Core Partners- the core partners for CBS are software providers and integrators, partners for archiving documents and partners for bulk scanning.
 - c. Focal Organization- Here CBS is the focal organization as they are act as the orchestrator between customer and partners of CBS.
 - d. Enriching Services- enriching services are the services that add value to the core services. CBS provides matching of payment orders, checking on duplicate payments and automated approval of payments as enriching services.
 - e. Enriching Partners- enriching partners for CBS are software providers and integrators for analyzing data for matching payments and checking duplicates and the workflow solution providers for automated approval of invoices.
- Collaboration management – In this block we fill in how CBS can manage its inside out and outside in relationship with the business partners. In the invoice processing case study, the actors and the service providers are business collaborators of CBS. So for the service of invoice processing, CBS does not need collaboration management. Therefore, in this case collaboration management is not relevant so we leave the block of collaboration management empty.

Figure 4.2 shows the filled-in Service-Dominant Strategy Canvas for CBS to strategically provide invoice processing service.

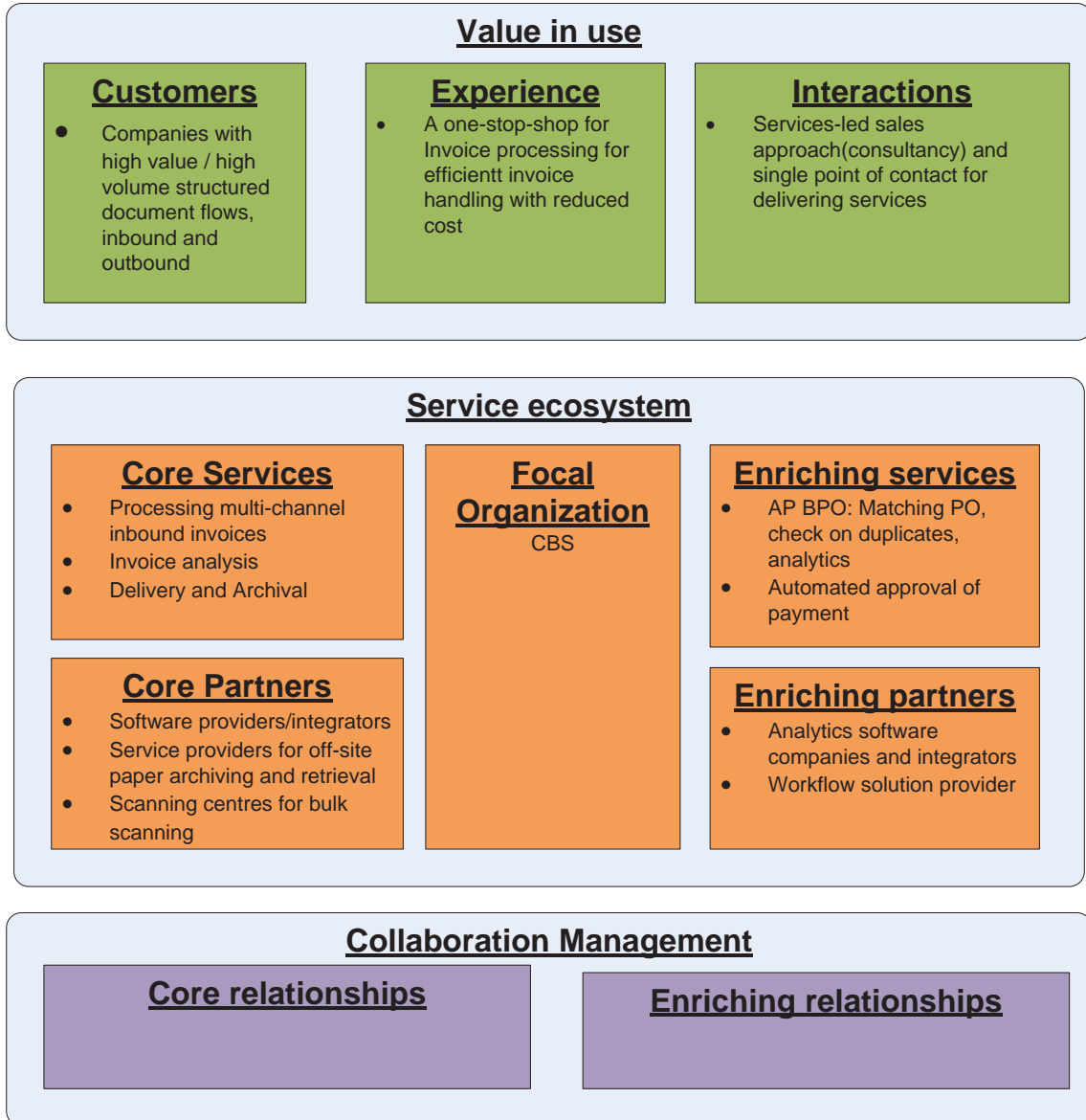


Figure 4.2 Service-Dominant Strategy Canvas for Invoice Processing Service

Abbreviations used in Figure 4.2: BPO- Business Process Outsourcing, PO- Payment Orders

Step 1.2 - Identify service modules from core services and enriching services of service dominant strategy canvas

In this step, we identified the following core service module and enriching service modules at an abstract level from Figure 4.2

Table 4.2 Service Modules from Figure 4.2

Core Service Modules	Enriching Service Modules
Assessment Service	Match data
Prepare Document	Manual validation
Capture data	Content based indexing
Validate data	Automated approval
Improve Quality	
Import file	
Extract	
Index	
Classify	
Validate analyzed data	
Deliver physical documents	
Deliver digital documents	
Archive physical documents	
Archive digital documents	

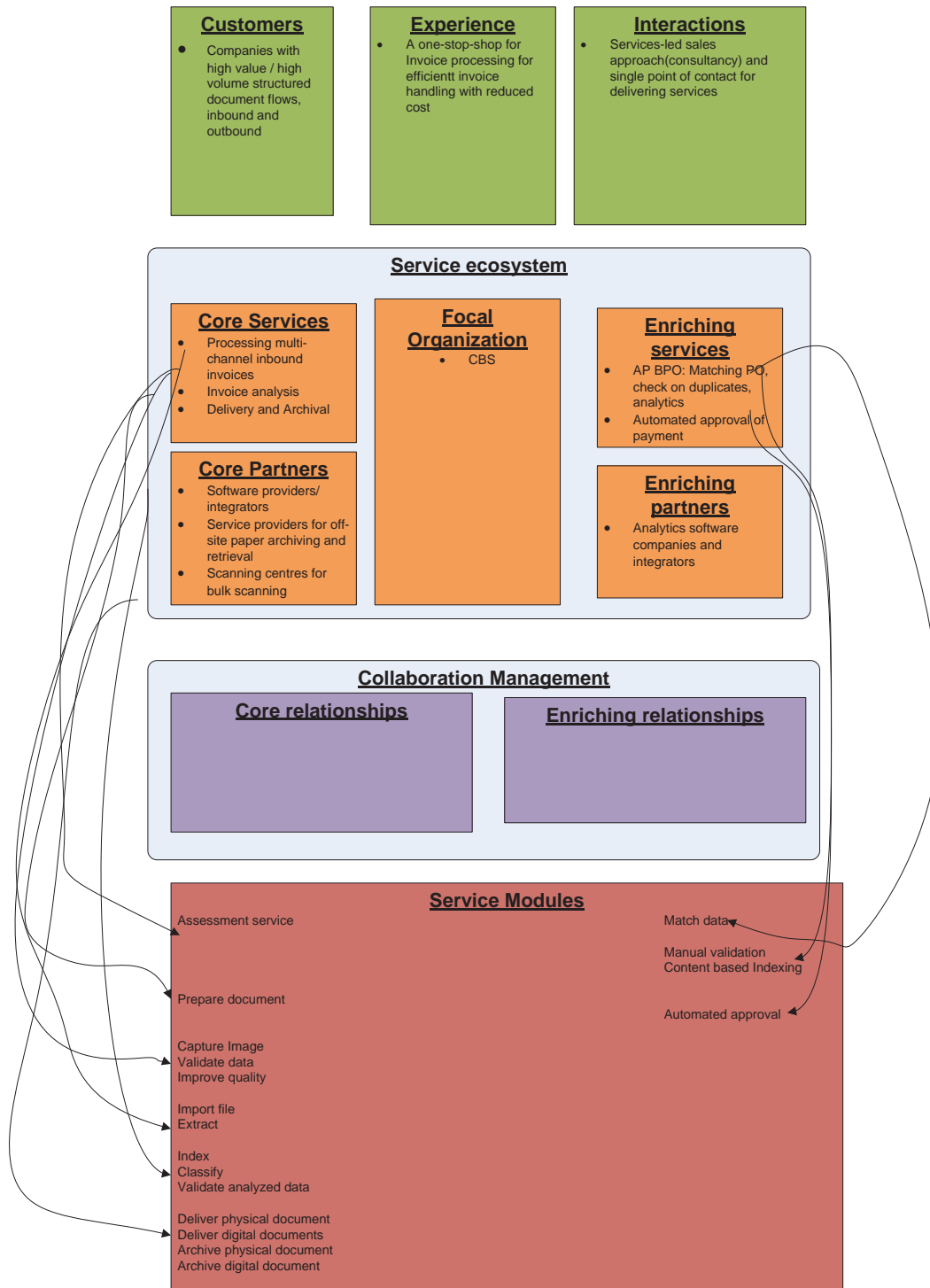


Figure 4.3 Derivation of service modules from strategy canvas

Step 1.3 - Perform granularity check for identified service modules

In this step we check the granularity for the service modules in step 1.2. The check is performed according to the template in Figure 3.4 [30]. Details of granularity check are presented in Appendix D: . Below we present result of the granularity check for the service modules identified in Table 4.2.

Table 4.3 Granularity check for the service modules

Name of the service module	Did the service module pass granularity check	Actions taken after granularity check
Assessment Service	Yes	This service module satisfied all granularity check criterion.
Prepare Document	Yes	This service module satisfied all granularity check criterion.
Capture data	No	Because the service module does not transform the state of customer perception of value in use. So this service module is redefined as a building block service for the service module prepare document.
Validate data	Yes	This service module satisfied all granularity check criterion.
Import file	Yes	This service module satisfied all granularity check criterion.
Improve Quality	No	No, this does not transform the state of the customer perception of the value in use. This is rather a building block for the service module of import image.
Extract	Yes	This service module satisfied all granularity check criterion.
Index	No	The service modules of index and classify are too small service modules because they have a functional overlap with each and they can be performed by the actor for service module extract. So we decided to combine extract index and classify as one service module.
Classify	No	
Deliver physical documents	No	These two service modules functionally overlap with each other. So they are combined to one service module of deliver documents
Deliver digital documents	No	
Archive physical documents	No	These two service modules functionally overlap with each other. So they are combined to one service module of archive documents
Archive digital documents	No	
Match data	No	This service module is removed because it is too small to combine in multiple service compositions and it also functionally overlaps with validate data. So we do not consider this as a service module.
Manual validation	No	No because it has a functional overlap with service module of validate data. So we combine this service

		module with validate data service module.
Content based indexing	Yes	This service module satisfied all granularity check criterion.
Automated approval	Yes	This service module satisfied all granularity check criterion.

Based on the results of granularity check that we presented in Table 4.3, we have the following service modules that are at right level of granularity.

Table 4.4 Service modules with right level of granularity.

Core Service Modules	Enriching Service Modules
Assessment Service	Content based indexing
Prepare Document	Automated approval
Validate data	
Import file	
Extract Index and Classify	
Deliver documents	
Archive documents	

In this step we defined service modules with right level of granularity. This is an important step because choosing service modules with fine granularity might end up in a scenario with an excessive number of service modules [46]. Coarse granularity reduces the need for maintaining a large number of service modules. In Figure 4.4 we present the service modules from Table 4.4 linked to the service dominant strategy canvas that we filled in step 1.

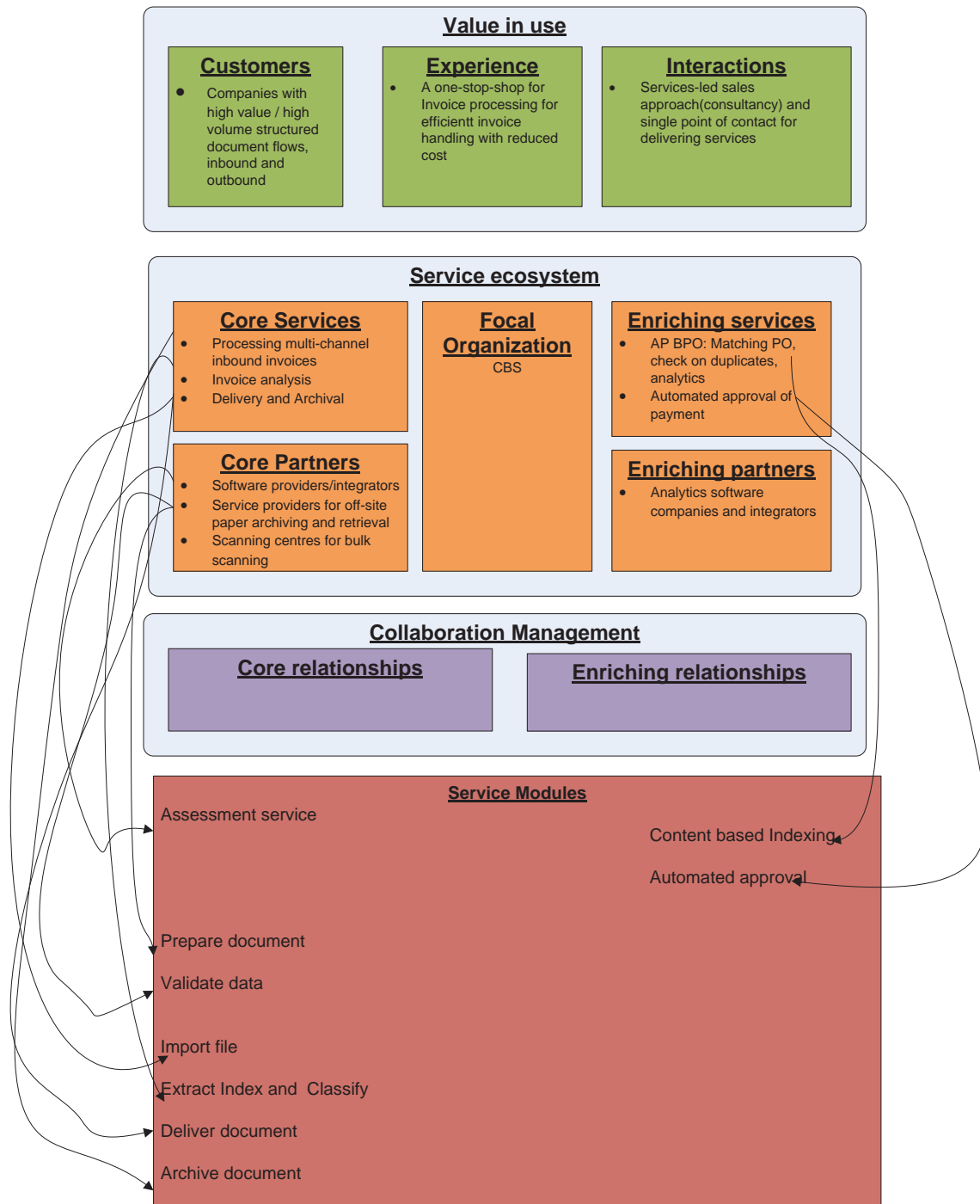


Figure 4.4 Service modules with right level of granularity linked to service dominant strategy canvas for invoice processing

Step 1.4- Fill in the abstract details of input, output and business service functionality for each business service building block

In this step we fill in the abstract details of service modules in terms of input to the service module, function of the service modules and output from the service module. In Figure 4.5 we present the abstract details of the service modules that we identified in step 1.3.



Figure 4.5 Abstract details of service modules

Step 1.5 - Fill in the details of service contracting conditions, resources and the function performed for service modules

In this step we continue with the service contracting details of the service modules from Figure 4.4 and Table 4.4. In this step we show how the abstract notion of services is mapped to the physical notion of resources such as capital goods, people and capital [23].

Table 4.5 Service contracting details for service modules

	Assessment service	Prepare document	Validate data	Import file
Service module functions	Provide assessment service to the customer	To digitize incoming documents	Validate correctness of digitized data	Upload file of validated documents for processing
Human resources	CBS consultants	Scanning operator	Software executor	Software executor
Hardware/software resources	Solution designing tools and solution repository	IRIS powerscan and Canon scanner	Document comparer	XML fetcher
SLA parameters	A tailor made solution will be proposed for the as-is situation	All the incoming documents will be digitized.	Invoices will be validated to 99% of accuracy	All the validated invoices will be uploaded to IT application with 99% accuracy.
FA parameters	Cost per invoice	Cost per invoice	Cost per invoice	Cost per invoice
Business capability	Capable of providing tailor made solutions on customer basis.	To digitize documents coming from multiple sources	Ensure no mismatch in the processed document	To upload documents for further processing

	Extract index and classify	Deliver documents	Archive documents	Content based indexing	Automated approval
Service module functions	To extract relevant information, perform indexing and classification of documents	Deliver documents at location(s) agreed with customer	Archive documents at location(s) agreed with customer	Indexing documents as per customer specification	Automate the approval process of documents.
Human resources	Software executor	Delivery service executor	Archival service executor	Software executor	Document solution executor
Hardware/software	XML fetcher, classifier	Delivery service	Archiving platform	XML fetcher, Indexing	Therefore document

resources		platform		application	solutions
SLA parameters	Extraction, indexing and classification will be done with 99% accuracy.	Documents will be delivered with 99% accuracy.	Documents will be archived with 99% accuracy.	Documents will be indexed to 95% accuracy.	Process will be finished in 5 days.
FA parameters	Cost per invoice	Cost per invoice	Cost per invoice	Cost per invoice	Cost per invoice
Business capability	To index and classify documents for efficient information retrieval.	Deliver documents at desired location	Archive documents at desired location	Indexing of documents as per customer requirement	Automation of approval process.

Step 1.6 - Arrange service modules into service catalogue

In this step we arrange the logically related elementary service modules from Table 4.4 into subsets called service domains [30]. Service domains represent the major areas of service delivering capabilities of CBS.

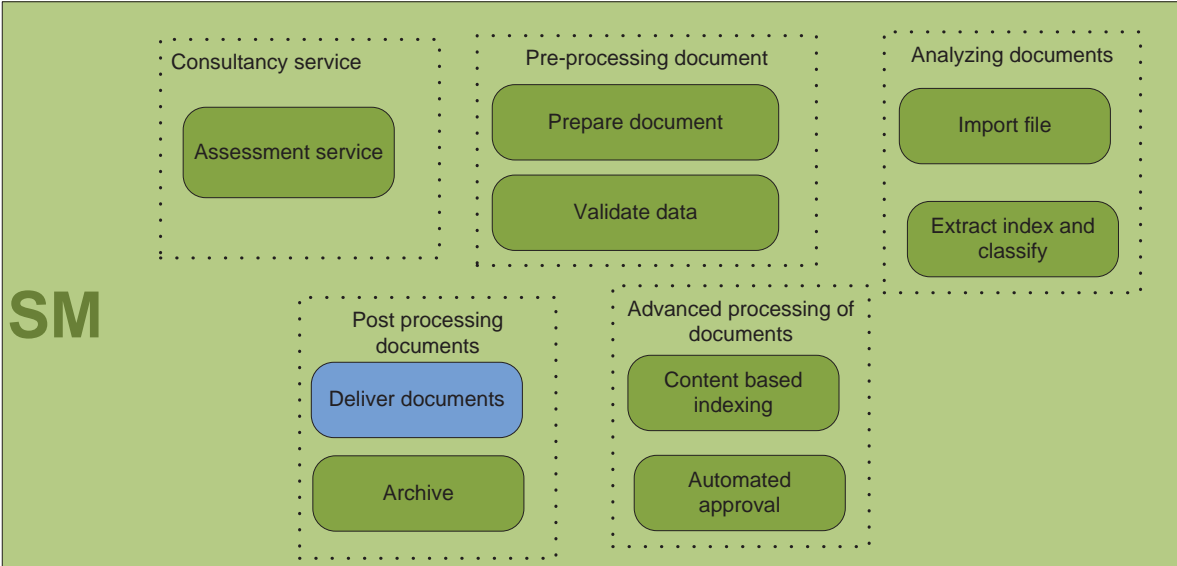


Figure 4.6 Service catalogue for service modules for invoice processing

We briefly discuss the service domains from Figure 4.6 representing the service catalogue for CBS for invoice processing service which consists of all service modules grouped into service domains. Service modules that are core capabilities of CBS are shown in green color where as service modules that rely on external partners in the business network of CBS are shown in blue color.

- *Consultancy service*- this service is to provide an assessment service to the customer on how invoice processing service can improve the current situation.
- *Preprocessing document*- Enables the activities to prepare the document for processing such as all relevant documents should be scanned and digitized. Also the digitized documents should be validated with the original document.
- *Analyzing documents*- Enables analyzing documents by preparing the documents to be uploaded into IT applications in suitable format for processing. Also the supports extraction of information from the documents, indexing and classification of documents.
- *Post processing documents*- Enables post processing services of delivering and archiving of documents at agreed location.
- *Advanced processing of documents*- Enables advanced document processing services such as indexing documents based on content that can be specified by the customer. Also supports automation of approval workflow for documents.

We further extend the service catalogue with details on each service domain. In Table 4.6 we show an example to fill in the details for the service module of prepare documents from the service domain of pre-processing documents. We make the service catalogue complete by filling in the details for all service domains from Figure 4.6. Service catalogue details for other service modules can be found in Appendix C: .

Table 4.6 Chapter from service catalogue of CBS with details for service domain of preprocessing documents

Service name		<i>Prepare document</i>		
General service description				
Service to service domain		Preprocessing documents		
Service functionality in terms of value-in-use		<i>All inbound documents are scanned and converted into digital version for further processing.</i>		
Business resources used by service		<i>Iris Powerscan and Canon scanner</i>		
Service classification				
Mission critical or Non-mission-critical	MC	Remarks	MC because quality of scanned document has a guarantee in SLA.	
Commodity differentiation or	Commodity	Remarks	Differentiating because it contributes to the unique value in use of the invoice processing service.	
Internal or external	Internal if not then externally available with right SLA.	Remarks	External with right SLA (outsourced to CoE)	
Service functions				
Function	Functionality	Input	Output	SLA
Capture_image	To create image	Document	Image file	All incoming

	file for the physical document			digital files will be captured in image form.
Check_quality	Check the quality of the scanned image file	Image file	Quality improvement needed or not needed.	All digitized documents will be checked for quality.
Improve_quality	Make the image file more readable if quality improvement is needed	Image file to be improved	Improved final image file	All digitized documents will be in clear readable format.

4.3. Step 2 Strategy to Business Model

In this step we define a set of business models required to execute the strategic directions of value-in-use set in Step 1 from Figure 4.2

Step 2.1 - Split the abstract value in use from the strategy layer into concrete value in use to be delivered to customers

In this step we derive customer focused two concrete cases of the value-in-use “Efficient invoice processing of incoming invoices”. In this step we explicitly choose customer group for the concrete value-in-use. Table 4.7 shows an overview of this step.

Table 4.7 Concrete value-in-use for invoice processing service

Abstract value-in-use	Customer Group	Concrete value-in-use	Label
Efficient invoice processing of incoming invoices	Corporate organizations with more than 50,000 invoices per year	Reduced cost and time of invoice processing with eliminated duplicate payments with onsite support.	LO (large organizations)
	Corporate organizations with more than 10,000 and less than 50,000 invoices per year	Reduced cost and time of invoice processing with offsite support	MO (Medium sized organizations)

The two customer groups can be briefly described in the following way:

- *Corporate organizations with more than 50,000 invoices per year (LO)* - here we categorize customers as large organization (LO) if they receive more than 50,000 invoices per year. Customers get an efficient invoice processing service from CBS and CBS guarantees the quality of service by providing a combination of onsite and offsite service delivery model.

- *Corporate organizations with more than 10,000 and less than 50,000 invoices per year (MO)*- here we categorize the customers as medium sized organizations (MO) if they receive more than 10,000 and less than 50,000 invoice per year. For this group of customers CBS offers a cheaper service delivery model by providing invoice processing service only with an offsite service delivery model. Here CBS only acts as the orchestrator and the single point of contact for the invoice processing service.

Step 2.2- Prepare business model radar for each value in use to be delivered to the customer

In this step we model two business models for each customer group from step 2.1 using the business model radar tool introduced in Section 3.1.2.

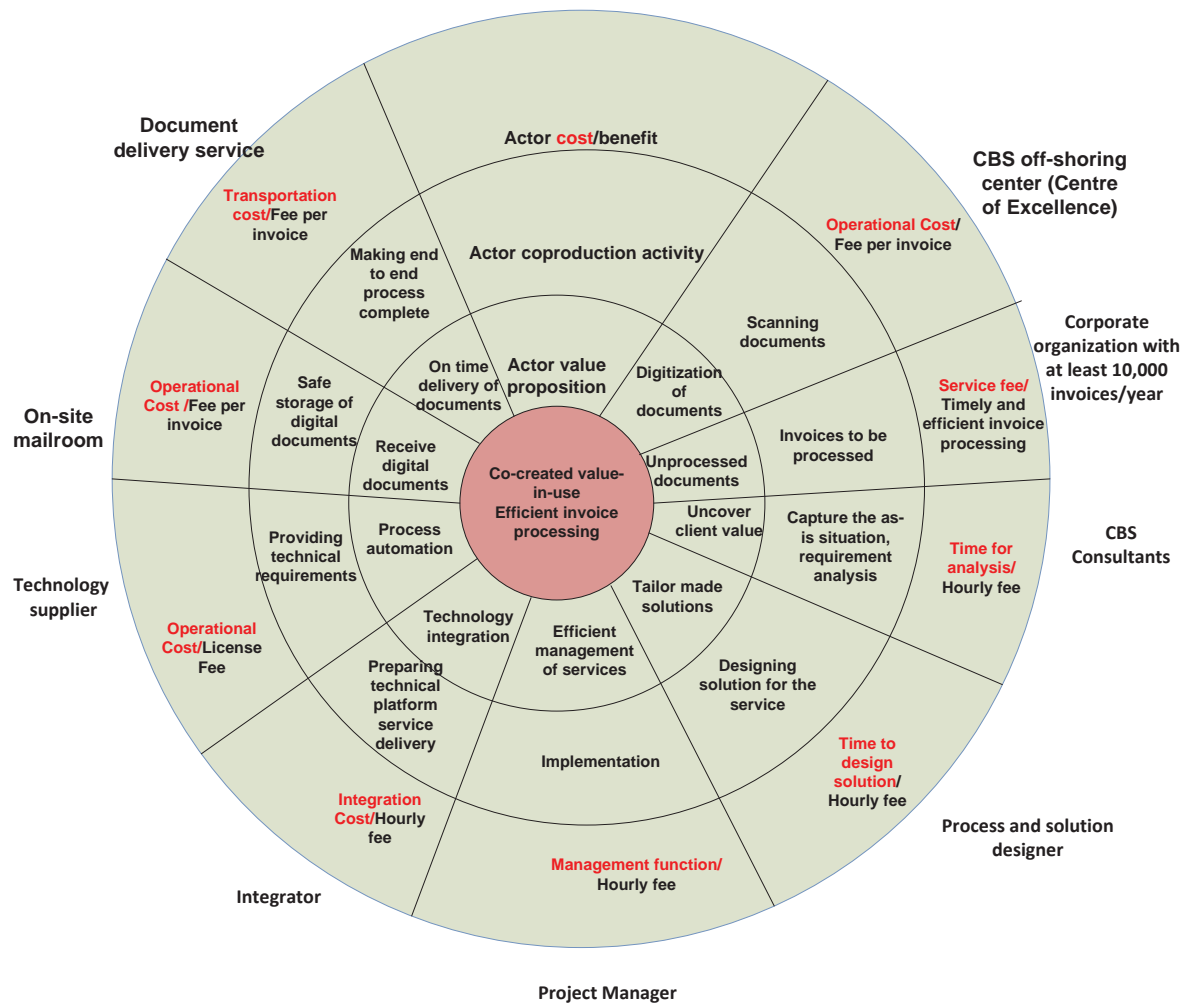


Figure 4.7 Business Model Radar for CBS for invoice processing service for LO

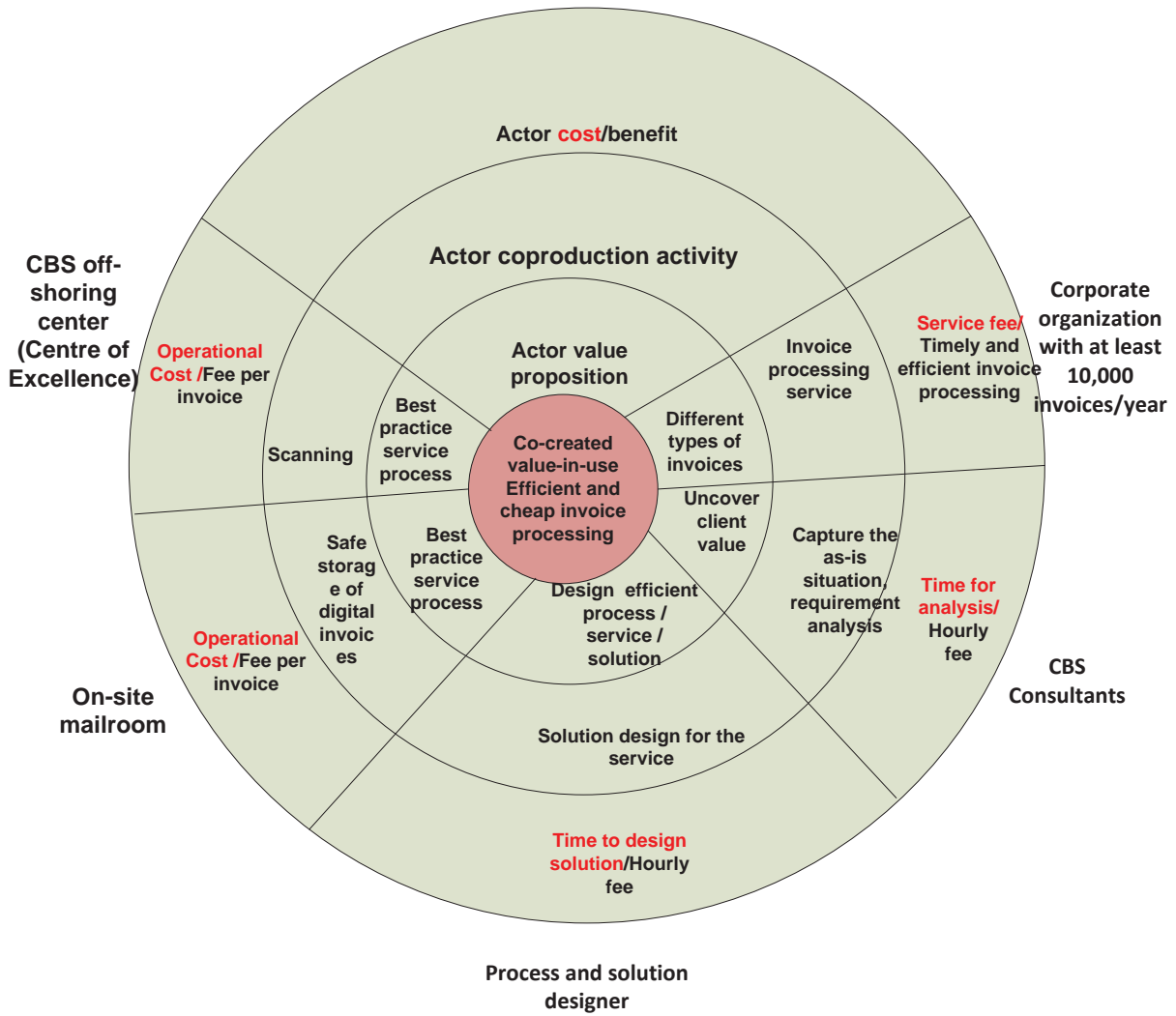


Figure 4.8 Business Model Radar for CBS for invoice processing service for MO

4.4. Step 3 Business Model to Service Composition

Step 3.1- Link the co production activities to the service modules

Below we link the co production activities for the business model radar for large organizations from Figure 4.7.

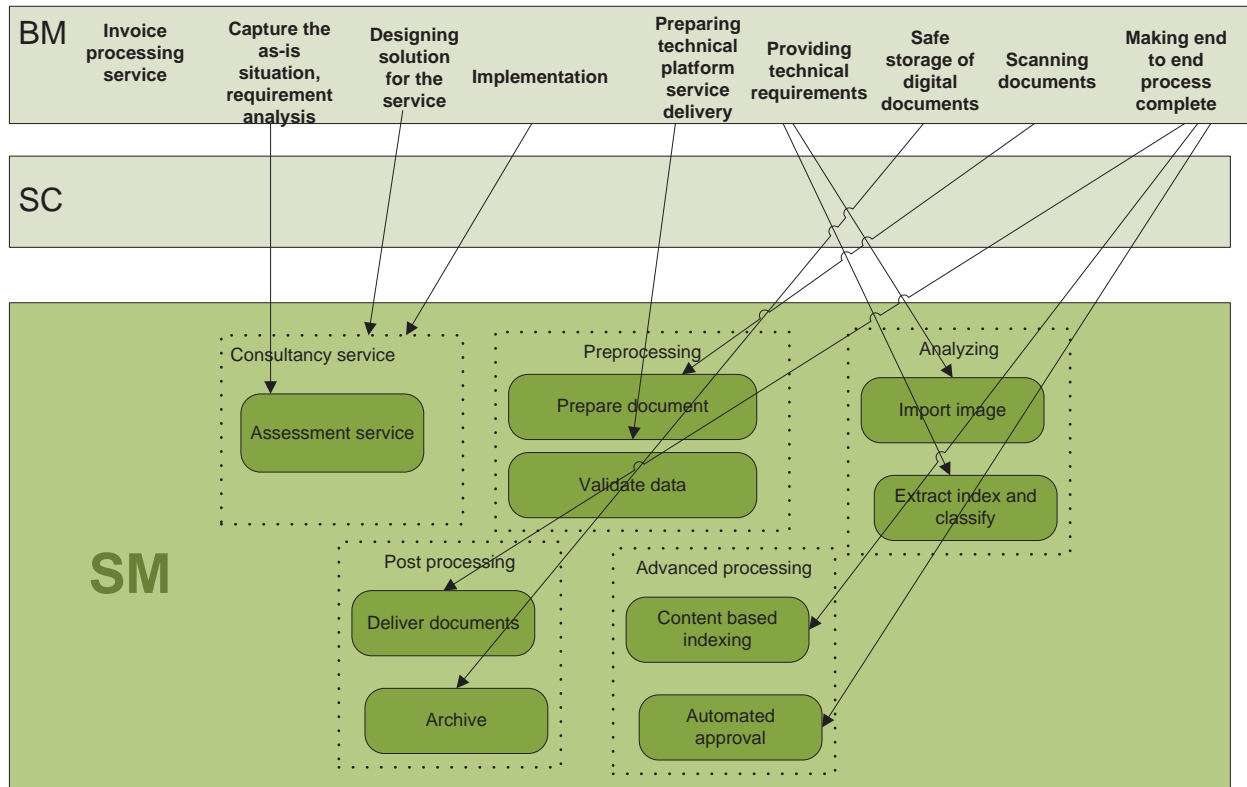


Figure 4.9 Mapping of co-production activities to service module elements

Step 3.2, Define Service Case scenarios

In this step we identify service case scenarios for service compositions which are captured as use cases for the concrete value-in-use from Step 2.1 and 2.2. In these service case scenarios we will show how we can use the service modules to make service compositions. We define these service cases for the concrete value-in-use stated in the business model radar [30].

- *Invoice processing service*- In this service CBS serves the customer with the basic form of invoice processing service. First of all an assessment is done by a CBS consultant to capture the as-is situation for the customer. Then a solution design is proposed to the customer by the process and solution engineer from CBS. Customer can either accept the solution design or reject. If the customer rejects the solution design then the process ends. If the customer accepts the solution design then CBS can start implementing the service for the customer.

In the first step of the service, first of all documents are sorted into paper category and digital category. Paper documents are scanned and converted into desired digital format. Digital documents are imported and converted into desired digital format. After this step all the received invoices are converted into one digital format.

In the next step, information such as payment date, payee name and account number are extracted. Invoices are classified into categories such as urgency of payment, can be paid, need further clarification etc. After classification, invoices are validated to check its correctness and they are sent to the accounts payable department of the customer for payment. The processed documents both in digital format and paper format are archived at an agreed location.

- *Enriched invoice processing service*- This is an advanced version of invoice processing service, so it has all the service modules of invoice processing and extra service modules from the service domain of advanced processing of documents. In this service, documents are enriched with extra service modules of content based indexing to index the invoices based on their content.
- *Automated invoice processing service*- This is an automated version of invoice processing service, so it has all the service modules of invoice processing and extra service modules from the service domain of advanced processing of documents. In this service, invoices with a higher amount (as defined by the customer in the SLA) are supported with service module of automated approval service.

Enriched invoice processing service and automated invoice processing service are the advanced versions of invoice processing service. They both use invoice processing service as their base. So a customer can choose to take only invoice processing service and as the complexity and volume of invoices increases, the customer can scale up its service offerings.

Thus using service catalogue to define service case scenarios ensures CBS in making scalable service offering to its customers. Therefore use of service catalogue gives answer to research question 2 from Section 1.3.2 on “How CBS can ensure a scalable service offering in the field of value added outsourcing of document processing?”

4.5. Step 4 Service Modules to Service Composition

In this step Business Process Management (BPM) plays the role of realization of the Service Composition layer of the Business Pyramid of the BASE/X framework [30]. BPM coordinates automated business processes in such a way that all work is done at the right time by the right resource [33]. We use BPMN notation³ to model the service case scenarios.

³ <http://www.bpmn.org/>

Step 4.1, Identify the service modules to be invoked for the service case scenarios

Figure 4.10 shows business process model for the invoice processing service using service modules from Figure 4.6. Figure 4.11 shows business process model for the enriched invoice processing service. It should be noticed in Figure 4.11 that there are three extra service modules (highlighted in red color) executed for enriched invoice processing. This brings in reusability of service modules for CBS. Here a customer having invoice processing service can add extra service module to the invoice processing service to get enriched invoice processing service.

Similarly Figure 4.12 also shows an extended invoice processing service as automated invoice processing which is developed by adding extra service modules to invoice processing service. The added modules are highlighted in blue color.

Figure 4.10 , Figure 4.11 and Figure 4.12 shows how services can be modularized into reusable chunks. Thus here we provide answer to research question 1 from section 1.3.1. Figure 4.10, Figure 4.11 and Figure 4.12 also shows that if a customer wants to scale up its service offering then the customer only needs the extra modules to be added by CBS for the scaled up service.

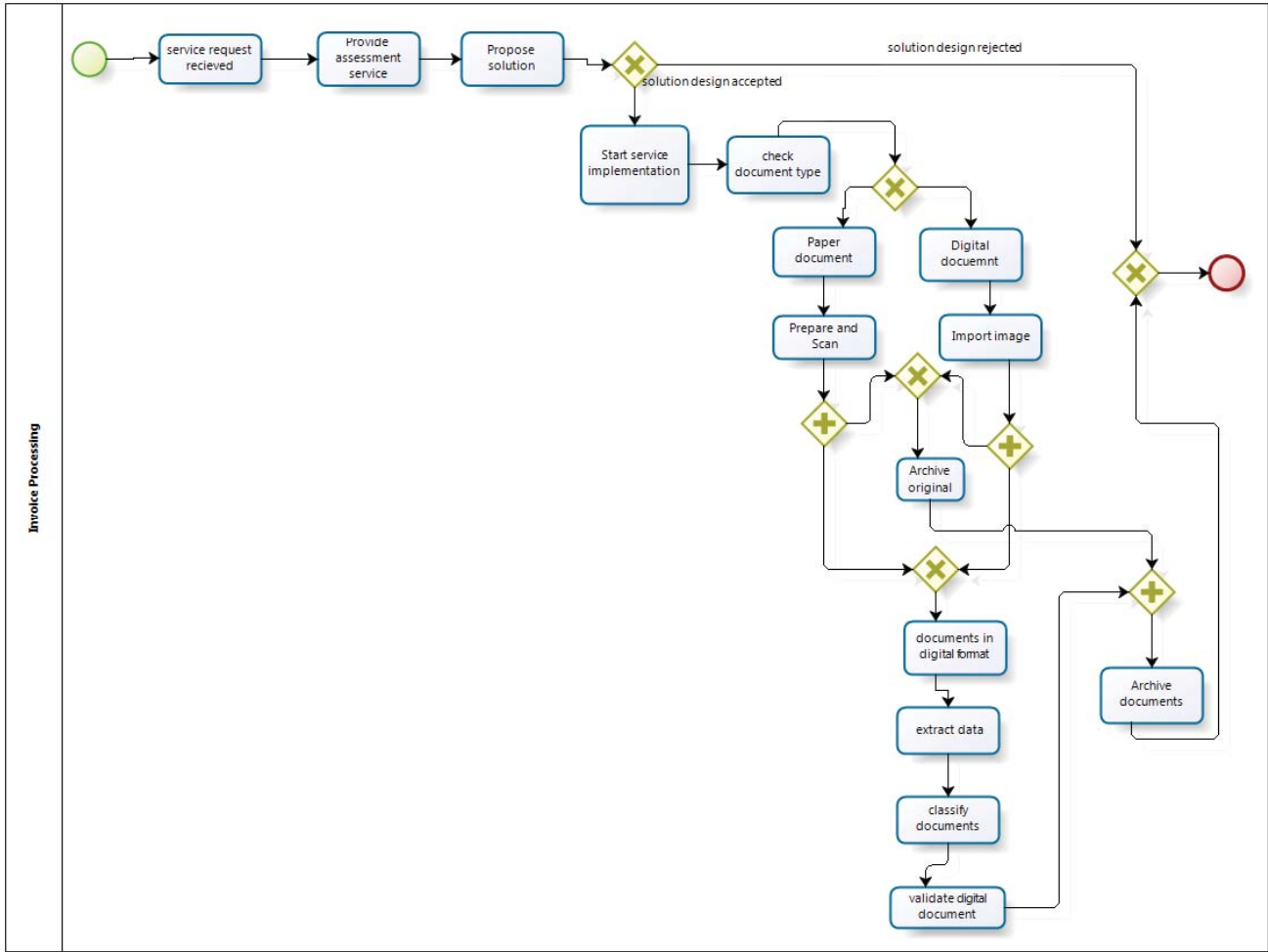


Figure 4.10 Business process model for invoice processing

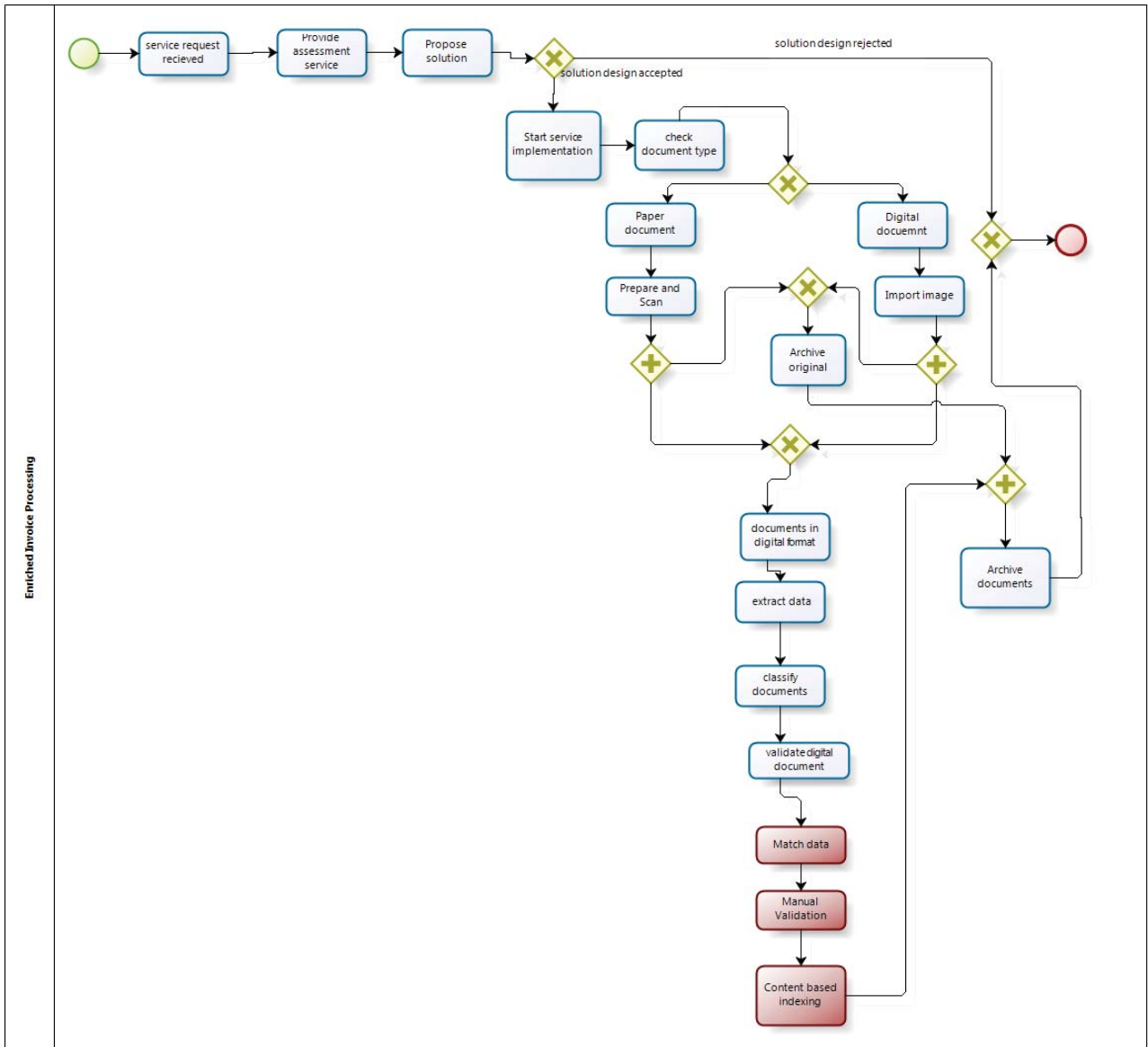


Figure 4.11 Business process model for enriched invoice processing

Extra service modules and building blocks (match data, manual validation and content based indexing) that are added to invoice processing service are highlighted in red.

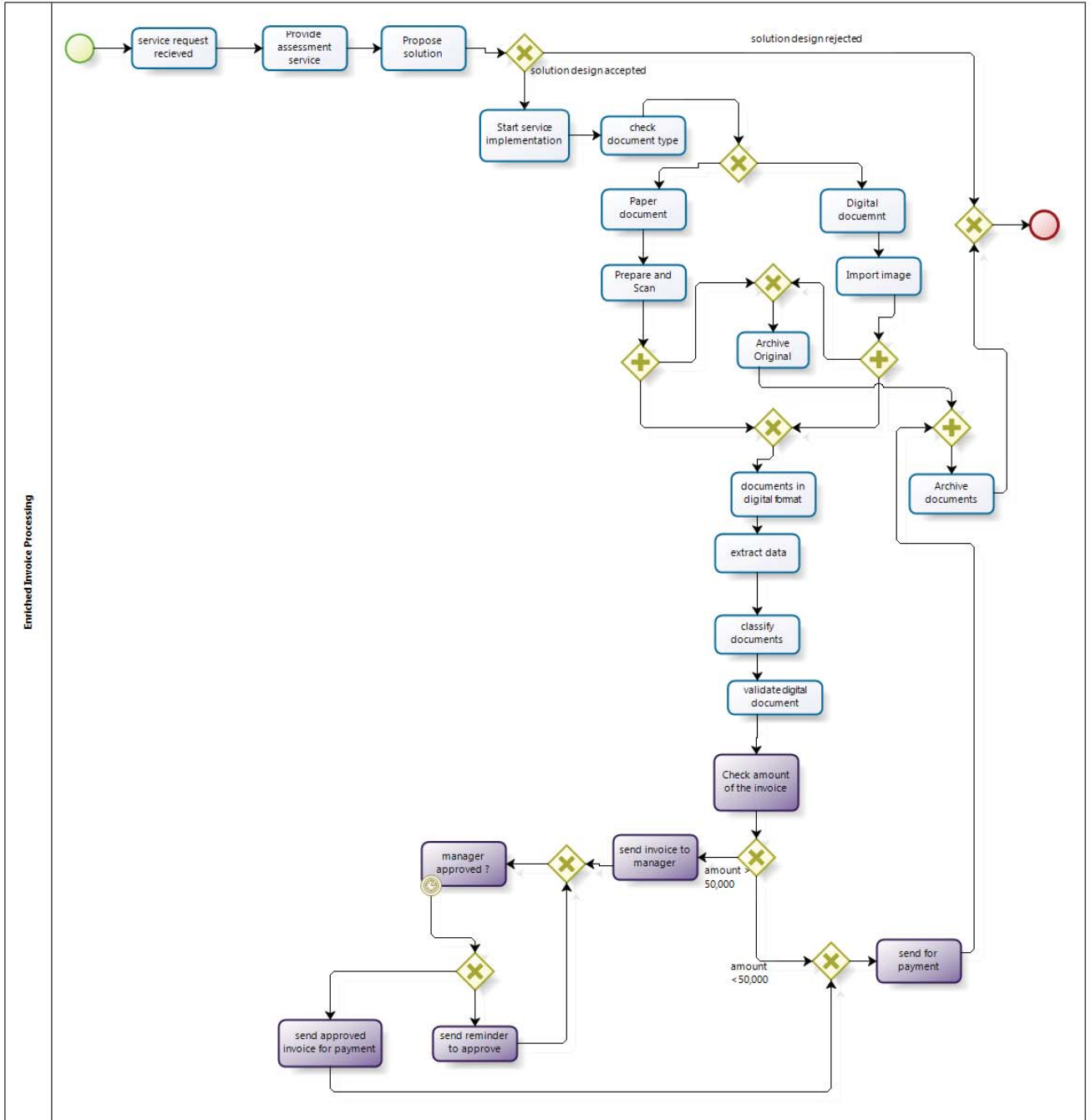


Figure 4.12 Business process model for automated invoice processing

Extra service modules and building blocks (automated approval workflow) that are added to invoice processing service are highlighted in blue.

4.6. Results

We showed how application of BASE/X to invoice processing service of CBS helps in improving reusability of service modules. Improved reusability of service modules gives the following benefits to CBS:

- Reduced development time to develop new services- In Step 3.4, of defining the service case scenarios we saw how we can extend invoice processing service to enriched invoice processing service and automated invoice processing. To develop enriched invoice processing service and automated invoice processing service we are reusing the service modules of invoice processing in enriched invoice processing and automated invoice processing. So the development time for enriched invoice processing and automated invoice processing is less and the services are developed quicker.
- CBS as a flexible service provider- the idea of combining service modules in different service compositions is useful for CBS in becoming flexible in providing services to customers from different domains and having variety of documents. Also CBS gains capability to adapt its services with changing volume and complexity of documents.

Improved reusability of service modules gives the following benefits to customers of CBS:

- Value added outsourcing of document processing services becoming cheaper for customers – the concept of combining service modules in different service compositions is also making it cheaper for the customer to extend services. If a customer wants to extend the services then they pay only for the implementation and operation of extra service modules. For example if a customer of invoice processing service wants to extend its service to enriched invoice processing service then the customer has to pay for three extra modules of match data, manual validation and content based indexing. This makes it easier as well as cheaper for the customer to receive scaled up services.

Also we showed how tools of business model radar and defining service cases from service catalogue ensure capability to offer scalable services to CBS in following ways:

- Scalable service offering- with the concept of extending the service compositions by adding extra service modules will enable CBS to provide a scalable service offering. With a scalable service offering model CBS can ensure its customers that they are capable of coping with the growing size and complexity of the documents.

4.7. Conclusions

In this chapter we showed how BASE/X can be applied to invoice processing service and we also answered research question 1 and 2 from Section 1.3.1 and Section 1.3.2. We explained the benefits of application of BASE/X as a reference framework to invoice processing service of CBS.

Further in this report, we will validate all the results from Section 4.6 with the service developers from the CBS-SBU team. To evaluate the result we will conduct workshops followed by interviews to explain

the concepts of BASE/X framework, its applicability and benefits. Also we will demonstrate the solutions to the research questions in the workshop and interviews. We will collect feedback of audiences in the workshop and interviewees in the interviews to evaluate the results. Details of evaluation of results can be found in Chapter 7. In the next chapter we will address research question 3 and 4 from Section 1.3.

5. Alignment between disciplines

Enterprise Architecture (EA) is intended to provide a holistic approach for all aspects of business and its surrounding environment through the business processes, organizational units, roles and responsibilities and the underlying IT systems that the business relies on [34]. In addition to presenting a coherent explanation of the what, why and how of a business, EA also supports in strategically aligning the disciplines in an organization. Strategic alignment between disciplines remains an ongoing challenge for organizations as they react to the changing requirements of customers [34]. In this chapter we will look into a solution for research question 3 from Section 1.3.3.

The SBU team of CBS consists of three disciplines namely, Strategy and Research, Service Development and Business Development. The teams have following responsibilities:

Table 5.1 Disciplines of CBS and their responsibilities [35]

Strategy and Research	Service Development	Business Development
<ul style="list-style-type: none"> • Prepare business plan • Prepare innovation road maps • Perform competitor analysis • Check for market updates 	<ul style="list-style-type: none"> • Prepare service architectures • Detail out service design • Prepare and maintain knowledge and process assets • Prepare service delivery assets • Design and develop service kits 	<ul style="list-style-type: none"> • Provide business launch support • Provide localization support • Facilitate exchange of knowledge

Strategic alignment between disciplines is also an ongoing problem for the SBU team of CBS. In this chapter we will discuss how the organizational structure of the SBU team of CBS can be aligned in the framework of BASE/X.

5.1. Mapping of organizational structure of CBS into BASE/X framework

The responsibilities of the team of strategy and research are mainly concerned with the activities in the layer of strategy in the BASE/X framework. So they will be responsible to fill in the service dominant strategy canvas. They should also prepare a high level abstract view of required functionalities from the services which serve as input information to the service developers to prepare the service catalogue. They should also prepare the list of service modules to be developed to achieve strategic goals.

The responsibilities of the team of service development are mainly concerned with the activities of preparing the service catalogue, defining the service case scenarios for the customer and also to prepare the service compositions that are specific to the problems of customer. The team of service development will get input from the team of strategy and research on which service modules should be

there in the service catalogue. In this way the team of strategy and research and the team of service developers get aligned at the layers of strategy and service modules of the BASE/X framework.

The responsibilities of the team of business development are mainly concerned with the business model layer. The team of strategy and research provides input to the team of business development on the abstract value-in-use of the services from the service dominant strategy canvas. The business developers prepare the business model radar for the concrete value-in-use per customer group. Here the team of strategy and research and the team of business development get aligned.

The team of business developers provides input about the concrete value-in-use to the team of service developers and information on service case scenarios. Service developers prepare the service composition to deliver the concrete value-in-use to the customers. Thus here service developers and business developers get aligned.

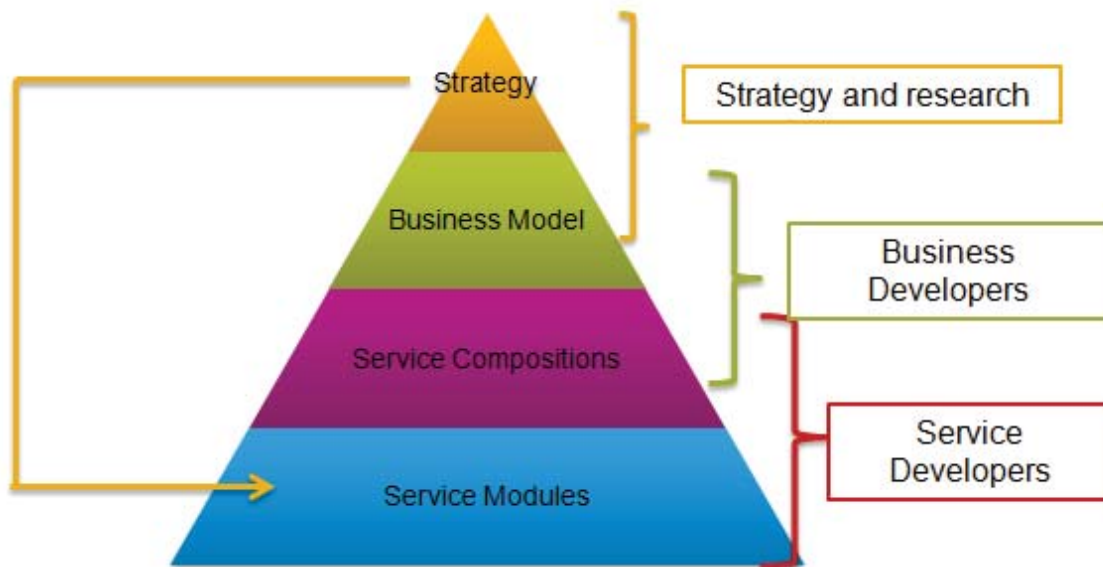


Figure 5.1 Overview of alignment of disciplines in the BASE/X framework

In Figure 3.1 we show a four step guideline sequence on filling the business level pyramid of BASE/X. In Figure 3.1 Figure 3.1 Guideline sequence for business level pyramid Table 5.2 we show a mapping of guideline sequence from Figure 3.1 and the teams that will be responsible for respective guideline sequence.

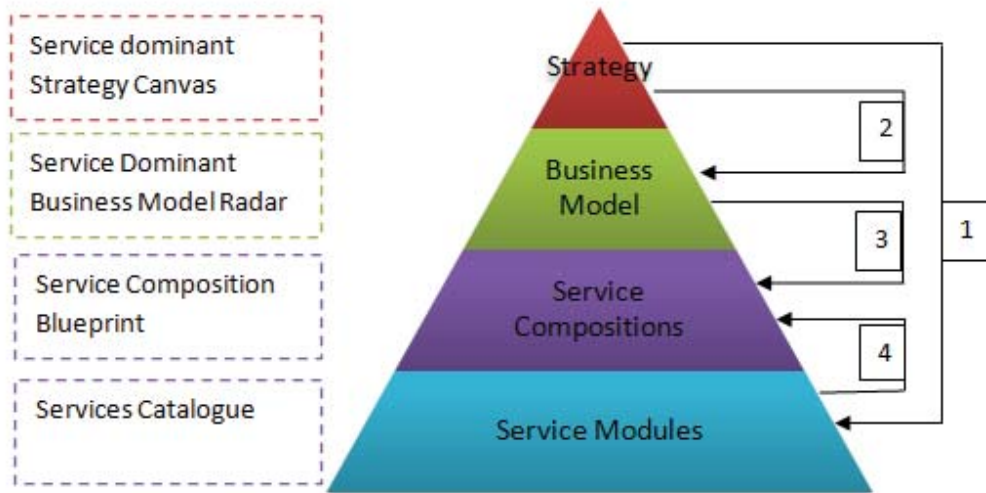


Figure 3.1 Figure 3.1 Guideline sequence for business level pyramid

Table 5.2 Mapping of guideline sequence with the teams of CBS SBU

Step 1	Strategy and research with service development
Step 2	Strategy and research with business development
Step 3	Business development with service development
Step 4	Business development with service development

5.2. Results

In this chapter we discussed on solution to research question 3, from section 1.3.3 on how implementation of Enterprise Architecture based on service dominant business paradigm can improve the alignment between disciplines in CBS. We showed in this chapter how the disciplines from the SBU team of CBS can be aligned in the BASE/X framework. We also showed in this chapter how each of the disciplines will provide inputs to each other for delivering and developing the services.

5.3. Conclusions

Implementation of BASE/X in CBS will be useful to solve the ongoing problem of missing alignment between the disciplines of SBU team of CBS. BASE/X framework will be useful in gaining structured goals for each of the disciplines of CBS SBU.

In the next chapters we will discuss on the solution to research question 4 and validation of our solutions to the research questions.

6. Stage gate model

In this chapter we investigate solution for research question 4 which is “How CBS can accelerate time to market for service innovation business ideas?” CBS make use of innovation stage gate model for its innovative projects. Stage-Gate model is an innovation approach to make the development process for new services more effective from generation of initial idea to launching the product. The stage gate model facilitates checks with respect to various criteria to find out the feasibility in continuing with the service innovation idea for CBS.

6.1. About the stage gate model

A Stage-Gate model is a conceptual and operational map for moving new projects from idea to launch and a blueprint for managing the development process for the innovative idea in an effective and efficient way [36]. Stage-Gate, in its simplest format, consists of following elements (shown in Figure 6.1):

- *Stages*: The innovation process can be visualized as a series of stages, where the project team undertakes the work, obtains the needed information, and does the subsequent data integration and analysis. Each stage is composed of a set of required or recommended best-practice activities needed to progress the project to the next gate or decision point. Each stage is designed to gather information to reduce uncertainties and risks in the project. The information requirements thus define the purpose of each of the stages in the process [36].
 - Each stage costs more than the preceding one. But the unknowns and uncertainties are driven down so that risk is effectively managed.
 - The activities within stages are undertaken in parallel and by a team of people from different functional areas within the organization. Thus tasks within a stage are done concurrently.
 - Each stage is cross-functional. There is no research and development (R&D) stage or marketing stage; rather, every stage is marketing, R&D, production, or engineering. No department owns any stage.
 - *Deliverables*: what the project leader and team bring to the decision point. These deliverables are based on a standard menu for each gate, and are decided at the output of the previous gate.
- *Gates*: Following each stage is a gate with a go/kill decision point, as in Figure 6.1. Gates serve as quality-control check points for go/kill decisions and prioritization of decisions points, and points where the path forward for the next stage of the project is agreed to. Gates consist of the following:
 - Criteria against which the project is judged: These include must-meet criteria or knock-out questions (a checklist) designed to weed out misfit projects quickly; and should-meet criteria that are scored and added (a point count system), which are used to prioritize projects.

- *Outputs:* a decision (Go/Kill/Hold/Recycle), along with an approved action plan for the next stage (an agreed-to timeline and resources committed), and a list of deliverables and date for the next gate.

The stage gate framework is very similar to that of buying a series of options on an investment. Initially, one purchases an option for a small amount of money, then does some due diligence, and finally decides whether or not to continue to invest. A series of these rounds of “due- diligence-and-buy- options” stages constitutes a Stage-Gate framework [36].

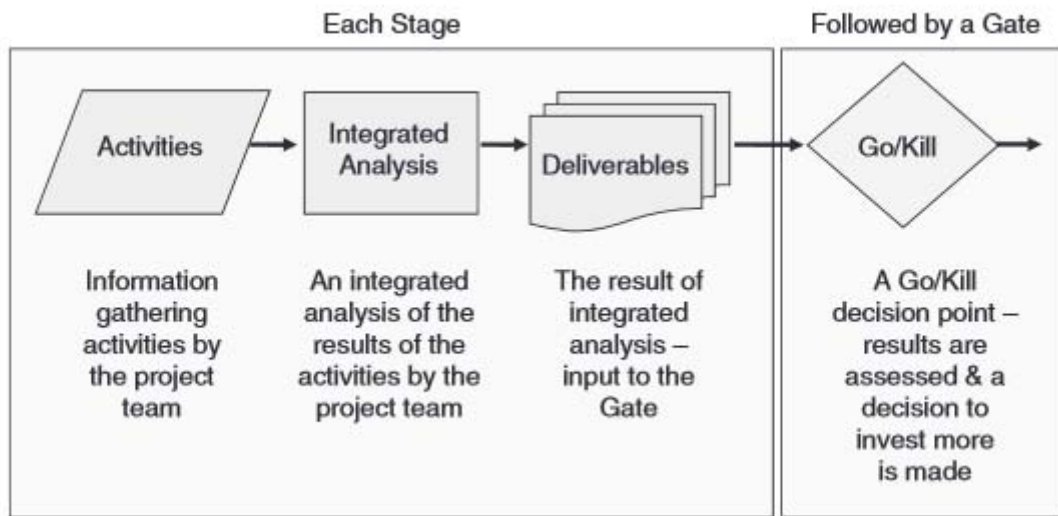


Figure 6.1 Format of stage gate model [36]

A standard Stage-Gate system designed for product and service developments is shown in Figure 6.2[37]. The stage-gate system begins with an ideation stage, called Discovery, and ends with the Post launch review. The three stages of discovery, scoping and build business case are done before making financial commitments for the idea and decisions are made at the go-to-development gate (gate 3 in Figure 6.2) [36] [37].

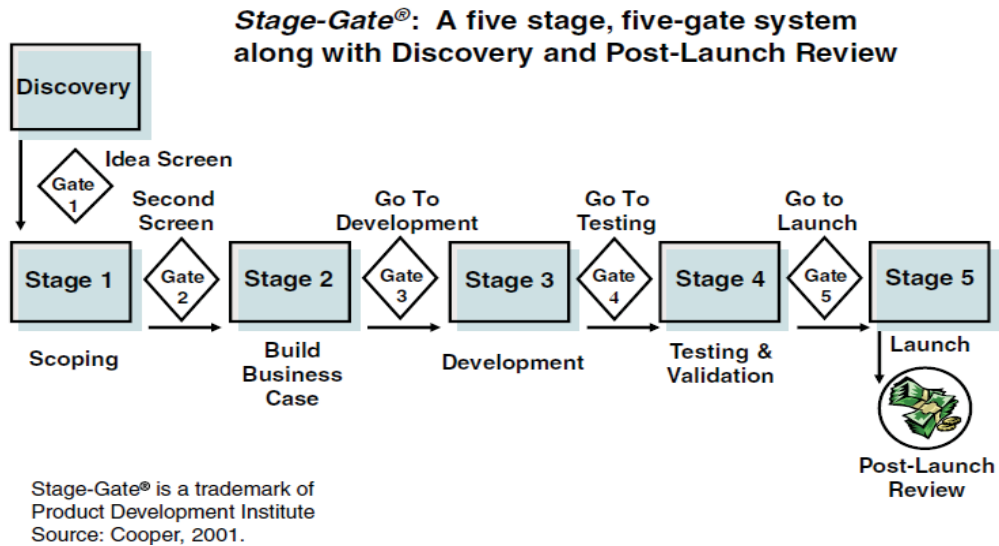


Figure 6.2 Stages and gates [37]

6.2. Stage gate model for CBS

CBS uses the stage gate model for New Service Development Process Governance as a framework for Innovation and Project Management to define a set of criteria and requirements to allow a new idea to move from a Development Stage to the next Gate Review [11].

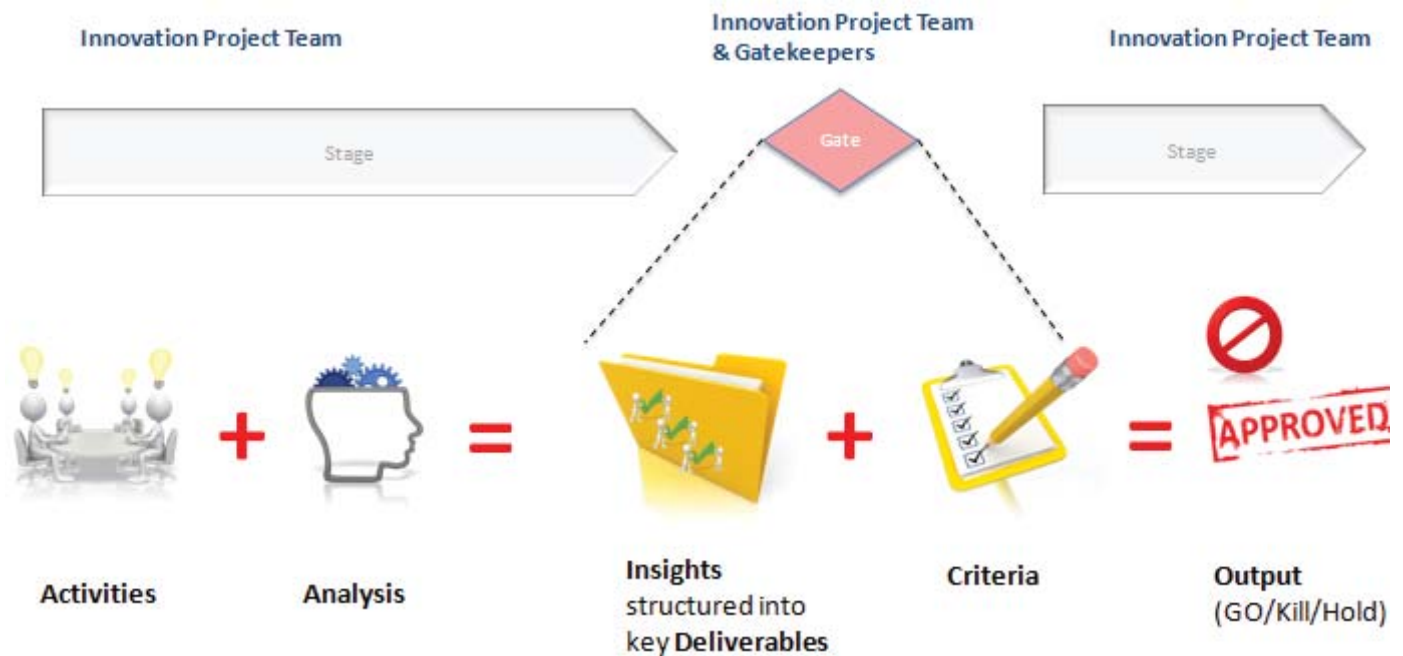


Figure 6.3 Team wise overview of stage gate model of CBS [11]

In Figure 6.3 the innovation project team of CBS does the information gathering activities and integrated analysis for the respective stage (from Figure 6.1). They prepare the deliverables for each stage which has the result of integrated analysis to serve as input to the gate. The innovation project team and the gatekeepers check the delivered results of integrated analysis from the innovation project team to find out the set of criteria that are satisfied and not satisfied to make the go or kill decision. A decision of go means the innovation project team can start working on the deliverables of next stage whereas a decision of kill means that the service innovation idea is discarded.

CBS uses the stage gate model for following benefits [11]:

- To accelerate speed-to-market for new value added outsourcing of document processing services.
- Increase success rates for new value added outsourcing of document processing services.
- Decrease failures in new value added outsourcing of document processing services.
- Increase organizational discipline and focus on the right projects
- Fewer errors, waste and re-work within projects
- Improve alignment across business leaders
- Efficient and effective allocation of resources
- Improve visibility of all projects in the pipeline
- Improve cross-functional engagement and collaboration
- Improve communication and coordination with external stakeholders

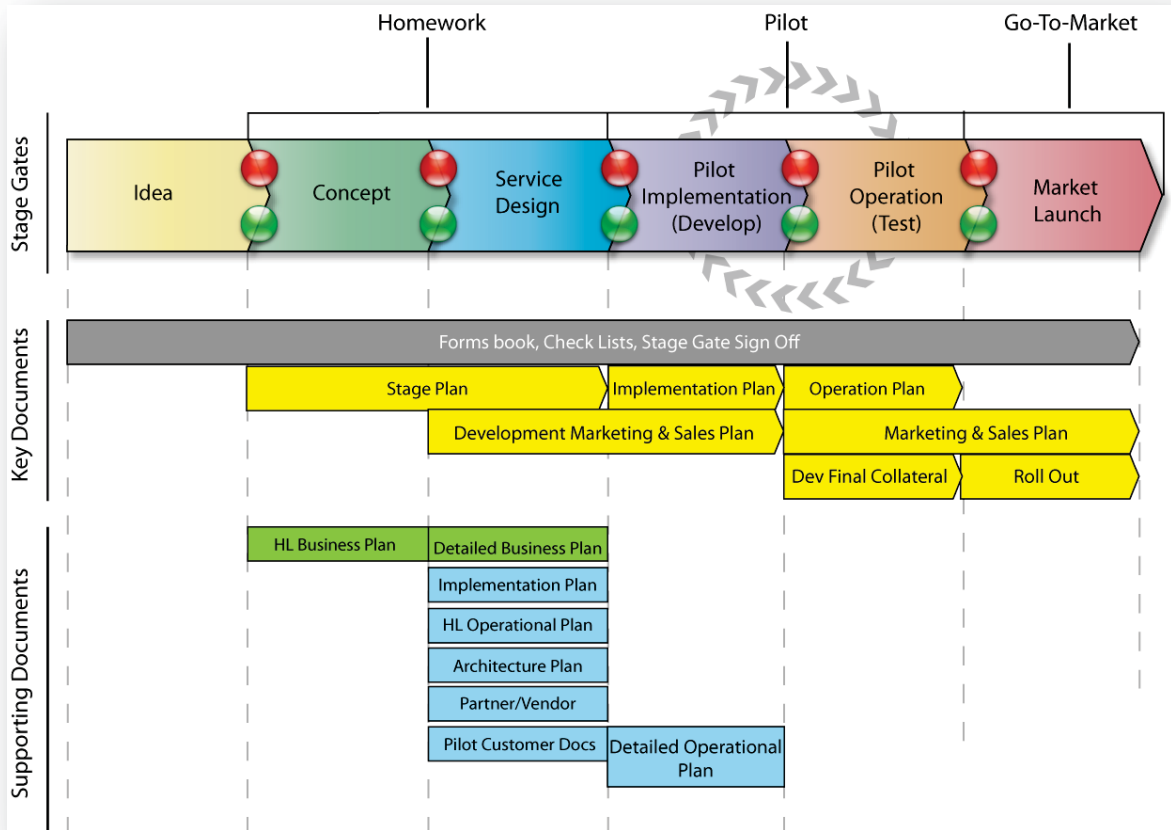


Figure 6.4 Overview of stage gate model for CBS [11]

Figure 6.4 shows the stage gate model for service innovation in CBS with the stages-gates, deliverables as key documents and the supporting documents for each stage of the stage gate model. Key documents and supporting documents shown in Figure 6.4 are prepared when a go decision is taken for a stage.

Table 6.1 Mapping of elements of Figure 6.2 with Figure 6.4

Name of stages in the stage gate model from Figure 6.2	Name of stages in the stage gate model from Figure 6.4
Discovery	Idea
Concept	Scoping
Service design	Build business case
Pilot implementation (Develop)	Development
Pilot operation (Test)	Testing and validation
Market Launch	Launch

6.2.1. Description of stages and gates from the stage gate model of CBS

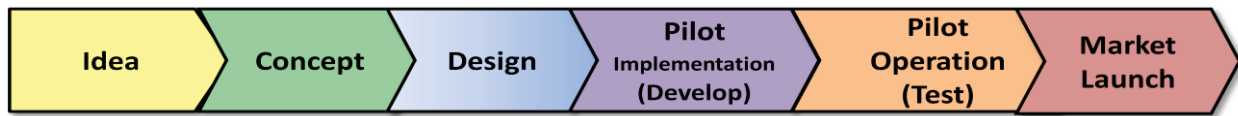


Figure 6.5 Stages in the stage gate model of CBS [11]

In this section, we list the details of each gate from the stage gate model from Figure 6.5 and we analyze the relation between the gates and the layers of business pyramid from BASE/X framework. We also look into how the criteria in the gates of the stage gate model relate to the tools of business level pyramid of BASE/X in Figure 3.1.

Gate 1 Figure 6.6 shows the details of gate 1, which is between the idea stage and concept stage in Figure 6.5. In Table 6.2 we analyze how the activity of gate 1 is related to layers of business level pyramid from BASE/X.

Gate #1 : Pitch a minimum viable Proposition		
Deliverables	Insights	Criteria
<ul style="list-style-type: none"> Business idea 	<ul style="list-style-type: none"> Idea description Strategic & Market fit Offering development Offering delivery Offering champion High level business case 	<ul style="list-style-type: none"> Does the innovation idea has a strategic fit with our company? Do we have the business competencies to make it successful? Do we have the technical and delivery competencies to make it work? (if it doesn't could we acquire that know-how?) Do we have any customer who demonstrated an appetite for this new service? Does the service represent a large enough business pocket? (i.e. 5-10% service business growth within the MTP timeline)
<ul style="list-style-type: none"> Project plan 	<ul style="list-style-type: none"> Investments (FTE and €) Activities Planning 	<ul style="list-style-type: none"> Next Stage Investment in Resources Project Team Mobilisation Timelines , Dependencies, Risks, Milestones

Figure 6.6 Gate 1 from idea stage to concept stage[11]

Table 6.2 Relation between activities of gate 1 and BASE/X

Does the innovation idea has a strategic fit with our company?	This question can be answered from the <i>service dominant strategy canvas</i> .	Yes, and then proceed. No then is it worth changing the strategy? Yes, then the idea might require changes in all the
--	--	--

		<p>layers of business level pyramid.</p> <p>No, then discard the idea.</p>
<p>Do we have the business competencies to make it successful?</p>	<p>This question can be answered by checking the core partners and enriching partners in the <i>service dominant strategy canvas</i> and the existing <i>service modules</i>.</p>	<p>Yes, and then proceed. No then is it worth changing the strategy?</p> <p>Yes, then the idea might require changes in all the layers of business level pyramid.</p> <p>No, then discard the idea.</p>
<p>Do we have the technical and delivery competencies to make it work? (if it doesn't could we acquire that know-how?)</p>	<p>This question can be answered by checking whether we have the required <i>service modules</i>. And also checking the core partners and enriching partners form the <i>service dominant strategy canvas</i> whether they can provide us the required technical and delivery competencies.</p>	<p>Yes, and then proceed.</p> <p>No then do we need to change the strategy for adding a new service module?</p> <p>No, then proceed with developing the service module.</p> <p>Yes, then the idea might require changes in the strategy.</p> <p>Is it worth changing the strategy: yes and then proceed</p> <p>No then discard the idea.</p>
<p>Do we have any customer who demonstrated an appetite for this new service?</p> <p>Does the service represent a large enough business pocket? (i.e. 5-10% service business growth within the MTP timeline)</p>	<p>These questions can also be answered by checking the customer block from the <i>service dominant strategy canvas</i>. Does the new service align with the targeted customer group in the service dominant strategy canvas?</p>	<p>Yes, and then proceed. No then is it worth changing the strategy?</p> <p>Yes, then the idea might require changes in all the layers of business level pyramid.</p> <p>Is it worth changing the most stable layer of the pyramid?</p> <p>Yes and then proceed.</p> <p>No, then discard the idea.</p>

Gate 2 - Figure 6.7 shows the details of gate 2, which is between the concept stage and design stage in Figure 6.5. In Table 6.3 we analyze how the activities of gate 2 relate to layers of business level pyramid from BASE/X.

Gate #2: Build the Business Case		
Deliverables	Insights	Criteria
<ul style="list-style-type: none"> Business and Innovation plan 	<ul style="list-style-type: none"> Market analysis <ul style="list-style-type: none"> Trends, size, growth rates Customer analysis <ul style="list-style-type: none"> Pain, needs and requirements Vertical market target selection Potential first customer segment Selection criteria customer Competitor landscape Unique Value Proposition Business model <ul style="list-style-type: none"> Position in value chain (make / buy) Strategy to defend uniqueness Business model and channel Core technologies Business case <ul style="list-style-type: none"> High level Financial projections Investment until break-even High level building blocks of the offering <ul style="list-style-type: none"> Timeline Effort 	<ul style="list-style-type: none"> Alignment score of business idea with CBS Business Growth Objectives Service delivers unique customer (or user) benefits Service offers customer (or user) excellent commercial model (compelling value proposition) Differentiated service in the eyes of customer/user CBS Credibility and Thought Leadership in this domain Level of accessibility of the required technology (internally and externally) Market size Market growth & future potential Margins earned by others in this market CBS Competitiveness – how intense & tough the competition is (i.e. commoditized market, pocket of opportunities) Customers' need/desire for the service Interesting impact on financial bottom lines (realistic financial projections)
<ul style="list-style-type: none"> Project plan 	<ul style="list-style-type: none"> Investments (FTE and €) Activities Planning 	<ul style="list-style-type: none"> Next Stage Investment in Resources Project Team Mobilisation Timelines , Dependencies, Risks, Milestones

Figure 6.7 Gate 2 from concept stage to design stage [11]

Table 6.3 Relation between activities of gate 2 and BASE/X

Alignment score of business idea with CBS Business Growth Objective	These criteria do not relate to layers of business level pyramid of BASE/X. This criterion has to be checked independently by the innovation project team.	
Service delivers unique customer (or user) benefits	<p>This question can be answered from the value in use block of the <i>service dominant strategy canvas</i>.</p> <p>If the service is targeted at a specific customer group, then this question can be answered by preparing <i>business model radar</i> with concrete value-in-use delivered by the service.</p>	<p>Yes, and then proceed. No then is it worth changing the strategy?</p> <p>Yes, then the idea might require changes in all the layers of business level pyramid.</p> <p>No, then discard the idea.</p> <p>If the service is targeted at a specific customer group then proceed with preparing the business model radar with concrete value-in-use that the service will deliver to the unique customer segment.</p>

<p>Service offers customer (or user) excellent commercial model (compelling value proposition)</p> <p>Differentiated service in the eyes of customer/user</p> <p>Customers' need/desire for the service</p>	<p>These questions can be answered from the <i>business model radar</i> by checking the concrete value in use for the customer.</p>	<p>Does the customer receive a concrete value in use from the new service that aligns with the abstract value in use in the service dominant strategy canvas :</p> <p>Yes and then proceed with preparing the business model radar.</p> <p>No, discard the idea.</p>
<p>CBS Credibility and Thought Leadership in this domain</p>	<p>These criteria do not relate to layers of business level pyramid of BASE/X. These criteria have to be checked independently by the innovation project team.</p>	
<p>Level of accessibility of the required technology (internally and externally)</p>		
<p>Market size</p>		
<p>Market growth & future potential</p>		
<p>Margins earned by others in this market</p>		
<p>CBS Competitiveness – how intense & tough the competition is (i.e. commoditized market, pocket of opportunities)</p>		
<p>Interesting impact on financial bottom lines (realistic financial projections)</p>		

Gate 3 - Figure 6.8 shows the details of gate 3, which is between the design stage and Pilot (Implementation) stage in Figure 6.5. In Table 6.4 we analyze how the activities of gate 3 relate to layers of business level pyramid from BASE/X.

Gate #3: Develop the Service		
Deliverables	Insights	Criteria
<ul style="list-style-type: none"> ▪ Business and Innovation plan ▪ Implementation plan 	<ul style="list-style-type: none"> ▪ Updated final market analysis ▪ Updated customer analysis ▪ Updated Business model <ul style="list-style-type: none"> ▪ CBS offering ▪ Go to market strategy ▪ Business case ▪ Implementation plan <ul style="list-style-type: none"> ▪ Transition handbook ▪ Technical architecture ▪ Delivery blueprint ▪ Roll out planning ▪ Test plan ▪ Evaluation plan ▪ Typical Services SLAs ▪ Activities planning ▪ Quality standards ▪ Staffing and resource requirements 	<ul style="list-style-type: none"> ▪ Project leverages our core competences in: <ul style="list-style-type: none"> ▪ Management Consulting ▪ Operations ▪ Marketing (i.e. Brand, Market Awareness, Comms) ▪ Technology ▪ Delivery ▪ Distribution & Sales Force ▪ Familiarity of technology to our business ▪ Our delivery track record on these types of projects ▪ Technical results to date (Proof of Concept) ▪ Our ability to customise service based on specific customer requirements ▪ Size of financial opportunity (Are forecasted returns greater than costs?) ▪ Financial return (NPV, ECV, IRR) ▪ Certainty of financial estimates ▪ Upfront investment in relation to expected returns ▪ Replicable & scalable delivery model (not just "one-off") ▪ Level of risk & ability to address risks
<ul style="list-style-type: none"> ▪ Project plan 	<ul style="list-style-type: none"> ▪ Investments (FTE and €) ▪ Activities ▪ Planning 	<ul style="list-style-type: none"> ▪ Next Stage Investment in Resources ▪ Project Team Mobilisation ▪ Timelines, Dependencies, Risks, Milestones

Figure 6.8 Gate 3 from design stage to Pilot (Implementation) stage [11]

Table 6.4 Relation between activities of gate 3 and BASE/X

Project leverages our core competences in: <ul style="list-style-type: none"> • Management Consulting • Operations • Marketing (i.e. Brand, Market Awareness, Comms) • Technology • Delivery • Distribution & Sales Force 	These criteria do not relate to layers of business level pyramid of BASE/X. These criteria have to be checked independently by the innovation project team.
Familiarity of technology to our business	This question can be answered by
Our delivery track record on	If we find that we have

these types of projects	checking the <i>service compositions</i> that are delivered to the customers and the concrete value-in-use from the <i>business model</i> radars.	delivered similar service compositions and/or similar value-in-use then we can get a delivery track record.
Technical results to date (Proof of Concept)	This question can be answered by designing the <i>service composition</i> for the new service idea.	Service compositions will be the proof of concept.
Our ability to customize service based on specific customer requirements Replicable & scalable delivery model (not just "one-off")	These questions can be answered by checking whether the new service idea can be customized into several <i>service compositions</i> .	If yes then the new service idea will add to the capability of customizing specific service requirements.
Size of financial opportunity (Are forecasted returns greater than costs?)	This question can be qualitatively answered from the cost and benefits of the actors in the <i>business model radar</i> .	If yes then proceed with the new service idea the concrete value-in-use of the new service has business value in terms of cost and benefits.
Financial return (NPV, ECV, IRR) Certainty of financial estimates Upfront investment in relation to expected returns Level of risk & ability to address risks	These criteria do not relate to layers of business level pyramid of BASE/X. These criteria have to be checked independently by the innovation project team.	

Gate 4 - Figure 6.7 shows the details of gate 4, which is between the concept stage and design stage in Figure 6.5. In Table 6.5 we analyze how the activities of gate 2 relate to layers of business level pyramid from BASE/X.

Gate #4: From Implementation to Operations		
Deliverables	Insights	Criteria
<ul style="list-style-type: none"> ▪ Business and Innovation plan ▪ Transition Handbook ▪ Operations plan 	<ul style="list-style-type: none"> ▪ Updated #3 deliverables according to lessons learnt from pilot implementation ▪ Operations handbook <ul style="list-style-type: none"> ▪ Service Level agreements ▪ Operational excellence plan ▪ Business performance reporting ▪ Back office IT integration ▪ Dedicated resource allocation ▪ Activities planning ▪ Quality standards ▪ Staffing and resource requirements 	<ul style="list-style-type: none"> ▪ Is it Real? <ul style="list-style-type: none"> ▪ Is the market real? ▪ Is the Service Real? ▪ Can we Win it? <ul style="list-style-type: none"> ▪ Can the service be competitive? ▪ Can CBS be competitive? ▪ Is it Worth doing it? <ul style="list-style-type: none"> ▪ Will the Service be profitable at an acceptable risk? (Benchmark from Pilot implementation) ▪ Does bringing the service to market make strategic sense in respect of strategic growth in the next years? ▪ Replicable and scalable delivery model
<ul style="list-style-type: none"> ▪ Project plan 	<ul style="list-style-type: none"> ▪ Investments (FTE and €) ▪ Activities ▪ Planning 	<ul style="list-style-type: none"> ▪ Next Stage Investment in Resources ▪ Project Team Mobilisation ▪ Timelines , Dependencies, Risks, Milestones

Figure 6.9 Gate 4 from Pilot (Implementation) stage to Pilot Operation (Test) stage [11]

Table 6.5 Relation between activities of gate 4 and BASE/X

Is it Real? Is the market real? Is the Service Real?	These criteria do not relate to layers of business level pyramid of BASE/X. These criteria have to be checked independently by the innovation project team.	
Can we Win it? Can the service be competitive? Can CBS be competitive?		
Replicable and scalable delivery model	This question can be answered by checking whether we have reusable <i>service modules</i> using which we can offer scalable <i>service compositions</i> .	Answer is yes if we can have the required service compositions using the existing service modules. If yes then proceed. If no then discard the idea because we want to replicate the delivery model without developing new service modules

<p>Is it Worth doing it? Will the Service be profitable at an acceptable risk? (Benchmark from Pilot implementation) Does bringing the service to market make strategic sense in respect of strategic growth in the next years?</p>	<p>These criteria do not relate to layers of business level pyramid of BASE/X. These criteria have to be checked independently by the innovation project team.</p>
---	--

Gate 5 - Figure 6.10 shows the details of gate 4, which is between the concept stage and design stage in Figure 6.5. In Table 6.6 we analyze how the activities of gate 2 relate to layers of business level pyramid from BASE/X.

Gate #5: From Pilot to Market Launch		
Deliverables	Insights	Criteria
<ul style="list-style-type: none"> ▪ Business and innovation plan ▪ Productized service components ▪ Marketing & Sales plan 	<ul style="list-style-type: none"> ▪ Updated #3 and #4 deliverables according lessons learnt pilot ▪ Service component(s) kits <ul style="list-style-type: none"> • Service component blueprint • Implementation handbook • Operations handbook ▪ Marketing & Sales roll out plan <ul style="list-style-type: none"> • Marketing & Sales team • Trainings • Marcoms content • Marketing campaign • Sales pipeline • Pricing Models 	<ul style="list-style-type: none"> ▪ Is it Real? <ul style="list-style-type: none"> ▪ Is the market real? ▪ Is the Service Real? ▪ Can we Win it? <ul style="list-style-type: none"> ▪ Can the service be competitive? ▪ Can CBS be competitive? ▪ Is it Worth doing it? <ul style="list-style-type: none"> ▪ Will the Service be profitable at an acceptable risk? (Benchmark from Pilot Operations) ▪ Does bringing the service to market make strategic sense in respect of strategic growth in the next 3 years?
<ul style="list-style-type: none"> ▪ Project plan 	<ul style="list-style-type: none"> ▪ Investments (FTE and €) ▪ Activities ▪ Planning 	<ul style="list-style-type: none"> ▪ Next Stage Investment in Resources ▪ Project Team Mobilisation ▪ Timelines , Dependencies, Risks, Milestones

Figure 6.10 Gate 4 from Pilot Operation (Test) stage to market launch stage [11]

Table 6.6 Relation between activities of gate 5 and BASE/X

<p>Is it Real? Is the market real? Is the Service Real?</p>	<p>These criteria do not relate to layers of business level pyramid of BASE/X. These criteria have to be checked independently by the innovation project team.</p>
<p>Can we Win it?</p>	

Can the service be competitive? Can CBS be competitive?	
Is it Worth doing it? Will the Service be profitable at an acceptable risk? (Benchmark from Pilot implementation) Does bringing the service to market make strategic sense in respect of strategic growth in the next years?	

Getting back to research question 4 from section 1.3.4, on how CBS can accelerate time to market for service innovation business ideas. The main problem here is that the stage gate model is not efficient in processing service innovation ideas because for every idea, complete gate should be checked. CBS requires not only to be fast in processing innovation idea but also to be sure about risks and benefits in launching the idea.

We take the following approach to make the ideation process efficient for CBS:

- Step 1 – classify the idea as one of the layers of BASE/X. The idea can be classified as a
 - Strategy related idea
 - Business model related idea
 - Service Composition related idea
 - Service Module related idea
- Step 2 – Customize the checks in each of the stages of the stage gate for each type of idea.

In the next section of this chapter we will elaborate each of the steps in details.

6.3. Classification of service innovation ideas

In this section of the report, we will discuss on how to classify an idea into one of the layers of business level pyramid of BASE/X. The idea can be one the following category: Strategy or Business model or Service Composition or Service module. We will define a set of criteria on how to categorize an idea into one of the category.

6.3.1. Service innovation idea related to strategic change

An innovation idea will be classified as a strategy related idea if it has one or more of the characteristics listed below:

S1. If the service innovation idea is bringing a change in the value-in-use of the service dominant strategy canvas - Here the change means that the service innovation idea has an influence on the value-in-use block of the service dominant strategy canvas.

S2. If the service innovation idea is bringing a change in the service ecosystem of the service dominant strategy canvas- Here the change means that the service innovation idea will influence the list of core services and/or enriching services in the service dominant strategy canvas.

S3. If the service innovation idea is bringing a change in the collaboration management part of the service dominant strategy canvas- here the change means that there are new core partners or enriching partners who can contribute to the abstract value-in-use. So the service innovation idea might influence the collaboration management for core relationships and enriching relationships.

6.3.2. Service innovation idea related to changes in business model

An innovation idea will be classified as a business model related idea if it has one or more of the characteristics listed below:

BM1. If the service innovation idea is bringing a change in the concrete value-in-use- here the change means that there is a new customer group that brings in a new concrete value-in-use. Here we need a twofold check in the following way:

- a. Does the new concrete value-in-use strategically align with the abstract value-in-use in the service dominant strategy canvas?
 - i. If the answer here is yes then we categorize the service innovation idea as a business model related idea and we need to design new business model radar with the new concrete value-in-use at the centre.
- b. If the answer here is no then we check is it worth changing the strategy layer:
 - i. If yes then we proceed with adapting the strategy layer.
 - ii. If the answer is no then discard the idea because the service innovation idea requires a change in the strategy layer of the business pyramid which is the stable layer of the framework [30].

BM2. If the service innovation idea is changing the actor co-production activity- here the change means that one of the actors in the business model radar has new co-production activity that contributes to the concrete value-in-use. This is a feasible category of idea because this category of idea only influences the business model layer in the business level pyramid which is the dynamic layer [30].

BM3. If the service innovation idea is bringing a change in the actor value proposition- here the change means that value proposition of one or more actors in the business model radar is changing. This is also a feasible category of idea because this category of idea only influences the business model layer in the business level pyramid which is the dynamic layer [30].

6.3.3. Service innovation idea related to changes in service composition

An innovation idea will be classified as a service composition related idea if it has one or more of the characteristics listed below:

SC1. If the service innovation idea is bringing in a new service case scenario- here the change means that CBS is getting a completely new service case scenario which requires a new service compositions. This is a feasible change because service composition layer in the business level pyramid is also a dynamic layer [30]

SC2. if there is a new service module- here the changes comes when there is a new service module which means to find out how the new service module can be used in service compositions. In this case the service innovation idea undergoes the following twofold check:

- a. Does the required new service module align with the service dominant strategy canvas
 - i. If the answer is yes then we proceed with developing the service module.
 - ii. If the answer here is no then we check is it worth changing the strategy layer:
 - ii.1. If yes then we proceed with adapting the strategy layer.
 - ii.2. If the answer is no then discard the idea because the service innovation idea requires a change in the strategy layer of the business pyramid which is the stable layer of the framework [30].

6.3.4. Service innovation idea related to changes in service module

SM1. If we have a new core or enriching services in service dominant strategy canvas- Here it means to have a service innovation idea that brings in a new core service or a new enriching service for which CBS might have to develop new service module(s).

In Figure 6.11 we present an overview of classification of idea as per each layer of business pyramid of BASE/X framework.

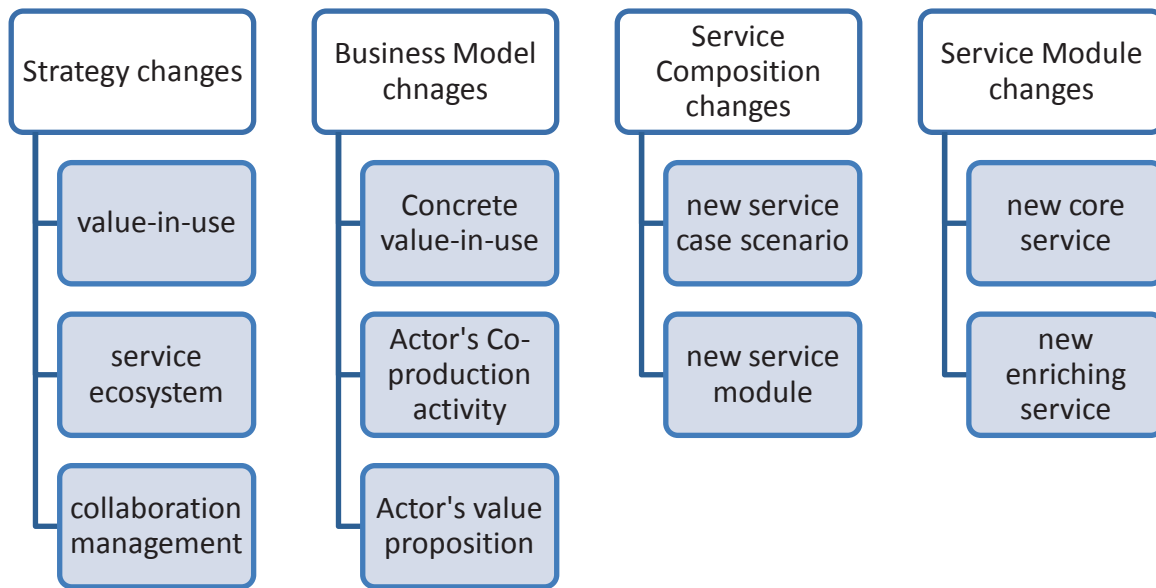


Figure 6.11 List of category of service innovation idea according to the layers of business pyramid of BASE/X

6.4. Processing of categorized idea through stage gate model

In this section of the report, we will discuss how each category of idea can be processed through the stage gate model.

6.4.1. Strategy related idea

A service innovation idea is categorized as a strategy related idea if it fits into one or more criterion discussed in Section 6.3.1. As strategy is the stable layer of the business level pyramid of BASE/X framework and it is linked to the identity of an organization. So a strategy related idea should be thoroughly and carefully checked. Hence it should go through all the stages of the stage gate model to come to go or kill decision

6.4.2. Business model related idea

A service innovation idea is categorized as a business model related idea if it fits into one or more criterion discussed in Section 6.3.2. For this category, if the service innovation idea falls into a purely business model related idea such as BM2 and BM3, which means that the idea only requires changes in the business model. Then we skip gate 1 and gate 2 and come directly to the design stage because gate 1 and gate 2 are required to check the strategic feasibility of the service innovation idea. Otherwise we check the strategic alignment of the idea and take the actions shown for the category BM1.

6.4.3. Service composition related idea

A service innovation idea is categorized as a service composition related idea if it fits into one or more criterion discussed in Section 6.3.3. For this category, if the service innovation idea falls into a purely service composition related idea such as SC1, which means that the idea only requires a new service case scenario which is possible with the existing service modules. Then we skip gate 1 and gate 2 and come directly to the design stage because gate 1 and gate 2 are required to check the strategic feasibility of the service innovation idea. Otherwise we check the strategic alignment of the idea and take the actions shown for the category SC2.

6.4.4. Service module related idea

As service module is also a stable layer of the business level pyramid of BASE/X framework as they are based on the resources of an organization, so similar to strategy related idea a service module related idea also has to go through all the stages of the stage gate model to come to go or kill decision.

6.5. Results

From the discussion in section model we find that the ideas that fall under the category of strategy or service modules has to go through all the stages of the stage gate model. But service innovation ideas that fall under the business model category or service composition category can be directly taken to the stage of design. This is because we explained in section 6.4.2 and 6.4.3 that if an idea is strategically aligned with the service dominant strategy canvas then we skip the checks in gate 1 and gate 2.

Also the layers of service composition and business model are the dynamic layer of the pyramid so they change often. Having a simpler check for service composition and business model related idea with reduced stage and gates will make the processing of stage gate faster for such idea for CBS. Also CBS becomes agile in adapting to the changes related to dynamic layer of the pyramid.

We also found in section 6.4 that some of the checks in the stage gate model are not supported by the concepts business level pyramid of BASE/X. Thus when we combine BASE/X and stage gate model together, we see that the stage gate model compliments BASE/X framework with following elements:

- To find the size of financial benefits with the service innovation project
- To know whether the returns on the service will be greater than costs
- To know the level of risks and ability to address the risks
- Will the service be profitable at an acceptable level of risk?

6.6. Conclusions

In this chapter of the report we answered research question 4 from section 1.3.4 which is how CBS can accelerate time to market for service innovation business ideas? We explained in this chapter how to classify service innovation idea and then process the stages and gates accordingly. We found that service innovation ideas related business model layer or service composition layer of the business level

pyramid of BASE/X can be processed with reduced number of checks. We also conclude that classifying the idea is useful to determine which idea will influence the stable layers of business level pyramid of BASE/X and which idea will influence the dynamic layers of business level pyramid of BASE/X. With this classification we will have the knowledge of risks involved with the service innovation idea.

Also we found that stage gate model complements business level pyramid of BASE/X with the checks that are not supported by tools and concepts from the business level pyramid of BASE/X.

7. Validations

In this chapter we will discuss the details of evaluation of the quality aspects of the blueprint of architectural design. Our goal is to qualitatively evaluate the quality aspects of the architectural design from research questions from Section 1.3.5.

In order to validate the blueprint of architectural design, we conducted a workshop to present BASE/X as reference framework for designing the service dominant enterprise architectural framework for CBS and applicability of BASE/X to overcome the challenges with the complete team of strategic business unit of Canon Business Services. The aim of the workshop was to present the problem statement, research question and our approach to solve them. At the end of the workshop, we asked audiences to fill in a questionnaire which had questions on the quality aspects of the blueprint design of the architecture. Questions can be found in Appendix E:

Also we conducted interviews with service developers from strategic business unit of Canon Business Services, Nederland to evaluate suitability and applicability of the quality aspects of the solutions to the research questions. In total, we conducted 7 evaluation interviews where each of them was between 30 to 45 minutes long. In the sections below we discuss the objective, approach and conclusions of the evaluations. Interview questions can be found in Appendix F:

7.1. Evaluation through workshop

The goal of the workshop was to explain the concepts of BASE/X framework, how we used BASE/X to solve the research questions and what the solutions are. Explaining the concepts of BASE/X was important because most of team members of SBU team were not aware of the concepts of BASE/X. We presented invoice processing service as a running case example to show how applicability of BASE/X framework to invoice processing answers the research questions.

After the presentation, audiences were asked to fill in a questionnaire (questions can be found in Appendix E: on the quality aspects of the blueprint design of the architecture. We chose to keep the questions open ended to get reason based opinion from the audiences. We chose this strategy to get answers which will not only evaluate the blueprint of the architecture but will also help the management team of CBS-SBU to understand the challenges that team is facing in their daily business. The questionnaire was circulated to 22 members of the SBU team of which 13 responded with filled in answers. Below we provide the outcomes of the response that we received.

1. Among the key challenges discussed in service innovation, which one(s) do “YOU” recognize as key challenge(s) and WHY?

We asked this question to know how audiences prioritize the key challenges and what their reason for prioritization is. In Table 7.1 we discuss the answers received for this question.

Table 7.1 Summary of answers received for question 1

Questions	Number of respondents agreeing or disagreeing
i. Alignment between disciplines	9 out of 13 respondents said that this is not a main challenge for the SBU team.
ii. Reusability in development of services	10 out of 13 respondents considered this is a relevant challenge.
iii. Offering scalable service model to customers	11 out of 13 respondents considered this is a relevant challenge.
iv. Accelerated time to market	5 out of 13 respondents considered this is a relevant challenge.

2. Which other service innovation challenges do you have?

We asked this question to know whether what other challenges exist in the team and can we answer them in the scope of this project. We received following answers for the above question:

- Can BASE/X address to innovate outside the boundaries of CBS
- Can BASE/X provide a clear picture on who does what in the organization?
- How can we overcome the challenges of capturing customer demands?
- How can we collaborate between different geographical regions?
- How can we prioritize between business needs and customer needs?
- How can we fit in existing services into BASE/X framework?

3. Can you choose one challenge that “YOU” think is the most important to be resolved? What is the reason for your choice?

We asked this question to get an input to plan for the interviews. Answer to this question gives a clear indication on which quality aspect can be evaluated by which expert from the SBU team.

Table 7.2 Summary of answers received for question 1

Questions	Number of respondents	Reasons
Alignment between disciplines	None	We did not receive any reason on why Alignment between disciplines is not an important challenge for CBS.
Reusability in development of services	6 out of 13	<ul style="list-style-type: none"> • To make effective use of existing service bits. • For consistency and efficient service development. • To reduce time-to-market • To have consistent development material not to double work • For service optimization.
Offering scalable service	6 out of 13	<ul style="list-style-type: none"> • Business cannot survive economically without

model to customers		<p>enough scalability.</p> <ul style="list-style-type: none"> • Competitors are increasingly leveraging scalability. • It will help us to build upon the knowledge we already acquire and it will lead to accelerate the time to market • High level of scalability would provide and added value of to high level of customization of services to the customers.
Accelerated time to market	1 out of 13	CBS has developed (global) service offerings and now the main objective is to “sell” our service offerings to our Canon counterparts. This takes time and effort to launch the service offering kits.
AND Which other service innovation challenges do you have?	2 out of 13	Business model and capturing customer demand

We conclude from the responses we received for question1 and question 2 in the questionnaire Appendix E: that reusability of service module and capability to offer scalable services to customer are the main challenges for the SBU team of CBS.

4. Would you like to explore how Service Dominant Enterprise Architecture (SDEA) can help to address the challenge that you placed at the top position?

We asked this question to know opinion of the audiences on the approach that we followed in this project to solve the research questions. 11 out 13 respondents answered yes to the question with following reasons:

- To facilitate conversations with internal and external stakeholders.
- To keep the team together in achieving the goals.
- To have structured guidelines on what activities should be performed.
- To have a common methodology

5. What should be our next steps and why?

We asked this question to know opinion of the audiences on whether they accept the proposed architectural design using BASE/X as a reference framework. 11 out of 13 said that a service dominant architectural framework is definitely needed for the business services of CBS SBU. Moreover they also expressed interest in seeing more case studies on BASE/X. Many raised their concern on how BASE/X can be adopted as a reference framework for the business of CBS SBU.

6. What’s your takeaway of the BASE/X framework?

We also asked this question to know opinion of the audiences on whether they accept the proposed architectural design using BASE/X as a reference framework. 8 out of 13 respondents replied that they

consider BASE/X as an applicable framework that is applicable framework to the value added document outsourcing business of CBS to solve the existing challenges that they listed in question 1 and 2.

Based on the response that we received for questions 3, 4 and 5 we conclude that audiences agree on suitability and applicability of BASE/X as a reference framework to design the SDEA for CBS. Also the audiences agree that BASE/X is a useful tool to improve reusability of service modules in service development and to gain capability to make scalable service offerings to customers.

7.2. Conclusion from workshop

We received overall positive feedback for the questions in the questionnaire. We conclude from the responses that proposed blueprint design of the architecture using BASE/X framework as a reference framework is well accepted by the audience. Also we conclude from Table 7.1 and Table 7.2 that audiences agree over proposed blueprint design for improving reusability of the service modules and the concept of service compositions facilitates CBS in making scalable service offerings to its customers. For solution to research question 3 from Section 1.3, we see from the answers to question 3 and Table 7.2 Summary of answers received for question 1 Table 7.2 that audiences agreed that the proposed blueprint design is facilitating an improved alignment between internal and external stakeholders. From this response we conclude that we received positive feedback for solution proposed to research question 3 in Chapter 5 of the report.

For research question 4 from Section 1.3.4, the respondents agreed that improving time to market for service innovation idea is a relevant challenge. But we did not receive any overall remark on the solution because most of the audiences did not consider time to market as a primary challenge for CBS.

7.3. Evaluation through interviews

We created an abstract level of understanding with the presentation in the workshop session and collected opinion of the members of SBU team on the quality aspects of the proposed blueprint of the architectural design. After the workshop, we conducted interviews with the service developers of the SBU team. We chose to interview members from service development team because they are the developers of invoice processing service. So they can make a comparison between the two situations of having and not having an architectural framework.

We observed from the response to the questions in workshop that the members of the SBU team rated research question 1 and 2 as important challenges. Also interviewees had limited availability, so we decided to evaluate only research question 1 and 2 with service developers. Our aim was to take their opinion on the solutions to research question 1 and 2 from section 1.3.1 and 1.3.2 above and on the following benefits of applicability of BASE/X on invoice processing service from Section 4.6:

- i. Reduced development time to develop new services
- ii. Value added document outsourcing services becoming cheaper for customers
- iii. CBS gaining flexibility in providing services to its customers

We selected to evaluate the above listed benefits to receive a clear opinion on these benefits from the service developers. Questions are listed in Appendix F:

1. RQ1- How CBS can modularize its services that can be broken into reusable chunks? Do you agree that the concept of service modules, service catalogue and service compositions is answering the above question? Please mention the reason for your opinion.

The interviewees agreed that the concept of defining service module improves reusability by modularizing service development process and the concept of service catalogue is an important tool to define service modules at right level of granularity as shown in Section 3.1.3, Section 3.1.4, Section 4.4 and Section 4.5. To some extent the concept of reusing chunks in services is already their but it is not as structured as it can be by having architecture with BASE/X as a reference framework.

2. RQ2- How CBS can ensure a scalable service offering in the field of “value added outsourcing of document processing”? Do you agree that the concept of service case scenario and service compositions is answering the above question? Please mention the reason for your opinion.

For this question, service developers agreed that defining use cases in the form of service case scenarios and service compositions will ensure a scalable service offering as shown in Section 3.1.3 and Section 4.4. They reasoned their opinion that most document processing services share a common foundation. By identifying the service modules that are common between services will make it easy to upscale and downscale the services for customers. The concept of service composition will indeed provide the capability to offer scalable service by adding or detracting service modules.

3. What is your opinion on following? Please mention the reason for your opinion
 - i. Reduced development time to develop new services

The service developers agreed that the concepts in the layer of service compositions and service modules reduce the development time to develop new services as shown in Section 3.1.3, Section 3.1.4, Section 4.4 and Section 4.5. Although they also remarked that in their current practice they try to reduce the development by finding out the reusable components in the services. But application of BASE/X framework adds a structure in identifying the reusable service modules thus it will be easier for service developers to have reusability in service development.

- ii. Value added document outsourcing services becoming cheaper for customers

Here the service developers say that improved reusability results in reduced development time in developing services and reduced development time reduces cost and thus the services becomes cheaper. Also the customers can choose to scale up the services by only incurring the costs for the newly added service modules as shown in Section 4.5. One of the service developer also remarked that CBS could only achieve notable savings for customers if the process of sales and implementations of services will also have the concept of modularization in their process.

iii. CBS as a flexible service provider

Service developers agreed for this benefit. They reasoned this benefit that the concept of service modules (from Section 3.1.1 and Section 4.2) improves the flexibility by creating a portfolio of services instead of several service lines. Also the proposed architectural design provides a useful mechanism to easily accommodate changing requirements of customers. One of the service developer also remarked that service modules can be recombined and reused in different service compositions, which enhances making flexible service offerings to customers.

4. Do you see more possible benefits coming out of above mentioned concepts?

For this question we got the following response:

- Customer can have a clear understanding of the CBS service offerings through service catalogues.
- BASE/X provides a structured approach which can make strategy and research, service developers and business developers work together.

5. What challenges do you see in having a business level pyramid for CBS?

For this question we got the following response:

- How the framework can be applied to existing service kits.
- How the change management will take place to apply BASE/X framework.
- What will be the governance structure before and after applying BASE/X framework with roles and responsibilities?

7.4. Conclusion from interviews

Interviewees from the service developer team agree that the concept of service modules, service catalogue and service compositions modularize the services that can be broken into reusable chunks. They also agree that concept of service case scenario and service compositions ensure capability to provide scalable service offering in the field of value added outsourcing of document processing. Based on the responses we conclude to receive an overall positive feedback from the service developers. We did not ask the interviewees about solution to research question 3 from Section 1.3.3, still we got positive response that the proposed architectural design also improves alignment between the three disciplines of SBU teams namely strategy and research, service development and business development.

We also asked service developers for their feedback on the extra benefits of the proposed architectural design that we received in the response to the questions in the workshop. They also agreed on the following benefits from the proposed architectural design:

- i. Reduced development time to develop new services
- ii. Value added document outsourcing services becoming cheaper for customers
- iii. CBS gaining flexibility in providing services to its customers

The responses for the questions asked in the questionnaire from the workshop (Section 7.1) and the responses received in the interviews are aligned with each other. The respondents in both type of evaluation agree on the quality aspects of the proposed architectural design.

8. Conclusions

This project is directed towards research direction of the IS group focusing on the shift of asset oriented organizations towards a service dominant business environment. Our study was aiming at designing a blue print of service dominant enterprise architecture for Canon Business Services. We used BASE/X a business engineering framework for service-dominant business and its concepts, as reference to our design.

Section 8.1 summarizes the findings in view of the research goal that was set in Chapter 1. In Section 8.2 we discuss on the constraints and limitations of this project. In Section 8.3 we propose possible directions for future work for this project. We conclude the chapter with a reflection on the product of this study and the process utilized during the study.

8.1. Research Conclusions

The goal of the current project was defined as follows:

Goal of the project: *Design blueprint of service dominant enterprise architecture for Canon Business Services to be “Always Better” in service innovation projects.*

The approach we followed to design the targeted blueprint of the architecture was to study appropriate frameworks to select our reference framework. We did requirement analysis on the value added document outsourcing services of CBS to understand the required specifications for the blueprint design of the architecture. Based on requirement analysis we set some criteria to select the reference framework to design the blueprint. We studied literature on Service Oriented Architecture (SOA), Business Process Management (BPM), BOAT framework and BASE/X framework to make the selection. We decided to select BASE/X framework as our reference framework because it is the best fit in the criteria.

To design the blueprint of service dominant enterprise architecture for Canon Business Services, we prepared step by step guideline on how to fill in the layers of business level pyramid from BASE/X framework in Chapter 3. These step wise guideline were applied to invoice processing service offered by CBS in Chapter 4. Using the step wise guideline we filled in all the layers of business layer pyramid for CBS with the assumption that CBS only provides invoice processing service.

Through the entire course of the project we had four research questions to be answered. The first one is how CBS can modularize its services that can be broken into reusable chunks. Even though the architectural design is scoped to invoice processing service, we believe that the concepts from the layer of service modules from the business pyramid of BASE/X framework is an answer to this question. The second research question is to find out how CBS can ensure capability for scalable service offerings in the field of value added outsourcing of document processing. We discussed in Section 4.4 and Section 4.5 that the concepts in the service composition layer from the business pyramid of BASE/X framework answers this question.

The third research question is to find out how implementation of Enterprise Architecture based on service dominant business paradigm can improve the alignment between disciplines in the SBU team of CBS? We explained in Chapter 5 that the three disciplines of the SBU teams of CBS can be aligned with each other in the business pyramid of BASE/X. Also we explained how each discipline will support other disciplines by providing input and receiving output. With clear separation of responsibility of disciplines of CBS SBU, we believe that we have clearly answered this question.

And the last research question to be solved was how CBS can accelerate time to market for service innovation business ideas. We solved this problem in Chapter 6 by combining the stage gate model for new service development with the business level pyramid of BASE/X framework. Here we used BASE/X to classify service innovation idea and then customized the stage gate for each category of idea. We believe that customization of stage gate for each category of service innovation idea is making the stage gate model efficient. Thus in our opinion, the combination of stage gate model with BASE/X framework is making the ideation process efficient and it will accelerate time to market for service innovation business idea.

We discussed the quality of aspects of the proposed blueprint design of architecture with the experts from the SBU team of CBS in a workshop session and through interviews. Overall we received positive feedback from the audiences in the workshop and the interviewees from the service development team, even though some concepts are subjected to discussion (mainly how BASE/X can be applied to existing service kits and how change management will take place). The fact that the audiences perceived BASE/X as a suitable and applicable framework to solve the challenges and they responded with positive and encouraging feedback on the quality aspects of propose architectural design brought us to the conclusion that the project goal is achieved.

8.2. Limitations

One limitation of this project is that the architectural design is applied only to invoice processing service whereas CBS delivers a variety of value added document outsourcing service. Because of this, service developers raised their concern on applicability of the architectural design on the complete service domain of CBS. This concern can be addressed by applying the proposed architectural design on the complete service domain of CBS. This requires filling in the four layers of BASE/X framework in the similar way as we did for invoice processing service in Chapter 4.

Another limitation in the project is the fact that because of limited time and limited availability of people we did not interview experts from business development and strategy and research discipline. We chose to interview service developers because they showed a clear curiosity on the layers of service compositions and service modules in their response to the questionnaire in Appendix E: . Also the response to the questionnaire in workshop was clearly dominated by response from service developers. The results should be more generalized by taking opinions from the other two disciplines namely, business development and strategy and research.

8.3. Future work

The most logical extension to the project is to extend the blueprint of the architectural design to the complete service domain of CBS. This extension would also answer the concerns that we received in the response for questionnaire in the workshop and in the interviews.

Further research can be conducted on how the existing service kits can be fitted into BASE/X framework. Whether the existing service kits will remain as they are or they can also be fitted into the architectural framework. This research will answer the change management related concerns that we received in the workshop and interviews.

Also we did not touch the other two pyramids namely organizational pyramid and platform pyramid of BASE/X framework [23] [30]. The blue print of the architectural design will become concrete by extending the business layer pyramid with the other two pyramids.

The complete architecture design that covers all the three pyramids of BASE/X framework should be further complemented with the stage gate model from Chapter 6. A service innovation idea can be first classified into an idea belonging to one of the three pyramids and then classify the idea as per the layer of the pyramid to which it belongs. This will make the stage gate model even more efficient because we can clearly classify the influence of the idea to one of the pyramids and then to one or more layers of pyramid.

8.4. Reflection

It is important to reflect on the process that was applied to realize this project. The gathered experience can serve as a guideline for better execution of similar master thesis projects in future. An important step in such projects where goal is to design architecture is to set right design goals and the objectives right from the beginning of the study. A design project require a lot of information and discussions in order to find the right problem statement and research questions, and without setting the right objective at the beginning the project gets into risk of facing delays.

As the project required a lot of collaboration with domain experts to find already-developed project as case studies, it could have been better to plan this process in the earlier stages of project. Additionally, the design process requires an iterative approach of plan, check, action and do and it goes through a number of iteration before coming to the final stage. This should be considered in the planning. We should mention that since the project required a lot of collaboration with experts and professionals, extra work was done to discuss many aspects of the projects such as setting the goals, the scope and approach, explaining concepts of BASE/X to people who were not aware of, presenting results and taking decisions on certain stages. This work is generally not depicted in the report but had to be expected, scheduled and performed in addition to the deliverables of the project.

Defining the scope for the project is another important step in this type of project. Scope of the project should be clearly decided with respect to availability and accessibility of information and the given time frame. Having a clear scope is very useful in progressing in the project. The scoping decisions require

discussions with domain experts, so they should be planned and done at the earlier phase of the project. Right scoping of the project also helps in finishing the project in the given time frame.

Summarizing our observations regarding the project process, we can claim that setting clear objective, scoping the project to the given time frame and availability of information, selecting case study candidate and planning the phases of the project in the beginning of the study is of high importance. Additionally, improving the communication with the experts and specialists and having a clear approach during the design process would give some acceleration to such type of a project. Also a better planning to implement the feedbacks that we receive is also important.

Bibliography

- [1] S. Vandermerwe and J. Rada, "Servitization of Business: Adding Value by Adding Services," *Europtvn Management Journal*, vol. 6, no. 4, p. 314–324, 1988.
- [2] T. Baines, H. Lightfoot, J. Peppard, M. Johnson, A. Tiwari, E. Shehab and M. Swink, "Towards an operations strategy for product-centric servitization," *International Journal of Operations & Production Management*, vol. 29, no. 5, pp. 494 - 519, 2009.
- [3] P. Grefen, E. Lüftenegger, E. van der Linden and C. Weisleder, "BASE/X Business Agility through Cross-Organizational Service Engineering," Eindhoven, 2013.
- [4] C. Kowalkowski and D. Kindström, "Servitization in manufacturing firms," in *Aston Business School Spring Servitization Conference 2013: Servitization in the multi-organisation enterprise*, Birmingham , 2013.
- [5] D. C. Plummer and D. W. McCoy, "Achieving Agility: Defining Agility in an IT Context," Gartner, 2006.
- [6] G. Doucet, J. Götze, P. Saha and S. Bernard, "Coherency Management: Using Enterprise Architecture for Alignment, Agility, and Assurance," *Journal of Enterprise Architecture* 4, pp. 77-98, 2009.
- [7] W. Ulrich, "Business Architecture: Turning Strategy into Actionable Results," BrainStorm Group , 2014.
- [8] H. Lotriet, J. V. Loggerenberg and C. Chuang, "Towards Improving Enterprise Architecture Decision-Making through Service-Dominant Logic," in *PACIS*, 2010.
- [9] A. Tadahiko, "What is service science?," The Fujitsu Research Institute, Economic Research Center, Tokyo, 2005.
- [10] R. High, S. Kinder and S. Graham, "IBM's SOA Foundation An Architectural Introduction and Overview," IBM, 2005.
- [11] "Innovation Management Stage- Gate Process & Governance," Canon Business Services (Confidential), 2013.
- [12] G. G. Steunebrink, "The Servitization of Product - Oriented Companies," University of Twente, Twente, 2012.
- [13] J. Gao, Y. Yao, C. Y. Z. Valerie, L. Sun and L. Lin, "Service-oriented manufacturing: a new product pattern and manufacturing paradigm," *Journal of Intelligent Manufacturing*, vol. 22, no. 3, pp. 435-

446, 2011.

- [14] M. O. ' . Land, E. Proper, M. Waage, J. Cloo and C. Steghuis, *Enterprise Architecture Creating Value by Informed Governance*, Springer Berlin Heidelberg, 2009.
- [15] J. W. Ross, P. Weill and D. Robertson, *Enterprise Architecture as Strategy: Creating a Foundation for Business Execution*, Harvard Business School Press, 2006.
- [16] G. C. Lin, K. E. T. Desmond, ,. N. T. Htoon and N. V. Thuat, *A Fresh Graduate's Guide to Software Development Tools and Technologies*, National University of Singapore, 2011.
- [17] M. Weske, *Business Process Management, Concepts*, Potsdam: Springer, 2007.
- [18] C. Møller, C. J. Maack and R. D. Tan, "What is Business Process Management: A Two Stage Literature Review of an Emerging Field," in *Research and Practical Issues of Enterprise Information Systems II*, Springer US, 2008, pp. 19-31.
- [19] M. Weske, *Business Process Management, Concepts, L*, Potsdam: Springer, 2007.
- [20] J. Noel, "BPM and SOA: Better Together," IBM Corporation, 2005.
- [21] P. Grefen, *Mastering E-Business*, Routledge, 2010.
- [22] P. Grefen, *Mastering E-Business*, Routledge, 2010.
- [23] P. Grefen, "Achieving Business Agility through Service Engineering in Extended Business Networks - A BASE/X Primer," Eindhoven University of Technology, Eindhoven, 2014.
- [24] F. Iemenschot, "Service Offering Brochure_IP2,," Canon Business Service, Venlo, 2014.
- [25] E. Sabelnikova, "DO Brochure_MR," Canon Business Services, Venlo, 2014.
- [26] E. Lüftenegger, M. Comuzzi and P. Grefen, *The service dominant business model : a service focused conceptualization*, Eindhoven: Technische Universiteit Eindhoven, 2013.
- [27] T. Erl, *SOA Design Patterns*, 1st ed., Prentice Hall/PearsonPTR, 2009, pp. 117, 118 and 155.
- [28] R. F. Lusch and S. L. Vargo, "The Service-Dominant Mindset," in *Service Science, Management and Engineering Education for the 21st Century*, Springer US, 2008, pp. 89-96.
- [29] T. Erl, *SOA: principles of service design*, 1st edition, Prentice Hall/PearsonPTR, 2008.
- [30] P. Grefen, E. Lüftenegger, E. v. d. Linden and C. Weisleder, "BASE/X: Business Agility through Cross-Organizational Service Engineering - The Business and Service Design Approach developed in the

CoProFind Project," Eindhoven, 2014.

- [31] R. Ghannoum, "Service Level Agreements," Swedish Institute of Computer Science, 2005.
- [32] *Invoice processing Project Scoping Session (Confidential to CBS)*, 2013.
- [33] K. Traganos, "Designing a Standard Architecture for Service Management based on the BASE/X framework," Eindhoven, 2014.
- [34] T. Clark, B. S. Barn and S. Oussena, "A Method for Enterprise Architecture Alignment," in *Practice-Driven Research on Enterprise Transformation*, Heidelberg, Springer Berlin, 2012, pp. 48-76.
- [35] P. Verleg, "Organizational Structure of CBS (Confidential)".
- [36] R. G. Cooper, "Perspective: The Stage-Gates Idea-to-Launch Process—Update, What's New, and NexGen Systems," *Journal of Product Innovation Management*, vol. 25, no. 3, p. 213–232, 2008.
- [37] R. G. Cooper, *Winning at New Products: Accelerating the Process from Idea to Launch*, Perseus Books, 2001.
- [38] S. Nurcan and R. Schmidt, "Service Oriented Enterprise-Architecture for enterprise engineering introduction," in *Enterprise Distributed Object Computing Conference Workshops, 2009. EDOCW 2009. 13th*, Auckland, 2009.
- [39] P. Grefen, R. Dijkman and Z. Yan, "Business Process Model Repositories - Framework and Survey," *Information and Software Technology*, pp. 380-395, 4 April 2012.
- [40] M. Rosen, "Business Processes start with Capabilities," <http://www.bptrends.com/>, 2010.
- [41] W. Ulrich, "How Business Rules Relate to Business Processes from a Business Person's Point of View," Minneapolis, 2010.
- [42] L. Goldberg and B. v. Halle, "Business Process Models, Business Rules and The Decision Model: How They Should Work Together," BrainStorm Group.
- [43] C. Baragoin, M. Marini, C. Morgan, O. Mueller, A. Perkins and K. H. Yim, *Building the Operational Data Store on DB2 UDB Using IBM Data Replication, WebSphere MQ Family, and DB2 Warehouse Manager*, California: IBM, 2001.
- [44] M. Dumas, M. La Rosa, J. Mendling and H. A. Reijers, *Fundamentals of Business Process Management*, Heidelberg: Springer-Verlag, 2013.

Appendix A: List of articles studied

Tables below show a list of papers per topic. First row is the title of the paper, second row is the source of the paper, third row is the name of authors, fourth row is the year of publication and the last row tells whether the paper was selected to conduct the literature study.

Business process management (BPM)

Table 8.1 List of papers on BPM

Title	Source	Authors	Year of publication	Selected
The Road to a Business Process Architecture: An Overview of Approaches and their Use	http://scholar.google.nl	Remco Dijkman, Irene Vanderfeesten, Hajo A. Reijers	2011	No
Business process model repositories – Framework and survey	webofknowledge.com	Zhiqiang Yan, Remco Dijkman, Paul Grefen	2012	No
Conceptual framework and architecture for service mediating workflow management	webofknowledge.com	Jinmin Hu, Paul Grefen	2003	No
The Next Decade of BPM	webofknowledge.com	Phil Gilbert	2010	No
Business process management: a boundary less approach to modern competitiveness	http://scholar.google.nl	Mohamed Zairi	1997	No
Business Process Management Concepts, Languages, Architectures	http://link.springer.com	Mathias Weske	2007	Yes
BPM vs. Workflow	http://scholar.google.nl	Nathaniel Palmer	2008	Yes
Requirements for Business Process Management Systems Supporting Business Process Agility	http://link.springer.com	Richard Heiningner	2012	No
A Success Model for Business Process Management Implementation	http://scholar.google.nl	A. Zeinab Dabaghkashani, B. Nastsran Hajiheydari, and C. Manijeh Haghghinasab	2012	No
BPM in Practice: Who Is Doing What?	http://link.springer.com	Hajo A. Reijers, Sander van Wijk, Bela Mutschler, and Maarten Leurs	2010	No
IT Requirements of Business	http://link.springer.com	Susanne Patig, Vanessa	2010	No

Process Management in Practice – An Empirical Study		Casanova-Brito, and Barbara Vögeli		
Web services and business process management	http://ieeexplore.ieee.org	F. Leymann, D. Roller, M.-T. Schmidt	2002	No
Business Process Management: A Survey	http://link.springer.com	Wil M.P. van der Aalst, Arthur H.M. ter Hofstede, and Mathias Weske	2003	Yes
Semantic Business Process Management: A Vision Towards Using Semantic Web Services for Business Process Management	http://ieeexplore.ieee.org	Martin Hepp, Frank Leymann, John Domingue, Alexander Wahler, and Dieter Fensel	2005	No
A Cloud-Based BPM Architecture with User-End Distribution of Non-Compute-Intensive Activities and Sensitive Data	webofknowledge.com	Yan-Bo Han, Jun-Yi Sun, Gui-Ling Wang, Hou-Fu Li	2010	No
What is Business Process Management: A Two Stage Literature Review of an Emerging Field	webofknowledge.com	Charles Møller, Carsten J. Maack, Rune D. Tan	2008	Yes
Fundamentals of Business Process Management	http://link.springer.com	Marlon Dumas	2013	Yes
Workflow and Process Management	http://books.google.nl	Carol Prior	2003	Yes

Service Oriented Architecture (SOA)

Table 8.2 List of papers on SOA

Title	Source	Authors	Year of publication	Selected
SOA Principles of service design	http://scholar.google.nl	Thomas Erl	2008	No
IBM's SOA Foundation An Architectural Introduction and Overview	http://scholar.google.nl	Rob High, Jr., Stephen Kinder, Steve Graham	2005	Yes
Impact of SOA on Enterprise Information Architectures	http://scholar.google.nl	Paul Patrick	2005	Yes
Enterprise Interoperability with SOA: a Survey of Service Composition Approaches	webofknowledge.com	Rodrigo Mantovaneli Pessoa, Eduardo Silva, Marten van Sinderen, Dick A. C. Quartel, Luís Ferreira Pires	2008	Yes

Service Redundancy Strategies in Service-Oriented Architectures	webofknowledge.com	Nicholas R. May, Heinz W. Schmidt, Ian E. Thomas	2009	No
A Quick Introduction to SOA	http://scholar.google.nl	Mahmoud Mohamed AbdAllah, Waseim Hashem Mahjoub	2013	No
The Enterprise Service Bus: Making service-oriented architecture real	http://ieeexplore.ieee.org	M.-T Schmidt, B. Hutchison, P. Lambros, R. Phippen,	2005	Yes

BPM and SOA

Table 8.3 List of papers on BPM and SOA

Title	Source	Authors	Year of publication	Selected
BPM and SOA: A Strategic Alliance	http://scholar.google.nl	Dr. Gopala Krishna Behara	2006	Yes
A Roadmap towards the Convergence of Business Process Management and Service Oriented Architecture	http://dl.acm.org	Faouzi Kamoun	2007	No
Achieving Business Agility by Integrating SOA and BPM Technology	http://ieeexplore.ieee.org	Chen Ling, Lu Xin	2009	No
Service Identification: BPM and SOA Handshake	http://scholar.google.nl	Srikanth Inaganti & Gopala Krishna Behara	2007	
BPM and SOA	http://scholar.google.nl	Mike Rosen	2011	Yes
The Architecture of a Secure Business-Process-Management System in Service-Oriented Environments	http://ieeexplore.ieee.org	Jens M"uller and Klemens B"ohm	2011	No
SOA and BPM Are Better Together	http://scholar.google.nl	Paolo Malinverno, Janelle B. Hill	2007	Yes
BPM Meets SOA	http://link.springer.com	F. A. Cummins	2010	Yes
BPM and SOA: Better Together	http://scholar.google.nl	Jasmine Noel	2005	Yes
BPM and SOA: Synergies and Challenges	http://link.springer.com	Thomas Woodley, Stephane Gagnon	2005	Yes

Frameworks for servitization

Table 8.4 List of papers on servitization

Title	Source	Authors	Year of publication	Selected
The servitization of manufacturing; a review of literature," <i>Journal of Manufacturing Technology Management</i>	http://scholar.google.nl	T.S. Baines , H.W. Lightfoot, O. Benedettini, J.M. Kay	2009	Yes
Changing times and changing timescales: the servitization of manufacturing," <i>International Journal of Operations & Production Management</i>	http://scholar.google.nl	Adrian Wilkinson, Andy Dainty, Andy Neely	2009	Yes
A framework for information systems architecture	ieeexplore.ieee.org	JA Zachman	1987	Yes
BASE/X: Business Agility through Cross-Organizational Service Engineering - The Business and Service Design Approach developed in the CoProFind Project	http://scholar.google.nl	Paul Grefen, Egon Lüftenegger, Eric van der Linden, Caren Weisleder	2013	Yes
Business Information System Architecture reader	Study material for 1BM41 - Business information systems architecture (BISA)	P. Grefen	2012	Yes
Above the Clouds: A Berkeley View of Cloud	http://scholar.google.nl	Michael Armbrust, Armando Fox, Rean Griffith, Anthony D. Joseph, Randy H. Katz, Andrew Konwinski, Gunho Lee, David A. Patterson, Ariel Rabkin, Ion Stoica Matei Zaharia	2009	Yes
Business Process Technology and the Cloud: defining a Business Process Cloud Platform	TU/e library	V. Stoitsev, P.W.P.J Grefen	2012	Yes
Mastering E-Business	Study material for 1BM10 – Electronic business	P.W.P.J Grefen	2010	Yes

Appendix B: Aspects of BOAT framework

Business (B): The business aspect in the framework defines the goal of the e-business. The business goal is defined by providing answer to the questions on existence of the e-business and what should be reached from the e-business [21]. The business aspect is described in terms of scope of parties, objects and time. There are three types of e-business parties: business party (B), consumer party (C) and government party (G). The business objects categorized as physical goods, digital goods, services, financial goods and hybrid objects. The business objects are the things that can be exchanged between the partners. Four types of time scope are: static, semi-dynamic, dynamic and ultra-dynamic [21].

Organization (O): The organization aspect describes the organizational structures, business processes and business functions to achieve the goals defined in the B aspect [21]. The O aspect takes into account following three types of parties:

- *Consumer*: the party that needs the product or service
- *Provider*: the party that offers the product or service
- *Intermediary*: the party that acts as an auxiliary between the consumer and provider.

The O aspect distinguishes between the inter-organizational and intra-organizational structures. Inter-organizational structure takes into account the interaction between the above mentioned three parties in the e-business scenario. In this organizational structure, first the consumer and the provider are identified and then the intermediaries are identified to support the collaboration between consumer and provider.

Inter-organizational structure takes into account the internal organizational structure between the above mentioned three parties. This structure also distinguishes between the front-end and the back-end of the e-business. Front-end consists of the organizational modules that result in the actual e-business collaboration between the parties. Back-end is the internally oriented core business functions [21].

The business function in the O aspect also classifies business functions as front-end business functions and back-end business functions.

The business process in the O aspect specifies the sequence in which the business functions should be executed to achieve the business goal. Apart from organizational structures, business processes and business functions, O aspect also take into account the operation management and change management. Operation management is important to organize the execution of the business processes and business functions. Whereas change management is important for the agility of the business to adapt to the fast changing market scenarios [21].

The architecture aspect describes the conceptual structure of the information system that supports the O aspect [21]. The architecture acts as the pivot between the B and O aspect on one side and technology on the other side. This aspect defines the functional software systems that are required to support the business functions and the interfaces that help those systems to communicate. Reference architecture in this aspect is used to design the system architecture for a proven system within the organization.

This aspect has three aggregation levels of architecture:

- i. Market level – to describe how the relation between multiple parties is implemented using the software systems.
- ii. Party level – to refine the market level architecture. In party level architecture the black boxes of the market level architecture are detailed. Details about the interfaces between the front end and the back end system are shown and also the platform systems such as workflow management system, database system and the middleware are detailed out.
- iii. System level – this is the refinement of one part of the party level architecture of the front-end or the back-end system. It describes the system structure for a specific business scenario.

Technology (T): The technology aspect describes how the architecture from the A aspect can be realized. T aspect covers the hardware and software platforms and the communication protocols [27]. There are four distinguished classes of technology in this aspect:

Internet and web technology – this is the bare basic for an e-business to provide the communication and collaboration platform using standard languages such as HTML or XML and protocols such as HTTP.

Advanced platform technology – it provides a top layer to internet and web technology to facilitate the interoperability between functional modules in the context of languages, protocols and mechanisms for exchanging information between software modules.

Aspect oriented technology – this class of technology is to provide support to specific aspect such as security, data management, performance etc.

Function – oriented technology – this class of technology provides support to specific function such as business intelligence, e-catalog etc.

Appendix C: Service catalogue for service modules and service domains

Table 8.5 Service catalogue for Assessment Service

Service name		<i>Assessment Service</i>		
General service description				
Service to service domain		Consultancy service		
Service functionality in terms of value-in-use		<i>Analyze the as-is situation of customer and propose a solution design.</i>		
Business resources used by service		Solution designing tools and solution repository		
Service classification				
Mission critical or Non-mission-critical	MC	Remarks	MC because quality of analysis is important to deliver the right value-in-use to the customer.	
Commodity differentiation or	Commodity	Remarks	Differentiating because it contributes to the unique value in use of the invoice processing service.	
Internal or external	Internal if not then externally available with right SLA.	Remarks	Internal	
Service functions				
Function	Functionality	Input	Output	SLA
Analyze_as-is_situation	Analyze the current situation of the customer	Document	Analysis report	The analysis will cover the current situation.
Solution_design	Design solution for the customers to deliver the value-in-use	Analysis report	Solution design	Solution design will show how the value-in-use improves the current situation of customer

Table 8.6 Service catalogue for Validate data

Service name		<i>Validate data</i>		
General service description				
Service to service domain		Pre-processing documents		
Service functionality in terms of value-in-use		Validate correctness of digitized data.		
Business resources used by service		Solution designing tools and solution repository		
Service classification				
Mission critical or Non-mission-critical	MC	Remarks	MC because correctness of digitized is highly important for	

			correct processing of documents.
Commodity differentiation or	Commodity	Remarks	Commodity because this service functions is not unique.
Internal or external	Internal if not then externally available with right SLA.	Remarks	External with right SLA.
Service functions			
Function	Functionality	Input	Output
Validate_digitized_data	Check the data in the digital version of the original document	Original document	Validated digital document
			SLA All digital documents will be validated to 99% of accuracy.

Table 8.7 Service catalogue for Import file

Service name		<i>Import File</i>		
General service description				
Service to service domain		Analyzing documents		
Service functionality in terms of value-in-use		Upload file of validated documents for processing for efficient processing		
Business resources used by service		XML fetcher		
Service classification				
Mission critical or Non-mission-critical	Non MC	Remarks	Non MC because the service function can be done with automation.	
Commodity differentiation or	Commodity	Remarks	Commodity because this service functions is not unique.	
Internal or external	Internal if not then externally available with right SLA.	Remarks	External with right SLA.	
Service functions				
Function	Functionality	Input	Output	SLA
Import_doc	Upload validated document into the application for processing	Validated digital document	Message to confirm upload of document	All digital documents will be uploaded to 99% of accuracy.

Table 8.8 Service catalogue for Extract Index and Classify

Service name		<i>Extract Index and Classify</i>		
General service description				
Service to service domain		Analyzing documents		
Service functionality in terms of value-in-use		Extract relevant information from documents,		

		index and classify the documents		
Business resources used by service		XML fetcher and classifier		
Service classification				
Mission critical or Non-mission-critical	MC	Remarks	Easy information retrieval contributes directly to the value-in-use of efficient processing of documents.	
Commodity differentiation or	Commodity	Remarks	Commodity because this service functions is not unique.	
Internal or external	Internal if not then externally available with right SLA.	Remarks	External with right SLA.	
Service functions				
Function	Functionality	Input	Output	SLA
Extract_information	Upload validated document into the application for processing	Validated digital document	Extracted information for processing of documents	Extracted information will be correct to 95% of accuracy.
Add_index	Add index to the documents	Validated digital document	Indexed documents	All documents will be indexed
Classify_documents	Classify documents into classes	Indexed documents	Classified documents	All indexed documents will be classified

Table 8.9 Service catalogue for Deliver Documents

Service name		<i>Deliver Documents</i>		
General service description				
Service to service domain		Post processing documents		
Service functionality in terms of value-in-use		Delivering processed documents		
Business resources used by service		Delivery service executor and Delivery service platform		
Service classification				
Mission critical or Non-mission-critical	Non MC	Remarks	Non MC because this is not a unique service module that differentiated CBS with its competitors.	
Commodity differentiation or	Commodity	Remarks	Commodity because this service functions is not unique.	
Internal or external	Internal if not then externally available with right SLA.	Remarks	External with right SLA.	
Service functions				
Function	Functionality	Input	Output	SLA
Deliver_document	Deliver processed document to the	Processed document	Delivered document and	Documents will be delivered to

	agreed location		message confirming the delivery.	99% of accuracy of being delivered at right location.
--	-----------------	--	----------------------------------	---

Table 8.10 Service catalogue for Archive Documents

Service name		<i>Archive Documents</i>		
General service description				
Service to service domain		Post processing documents		
Service functionality in terms of value-in-use		Archiving processed documents		
Business resources used by service		Archival service executor and Archiving service platform		
Service classification				
Mission critical or Non-mission-critical	Non MC	Remarks	Non MC because this is not a unique service module that differentiated CBS with its competitors.	
Commodity differentiation	Commodity	Remarks	Commodity because this service functions is not unique.	
Internal or external	Internal if not then externally available with right SLA.	Remarks	External with right SLA.	
Service functions				
Function	Functionality	Input	Output	SLA
Archive_document	Archive processed document to the agreed location	Processed document	Archived document and message confirming the archival.	Documents will be archived to 99% of accuracy of being archived at right location.

Table 8.11 Service catalogue for Content based indexing

Service name		<i>Content based indexing</i>		
General service description				
Service to service domain		Advanced processing of documents		
Service functionality in terms of value-in-use		Efficient retrieval of documents		
Business resources used by service		Software executor and XML fetcher, Indexing application		
Service classification				
Mission critical or Non-mission-critical	MC	Remarks	MC because this adds to the value in use of efficient processing of documents.	
Commodity differentiation	Differentiating	Remarks	Differentiating because with this service module customer can	

			customize its requirements to index documents.
Internal or external	Internal if not then externally available with right SLA.	Remarks	External with right SLA.
Service functions			
Function	Functionality	Input	Output
Index_document	Documents indexed as per the agreed set of tags.	Processed document	Indexed document
			99% of the documents will be indexed as per the agreed set of tags.

Table 8.12 Service catalogue for Automated approval

Service name		<i>Automated approval</i>		
General service description				
Service to service domain		Advanced processing of documents		
Service functionality in terms of value-in-use		Automated approval of documents		
Business resources used by service		Document solution executor and Therefore document solutions		
Service classification				
Mission critical or Non-mission-critical	MC	Remarks	MC because this adds to the value in use of efficient processing of documents.	
Commodity differentiation or	Differentiating	Remarks	Differentiating because with this service module customer gets faster and automated processing of invoices.	
Internal or external	Internal if not then externally available with right SLA.	Remarks	External with right SLA.	
Service functions				
Function	Functionality	Input	Output	SLA
Approve_document	Documents automatically sent for approval.	Processed document	Document that is either approved or rejected for further processing.	The approval process will be finished within 5 days.

Appendix D: Granularity check for service modules

Table 8.13 Granularity check for assessment service

Class	Name	Outcome
Why	Right Context	Yes, because analyzing the as-is situation for the customers helps in designing a tailor-made value added solution design that can ensure improved efficiency and reduced processing cost.
	Right goal	Yes, because assessment service will give a clear idea to the customer that invoice processing services is not just about efficient processing of invoices. Invoice processing when combined with extra value added services can make the data in invoices for analytics as well.
What	Right size	Yes, assessment service is the starting point for every value added document outsourcing service of CBS.
	Right scope	No because this is the only service module that provides assessment service to the customers.
Who	Right actor	Yes, CBS consultants provide the assessment service.
	Right beneficiary	Yes, the finance management unit is the beneficiary.
When	Right start	Yes, assessment service is executed whenever a potential customer is found.
	Right end	Yes, assessment service ends after the customer either agrees or degrades to get a proposal for service design.

Table 8.14 Granularity check for Prepare Document

Class	Name	Outcome
Why	Right Context	Yes, because document preparation will be needed in every value added document outsourcing service.
	Right goal	Yes because the customer will understand that digitization of documents makes document processing efficient.
What	Right size	Yes, because every value added document outsourcing service has to deal with a varying format of document. And it is important to convert documents into one format.
	Right scope	No because this is the only service module that deals with preparing and scanning documents for processing.
Who	Right actor	Yes, scanning service provider
	Right beneficiary	Yes, finance management unit.
When	Right start	Yes, when the documents are received

	Right end	Yes, after the documents are digitized.
--	-----------	---

Table 8.15 Granularity check for Capture image

Class	Name	Outcome
Why	Right Context	Yes because every value added document outsourcing service has to capture image from the digitized documents for further processing.
	Right goal	No, so capture image is classified as a building block
What	Right size	
	Right scope	
Who	Right actor	
	Right beneficiary	
When	Right start	
	Right end	

Table 8.16 Granularity check for Validate data

Class	Name	Outcome
Why	Right Context	Yes, because the services guarantee reduced error in processing.
	Right goal	Yes, because the customer understands that the services ensure that the right data is processed.
What	Right size	Yes because the data to be processed will be validated for correctness in every service.
	Right scope	No, because this is the only service modules where data is ensured to be correct.
Who	Right actor	Yes, consultants from software service providers.
	Right beneficiary	Yes, finance management unit.
When	Right start	Yes, after the documents are digitized and ready to be processed.
	Right end	Yes, when the CBS consultant has validated all the digitized data.

Table 8.17 Granularity check for Import image

Class	Name	Outcome
Why	Right Context	Yes, because in every service the digitized files has to be converted into one file format that can be uploaded into the applications for processing.
	Right goal	Yes, because customer understands why we say that document processing is automated.
What	Right size	Yes, because it will be efficient in every value added document outsourcing service to have documents in one file format.
	Right scope	No, because this is the only service module that converts all documents in one file format.
Who	Right actor	Yes, consultants from software service providers.
	Right beneficiary	Yes, finance management unit.

When	Right start	Yes, after the digitized documents are validated to be correct.
	Right end	Yes, when all the documents to be processed are in ready in one format.

Table 8.18 Granularity check for Improve quality

Class	Name	Outcome
Why	Right Context	Yes, because the service adds quality to the value-in-use of the services.
	Right goal	No, this does not transform the state of the customer perception of the value in use. This is rather a building block for the service module of import image.
What	Right size	
	Right scope	
Who	Right actor	
	Right beneficiary	
When	Right start	
	Right end	

Table 8.19 Granularity check for Extract, index and classify

Class	Name	Outcome
Why	Right Context	Yes, because this service module makes information retrieval efficient and contributes to the efficiency in document processing.
	Right goal	Yes because the customer gets an efficient information retrieval service as well.
What	Right size	Yes, because efficient retrieval of information is useful for other document processing services.
	Right scope	No this is a unique service module.
Who	Right actor	Yes, consultants from software service providers.
	Right beneficiary	Yes, finance management unit.
When	Right start	Yes, after the documents are ready in one format.
	Right end	Yes, after the documents are indexed and classified based on extracted data.

Table 8.20 Granularity check for Deliver documents

Class	Name	Outcome
Why	Right Context	Yes, because the service module contributes in providing end to end value added document outsourcing service.
	Right goal	Yes, because the customer understands the meaning of one stop shop for document processing.
What	Right size	Yes because most of the document processing service will perform delivery of documents.
	Right scope	No because this is the only service module that provides delivery service.

Who	Right actor	Document delivery service provider.
	Right beneficiary	Document management unit of customer.
When	Right start	Yes, after the document is ready to be delivered.
	Right end	Yes, after the document is delivered at the agreed location.

Table 8.21 Granularity check for Archive documents

Class	Name	Outcome
Why	Right Context	Yes, because the service module contributes in providing end to end value added document outsourcing service.
	Right goal	Yes, because the customer understands the meaning of one stop shop for document processing.
What	Right size	Yes because most of the document processing service will perform archiving of documents.
	Right scope	No because this is the only service module that provides archiving service.
Who	Right actor	Document archiving service provider.
	Right beneficiary	Document management unit of customer.
When	Right start	Yes, after the document is ready to be archived.
	Right end	Yes, after the document is archived at the agreed location.

Table 8.22 Granularity check for Manual validation

Class	Name	Outcome
Why	Right Context	Yes, because this service module ensures that the documents are processed correctly.
	Right goal	Yes, with this service customer understands how the documents are processed with no duplicate information.
What	Right size	Yes, this service module can be combined in any service where we want to guarantee correct processing of documents.
	Right scope	No because it has a functional overlap with service module of validate data. So we combine this service module with validate data service module.
Who	Right actor	
	Right beneficiary	
When	Right start	
	Right end	

Table 8.23 Granularity check for Content based indexing

Class	Name	Outcome
Why	Right Context	Yes because this service module contributes to the value in use of the service provided.
	Right goal	Yes because with this service module customer can customize its indexing requirements.
What	Right size	Yes because this service module can be used in any service where the customer wants to customize its indexing requirements.
	Right scope	No because this is the only service module where customer can specify their indexing requirement.
Who	Right actor	Yes CBS consultants
	Right beneficiary	Document management unit of customer.
When	Right start	Yes, when the customer asks for content based indexing
	Right end	Yes when all the documents as per requirements from the customer are processed.

Table 8.24 Automated approval workflow

Class	Name	Outcome
Why	Right Context	Yes, , because the service module contributes in providing end to end value added document outsourcing service
	Right goal	Yes because with this service modules customer can clearly see how invoice processing is becoming faster.
What	Right size	Yes, this service module can be combined in any service that requires approval workflow.
	Right scope	No because this service module is unique in providing approval workflow.
Who	Right actor	Yes operator from the software service provider
	Right beneficiary	Yes accounts payable unit of customer.
When	Right start	Yes, when the document requires approval
	Right end	Yes when its decided when the approval rejection decision is ready

Appendix E: Questionnaire for the workshop How to become “Always Better” in service innovation

Dear Colleagues,

This study is part of the final thesis I am writing for my Master’s degree in Business Information Systems at Eindhoven University of Technology. I am supervised by Paul Grefen, Professor of Information Systems Group, School of Industrial Engineering, Eindhoven University of Technology. At Canon Business Services, I am guided by Paul Verleg.

Based on the presentation about service dominant enterprise architectural framework below are some questions to be answered. Answers to these questions would serve as an input to validate the solution to the research questions of my graduation assignment on “How Canon Business Services can be Always Better in service innovation projects?”

Please support your answers with reasons that will help me to draw conclusions.

1. Among the challenges discussed in the presentation which one(s) do “You” think are our key challenges in service innovation?
 - i. Alignment between disciplines. Why?
 - ii. Reusability in development of services. Why?
 - iii. Offering scalable service model to customers. Why?
 - iv. Accelerated time to market for new service ideas. Why?
2. Which other service innovation challenges do you have?
3. Can you choose one challenge that “YOU” think is the most important to be resolved? What is the reason for your choice?
4. Would you like to explore how Service Dominant Enterprise Architecture (SDEA) can help to address the challenge that you placed at the top position?
5. What should be our next steps and why?
6. What’s your takeaway of the BASE/X framework?

Name:

Function title in CBS:

Thank you for your time and input.

Appendix F: Interview questions

1. RQ1- How CBS can modularize its services that can be broken into reusable chunks? Do you agree that the concept of service modules, service catalogue and service compositions is answering the above question? Please mention the reason for your opinion.
2. RQ2- How CBS can ensure a scalable service offering in the field of “value added outsourcing of document processing”? Do you agree that the concept of service case scenario and service compositions is answering the above question? Please mention the reason for your opinion.
3. What is your opinion on following? Please mention the reason for your opinion
 - i. Reduced development time to develop new services
 - ii. Value added document outsourcing services becoming cheaper for customers
 - iii. CBS gaining flexibility in providing services to its customers
4. Do you see more possible benefits coming out of from above mentioned concepts?
5. What challenges do you see in having a business level pyramid for CBS?