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MSc Dissertation

MAPPING THE BUSINESS PROCESS LANDSCAPE OF AN ENTERPRISE: STUDY, ANALYSIS AND COMPARISON OF BUSINESS PROCESS REFERENCE FRAMEWORKS

by

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Abstract

Creating and sustaining a competitive advantage nowadays can prove to be a difficult task for an enterprise. This calls for effective business management that will help the enterprises take advantage of every useful management tool at their disposal. The present thesis aims to aid businesses in this effort, by mapping the business processes existing in the each process area and showing how business process frameworks can be used as a reference for this purpose. This study begins by presenting, studying and analysing the business process frameworks found in literature, giving the reader the ability to gain an understanding of the overall structure of an enterprise and its' operations. The comparison that takes place after that, gives the reader the opportunity to see the different ways the frameworks are organized, and the value each one of them adds. Gathering each framework's knowledge and seeing how different business sectors are organized, a business process framework proposal is developed that gives the reader the ability to study a non sector-specific business process map, useful for every enterprise. The final part of this thesis is a case study of a consulting company named consolut that seeks to examine the functionality of some of their existing processes using the SAP model as a reference.

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1. Introduction

1.1. Problem statement

In a world that is constantly changing, enterprises face the difficult and tricky task of trying to remain competitive and keep a sustainable competitive advantage with the limited resources they have. For this reason many business management tools have been developed, in order to aid and support an enterprise's journey to success.

One of these powerful tools is the management of the business processes of an enterprise. This "can determine the financial profile of the organizations and their potentiality to achieve their objective goals in an economic context" (Lohrmann and Reichert, 2013; Dumas et al., 2013; Wibig, 2013 as cited in Dragoslis, 2019). Business process mapping is one of the techniques used to achieve this, by allowing the manager to have a visual representation of the process.

Other useful tools are the business process frameworks. These can be used to organize the business processes, by defining their hierarchical relationships and proposing a process taxonomy. These frameworks can be used by enterprises as reference models in order to classify and improve their own processes.

Many business process frameworks have been developed for this purpose, some of them being a sector-specific and others having a more general perspective. Their differences are so many that trying to use and consult more than one of them for the same project can prove to be a difficult task.

A considerable amount of literature has been published on business process frameworks. However, there have been no studies that attempt to map the business process landscape of an enterprise by using them as a reference and this is the gap the present study aims to cover.

1.2. Aim and objectives

The aim of this thesis is to understand the business processes of an enterprise, the way these are organized and the reason for their existence, and develop an enterprise's business process map.

The analysis and study of the existing business process frameworks is the heart of our understanding of the way an enterprise is structured. A presentation and analysis of the business processes included in each framework will help us understand each area's object of interest as well as the relationships between these areas. The next step is to compare the frameworks for each process area, in order to better understand them and identify the similarities and differences between the frameworks.

This study leads to the development of a business process framework that is non sector-specific, which can be used by any enterprise for their business process management.

The last step in this thesis is a study of two processes own by consolut, a consulting company, in order to see how a business process framework can be used to improve the existing business processes of an enterprise.

1.3. Structure of the thesis

This thesis' first chapter is an introduction to the object of study. The second chapter gives a brief view of the concepts of business process management.

The third chapter is a presentation of the business process frameworks that will be used as a reference for our study. These frameworks are being compared in order to help us define the process areas of an enterprise.

The next part of the thesis, which is composed by chapters four and five, examines each of these process areas, by presenting, studying and analyzing the reference frameworks separately.

The sixth chapter is a business process framework proposal for multiple process areas, based on the findings of the previous chapters.

The seventh chapter is a case study research, aiming to compare two business processes of a consulting company named consolut and the respective proposed processes by SAP.

The final part of the thesis, chapter 8, is composed by conclusions and areas for further research are identified.

2. Literature review

This chapter aims to introduce the basic business process management concepts to the reader and help them understand the terminology used throughout the thesis.

2.1. Business Process

According to Dumas et al. (2013, p.2), “business processes are what companies do whenever they deliver a service or a product to customers”. Business processes are a group of activities, connected to each other, that create a result. This result could be customer-related, for instance the creation of a product, or a solution to an internal need, for example a vendor payment.

There are many definitions in literature regarding the business processes, the first of which appeared in 1990’s, however there isn’t one globally accepted. Each of these definitions highlights specific aspects of the process, depending on what field the author comes from. For example according to Agerfalk (1999) “A business process consists of activities ordered in a structured way with the purpose of providing valuable results to the customer” and according to Davenport and Short (1990) “Business process is a set of logically related tasks performed to achieve a defined business outcome” (Georgoulakos, 2019). In 2003 Lindsay, Downs and Lunn attempted to find a general definition for business processes. According to their study “A process is thus a specific ordering of work activities across time and place with a beginning, an end and clearly identified inputs and outputs: a structure for action”. Doomun and Jungum (2008) state that a business process consists of a series of entities within the enterprise, linked one after another, that use enterprise’s resources. In general, business processes determine the optimum use of the resources, which is what makes them essential for the lifeline and the competitive advantage of any enterprise.

Every business process is defined by the steps that are being followed, the parties that are being affected and the enterprise’s goals, as Figure 1 indicates. Processes are susceptible to change, thus if any of the above parameters is modified, the process itself is modified too (Smith and Fingar, 2003).

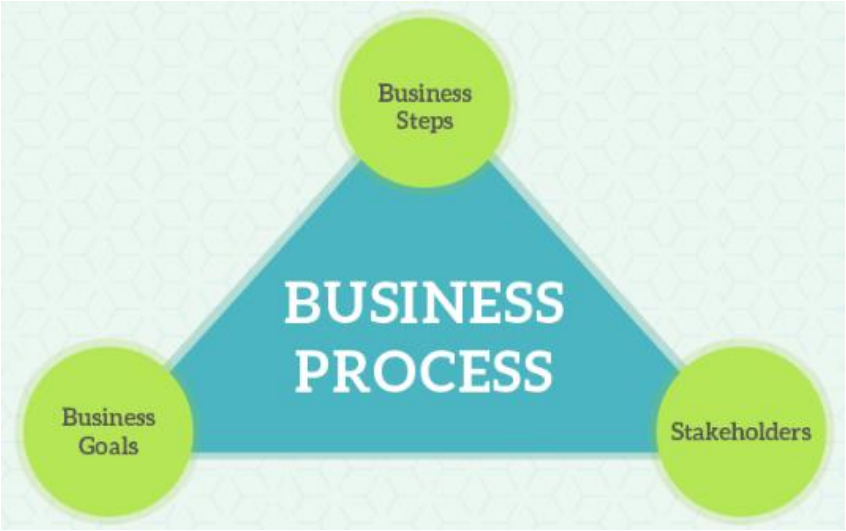


Figure 1: Business process overview (Kissflow, 2019)

2.2. Business Process Management

Business processes are highly subject to management methods, for instance planning, monitoring and controlling (Koontz et al., 1982 as cited in Lohrmann and Reichert, 2013).

“Business Process Management is defined as an administrative strategy that is consisted of a variety of concepts, methods, and techniques to support the identification, design, analysis, monitoring, reengineering and enactment of business processes” (Weske, 2012;Dumas et al., 2013; Van der Aalst, ter Hofstede and Weske, 2003 as cited in Dragoslis, 2019, p.6).

Many enterprises face difficulties trying to cope with the limited resources at their disposal. By focusing on the business processes, the enterprises can be more efficient and, more importantly, innovative and in alignment to today’s markets demand. Business process management (BPM) can be a powerful tool at their disposal, as BPM “discovers what you do, and then manages the lifecycle of improvement and optimization, in a way that translates directly to operation” (Smith and Fingar, 2003). Process management is necessary either for adopting new practices, or optimizing the ones that already exist.

According to Dumas et al. (2013), business process management is a cycle of six phases, as shown in Figure 2. These phases are: (1) process identification, where a business problem is posed, (2) process discovery, where the as-is state of the business processes is documented, (3) process analysis, in which the issues of the processes are being recognized, (4) process redesign or process improvement, where the issues of the previous phase are being addressed and a to-be model is proposed, (5) process implementation, in which the to-be process is performed and, last but not least, (6) process monitoring and controlling, where the performance of the new process is being analyzed and corrected. The cycle is repeated again for any new issues that might come up.

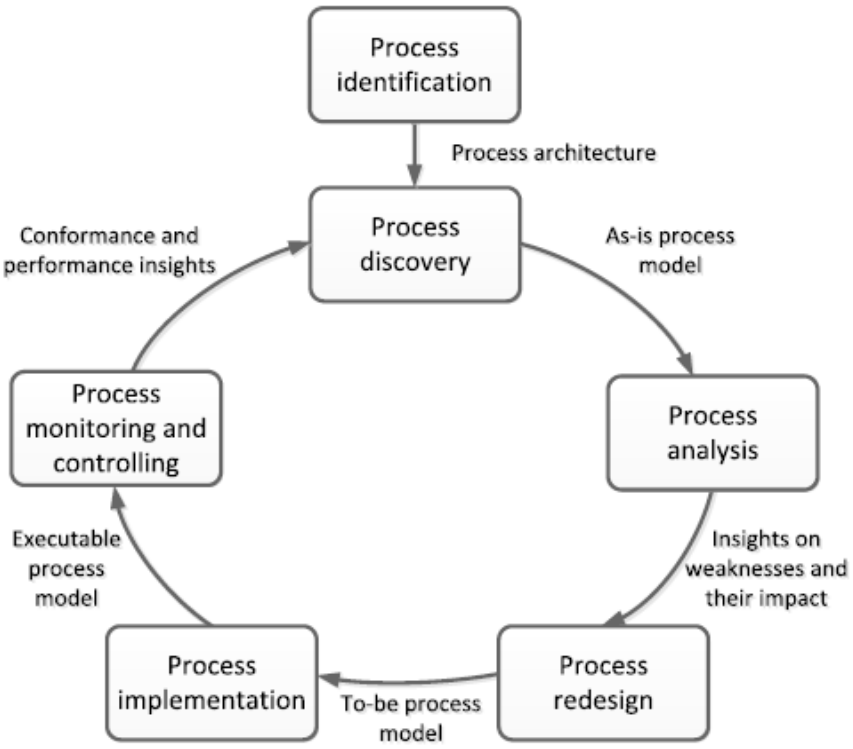


Figure 2: Business Process Management lifecycle (Dumas et al., 2013, pp.21)

2.3. Business Process Hierarchy

One of the key ideas in studying business processes is the use of hierarchy levels, i.e. grouping and presenting them in levels. These levels can be divided in three major categories, as shown in Figure 3, the high-level business processes that focus on the architectural analysis, the mid-level business processes that focus on the redesign and improvement of projects and, finally, the procedures, tasks and steps that focus on the task analysis (Harmon, 2014).

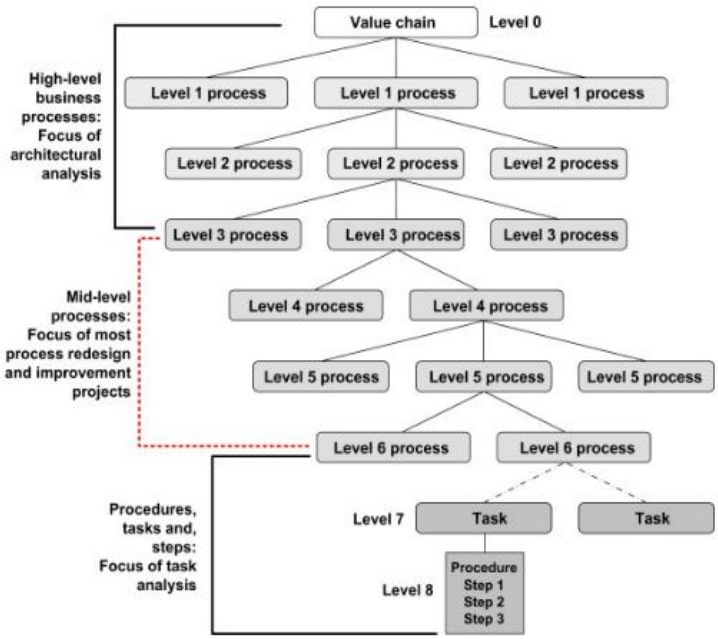


Figure 3: Levels of business process hierarchy (Harmon, 2014, p.187)

In general, the high-level of the business process analysis deals with problems associated to architectural analysis and the coordination between the departments. The mid-level analysis deals with problems that might come up within the same department or in some cases between a few departments of the enterprise, and focuses on the major processes and their sub-processes. Last but not least, the lowest level of the business process analysis deals with problems that usually involve individual actors or software systems, focusing on the analysis of specific activities (Harmon, 2014).

2.4. Business Process Framework

Business process frameworks can prove to be helpful for the businesses, as they provide a basic structure for their processes. What is more, in most cases, they also offer a list of processes that the businesses can adopt. Process frameworks can be a powerful tool both for improving current processes that are used in an enterprise, as well as introducing a new "way of thinking" for the organization. What is more, they provide a common business language for the businesses around the world (Smith, 2014).

According to Dragoslis (2019), even though business process frameworks offer a variety of managerial tools, in practice the most important factor is the way the manager interprets them, based on the level of experience they have.

One of the first and most influential business process categorization is Porter's Value Chain model. According to Porter (1985), "every firm is a collection of activities that are performed to design, produce, market, deliver and support its product". The processes are divided in two categories: (1) primary activities and (2) support activities. An overview of the model is shown in Figure 4, as it was first published in 1985 in his book "Competitive Advantage: Creating and sustaining superior performance".

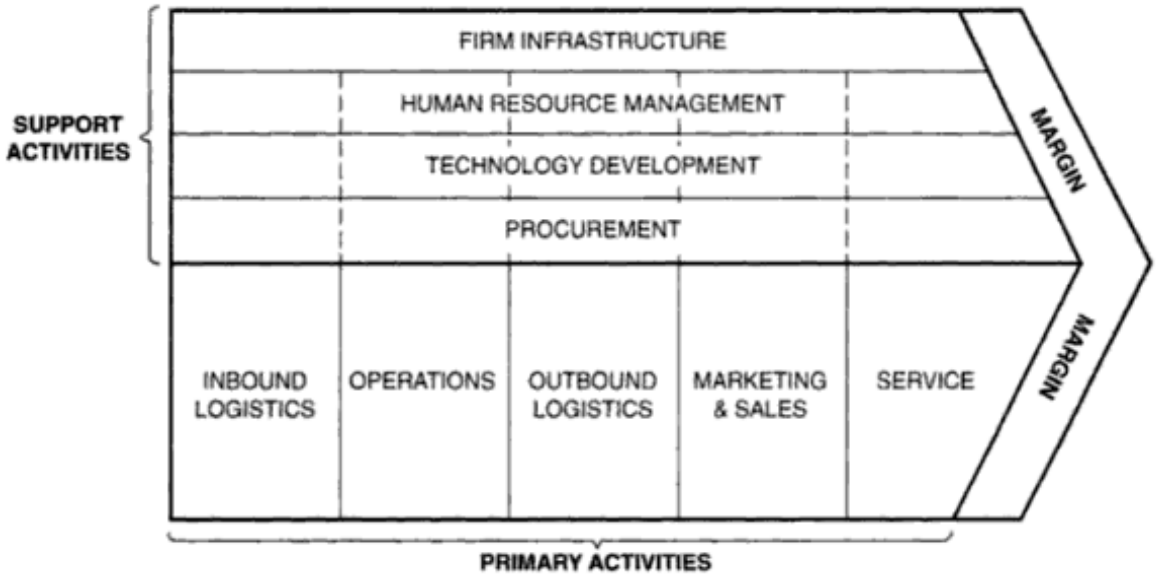


Figure 4: The generic value chain (Porter, 1985, as shown in Barnes, 2001. pp.52)

These activities could be referred to as process areas. The Capability Maturity Model Integration (CMMI) defines a Process Area as, " A process area is a cluster of related practices in an area that, when implemented collectively, satisfies a set of goals considered important for making improvement in that area" (Carnegie Mellon University, 2010).

Several detailed business process frameworks have been developed since Porter's Value Chain model, both for academic and application purposes, which analyze the processes on a high as well as a lower level. Most of these frameworks propose a categorization of their own. In the next section of this thesis we will present some of the business process frameworks that are known and used by enterprises.

3. Business Process Frameworks

In this chapter we will present the high-level (or first-level) analysis of seven frameworks, meaning the major process categories each of them has. The purpose of this chapter is to study these categories and understand which are the basic process areas of an enterprise, both core and support process areas, and move on to study each one of them in the next chapters of the thesis.

3.1. Frameworks

We will study seven frameworks, which are: (1) IMM Approach, (2) PCF, (3) SCOR, (4) eTOM, (5) COBIT, (6) Oracle and (7) SAP. Some of these come from the academic world and others derive from specific software. For each of the frameworks we provide all the relevant links in the "List of References" section. Any additional links needed will be added as a footnote in the text.

3.1.1. Integrated Modeling Method (IMM™)

The first framework we will study is an example of the Integrated Modelling Method (IMM™), and more specifically an example of the Business Function Modeling of this method. The IMM™ Approach is an integrated enterprise modeling method developed by John Owens[1]. This example refers to a motor spares company's business process hierarchy. Its simplicity will help us better understand the structure and the process areas of an enterprise and that's the reason we chose to present this model first. This motor spares company has six categories of business processes on a first level analysis (or six process areas), as shown in Figure 5. These categories describe the company's major operations, which are: (1) sell motor spares, (2) manufacture motor spares, (3) transport motor spares and raw materials, (4) manage revenue, (5) provide human resources and (6) provide IT resources & services. Each one of these categories includes a group of related processes.

[1] https://integrated-modeling-method.com/about/ (Accessed 15 September 2019)

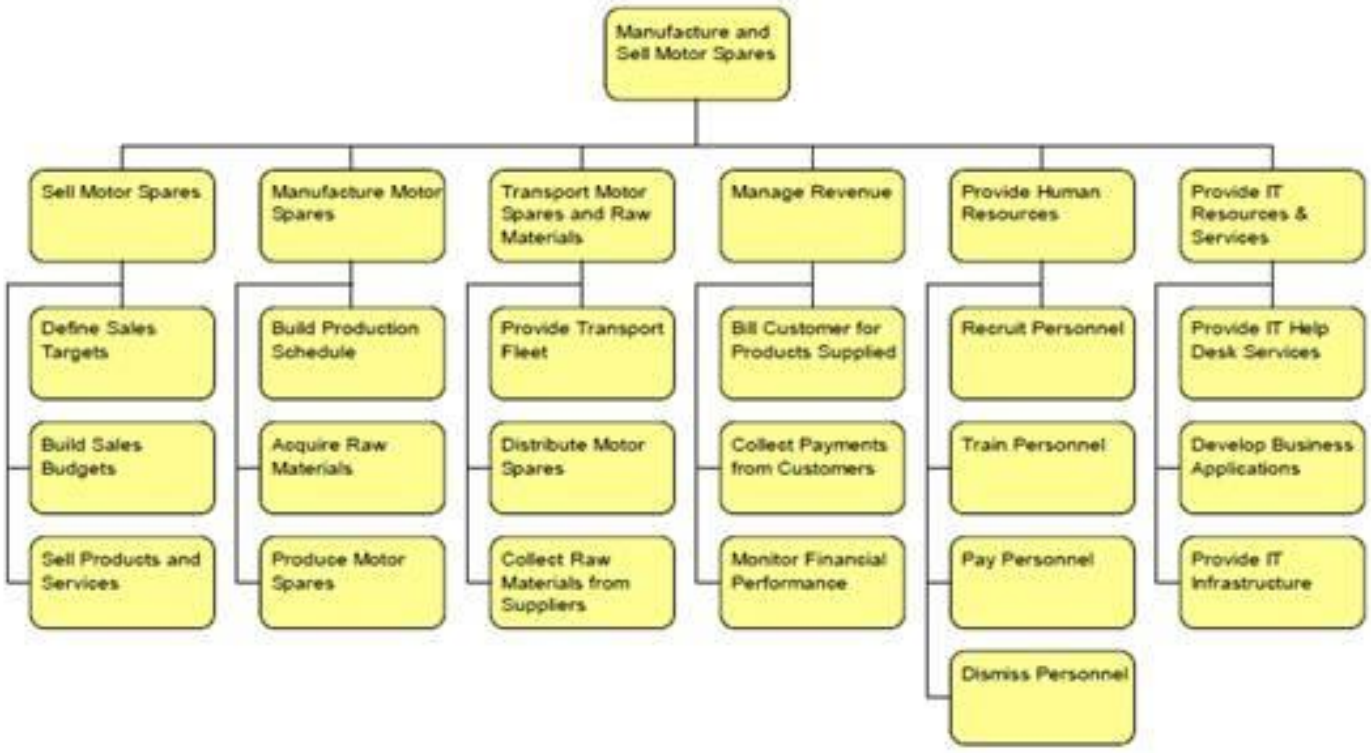


Figure 5: An example of the Function Catalogue of a motor spares company (Integrated Modeling Method, 2019)

The model does not provide any further information regarding the contents of these groups, so this is the lowest level of analysis available.

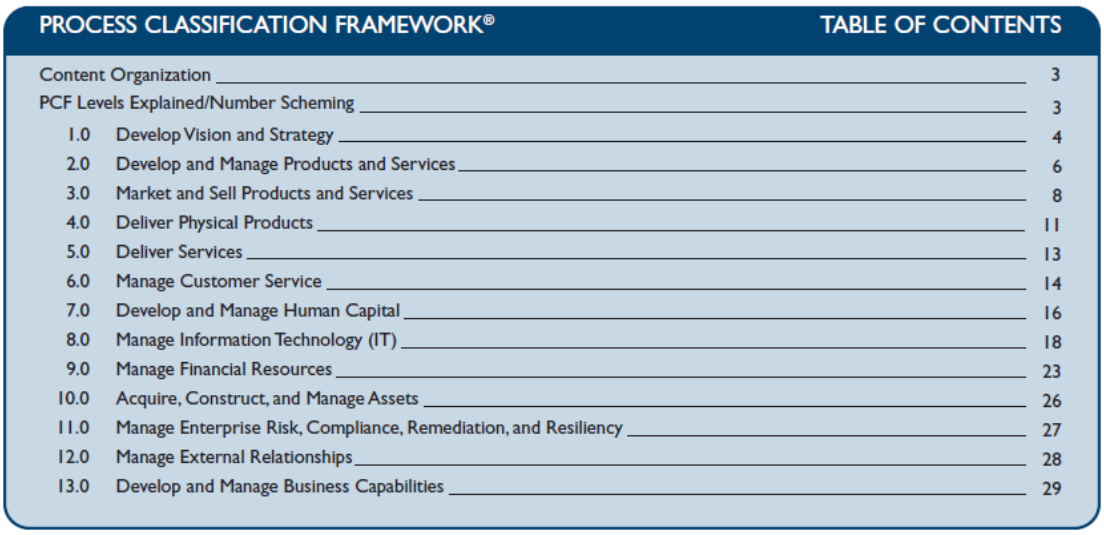
These process categories can be classified as core and support, based on Porter's Value Chain model. The first three are core and the rest of them are support process areas.

3.1.2. APQC's Process Classification Framework (PCF)

A widely known and very detailed business process framework is the Process Classification Framework (PCF), developed by the American Productivity & Quality Center (APQC)[2]. PCF is a standard for terminology on process definitions and measures for benchmarking (Srivastava & Mazzoleni, 2010). It was presented for the first time in 1992 as a tool to organize the business processes of its member

[2] https://www.apqc.org/ (Accessed 6 September 2019)

companies and create a common language for them. The version we will study is v.7.2.1, a first level analysis overview of which is shown in Figure 6 (APQC, 2018).



PROCESS CLASSIFICATION FRAMEWORK® TABLE OF CONTENTS

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2.0 Develop and Manage Products and Services 6
3.0 Market and Sell Products and Services 8
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13.0 Develop and Manage Business Capabilities 29

Figure 6: APQC's PCF, version 7.2.1 (APQC, 2018, p.2)

The PCF organizes operating and management processes into 13 enterprise-level categories, which are: (1) develop vision and strategy, (2) develop and manage products and services, (3) market and sell products and services, (4) deliver physical products, (5) deliver services, (6) manage customer service, (7) develop and manage human capital, (8) manage information technology (IT), (9) manage financial resources, (10) acquire, construct and manage assets, (11) manage enterprise risk, compliance, remediation and resiliency, (12) manage external relationships and (12) develop and manage business capabilities. There are five levels of analysis. In general, these 13 categories cover all possible operations within a company, including process groups and more than 1,000 processes and associated activities.

3.1.3. SCOR

The Supply Chain Operations Reference (SCOR) model was developed in 1996 by the consulting company PRTM, AMR Research and the non-profit organization Supply Chain Council (SCC)[3]. It is used by companies as one of the most helpful tools for evaluating and comparing supply chain activities and their performance (SCC, 2010).

[3] http://www.apics.org/apics-for-business/frameworks/scor (Accessed 6 September 2019)

In 2014, a merger between SCC and American Production and Inventory Control Society (APICS) took place, and now SCOR model is maintained and developed by the latter. The version we will study is 12.0, which was presented in 2017.

The SCOR model is divided in four basic sections, which are: (1) process, (2) performance, (3) practices and (4) people. The first section (Process) describes all processes and the relations between them, the second (Performance) includes standard metrics to describe process performance and define strategic goals, the third one (Practices) includes management practices to improve process performance. Last but not least the fourth section (People), which was introduced in SCOR version 10.0, includes all the skills that are necessary in order to perform the processes (APICS, 2017).

For the purpose of this thesis we will focus on the first section, "Process", of version 12.0. SCOR is organized around six major management processes, which are (1) plan, (2) source, (3) make, (4) deliver, (5) return, (6) enable. This is the first level analysis of the model and it is illustrated in Figure 7.

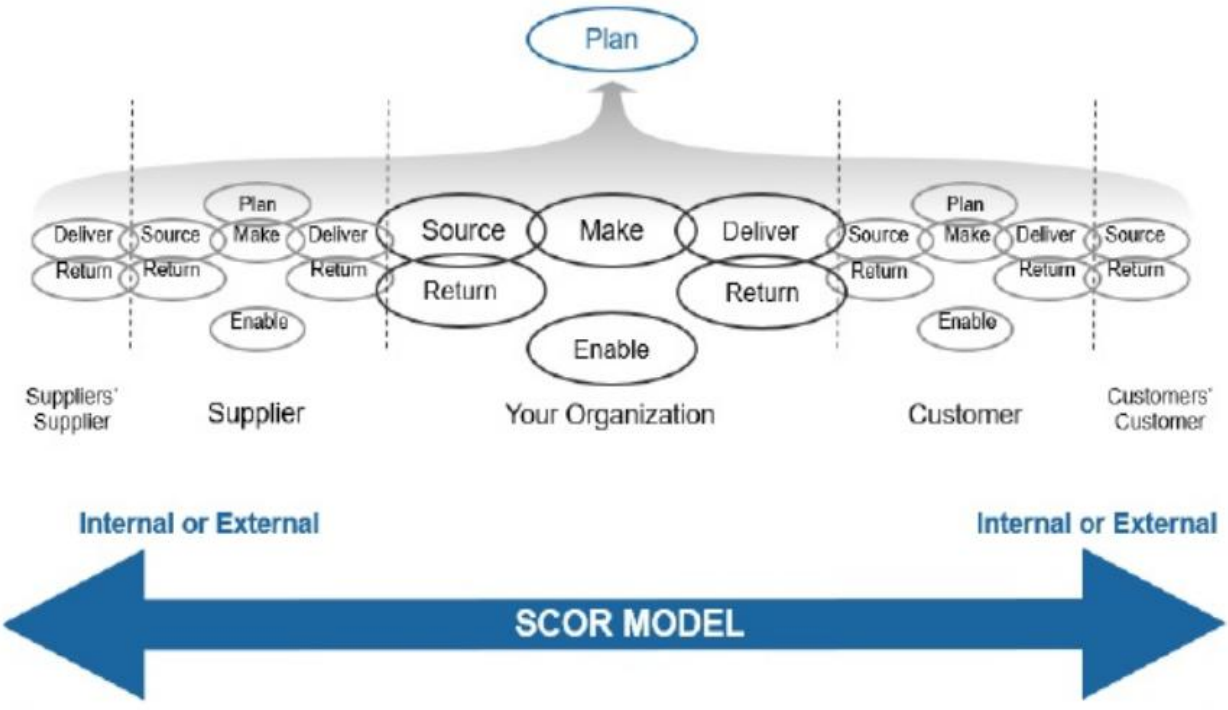


Figure 7: The structure of SCOR framework (APICS, 2017, p.12)

Apart from this first level, SCOR includes three more process hierarchy levels, as illustrated in Figure 8. However, SCOR refers only to the top three process levels, which are the same for every company, irrespective of their operations. If a company chooses to use SCOR they need to define their own processes in the fourth level.

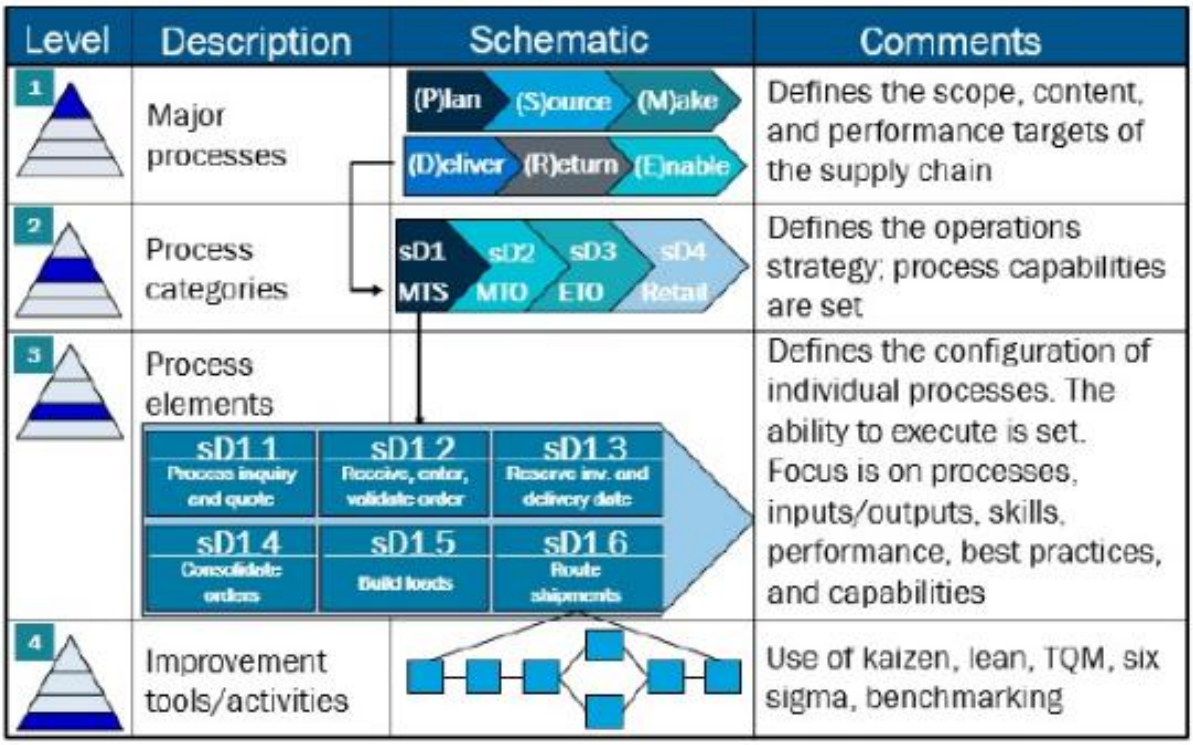


Figure 8: Process hierarchy in SCOR model (APICS, 2017, p.13)

SCOR doesn't cover every business process that takes place within a company. For example, SCOR does not address sales and marketing, product development or research and development. Moreover, a company that chooses to use SCOR should extend the model by taking into consideration its own practices, as SCOR does not offer a standard for the way each process should be conducted (APICS, 2017).

APICS has also developed and launched an android app, as shown in Figure 9, which is available for free, in order to help anyone who is interested in the model to navigate easily through the latest version.

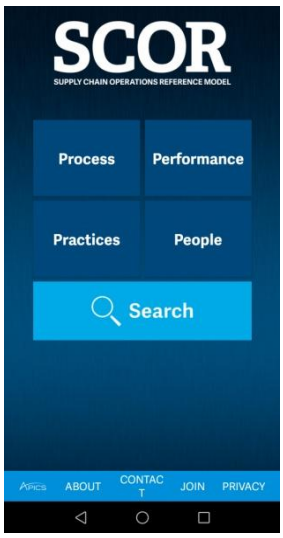


Figure 9: The APICS SCOR app (APICS, 2018)

3.1.4. Business Process Framework (eTOM)

According to Kelly (2003), Business Process Framework (eTOM) is an ongoing project to deliver a business process model for use by service providers and others within the telecommunications industry. It provides the industry with a common language to describe business processes carried out in telecom activities (Raouyane et al., 2011), enabling communication service providers to transform their business operations. However, the framework is generic enough so that it is not organization-, technology- or service-specific (CISCO, 2009).

It was first presented in 2001 by TM Forum, a non-profit member organization, under the name Telecom Operation Map (TOM). Later, it was extender and renamed to Enhanced Telecom Operations Map (eTOM) and finally in 2013 it was renamed to Business Process Framework (eTOM), as it is known today. In 2018, the latest version 18.5[4] was published.

The eTOM framework is structured in six process levels, as shown in Figure 10.

[4] https://www.tmforum.org/resources/suite/gb921-business-process-framework-etom-suite-release-18-5/ (Accessed 2 April 2019)

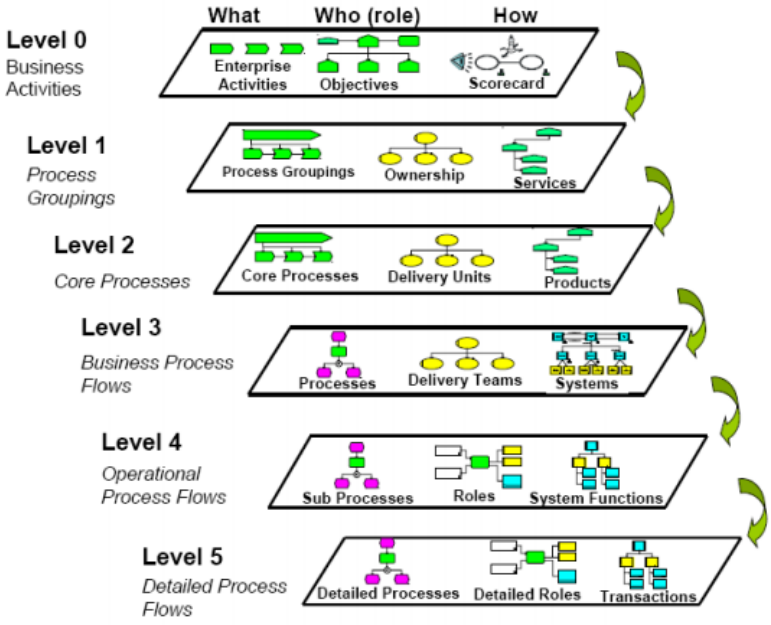
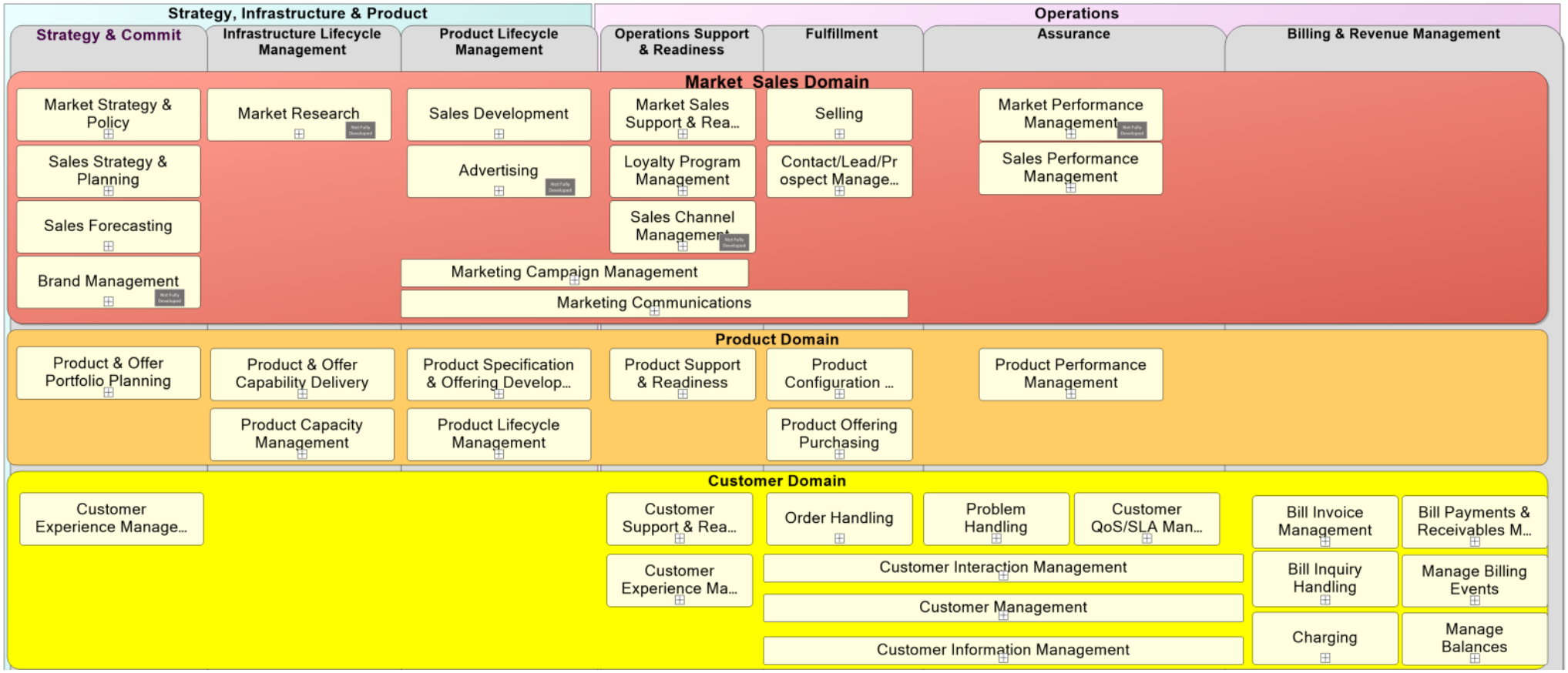


Figure 10: The process levels of eTOM (Jiejin, 2009, p.15)

Figure 11 provides an overview of eTOM framework[5]. The first categorization of the model includes three main groups of processes, which are: (1) strategy, infrastructure and product, (2) operations and (3) enterprise management, which is the "Enterprise Domain" of the model.

5 http://casewise.tmforum.org/evolve/statics/frameworx/index.html#cwtype=index&cwview=index_diagrams_etom_start (Accessed 13 May 2019)


Strategy, Infrastructure & Product
Operations
Strategy & Commit
Infrastructure Lifecycle Management
Product Lifecycle Management
Operations Support & Readiness
Fulfillment
Assurance
Billing & Revenue Management
Market Sales Domain
Market Strategy & Policy
Market Research
Sales Development
Market Sales Support & Rea...
Selling
Market Performance Management
Sales Strategy & Planning
Advertising
Loyalty Program Management
Contact/Lead/Prospect Manage...
Sales Performance Management
Sales Forecasting
Sales Channel Management
Brand Management
Marketing Campaign Management
Marketing Communications
Product Domain
Product & Offer Portfolio Planning
Product & Offer Capability Delivery
Product Specification & Offering Develop...
Product Support & Readiness
Product Configuration ...
Product Performance Management
Product Capacity Management
Product Lifecycle Management
Product Offering Purchasing
Customer Domain
Customer Experience Manage...
Customer Support & Rea...
Order Handling
Problem Handling
Customer QoS/SLA Man...
Bill Invoice Management
Bill Payments & Receivables M...
Customer Experience Ma...
Customer Interaction Management
Bill Inquiry Handling
Manage Billing Events
Customer Management
Charging
Manage Balances
Customer Information Management

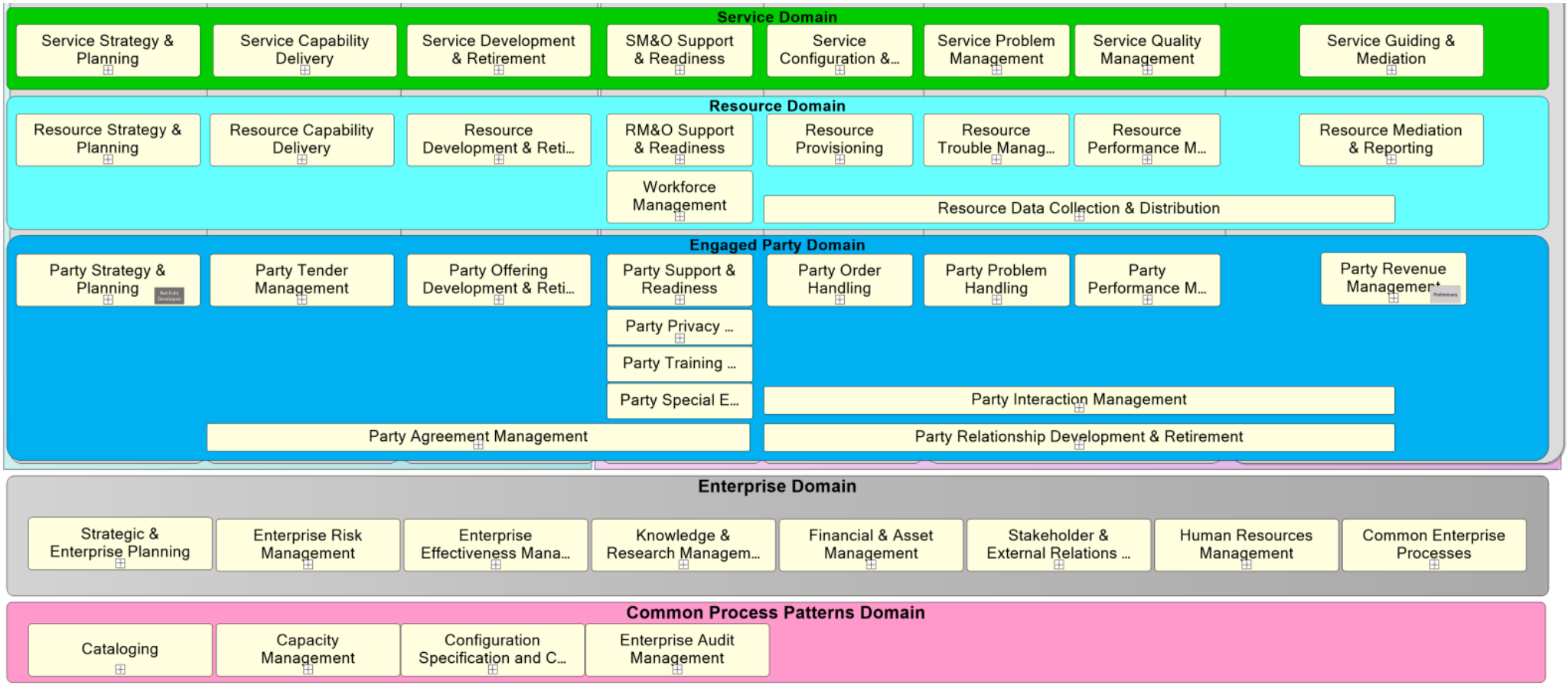


Figure 11: An overview of the eTOM framework (TM Forum, 2016)

The processes in eTOM are mapped both vertically and horizontally. The strategy, infrastructure and product group of processes includes three process categories on a first level analysis, which are: (1) strategy & commit, (2) infrastructure lifecycle management and (3) product lifecycle management. There are four process categories included in the operations group, which are: (1) operations support & readiness, (2) fulfillment, (3) assurance and (4) billing & revenue management.

The processes included in the above categories are also divided horizontally in six groups, which are: (1) market and sales domain, (2) product domain, (3) customer domain, (4) service domain, (5) resource domain and (6) engaged party domain. These groups are the different core process areas for the eTOM model.

There are two additional horizontal domains, not related to the above, which are: (1) enterprise domain and (2) common process patterns domain. As shown in Figure 11, the “Enterprise domain” is the one that contains all the support activities, which are: (1) strategic & enterprise planning, (2) enterprise risk management, (3) enterprise effectiveness management, (4) knowledge & research management, (5) financial & asset management, (6) stakeholder & external relations, (7) human resources management and (8) common enterprise processes.

If we take a look at the “Common Process Patterns Domain”, we can see that it contains “reusable components that can be used to define business processes, such as Product Capacity Management, Service Capacity Management, and Resource Capacity Management. A key characteristic of Common Process Patterns domain is that they cannot execute on their own and always require specialization (they are used to define true business processes)” (TM Forum, 2016). This is the reason why we will not study this domain in the thesis.

In total there are 15 process areas in the eTOM model, both core and support ones.

3.1.5. COBIT

Another widely known business process framework is the Control Objectives for Information and Related Technologies (COBIT). It was first introduced in 1996 by Information Systems Audit and Control Association (ISACA)[6] with a main goal to provide a comprehensive framework that assists enterprises in achieving their objectives for the IT governance (ISACA, 2018). Figure 12 provides an overview of the latest COBIT version, COBIT 2019.

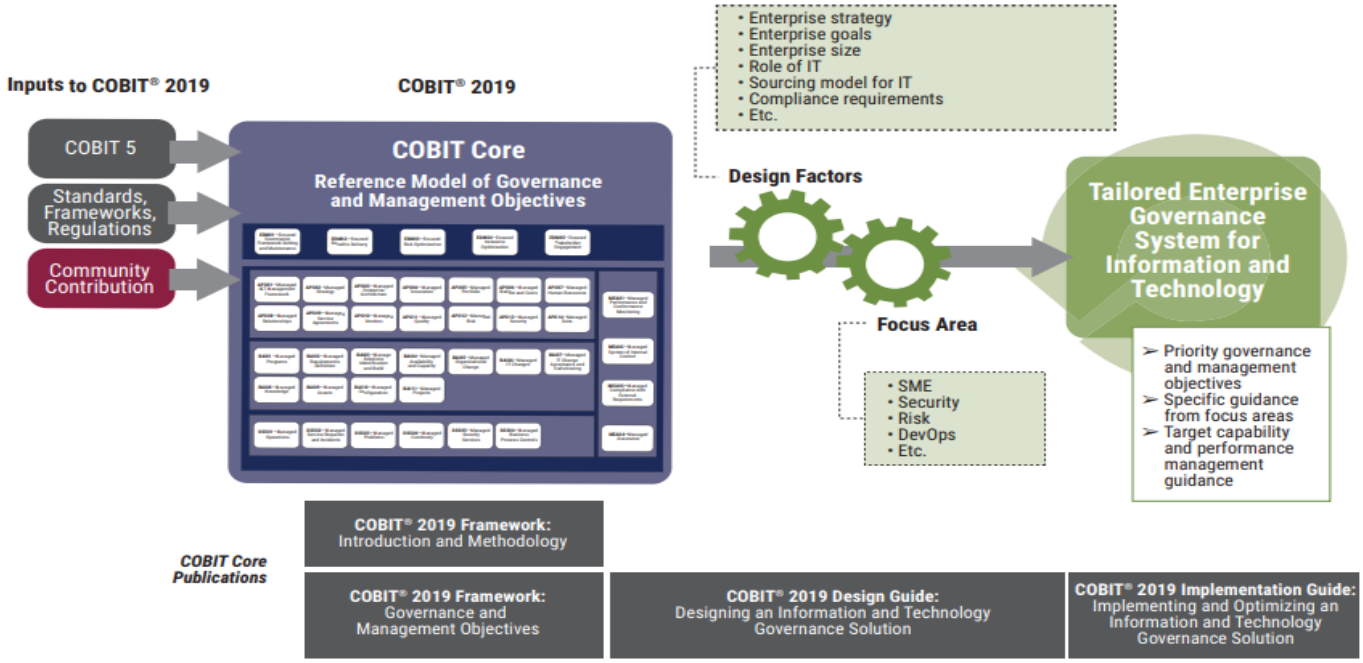


Figure 12: The COBIT framework – an overview (ISACA, 2018. p.10)

According to COBIT, each enterprise needs to develop a governance system that includes a number of components. Figure 13 provides an overview of these components, the way they are presented in the COBIT 2019 model (ISACA, 2018).

[6] http://www.isaca.org/cobit/pages/default.aspx (Accessed 6 September 2019)

Figure 13: The components of a governance system according to COBIT 2019 (ISACA, 2018, p.13)

By focusing on the Reference model of Governance and Management Objectives (Figure 14), which is the one referring to business processes, we see that the Governance objectives are grouped in the evaluate, direct and monitor (EDM) domain, while the Management objectives are grouped in four domains, which are: (1) align, plan and organize (APO), (2) build, acquire and implement (BAI), (3) deliver, service and support (DSS) and (4) monitor, evaluate and assess (MEA). The first management domain includes the strategy and supporting activities related to IT. The second one refers to the implementation of these strategies. The third one refers to the overall organization, strategy and supporting activities for IT and the last domain refers to the IT performance monitoring (ISACA, 2018).

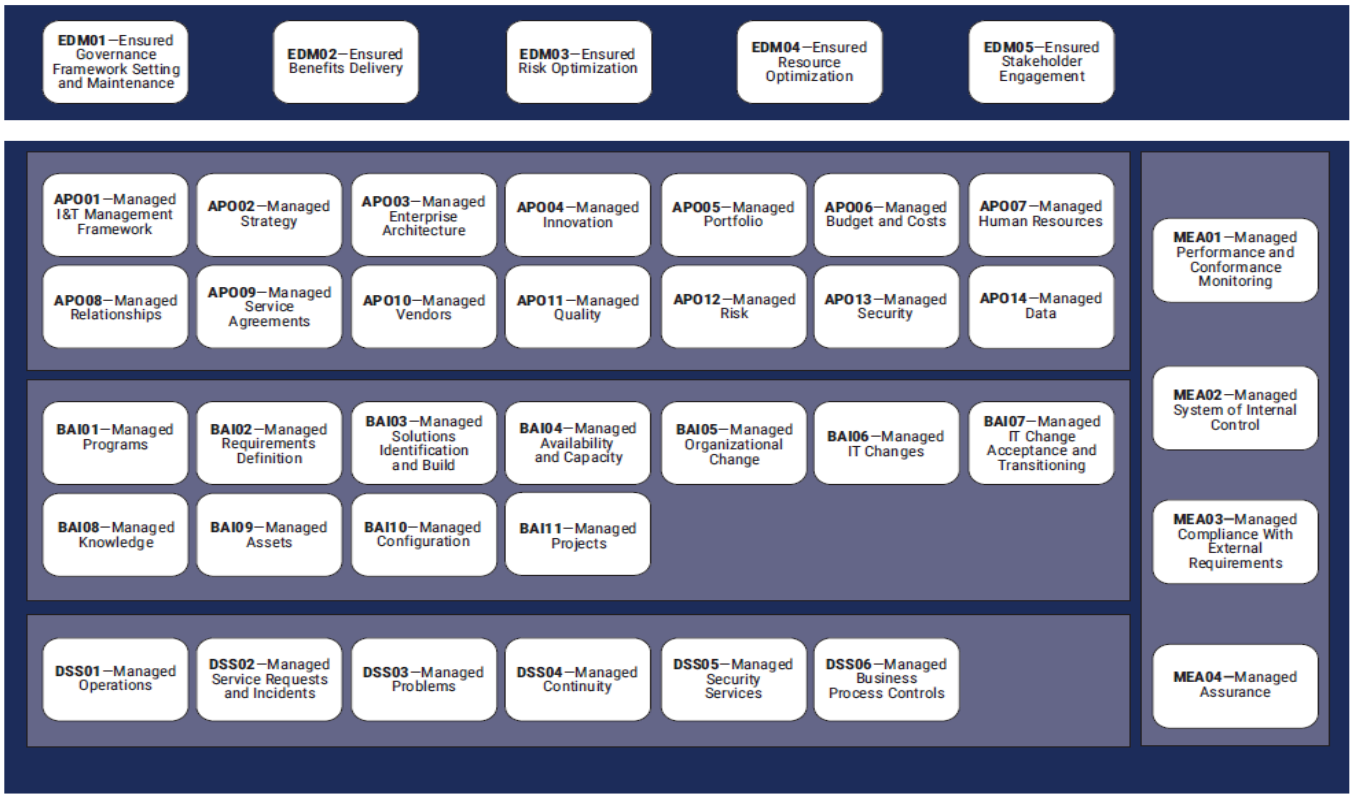


Figure 14: The COBIT core model (ISACA, 2018, p.12)

As shown in Figure 14, there are 47 generic components in COBIT 2019. We will present a few of them in the following sections of the thesis, when we will study some of the major business process areas separately.

3.1.6. Oracle

PeopleSoft was a software company, founded in 1987 by Ken Morris and David Duffield. The first version of their software, that was a human resource management system (HRMS), was available in 1989. Later versions of the software include financial management solutions (FMS) and solutions for supply chain management (SCM), customer relationship management (CRM), enterprise performance management (EPM), as well as software for manufacturing and student administration for large corporations, governments, and organizations.

PeopleSoft was acquired by Oracle in 2005. Since then, PeopleSoft's software was integrated into the Oracle software and is updated by the latter. In 2013, Oracle

released the PeopleSoft 9.2 version, both the financials and supply chain management (FSCM) system and the human capital management (HCM) system.

Oracle's PeopleSoft Enterprise Business Process Maps are publicly available at https://docs.oracle.com. In this chapter we will study the FSCM system[7], the process map of which is shown in Figure 15. The HCM system specializes in the "Human Resources" area, thus we will present and study it in that section of the thesis.

Figure 15: PeopleSoft Financials and Supply Chain Management 9.2 process map (Oracle, 2019)

The main modules of the FSCM system are: (1) marketing, (2) sales, (3) order fulfillment, (4) product development, (5) production, (6) procurement and materials management, (7) project management, (8) financial control and reporting, (9) treasury, (10) asset lifecycle management, (11) deployment and (12) staffing.

[7] https://docs.oracle.com/cd/F16439_01/fscm92pbr31/eng/fscm/index.html (Accessed 14 May 2019)

3.1.7. SAP

SAP (Systeme, Anwendungen und Produkte in der Datenverarbeitung or Systems, Applications & Products in Data Processing) is a continuously growing German multinational software company that was founded in 1972 and is active in more than 180 countries.

SAP is widely known for its Enterprise Resource Planning (ERP) software system, the first version of which was a financial accounting system and became available in 1973 under the name SAP R/1. The latest version of the SAP ERP was presented in 2016, under the name SAP S/4HANA, a version that is specifically designed to run on the SAP HANA platform.

The company collaborated with Professor August-Wilhelm Scheer (the creator of ARIS architecture[8]) for the data modeling of the system version R/2, and later for the R/3 system as well (Scheer, 2002). This collaboration later led to the creation of a model that could be customized for every customer, depending on their needs. SAP gained a great knowledge and experience with user and business needs throughout the years, resulting to the development of a methodology for business process analysis and hierarchy, as shown in Figure 16.

Figure 16: Business process hierarchy in SAP

[8] https://www.softwareag.com/za/products/aris_alfabet/bpa/aris_architect/default (Accessed 6 September 2019)

Figure 17 provides an overview of the SAP ERP modules that are hosted on the same database, which are: (1) PP – Production Planning, (2) MM – Materials Management, (3) SD – Sales and Distribution, (4) FI – Financial Accounting, (5) CO – Controlling, (6) AM – Asset Management, (7) HR – Human Resources, (8) WF – Workflow, (9) PS – Project System, (10) WM – Warehouse Management, (11) PM – Plant Maintenance and (12) QM – Quality Management.

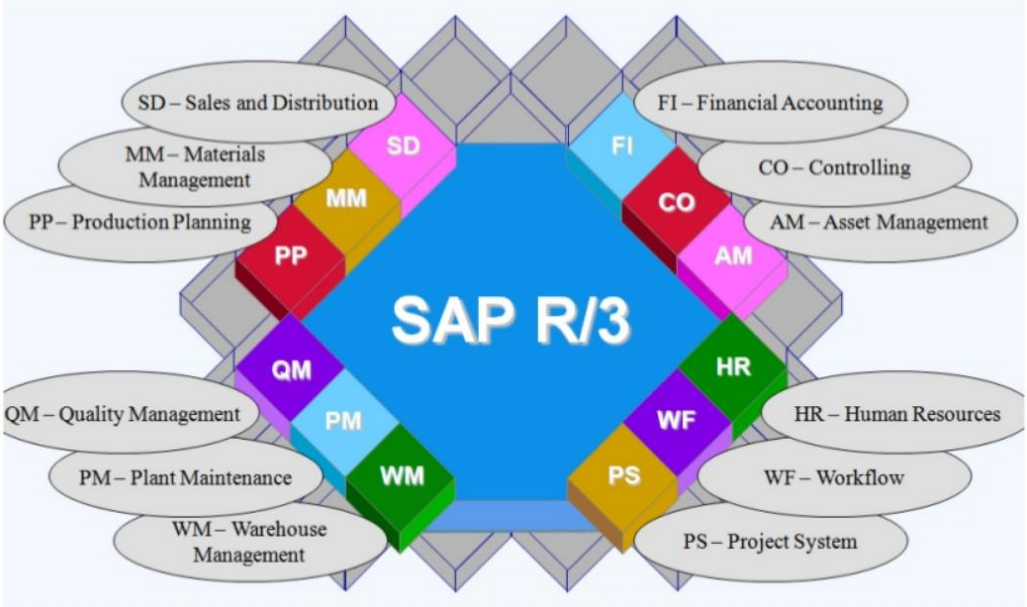


Figure 17: Overview of the SAP modules (Emani, 2012, p.12)

By visiting the https://rapid.sap.com website, where all SAP solution packages are available, we see that there is a solution package regarding the adoption of SAP S/4HANA, with the name SAP Best Practices for SAP S/4HANA (on premise)[9], which includes the "core business processes with a role-specific, responsive, and simple user experience" (SAP, 2019). As Figure 18 shows, there are 10 modules, some of which refer to more technical issues of the SAP software, such as data migration. The modules included are: (1) finance, (2) human resources, (3) sales, (4) asset management, (5) manufacturing, (6) R&D engineering, (7) sourcing and procurement, (8) supply chain, (9) application platform and infrastructure and (10)

[9] https://rapid.sap.com/bp/BP_OP_ENTPR (Accessed 21 May 2019)

database and data management. These are the process areas of SAP, six of which are core and three support.

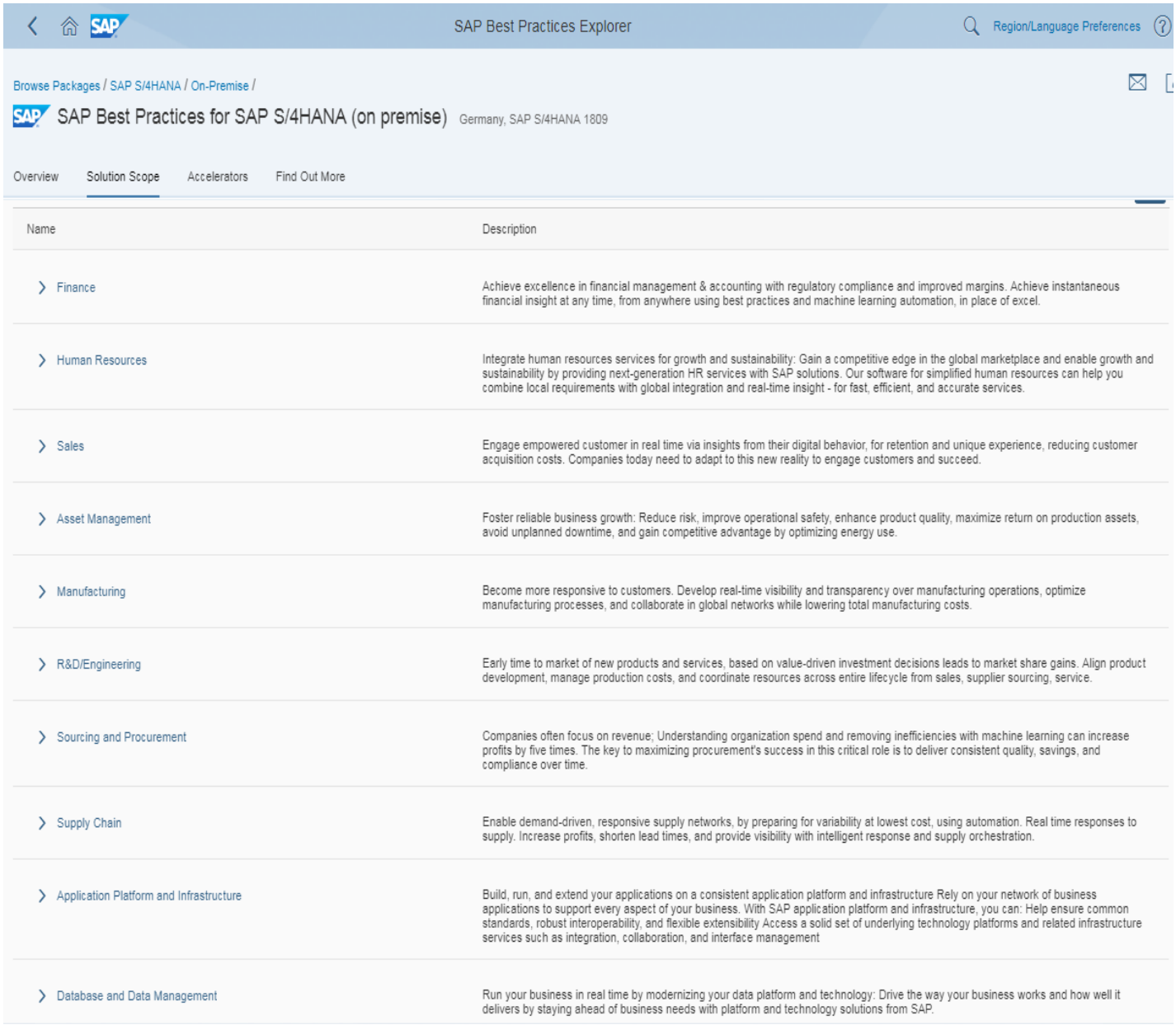


Figure 18: SAP Best Practices for SAP S/4HANA (on premise) solution package (SAP, 2019)

Apart from this complete solution, SAP also offers solution packages for specific line of business. Some of them will be presented and studied later in this thesis, while studying the respective process areas.

3.2. Comparison

We will now proceed to compare the frameworks. Let's begin with some important notes on the comparison that follows.

First of all, PCF is used as a basis for the comparison, as it is the most detailed one.

Regarding the SCOR model, every time we mention the "Enable" category we also name the specific process group that we refer to. As far as the rest of the categories are concerned, the process groups they include do not have major differences between them. For instance, the category "Plan" has five groups of processes which are: (1) sP1.Plan Supply Chain, (2) sP2. Plan Source, (3) sP3. Plan Make, (4) sP4. Plan Deliver, (5) sP5. Plan Return. The processes included in each these groups are similar, thus we only mention the name "Plan".

eTOM is the framework with the most unique structure of the ones we studied. Thus, we used both the vertical and horizontal categorization the model offers and every time we also name the specific process categories that we refer to.

Also, because of the structure of the COBIT model, for each process group we also name the domain as well as the component that includes the processes we refer to.

As far as Oracle is concerned, apart from the main processes it also has some "overview" ones, that serve as a connection between the main ones.

Last, but not least, Table 1 provides an explanation of the vocabulary that will be used.

Table 1: Vocabulary used for the comparison of the frameworks

IDENTICAL	includes the same processes
EXTENSIVE	includes more processes/ more completed/ more detailed
CONCISE	includes less processes/ not complete/ less detailed
MISSING	these processes do not exist

The comparison of the frameworks is presented in Table 2

Table 2: First-level frameworks comparison

PCF	IMM	SCOR	eTOM	COBIT	Oracle	SAP
1.0.Develop Vision and Strategy	**MISSING**	1.Plan **(CONCISE)**	Strategy, Infrastructure & Product / Strategy & Commit	Evaluate, Direct & Monitor (EDM) / EDM01. Ensured Governance Framework Setting and Maintenance	**MISSING**	**MISSING**
		6.Enable / sE7. Manage Supply Chain Network **(CONCISE)**		Align, Plan & Organize (APO) / APO02. Managed Strategy		
				APO04. Managed Innovation **(CONCISE)**		
		6.Enable / sE10. Manage Supply Chain Procurement **(CONCISE)**		Build, Acquire & Implement (BAI) / BAI02. Managed Requirements Definition **(CONCISE)**		
2.0.Develop and Manage Products and Services **(EXTENSIVE)**	**MISSING**	1.Plan **(CONCISE)**	Strategy, Infrastructure & Product / Product Domain	Align, Plan & Organize (APO) / APO04. Managed Innovation	4.Product Development	6.R&D Engineering
		2.Source **(CONCISE)**	Operations / Product Domain	Build, Acquire & Implement (BAI) / BAI02. Managed Requirements Definition		
		6.Enable / sE2. Manage Supply Chain Performance **(EXTENSIVE)**	Enterprise Domain / Knowledge & Research Management	BAI03. Managed Solutions Identification and Build		
				BAI10. Managed Configuration		

<table>
<tr><th>PCF</th><th>IMM</th><th>SCOR</th><th colspan="2">eTOM</th><th>COBIT</th><th>Oracle</th><th>SAP</th></tr>
<tr><td rowspan="4">3.0.Market and Sell Products and Services (EXTENSIVE)</td><td rowspan="4">1.Sell Motor Spares</td><td rowspan="4">MISSING</td><td>Strategy, Infrastructure & Product</td><td>Market Sales Domain</td><td rowspan="4">MISSING</td><td>1.Marketing</td><td rowspan="4">3.Sales</td></tr>
<tr><td rowspan="3">Operations</td><td>Market Sales Domain</td><td>2.Sales</td></tr>
<tr><td>Customer Domain</td><td>3.Order Fulfillment</td></tr>
<tr><td>Product Domain</td></tr>
<tr><td rowspan="7">4.0.Deliver Physical Products (EXTENSIVE)</td><td rowspan="2">2.Manufacture Motor Spares</td><td>1.Plan</td><td colspan="2" rowspan="7">MISSING</td><td rowspan="7">MISSING</td><td>3.Order Fulfillment</td><td>3.Sales</td></tr>
<tr><td>2.Source (CONCISE)</td><td>5.Production</td><td>5.Manufacturing</td></tr>
<tr><td rowspan="5">3.Transport Motor Spares and Raw Materials</td><td>3.Make (CONCISE)</td><td rowspan="4">6.Procurement & Materials Management</td><td>7.Sourcing and Procurement</td></tr>
<tr><td>4.Deliver (EXTENSIVE)</td></tr>
<tr><td>5.Return (CONCISE)</td></tr>
<tr><td>6.Enable</td><td>sE6. Manage Supply Chain Contracts (CONCISE)</td><td>8.Supply Chain</td></tr>
<tr><td rowspan="2">5.0.Deliver Services</td><td rowspan="2">MISSING</td><td colspan="2" rowspan="2">MISSING</td><td colspan="2" rowspan="2">MISSING</td><td rowspan="2">MISSING</td><td>3.Order Fulfillment</td><td>3.Sales</td></tr>
<tr><td>5.Production</td><td>5.Manufacturing</td></tr>
</table>

PCF	IMM	SCOR	eTOM	COBIT	Oracle	SAP
					6.Procurement & Materials Management	7.Sourcing and Procurement 8.Supply Chain
6.0.Manage Customer Service **(EXTENSIVE)**	**MISSING**	**MISSING**	Strategy, Infrastructure & Product – Customer Domain Operations – Customer Domain	Deliver, Service & Support (DSS) – DSS02. Managed Service Requests and Incidents Deliver, Service & Support (DSS) – DSS03. Managed Problems Align, Plan & Organize (APO) – APO11. Managed Quality **(CONCISE)**	3. Order Fulfillment	**MISSING**
7.0.Develop and Manage Human Capital	5.Provide Human Resources	6.Enable – sE4. Manage Supply Chain Human Resources **(CONCISE)**	Enterprise Domain – Human Resources Management Strategy, Infrastructure & Product – Workforce Management	Align, Plan & Organize (APO) – APO07. Managed Human Resources Evaluate, Direct & Monitor (EDM) – EDM04. Ensured Resource Optimization	11.Deployment 12.Staffing	2.Human Resources
8.0.Manage Information Technology (IT) **(EXTENSIVE)**	6.Provide IT Resources & Services	6.Enable – sE3. Manage Supply Chain Data and Information	Enterprise Domain **(CONCISE)** – Common Enterprise Processes	Evaluate, Direct & Monitor (EDM) – EDM02. Ensured Benefits Delivery Evaluate, Direct & Monitor (EDM) – EDM04. Ensured Resource Optimization Align, Plan & Organize (APO) – APO01. Managed I&T Management Framework	**MISSING**	9.Application Platform & Infrastructure

PCF	IMM	SCOR		eTOM		COBIT		Oracle	SAP
							APO03. Managed Enterprise Architecture		
							APO09. Managed Service Agreements		
							APO10. Managed Vendors		
							APO11. Managed Quality		
							APO12. Managed Risk		
							APO13. Managed Security		
			sE11. Manage Supply Chain Technology	Strategy, Infrastructure & Product	Resource Domain		APO014. Managed Data		10.Database & Data Management
						Build, Acquire & Implement (BAI)	BAI03. Managed Solutions Identification and Build **(CONCISE)**		
							BAI04. Managed Availability and Capacity		
							BAI06. Managed IT Changes		
							BAI07. Managed IT Change Acceptance and Transitioning		
				Operations	Resource Domain		BAI08. Managed Knowledge		
							BAI10. Managed Configuration		

PCF	IMM	SCOR	eTOM	COBIT	Oracle	SAP
				Deliver, Service & Support (DSS): DSS01. Managed Operations; DSS04. Managed Continuity; DSS05. Managed Security Services		
9.0.Manage Financial Resources	4.Manage Revenue	2.Source **(CONCISE)**	Operations: Customer Domain; Engaged Party Domain	Align, Plan & Organize (APO): APO05. Managed Portfolio; APO06. Managed Budget and Costs	3.Order Fulfillment; 8.Financial Control & Reporting	1.Finance; 3.Sales
		4.Deliver **(CONCISE)**	Enterprise Domain: Financial & Asset Management	Evaluate, Direct & Monitor (EDM): EDM04. Ensured Resource Optimization	9.Treasury; 12.Staffing	7.Sourcing and Procurement **(CONCISE)**
10.0.Acquire, Construct and Manage Assets	**MISSING**	6.Enable: sE5. Manage Supply Chain Assets **(CONCISE)**	Enterprise Domain: Financial & Asset Management	Build, Acquire & Implement (BAI): BAI09. Managed Assets	10.Asset Lifecycle Management	4.Asset Management
11.0.Manage Enterprise Risk, Compliance, Remediation and Resiliency	**MISSING**	6.Enable: sE8. Manage Supply Chain Regulatory Compliance; sE9. Manage Supply Chain Risk	Enterprise Domain: Enterprise Risk Management	Evaluate, Direct & Monitor (EDM): EDM03. Ensured Risk Optimization; Monitor, Evaluate & Assess (MEA): MEA01. Managed Performance and Conformance Monitoring	9.Treasury **(CONCISE)**	**MISSING**

PCF	IMM	SCOR		eTOM		COBIT		Oracle	SAP
							MEA02. Managed System of Internal Control		
12.0.Manage External Relationships	**MISSING**	**MISSING**		Enterprise Domain	Stakeholder & External Relations	Align, Plan & Organize (APO)	APO08. Managed Relationships	**MISSING**	**MISSING**
						Monitor, Evaluate & Assess (MEA)	MEA03. Managed Compliance With External Requirements		
							MEA04. Managed Assurance		
13.0.Develop and Manage Business Capabilities	**MISSING**	6.Enable	sE1. Manage Supply Chain Business Rules **(CONCISE)**	Enterprise Domain	Strategic & Enterprise Planning **(EXTENSIVE)**	Build, Acquire & Implement (BAI)	BAI01. Managed Programs	7.Project Management	9.Application Platform & Infrastructure **(CONCISE)**
							BAI05. Managed Organizational Change		
							BAI11. Managed Projects		
					Enterprise Effectiveness Management	Deliver, Service & Support (DSS)	DSS06. Managed Business Process Controls		
						Evaluate, Direct & Monitor (EDM)	EDM04. Ensured Resource Optimization		
							EDM05. Ensured Stakeholder Engagement		

PCF	IMM	SCOR	eTOM	COBIT	Oracle	SAP
MISSING	**MISSING**	**MISSING**	Strategy, Infrastructure & Product: Engaged Party Domain Operations: Engaged Party Domain	**MISSING**	**MISSING**	**MISSING**
MISSING	**MISSING**	6.Enable: sE2. Manage Supply Chain Performance 1.Plan: sP1. Plan Supply Chain	Enterprise Domain: Enterprise Effectiveness Management	**MISSING**	**MISSING**	**MISSING**
MISSING	**MISSING**	**MISSING**	Common Process Patterns Domain	**MISSING**	**MISSING**	**MISSING**
MISSING	**MISSING**	**MISSING**	**MISSING**	**MISSING**	**MISSING**	9.Application Platform & Infrastructure

In general, if we take a look at Table 2, we can see that some models include more process categories than others, like PCF, while others are structured in a less detailed way, like the IMM Approach. Most of the frameworks we studied have their own and unique structure. This is why attempting to compare them proved to be a difficult task, as the process areas of each framework are different. None of the frameworks could be described as identical to another.

As mentioned before, PCF is the most detailed of the frameworks, with 13 process areas. Although it covers most of the processes that take place within an enterprise, it omits processes referring to service, service agreements and managing problems that come up with the customers regarding the product. What is more, since some of the other frameworks are supply chain-oriented, they have some process categories regarding the supply chain management and effectiveness, something that doesn't show up at PCF. Another important note here is that PCF makes a distinction between the delivery of physical products and services, as we can see in process categories 4.0 and 5.0. None of the other frameworks makes this distinction. The IMM Approach refers to physical products, motor spares to be specific. The SCOR model also applies to physical products, as it is a supply chain management model. The eTOM is a telecommunications model, thus it refers to services. The same applies to COBIT, as it describes IT usage. Last but not least, Oracle and SAP can be used for both physical products and services, and that's the reason we mention the same modules for both cases.

As far as the IMM Approach is concerned, it is the most concise framework we studied. It includes the processes of some basic areas of an enterprise, such as "Manufacturing" and "Sales" however there are no processes about other important operations like strategy development, product development, customer service as well as risk and enterprise management.

If we take a closer look at SCOR we can see that it does not include any processes about external relationships management, sales and marketing as PCF does, and it does not refer to financial processes at the extent PCF does. Most of the processes

included, if not all, refer to the supply chain, since SCOR is a supply chain management model. This is the reason why most of the process categories are mentioned as concise, compared to non-sector-specific frameworks.

As far as the eTOM framework is concerned, most of the processes that PCF has are also mentioned here. The main difference is that the processes included in the "Engaged Party Domain" are not included in PCF. What is more, the "Common Process Patterns Domain" is something we don't see in any of the other frameworks.

Moving on to the COBIT framework, it is an IT governance model, thus, it includes the most detailed processes regarding the IT management. An important note is that the COBIT process groups that align with the PCF "2.0.Develop and Manage Products and Services" category may refer to IT product development but with one key difference: these IT products are to be used by the same enterprise that creates them and not by a customer. Because of the fact that it refers to IT usage within the enterprise, it doesn't include any product development, marketing and sales processes.

As far as the Oracle and SAP frameworks are concerned, we can see that they have a similar structure, due to the fact that both derive from specific software. However, SAP's categorization seems to be more similar to PCF than Oracle's. Even though both frameworks cover most of the process categories PCF has, they don't include a separate process category regarding the strategy and the goals of the company, customer service as well as external relationships management. Oracle and SAP are system-specific frameworks, meaning they were developed based on specific software. Because of this some of their processes have taken place before the software development, like the strategy processes. Oracle also omits processes regarding customer service, supply chain and IT management. Last but not least, SAP is the only framework that includes processes regarding the system integration, like the category "9. Application Platform & Infrastructure".

3.3. Business Process Areas

In the previous section we presented a comparison of the most well-known business process frameworks. We acquired basic knowledge for business process areas, based on which we can develop a proposal for the basic process areas of an enterprise. These are: (1) Sales, (2) Marketing, (3) Research and Development (R&D), (4) Product Management, (5) Production, (6) Procurement, (7) Logistics, (8) Customer Service, (9) Human Resources, (10) Finance and (11) Information Technology.

These areas can be divided in core and support, based on the functionality of the business processes they consist of. Figure 19 provides an overview of this taxonomy.

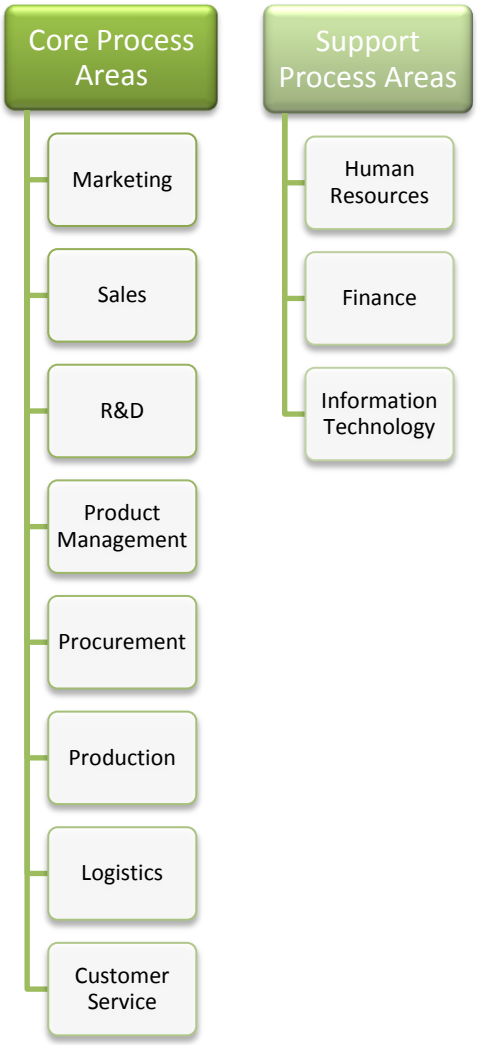


Figure 19: The process areas of an enterprise

In the next chapters of this thesis we will attempt to study the processes included in each of these process areas. To do so, we will present each framework's proposed taxonomy of the processes for each process area separately. The frameworks we will study are not only the ones already presented, but also four others that are sector-specific that will help us understand these areas in depth. These are: (1) Capital Business Reference Model (HCBRM), (2) Software AG (ARIS), (3) Signavio and (4) ITSMA. The first three will be studied in the "Human Resources (HR)" area and the fourth one in the "Information Technology (IT) & Data management" area.

4. Core Process Areas

In this chapter we will discuss the core process areas of the enterprise, based on our proposal in the previous chapter of the thesis.

Each section begins with a definition of that process area, in order to understand better what processes are included there and why, followed by the presentation of the frameworks that will be studied. In order to better understand which of them are detailed, which of them are more concise and what processes are included in each framework, a comparison will take place at the end of each section, followed by our conclusions.

4.1. Marketing

According to the Chartered Institute of Marketing (CIM) the "Marketing" process area is "the management process responsible for identifying, anticipating and satisfying customer requirements profitably" (CIM, 2019).

In this section we will discuss the taxonomy of the "Marketing" related processes, as proposed by the business process frameworks we presented in the previous chapter.

4.1.1. Frameworks

We will now present the five frameworks that include processes for the "Marketing" process area of an enterprise, which are: (1) PCF, (2) eTOM, (3) Oracle, (4) SAP and (5) ITSMA. For each of the frameworks we provide all the relevant links in the "List of References" section. Any additional links needed will be added as a footnote in the text.

Some of the frameworks have one category both for the "Sales" and the "Marketing" processes, but we believe that they are two separate process areas and we will study them as such. The COBIT and SCOR frameworks don't include processes regarding the "Marketing" area, thus we will not use them for this comparison. ITSMA is a framework we haven't presented in the previous chapter. It is both "Marketing" and "Sales"-related, and we will study it in these process areas.

4.1.1.1. APQC's Process Classification Framework (PCF)

The 3rd category of PCF, "3.0 Market and Sell Products and Services", is the one that that we will study for the "Marketing" process area. . It includes all the processes related to marketing and selling the products. Figure 20 provides an overview of this category. We can see that it includes five process groups, the three of which are of interest to us. These are: (1) understand markets, customers, and capabilities, (2) develop marketing strategy and (3) develop and manage marketing plans. These categories include between two and seven process sub-groups, of the 15 in total. The processes included are 109.

3.0 Market and Sell Products and Services (10004)

3.1 Understand markets, customers, and capabilities (10101)

- 3.1.1 Perform customer and market intelligence analysis (10106)
  - 3.1.1.1 Conduct customer and market research (10108)
    - 3.1.1.1.1 Understand consumer needs and predict customer purchasing behavior (10114)
  - 3.1.1.2 Identify market segments (10109)
    - 3.1.1.2.1 Determine market share gain/loss (10115)
  - 3.1.1.3 Analyze market and industry trends (10110)
  - 3.1.1.4 Analyze competing organizations, competitive/substitute products/services (10111)
  - 3.1.1.5 Evaluate existing products/services (10112)
  - 3.1.1.6 Assess internal and external business environment (10113)
- 3.1.2 Evaluate and prioritize market opportunities (10107)
  - 3.1.2.1 Quantify market opportunities (10116)
  - 3.1.2.2 Determine target segments (10117)
    - 3.1.2.2.1 Identify under-served and saturated market segments (18941)
  - 3.1.2.3 Prioritize opportunities consistent with capabilities and overall business strategy (10118)
  - 3.1.2.4 Validate opportunities (10119)
    - 3.1.2.4.1 Test with customers/consumers (10120)
    - 3.1.2.4.2 Confirm internal capabilities (10121)

3.2 Develop marketing strategy (10102)

- 3.2.1 Define offering and customer value proposition (11168)
  - 3.2.1.1 Define offering and positioning (11169)
  - 3.2.1.2 Develop value proposition including brand positioning for target segments (11170)
  - 3.2.1.3 Validate value proposition with target segments (11171)
  - 3.2.1.4 Develop new branding (11172)
- 3.2.2 Define pricing strategy (10123)
  - 3.2.2.1 Conduct pricing analysis (13169)
  - 3.2.2.2 Establish guidelines for applying pricing and discounting of products/services (10124)
  - 3.2.2.3 Establish pricing targets (19999)
  - 3.2.2.4 Approve pricing strategies/policies and targets (10125)
- 3.2.3 Define and manage channel strategy (20000)
  - 3.2.3.1 Determine channels to be supported (20001)
  - 3.2.3.2 Establish channel objectives (20002)
  - 3.2.3.3 Determine channel role and fit with target segments (10127)
  - 3.2.3.4 Select channels for target segments (10128)
  - 3.2.3.5 Identify required channel capabilities (20003)
  - 3.2.3.6 Evaluate channel attributes and potential partners (10126)
  - 3.2.3.7 Orchestrate seamless customer experience across supported channels (20004)
    - 3.2.3.7.1 Define omni-channel strategy (16590)
    - 3.2.3.7.2 Define omni-channel requirements (16591)
    - 3.2.3.7.3 Develop omni-channel policies and procedures (16592)
  - 3.2.3.8 Develop and manage execution roadmap (20005)
- 3.2.4 Analyze and manage channel performance (20006)
  - 3.2.4.1 Establish channel-specific metrics and targets (16573)
  - 3.2.4.2 Monitor and report performance (16574)
  - 3.2.4.3 Monitor and report events influencing factors (16575)
  - 3.2.4.4 Analyze performance (16500)
  - 3.2.4.5 Develop plan for improvements (16501)
- 3.2.5 Develop marketing communication strategy (16848)
  - 3.2.5.1 Develop customer communication calendar (16849)
  - 3.2.5.2 Define public relations (PR) strategy (16850)
  - 3.2.5.3 Define direct marketing strategy (16851)
  - 3.2.5.4 Define internal marketing communication strategy (16852)
  - 3.2.5.5 Identify new media for marketing communication (16853)
  - 3.2.5.6 Define new media communication strategy (16854)
  - 3.2.5.7 Define point of sale (POS) communication strategy (16855)
  - 3.2.5.8 Define communication guidelines and mechanisms (18627)
- 3.2.6 Design and manage customer loyalty program (18924)
  - 3.2.6.1 Define customer loyalty program (20007)
  - 3.2.6.2 Acquire members to customer loyalty program (18925)
  - 3.2.6.3 Build engagement and relationship with members (18926)
  - 3.2.6.4 Monitor customer loyalty program benefits to the enterprise and the customer (16633)
  - 3.2.6.5 Optimize loyalty program value to both the enterprise and the customer (18927)

3.3 Develop and manage marketing plans (20008)

- 3.3.1 Establish goals, objectives, and metrics for products/services by channel/segment (10148)
- 3.3.2 Establish marketing budgets (10149)
  - 3.3.2.1 Confirm marketing alignment to business strategy (10155)

3.3.2.2 Determine costs of marketing (10156)
3.3.2.3 Create marketing budget (10157)
3.3.2.4 Determine projected ROI for marketing investment (17683)

3.3.3 Develop and manage pricing (20593)
3.3.3.1 Understand resource requirements for each product/service and delivery channel/method (20009)
3.3.3.2 Determine corporate incentives (18948)
3.3.3.3 Determine pricing based on volume/unit forecast (10163)
3.3.3.4 Execute pricing plan (10164)
3.3.3.5 Evaluate pricing performance (10165)
3.3.3.6 Refine pricing as needed (10166)
3.3.3.7 Implement promotional pricing programs (11495)
3.3.3.8 Implement other retail pricing programs (11496)
3.3.3.9 Communicate and implement price changes (11497)
3.3.3.10 Achieve regulatory approval for pricing (17684)

3.3.4 Develop and manage promotional activities (20010)
3.3.4.1 Define promotional concepts and objectives (10167)
3.3.4.2 Develop marketing messages (10159)
3.3.4.3 Define target audience (10160)
3.3.4.4 Plan and test promotional activities (10168)
3.3.4.5 Execute promotional activities (10169)
3.3.4.6 Evaluate promotional performance metrics (10170)
3.3.4.7 Refine promotional performance metrics (10171)
3.3.4.8 Incorporate learning into future/planned consumer promotions (10172)

3.3.5 Track customer management measures (10153)
3.3.5.1 Determine customer lifetime value (10173)
3.3.5.2 Analyze customer revenue trend (10174)
3.3.5.3 Analyze customer attrition and retention rates (10175)
3.3.5.4 Analyze customer metrics (10176)
3.3.5.5 Revise customer strategies, objectives, and plans based on metrics (10177)

3.3.6 Analyze and respond to customer insight (16613)
3.3.6.1 Monitor and respond to social media activity (16627)
3.3.6.2 Analyze customer website activity (16614)
3.3.6.3 Analyze customer purchase patterns (16615)
3.3.6.4 Develop business rules to provide personalized offers (16616)
3.3.6.5 Monitor effectiveness of personalized offers and adjust offers accordingly (16617)

3.3.7 Develop and manage packaging strategy (10154)
3.3.7.1 Plan packaging strategy (10178)
3.3.7.2 Test packaging options (10179)
3.3.7.3 Execute packaging strategy (10180)
3.3.7.4 Refine packaging (10181)

3.4 Develop sales strategy (10103)

3.4.1 Develop sales forecast (10129)
3.4.1.1 Gather current and historic order information (10134)
3.4.1.2 Analyze sales trends and patterns (10135)
3.4.1.3 Generate sales forecast (10136)
3.4.1.4 Analyze historical and planned promotions and events (10137)

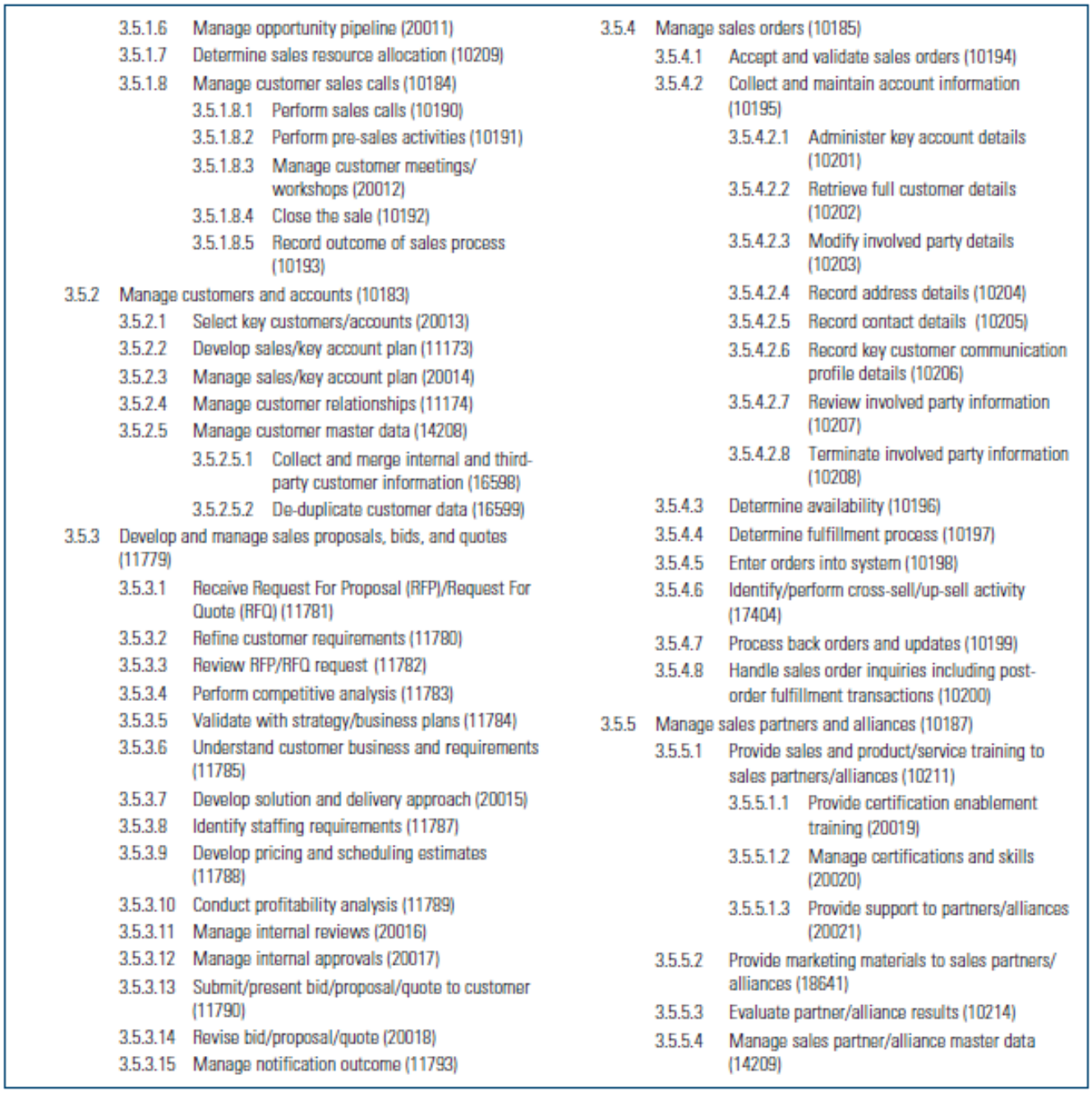
3.4.2 Develop sales partner/alliance relationships (10130)
3.4.2.1 Identify alliance opportunities (10138)
3.4.2.2 Design alliance programs and methods for selecting and managing relationships (10139)
3.4.2.3 Select alliances (10140)
3.4.2.4 Develop trade customer trade strategy and customer objectives/targets (11465)
3.4.2.5 Define trade programs and funding options (11521)
3.4.2.6 Conduct planning activities for major trade customers (11466)
3.4.2.7 Develop partner and alliance management strategies (10141)
3.4.2.8 Establish partner and alliance management goals (10142)
3.4.2.9 Establish partner and alliance agreements (18629)
3.4.2.10 Develop promotional and category management calendars (trade marketing calendars) (11522)
3.4.2.11 Create strategic and tactical sales plans by customer (11523)
3.4.2.12 Communicate planning information to customer teams (11468)

3.4.3 Establish overall sales budgets (10131)
3.4.3.1 Calculate product market share (17682)
3.4.3.2 Calculate product revenue (10143)
3.4.3.3 Determine variable costs (10144)
3.4.3.4 Determine overhead and fixed costs (10145)
3.4.3.5 Calculate net profit (10146)
3.4.3.6 Create budget (10147)

3.4.4 Establish sales goals and measures (10132)
3.4.5 Establish customer management measures (10133)

3.5 Develop and manage sales plans (10105)

3.5.1 Manage leads/opportunities (20594)
3.5.1.1 Identify potential customers (10188)
3.5.1.2 Identify/receive leads/opportunities (10189)
3.5.1.3 Validate and qualify leads/opportunities (18115)
3.5.1.4 Match opportunities to business strategy (11773)
3.5.1.5 Develop opportunity win plans (18116)



3.5.1.6 Manage opportunity pipeline (20011)
3.5.1.7 Determine sales resource allocation (10209)
3.5.1.8 Manage customer sales calls (10184)
3.5.1.8.1 Perform sales calls (10190)
3.5.1.8.2 Perform pre-sales activities (10191)
3.5.1.8.3 Manage customer meetings/ workshops (20012)
3.5.1.8.4 Close the sale (10192)
3.5.1.8.5 Record outcome of sales process (10193)
3.5.2 Manage customers and accounts (10183)
3.5.2.1 Select key customers/accounts (20013)
3.5.2.2 Develop sales/key account plan (11173)
3.5.2.3 Manage sales/key account plan (20014)
3.5.2.4 Manage customer relationships (11174)
3.5.2.5 Manage customer master data (14208)
3.5.2.5.1 Collect and merge internal and third-party customer information (16598)
3.5.2.5.2 De-duplicate customer data (16599)
3.5.3 Develop and manage sales proposals, bids, and quotes (11779)
3.5.3.1 Receive Request For Proposal (RFP)/Request For Quote (RFQ) (11781)
3.5.3.2 Refine customer requirements (11780)
3.5.3.3 Review RFP/RFQ request (11782)
3.5.3.4 Perform competitive analysis (11783)
3.5.3.5 Validate with strategy/business plans (11784)
3.5.3.6 Understand customer business and requirements (11785)
3.5.3.7 Develop solution and delivery approach (20015)
3.5.3.8 Identify staffing requirements (11787)
3.5.3.9 Develop pricing and scheduling estimates (11788)
3.5.3.10 Conduct profitability analysis (11789)
3.5.3.11 Manage internal reviews (20016)
3.5.3.12 Manage internal approvals (20017)
3.5.3.13 Submit/present bid/proposal/quote to customer (11790)
3.5.3.14 Revise bid/proposal/quote (20018)
3.5.3.15 Manage notification outcome (11793)
3.5.4 Manage sales orders (10185)
3.5.4.1 Accept and validate sales orders (10194)
3.5.4.2 Collect and maintain account information (10195)
3.5.4.2.1 Administer key account details (10201)
3.5.4.2.2 Retrieve full customer details (10202)
3.5.4.2.3 Modify involved party details (10203)
3.5.4.2.4 Record address details (10204)
3.5.4.2.5 Record contact details (10205)
3.5.4.2.6 Record key customer communication profile details (10206)
3.5.4.2.7 Review involved party information (10207)
3.5.4.2.8 Terminate involved party information (10208)
3.5.4.3 Determine availability (10196)
3.5.4.4 Determine fulfillment process (10197)
3.5.4.5 Enter orders into system (10198)
3.5.4.6 Identify/perform cross-sell/up-sell activity (17404)
3.5.4.7 Process back orders and updates (10199)
3.5.4.8 Handle sales order inquiries including post-order fulfillment transactions (10200)
3.5.5 Manage sales partners and alliances (10187)
3.5.5.1 Provide sales and product/service training to sales partners/alliances (10211)
3.5.5.1.1 Provide certification enablement training (20019)
3.5.5.1.2 Manage certifications and skills (20020)
3.5.5.1.3 Provide support to partners/alliances (20021)
3.5.5.2 Provide marketing materials to sales partners/ alliances (18641)
3.5.5.3 Evaluate partner/alliance results (10214)
3.5.5.4 Manage sales partner/alliance master data (14209)

Figure 20: 3.0 Market and Sell Products and Services (APQC, 2018, p.8-10)

4.1.1.2. Business Process Framework (eTOM)

All "Marketing"-related processes of the eTOM model are in its "Market Sales Domain", an overview of which is shown in Figure 21.

Figure 21: The "Market & Sales" domain of the eTOM model (TM Forum, 2016)

We will study seven process groups from this domain, which are: (1) market strategy & policy, (2) market research, (3) loyalty program management, (4) market performance management, (5) brand management, (6) marketing communications and advertising and (7) marketing campaign management. The contents of each group are shown in Figure 22-Figure 28.

Each of these groups includes between one and eight process groups on a third level analysis, of the 26 in total.

Figure 22: The "Market Strategy & Policy" group of processes (TM Forum, 2016)

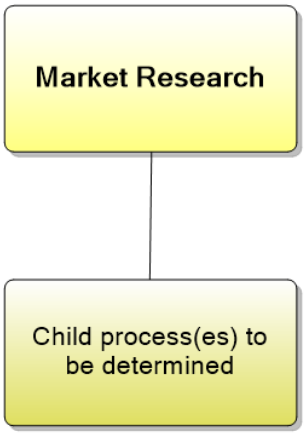


Figure 23: The "Market Research" group of processes (TM Forum, 2016)

Figure 24: The "Loyalty Program Management" group of processes (TM Forum, 2016)

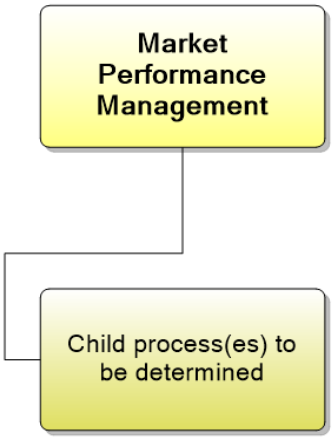


Figure 25: The "Market Performance Management" group of processes (TM Forum, 2016)

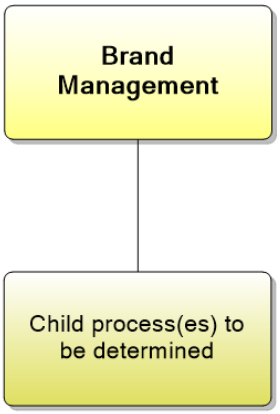


Figure 26: The "Brand Management" group of processes (TM Forum, 2016)

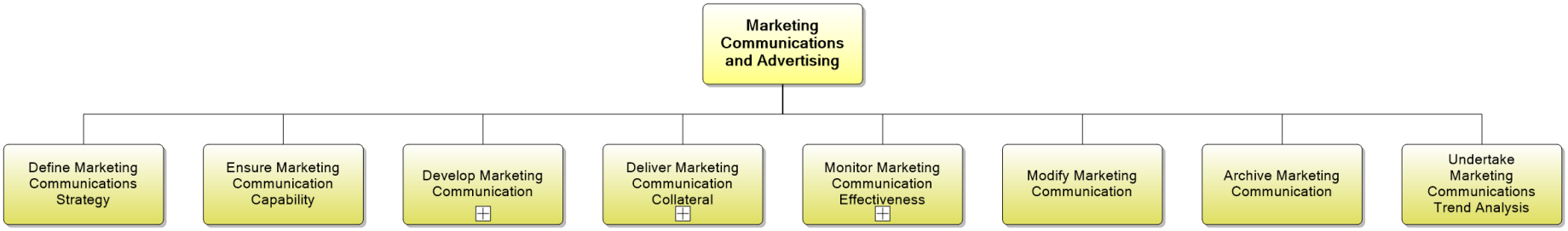


Figure 27: The "Marketing Communications and Advertising" group of processes (TM Forum, 2016)

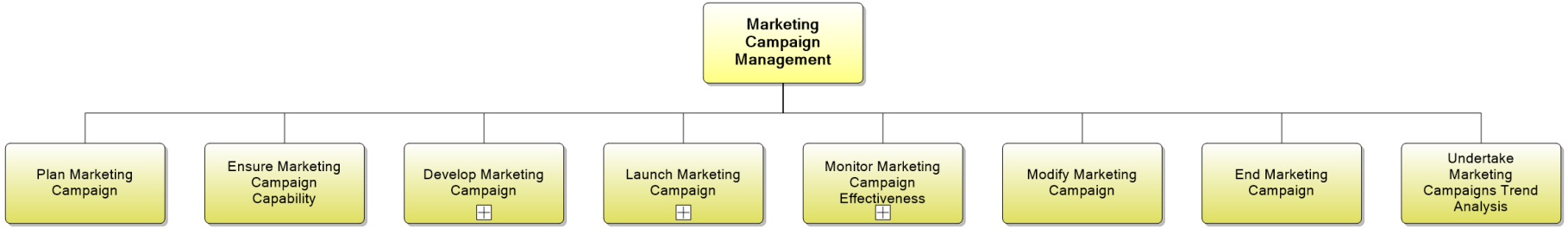


Figure 28: The "Marketing Campaign Management" group of processes (TM Forum, 2016)

The last group we will study comes from the “Customer Domain” part of the model (Figure 29), and it’s called “Customer Management” (Figure 30 provides an overview of its contents).

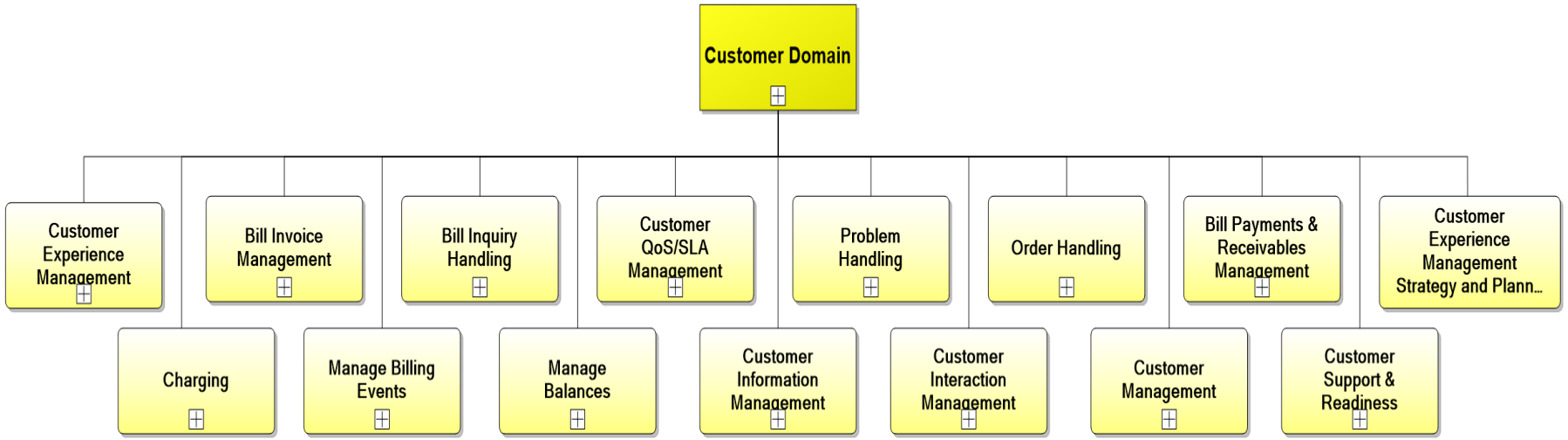


Figure 29: The "Customer" domain of the eTOM model (TM Forum, 2016)

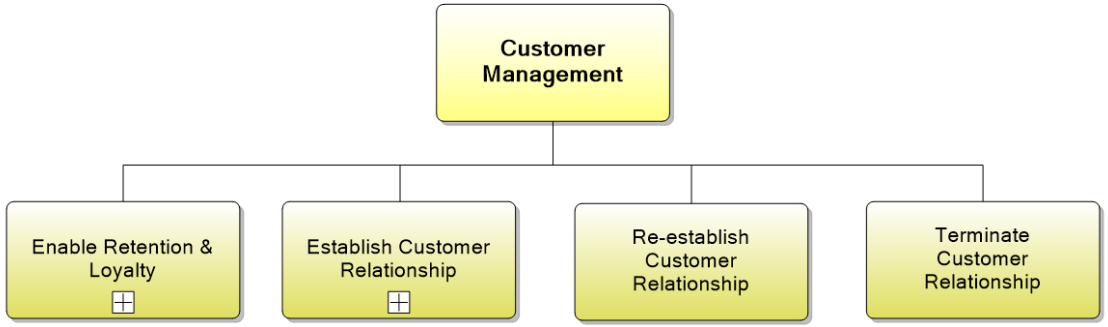


Figure 30: The "Customer Management" group of processes (TM Forum, 2016)

4.1.1.3. Oracle

If we look at the PeopleSoft process maps provided by Oracle[10], we see that there is a "Marketing" module. The only process category that exists there is named "Marketing overview", as shown in Figure 31, and this is the one we will study for this process area.

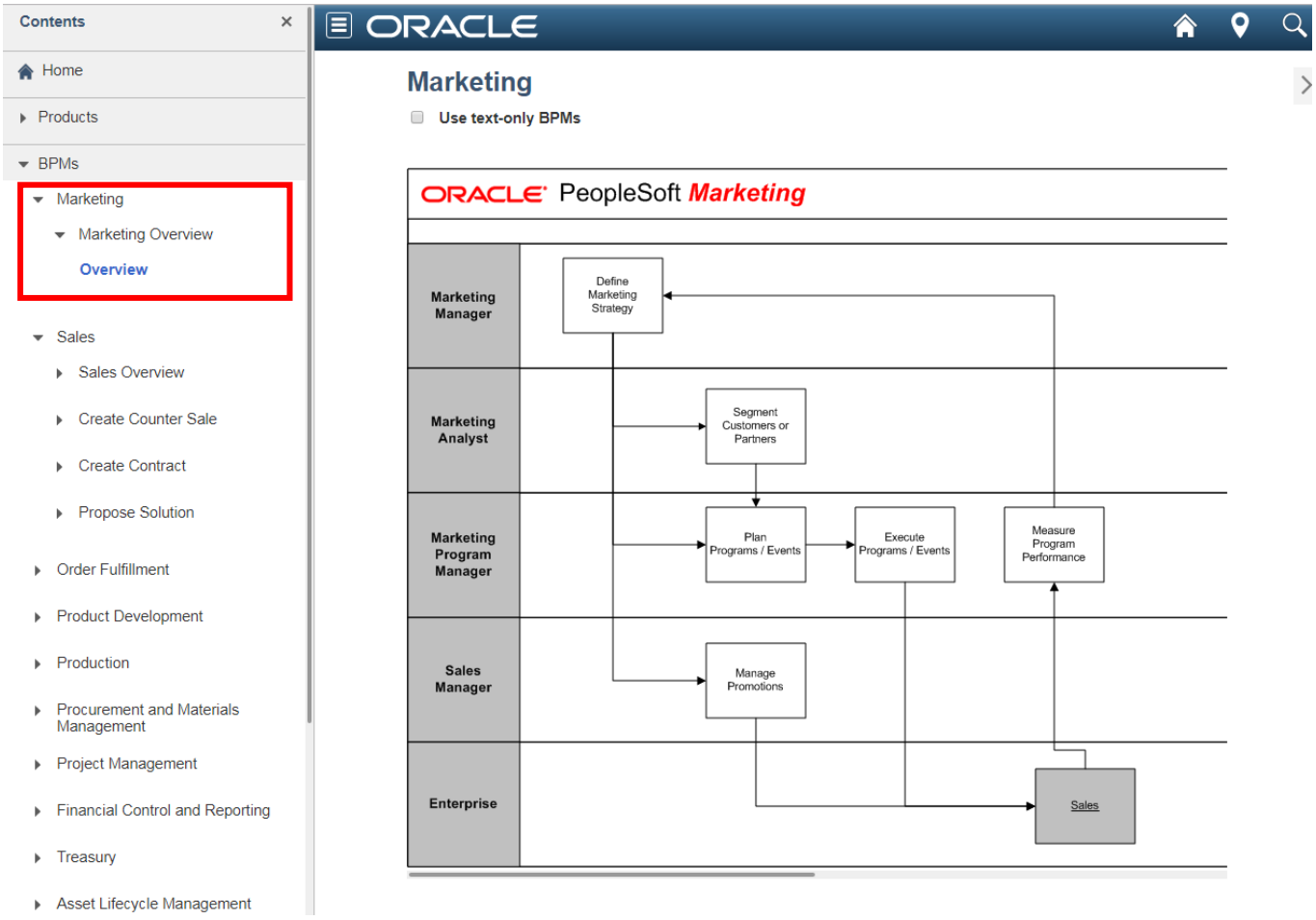


Figure 31: The "Marketing" module by PeopleSoft Financial and Supply Chain Management 9.2 process map (Oracle, 2019)

[10] https://docs.oracle.com/cd/F19196_01/fscm92pbr32/eng/fscm/index.html?focusnode=home (Accessed 11 June 2019)

4.1.1.4. SAP

For the SAP framework we will focus on the solution packages offered by SAP for every line of business. There are four SAP solution packages specifically for "Marketing"[11], as shown in Figure 32.

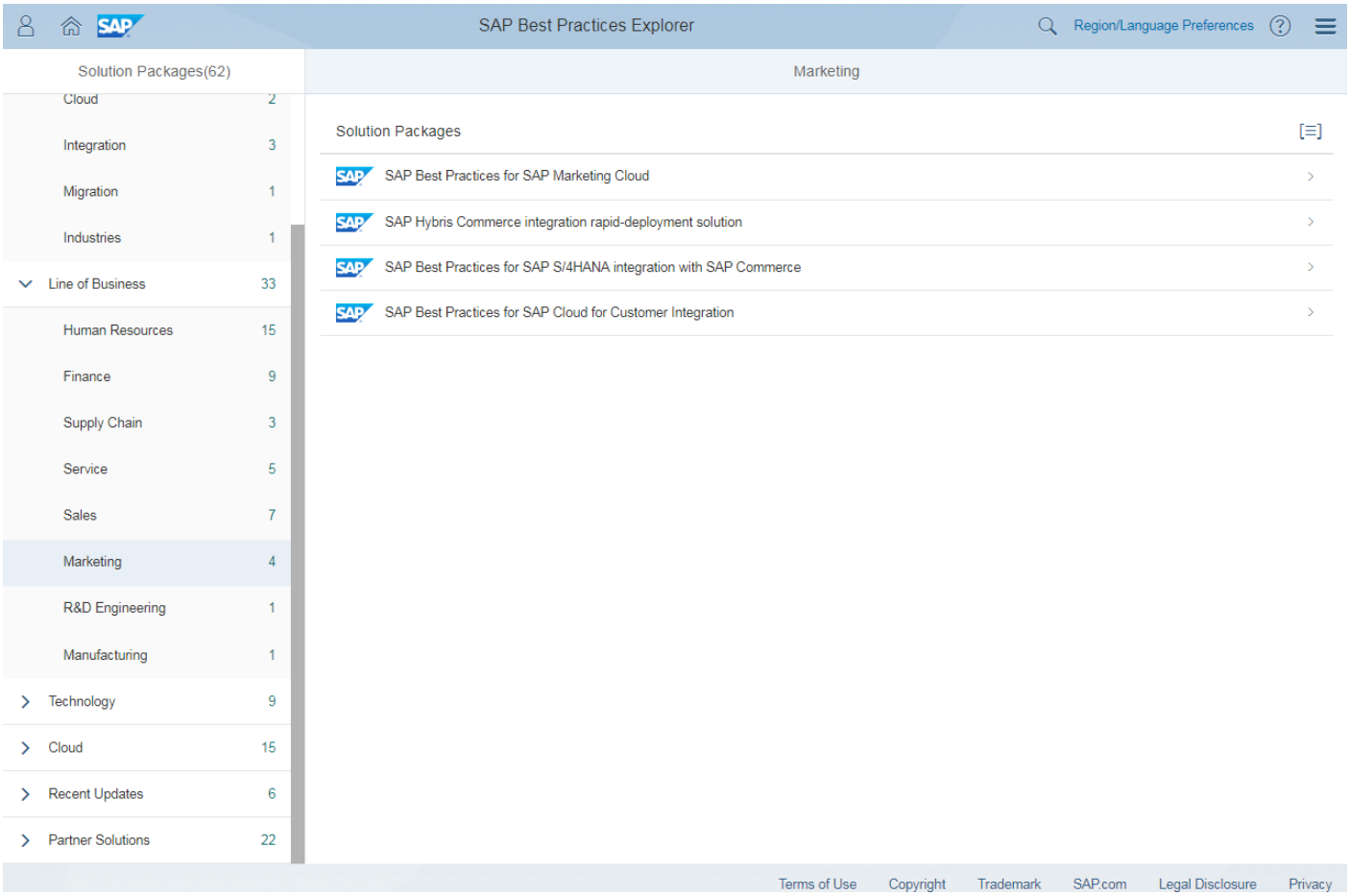


Figure 32: SAP's "Marketing" solution packages (SAP, 2019)

We will study the first one, "SAP Best Practices for SAP Marketing Cloud"[12], as SAP Best Practices for SAP S/4HANA (on premise) doesn't include a separate "Marketing" module. The other three solutions refer to system integration.

[11] https://rapid.sap.com/bp/#/browse/categories/lines_of_business/areas/marketing (Accessed 11 June 2019)

[12] https://rapid.sap.com/bp/BP_CLD_MKT (Accessed 11 June 2019)

In “SAP Best Practices for SAP Marketing Cloud” there are three process categories (Figure 33), which are: (1) data load, (2) integration and (3) marketing. We will focus on the third category, as it includes all the processes that are of interest to us.

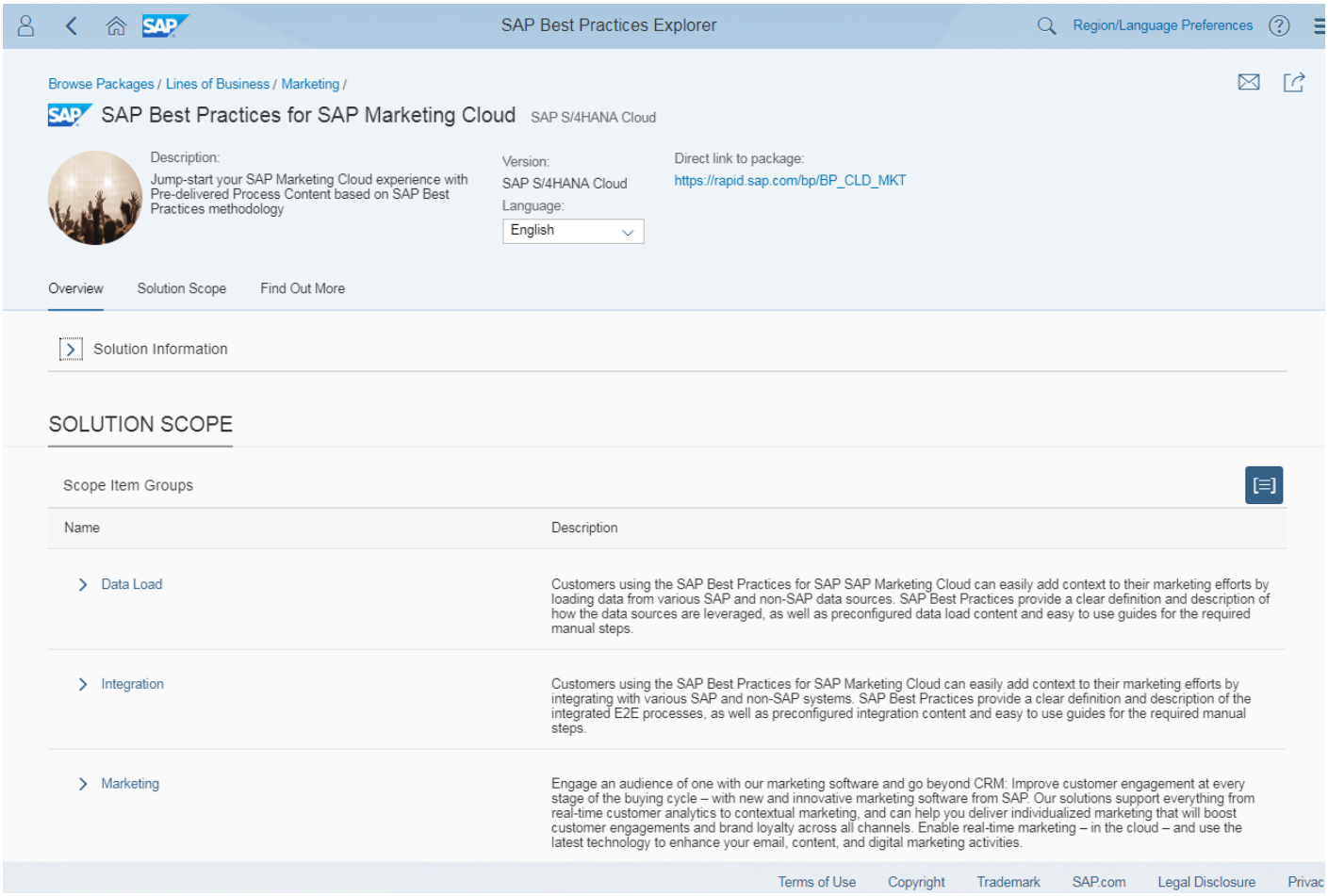


Figure 33: “SAP Best Practices for SAP Marketing Cloud” solution package (SAP, 2019)

The list of processes included in “Marketing” category is shown in Figure 34. In total, there are 20 processes.

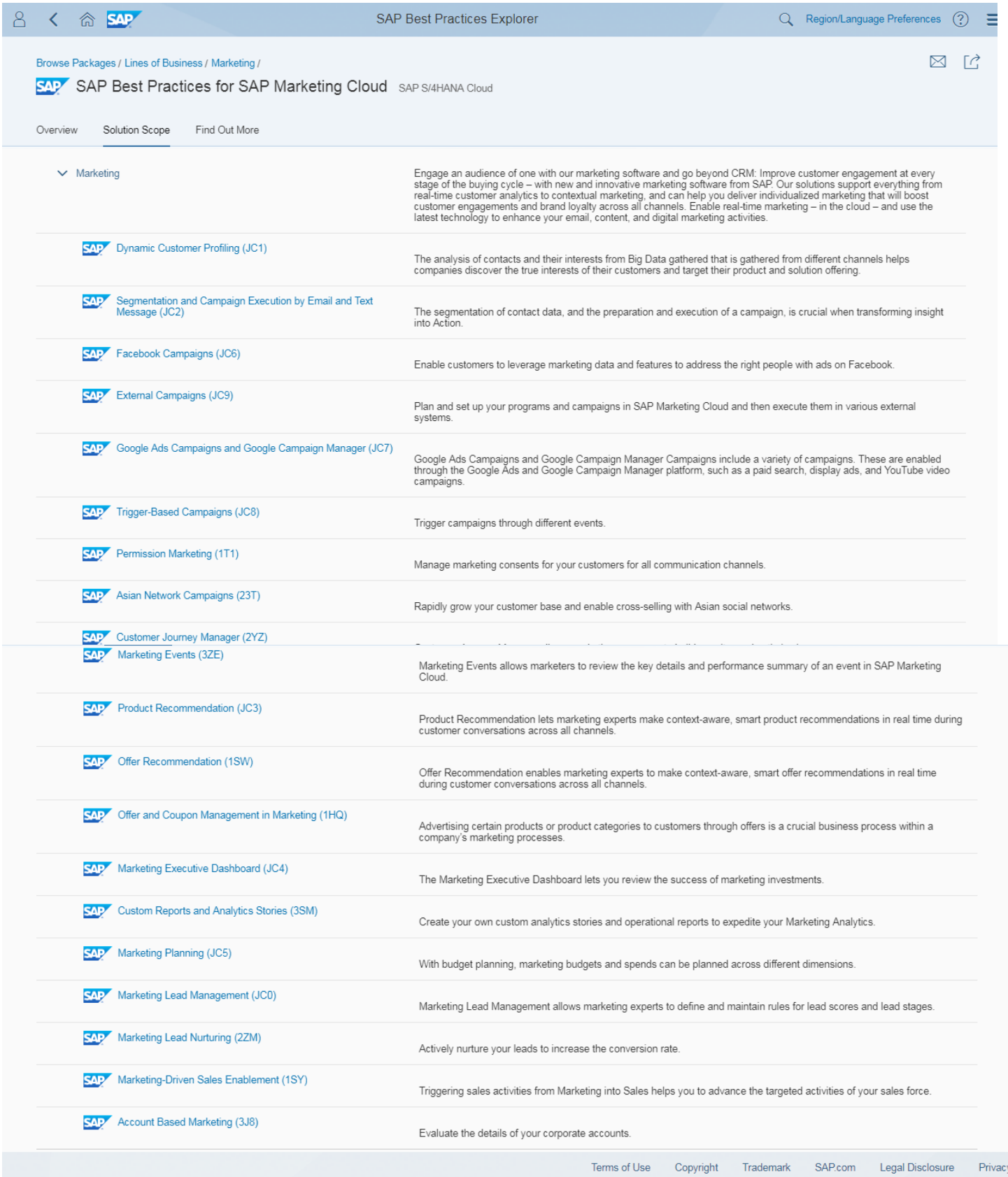


Figure 34: The list of processes included in the "Marketing" category (SAP, 2019)

4.1.1.5. ITSMA

Founded in the early 1990s, ITSMA is an association that specializes in helping companies and enterprises being more effective in their sales and marketing process by offering B2B services and solutions. For this purpose they created a marketing framework, the last update of which took place in 2017. We will study the 2010 version, an overview of which is shown in Figure 35 and Figure 36.

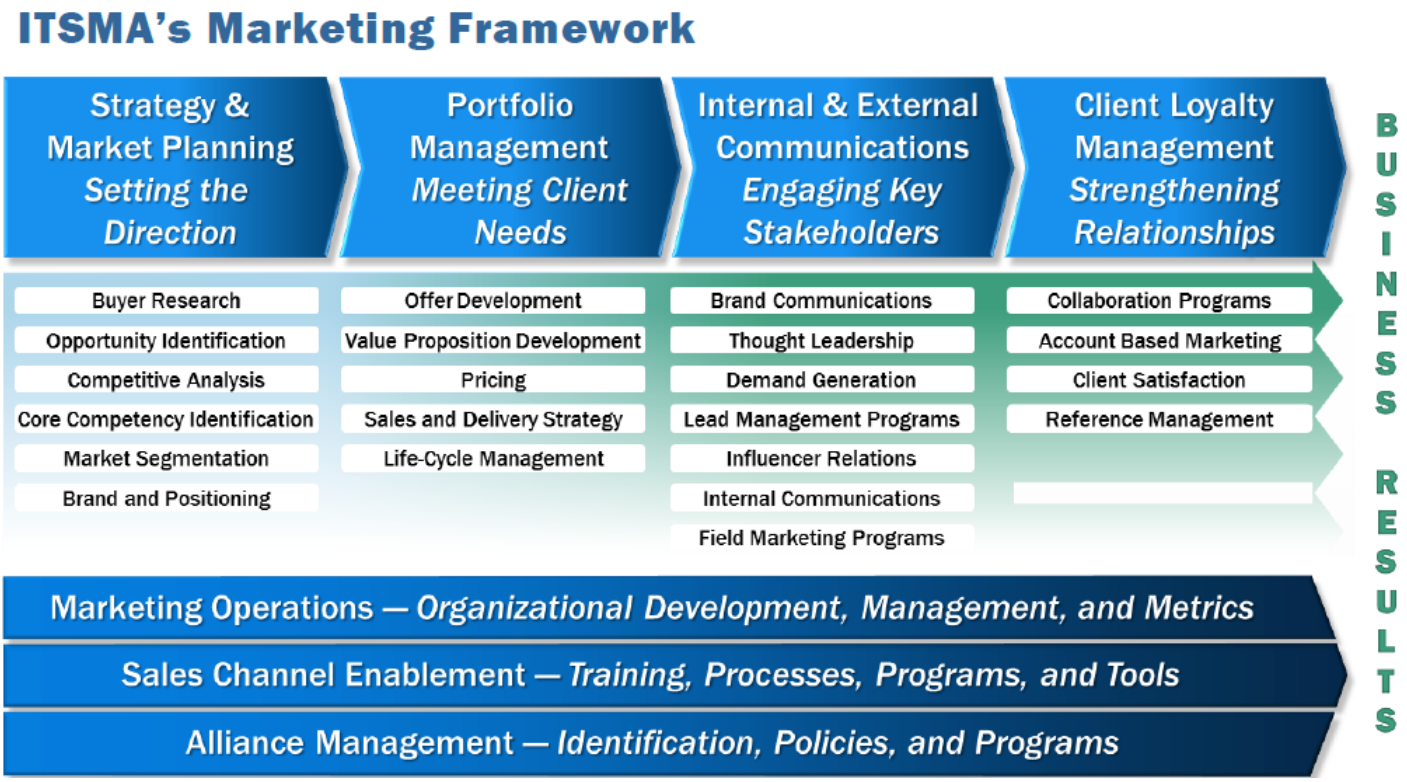


Figure 35: The ITSMA Framework (ITSMA, 2010, p.1)

Marketing Operations	Managing the people, processes and technology to maximize marketing effectiveness. Marketing operations includes: ▪ Organization planning and design ▪ Budgeting ▪ Staff and process management ▪ Professional development ▪ Infrastructure and tools to support marketing workflow automation and asset management ▪ Measurement and reporting
Sales Channel Enablement	Marketing programs and activities that reduce the cost and effort to move a prospect through the buying process. Sales enablement lowers the sales cost per order dollar/Euro by improving sales conversion rates, shortening the sales cycle, and increasing revenue. Sales enablement includes: ▪ Structured sales information (e.g., collateral, sales guides, sales presentations, competitive information) ▪ Market/account information and intelligence (e.g., Hoovers, OneSource) ▪ ROI/price justification tools ▪ References (e.g., dynamic references, case studies, testimonials) ▪ Sales portals ▪ Proposal support/automation/hotline ▪ Customer briefing centers ▪ Training Sales enablement encompasses all these activities delivered to and for the direct sales force, business development, partners/practitioners, channel partners, and strategic alliances.
Alliance Management	Processes and programs to facilitate business to business cooperation to achieve a common goal (such as joint marketing, offering development, sales/distribution, and project funding) while minimizing risk, including: ▪ Alliance objectives and business plans ▪ Search criteria ▪ Alternative evaluation ▪ Negotiation ▪ Ongoing relationship management ▪ Termination Alliances can range from information business relationships based on a simple contract, to complex joint ventures. They can be horizontal (between two services providers) or vertical (between a services provider and a client), and global or local.

Figure 36: "Marketing Operations", "Sales Channel Enablement" and "Alliance Management" description (ITSMA, 2010, p.4)

There are four important processes regarding the "Marketing", which are: (1) strategy & market planning, (2) portfolio management, (3) internal & external communications and (4) client loyalty management. The first process sets the overall direction of the business, which is always up to date with the latest changes in the market. The second process is about investments in ideas. The third one refers to the activities that take place in order to communicate effectively with the internal as well as the external audiences for issues regarding the marketing and sales

processes. Last but not least, the last process is about strengthening key stakeholder relationships.

Apart from these four processes, there are also “the three foundations of marketing that cut across all processes and all stages of the buying process” (ITSMA, 2010). These are: (1) marketing operations, (2) sales channel enablement and (3) alliance management. The first one aims to maximize the enterprise’s marketing effectiveness by managing people, technology and processes. The second one aims to shorten the sales cycle and increase the profits. Finally, the third one refers to business to business cooperation.

All processes groups, apart from the “Alliance Management”, are marketing-related, thus we will use them in the comparison than follows.

4.1.2. Comparison

We will now move on to compare the “Marketing”-related frameworks that were presented above. PCF was used as a base for the comparison, which is shown in Table 3.

Table 3: Marketing frameworks comparison

PCF	eTOM		ITSMA		Oracle	SAP	
3.1.Understand markets, customers, and capabilities	Market Sales Domain	Market Strategy & Policy	Marketing Processes	Strategy & Market Planning	Marketing	Marketing	Marketing
		Market Research					
3.2.Develop marketing strategy	Market Sales Domain	Market Strategy & Policy	Marketing Processes	Portfolio Management	Marketing	Marketing	Marketing **(CONCISE)**
		Loyalty Program Management		Internal & External Communications			
				Client Loyalty Management			
		Market Performance Management					
		Marketing Communications and Advertising **(EXTENSIVE)**	Marketing Foundations	Marketing Operations			
		Marketing Campaign Management **(EXTENSIVE)**		Sales Channel Enablement (EXTENSIVE)			
	Customer Domain	Customer Management					

3.3.Develop and manage marketing plans	Market Sales Domain	Market Performance Management	Marketing Processes	Portfolio Management	Marketing	Marketing	Marketing
		Marketing Campaign Management **(EXTENSIVE)**	Marketing Foundations	Marketing Operations			
	Customer Domain	Customer Management					
MISSING	Brand Management		Marketing Processes	Strategy & Market Planning	**MISSING**	Marketing	Marketing
				Internal & External Communications			
MISSING	**MISSING**		**MISSING**		**MISSING**	Marketing	Data Load

If we take a closer look at the comparison, we can see that eTOM and ITSMA are the most detailed models of the ones we've studied. Now let's discuss each of the frameworks separately.

PCF has a clear theoretical structure, including three process categories with all the "Marketing" related processes. Its' structure seems to be less complex than the rest of the frameworks.

Moving on to eTOM, it is very detailed, as it includes the most process categories with "Marketing"-related processes. What is more, it contains a group with "Brand management" processes, something we don't see in any of the other models. The ITSMA and SAP frameworks also have some similar processes, but not in a separate process group.

The next model we studied is ITSMA. It can be described as extensive, compared to PCF and this is because "Marketing" is the main focus of the model.

Oracle seems to be the most concise of the frameworks we've studied, as it has all the "Marketing" processes in one module. However, it covers all the basic processes, compared to PCF.

Last but not least, SAP is quite detailed as far as the "Marketing" process area is concerned, as it has a separate solution package for this purpose. Not only it covers all the basic "Marketing" processes that PCF and the other frameworks have, but since it is software-oriented it also includes some data-related processes that none of the other frameworks have.

4.2. Sales

The “Sales” area of an enterprise contains all the steps needed for a salesperson in order to sell a product. The “selling process is a complete cycle which starts from identifying the customers to closing the deal with them. It is more relevant is B2B business sales where the sales cycle is not short and might take a longer duration to close. In B2C the selling process may be transient and shorter” (MBASkool.com, 2019).

In this section of the thesis we will discuss what each framework proposes for all these “Sales”-related processes.

4.2.1. Frameworks

We will study six frameworks, which are: (1) IMM Approach, (2) PCF, (3) eTOM, (4) Oracle and (5) SAP. The selection of the frameworks was made once again based on their structure. For each of the frameworks we provide all the relevant links in the “List of References” section. Any additional links needed will be added as a footnote in the text.

As mentioned in the previous section, some of the frameworks have one category both for the “Sales” and the “Marketing” processes, but we are looking at them separately.

The COBIT and SCOR frameworks don’t include processes regarding the “Sales” area, thus we will not include them in this section.

4.2.1.1. Integrated Modeling Method (IMM™)

The IMM Approach is the simplest and less detailed model we’ve studied. As far as the “Sales” area is concerned, the IMM Approach has three process groups included in the “Sell motor spares” category (Figure 5 of Chapter 3). These groups are: (1) define sales targets, (2) build sales budgets and (3) sell products and services.

4.2.1.2. APQC's Process Classification Framework (PCF)

The 3rd category of PCF, "3.0 Market and Sell Products and Services", is the one that is of interest to us for the "Sales" process area. As mentioned, it includes all the processes related to marketing and selling the products, referring mainly to the strategies that are being followed by the company but including also processes concerning the actual process of selling. As Figure 20 of the "Marketing" section demonstrates, this category has five process groups, of which we will study the two: (1) develop sales strategy and (2) develop and manage sales plans.

Each of these categories includes five process sub-groups, making them 10 in total. In general, the "3.0 Market and Sell Products and Services" is composed of 201 processes, the 92 of which are "Sales"-related.

4.2.1.3. Business Process Framework (eTOM)

The eTOM framework has a domain both for the marketing and selling strategies, called "Market & Sales Management". It includes 15 process groups, as shown in Figure 21. For the "Sales" process area we will study eight of these groups, which are: (1) sales strategy & planning, (2) sales forecasting, (3) sales performance management, (4) selling, (5) contact/lead/prospect management, (6) sales development, (7) sales channel management and (8) market sales support & readiness. The rest of the processes refer to the "Marketing" process area, and we already studied them in the previous section.

Each of these groups includes between one and six process groups on a third level analysis, of the 30 in total. The contents of each group are shown in Figure 37-Figure 44.

Figure 37: The "Sales Strategy & Planning" group of processes (TM Forum, 2016)

Figure 38: The "Sales Forecasting" group of processes (TM Forum, 2016)

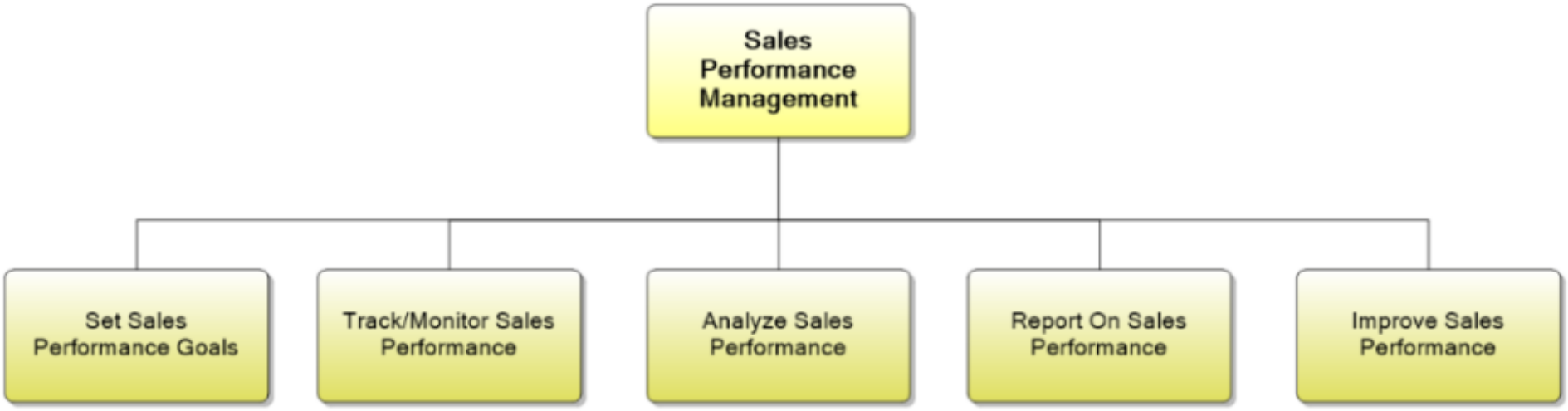


Figure 39: The "Sales Performance Management" group of processes (TM Forum, 2016)

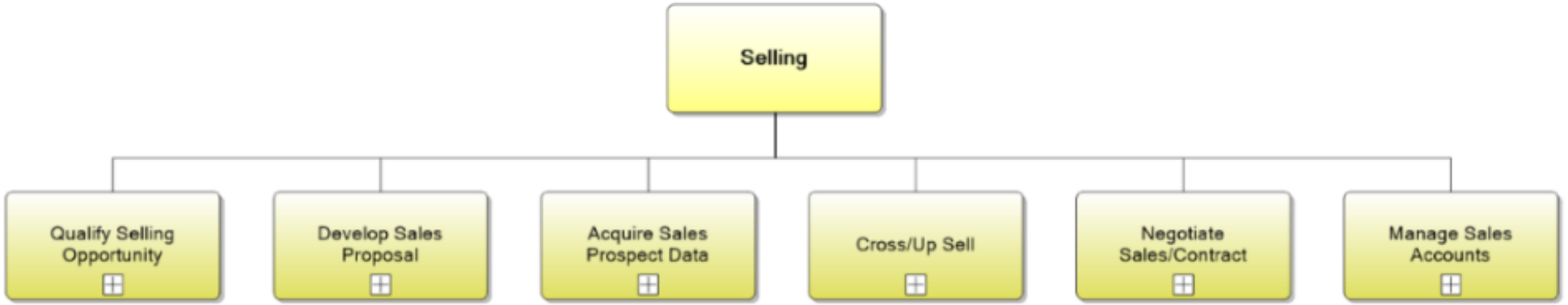


Figure 40: The "Selling" group of processes (TM Forum, 2016)

Figure 41: The "Contact/ Lead/ Prospect Management" group of processes (TM Forum, 2016)

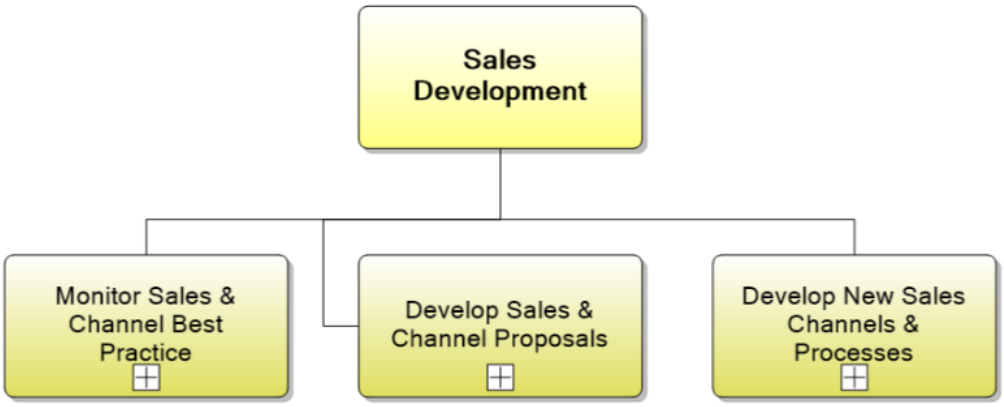


Figure 42: The "Sales Development" group of processes (TM Forum, 2016)

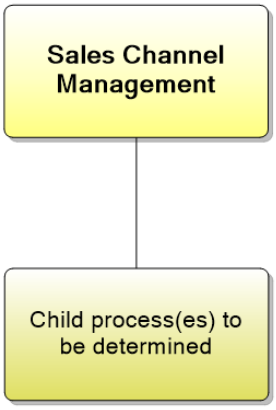


Figure 43: The "Sales Channel Management" group of processes (TM Forum, 2016)

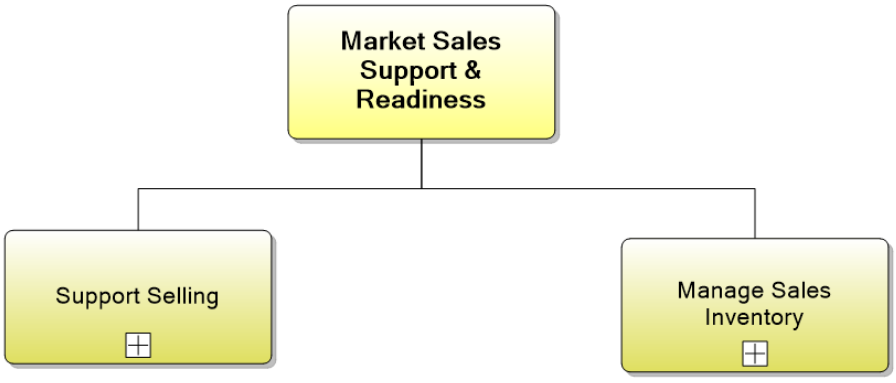


Figure 44: The "Market Sales Support & Readiness" group of processes (TM Forum, 2016)

Another domain of the model that has “Sales”-related processes is the “Customer Domain”, an overview of which is shown in Figure 29 of the “Marketing” section. We will study two process groups from this domain, as the rest of them are relevant to the “Customer Service” and “Finance” process areas.

These groups are: (1) customer management and (2) customer information management. They include four and five process sub-groups respectively, of the nine in total. Figure 30 of the "Marketing" section and Figure 45 below provide an overview of their contents.

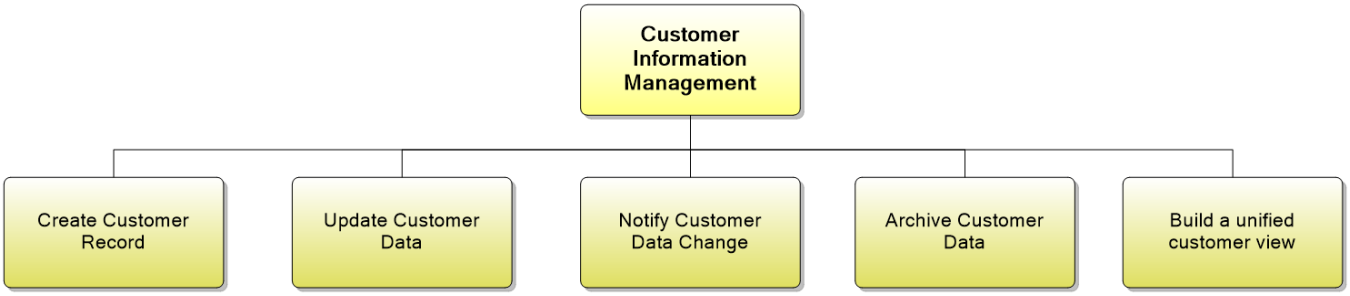


Figure 45: The "Customer Information Management" group of processes (TM Forum, 2016)

We will also study the process group "Product Offering & Purchasing" from the "Product Domain" of the model. It includes processes regarding the management of the purchase lifecycle. It includes eight process groups on a third level analysis, as shown in Figure 46.

TM forum offers more detailed regarding the contents of each of these process categories and groups. These can be found at the links provided in the "List of References" chapter of the thesis.

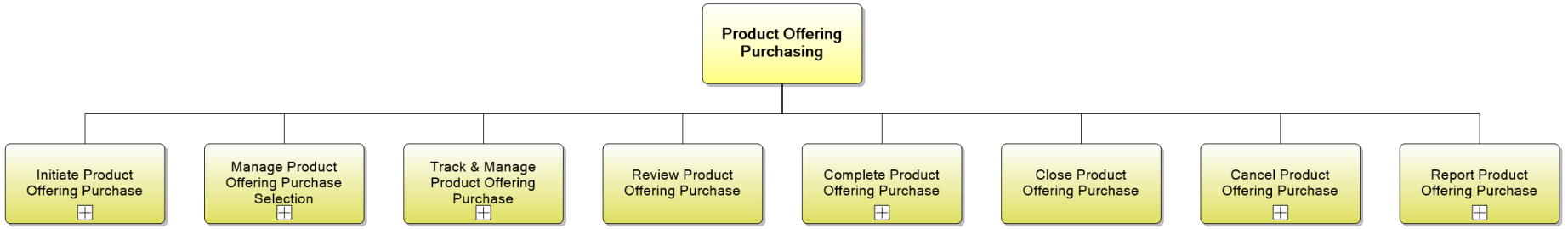


Figure 46: The "Product Offering Purchasing" group of processes (TM Forum, 2016)

4.2.1.4. Oracle

If we look at the PeopleSoft process maps provided by Oracle[13], we see that there is a module called “Sales” (Figure 47).

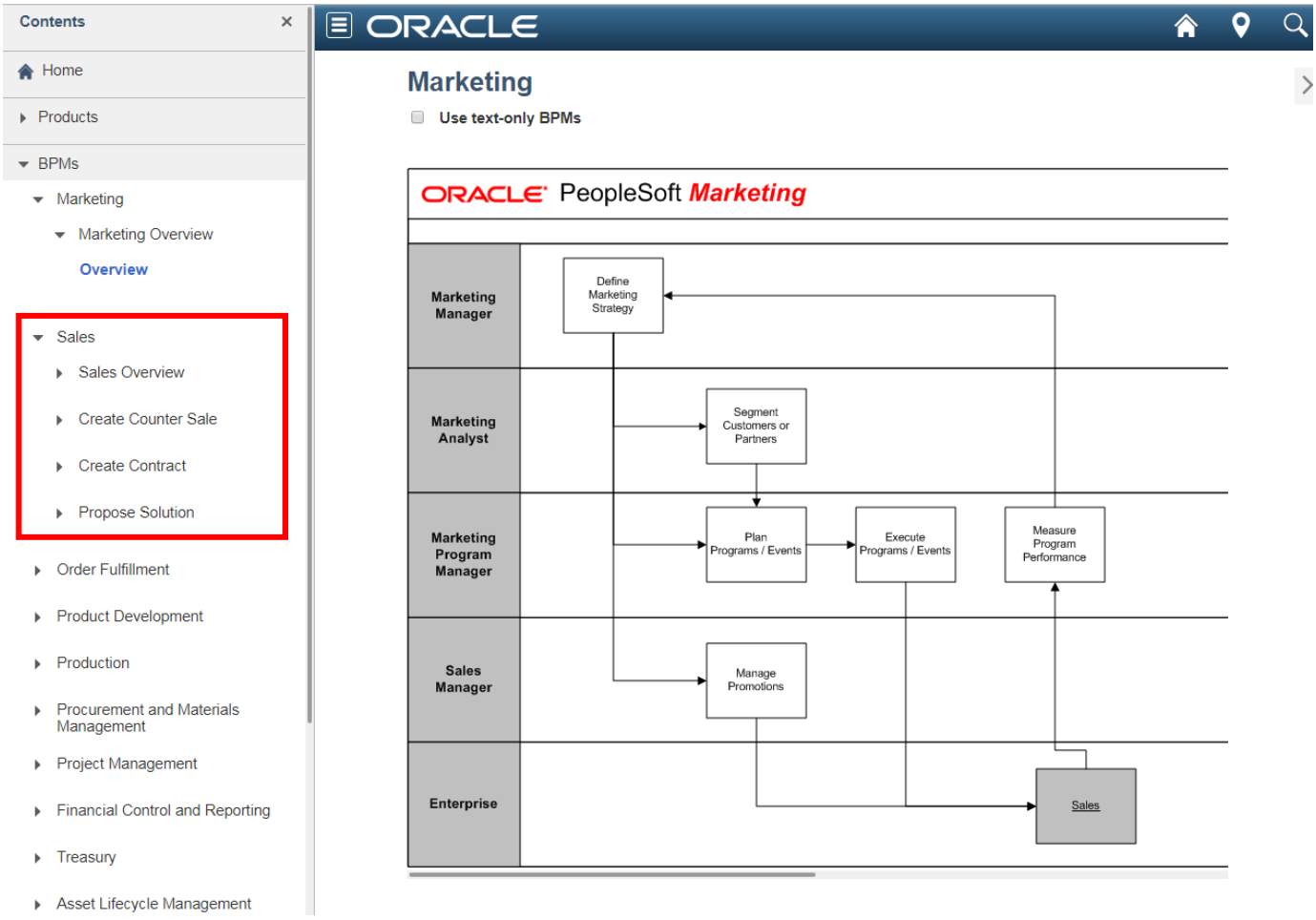


Figure 47: The "Sales" module by PeopleSoft Financial and Supply Chain Management 9.2 process map (Oracle, 2019)

It includes four process categories, which are: (1) sales overview, (2) create counter sale, (3) create contract and (4) propose solution. The contents of each are shown in Figure 48. The “Sales” module consists of 18 processes in total.

[13] https://docs.oracle.com/cd/F19196_01/fscm92pbr32/eng/fscm/index.html?focusnode=home (Accessed 11 June 2019)

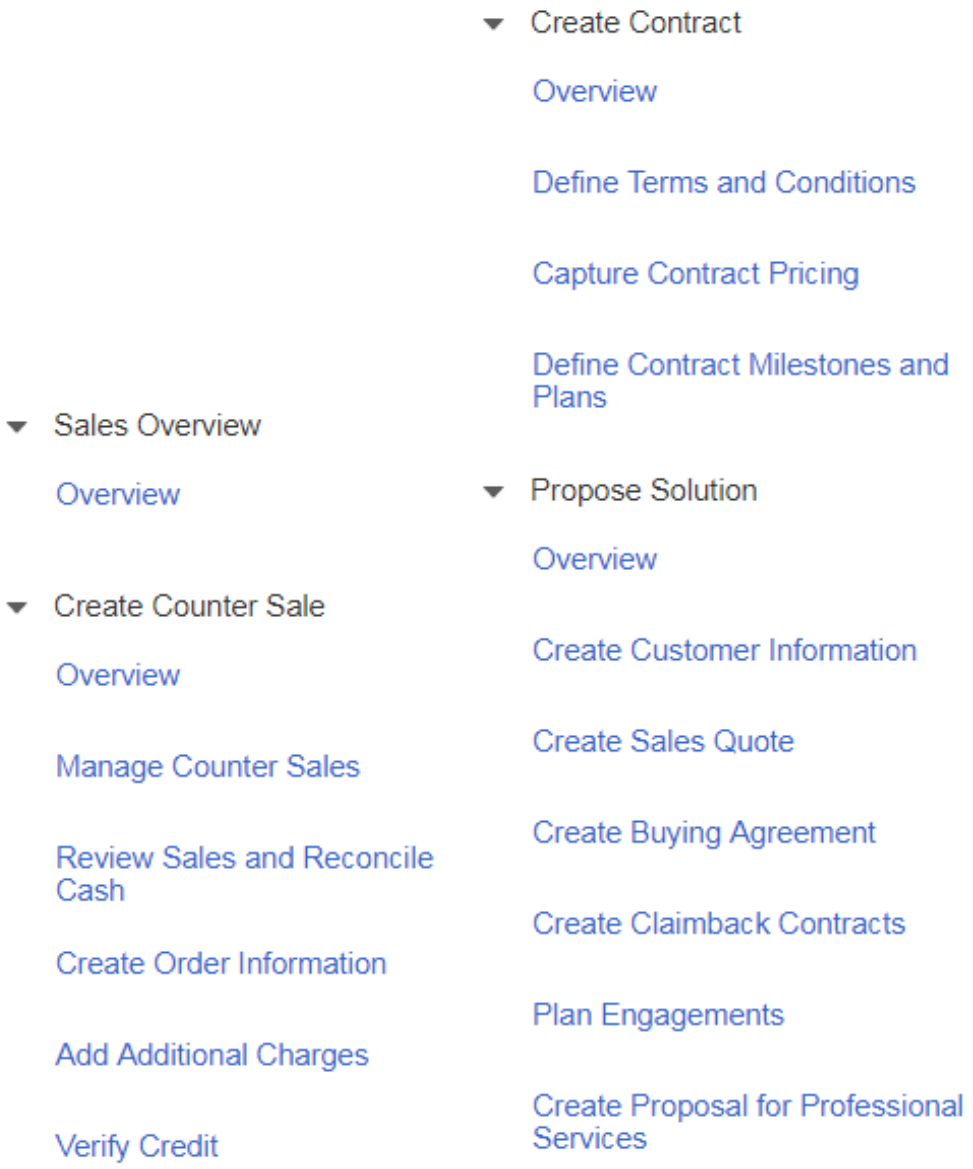


Figure 48: The processes included in the "Sales" module, PeopleSoft Financial and Supply Chain Management 9.2 (Oracle, 2019)

What is more, Oracle includes some processes regarding customer contracts in its "Order Fulfillment" module, specifically in the "Manage Sales Contract" and "Manage Sales Order" process groups. The contents of these groups are shown in Figure 49.

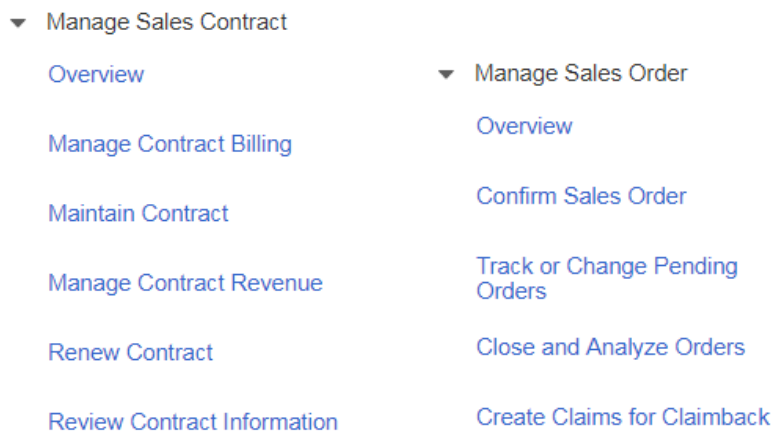
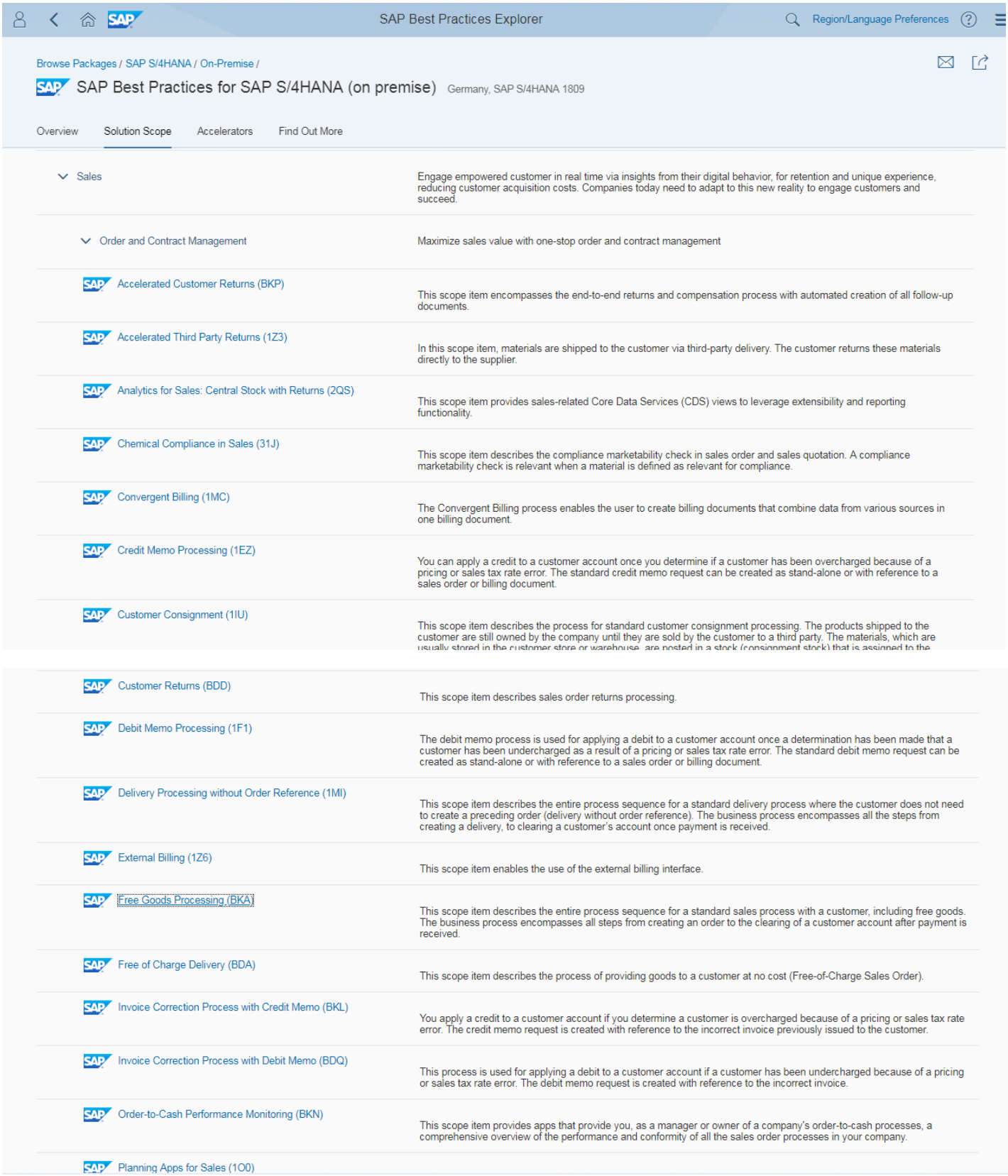


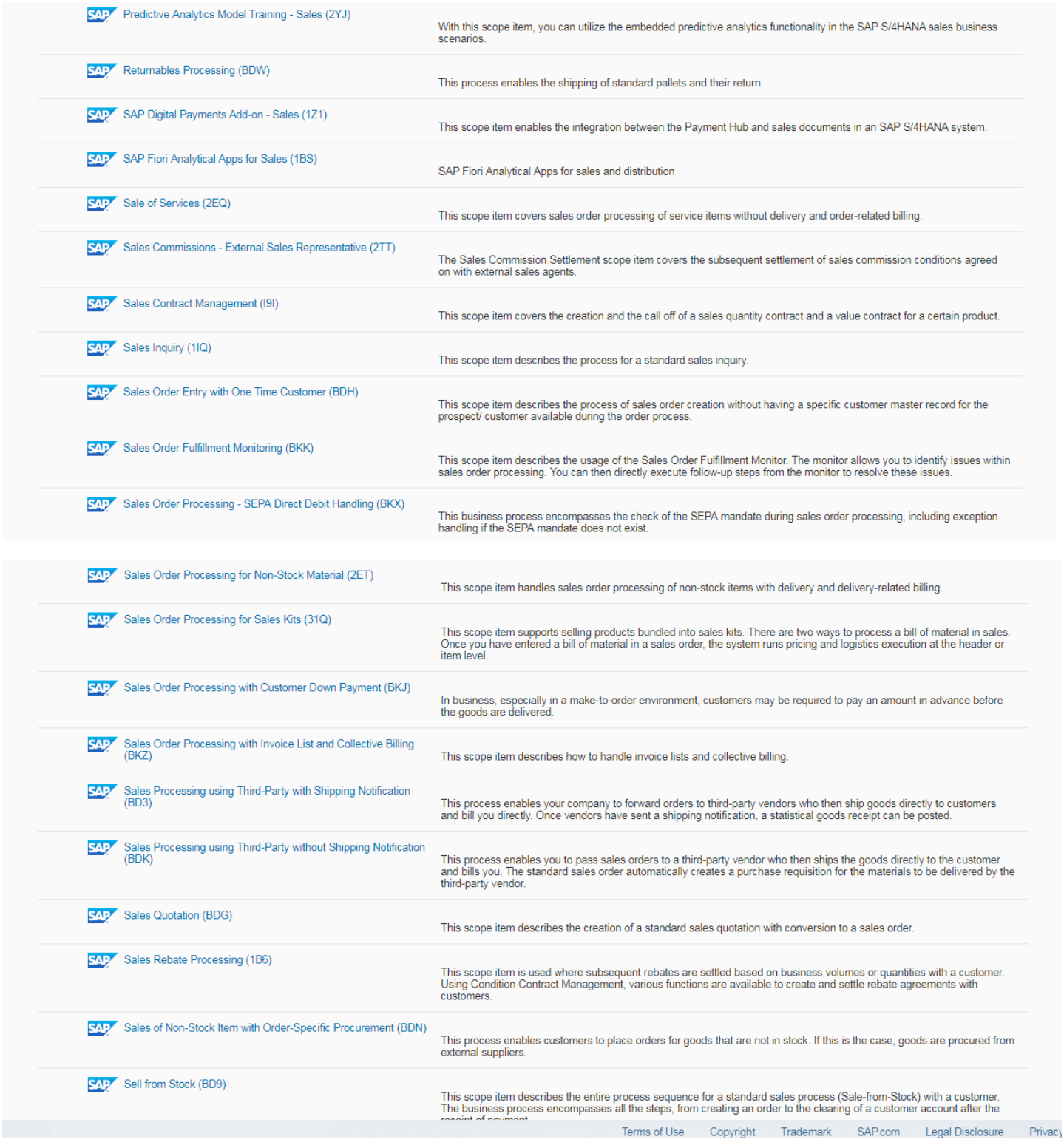
Figure 49: The processes included in the "Manage Sales Contract" and "Manage Sales Order" group of the "Order Fulfillment" module, PeopleSoft Financial and Supply Chain Management 9.2 (Oracle, 2019)

4.2.1.5. SAP

For the SAP framework we will focus on the SAP Best Practices for SAP S/4HANA (on premise) solution[14]. There is a module "Sales" that includes all the relevant processes, the contents of which are shown in Figure 50.

[14] https://rapid.sap.com/bp/BP_OP_ENTPR (Accessed 21 May 2019)


SAP Best Practices Explorer
Region/Language Preferences
Browse Packages / SAP S/4HANA / On-Premise /
SAP Best Practices for SAP S/4HANA (on premise) Germany, SAP S/4HANA 1809
Overview
Solution Scope
Accelerators
Find Out More
Sales
Engage empowered customer in real time via insights from their digital behavior, for retention and unique experience, reducing customer acquisition costs. Companies today need to adapt to this new reality to engage customers and succeed.
Order and Contract Management
Maximize sales value with one-stop order and contract management
Accelerated Customer Returns (BKP)
This scope item encompasses the end-to-end returns and compensation process with automated creation of all follow-up documents.
Accelerated Third Party Returns (1Z3)
In this scope item, materials are shipped to the customer via third-party delivery. The customer returns these materials directly to the supplier.
Analytics for Sales: Central Stock with Returns (2QS)
This scope item provides sales-related Core Data Services (CDS) views to leverage extensibility and reporting functionality.
Chemical Compliance in Sales (31J)
This scope item describes the compliance marketability check in sales order and sales quotation. A compliance marketability check is relevant when a material is defined as relevant for compliance.
Convergent Billing (1MC)
The Convergent Billing process enables the user to create billing documents that combine data from various sources in one billing document.
Credit Memo Processing (1EZ)
You can apply a credit to a customer account once you determine if a customer has been overcharged because of a pricing or sales tax rate error. The standard credit memo request can be created as stand-alone or with reference to a sales order or billing document.
Customer Consignment (1IU)
This scope item describes the process for standard customer consignment processing. The products shipped to the customer are still owned by the company until they are sold by the customer to a third party. The materials, which are
Customer Returns (BDD)
This scope item describes sales order returns processing.
Debit Memo Processing (1F1)
The debit memo process is used for applying a debit to a customer account once a determination has been made that a customer has been undercharged as a result of a pricing or sales tax rate error. The standard debit memo request can be created as stand-alone or with reference to a sales order or billing document.
Delivery Processing without Order Reference (1MI)
This scope item describes the entire process sequence for a standard delivery process where the customer does not need to create a preceding order (delivery without order reference). The business process encompasses all the steps from creating a delivery, to clearing a customer's account once payment is received.
External Billing (1Z6)
This scope item enables the use of the external billing interface.
Free Goods Processing (BKA)
This scope item describes the entire process sequence for a standard sales process with a customer, including free goods. The business process encompasses all steps from creating an order to the clearing of a customer account after payment is received.
Free of Charge Delivery (BDA)
This scope item describes the process of providing goods to a customer at no cost (Free-of-Charge Sales Order).
Invoice Correction Process with Credit Memo (BKL)
You apply a credit to a customer account if you determine a customer is overcharged because of a pricing or sales tax rate error. The credit memo request is created with reference to the incorrect invoice previously issued to the customer.
Invoice Correction Process with Debit Memo (BDQ)
This process is used for applying a debit to a customer account if a customer has been undercharged because of a pricing or sales tax rate error. The debit memo request is created with reference to the incorrect invoice.
Order-to-Cash Performance Monitoring (BKN)
This scope item provides apps that provide you, as a manager or owner of a company's order-to-cash processes, a comprehensive overview of the performance and conformity of all the sales order processes in your company.
Planning Apps for Sales (1O0)



Predictive Analytics Model Training - Sales (2YJ)	With this scope item, you can utilize the embedded predictive analytics functionality in the SAP S/4HANA sales business scenarios.
Returnables Processing (BDW)	This process enables the shipping of standard pallets and their return.
SAP Digital Payments Add-on - Sales (1Z1)	This scope item enables the integration between the Payment Hub and sales documents in an SAP S/4HANA system.
SAP Fiori Analytical Apps for Sales (1BS)	SAP Fiori Analytical Apps for sales and distribution
Sale of Services (2EQ)	This scope item covers sales order processing of service items without delivery and order-related billing.
Sales Commissions - External Sales Representative (2TT)	The Sales Commission Settlement scope item covers the subsequent settlement of sales commission conditions agreed on with external sales agents.
Sales Contract Management (I9I)	This scope item covers the creation and the call off of a sales quantity contract and a value contract for a certain product.
Sales Inquiry (1IQ)	This scope item describes the process for a standard sales inquiry.
Sales Order Entry with One Time Customer (BDH)	This scope item describes the process of sales order creation without having a specific customer master record for the prospect/ customer available during the order process.
Sales Order Fulfillment Monitoring (BKK)	This scope item describes the usage of the Sales Order Fulfillment Monitor. The monitor allows you to identify issues within sales order processing. You can then directly execute follow-up steps from the monitor to resolve these issues.
Sales Order Processing - SEPA Direct Debit Handling (BKX)	This business process encompasses the check of the SEPA mandate during sales order processing, including exception handling if the SEPA mandate does not exist.
Sales Order Processing for Non-Stock Material (2ET)	This scope item handles sales order processing of non-stock items with delivery and delivery-related billing.
Sales Order Processing for Sales Kits (31Q)	This scope item supports selling products bundled into sales kits. There are two ways to process a bill of material in sales. Once you have entered a bill of material in a sales order, the system runs pricing and logistics execution at the header or item level.
Sales Order Processing with Customer Down Payment (BKJ)	In business, especially in a make-to-order environment, customers may be required to pay an amount in advance before the goods are delivered.
Sales Order Processing with Invoice List and Collective Billing (BKZ)	This scope item describes how to handle invoice lists and collective billing.
Sales Processing using Third-Party with Shipping Notification (BD3)	This process enables your company to forward orders to third-party vendors who then ship goods directly to customers and bill you directly. Once vendors have sent a shipping notification, a statistical goods receipt can be posted.
Sales Processing using Third-Party without Shipping Notification (BDK)	This process enables you to pass sales orders to a third-party vendor who then ships the goods directly to the customer and bills you. The standard sales order automatically creates a purchase requisition for the materials to be delivered by the third-party vendor.
Sales Quotation (BDG)	This scope item describes the creation of a standard sales quotation with conversion to a sales order.
Sales Rebate Processing (1B6)	This scope item is used where subsequent rebates are settled based on business volumes or quantities with a customer. Using Condition Contract Management, various functions are available to create and settle rebate agreements with customers.
Sales of Non-Stock Item with Order-Specific Procurement (BDN)	This process enables customers to place orders for goods that are not in stock. If this is the case, goods are procured from external suppliers.
Sell from Stock (BD9)	This scope item describes the entire process sequence for a standard sales process (Sale-from-Stock) with a customer. The business process encompasses all the steps, from creating an order to the clearing of a customer account after the

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Figure 50: The list of processes included in the "Sales" module of SAP Best Practices for SAP S/4HANA (on premise) solution package (SAP, 2019)

SAP also offers some other solution packages for “Sales”[15], as shown in Figure 51.

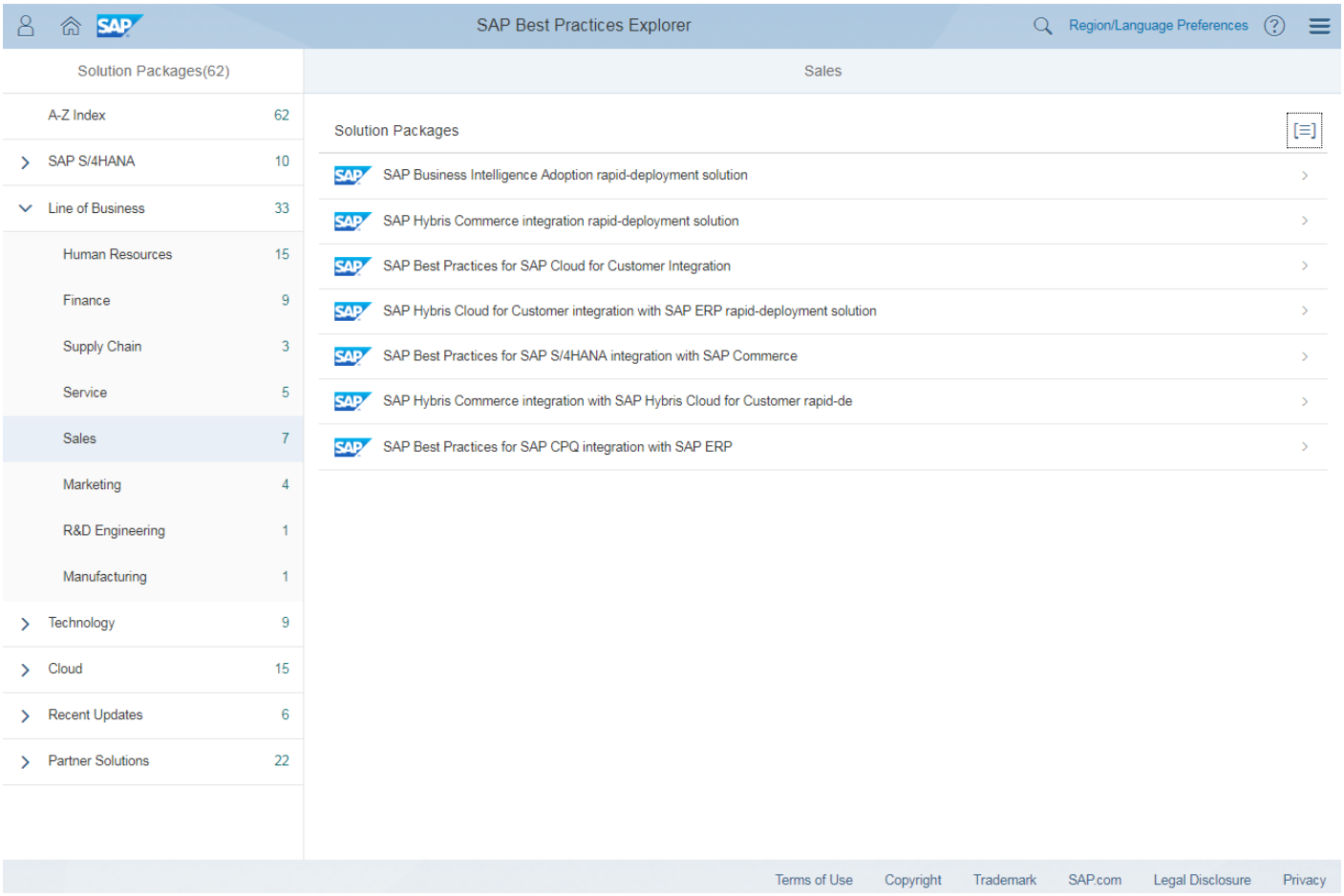


Figure 51: SAP's "Sales" solution packages (SAP, 2019)

There are seven solution packages regarding for the “Sales” module. There is one referring to business intelligence, and the rest of them are about system integration. None of these packages seem to be a complete “Sales” solution, as they were developed for specific business needs, thus we will not study any of them along with the “Sales” module mentioned before.

[15] https://rapid.sap.com/bp/#/browse/categories/lines_of_business/areas/sales (Accessed 11 June 2019)

4.2.2. Comparison

We will now move on to compare the frameworks for the “Sales” module. PCF is used as a base for the comparison, which is presented in Table 4.

Table 4: Sales frameworks comparison

<table>
<tr><th>PCF</th><th>IMM</th><th colspan="2">eTOM</th><th colspan="2">Oracle</th><th>SAP</th></tr>
<tr><td rowspan="3">3.4.Develop sales strategy</td><td>1. Define Sales Targets</td><td rowspan="2">Market Sales Domain</td><td>Sales Strategy & Planning</td><td rowspan="3">Sales</td><td rowspan="3">Propose Solution (CONCISE)</td><td rowspan="3">Sales (CONCISE)</td></tr>
<tr><td rowspan="2">2.Build Sales Budgets (CONCISE)</td><td>Sales Forecasting</td></tr>
<tr><td>Sales Performance Management</td></tr>
<tr><td rowspan="6">3.5.Develop and manage sales plans</td><td rowspan="6">3.Sell Products and Services (CONCISE)</td><td rowspan="2">Market Sales Domain</td><td>Selling</td><td rowspan="5">Sales</td><td>Sales Overview</td><td rowspan="6">Sales (CONCISE)</td></tr>
<tr><td rowspan="2">Contact/ Lead/ Prospect Management</td><td>Create Counter Sale</td></tr>
<tr><td>Propose Solution</td></tr>
<tr><td rowspan="2">Product Domain</td><td rowspan="2">Product Offering Purchasing</td><td rowspan="2">Create Contract</td></tr>
<tr><td rowspan="2">Customer Domain</td><td rowspan="2">Customer Information Management</td></tr>
<tr><td rowspan="2">Order Fulfillment</td><td>Manage Sales Contract</td></tr>
<tr><td>Manage Sales Order</td></tr>
<tr><td>MISSING</td><td>MISSING</td><td>Market Sales Domain</td><td>Market Sales Support & Readiness</td><td colspan="2">MISSING</td><td>MISSING</td></tr>
<tr><td rowspan="2">3.2.Develop marketing strategy</td><td rowspan="2">MISSING</td><td rowspan="2">Market Sales Domain</td><td>Sales Development</td><td colspan="2" rowspan="2">MISSING</td><td rowspan="2">MISSING</td></tr>
<tr><td>Sales Channel Management</td></tr>
</table>

If we take a closer look at Table 4, we can see that eTOM is the most detailed framework regarding the “Sales” process area. Let’s now discuss each framework separately.

PCF has the clearest structure as a model. There are two “Sales” process groups, covering all the basic sales activities.

The IMM Approach is once again the most concise one, as it only has three “Sales” process categories. However, they seem to cover the basic “Sales” activities.

Moving on to eTOM, we can see that it includes more business process categories than any of the other frameworks. One thing we noticed is that it includes two process groups, the “Sales development” and the “Sales channel management” that are not included in the “Sales” part of the PCF. We do find these processes in the PCF, but in they are listed as “Marketing”-related and that’s why we refer that PCF process group in the table above.

As far as the Oracle framework is concerned, it includes a less detailed version of most of the basic PCF processes. The main difference between the two is that Oracle includes processes regarding the customer contract creation in the “Sales” module, while PCF doesn’t.

Last but not least, SAP’s “Sales” module covers all the PCF “Sales” processes, but it is not as detailed. We noted that many processes in the SAP’s “Sales” module are not included in the PCF “Sales” category, but in a number of others. For example, customer returns that are in the “6.0 – Manage Customer Service” and customer billing, credit and debit that are in the “9.0 – Manage Financial Resources” category, but we will discuss this further in these parts of the thesis. What is more, since SAP is a software-oriented framework, it includes processes regarding the system data and integration.

4.3. Research & Development (R&D)

Let's move on to the "Research & Development" process area of the enterprise. According to Hall (2006) "Research and Development (R&D) is the term commonly used to describe the activities undertaken by firms and other entities such as individual entrepreneurs in order to create new or improved products and processes. The broadest meaning of the term covers activities from basic scientific research performed in universities and laboratories all the way to testing and refining products before commercial sale or use".

For the purposes of this study, the "Research & Development" process area is considered to end before the building of the product prototype. The prototype testing and product refining take place in the next process area, the "Product Management".

4.3.1. Frameworks

We will study five process frameworks: (1) PCF, (2) eTOM, (3) COBIT, (4) Oracle and (5) SAP. We will see that most of the business process categories in this section are linked to the "Production", a process area we will study later on.

For each of the frameworks we provide all the relevant links in the "List of References" section. Any additional links needed will be added as a footnote in the text.

4.3.1.1. APQC's Process Classification Framework (PCF)

The 2nd PCF category, "2.0 Develop and Manage Products and Services", is the one we will study in this chapter. It includes all the processes for the development of new products, as shown in Figure 52.

We will study two of the three process groups that exist in this category, the: (1) govern and manage product/service development program and (2) generate and define new product/service ideas. These groups have three and four process sub-groups respectively, of the 7 in total. They contain 64 "R&D"-related processes.

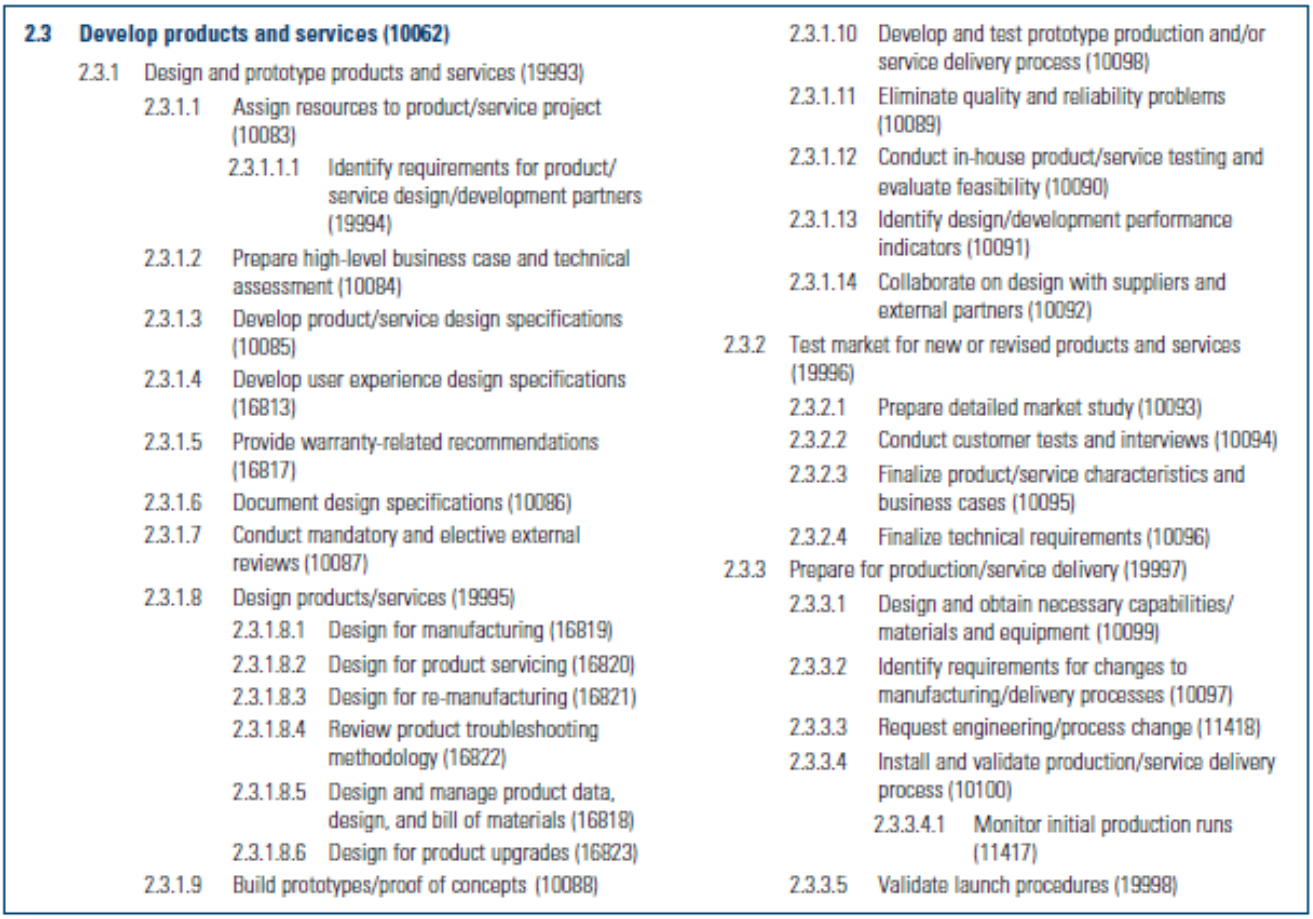
2.0 Develop and Manage Products and Services (10003)

2.1 Govern and manage product/service development program (19696)

- 2.1.1 Manage product and service portfolio (10061)
  - 2.1.1.1 Evaluate performance of existing products/services against market opportunities (10063)
  - 2.1.1.2 Confirm alignment of product/service concepts with business strategy (10066)
  - 2.1.1.3 Prioritize and select new product/service concepts (10074)
  - 2.1.1.4 Plan and develop cost and quality targets (10073)
  - 2.1.1.5 Specify development timing targets (10075)
  - 2.1.1.6 Plan for product/service offering modifications (10076)
- 2.1.2 Manage product and service life cycle (10067)
  - 2.1.2.1 Develop plan for new product/service development and introduction/launch (16824)
  - 2.1.2.2 Introduce new products/services (10077)
  - 2.1.2.3 Retire outdated products/services (10078)
  - 2.1.2.4 Identify and refine performance indicators (10079)
  - 2.1.2.5 Conduct post launch review (11423)
    - 2.1.2.5.1 Carry out post launch analytics to test the acceptability in the market (19646)
    - 2.1.2.5.2 Review market performance (11424)
    - 2.1.2.5.3 Review effectiveness of supply chain and distribution network (11425)
    - 2.1.2.5.4 Apply data and analytics to review supply chain methodologies (19647)
    - 2.1.2.5.5 Review quality and performance of the product/service (11426)
    - 2.1.2.5.6 Conduct financial review (11427)
    - 2.1.2.5.7 Conduct new product development process assessment (11428)
- 2.1.3 Manage patents, copyrights, and regulatory requirements (19985)
  - 2.1.3.1 Conduct mandatory and elective reviews (19941)
  - 2.1.3.2 Review infringement of patents and copyrights (16826)
  - 2.1.3.3 Determine patent and copyright needs (16827)
  - 2.1.3.4 Define product technical documentation management requirements (19697)
  - 2.1.3.5 Manage regulatory requirements (12771)
    - 2.1.3.5.1 Train employees on appropriate regulatory requirements (12772)
    - 2.1.3.5.2 Maintain records for regulatory agencies (12773)
    - 2.1.3.5.3 Manage regulatory submission life cycle (12776)
- 2.1.4 Manage product and service master data (11740)
  - 2.1.4.1 Manage materials master lists (11741)
  - 2.1.4.2 Manage bills of material (11742)
  - 2.1.4.3 Manage routings (11743)
  - 2.1.4.4 Manage specifications (11744)
  - 2.1.4.5 Manage drawings (11745)
  - 2.1.4.6 Manage product/material classification (11746)
  - 2.1.4.7 Develop and maintain quality/inspection documents (11747)
  - 2.1.4.8 Maintain process specification data (11748)
  - 2.1.4.9 Manage traceability data (11749)
  - 2.1.4.10 Review and approve data access requests (11750)

2.2 Generate and define new product/service ideas (19698)

- 2.2.1 Perform discovery research (10065)
  - 2.2.1.1 Identify new technologies (10070)
  - 2.2.1.2 Develop new technologies (10071)
  - 2.2.1.3 Assess feasibility of integrating new leading technologies into product/service concepts (10072)
- 2.2.2 Generate new product/service concepts (19669)
  - 2.2.2.1 Gather new product/service ideas and requirements (19986)
  - 2.2.2.2 Analyze new product/service ideas and requirements (19987)
  - 2.2.2.3 Evaluate new product/service inputs and requirements (19988)
  - 2.2.2.4 Formulate new product/service concepts (19989)
  - 2.2.2.5 Identify potential improvements to existing products and services (10068)
- 2.2.3 Define product/service development requirements (19990)
  - 2.2.3.1 Define product/service requirements (11331)
    - 2.2.3.1.1 Define basic functional requirements (19991)
    - 2.2.3.1.2 Derive interoperability requirements for products and services (16808)
    - 2.2.3.1.3 Derive safety requirements for products and services (16809)
    - 2.2.3.1.4 Derive security requirements for products and services (16810)
    - 2.2.3.1.5 Derive regulatory compliance requirements (16811)
    - 2.2.3.1.6 Derive requirements from industry standards (16812)
    - 2.2.3.1.7 Develop user experience requirements (19992)
    - 2.2.3.1.8 Derive 'services-as-a-product' offering (16814)
  - 2.2.3.2 Define post launch support model (16815)
  - 2.2.3.3 Identify product/service bundling opportunities (17389)



2.3 Develop products and services (10062)

- 2.3.1 Design and prototype products and services (19993)
  - 2.3.1.1 Assign resources to product/service project (10083)
    - 2.3.1.1.1 Identify requirements for product/service design/development partners (19994)
  - 2.3.1.2 Prepare high-level business case and technical assessment (10084)
  - 2.3.1.3 Develop product/service design specifications (10085)
  - 2.3.1.4 Develop user experience design specifications (16813)
  - 2.3.1.5 Provide warranty-related recommendations (16817)
  - 2.3.1.6 Document design specifications (10086)
  - 2.3.1.7 Conduct mandatory and elective external reviews (10087)
  - 2.3.1.8 Design products/services (19995)
    - 2.3.1.8.1 Design for manufacturing (16819)
    - 2.3.1.8.2 Design for product servicing (16820)
    - 2.3.1.8.3 Design for re-manufacturing (16821)
    - 2.3.1.8.4 Review product troubleshooting methodology (16822)
    - 2.3.1.8.5 Design and manage product data, design, and bill of materials (16818)
    - 2.3.1.8.6 Design for product upgrades (16823)
  - 2.3.1.9 Build prototypes/proof of concepts (10088)
  - 2.3.1.10 Develop and test prototype production and/or service delivery process (10098)
  - 2.3.1.11 Eliminate quality and reliability problems (10089)
  - 2.3.1.12 Conduct in-house product/service testing and evaluate feasibility (10090)
  - 2.3.1.13 Identify design/development performance indicators (10091)
  - 2.3.1.14 Collaborate on design with suppliers and external partners (10092)
- 2.3.2 Test market for new or revised products and services (19996)
  - 2.3.2.1 Prepare detailed market study (10093)
  - 2.3.2.2 Conduct customer tests and interviews (10094)
  - 2.3.2.3 Finalize product/service characteristics and business cases (10095)
  - 2.3.2.4 Finalize technical requirements (10096)
- 2.3.3 Prepare for production/service delivery (19997)
  - 2.3.3.1 Design and obtain necessary capabilities/materials and equipment (10099)
  - 2.3.3.2 Identify requirements for changes to manufacturing/delivery processes (10097)
  - 2.3.3.3 Request engineering/process change (11418)
  - 2.3.3.4 Install and validate production/service delivery process (10100)
    - 2.3.3.4.1 Monitor initial production runs (11417)
  - 2.3.3.5 Validate launch procedures (19998)

Figure 52: 2.0 Develop and Manage Products and Services APQC, 2018, p.6-7)

4.3.1.2. Business Process Framework (eTOM)

The "Product Domain" of the eTOM framework is the one containing all the "R&D"-related processes (Figure 53). There are nine process categories here and we will study four of them. These are: (1) Product Specification & Offering Development & Retirement, (2) Product & Offer Portfolio Planning, (3) Product Lifecycle Management and (4) Product Performance Management; Figure 54-Figure 57 show an overview of them. The "Product Offering Purchasing" was included in the studying of the "Sales" process area and the rest belong to the "Product Management" process area.

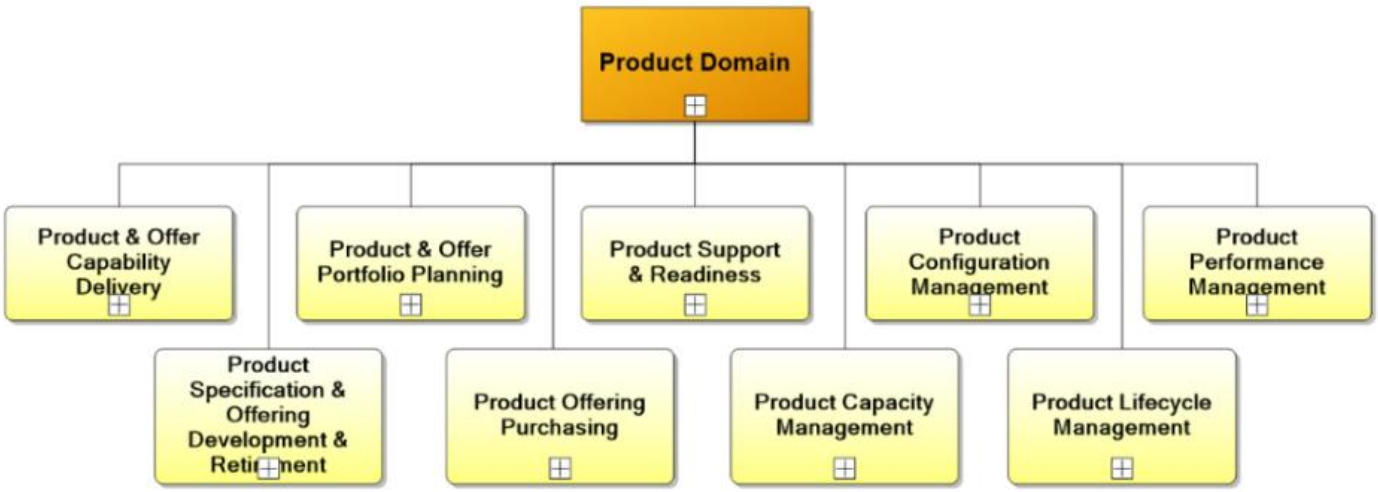


Figure 53: The "Product" domain of the eTOM model (TM Forum, 2016)

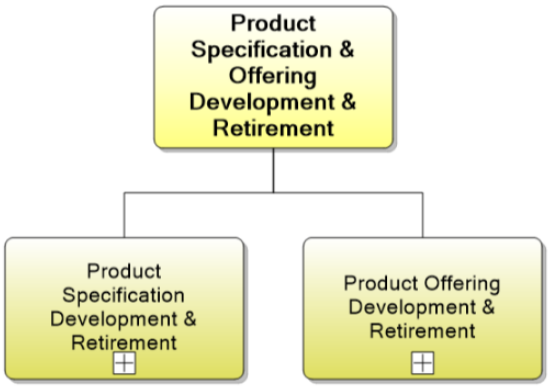


Figure 54: The "Product Specification & Offering Development & Retirement" group of processes (TM Forum, 2016)

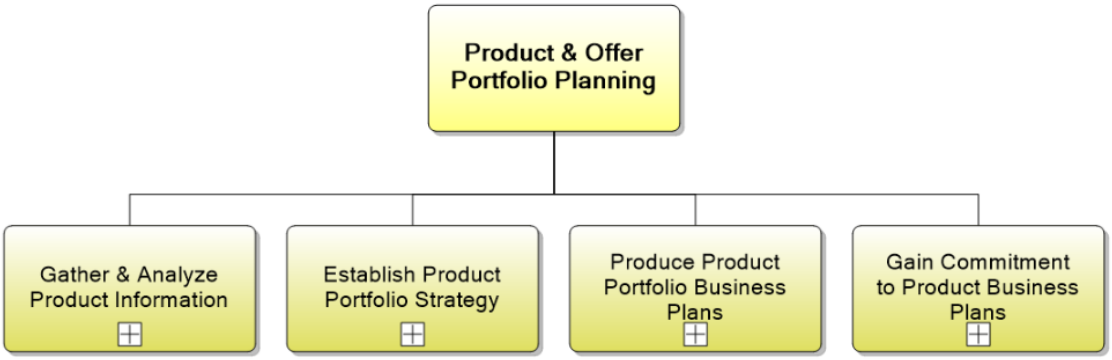


Figure 55: The "Product & Offer Portfolio Planning" group of processes (TM Forum, 2016)

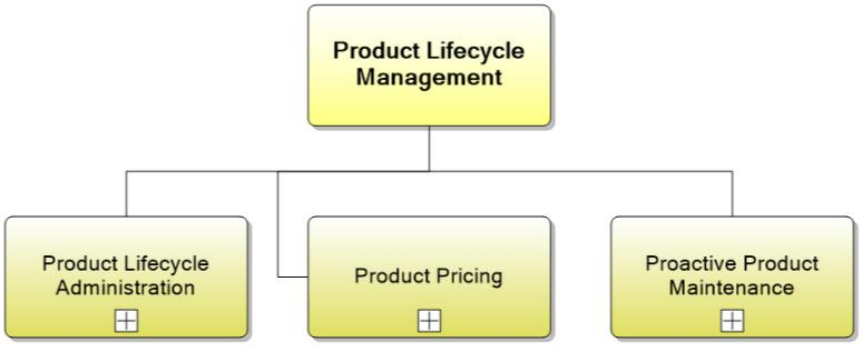


Figure 56: The "Product Lifecycle Management" group of processes (TM Forum, 2016)

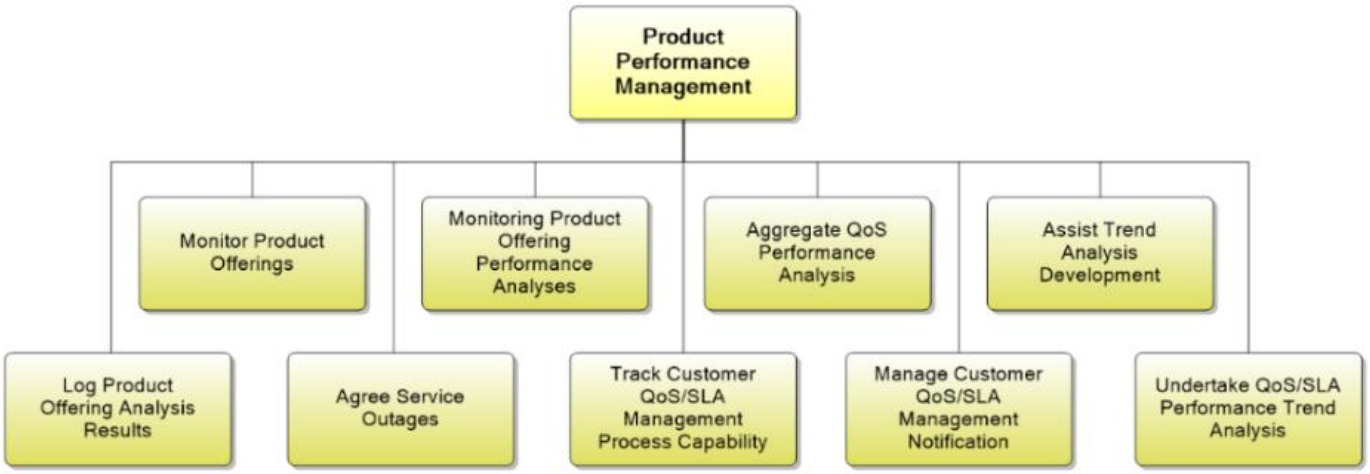


Figure 57: The "Product Performance Management" group of processes (TM Forum, 2016)

Each of the process groups contains between two and nine process sub-groups and processes on a second-level analysis, of the 19 in total.

The last group that contains processes regarding product development is the “Knowledge & Research Management”, which is shown in Figure 58. It includes three process sub-groups with market research-related processes.

Figure 58: The "Knowledge & Research Management" category of processes (TM Forum, 2016)

4.3.1.3. COBIT

There are three process groups in COBIT that we will study for the “Research and Development” area. These are: (1) APO04. Managed Innovation, (2) BAI02. Managed Requirements Definition and (3) BAI03. Managed Solutions Identification and Build. The contents of each are shown in Figure 59-Figure 61.

Key Management Practice
APO04.01 Create an environment conducive to innovation.
APO04.02 Maintain an understanding of the enterprise environment.
APO04.03 Monitor and scan the technology environment.
APO04.04 Assess the potential of emerging technologies and innovative ideas.
APO04.05 Recommend appropriate further initiatives.
APO04.06 Monitor the implementation and use of innovation.

Figure 59: The "APO04. Managed Innovation" group of processes (ISACA, 2018, p.83)

Key Management Practice
BAI02.01 Define and maintain business functional and technical requirements.
BAI02.02 Perform a feasibility study and formulate alternative solutions.
BAI02.03 Manage requirements risk.
BAI02.04 Obtain approval of requirements and solutions.

Figure 60: The "BAI02. Managed Requirements Definition" group of processes (ISACA, 2018, p.165)

Key Management Practice
BAI03.01 Design high-level solutions.
BAI03.02 Design detailed solution components.
BAI03.03 Develop solution components.
BAI03.04 Procure solution components.
BAI03.05 Build solutions.
BAI03.06 Perform quality assurance (QA).
BAI03.07 Prepare for solution testing.
BAI03.08 Execute solution testing.
BAI03.09 Manage changes to requirements.
BAI03.10 Maintain solutions.
BAI03.11 Define IT products and services and maintain the service portfolio.
BAI03.12 Design solutions based on the defined development methodology.

Figure 61: The "BAI03. Managed Solutions Identification and Build" group of processes (ISACA, 2018, p.176)

These groups include between four and 12 business processes, of the 22 in total. Not all of these processes are relevant to this area, as we will see in the comparison that follows.

4.3.1.4. Oracle

Oracle's PeopleSoft software has a separate module for "Product development"[16]. It includes four process categories, three of which contain "Research & Development"-related processes. These are: (1) product development overview, (2) define quality environment and (3) deploy manufacturing specifications and the contents of each are shown in Figure 62. Each includes between one and six processes, of the 10 in total.

[16] https://docs.oracle.com/cd/F19196_01/fscm92pbr32/eng/fscm/index.html (Accessed 1 July 2019)

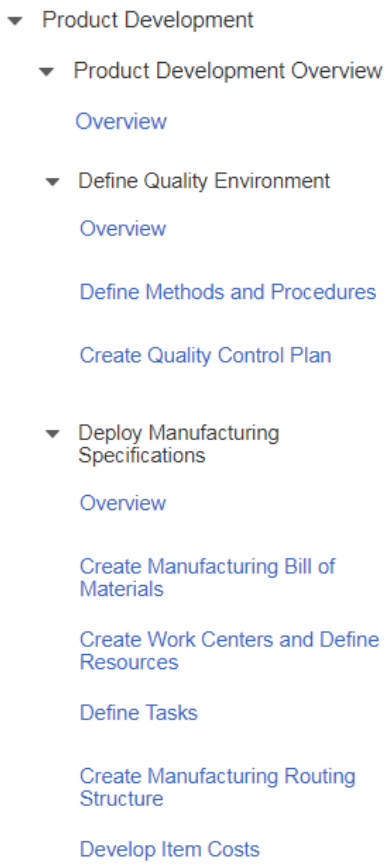


Figure 62: Some of the processes included in the "Product Development" module, PeopleSoft Financial and Supply Chain Management 9.2 (Oracle, 2019)

4.3.1.5. SAP

Moving on to SAP, we will once again study the "SAP Best Practices for SAP S/4HANA (on premise)" solution package[17]. SAP has a separate module regarding product development, called "R&D/ Engineering" (Figure 63). It includes four business process categories, which are: (1) product compliance, (2) product engineering, (3) product lifecycle management and (4) project control. There are 20 processes in total in this module.

[17] https://rapid.sap.com/bp/BP_OP_ENTPR (Accessed 1 July 2019)

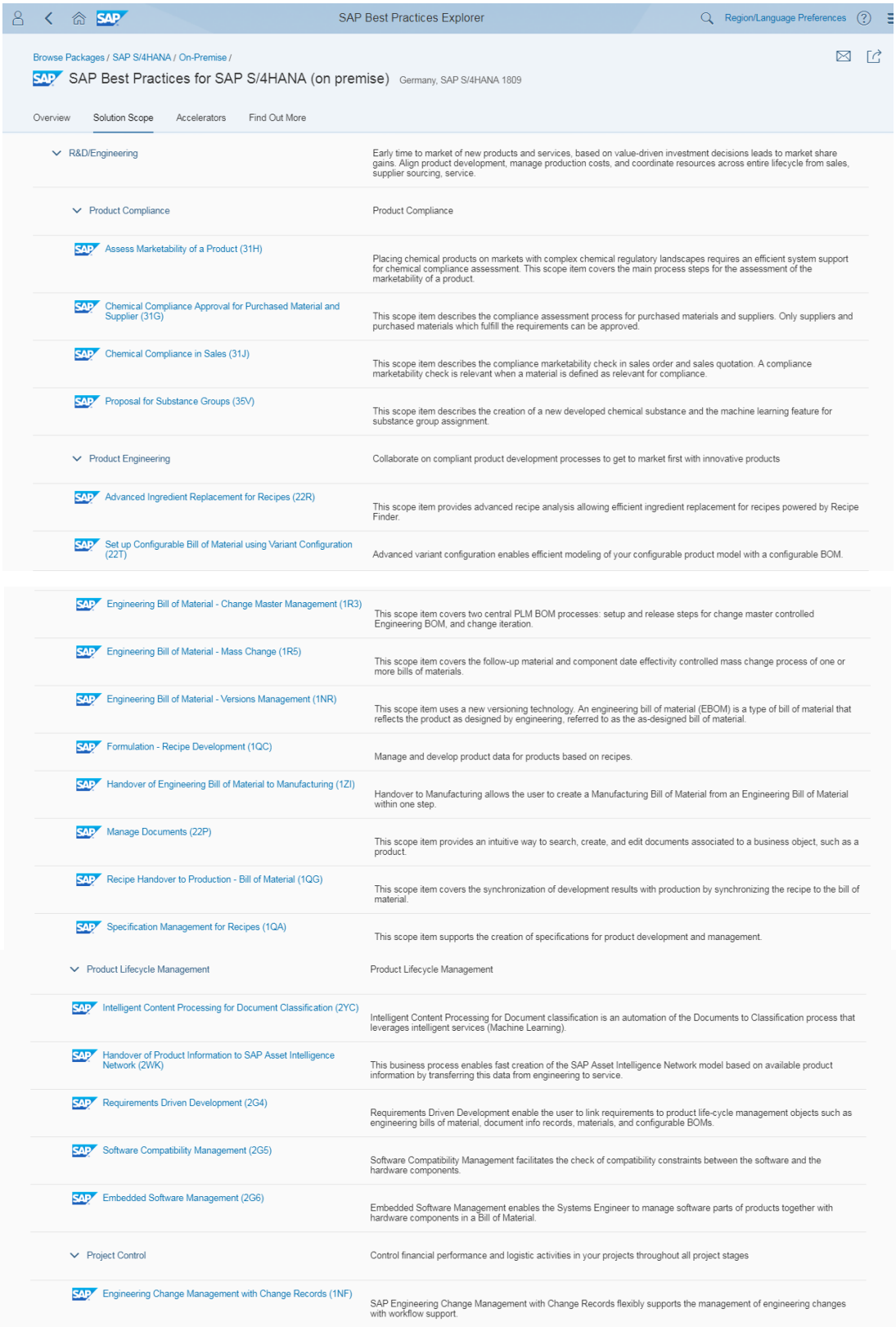


Figure 63: The list of processes included in the "R&D/ Engineering" module of SAP Best Practices for SAP S/4HANA (on premise) solution package (SAP, 2019)

4.3.2. Comparison

We will now move on to compare the frameworks presented (Table 5) for the "Research & Development" section. PCF was selected once again as a base for this comparison.

Table 5: Research & Development frameworks comparison

PCF	eTOM		COBIT		Oracle	SAP
2.1. Govern and manage product/service development program	Product Domain	Product & Offer Portfolio Planning	BAI03. Managed Solutions Identification and Build	BAI03.06. Perform quality assurance (QA)	Product Development Overview	Product Engineering
		Product Support & Readiness **(CONCISE)**			Define Quality	
		Product Performance Management **(EXTENSIVE)**				
		Product Specification & Offering Development & Retirement		BAI03.10. Maintain solutions **(CONCISE)**	Deploy Manufacturing Specifications **(CONCISE)**	Product Lifecycle Management
		Product Lifecycle Management **(CONCISE)**				
2.2. Generate and define new product/service ideas	Enterprise Domain	Knowledge & Research Management **(EXTENSIVE)**	APO04. Managed Innovation	APO04.03. Monitor and scan the technology environment **(EXTENSIVE)**	Product Development Overview **(CONCISE)**	Product Compliance
				APO04.04. Assess the potential of emerging technologies and innovative ideas **(EXTENSIVE)**		
			BAI02. Managed Requirements Definition	BAI02.03 Manage requirements risk		Product Engineering
			BAI03. Managed Solutions Identification and Build	BAI03.12. Design solutions based on the defined development methodology		
1.0. Develop Vision and Strategy	**MISSING**		APO04. Managed Innovation	APO04.01. Create an environment conducive to innovation	**MISSING**	**MISSING**
				APO04.02. Maintain an understanding of the enterprise environment		
MISSING	**MISSING**		**MISSING**		**MISSING**	Project Control

PCF follows a simple categorization for the “Research and Development” section, as it only has two process categories. As for the other frameworks, many of their R&D processes are not included in this PCF category,”2.0 Develop and Manage Products and Services”, but in other categories and we will study them in the respective sections of the thesis.

If we take a closer look at the eTOM model, it appears to be very detailed regarding the “R&D” processes, as there are six different related categories, some of which are more detailed than the PCF ones.

Moving on to COBIT, we can see that apart from the “Research and Development”, it also includes some strategy-related processes. However we will not study them in this chapter, as the comparison is PCF-based and that framework has a separate category for the strategy processes. The rest of the COBIT model seems to cover most of the PCF operations. The main difference we can see is that the first PCF category is way more detailed than the respective COBIT processes. As mentioned before, COBIT is IT-oriented, thus all these processes are IT-related.

The Oracle “Product Development Overview” category includes some processes regarding the market analysis, and it also serves as a connection of the other processes included in this module, that’s why we use it in the comparison. In general, the framework is not as detailed as others, for example COBIT.

Last but not least, the SAP framework has a separate “R&D” module, which includes basic “R&D” processes. However, like Oracle, it is not as detailed as the others.

4.4. Product Management

According to ProductPlan (2019) "Product management is the practice of strategically driving the development, market launch, and continual support and improvement of a company's products". The main goal of this process area is to develop new products that are better than the ones existing already and create value for the customer (projectmanager.com, 2019).

As mentioned in the introduction of the "Research & Development" section, the development of new ideas and products is considered to take place in that process area. The "Product Management" area begins by building the prototype product and continues with the necessary testing, refining and finalization of the characteristics, which are necessary steps in order to move on to the "Production" process area.

4.4.1. Frameworks

We will now present the four frameworks we will study for the "Product Management" process area, which are: (1) PCF, (2) eTOM, (3) COBIT and (4) Oracle.

For each of the frameworks we provide all the relevant links in the "List of References" section. Any additional links needed will be added as a footnote in the text.

4.4.1.1. APQC's Process Classification Framework (PCF)

The 2nd PCF category, "2.0 Develop and Manage Products and Services", is the one of interest to us for the "Product Management" comparison. It includes all the processes for the development of new products, as presented in Figure 52 of the "R&D" section.

Here, we will study the 3rd process group, the "2.3. Develop products and services". It includes all the processes following the idea of a new product, until the actual production. It has three process sub-groups and 35 processes in total.

4.4.1.2. Business Process Framework (eTOM)

For the “Product Management” purposes we will study again the “Product Domain” of the model, as it was presented in Figure 53 of the “R&D” process area. We will study four process groups, which are: (1) Product & Offer Capability Delivery, (2) Product Specification & Offering Development & Retirement, (3) Product Capacity Management and (4) Product Configuration Management. An overview of each process group is shown in Figure 64-Figure 67.

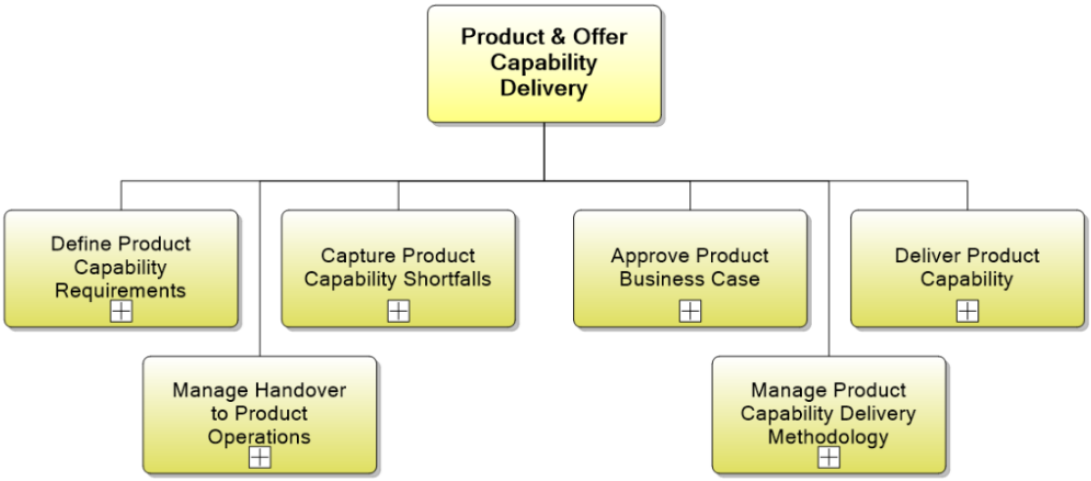


Figure 64: The "Product & Offer Capability Delivery" group of processes (TM Forum, 2016)

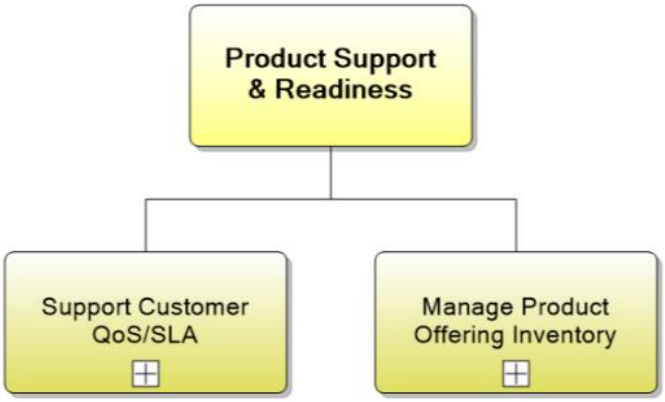


Figure 65: The "Product Support & Readiness" group of processes (TM Forum, 2016)

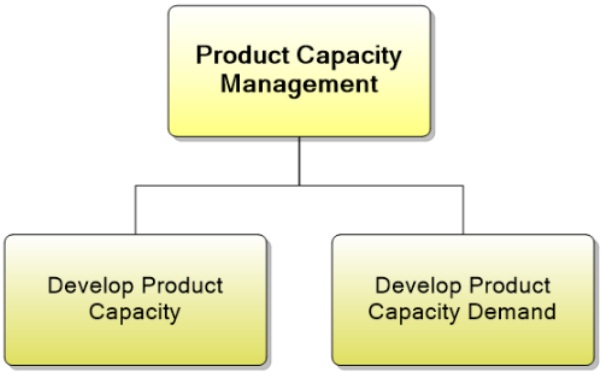


Figure 66: The "Product Capacity Management" group of processes (TM Forum, 2016)

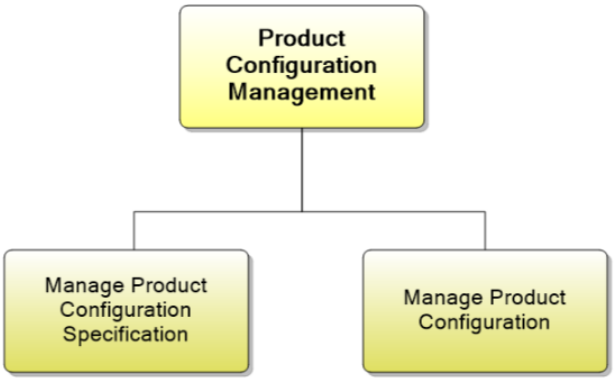


Figure 67: The "Product Configuration Management" group of processes (TM Forum, 2016)

Each of the process groups contains between two and six process sub-groups and processes on a second-level analysis, of the 12 in total.

4.4.1.3. COBIT

For the COBIT model we will study the same process groups as we did in the "Research & Development" process area. These were: (1) APO04. Managed Innovation, (2) BAI02. Managed Requirements Definition and (3) BAI03. Managed Solutions Identification and Build. The contents of each were presented in Figure 59-Figure 61 of the "R&D" section of the thesis.

Last but not least, another group of processes that is useful to us for the "Product Management" section is the "BAI10. Managed Configuration" (Figure 68).

Key Management Practice
BAI10.01 Establish and maintain a configuration model.
BAI10.02 Establish and maintain a configuration repository and baseline.
BAI10.03 Maintain and control configuration items.
BAI10.04 Produce status and configuration reports.
BAI10.05 Verify and review integrity of the configuration repository.

Figure 68: The "BAI10. Managed Configuration" group of processes (ISACA, 2018, p.217)

This group includes five processes, some of which are relevant to and will also be studied in the "Information Technology (IT) & Data" process area.

4.4.1.4. Oracle

For the "Product Management" process area we will focus again on Oracle's "Product development"[18] module, as we did in the "R&D" area. It includes four process categories, three of which are relevant for this section. These are: (1) design product, (2) define quality environment and (3) deploy manufacturing specifications. The contents of the first group are presented in Figure 69, while the contents of the rest were presented in Figure 62 of the "Research & Development" section. In total we will study 16 processes of in this module.

[18] https://docs.oracle.com/cd/F19196_01/fscm92pbr32/eng/fscm/index.html (Accessed 1 July 2019)

Figure 69: The processes included in the "Design Product" group of the "Product Development" module, PeopleSoft Financial and Supply Chain Management 9.2 (Oracle, 2019)

4.4.2. Comparison

We will now move on to compare the frameworks presented (Table 6) for the "Product Management" process area. PCF will once again serve as a base for this comparison.

Table 6: Product management frameworks comparison

PCF	eTOM	COBIT		Oracle
2.3. Develop products and services	Product & Offer Capability Delivery **(EXTENSIVE)**	APO04. Managed Innovation	APO04.06. Monitor the implementation and use of innovation	Design Product
	Product Specification & Offering Development & Retirement	BAI02. Managed Requirements Definition	BAI02.04. Obtain approval of requirements and solutions	
	Product Support & Readiness **(EXTENSIVE)**	BAI03. Managed Solutions Identification and Build	BAI03.01. Design high-level solutions	
			BAI03.02. Design detailed solution components	
			BAI03.03. Develop solution components	
			BAI03.04. Procure solution components	Define Quality Environment **(CONCISE)**
			BAI03.05. Build solutions	
			BAI03.07. Prepare for solution testing	
			BAI03.08. Execute solution testing	Deploy Manufacturing Specifications
			BAI03.09. Manage changes to requirements	
			BAI03.10. Maintain solutions	
MISSING	Product Capacity Management	**MISSING**		**MISSING**
2.3. Develop products and services	**MISSING**	BAI02. Managed Requirements Definition	BAI02.01. Define and maintain business functional and technical requirements	**MISSING**
1.0. Develop Vision and Strategy			BAI02.02. Perform a feasibility study and formulate alternative solutions	
			APO04.02. Maintain an understanding of the enterprise environment	
MISSING	Product Configuration Management **(CONCISE)**	BAI10. Managed Configuration **(EXTENSIVE)**	BAI10.01. Establish and maintain a configuration model	**MISSING**
			BAI10.02. Establish and maintain a configuration repository and baseline	
			BAI10.03. Maintain and control configuration items	
			BAI10.04. Produce status and configuration reports	
			BAI10.05. Verify and review integrity of the configuration repository	

PCF can be characterized as concise, as it only has one “Product Management”-relevant group of processes. However, it includes all the basic processes.

Moving on to the eTOM model, apart from the “Product Management” processes, it also has a process group named “Product Capacity Management” that is related to the products of the telecommunications sector. Since it is the only framework that specializes in this sector, none of the other frameworks mention a similar process group. In general, eTOM appears to be very detailed for this process area.

If we take a look at COBIT, we can see that it is the most detailed framework of the ones we studied in this process area and this is the main difference from the PCF. As mentioned before, COBIT is IT-related, thus the processes concern only IT-related products.

Last but not least, Oracle includes some processes regarding the design and the quality of the product, but it is very concise compared to the rest of the frameworks.

4.5. Procurement

According to Ward (2018) “Procurement is the sourcing and purchasing of goods and services for business use from an external source”. This is the section in which we will study the processes that deal with acquiring the necessary supplies for an enterprise.

4.5.1. Frameworks

The “Procurement” process area, which includes with supplier management processes, is a part of the following frameworks: (1) IMM Approach, (2) PCF, (3) SCOR, (4) Oracle and (5) SAP. Some of them have separate sections for the physical products and the services. We will not study the eTOM and COBIT frameworks in this section, as they don’t include “Procurement” processes.

Most of the frameworks suggest that these processes belong to the “Production” area. However, we consider all the supplier-related processes to be in a separate business process area, and that’s the reason why we will study and compare them separately. For each of the frameworks we provide all the relevant links in the “List of References” section. Any additional links needed will be added as a footnote in the text.

4.5.1.1. Integrated Modeling Method (IMM™)

The IMM Approach has a process category named “Manufacture Motor Spares” (Figure 5) with all the production processes. The second process group in this category is the “Acquire Raw Materials”, and it’s the one containing processes regarding the procurement.

4.5.1.2. APQC’s Process Classification Framework (PCF)

The PCF framework has supplier-related processes in its 4th and 5th category, “4.0 Deliver Physical Products” and “5.0 Deliver Service”. Each of these categories includes one relevant process group.

The 2nd group of processes in the “4.0 Deliver Physical Products” category (Figure 70) is named “4.2. Procure materials and services” and it’s the one we will study. It includes five process sub-groups with 28 processes in total. There are also some relevant processes in the “4.1. Plan for and align supply chain resources” process group, regarding the strategies followed by the enterprise. The rest of the processes are part of the “Production” and “Logistics” process areas.

4.0 Deliver Physical Products (20022)

4.1 Plan for and align supply chain resources (10215)

- 4.1.1 Develop production and materials strategies (10221)
  - 4.1.1.1 Define manufacturing goals (10229)
  - 4.1.1.2 Define labor and materials policies (10230)
  - 4.1.1.3 Define outsourcing policies (10231)
  - 4.1.1.4 Define capital expense policies (10232)
  - 4.1.1.5 Define capacities (10233)
  - 4.1.1.6 Define production network and supply constraints (10234)
  - 4.1.1.7 Define production process (14193)
  - 4.1.1.8 Define standard operating procedures (19551)
  - 4.1.1.9 Define production workplace layout and infrastructure (14194)
- 4.1.2 Manage demand for products (10222)
  - 4.1.2.1 Develop baseline demand forecasts (10235)
  - 4.1.2.2 Collaborate demand with customers (10236)
  - 4.1.2.3 Develop demand consensus forecast (10237)
  - 4.1.2.4 Determine available to promise (10238)
  - 4.1.2.5 Monitor activity against demand forecast and revise forecast (10239)
  - 4.1.2.6 Evaluate and revise demand forecasting approach (10240)
  - 4.1.2.7 Measure demand forecast accuracy (10241)
- 4.1.3 Create materials plan (10223)
  - 4.1.3.1 Create unconstrained plan (10242)
  - 4.1.3.2 Collaborate with supplier and contract manufacturers (10243)
  - 4.1.3.3 Identify critical materials and supplier capacity (10244)
  - 4.1.3.4 Monitor material specifications (10245)
  - 4.1.3.5 Generate constrained plan (10246)
  - 4.1.3.6 Define production balance and control (14196)
- 4.1.4 Create and manage master production schedule (10224)
  - 4.1.4.1 Model production network to enable simulation and optimization (20023)
  - 4.1.4.2 Create master production schedule (20024)
  - 4.1.4.3 Maintain master production schedule (17041)
- 4.1.5 Plan distribution requirements (17042)
  - 4.1.5.1 Maintain master data (10252)
  - 4.1.5.2 Determine finished goods inventory requirements at destination (10253)
  - 4.1.5.3 Determine product storage facility requirements (19555)
  - 4.1.5.4 Calculate requirements at destination (10254)
  - 4.1.5.5 Calculate consolidation at source (10255)
  - 4.1.5.6 Manage collaborative replenishment planning (10256)
  - 4.1.5.7 Calculate and optimize destination dispatch plan (10258)
  - 4.1.5.8 Manage dispatch plan attainment (10259)
  - 4.1.5.9 Calculate and optimize destination load plans (10260)
  - 4.1.5.10 Manage partner load plan (10261)
  - 4.1.5.11 Manage cost of supply (10262)
  - 4.1.5.12 Manage capacity utilization (10263)
- 4.1.6 Establish distribution planning constraints (10226)
  - 4.1.6.1 Establish distribution center layout constraints (10267)
  - 4.1.6.2 Establish inventory management constraints (10268)
  - 4.1.6.3 Establish transportation management constraints (10269)
  - 4.1.6.4 Establish storage management constraints (19558)
- 4.1.7 Review distribution planning policies (10227)
  - 4.1.7.1 Review distribution network (10264)
  - 4.1.7.2 Establish sourcing relationships (10265)
  - 4.1.7.3 Establish dynamic deployment policies (10266)
- 4.1.8 Develop quality standards and procedures (10368)
  - 4.1.8.1 Establish quality targets (10371)
  - 4.1.8.2 Develop standard testing procedures (10372)
  - 4.1.8.3 Communicate quality specifications (10373)

4.2 Procure materials and services (10216)

- 4.2.1 Provide sourcing governance and perform category management (10277)
  - 4.2.1.1 Develop procurement plan (10281)
  - 4.2.1.2 Clarify purchasing requirements (10282)
  - 4.2.1.3 Establish materials management contingency plans (10283)
  - 4.2.1.4 Match needs to supply capabilities (10284)
  - 4.2.1.5 Analyze organization's spend profile (10285)
  - 4.2.1.6 Seek opportunities to improve efficiency and value (10286)
  - 4.2.1.7 Collaborate with suppliers to identify sourcing opportunities (10287)
- 4.2.2 Develop sourcing and category management strategies (20973)
- 4.2.3 Select suppliers and develop/maintain contracts (10278)
  - 4.2.3.1 Select suppliers (10288)
  - 4.2.3.2 Certify and validate suppliers (10289)
  - 4.2.3.3 Negotiate and establish contracts (10290)
  - 4.2.3.4 Manage contracts (10291)
- 4.2.4 Order materials and services (10279)
  - 4.2.4.1 Process/Review requisitions (10292)
  - 4.2.4.2 Approve requisitions (10293)
  - 4.2.4.3 Solicit/Track vendor quotes (10294)
  - 4.2.4.4 Create/Distribute purchase orders (10295)
  - 4.2.4.5 Expedite orders and satisfy inquiries (10296)

4.2.4.6 Reconcile purchase orders (10297)
4.2.4.7 Research/Resolve order exceptions (10298)
4.2.5 Manage suppliers (10280)
4.2.5.1 Monitor/Manage supplier information (10299)
4.2.5.2 Prepare/Analyze procurement and vendor performance (10300)
4.2.5.3 Support inventory and production processes (10301)
4.2.5.4 Monitor quality of product delivered (10302)

4.3 Produce/Assemble/Test product (10217)

4.3.1 Schedule production (10303)
4.3.1.1 Model and simulate plant (19563)
4.3.1.2 Generate line level plan (10306)
4.3.1.3 Generate detailed schedule (10307)
4.3.1.4 Schedule production orders and create lots (10308)
4.3.1.5 Schedule preventive (planned) maintenance (preventive maintenance orders) (10315)
4.3.1.6 Schedule requested (unplanned) maintenance (work order cycle) (10316)
4.3.1.7 Release production orders and create lots (10309)
4.3.2 Produce/Assemble product (10304)
4.3.2.1 Manage raw material inventory (10310)
4.3.2.2 Execute detailed line schedule (10311)
4.3.2.3 Report maintenance issues (10319)
4.3.2.4 Rerun defective items (10313)
4.3.2.5 Monitor and optimize production process (19566)
4.3.2.5.1 Automate and control plant (19567)
4.3.2.5.2 Perform advanced process control (19568)
4.3.2.5.3 Perform real-time optimization (19569)
4.3.2.5.4 Manage plant alarms and alerts (19570)
4.3.2.6 Assess production performance (10314)
4.3.3 Perform quality testing (10369)
4.3.3.1 Calibrate test equipment (10318)
4.3.3.2 Perform testing using the standard testing procedure (10374)
4.3.3.3 Manage quality samples (20956)
4.3.3.4 Record test results (10375)
4.3.3.5 Track and analyze non-conformance trends (12045)
4.3.3.6 Perform root cause analysis (12046)
4.3.4 Maintain production records and manage lot traceability (10370)
4.3.4.1 Determine lot numbering system (10376)
4.3.4.2 Determine lot use (10377)

4.4 Manage logistics and warehousing (10219)

4.4.1 Provide logistics governance (10338)
4.4.1.1 Translate customer service requirements into logistics requirements (10343)
4.4.1.2 Design logistics network (10344)
4.4.1.3 Communicate outsourcing needs (10345)
4.4.1.4 Develop and maintain delivery service policy (10346)
4.4.1.5 Optimize transportation schedules and costs (10347)
4.4.1.6 Define key performance measures (10348)
4.4.1.7 Define reverse logistics strategy (16905)
4.4.2 Plan and manage inbound material flow (20936)
4.4.2.1 Plan inbound material receipts (10349)
4.4.2.2 Manage inbound material flow (10350)
4.4.2.3 Monitor inbound delivery performance (10351)
4.4.2.4 Manage flow of returned products (10352)
4.4.2.5 Control quality of returned parts (12708)
4.4.2.6 Salvage or repair returned products (20109)
4.4.2.6.1 Perform salvage activities (10366)
4.4.2.6.2 Manage repair/refurbishment and return to customer/stock (14195)
4.4.3 Operate warehousing (10340)
4.4.3.1 Track inventory deployment (10353)
4.4.3.2 Receive, inspect, and store inbound deliveries (10354)
4.4.3.3 Track product availability (10355)
4.4.3.4 Pick, pack, and ship product for delivery (10356)
4.4.3.5 Track inventory accuracy (10357)
4.4.3.6 Track third-party logistics storage and shipping performance (10358)
4.4.3.7 Manage physical finished goods inventory (10359)
4.4.3.8 Manage warehouse transfers (20957)
4.4.4 Operate outbound transportation (10341)
4.4.4.1 Plan, transport, and deliver outbound product (10360)
4.4.4.2 Track carrier delivery performance (10361)
4.4.4.3 Manage transportation fleet (10362)
4.4.4.4 Process and audit carrier invoices and documents (10363)

Figure 70: 4.0 Deliver Physical Products (APQC, 2018, p.11-12)

The group we will study from the "5.0 Deliver Service" category is named "Manage service delivery resources" and it includes three process sub-groups and 25

processes (Figure 71). The other two process groups will be studied in the "Production" section of the thesis.

5.0 Deliver Service (20025)

5.1 Establish service delivery governance and strategies (20026)

- 5.1.1 Establish service delivery governance (20027)
  - 5.1.1.1 Set up and maintain service delivery governance and management system (20028)
  - 5.1.1.2 Manage service delivery performance (20029)
  - 5.1.1.3 Manage service delivery development and direction (20030)
  - 5.1.1.4 Solicit feedback from customer on service delivery satisfaction (20031)
- 5.1.2 Develop service delivery strategies (20032)
  - 5.1.2.1 Define service delivery goals (20033)
  - 5.1.2.2 Define labor policies (20034)
  - 5.1.2.3 Evaluate resource availability (20035)
  - 5.1.2.4 Define service delivery network and supply constraints (20036)
  - 5.1.2.5 Define service delivery process (20037)
  - 5.1.2.6 Review and validate service delivery procedures (20038)
  - 5.1.2.7 Define service delivery workplace layout and infrastructure (20039)

5.2 Manage service delivery resources (20040)

- 5.2.1 Manage service delivery resource demand (20041)
  - 5.2.1.1 Monitor pipeline (20042)
  - 5.2.1.2 Develop baseline forecasts (20043)
  - 5.2.1.3 Collaborate with customers (20044)
  - 5.2.1.4 Develop consensus forecast (20045)
  - 5.2.1.5 Determine availability of skills to deliver on current and forecast customer orders (20046)
  - 5.2.1.6 Monitor activity against forecast and revise forecast (20047)
  - 5.2.1.7 Evaluate and revise forecasting approach (20048)
  - 5.2.1.8 Measure forecast accuracy (20049)
- 5.2.2 Create and manage resource plan (20050)
  - 5.2.2.1 Define and manage skills taxonomy (20051)
  - 5.2.2.2 Create resource plan (20052)
  - 5.2.2.3 Match resource demand with capacity, skills, and capabilities (20053)
  - 5.2.2.4 Collaborate with suppliers and partners to supplement skills and capabilities (20054)
  - 5.2.2.5 Identify critical resources and supplier capacity (20055)
  - 5.2.2.6 Monitor and manage resource capacity and availability (20056)
- 5.2.3 Enable service delivery resources (12127)
  - 5.2.3.1 Develop service delivery training plan (12128)
  - 5.2.3.2 Develop training materials (12129)
  - 5.2.3.3 Manage training schedule (12131)
  - 5.2.3.4 Deliver operations training (12132)
  - 5.2.3.5 Deliver technical training (12133)
  - 5.2.3.6 Perform skill and capability testing (20057)
  - 5.2.3.7 Evaluate training effectiveness (12135)

5.3 Deliver service to customer (20058)

- 5.3.1 Initiate service delivery (20059)
  - 5.3.1.1 Review contract and agreed terms (20060)
  - 5.3.1.2 Understand customer requirements and define refine approach (20061)
  - 5.3.1.3 Modify/revise and approve project plan (20062)
  - 5.3.1.4 Review customer business objectives (20063)
  - 5.3.1.5 Confirm environmental readiness (20064)
  - 5.3.1.6 Identify, select, and assign resources (20065)
    - 5.3.1.6.1 Establish people objectives (20066)
    - 5.3.1.6.2 Establish engagement rules (20067)
  - 5.3.1.7 Plan for service delivery (20068)
- 5.3.2 Execute service delivery (20069)
  - 5.3.2.1 Analyze environment and customer needs (20070)
  - 5.3.2.2 Define solution (20071)
  - 5.3.2.3 Validate solution (20072)
  - 5.3.2.4 Identify changes (20073)
  - 5.3.2.5 Obtain approval to proceed (20074)
  - 5.3.2.6 Make build/buy solution (20075)
  - 5.3.2.7 Deploy solution (20076)
- 5.3.3 Complete service delivery (20077)
  - 5.3.3.1 Conduct service delivery/project review and evaluate success (20078)
  - 5.3.3.2 Complete/finalize financial management activities (20079)
  - 5.3.3.3 Confirm delivery according to contract terms (20080)
  - 5.3.3.4 Release resources (20081)
  - 5.3.3.5 Manage service delivery completion (20082)
  - 5.3.3.6 Harvest knowledge (20083)
  - 5.3.3.7 Archive records and update systems (20084)

Figure 71: 5.0 Deliver Service (APQC, 2018, p.13)

4.5.1.3. SCOR

As a supply-chain-management model, SCOR is very detailed regarding the "Production, "Procurement" and "Logistics" related processes. The process groups we will study for the "Procurement" area are included in the "Plan" and "Source" management process, as shown in Figure 72 and Figure 73 .

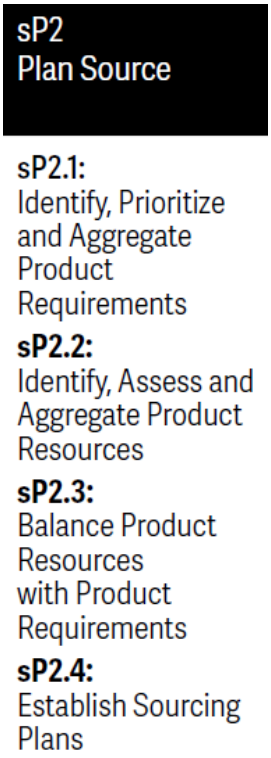


Figure 72: Part of the "Plan" management process (APICS, 2017, p.3)

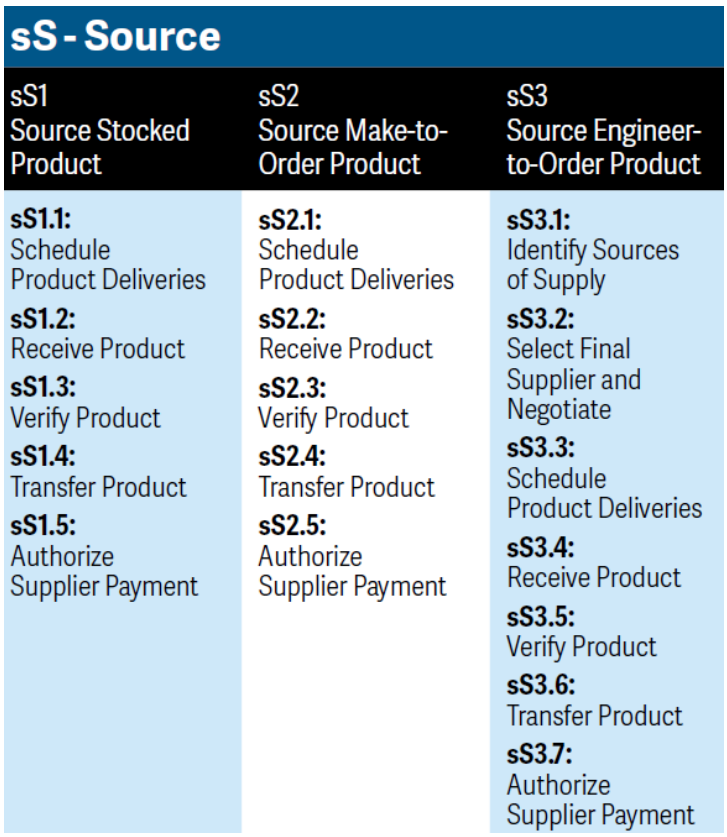


Figure 73: The "Source" management process (APICS, 2017, p.3)

In the “Return” management process there are some groups that are also of interest to us. These are shown in Figure 74, and they refer to source-product returns.

sR - Return		
sSR1 Source Return Defective Product	sSR2 Source Return MRO Product	sSR3 Source Return Excess Product
sSR1.1: Identify Defective Product Condition	**sSR2.1:** Identify MRO Product Condition	**sSR3.1:** Identify Excess Product Condition
sSR1.2: Disposition Defective Product	**sSR2.2:** Disposition MRO Product	**sSR3.2:** Disposition Excess Product
sSR1.3: Request Defective Product Return Authorization	**sSR2.3:** Request MRO Return Authorization	**sSR3.3:** Request Excess Product Return Authorization
sSR1.4: Schedule Defective Product Shipment	**sSR2.4:** Schedule MRO Shipment	**sSR3.4:** Schedule Excess Product Shipment
sSR1.5: Return Defective Product	**sSR2.5:** Return MRO Product	**sSR3.5:** Return Excess Product

Figure 74: Part of the "Return" management process (APICS, 2017, p.3)

4.5.1.4. Oracle

The processes in PeopleSoft's "Procurement and Materials Management" module are the ones that compose Oracle's "Procurement" process area. Figure 75 provides an overview of its contents.

- Procurement and Materials Management
  - Procurement and Materials Management Overview
    - Overview
  - Source and Enable Suppliers
    - Overview
    - Determine Sourcing Requirements
    - Solicit Bids
    - Evaluate and Negotiate Bids
    - Select Supplier
    - Set Up Supplier Information
  - Procure Goods and Services
    - Overview
    - Create Requisition for Services
    - Create Requisition (Self Service)
    - Purchase with Procurement Card
    - Create Rebate Agreement
    - Create Purchasing Contract or Blanket Purchase Order
    - Create Requisition
    - Source Goods
    - Create Purchase Order
    - Dispatch Purchase Order
    - Change Purchase Order
    - Source Services
    - Create Work Order
  - Manage Supplier Contracts
    - Overview
    - Manage Supplier Contract Standards
    - Create Supplier Contract
    - Negotiate Supplier Contract
    - Approve Supplier Contract
    - Execute Supplier Contract
    - Amend Supplier Contract
    - Manage Contract Deliverables
  - Receive Goods and Services
    - Overview
    - Inspect Items
    - Receive Items
    - Receive Items (SS)
    - Submit Time, Progress and Expense

Figure 75: The processes included in the "Procurement and Materials Management" module, PeopleSoft Financial and Supply Chain Management 9.2 (Oracle, 2019)

The "Procurement and Materials Management" has nine process groups, each of which includes between one and 13 processes, of the 56 in total.

4.5.1.5. SAP

For the SAP framework, we will once again focus on the "SAP Best Practices for SAP S/4HANA (on premise)" package[19] (Figure 18). The module that is relevant to the

[19] https://rapid.sap.com/bp/BP_OP_ENTPR (Accessed 28 June 2019)

“Procurement” process area is the “Sourcing and procurement”. It consists of six process groups: (1) central procurement, (2) invoice management, (3) operational procurement, (4) procurement analytics, (5) sourcing and contract management and (6) supplier management. Figure 76 demonstrates the processes included in these groups that are 44 in total.

Some processes of the “Invoice Management” group won’t be studied here, as they belong to the “Finance” process area.

Sourcing and Procurement	Companies often focus on revenue; Understanding organization spend and removing inefficiencies with machine learning can increase profits by five times. The key to maximizing procurement's success in this critical role is to deliver consistent quality, savings, and compliance over time.
Central Procurement	Central Procurement
Central Requisitioning (1XI)	Procurement departments across all company sizes are continuing to centralize their procurement processes globally or regionally. There is a trend to establish Shared Service Centers where buying is built over a centralized procurement system.
Central Purchasing (2XT)	Central Purchasing caters to the needs of the headquarters to centrally manage their procurement business processes for all the connected plants. This scenario provides a single point of access and visibility to purchasing documents.
Central Purchase Contracts (2ME)	This scope item describes the central contract created in the central purchasing organization and distributed to other subsidiaries.
Invoice Management	Integrate management for invoice processing and accounts payables
SAP Ariba Commerce Automation Integration (J82)	This scope item (for purchasing experts and accounts payable accountants) lets you focus on value-driving activities with SAP Ariba Commerce Automation integration with your suppliers in the Ariba Network, and lets you drive productivity with nearly touchless orders and invoices.
Complementary Procurement Functions (2TW)	This scope item comprises complementary functions in procurement. It provides seamless processes for the procurement of operating supplies and batch managed material, including the steps from the creation of a purchase order to the invoice creation.
Consumable Purchasing (BNX)	This scope item enables the user to order consumables. A seamless integration is incorporated and ensures a stable and efficient process including all steps from the initial creation of a purchase requisition to the invoice creation and handling.
Direct Procurement with Inbound Delivery (2TX)	This scope item enables the user to order direct materials using inbound deliveries. A seamless integration is incorporated and ensures an efficient process including all steps from the initial creation of a purchase order to the invoice management.
SAP Fieldglass - Invoice Integration with Finance (19W)	Integrate SAP S/4HANA with SAP Fieldglass solutions for optimum total workforce mix. Address counter seasonal skill shortages, staff projects with outside experts, and augment staff strategically or for short-term needs.
Procurement of Direct Materials (J45)	This scope item enables the user to order direct materials. A seamless integration is incorporated and ensures a stable and efficient process including all steps from the initial creation of a purchase requisition to the invoice creation and handling.
Procurement of Services (22Z)	This scope item enables an efficient process for the procurement of services. With seamless integration, this scope item ensures an easy-to-use process covering from the initial creation of a purchase requisition through invoice management.
Propose Resolution for Invoice Payment Block (2XX)	Propose resolution for invoice payment block
Requisitioning (18J)	This scope item describes employee requisitioning activities. An employee creates a shopping cart. A purchase requisition is generated and converted to a purchase order. When the employee receives the goods, they perform a goods receipt confirmation.
SAP Fieldglass - Service Procurement Integration (22K)	Integrate SAP S/4HANA with SAP Fieldglass solutions to optimize your optimum total workforce mix. Counter seasonal skill shortages, staff projects with outside experts, and augment staff strategically or for short term needs.
Subcontracting (BMY)	The subcontracting process involves sending components to a supplier for manufacturing and receiving the finished materials. The seamless and efficient process includes all steps from the initial creation of a purchase order to the invoice management.

Supplier Consignment (2LG)	By using the consignment process for procurement, the supplier provides the material and stores it at site of the procuring party. The supplier maintains the legal owner of the material until it is withdrawn from the consignment stores.
Operational Procurement	Optimize procurement through integrated processes
SAP Ariba Commerce Automation Integration (J82)	This scope item (for purchasing experts and accounts payable accountants) lets you focus on value-driving activities with SAP Ariba Commerce Automation integration with your suppliers in the Ariba Network, and lets you drive productivity with nearly touchless orders and invoices.
SAP Ariba Quote Automation Integration (1L2)	Before you buy materials or simple services, let your suppliers compete for the best price. Automatically select the supplier with the most favorable price bid. Automatically create purchase orders in SAP S/4HANA. Update Info records automatically.
Batch Management (BLF)	This scope item lets you work with homogeneous partial quantities of a material or product throughout the logistics quantity and value chain. This includes documentation of material properties, where-used information, and quality status.
Complementary Procurement Functions (2TW)	This scope item comprises complementary functions in procurement. It provides seamless processes for the procurement of operating supplies and batch managed material, including the steps from the creation of a purchase order to the invoice creation.
Consumable Purchasing (BNX)	This scope item enables the user to order consumables. A seamless integration is incorporated and ensures a stable and efficient process including all steps from the initial creation of a purchase requisition to the invoice creation and handling.
Direct Procurement with Inbound Delivery (2TX)	This scope item enables the user to order direct materials using inbound deliveries. A seamless integration is incorporated and ensures an efficient process including all steps from the initial creation of a purchase order to the invoice management.
Predictive Analytics for Contract Consumption in Procurement (1QR)	This scope item lets you predict contract consumption by analyzing contracts. The Purchaser can analyze important
Procurement of Direct Materials (J45)	This scope item enables the user to order direct materials. A seamless integration is incorporated and ensures a stable and efficient process including all steps from the initial creation of a purchase requisition to the invoice creation and handling.
Procurement of Materials with Variable Configuration (2XU)	This scope item describes the process of externally procuring materials using the Advanced Variant Configuration feature, required in the manufacturing process.
Procurement of Services (22Z)	This scope item enables an efficient process for the procurement of services. With seamless integration, this scope item ensures an easy-to-use process covering from the initial creation of a purchase requisition through invoice management.
Proposal of Material Group (2XV)	Proposal of Material Group
Proposal of New Catalog Item (2XW)	During purchase requisition creation, free text item entry can be interpreted as a catalog item, due to recommendations from the Machine Learning algorithm.
Proposal of Options for Materials without Purchase Contract (30W)	This scope item provides options for the purchaser to create an RFQ if the materials do not have a purchase contract.
Purchasing Rebate Processing (2R7)	This scope item covers the subsequent settlement of rebate conditions agreed on with suppliers. You can use supplier invoice amounts or goods receipts quantities as business volume for the rebate calculation.
Requisitioning (18J)	This scope item describes employee requisitioning activities. An employee creates a shopping cart. A purchase requisition is generated and converted to a purchase order. When the employee receives the goods, they perform a goods receipt confirmation.
Scheduling Agreement for Consignment Procurement (2NY)	This scope item describes the process for consignment procurement with scheduling agreement.
Scheduling Agreement for Subcontracting Procurement (2NX)	This scope item describes the process of subcontracting procurement with scheduling agreement.

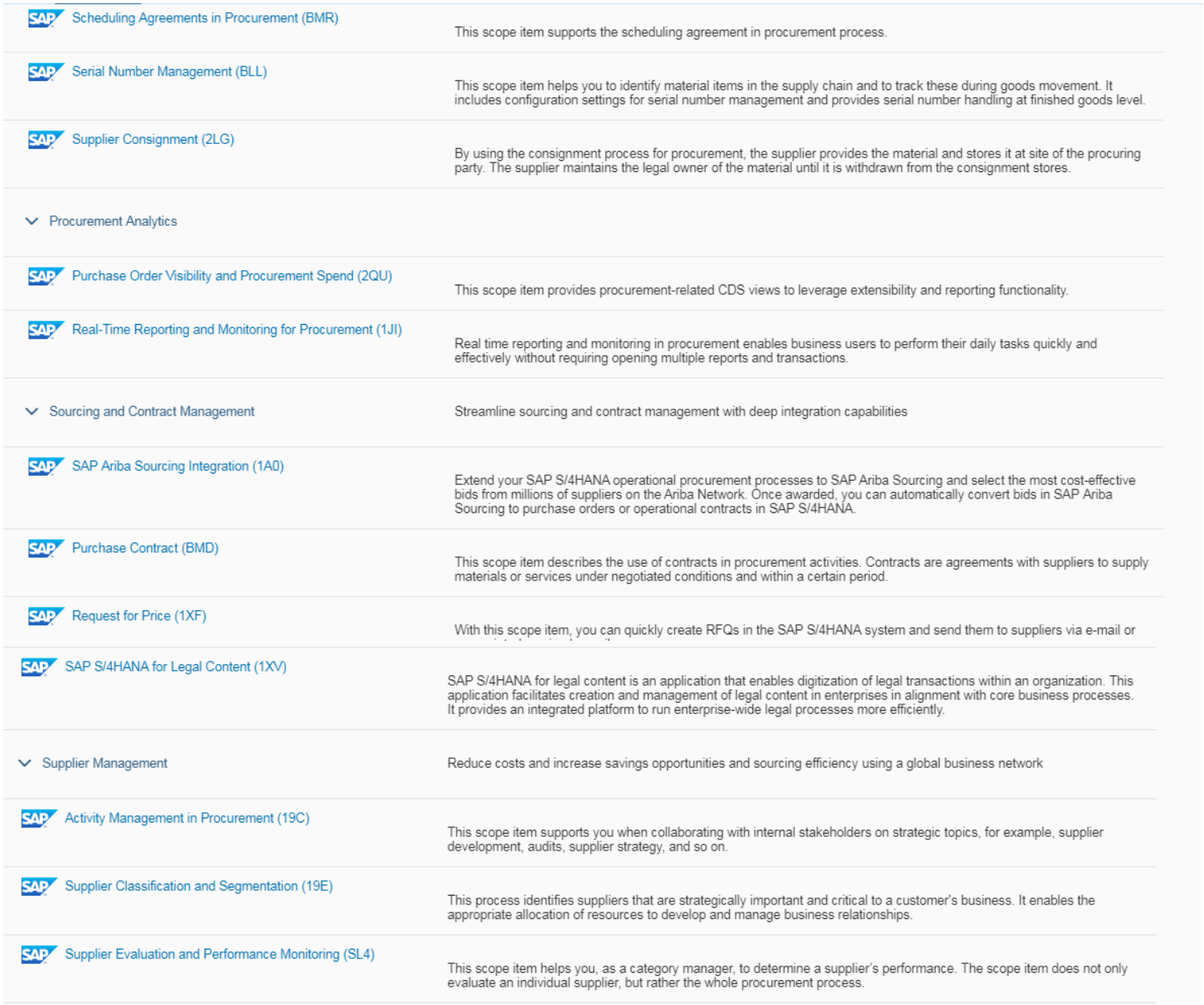


Figure 76: The list of processes included in the "Sourcing and Procurement" module of SAP Best Practices for SAP S/4HANA (on premise) solution package (SAP, 2019)

The "Quality Management" process group of the "Manufacturing" module also includes some procurement processes. The contents of this group are shown in Figure 77.

Manufacturing	Become more responsive to customers. Develop real-time visibility and transparency over manufacturing operations, optimize manufacturing processes, and collaborate in global networks while lowering total manufacturing costs.
Extended Production Planning and Scheduling	Extended Production Planning and Scheduling
Demand-Driven Buffer Level Management (1Y2)	Demand-Driven Buffer Level Management, as part of demand-driven replenishment, helps to plan and manage supply chains based on customer demand by decoupling material flows and lowering inventory using dynamically managed stock buffers for relevant products.
Demand-Driven Replenishment Planning and Execution (2QI)	Demand Driven Replenishment Planning and Execution helps you to monitor demand-driven replenishment using apps that provide dedicated views for Replenishment Planning and Replenishment Execution.
Production Operations	Control production based on validated, real-time demand and advanced simulation
Analytics for Production Unit: Plan/Actual Production Cost (2QW)	This scope item provides the foundation to produce prebuilt finance analytics content using Core Data Services (CDS). Views help the customer understand business trends. A set of Key Performance Indicators allow for robust analytics.
Integration of Manufacturing Execution System to Production Operation (1Y5)	This scope item provides an integration of SAP S/4HANA with an on-premise third-party Manufacturing Execution Systems (MES) to production operation.
Integration of SAP Manufacturing Execution to Production Operation (2JN)	Integration of SAP Manufacturing Execution to Production Operation offers you intelligence on the shop floor, enables a batch size of one, supports handover from engineering to manufacturing, and provides state-of-the-art production execution.
Make-to-Order Production - Finished Goods Sales and Final Assembly (BJE)	This scope item encompasses the Make-to-Order process of batch managed finished goods from customer quotation, sales order creation, production planning and execution to the delivery and billing of the customer including the handling of components.
Make-to-Order Production - Semifinished Goods Planning and Assembly (1BM)	This scope item supports production planning for semifinished components within a Make-to-order (MTO) environment before the receipt of incoming sales orders. This reduces the lead time of sales orders for finished goods that are received later.
Make-to-Order Production with Variant Configuration (1YT)	This scope item shows a Make-to-Order Production scenario using the Advanced Variant Configuration for an efficient state-of-the-art configuration of a material ordered by a customer. It covers single-level and multi-level configurable materials.
Make-to-Stock Production - Discrete Manufacturing (BJ5)	This process supports the following: Requirements planning, production order releasing, goods movements, and production order confirmation including Available-to-Promise checks for serial number managed finished good.
Make-to-Stock Production - Process Manufacturing (2UG)	This scope item provides a platform for process manufacturing, supporting processes in manufacturing for the chemical, pharmaceutical, and food and beverage industries, as well as the batch-oriented electronics industry.
Make-to-Stock Production - Repetitive Manufacturing (BJH)	This process enables you to perform make-to-stock production based on run schedules. The production is controlled without a direct reference to sales orders. Run schedules determine the dates and quantities. Requirements are created in Demand Management.
Make-to-Stock Production with Variant Configuration (21D)	This scope item shows the Make-to-Stock Production with Variant Configuration in which Advanced Variant Configuration enables efficient state-of-the-art configuration for product variants that reflect common definitions of a configurable material.
Manufacturing with Kanban Supply into Production (1E3)	This scope item focuses on a lean production control method within a manufacturing environment using Kanban processing for lean replenishment. It includes Supplier Kanban, Move Kanban, and Flow manufacturing flavors.
Predictive Analytics Model Training - Supply Chain (20N)	Predictive Analytics Model training and activation for scenarios in Supply Chain
Production Subcontracting - External Processing (BJK)	Individual production steps (operations or suboperations) are processed outside of your company by a vendor.

Rework Processing - Work-in-Process (BJQ)	This process takes care of defective materials within a production order.
Subcontracting (BMY)	The subcontracting process involves sending components to a supplier for manufacturing and receiving the finished materials. The seamless and efficient process includes all steps from the initial creation of a purchase order to the invoice management.
Production Planning	Control production based on validated, real-time demand and advanced simulation
Make-to-Order Production - Finished Goods Sales and Final Assembly (BJE)	This scope item encompasses the Make-to-Order process of batch managed finished goods from customer quotation, sales order creation, production planning and execution to the delivery and billing of the customer including the handling of components.
Make-to-Order Production - Semifinished Goods Planning and Assembly (1BM)	This scope item supports production planning for semifinished components within a Make-to-order (MTO) environment before the receipt of incoming sales orders. This reduces the lead time of sales orders for finished goods that are received later.
Make-to-Order Production with Variant Configuration (1YT)	This scope item shows a Make-to-Order Production scenario using the Advanced Variant Configuration for an efficient state-of-the-art configuration of a material ordered by a customer. It covers single-level and multi-level configurable materials.
Make-to-Stock Production - Process Manufacturing (2UG)	This scope item provides a platform for process manufacturing, supporting processes in manufacturing for the chemical, pharmaceutical, and food and beverage industries, as well as the batch-oriented electronics industry.
Make-to-Stock Production - Discrete Manufacturing (BJ5)	This process supports the following: Requirements planning, production order releasing, goods movements, and production order confirmation including Available-to-Promise checks for serial number managed finished good.
Make-to-Stock Production - Repetitive Manufacturing (BJH)	This process enables you to perform make-to-stock production based on run schedules. The production is controlled without a direct reference to sales orders. Run schedules determine the dates and quantities. Requirements are created in
Make-to-Stock Production with Variant Configuration (21D)	This scope item shows the Make-to-Stock Production with Variant Configuration in which Advanced Variant Configuration enables efficient state-of-the-art configuration for product variants that reflect common definitions of a configurable material.
Material Requirements Planning (J44)	This scope item describes the process for a standard Materials Requirements Planning (MRP) process to procure material either via purchase requisitions or delivery schedules in case a scheduling agreement exists.
Production Capacity Planning and Evaluation (31L)	This process supports transparency on current and future capacity situations based on production plans. The user can detect bottleneck situations early within his area of responsibility.
Quality Management	Quality management and compliance that exceed expectations
Quality Management for Complaints Against Suppliers (2F9)	This scope item describes the management of complaints against suppliers. The quality engineer captures basic information, informs the supplier, and manages defects and tasks. The quality engineer can capture the root causes identified by the supplier.
Quality Management for Complaints from Customers (2FA)	This scope item describes the management of customer complaints. The quality engineer captures basic information given by the customer and starts a root cause analysis. The engineer can manage defects and causes, corrections, and corrective and preventive actions.
Quality Management in Discrete Manufacturing (1E1)	This scope item describes quality inspection in discrete manufacturing. Quality inspection is relevant when a material is received from production or during the production process itself. The result of the inspection may trigger further processing.
Quality Management in Procurement (1FM)	This scope item describes quality inspection in procurement. Quality inspection is relevant when a material is received from a supplier. The result of the inspection might trigger further processing, such as return to the supplier for inadequate quality.
Quality Management in Sales (1MP)	This scope item describes quality inspection during the sales process (for example, high-quality materials are delivered to a customer). Once the inspection is accepted, the goods issue is posted and the materials are delivered to the customer.
Quality Management in Stock Handling (1MR)	This scope item implements quality inspection during the storage of goods. Quality inspection is relevant if a warehouse clerk identifies a potential issue with a material in the inventory that needs further investigation.
Quality Management of Internal Problems (2QP)	This scope item describes the management of internal problems. The quality engineer captures basic information and starts a root cause analysis. The quality engineer can manage defects and causes, corrections, corrective and preventive actions.

Figure 77: The list of processes included in the "Manufacturing" module of SAP Best Practices for SAP S/4HANA (on premise) solution package (SAP, 2019)

4.5.2. Comparison

We will now move on to compare the frameworks for the “Procurement” process area (Table 7). PCF serves once again as base for the comparison.

Table 7: Procurement frameworks comparison

PCF		IMM		SCOR		Oracle		SAP	
4.0. Deliver Physical Products	4.1. Plan for and align supply chain resources	Manufacture Motor Spares	Acquire Raw Materials	sP - Plan	sP2. Plan Source	Procurement and Materials Management	Overview **(CONCISE)**	Manufacturing	Quality Management
	4.2. Procure materials and services			sS - Source	sS1. Source Stocked Product		Source and Enable Suppliers		
					sS2. Source Make-to-Order Product		Manage Supplier Contracts		
					sS3. Source Engineer-to-Order Product		Procure Goods and Services	Sourcing and procurement	Central Procurement
5.0. Deliver Service	5.2. Manage service delivery resources			sR - Return	sSR1. Source Return Defective Product **(EXTENSIVE)**		Receive Goods and Services		Invoice Management
					sSR2. Source Return MRO Product **(EXTENSIVE)**		Settle With Suppliers		Operational Procurement
					sSR3. Source Return Excess Product **(EXTENSIVE)**		Analyze Procurement		Procurement Analytics
				sE - Enable	sE6. Manage Supply Chain Contracts **(EXTENSIVE)**		Manage Inventory **(EXTENSIVE)**		Sourcing and Contract Management
							Supplier Onboarding **(EXTENSIVE)**		Supplier Management

As mentioned in the beginning of this section, the first thing we noticed while studying the frameworks is that most of them don't have a separate "Procurement" process area, as they include these processes in the "Production".

PCF includes processes both the basic supplier-related processes as well as for the planning of the related strategies.

The IMM Approach is the simplest model we've studied, as it is the only one that has all the "Procurement"-related processes in one group.

SCOR seems to be the most detailed framework we've studied, having "Procurement"-related processes in all of its major management processes. It is very detailed both for the procurement planning, as well as its execution.

Moving on to the Oracle framework, we can see that all the "Procurement" processes are included in one module, the "Procurement and Materials Management" one.

Similarly, the respective SAP processes are included in the "Sourcing and Procurement" module. The main difference here is that the "Quality Management" group of the "Manufacturing" module contains all the quality inspection-related processes for all the stages of the "Production".

4.6. Production

We will now present the “Production” process area. According to Kenton (2018) Production “refers to the processes and techniques that are used to convert raw materials or semi-finished goods into finished products or services with or without the use of machinery”. These are the processes we will study in this section, according to what the frameworks propose.

4.6.1. Frameworks

The frameworks we will present are five, which are: (1) IMM Approach, (2) PCF, (3) SCOR, (4) Oracle and (5) SAP. Some of them have separate sections for the physical products and the services, for example PCF. However, both of these belong in the “Production” process area, thus we will present all cases here. For each of the frameworks we provide all the relevant links in the “List of References” section. Any additional links needed will be added as a footnote in the text.

We will not study the eTOM and COBIT frameworks in this section, as they don’t include a “Production” section.

4.6.1.1. Integrated Modeling Method (IMM™)

The process category of the IMM Approach that we will study in this section is again the “Manufacture Motor Spares”, as this is the one that includes processes regarding the “Production” operations.

If we take a look at Figure 5 of Chapter 3, we see that there are three process groups in this category, which are: (1) build production schedule, (2) acquire raw materials and (3) produce motor spares. For the comparison of the “Production” category of the frameworks we will use the first and the third process group, as the second one that refers to buying the raw materials needed for the production belongs to the “Procurement” process area.

4.6.1.2. APQC's Process Classification Framework (PCF)

The PCF categories we will study are "4.0 Deliver Physical Products" and "5.0 Deliver Service", as presented in Figure 70 and Figure 71 of the "Procurement" section of the thesis.

As we discussed there, the first category, "4.0 Deliver Physical Products", includes four process groups, of which we will study the first: plan for and align supply chain resources and the third: produce/ assemble/ test product. The contents of each group were shown in Figure 70 of the "Procurement" section of the thesis. Each of them includes between four and eight process sub-groups, of the 12 in total. These sub-groups contain 86 processes, of the 146 of the "4.0 Deliver Physical Products". The other two groups that will not be studied here belong to the "Procurement" and the "Logistics" process areas.

The second category, "5.0 Deliver Service", includes three process groups. We will study two of them, which are: (1) establish service delivery governance and strategies and (2) deliver service to customer. Each of these groups contains between two and three process sub-groups, of the five in total. They consist of 41 processes, of the 67 that are in the 5th PCF category. The third group, with the other 26 processes, was discussed in the previous section of the thesis, as it is "Procurement" related.

4.6.1.3. SCOR

Since SCOR is a supply chain management model, it describes the production processes in a very detailed way, compared to the rest of the model. The process groups we will study are included in various major management processes. Figure 78-Figure 80 show the groups as well as the contents of each.

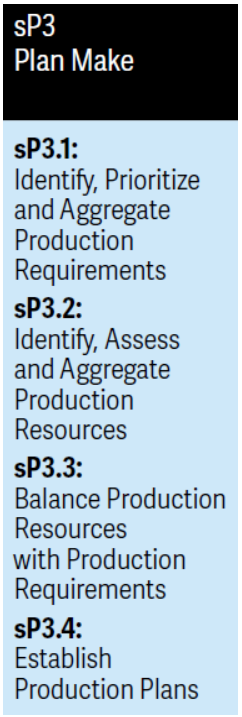


Figure 78: The "Plan" management process (APICS, 2017, p.3)

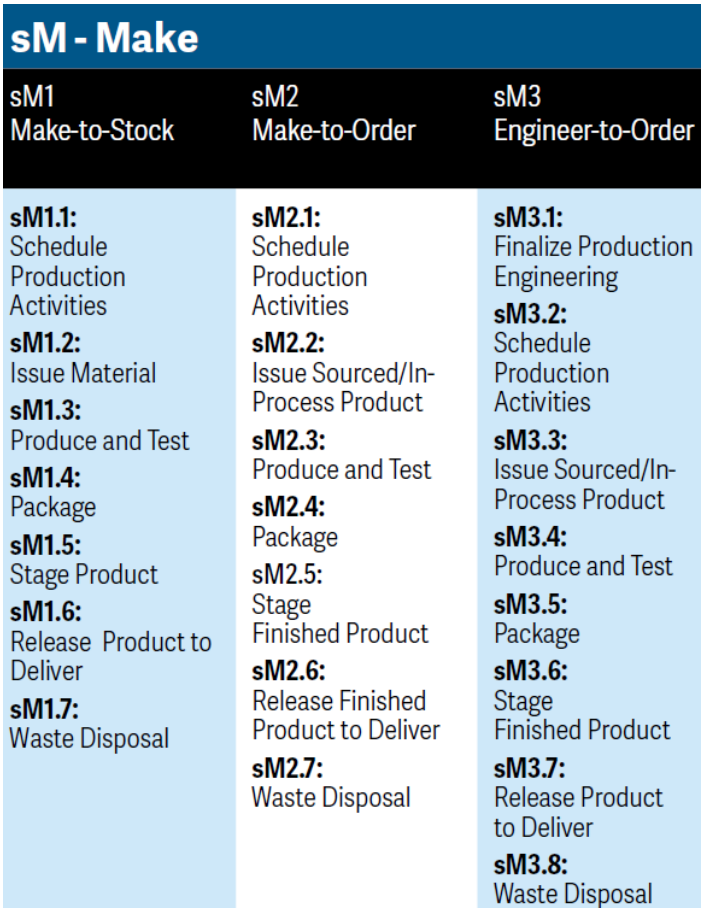


Figure 79: The "Make" management process (APICS, 2017, p.3)

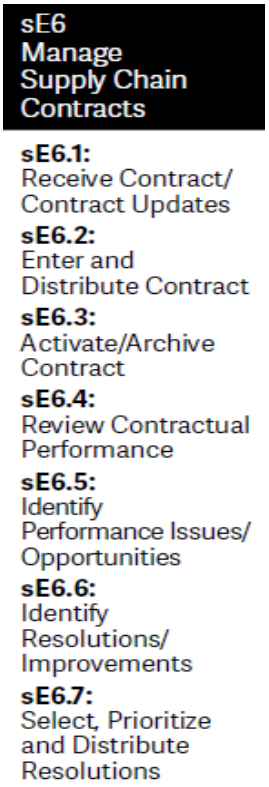


Figure 80: "sE6. Manage Supply Chain Contracts" (APICS, 2017, p.3)

4.6.1.4. Oracle

The Oracle framework doesn't draw a distinction between physical products and services. We will study one PeopleSoft's module, which is named "Production", as shown in Figure 81[20]. The contents of the group are shown in Figure 82.

[20] https://docs.oracle.com/cd/F19196_01/fscm92pbr32/eng/fscm/index.html?focusnode=home (Accessed 27 June 2019)

Figure 81: The PeopleSoft Financial and Supply Chain Management 9.2 process map (Oracle, 2019)

Figure 82: The processes included in the "Production" module, PeopleSoft Financial and Supply Chain Management 9.2 (Oracle, 2019)

The “Production” module consists of four process groups. The groups have between one and nine processes, of the 21 in total.

There are also some relevant processes in the “Order Fulfillment” module, which mainly serve as a connection between the basic “Production” processes. Figure 83 provides an overview of them.

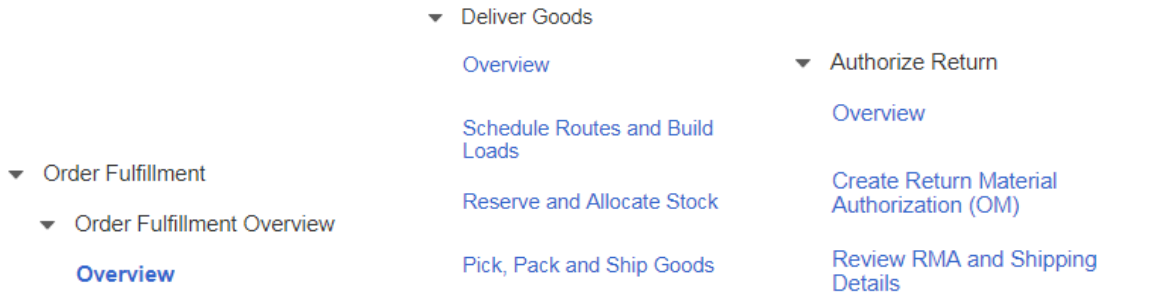


Figure 83: The processes included in the "Order Fulfillment" module, PeopleSoft Financial and Supply Chain Management 9.2 (Oracle, 2019)

We notice that Oracle includes the invoicing and payment processes in the "Order Fulfillment" module. What is more, it also includes customer contracts-related processes, as we saw in the "Sales" chapter. These process groups will not be included in this chapter's comparison.

4.6.1.5. SAP

Moving on to SAP framework, we will once again focus on the "SAP Best Practices for SAP S/4HANA (on premise)" package[21] (Figure 18). Same as Oracle, SAP doesn't draw a distinction between physical products and services.

The module we will study for the "Production" section is called "Manufacturing". It includes four groups, which are: (1) extended production planning and scheduling, (2) production operations, (3) production planning and (4) quality management. The contents of each group are shown in Figure 77 of the "Procurement" section. This module includes 33 processes.

[21] https://rapid.sap.com/bp/BP_OP_ENTPR (Accessed 28 June 2019)

4.6.2. Comparison

We will now move on to compare the “Production” process area of the frameworks (Table 8). PCF was once again used as a base for the comparison.

Table 8: Production frameworks comparison

PCF		IMM		SCOR		Oracle		SAP	
4.0. Deliver Physical Products	4.1. Plan for and align supply chain resources	Manufacture Motor Spares	Build Production Schedule	sP - Plan	sP3. Plan Make	Order Fulfillment	Overview **(CONCISE)**	Manufacturing	Extended Production Planning and Scheduling
5.0. Deliver Service	5.1. Establish service delivery governance and strategies			sE - Enable	sE6. Manage Supply Chain Contracts	Production	Overview **(CONCISE)**		Production Planning
							Analyze Production Costs **(CONCISE)**		Quality Management **(CONCISE)**
4.0. Deliver Physical Products	4.3. Produce/ Assemble/ Test product	Manufacture Motor Spares	Produce Motor Spares	sM - Make	sM1. Make-to-Stock	Production	Execute Manufacturing	Manufacturing	Product Operations
					sM2. Make-to-Order				
					sM3. Engineer-to-Order		Manage Quality		Quality Management
5.0. Deliver Service	5.3. Deliver service to customer	**MISSING**		**MISSING**		**MISSING**		**MISSING**	

The PCF framework is the only one that divides the product in two categories, physical product and service, thus there are some service-related processes that none of the other frameworks include.

The IMM Approach framework is the one with the simplest categorization, having only two “Production” relevant categories. It includes the basic processes for “Production”.

The SCOR model is very detailed regarding the product manufacturing, as it is a supply chain management model. What is more, it also includes a separate process category regarding the supply chain contracts, something that we don’t see in any of the other frameworks.

The Oracle framework seems to have many similarities with the SAP one. This could be because of the fact that both of them are developed based on software. It covers all the basic “Production” processes.

SAP also covers all the basic “Production” processes, and what is more they are all in the “Manufacturing” module whereas the rest of the frameworks have these processes in more than one categories.

4.7. Logistics

According to Kenton (2019) “Logistics is the overall process of managing how resources are acquired, stored, and transported to their final destination”. In this section we will study these processes of the frameworks.

In this section we will study these storage and delivery processes, based on what each of the business process frameworks includes in their respective process areas.

4.7.1. Frameworks

The frameworks we will present for the purpose of this section are: (1) IMM Approach, (2) PCF, (3) SCOR, (4) Oracle and (5) SAP. For each of them we provide all the relevant links in the “List of References” section. Any additional links needed will be added as a footnote in the text.

We will not study the eTOM and COBIT frameworks, as they refer to IT-related products, thus they don’t include a “Logistics” process area.

4.7.1.1. Integrated Modeling Method (IMM™)

The process category of the IMM Approach that we will study for the “Logistics” section is the “Transport Motor Spares and Raw Materials” one. As we can see in Figure 5 of Chapter 3, it consists of three process groups, which are: (1) provide transport fleet, (2) distribute motor spares and (3) collect raw materials from suppliers.

4.7.1.2. APQC’s Process Classification Framework (PCF)

The 4th PCF category, “4.0 Deliver Physical Products”, contains all the “Logistics”-related processes. The main process group we will study is “4.4. Manage logistics and warehousing”, the contents of which are shown in Figure 70. It has four process sub-groups with 32 processes. There are also some relevant processes in the “4.1. Plan for and align supply chain resources” process group, regarding the strategies that are set up and being followed in this process area.

4.7.1.3. SCOR

The “Logistic”-related processes of the SCOR model are included in several process categories. Figure 84 - Figure 86 show the process groups and the contents of each.

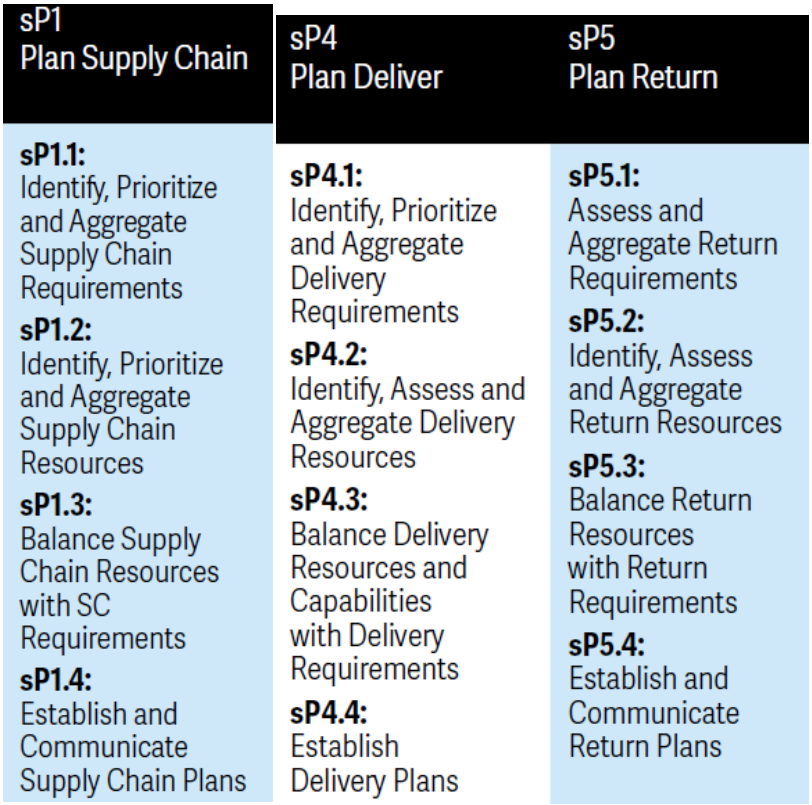


Figure 84: Part of the "Plan" management process (APICS, 2017, p.3)

sD - Deliver

sD1 Deliver Stocked Product	sD2 Deliver Make-to-Order Product	sD3 Deliver Engineer-to-Order Product	sD4 Deliver Retail Product
sD1.1: Process Inquiry and Quote	**sD2.1:** Process Inquiry and Quote	**sD3.1:** Obtain and Respond to RFP/ RFQ	**sD4.1:** Generate Stocking Schedule
sD1.2: Receive, Enter, and Validate Order	**sD2.2:** Receive, Configure, Enter and Validate Order	**sD3.2:** Negotiate and Receive Contract	**sD4.2:** Receive Product at Store
sD1.3: Reserve Inventory and Determine Delivery Date	**sD2.3:** Reserve Inventory and Determine Delivery Date	**sD3.3:** Enter Order, Commit Resources & Launch Program	**sD4.3:** Pick Product from backroom
sD1.4: Consolidate Orders	**sD2.4:** Consolidate Orders	**sD3.4:** Schedule Installation	**sD4.4:** Stock Shelf
sD1.5: Build Loads	**sD2.5:** Build Loads	**sD3.5:** Build Loads	**sD4.5:** Fill Shopping Cart
sD1.6: Route Shipments	**sD2.6:** Route Shipments	**sD3.6:** Route Shipments	**sD4.6:** Checkout
sD1.7: Select Carriers and Rate Shipments	**sD2.7:** Select Carriers and Rate Shipments	**sD3.7:** Select Carriers & Rate Shipments	**sD4.7:** Deliver and/or install
sD1.8: Receive Product from Source or Make	**sD2.8:** Receive Product from Source or Make	**sD3.8:** Receive Product from Source or Make	
sD1.9: Pick Product	**sD2.9:** Pick Product	**sD3.9:** Pick Product	
sD1.10: Pack Product	**sD2.10:** Pack Product	**sD3.10:** Pack Product	
sD1.11: Load Vehicle & Generate Shipping Docs	**sD2.11:** Load Product & Generate Shipping Docs	**sD3.11:** Load Product & Generate Shipping Docs	
sD1.12: Ship Product	**sD2.12:** Ship Product	**sD3.12:** Ship Product	
sD1.13: Receive and Verify Product by Customer	**sD2.13:** Receive and Verify Product by Customer	**sD3.13:** Receive and Verify Product by Customer	
sD1.14: Install Product	**sD2.14:** Install Product	**sD3.14:** Install Product	
sD1.15: Invoice	**sD2.15:** Invoice	**sD3.15:** Invoice	

Figure 85: The "Deliver" management process (APICS, 2017, p.3)

sDR1 Deliver Return Defective Product	sDR2 Deliver Return MRO Product	sDR3 Deliver Return Excess Product
sDR1.1: Authorize Defective Product Return	**sDR2.1:** Authorize MRO Product Return	**sDR3.1:** Authorize Excess Product Return
sDR1.2: Schedule Defective Return Receipt	**sDR2.2:** Schedule MRO Return Receipt	**sDR3.2:** Schedule Excess Return Receipt
sDR1.3: Receive Defective Product (includes verify)	**sDR2.3:** Receive MRO Product	**sDR3.3:** Receive Excess Product
sDR1.4: Transfer Defective Product	**sDR2.4:** Transfer MRO Product	**sDR3.4:** Transfer Excess Product

Figure 86: Part of the "Return" management process (APICS, 2017, p.3)

What is more, there are some supply-chain-related processes in the "sE6. Manage Supply Chain Contracts" category, as shown in Figure 80, as well as some process groups in the “Make” and “Source” processes, as shown in Figure 79 and Figure 73 respectively.

4.7.1.4. Oracle

The Oracle process groups that are of interest to us for the “Logistics” process area are included in the “Order Fulfillment” module. These are: (1) deliver goods and (2) authorize return. The contents of each are shown in Figure 83 in the previous section of the thesis.

Another process group that includes Logistics-relevant processes is the “Manage Inventory”, which is included in the “Procurement and Materials Management” module (Figure 75 of the “Procurement” section).

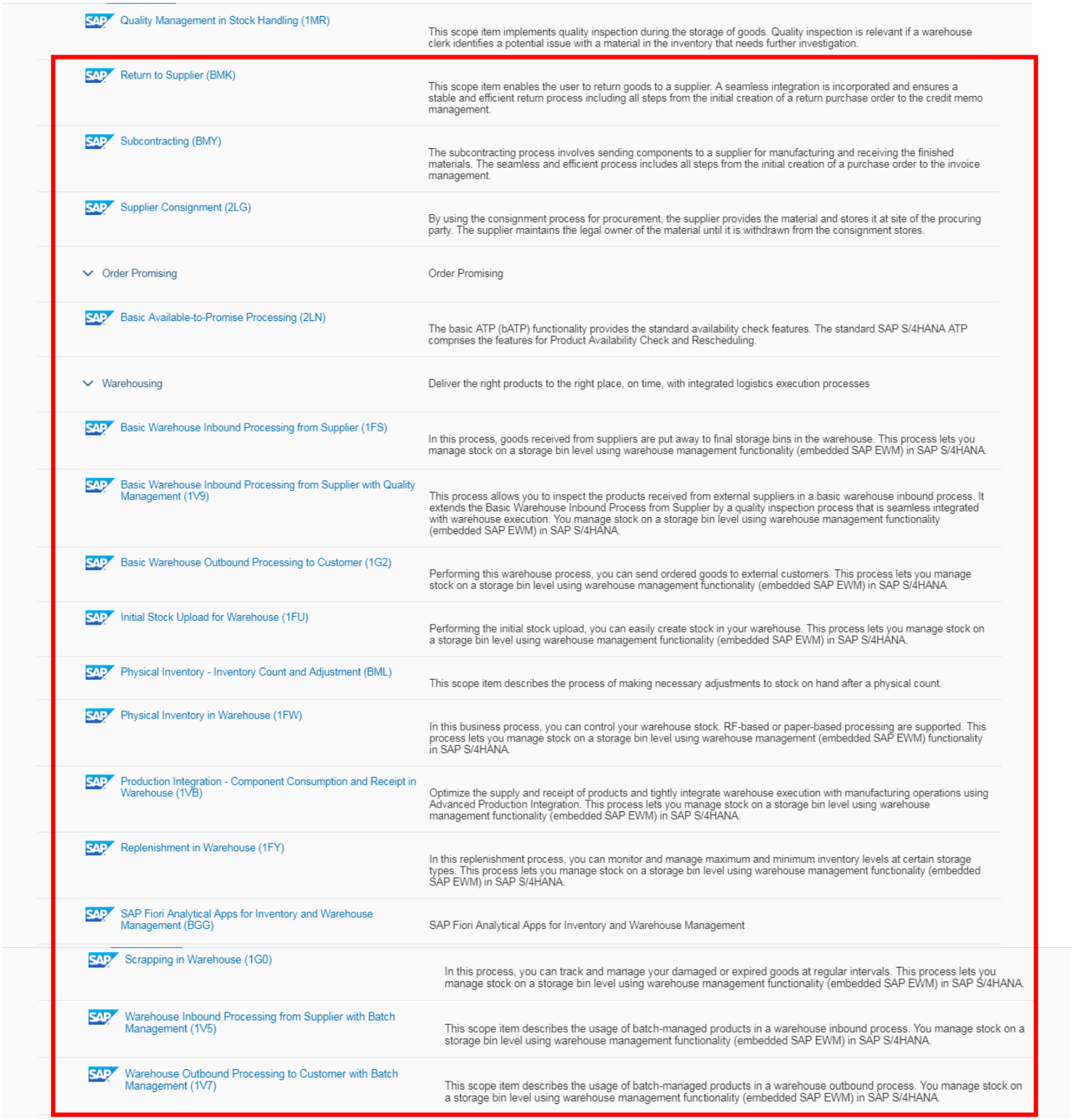
4.7.1.5. SAP

We will study the “SAP Best Practices for SAP S/4HANA (on premise)” package[22] (Figure 18), as we also did in the previous sections.

[22] https://rapid.sap.com/bp/BP_OP_ENTPR (Accessed 28 June 2019)

The “Supply Chain” module includes five process groups, which are: (1) advanced order promising, (2) advanced warehousing, (3) inventory, (4) order promising and (5) warehousing. These groups include in total 29 supply-chain management- related processes (Figure 87) and we will study 18 of them for the “Logistics” comparison. The rest of the processes were already studied in the “Procurement” and “Production” process areas. They refer to procurement and quality management, and they are also included in the respective SAP modules.

Supply Chain	Enable demand-driven, responsive supply networks, by preparing for variability at lowest cost, using automation. Real time responses to supply. Increase profits, shorten lead times, and provide visibility with intelligent response and supply orchestration.
Advanced Order Promising	Advanced Order Promising
Advanced Available-to-Promise Processing (1JW)	The advanced ATP (aATP) functionality enhances the standard availability check features. The standard SAP S/4HANA ATP comprises the features for Product Availability Check and Rescheduling. With new user interfaces, the aATP within scope item 1JW focuses on performance, simplicity, and integration and additionally provides the functionality for Release-for-Delivery, Product Allocation Check, and Backorder Processing.
Advanced Warehousing	Advanced Warehousing
Advanced Warehouse Outbound Processing to Customer (1VD)	This warehouse process optimizes the process of picking products and sending them to external customers by leveraging extended warehouse management functionality (embedded SAP EWM) in SAP S/4HANA.
Inventory	Optimize goods movement for more efficient warehouse operations
SAP Ariba Commerce Automation Integration (J82)	This scope item (for purchasing experts and accounts payable accountants) lets you focus on value-driving activities with SAP Ariba Commerce Automation integration with your suppliers in the Ariba Network, and lets you drive productivity with nearly touchless orders and invoices.
Complementary Procurement Functions (2TW)	This scope item comprises complementary functions in procurement. It provides seamless processes for the procurement of operating supplies and batch managed material, including the steps from the creation of a purchase order to the invoice creation.
Consumable Purchasing (BNX)	This scope item enables the user to order consumables. A seamless integration is incorporated and ensures a stable and efficient process including all steps from the initial creation of a purchase requisition to the invoice creation and handling.
Core Inventory Management (BMC)	The scope item describes different transfer posting scenarios as well as stock and goods movement analysis.
Direct Procurement with Inbound Delivery (2TX)	This scope item enables the user to order direct materials using inbound deliveries. A seamless integration is incorporated and ensures an efficient process including all steps from the initial creation of a purchase order to the invoice management.
Procurement of Direct Materials (J45)	This scope item enables the user to order direct materials. A seamless integration is incorporated and ensures a stable and efficient process including all steps from the initial creation of a purchase requisition to the invoice creation and handling.
Quality Management for Complaints Against Suppliers (2F9)	This scope item describes the management of complaints against suppliers. The quality engineer captures basic information, informs the supplier, and manages defects and tasks. The quality engineer can capture the root causes identified by the supplier.
Quality Management for Complaints from Customers (2FA)	This scope item describes the management of customer complaints. The quality engineer captures basic information given by the customer and starts a root cause analysis. The engineer can manage defects and causes, corrections, and corrective and preventive actions.
Quality Management in Procurement (1FM)	This scope item describes quality inspection in procurement. Quality inspection is relevant when a material is received from a supplier. The result of the inspection might trigger further processing, such as return to the supplier for inadequate quality.
Quality Management in Sales (1MP)	This scope item describes quality inspection during the sales process (for example, high-quality materials are delivered to a customer). Once the inspection is accepted, the goods issue is posted and the materials are delivered to the customer.



Quality Management in Stock Handling (1MR)	This scope item implements quality inspection during the storage of goods. Quality inspection is relevant if a warehouse clerk identifies a potential issue with a material in the inventory that needs further investigation.
Return to Supplier (BMK)	This scope item enables the user to return goods to a supplier. A seamless integration is incorporated and ensures a stable and efficient return process including all steps from the initial creation of a return purchase order to the credit memo management.
Subcontracting (BMY)	The subcontracting process involves sending components to a supplier for manufacturing and receiving the finished materials. The seamless and efficient process includes all steps from the initial creation of a purchase order to the invoice management.
Supplier Consignment (2LG)	By using the consignment process for procurement, the supplier provides the material and stores it at site of the procuring party. The supplier maintains the legal owner of the material until it is withdrawn from the consignment stores.
Order Promising	Order Promising
Basic Available-to-Promise Processing (2LN)	The basic ATP (bATP) functionality provides the standard availability check features. The standard SAP S/4HANA ATP comprises the features for Product Availability Check and Rescheduling.
Warehousing	Deliver the right products to the right place, on time, with integrated logistics execution processes
Basic Warehouse Inbound Processing from Supplier (1FS)	In this process, goods received from suppliers are put away to final storage bins in the warehouse. This process lets you manage stock on a storage bin level using warehouse management functionality (embedded SAP EWM) in SAP S/4HANA.
Basic Warehouse Inbound Processing from Supplier with Quality Management (1V9)	This process allows you to inspect the products received from external suppliers in a basic warehouse inbound process. It extends the Basic Warehouse Inbound Process from Supplier by a quality inspection process that is seamless integrated with warehouse execution. You manage stock on a storage bin level using warehouse management functionality (embedded SAP EWM) in SAP S/4HANA.
Basic Warehouse Outbound Processing to Customer (1G2)	Performing this warehouse process, you can send ordered goods to external customers. This process lets you manage stock on a storage bin level using warehouse management functionality (embedded SAP EWM) in SAP S/4HANA.
Initial Stock Upload for Warehouse (1FU)	Performing the initial stock upload, you can easily create stock in your warehouse. This process lets you manage stock on a storage bin level using warehouse management functionality (embedded SAP EWM) in SAP S/4HANA.
Physical Inventory - Inventory Count and Adjustment (BML)	This scope item describes the process of making necessary adjustments to stock on hand after a physical count.
Physical Inventory in Warehouse (1FW)	In this business process, you can control your warehouse stock. RF-based or paper-based processing are supported. This process lets you manage stock on a storage bin level using warehouse management (embedded SAP EWM) functionality in SAP S/4HANA.
Production Integration - Component Consumption and Receipt in Warehouse (1VB)	Optimize the supply and receipt of products and tightly integrate warehouse execution with manufacturing operations using Advanced Production Integration. This process lets you manage stock on a storage bin level using warehouse management functionality (embedded SAP EWM) in SAP S/4HANA.
Replenishment in Warehouse (1FY)	In this replenishment process, you can monitor and manage maximum and minimum inventory levels at certain storage types. This process lets you manage stock on a storage bin level using warehouse management functionality (embedded SAP EWM) in SAP S/4HANA.
SAP Fiori Analytical Apps for Inventory and Warehouse Management (BGG)	SAP Fiori Analytical Apps for Inventory and Warehouse Management
Scrapping in Warehouse (1G0)	In this process, you can track and manage your damaged or expired goods at regular intervals. This process lets you manage stock on a storage bin level using warehouse management functionality (embedded SAP EWM) in SAP S/4HANA.
Warehouse Inbound Processing from Supplier with Batch Management (1V5)	This scope item describes the usage of batch-managed products in a warehouse inbound process. You manage stock on a storage bin level using warehouse management functionality (embedded SAP EWM) in SAP S/4HANA.
Warehouse Outbound Processing to Customer with Batch Management (1V7)	This scope item describes the usage of batch-managed products in a warehouse outbound process. You manage stock on a storage bin level using warehouse management functionality (embedded SAP EWM) in SAP S/4HANA.

Figure 87: The list of the "Logistics"-related processes that are included in the "Supply Chain" module of SAP Best Practices for SAP S/4HANA (on premise) solution package (SAP, 2019)

What is more, the module "Sales", which was presented in the "Sales & Marketing" chapter (Figure 50) and includes the "Order and Contract Management" process

category, is also relevant to the “Logistics” section. The processes that we will study here are the ones referring to customer returns.

Last but not least, the “Manufacturing” module also has some related processes in the “Quality Management” process group, and we will refer to them in this chapter’s comparison. The contents of this group were presented in Figure 77 of the “Procurement” section of this thesis.

4.7.2. Comparison

We will now move on to compare the frameworks for the “Logistics” section (Table 9). PCF was used as a base for the comparison.

Table 9: Logistics framework comparison

PCF		IMM		SCOR		Oracle		SAP	
4.0. Deliver Physical Products	4.1. Plan for and align supply chain resources	Transport Motor Spares and Raw Materials	Provide Transport Fleet	sP - Plan	sP1. Plan Supply Chain	Procurement and Materials Management	Manage Inventory	Sales	Order and Contract Management **(CONCISE)**
					sP4. Plan Deliver				
					sP5. Plan Return				
				sS - Source	sS1. Source Stocked Product				
					sS2. Source Make-to-Order Product				
					sS3. Source Engineer-to-Order Product				
	4.4. Manage logistics and warehousing		Distribute Motor Spares	sM - Make	sM1. Make-to-Stock			Manufacturing	Quality Management
					sM2. Make-to-Order				
					sM3. Engineer-to-Order				
				sD - Deliver	sD1. Deliver Stocked Product	Order fulfillment	Deliver Goods		
					sD2. Deliver Make-to-Order Product				
					sD3. Deliver Engineer-to-Order Product				
					sD4. Deliver Retail Product			Supply Chain	Advanced Order Promising
			Collect Raw Materials from Suppliers	sR - Return	sDR1. Deliver Return Defective Product		Authorize Return		Advanced Warehousing
					sDR2. Deliver Return MRO Product				Inventory
					sDR3. Deliver Return Excess Product				Order Promising
				sE - Enable	sE6. Manage Supply Chain Contracts				Warehousing

The PCF seems to be the only framework that has a separate “Logistics” category. However there are also some strategy-related processes in another category that we include in the comparison.

The IMM Approach is very inclusive regarding the “Logistics” processes, as it has all the basic ones for the transportation, distribution and collection of the materials and products. If we compare this category to the other ones of the model we can safely reach the conclusion that this is the most detailed one.

If we now turn to the SCOR model, we can see that once again it is the most detailed one, as it is a supply-chain management model. All its major management processes have are “Logistics” related, and they seem to cover most of the events that are possible to happen in this process area.

The Oracle model is concise when it comes to the “Logistics” part of an enterprise, having only three related process groups. However, they seem to cover all the basic functions, which are the warehouse management, product delivery and returns management.

Last but not least, the SAP framework has the most peculiar categorization, compared to the rest of the frameworks we studied, as it is the only one that has the processes that are related to the returns of the products in the “Sales” module. Other than that, all the “Logistics” related processes are included in a separate module, the “Supply Chain” one. Once again, some quality management processes that are relevant to this chapter are in the “Manufacturing” module.

4.8. Customer Service

According to Grant and Kagan (2019), "Customer service is the process of ensuring customer satisfaction with a product or service. Often, customer service takes place while performing a transaction for the customer, such as making a sale or returning an item. Customer service can take the form of in-person interaction, a phone call, self-service systems, or by other means".

4.8.1. Frameworks

We will now move on to compare three frameworks for the "Customer Service" process area of an enterprise. The frameworks we will study are: (1) PCF, (2) eTOM, (3) Oracle and (4) COBIT.

For each of the frameworks we provide all the relevant links in the "List of References" section. Any additional links needed will be added as a footnote in the text.

4.8.1.1. APQC's Process Classification Framework (PCF)

The 6th process category of the framework contains processes related to customer service. It is called "6.0 Manage Customer Service", and Figure 88 provides an overview of the process group. There are five process groups in this category, each of them containing between four and seven smaller process groups, of the 27 in total. This category contains 103 processes in total.

6.0 Manage Customer Service (20085)

6.1 Develop customer care/customer service strategy (10378)

- 6.1.1 Define customer service requirements across the enterprise (20086)
- 6.1.2 Define customer service experience (20087)
- 6.1.3 Define and manage customer service channel strategy (20088)
- 6.1.4 Define customer service policies and procedures (10382)
- 6.1.5 Establish target service level for each customer segment (10383)
- 6.1.6 Define warranty offering (20089)
  - 6.1.6.1 Determine and document warranty policies (16893)
  - 6.1.6.2 Create and manage warranty rules/claim codes for products (16890)
  - 6.1.6.3 Agree warranty responsibilities with suppliers (20090)
  - 6.1.6.4 Define warranty related offerings for customers (20091)
  - 6.1.6.5 Communicate warranty policies and offerings (12673)
- 6.1.7 Develop recall strategy (20092)

6.2 Plan and manage customer service contacts (10379)

- 6.2.1 Plan and manage customer service work force (10387)
  - 6.2.1.1 Forecast volume of customer service contacts (10390)
  - 6.2.1.2 Schedule customer service work force (10391)
  - 6.2.1.3 Track work force utilization (10392)
  - 6.2.1.4 Monitor and evaluate quality of customer interactions with customer service representatives (10393)
- 6.2.2 Manage customer service problems, requests, and inquiries (10388)
  - 6.2.2.1 Receive customer problems, requests, and inquiries (10394)
  - 6.2.2.2 Analyze problems, requests, and inquiries (13482)
  - 6.2.2.3 Resolve customer problems, requests, and inquiries (10395)
  - 6.2.2.4 Respond to customer problems, requests, and inquiries (10396)
  - 6.2.2.5 Identify and capture upsell/cross-sell opportunities (16928)
  - 6.2.2.6 Deliver opportunity to sales team (16937)
- 6.2.3 Manage customer complaints (10389)
  - 6.2.3.1 Receive customer complaints (10397)
  - 6.2.3.2 Route customer customer complaints (10398)
  - 6.2.3.3 Resolve customer complaints (10399)
  - 6.2.3.4 Respond to customer customer complaints (10400)
  - 6.2.3.5 Analyze customer complaints and response/ redressal (19072)
- 6.2.4 Process returns (20094)
  - 6.2.4.1 Authorize return (10364)
  - 6.2.4.2 Process return and record reason (20095)
- 6.2.5 Report incidents and risks to regulatory bodies (12840)

6.3 Service products after sales (12658)

- 6.3.1 Register products (20605)
- 6.3.2 Process warranty claims (12669)
  - 6.3.2.1 Receive warranty claim (20096)
  - 6.3.2.2 Validate warranty claim (12671)
  - 6.3.2.3 Investigate warranty issues (20097)
    - 6.3.2.3.1 Define issue (20098)
    - 6.3.2.3.2 Schedule field service (12677)
    - 6.3.2.3.3 Request and receive defective part (12678)
    - 6.3.2.3.4 Investigate issue/perform root cause analysis (20099)
    - 6.3.2.3.5 Receive investigation result/ recommendation for corrective action (20100)
  - 6.3.2.4 Determine responsible party (20101)
  - 6.3.2.5 Manage pre-authorizations (20102)
  - 6.3.2.6 Approve or reject warranty claim (12668)
  - 6.3.2.7 Notify originator of approve/reject decision (20103)
  - 6.3.2.8 Authorize payment (20104)
  - 6.3.2.9 Close claim (20105)
  - 6.3.2.10 Reconcile warranty transaction disposition (12667)
- 6.3.3 Manage supplier recovery (20106)
  - 6.3.3.1 Create supplier recovery claims (20107)
  - 6.3.3.2 Negotiate recoveries with suppliers (20108)
- 6.3.4 Service products (10218)
  - 6.3.4.1 Confirm specific service requirements for individual customer (10320)
    - 6.3.4.1.1 Process customer request (10324)
    - 6.3.4.1.2 Create customer profile (10325)
    - 6.3.4.1.3 Generate service order (10326)
  - 6.3.4.2 Identify and schedule resources to meet service requirements (10321)
    - 6.3.4.2.1 Create resourcing plan and schedule (10327)
    - 6.3.4.2.2 Create service order fulfillment schedule (10328)
  - 6.3.4.3 Provide service to specific customers (10322)
    - 6.3.4.3.1 Organize daily service order fulfillment schedule (10330)
    - 6.3.4.3.2 Execute product repair (10331)
    - 6.3.4.3.3 Manage service order fulfillment (10332)

6.3.4.4 Ensure quality of service (10322)
6.3.4.4.1 Identify completed service orders for feedback (10334)
6.3.4.4.2 Identify incomplete service orders and service failures (10335)
6.3.4.4.3 Solicit customer feedback on services delivered (10336)
6.3.4.4.4 Process customer feedback on services delivered (10337)

6.4 Manage product recalls and regulatory audits (20110)

6.4.1 Initiate recall (20111)
6.4.2 Assess the likihood and consequences of occurrence of any hazards (20112)
6.4.3 Manage recall related communications (20113)
6.4.4 Submit regulatory reports (20114)
6.4.5 Monitor and audit recall effectiveness (20115)
6.4.6 Manage recall termination (20116)

6.5 Evaluate customer service operations and customer satisfacion (20595)

6.5.1 Measure customer satisfaction with customer problems, requests, and inquiries handling (10401)
6.5.1.1 Solicit customer feedback on customer service experience (11687)
6.5.1.2 Analyze customer service data and identify improvement opportunities (11688)
6.5.1.3 Provide customer feedback to product management on customer service experience (18126)
6.5.2 Measure customer satisfaction with customer- complaint handling and resolution (10402)
6.5.2.1 Solicit customer feedback on complaint handling and resolution (11236)
6.5.2.2 Analyze customer complaint data and identify improvement opportunities (11237)
6.5.2.3 Identify common customer complaints (11689)
6.5.3 Measure customer satisfaction with products and services (10403)
6.5.3.1 Gather and solicit post-sale customer feedback on products and services (11238)
6.5.3.2 Solicit post-sale customer feedback on ad effectiveness (11239)
6.5.3.3 Solicit customer feedback on cross-channel experience (20117)
6.5.3.4 Analyze product and service satisfaction data and identify improvement opportunities (11240)
6.5.3.5 Provide feedback and insights to appropriate teams (product design/development, marketing, manufacturing) (11241)
6.5.4 Evaluate and manage warranty performance (12672)
6.5.4.1 Measure customer satisfaction with warranty handling and resolution (20118)
6.5.4.2 Monitor and report on warranty management metrics (12676)
6.5.4.3 Identify improvement opportunities (20119)
6.5.4.4 Identify opportunities to eliminate warranty waste (12674)
6.5.4.5 Investigate fraudulent claims (20120)
6.5.5 Evaluate recall performance (20121)

Figure 88: 6.0 Manage Customer Service (APQC, 2018, p.14-15)

4.8.1.2. Business Process Framework (eTOM)

The eTOM framework has a separate “Customer” Domain. All the processes included here, both the “Strategy, Infrastructure & Product” and the “Operations” ones, refer to customer service, relations and management. This domain contains 14 process groups, the five of which are of interest to us for the “Customer Service” process area. These are: (1) customer support & readiness, (2) customer experience management, (3) customer interaction management, (4) problem handling and (5) customer QoS/SLA management. Each of them contains between two and 11 smaller groups of processes, of the 34 in total. Figure 29 of the “Marketing” section of this thesis provides an overview of this domain and Figure 89–Figure 93 provide details of the five process groups we will study.

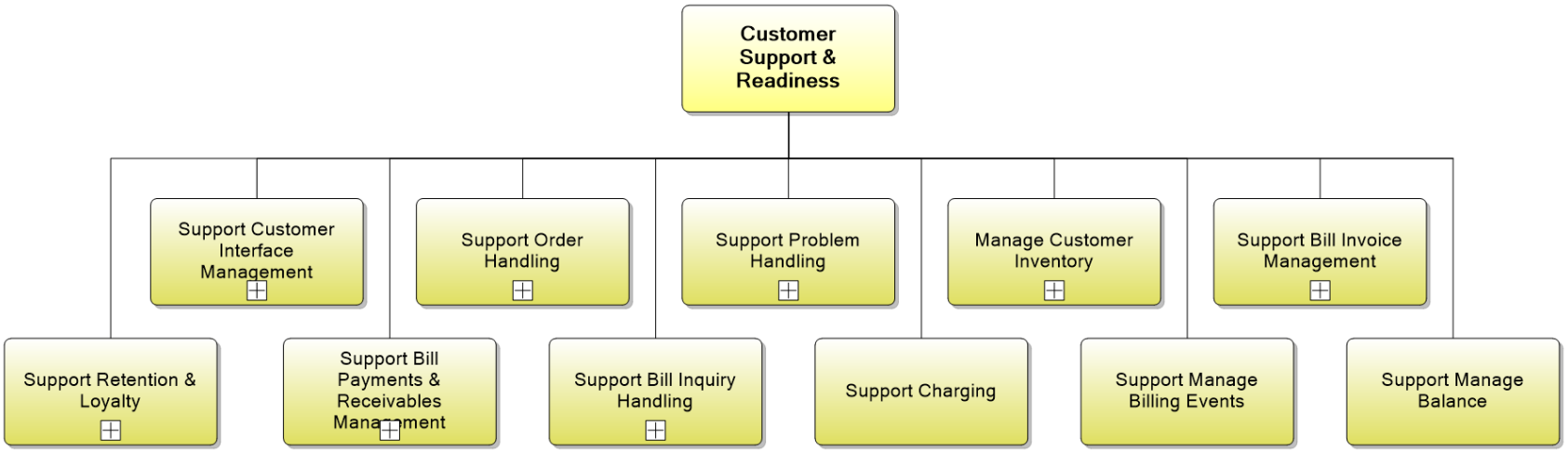


Figure 89: The "Customer Support & Readiness" group of processes (TM Forum, 2016)

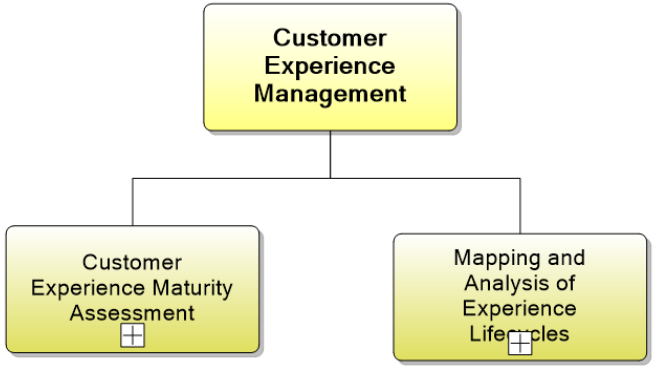


Figure 90: The "Customer Experience Management" group of processes (TM Forum, 2016)

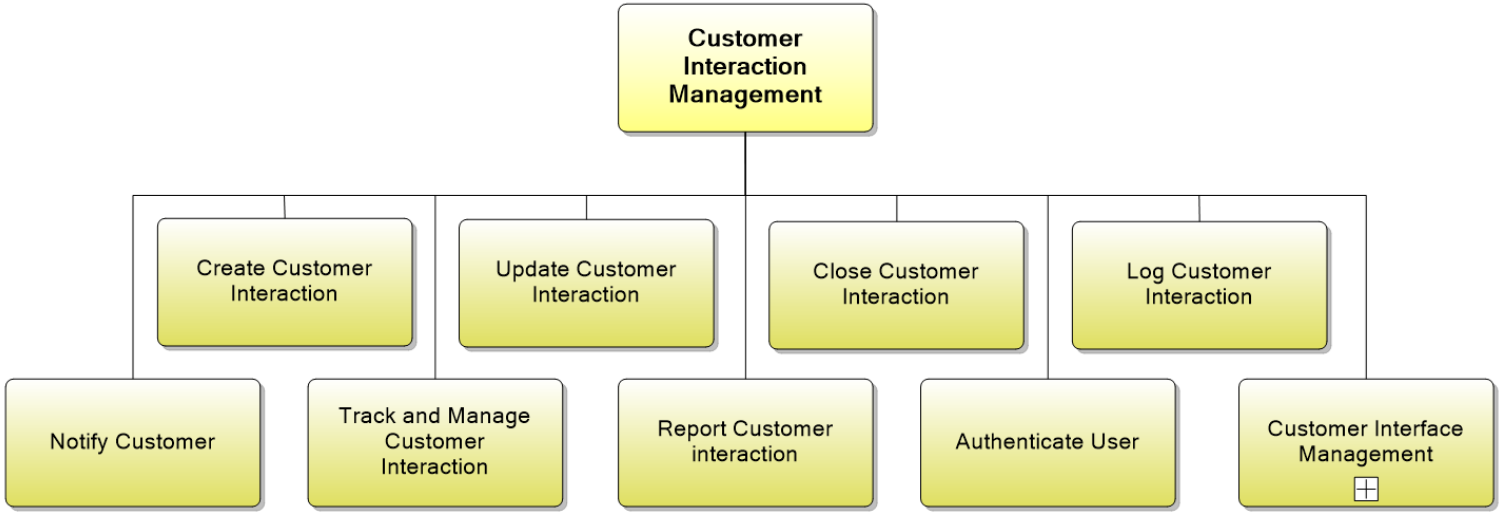


Figure 91: The "Customer Interaction Management" group of processes (TM Forum, 2016)

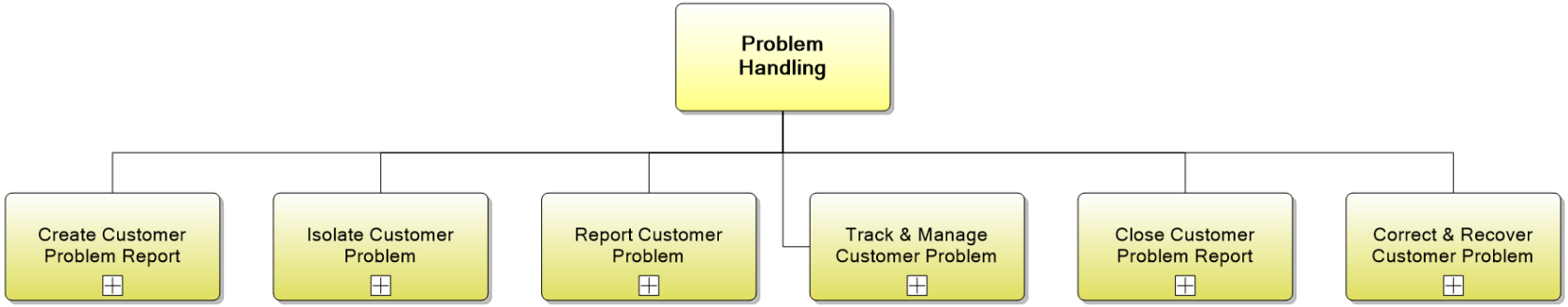


Figure 92: The "Problem Handling" group of processes (TM Forum, 2016)

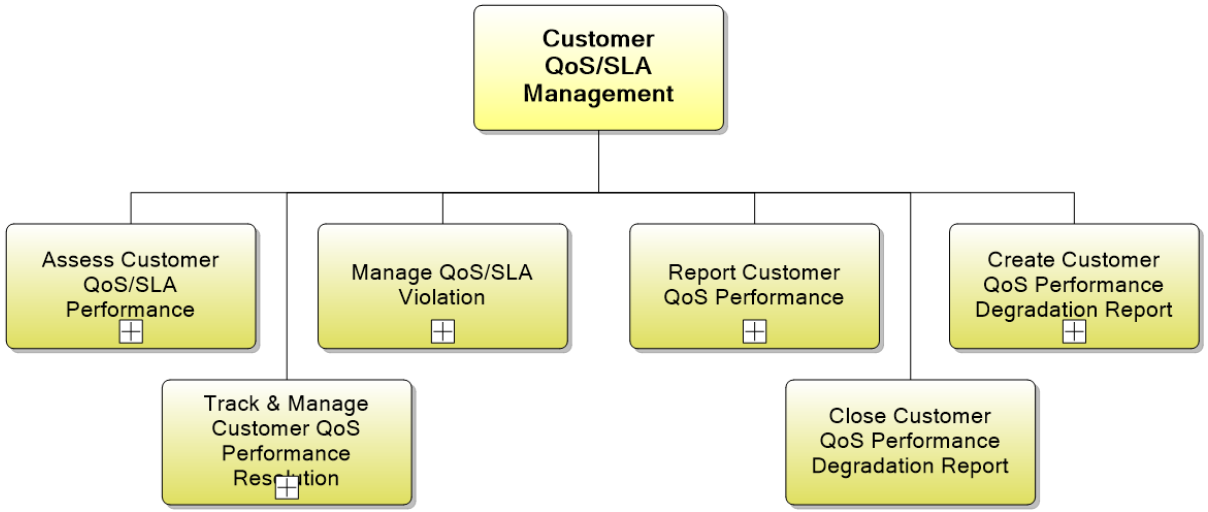


Figure 93: The "Customer QoS/SLA Management" group of processes (TM Forum, 2016)

The rest of the process groups that exist in this domain refer to customer billing. Most of them will be studied in the “Finance” section, one of the support process areas, as this is the part where all the billing processes take place. The ones that will not be studied at all are the balance-related, as they are telecommunications-specific.

4.8.1.3. COBIT

There are three process groups in the COBIT framework that we will study for the “Customer Service” process area. These are: (1) DSS02 - Managed Service Requests and Incidents, (2) DSS03 - Managed Problems and (3) APO11 — Managed Quality. Figure 94-Figure 96 provide an overview of the contents of each group. They contain between five and seven processes, of the 17 in total.

DSS02.01 Define classification schemes for incidents and service requests.
DSS02.02 Record, classify and prioritize requests and incidents.
DSS02.03 Verify, approve and fulfil service requests.
DSS02.04 Investigate, diagnose and allocate incidents.
DSS02.05 Resolve and recover from incidents.
DSS02.06 Close service requests and incidents.
DSS02.07 Track status and produce reports.

Figure 94: "DSS02 - Managed Service Requests and Incidents" group of processes (ISACA, 2018, p.240)

DSS03.01 Identify and classify problems.
DSS03.02 Investigate and diagnose problems.
DSS03.03 Raise known errors.
DSS03.04 Resolve and close problems.
DSS03.05 Perform proactive problem management.

Figure 95: "DSS03 - Managed Problems" group of processes (ISACA, 2018, p.245)

APO11.01 Establish a quality management system (QMS).
APO11.02 Focus quality management on customers.
APO11.03 Manage quality standards, practices and procedures and integrate quality management into key processes and solutions.
APO11.04 Perform quality monitoring, control and reviews.
APO11.05 Maintain continuous improvement.

Figure 96: "APO11 — Managed Quality" group of processes (ISACA, 2018, p.128)

The last group, “APO11 — Managed Quality” refers to quality management. In this process area we will study these processes for the quality of the processes regarding the customer communications and services. However, we will also see the APO11 group in the “Information Technology (IT) & Data” process area, while studying the quality of the product and the services.

4.8.1.4. Oracle

Even though Oracle’s PeopleSoft software doesn’t include a specific “Customer Service” module, there are some relevant processes in the “Order Fulfillment” one (Figure 83 of the “Production” section). The processes that are of interest to us are the ones in the “Authorize Returns” process group, as the returns are part of the customer service experience.

4.8.2. Comparison

We will now move on to compare the frameworks for the “Customer Service” process area (Table 10). PCF was once again used as a base for the comparison.

Table 10: Customer Service frameworks comparison

PCF	eTOM	Oracle		COBIT	
6.1. Develop customer care/customer service strategy	Customer Experience Management	**MISSING**		DSS02 - Managed Service Requests and Incidents	DSS02.01. Define classification schemes for incidents and service requests
6.2. Plan and manage customer service contacts	Customer Interaction Management **(EXTENSIVE)**	Order Fulfillment	Authorize Returns	DSS02 - Managed Service Requests and Incidents	DSS02.02. Record, classify and prioritize requests and incidents
	Problem Handling			DSS03 - Managed Problems	DSS03.01. Identify and classify problems **(CONCISE)**
				APO11 — Managed Quality	APO11.02. Focus quality management on customers
6.3. Service products after sales	Customer QoS/SLA Management **(CONCISE)**	**MISSING**		DSS02 - Managed Service Requests and Incidents	DSS02.03. Verify, approve and fulfill service requests
					DSS02.04. Investigate, diagnose and allocate incidents
					DSS02.05. Resolve and recover from incidents
	Customer Support & Readiness **(EXTENSIVE)**				DSS02.06. Close service requests and incidents
				DSS03 - Managed Problems	DSS03.02. Investigate and diagnose problems
					DSS03.03. Raise known errors **(EXTENSIVE)**
					DSS03.04. Resolve and close problems
				APO11 — Managed Quality	APO11.02. Focus quality management on customers
					APO11.03. Manage quality standards, practices and procedures and integrate quality management into key processes and solutions **(CONCISE)**

6.4. Manage product recalls and regulatory audits	**MISSING**	**MISSING**	**MISSING**	
6.5. Evaluate customer service operations and customer satisfacion	Customer Experience Management	**MISSING**	DSS02 - Managed Service Requests and Incidents	DSS02.07. Track status and produce reports
	Problem Handling **(CONCISE)**		DSS03 - Managed Problems	DSS03.05. Perform proactive problem management
	Customer QoS/SLA Management		APO11 — Managed Quality	APO11.04. Perform quality monitoring, control and reviews
				APO11.05. Maintain continuous improvement **(CONCISE)**
MISSING	Customer QoS/SLA Management	**MISSING**	APO11 — Managed Quality	APO11.01. Establish a quality management system (QMS)

By looking at the comparison we can see that all three models are very detailed regarding the “Customer Support” processes. Let’s take a look at each of them separately.

PCF, with five process groups, has the simplest structure of the frameworks we’ve studied. An interesting observation here is that it includes processes for product recalls and regulatory audits, something we don’t see in any of the other frameworks. The reason for this could be that eTOM is build around telecommunications and COBIT is IT-related, thus neither has a physical product to recall.

Moving on to eTOM, since it has a separate “Customer Domain”, it is very detailed regarding “Customer Service”. It might be concise in some process groups, compared to PCF, but it is important to note that it includes some “Customer Service”-related processes that PCF doesn’t, for example support billing events, balance, billing invoice, charging and more detailed quality management processes.

As far as Oracle is concerned, there are no “Customer Service” related processes but the ones referring to product returns, and more specifically the return authorization.

Last but not least, similarly to eTOM, COBIT is also very detailed in its “Customer Service” process area. The main difference between this framework and PCF is that COBIT contains processes for establishing a quality management system, like eTOM does.

5. Support Process Areas

In this chapter we will discuss the support process areas of the enterprise. Similarly with the previous chapter, each section begins with a definition of the process area that will be studied, followed by the presentation of the frameworks. At the end of each section we will present a comparison made between the frameworks, as well as our conclusions.

5.1. Human Resources (HR)

According to Kenton (2019) “Human resources or HR is the company department charged with finding, screening, recruiting, and training job applicants, and administering employee-benefit programs. As companies reorganize to gain a competitive edge, HR plays a key role in helping companies deal with a fast-changing environment and the greater demand for quality employees”.

Another definition for the HR is “Human Resources is also the function in an organization that deals with the people and issues related to people such as compensation and benefits, recruiting and hiring employees, onboarding employees, performance management, training, and organization development and culture” (Heathfield, 2019).

In this section of the thesis we will present all these processes that belong to the HR department of an enterprise.

5.1.1. Frameworks

All of the frameworks we studied so far have a separate business process category regarding the Human Resources management, which we will now study. In addition to these, three more HR-specific frameworks will be introduced and studied later in this section. In total we will present 10 frameworks, which are: (1) IMM Approach, (2) PCF, (3) SCOR, (4) eTOM, (5) COBIT, (6) HCBRM, (7) Software AG, (8) Signavio, (9) Oracle and (10) SAP.

The frameworks were selected based on their structure, as the analysis and the levels of hierarchy they include offer a common ground based on which a comparison will take place in the following section. For each of the frameworks we provide all the relevant links in the "List of References" section. Any additional links needed will be added as a footnote in the text.

5.1.1.1. Integrated Modeling Method (IMM™)

One of the process areas in the IMM Approach is the "Provide Human Resources". We see that there are four process categories included, as they were demonstrated in Figure 5 in Chapter 3 of the thesis. There categories are: (1) recruit personnel, (2) train personnel, (3) pay personnel and (4) dismiss personnel.

5.1.1.2. APQC's Process Classification Framework (PCF)

The 7th PCF group, "7.0 Develop and Manage Human Capital", contains nine process categories as shown in Figure 97. These categories are: (1) develop and manage human resources planning, policies and strategies, (2) recruit, source and select employees, (3) manage employee on boarding, development and training, (4) manage employee relations, (5) reward and retain employees, (6) redeploy and retire employees, (7) manage employee information and analytics, (8) manage employee communication and (9) deliver employee communications.

Each of these categories includes between zero and seven processes on third level analysis. In general, PCF's Develop and Manage Human Capital group contains 134 processes.

APQC provides further details and a description for every process in the Excel file of the framework.

7.0 Develop and Manage Human Capital (10007)

7.1 Develop and manage human resources planning, policies, and strategies (17043)

- 7.1.1 Develop human resources strategy (20958)
  - 7.1.1.1 Identify strategic HR needs (10418)
  - 7.1.1.2 Define HR and business function roles and accountability (10419)
  - 7.1.1.3 Determine HR costs (10420)
  - 7.1.1.4 Establish HR measures (10421)
  - 7.1.1.5 Communicate HR strategies (10422)
  - 7.1.1.6 Develop strategy for HR systems/technologies/ tools (10432)
  - 7.1.1.7 Manage employer branding (20606)
- 7.1.2 Develop and implement workforce strategy and policies (17045)
  - 7.1.2.1 Gather skill requirements according to corporate strategy and market environment (10423)
  - 7.1.2.2 Plan employee resourcing requirements per business unit/organization (10424)
  - 7.1.2.3 Develop compensation plan (10425)
    - 7.1.2.3.1 Establish incentive plan (10210)
  - 7.1.2.4 Develop succession plan (10426)
  - 7.1.2.5 Develop high performers/leadership programs (16938)
  - 7.1.2.6 Develop employee diversity plan (10427)
  - 7.1.2.7 Develop training program (11622)
  - 7.1.2.8 Develop recruitment program (11623)
  - 7.1.2.9 Develop other HR programs (10428)
  - 7.1.2.10 Develop HR policies (10429)
  - 7.1.2.11 Administer HR policies (10430)
  - 7.1.2.12 Plan employee benefits (10431)
  - 7.1.2.13 Develop workforce strategy models (10433)
  - 7.1.2.14 Implement workforce strategy models (20122)
- 7.1.3 Monitor and update strategy, plans, and policies (10417)
  - 7.1.3.1 Measure realization of objectives (10434)
  - 7.1.3.2 Measure contribution to business strategy (10435)
  - 7.1.3.3 Communicate plans and provide updates to stakeholders (10436)
  - 7.1.3.4 Review and revise HR plans (10438)
- 7.1.4 Develop competency management models (17046)

7.2 Recruit, source, and select employees (10410)

- 7.2.1 Manage employee requisitions (10439)
  - 7.2.1.1 Align staffing plan to work force plan and business unit strategies/resource needs (10445)
  - 7.2.1.2 Develop and maintain job descriptions (10447)
  - 7.2.1.3 Open job requisitions (10446)
  - 7.2.1.4 Post job requisitions (10448)
  - 7.2.1.5 Modify job requisitions (10450)
  - 7.2.1.6 Notify hiring manager (10451)
  - 7.2.1.7 Manage requisition dates (10452)
- 7.2.2 Recruit/Source candidates (10440)
  - 7.2.2.1 Determine recruitment methods and channels (10453)
  - 7.2.2.2 Perform recruiting activities/events (10454)
  - 7.2.2.3 Manage recruitment vendors (10455)
  - 7.2.2.4 Manage employee referral programs (17047)
  - 7.2.2.5 Manage recruitment channels (17048)
- 7.2.3 Screen and select candidates (20123)
  - 7.2.3.1 Identify and deploy candidate selection tools (10456)
  - 7.2.3.2 Interview candidates (10457)
  - 7.2.3.3 Test candidates (10458)
  - 7.2.3.4 Select and reject candidates (10459)
- 7.2.4 Manage new hire/re-hire (10443)
  - 7.2.4.1 Draw up and make offer (10463)
  - 7.2.4.2 Negotiate offer (10464)
  - 7.2.4.3 Hire candidate (10465)
- 7.2.5 Manage applicant information (10444)
  - 7.2.5.1 Obtain candidate background information (10460)
  - 7.2.5.2 Create applicant record (10466)
  - 7.2.5.3 Manage/track applicant data (10467)
    - 7.2.5.3.1 Complete position classification and level of experience (20124)
  - 7.2.5.4 Archive and retain records of non-hires (10468)

7.3 Manage employee on boarding, development, and training (20599)

- 7.3.1 Manage employee orientation and deployment (10469)
  - 7.3.1.1 Create/maintain employee on-boarding program (10474)
    - 7.3.1.1.1 Develop employee induction program (10477)
    - 7.3.1.1.2 Maintain/Update employee induction program (10478)
  - 7.3.1.2 Evaluate the effectiveness of the employee on-boarding program (11243)
  - 7.3.1.3 Execute on-boarding program (17050)
- 7.3.2 Manage employee performance (10470)
  - 7.3.2.1 Define employee performance objectives (10479)
  - 7.3.2.2 Review, appraise, and manage employee performance (10480)
  - 7.3.2.3 Evaluate and review performance program (10481)
- 7.3.3 Manage employee development (10472)
  - 7.3.3.1 Define employee development guidelines (10487)
  - 7.3.3.2 Develop employee career plans and career paths (10488)
  - 7.3.3.3 Manage employee skill and competency development (17051)

7.3.4 Develop and train employees (10473)
- 7.3.4.1 Align employee with organization development needs (10490)
- 7.3.4.2 Define employee competencies (16940)
- 7.3.4.3 Align learning programs with competencies (10491)
- 7.3.4.4 Establish training needs by analysis of required and available skills (10492)
- 7.3.4.5 Develop, conduct, and manage employee and/or management training programs (10493)
- 7.3.4.6 Manage examinations and certifications (20125)
  - 7.3.4.6.1 Liaise with external certification authorities (20126)
  - 7.3.4.6.2 Administer certification tests (20127)
  - 7.3.4.6.3 Appraise experience qualifications (20128)
  - 7.3.4.6.4 Administer certificate issue and maintenance (20129)

7.4 Manage employee relations (17052)

- 7.4.1 Manage labor relations (10483)
- 7.4.2 Manage collective bargaining process (10484)
- 7.4.3 Manage labor management partnerships (10485)
- 7.4.4 Manage employee grievances (10531)

7.5 Reward and retain employees (10412)

- 7.5.1 Develop and manage reward, recognition, and motivation programs (10494)
  - 7.5.1.1 Develop salary/compensation structure and plan (10498)
  - 7.5.1.2 Develop benefits and reward plan (10499)
  - 7.5.1.3 Perform competitive analysis of benefit and rewards (10500)
  - 7.5.1.4 Identify compensation requirements based on financial, benefits, and HR policies (10501)
  - 7.5.1.5 Administer compensation and rewards to employees (10502)
  - 7.5.1.6 Reward and motivate employees (10503)
- 7.5.2 Manage and administer benefits (10495)
  - 7.5.2.1 Deliver employee benefits program (10504)
  - 7.5.2.2 Administer benefit enrollment (10505)
  - 7.5.2.3 Process claims (10506)
  - 7.5.2.4 Perform benefit reconciliation (10507)
- 7.5.3 Manage employee assistance and retention (10496)
  - 7.5.3.1 Deliver programs to support work/life balance for employees (10508)
  - 7.5.3.2 Develop family support systems (10509)
  - 7.5.3.3 Review retention and motivation indicators (10510)
  - 7.5.3.4 Review compensation plan (10511)
- 7.5.4 Administer payroll (10497)

7.6 Redeploy and retire employees (10413)

- 7.6.1 Manage promotion and demotion process (10512)
- 7.6.2 Manage separation (10513)
- 7.6.3 Manage retirement (10514)
- 7.6.4 Manage leave of absence (10515)
- 7.6.5 Develop and implement employee outplacement (10516)
- 7.6.6 Manage workforce scheduling (20132)
  - 7.6.6.1 Receive required resources/skills and capabilities (20133)
  - 7.6.6.2 Manage resource deployment (10517)
- 7.6.7 Relocate employees and manage assignments (17055)
  - 7.6.7.1 Manage expatriates (10520)

7.7 Manage employee information and analytics (17056)

- 7.7.1 Manage reporting processes (10522)
- 7.7.2 Manage employee inquiry process (10523)
- 7.7.3 Manage and maintain employee data (10524)
- 7.7.4 Manage human resource information systems HRIS (10525)
- 7.7.5 Develop and manage employee metrics (10526)
- 7.7.6 Develop and manage time and attendance systems (10527)
- 7.7.7 Manage/Collect employee suggestions and perform employee research (10530)

7.8 Manage employee communication (17057)

- 7.8.1 Develop employee communication plan (10529)
- 7.8.2 Conduct employee engagement surveys (16944)

7.9 Deliver employee communications (10532)

Figure 97: 7.0 Develop and Manage Human Capital (APQC, 2018, p.16-17)

5.1.1.3. SCOR

The SCOR model has all the “Human Resources”-related processes in the “Enable” category. The group “sE4 – Manage Supply Chain Human Resources” is the one that is of interest to us in this section, as it includes all the processes needed to manage

the human capital in a supply chain model. Figure 98 shows the six processes included.

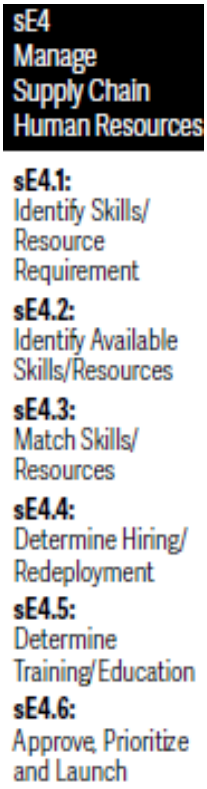


Figure 98: The process groups included in the "sE4 – Manage Supply Chain Human Resources" (APICS, 2017, p.3)

As we already mentioned, there is a section in SCOR called "People", which is divided into three smaller sections: (1) skills, (2) experience and (3) training. It doesn't include any processes, but all employee characteristics that are essential in order to perform them.

5.1.1.4. Business Process Framework (eTOM)

Moving on to the Business Process Framework (eTOM) and the "Human Resources Management" category of the enterprise domain, we see that on a second level analysis there are five groups of processes, which are: (1) HR policies and practices, (2) organization development, (3) workforce strategy, (4) workforce development and (5) employee and labor relations management. Figure 99 provides an overview of this category and Figure 100-Figure 103 demonstrate the contents of each process

group, when this information is provided. We can see that each of these five groups of includes between zero and nine processes, of the 22 in total.

Figure 99: The "Human Resources Management" category of the eTOM framework (TM Forum, 2016)

Figure 100: The "HR Policies & Practices" group of processes (TM Forum, 2016)

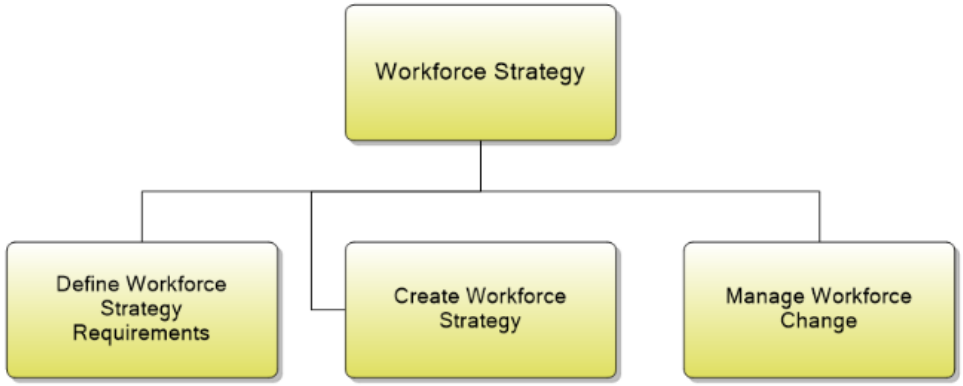


Figure 101: The "Workforce Strategy" group of processes (TM Forum, 2016)

Figure 102: The "Workforce Development" group of processes (TM Forum, 2016)

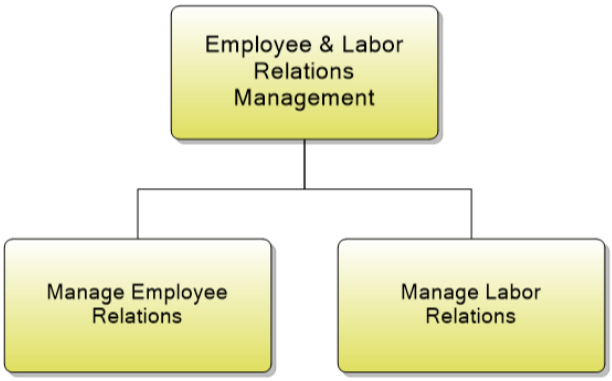


Figure 103: The "Employee & Labor Relations Management" group of processes (TM Forum, 2016)

There is also one more category that refers to the human resources management, which is called "Workforce Management", and it is in the "Resource Domain" (Figure 104). This category includes processes regarding the workforce schedule, for instance working hour, work assignments and appointments. Figure 105-Figure 108 provide an overview of the contents of each group, where this information is provided.

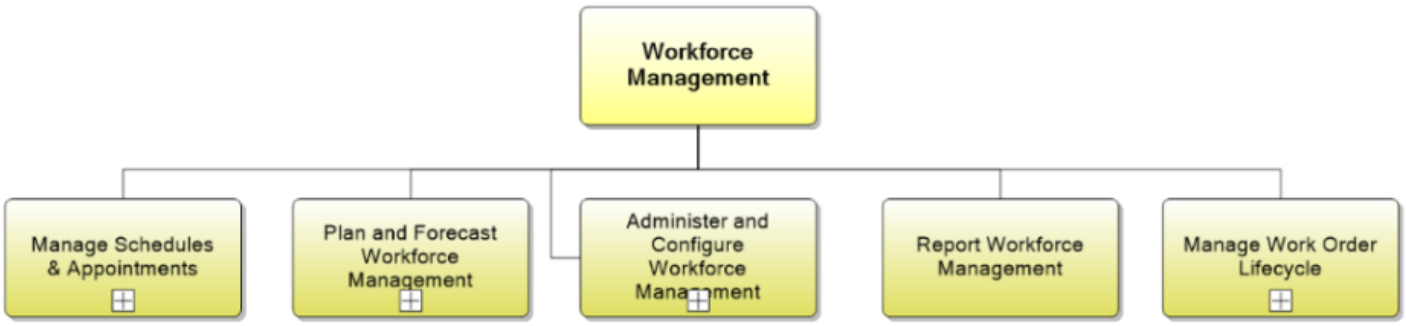


Figure 104: The Workforce Management group of processes (TM Forum, 2016)

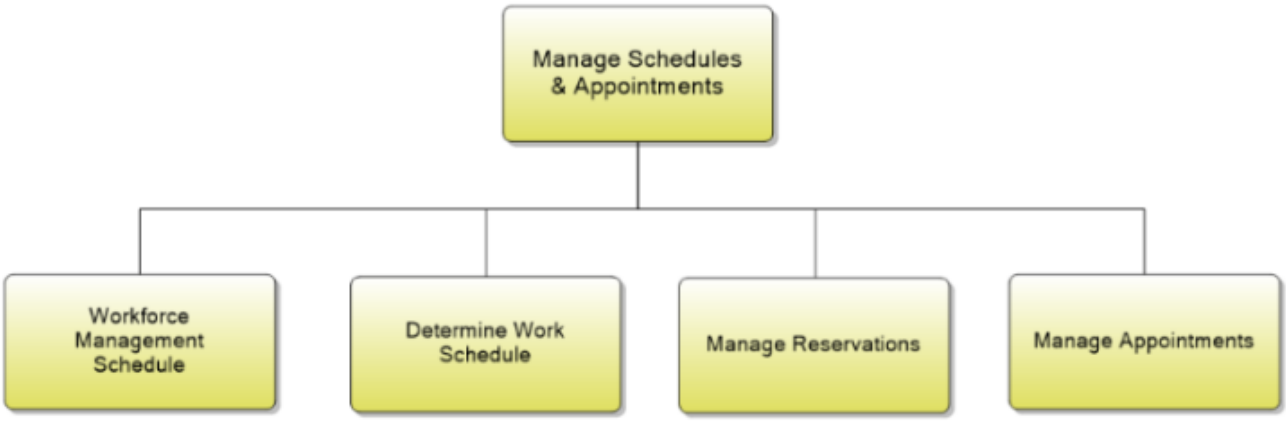


Figure 105: The "Manage Schedules & Appointments" group of processes (TM Forum, 2016)

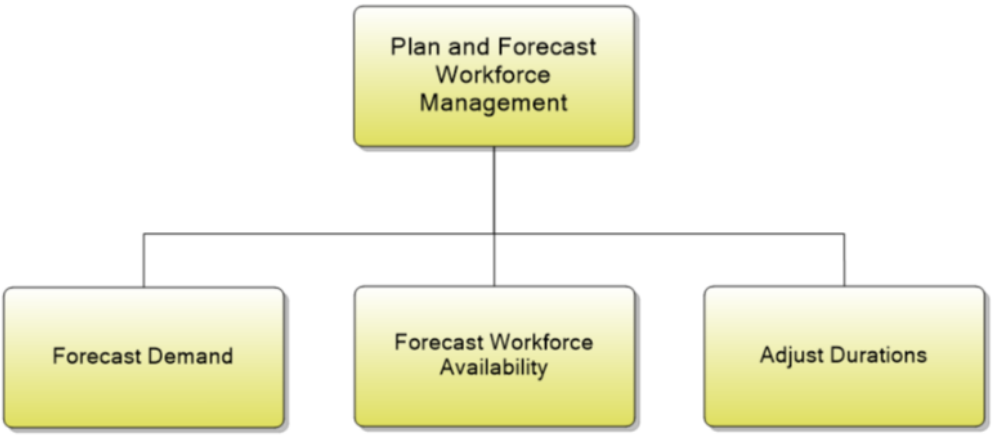


Figure 106: The "Plan and Forecast Workforce Management" group of processes (TM Forum, 2016)

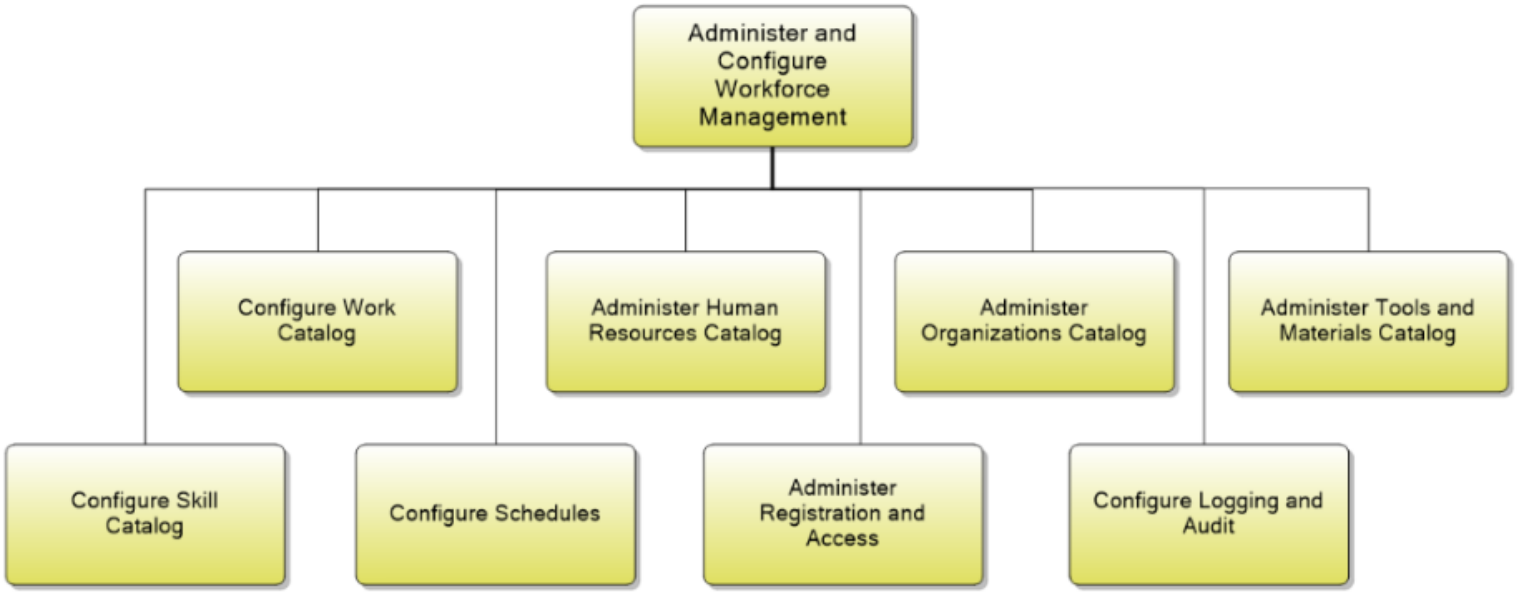


Figure 107: The "Administer and Configure Workforce Management" group of processes (TM Forum, 2016)

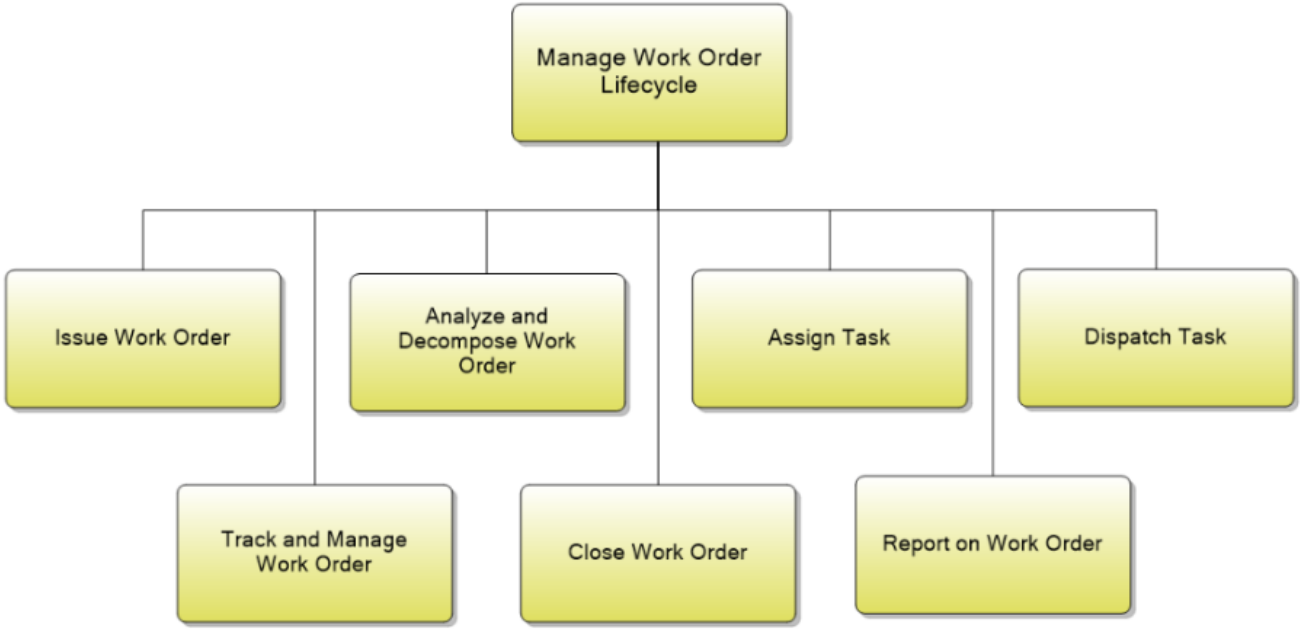


Figure 108: The "Manage Work Order Lifecycle" group of processes (TM Forum, 2016)

In the TM forum's tool for studying the eTOM framework one can find further information and details for the contents of each process group. The link of this tool is provided in the "List of References" section.

5.1.1.5. COBIT

The COBIT framework is the most complex one that we've seen so far. We will focus on two groups of processes for studying the HR area. The first one is from the Align, Plan & Organize (APO) domain, the "APO07 – Managed Human Resources" group of processes, that contains all the processes that are of interest to us in this section of the thesis. Figure 109 demonstrates the processes included in the APO07 on a second level analysis.

Key Management Practice
APO07.01 Acquire and maintain adequate and appropriate staffing.
APO07.02 Identify key IT personnel.
APO07.03 Maintain the skills and competencies of personnel.
APO07.04 Assess and recognize/reward employee job performance.
APO07.05 Plan and track the usage of IT and business human resources.
APO07.06 Manage contract staff.

Figure 109: "APO07 – Managed Human Resources" group of processes (ISACA, 2018, p.102)

The second group we will study is from the Evaluate, Direct & Monitor (EDM) domain of the model, titled "EDM04 - Ensured Resource Optimization". This group includes processes that determine the effective use of the available resources. As shown in Figure 110, it includes three processes on a second level analysis. These processes refer to both human and financial resources.

Key Governance Practice
EDM04.01 Evaluate resource management.
EDM04.02 Direct resource management.
EDM04.03 Monitor resource management.

Figure 110: "EDM04 - Ensured Resource Optimization" group of processes (ISACA, 2018, p.47)

5.1.1.6. Human Capital Business Reference Model (HCBRM)

The Human Capital Business Reference Model (HCBRM) was developed in 2017 by HR policy and industry experts on behalf of the United States Office of Personnel Management. The main goal of the model is to establish a common experience for all employees concerning the delivery of HR operations and services. As every business process model does, HCBRM provides a common language for all HR operations (Washington DC, United States Office of Personnel Management, 2017).

As shown in Figure 111, HCBRM has four function categories, which are: (1) government-wide, (2) enabling, (3) employee lifecycle and (4) supporting. These functions include 15 process groups.

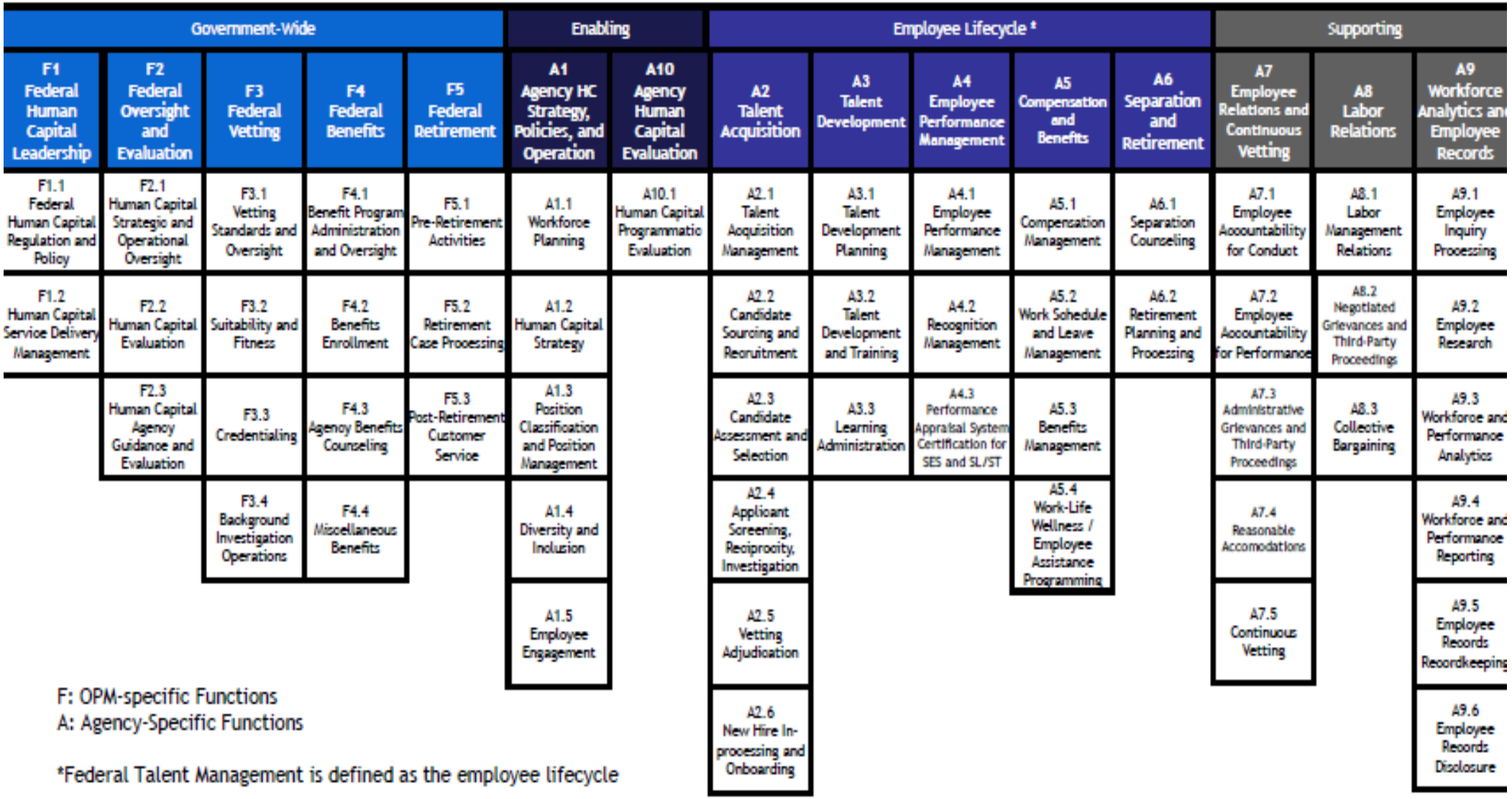


Figure 111: HCBRM model overview (United States Office of Personnel Management, 2017)

The government-wide functions are of no interest to us at this point, as they refer to strategies and policies followed by the government. We will study 10 process groups, A1- A10, as shown in Figure 112. These process groups include between one and six process sub-groups, of the 38 in total.

Figure 112: The HCBRM model (United States Office of Personnel Management, 2017)

5.1.1.7. Software AG

Software AG is the second largest software company in Germany and the seventh largest in Europe. Founded in 1969, it has over 10,000 enterprise customers in over 70 countries. Having more than 50 years of experience, they developed their own business process framework.

According to Brooks and Garcia (2008), Software's AG executives, the central HR processes are: (1) new employee recruitment, (2) employee onboarding and (3) performance management, as shown in Figure 113, which is a framework that could be useful in the HR approach of this thesis. The most important process here, as the writers suggest, is the employee onboarding, as it is the process linking recruitment of new hires to productive roles within an organization.

Figure 113: The central HR processes, according to Software AG (Brooks & Garcia, 2008)

More precisely, the processes that refer to employee onboarding are divided into four groups. The first one (Pre-hire) includes the processes that take place before hiring the new employee, from the time an offer is made to the employee up until the moment it is accepted. This triggers the second group of processes (New hire), which includes all the processes that take place until the employee is ready to begin their first day on the job, for instance the assignment of an office and equipment. The third group (Provisional employment) includes all the processes that take place during the first period of time the employee works in the company and, last but not least, the fourth group (Vesting) includes all the processes that take place when the employee onboarding is at the end and their evaluation begins. Figure 114 provides an overview of the employee onboarding process.

Figure 114: Employee Onboarding process phase (Brooks & Garcia, 2008)

Brooks and Garcia (2008) also suggest that the same steps, but in reverse, could be used in the employee off-boarding process, as the tasks that would take place in such a case would be the same.

Regarding the other two central HR processes, new employee recruitment and performance management, we were not able to come across any more information about the tasks they include, thus they will not be referred to.

5.1.1.8. Signavio

Signavio is a software company, founded in 2009 by Gero Decker, Torben Schreiter, Nicolas Peters, Willi Tscheschner and Mathias Weske, in Germany. Its main product is Signavio Process Manager, a business process modeling online tool. Signavio has developed its own proposals for business process management as examples.

Figure 115 shows an overview of their proposal for the Human Resources Management, on a second level analysis. We can see that there are three process groups in the "Human Resources" category, which are: (1) employee recruitment, (2) employee development and (3) employee redundancy and discharge. Each of these groups includes between one and four process sub-groups on a second level analysis, of the 10 in total.

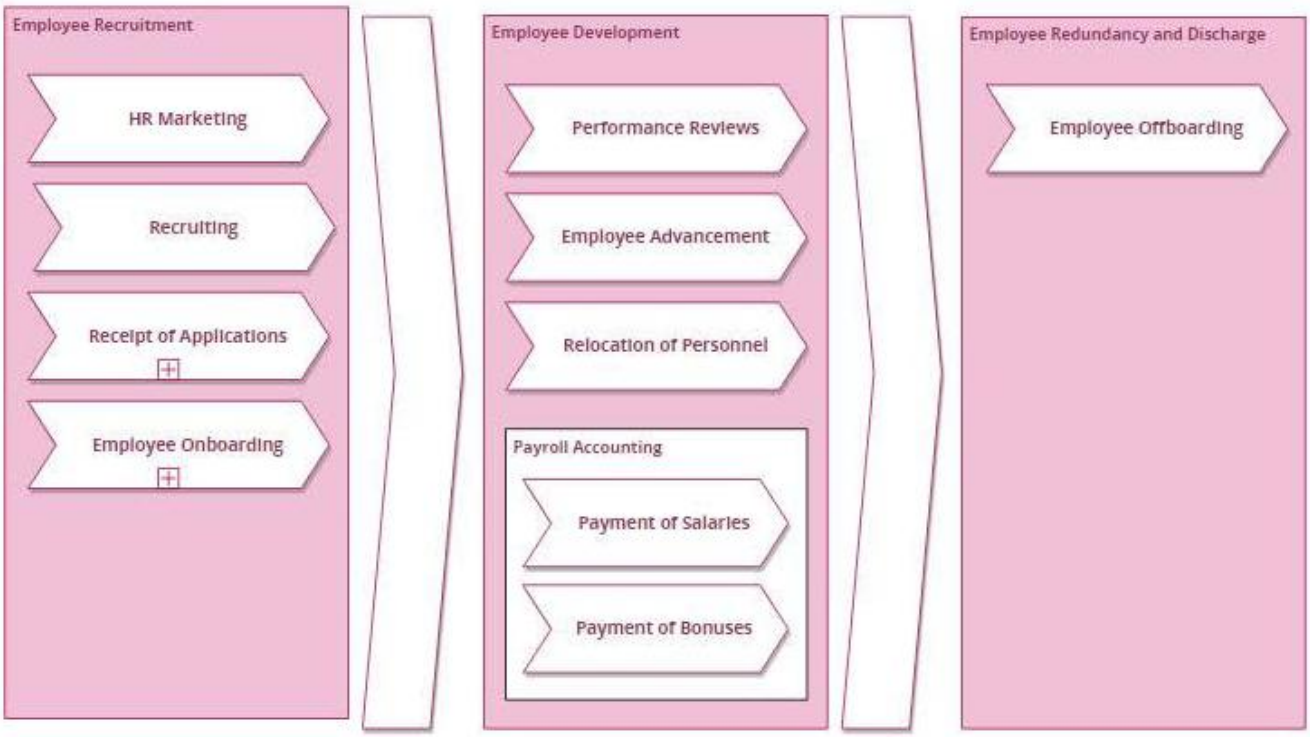


Figure 115: Signavio's Human Resources Management (Signavio, 2019)

We can see that there is also a "Payroll Accounting" process group, with processes regarding the payment of salaries and bonuses. This group will also be studied in the "Finance" section, with all the other accounting processes.

5.1.1.9. Oracle

As it was mentioned in the previous chapter of this thesis, Oracle offers a human capital management (HCM) system in the PeopleSoft latest version, 9.2. Instead of using and presenting the process map documentation of the 12th process category (staffing) of the FSCM PeopleSoft system, we will use the process map of this HCM PeopleSoft system[23], as it refers specifically and exclusively to human resources and thus the processes included are more detailed than the FSCM ones.

As Figure 116 demonstrates, there are four process categories that refer to the management of human resources. These are: (1) recruiting, (2) deployment, (3) development and (4) reward.

Figure 116: PeopleSoft Human Capital Management 9.2 process map (Oracle, 2019)

On a second level analysis, these four process categories include between four and seven groups of processes, of the 23 in total (Figure 117).

[23] https://docs.oracle.com/cd/F17865_01/hcm92pbr30/eng/hcm/index.html (Accessed 14 May 2019)

Figure 117: The processes included in the HCM PeopleSoft software, version 9.2 (Oracle, 2019)

5.1.1.10. SAP

As it was mentioned in the chapter of the first-level analysis, SAP ERP is consisted of different modules, which are hosted on the same database. The Human Resources (HR) module is the one of interest in this section, as it includes all the processes and tasks for the personnel recruitment, time management and evaluation. More precisely, the most important process categories of the HR module according to Tatsiopoulos and Chatzigiannakis (2008) are: (1) personnel management, (2) time management, (3) personnel development, (4) organization management, (5) training and event management, (6) recruitment, (7) personnel cost planning and (8) employee self-service, and according to Giannadakis (2017) these categories are: (1)

organizational management, (2) personnel administration, (3) recruitment time management, (4) management personnel cost, (5) planning budget, (6) payroll benefits compensation, (7) personnel management, (8) development training & event management and (9) travel management.

As stated in the previous section, SAP offers a variety of solution packages in the latest version, SAP S/4HANA, of the ERP software. As far as human resources management is concerned, there are 15 available solution packages[24], as shown in Figure 118. Most of these packages offer solutions for specific HR functions, with SAP's SuccessFactors software. These functions include service centre management, payroll management, compensation management, performance evaluation management and learning management. Other solution packages focus on data migration between systems.

What is more, it should be noted that the HR SAP module and the processes it contains are very country-specific, as there are different laws in every country regarding the employment, the taxes and the benefits (Hernandez, 1999). For this reason, SAP offers solution packages for specific regions, like United Arab Emirates.

Many companies, that now begin to use SAP ERP software, choose to implement some of the rapid-deployment solution packages, as these solutions are easier to implement, the results are direct and the return on investment (ROI) is higher (Chatzis, 2006).

[24] https://rapid.sap.com/bp/#/browse/categories/lines_of_business/areas/human_resources (Accessed 16 May 2019)

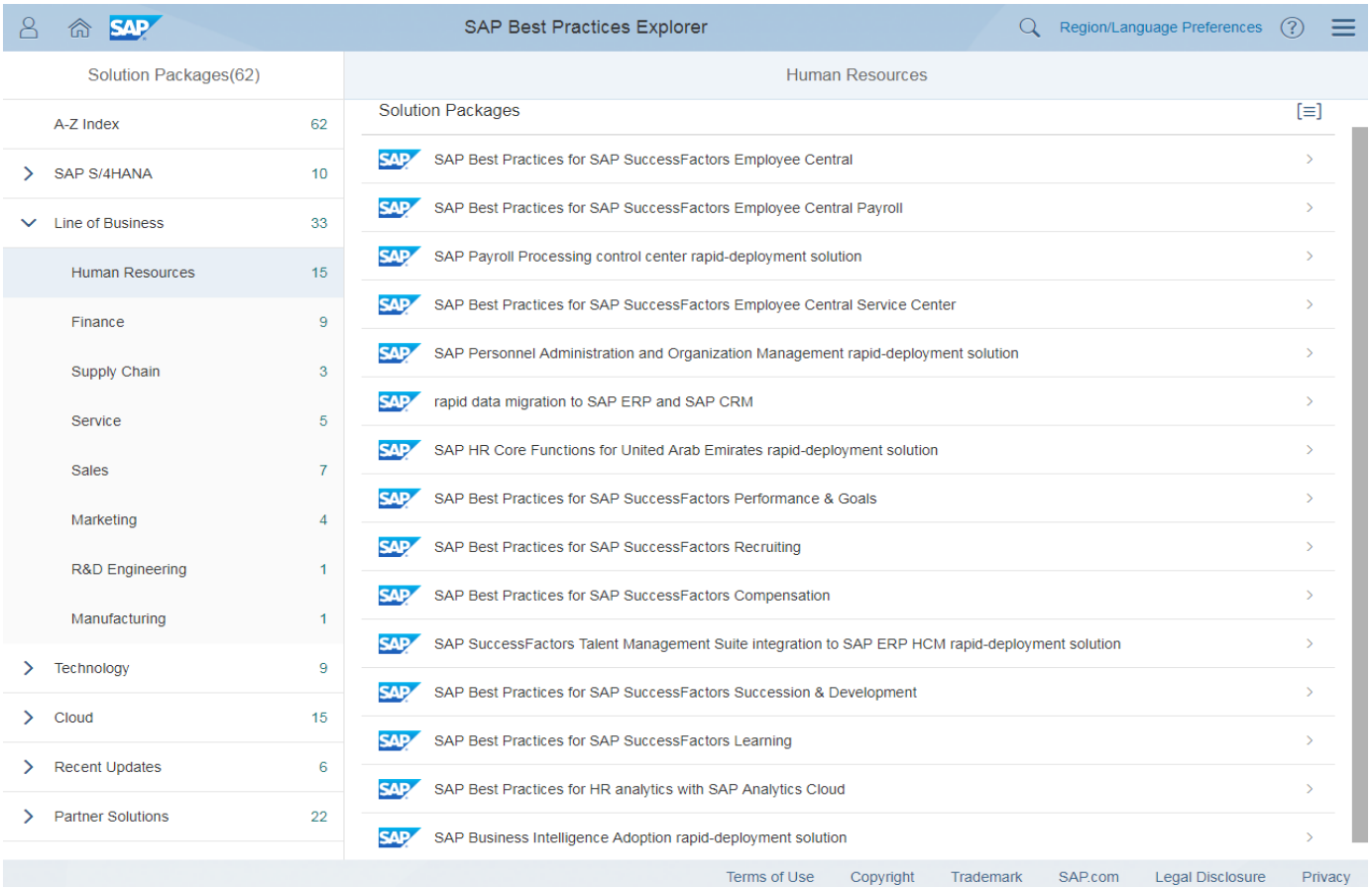


Figure 118: SAP's "Human Resources" solution packages (SAP, 2019)

The SAP Best Practices for SAP SuccessFactors Employee Central[25] is the SAP solution for the basic HR processes, thus this is the solution package we will use for this study. As shown in Figure 119, there are six HR process categories, which are: (1) HR administration, (2) time & attendance management, (3) organizational data management, (4) global mobility, (5) contingent workforce management and (6) integration. These categories include 17 processes in total.

[25] https://rapid.sap.com/bp/BP_SFSF_EC (Accessed 11 April 2019)

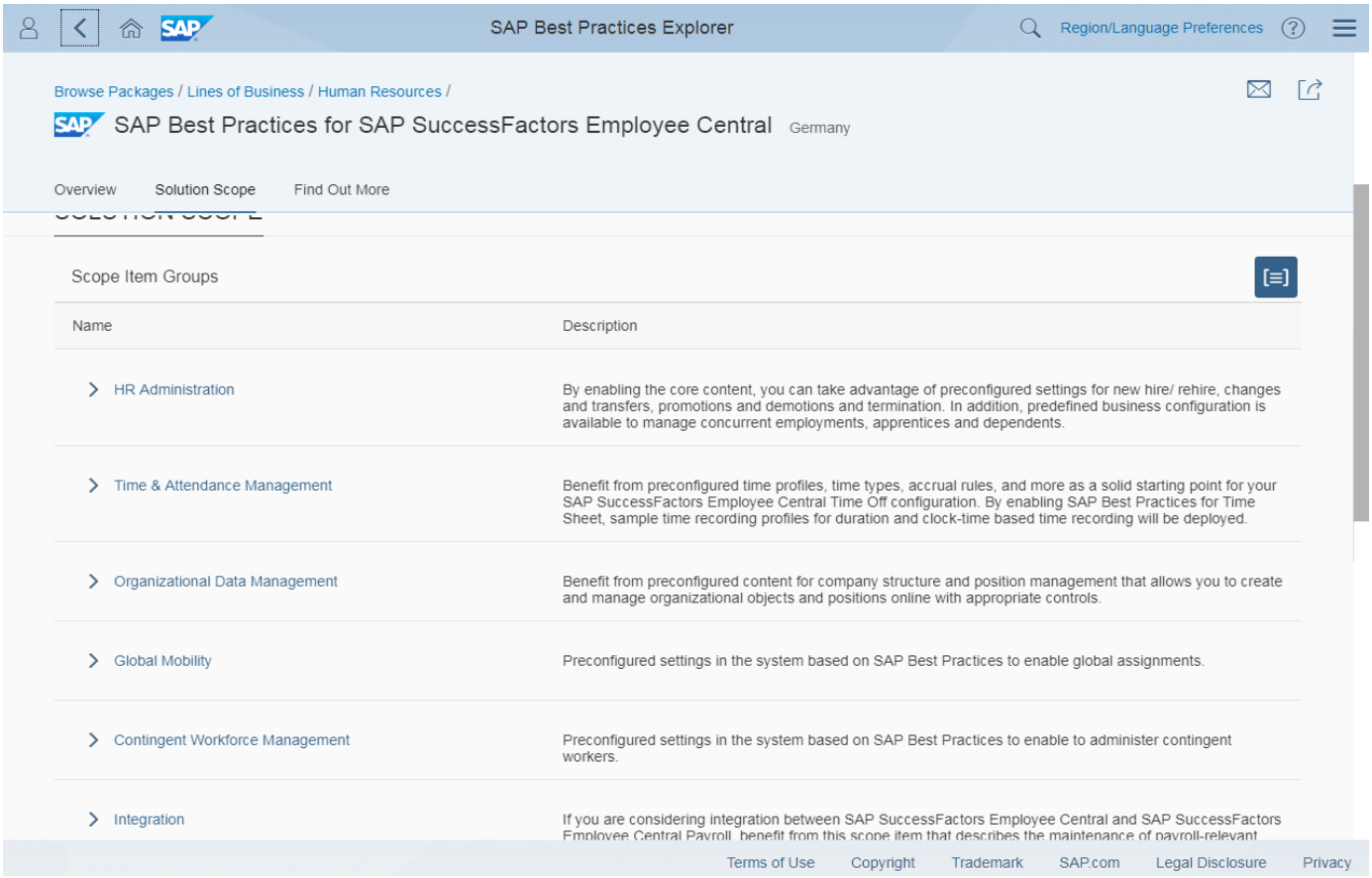


Figure 119: "SAP Best Practices for SAP SuccessFactors Employee Central" solution package (SAP, 2019)

The last category (integration) refers to another solution package that was mentioned before, the SAP Best Practices for SAP SuccessFactors Employee Central Payroll[26]. As shown in Figure 120, this package includes three process categories, which are: (1) HR basic transaction, (2) time management and (3) payroll processing. These categories include 12 processes in total, seven of which are included in the previous package and five are introduced in this one for the first time.

[26] https://rapid.sap.com/bp/BP_SFSF_PY (Accessed 11 April 2019)

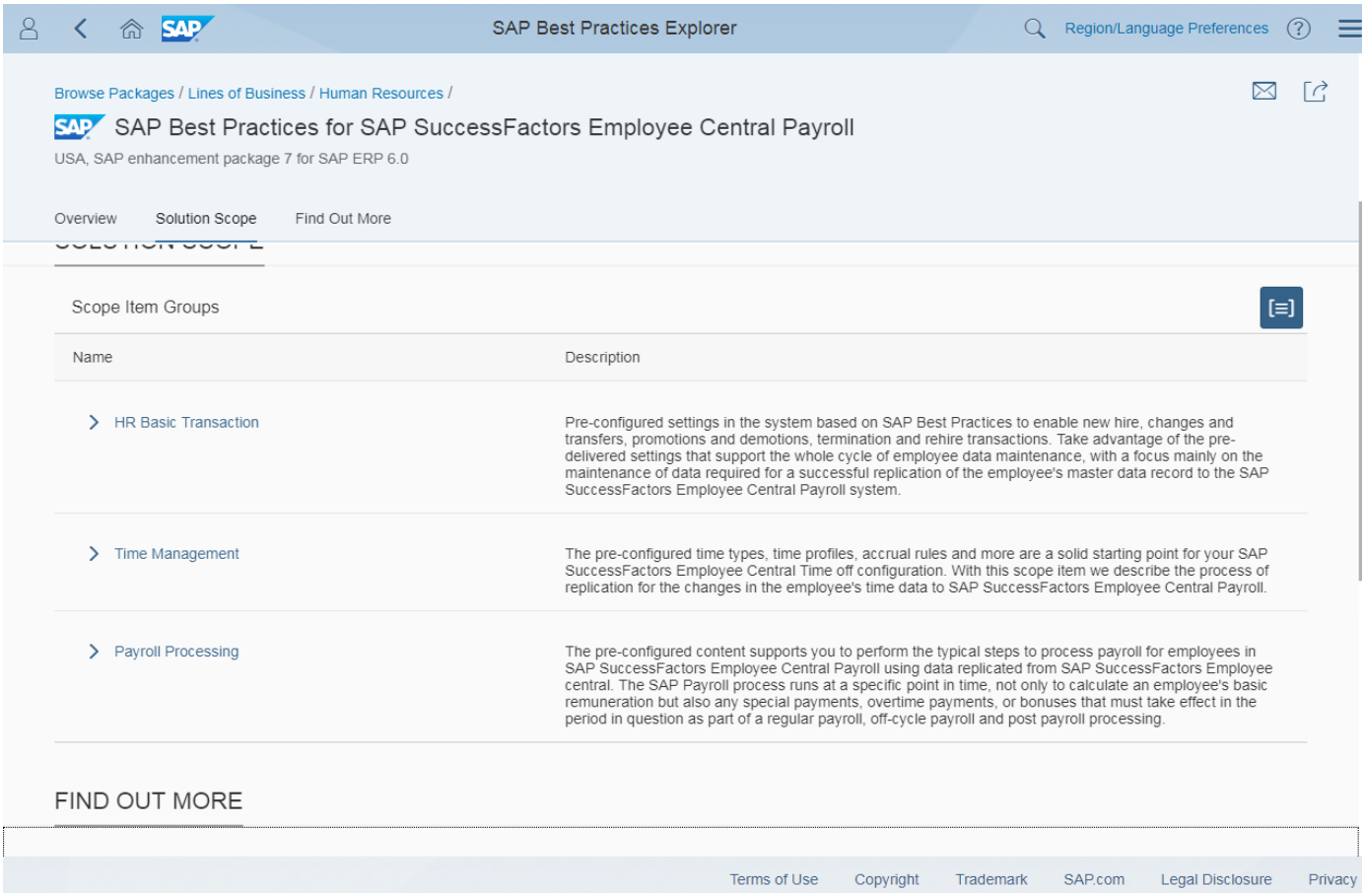


Figure 120: "SAP Best Practices for SAP SuccessFactors Employee Central Payroll" solution package (SAP, 2019)

5.1.2. Comparison

We will now compare the frameworks we studied. We will use PCF as a base for the comparison, as it is the most detailed framework we studied and the most widely known and used by enterprises. The comparison is presented in Table 11.

Table 11: Human Resources frameworks comparison

PCF	IMM	SCOR	eTOM	COBIT		HCBRM	Software AG	Signavio	Oracle	SAP
7.1. Develop and manage human resources planning, policies, and strategies **(EXTENSIVE)**	**MISSING**	sE4.1. Identify skills/ resource requirement	1.2. Organization Development **(CONCISE)**	APO07. Managed Human Resources	APO07.01. Acquire and maintain adequate and appropriate staffing	A1. Agency HC Strategy, Policies and Operation Plan	**MISSING**	Employee Recruitment **(CONCISE)**	3. Development **(CONCISE)**	3. Organizational Data Management **(CONCISE)**
			1.3. Workforce Strategy **(CONCISE)**	EDM04. Ensured Resource Optimization	EDM04.01. Evaluate resource management **(CONCISE)**					
7.2. Recruit, source, and select employees	1. Recruit	sE4.2. Identify available skills/ resources **(EXTENSIVE)**	1.1. HR Policies & Practices	APO07. Managed Human Resources	APO07.01. Acquire and maintain adequate and appropriate staffing	A2. Talent Acquisition **(IDENTICAL)**	1. New Employee Recruitment	Employee Recruitment	1. Recruiting	1. HR Administration
					APO07.02. Identify key IT personnel					
					APO07.03. Maintain skills and competencies of personnel					
		sE4.3. Match skills/ resources **(EXTENSIVE)**	1.2. Organization Development	EDM04. Ensured Resource Optimization	EDM04.02. Direct resource management **(CONCISE)**					3. Organizational Data Management
		sE4.4. Determine hiring/ redeployment	1.3. Workforce Strategy							5. Contingent Workforce Management

PCF	IMM	SCOR	eTOM	COBIT		HCBRM	Software AG	Signavio	Oracle	SAP
7.3. Manage employee on boarding, development, and training **(EXTENSIVE)**	2. Train	sE4.5. Determine training/ education	1.4. Workforce Development	APO07. Managed Human Resources	APO07.02. Identify key IT personnel	A2. Talent Acquisition	2. Employee Onboarding **(EXTENSIVE)**	Employee Recruitment	3. Development	1. HR Administration
					APO07.03. Maintain skills and competencies of personnel	A3. Talent Development				
					APO07.04. Assess and recognize/ reward employee job performance					
		sE4.6. Approve, prioritize and launch		EDM04. Ensured Resource Optimization	EDM04.03. Monitor resource management **(CONCISE)**	A4. Employee Performance Management		Employee Development		
						A10. Agency Human Capital Evaluation				
7.4. Manage employee relations	**MISSING**	**MISSING**	1.5. Employee & Labor Relations Management **(IDENTICAL)**	**MISSING**		A7. Employee Relations and Continuous Vetting **(EXTENSIVE)**	**MISSING**	**MISSING**	**MISSING**	**MISSING**
						A8. Labor Relations				
7.5. Reward and retain employees **(EXTENSIVE)**	3. Pay	**MISSING**	1.1. HR Policies & Practices	APO07. Managed Human Resources	APO07.01. Acquire and maintain adequate and appropriate staffing	A4. Employee Performance Management **(CONCISE)**	**MISSING**	Payroll Accounting	2. Deployment	6. Integration

PCF	IMM	SCOR	eTOM	COBIT		HCBRM	Software AG	Signavio	Oracle	SAP
					APO07.04. Assess and recognize/ reward employee job performance				4. Reward	
7.6. Redeploy and retire employees **(EXTENSIVE)**	4. Dismiss	sE4.4. Determine hiring/ redeployment **(CONCISE)**	1.1. HR Policies & Practices	APO07. Managed Human Resources	APO07.01. Acquire and maintain adequate and appropriate staffing	A6. Separation and Retirement **(CONCISE)**	**MISSING**	Employee Development	**MISSING**	1. HR Administration
					APO07.02. Identify key IT personnel **(CONCISE)**			Employee Redundancy and Discharge		4. Global Mobility
7.7. Manage employee information and analytics	**MISSING**	**MISSING**	2.0.Workforce Management **(EXTENSIVE)**	APO07. Managed Human Resources	APO07.03. Maintain skills and competencies of personnel **(CONCISE)**	A9. Workforce Analytics and Employee Records **(CONCISE)**	3. Performance Management	**MISSING**	2. Deployment	1. HR Administration
					APO07.04. Assess and recognize/ reward employee job performance **(CONCISE)**				3. Development	2. Time & Attendance Management
					APO07.05. Plan and track the usage of IT and business human resources **(CONCISE)**					
7.8. Manage employee communication	**MISSING**	**MISSING**	**MISSING**	**MISSING**		**MISSING**	**MISSING**	**MISSING**	**MISSING**	**MISSING**

PCF	IMM	SCOR	eTOM	COBIT		HCBRM	Software AG	Signavio	Oracle	SAP
7.9. Deliver employee communications	**MISSING**	**MISSING**	**MISSING**	**MISSING**		**MISSING**	**MISSING**	**MISSING**	**MISSING**	**MISSING**
MISSING	**MISSING**	**MISSING**	**MISSING**	APO07. Managed Human Resources	APO07.06. Manage contract staff	**MISSING**	**MISSING**	**MISSING**	**MISSING**	5. Contingent Workforce Management
MISSING	**MISSING**	**MISSING**	**MISSING**	APO07. Managed Human Resources	APO07.05. Plan and track the usage of IT and business human resources	**MISSING**	**MISSING**	**MISSING**	**MISSING**	**MISSING**

At first glance, we can see that some frameworks are more detailed than others, as they include more HR processes, for example PCF. Others do not include as many categories and processes, like Software AG. What is more, only a few process categories seem to be the exact same between the frameworks and that is a result of the different way each framework is structured. Thus, the processes included in one category of a framework might be included in two or more categories of a different framework. For example, the PCF's "7.2. Recruit, source, and select employees" process category includes processes that show up in SAP's "HR Administration", "Organizational Data Management" and "Contingent Workforce Management" categories.

If we take a closer look at the Table 6, it is certain that PCF is the most detailed one, as it includes more process categories than the others on a first level as well as a second level analysis. Some of the PCF process groups do not exist in the other frameworks, like group "7.8. Manage employee communication" and "7.9. Deliver employee communications" that refer to employee relations.

As long as the IMM Approach is concerned, it has the most simplified categorization compared to the rest of the frameworks. Nevertheless, it includes most of the functions that take place in the basic industry sectors.

Moving on to SCOR model, we can see that it includes most of the basic HR processes. However, as SCOR is a supply chain management model all the process categories included are related to the supply chain. Thus, the HR processes mainly focus on linking the skills the employees have with the skills required and the training that may be needed. This is the reason why there are not processes concerning payments, evaluation after training, time management or employee relations.

The eTOM framework includes only the basic HR management processes, with only five categories, thus it could be characterized as concise. The sixth category that we also considered for this comparison, the "Workforce Management", includes processes regarding the workforce schedule, something that we only see in the SAP framework as a separate category ("Time & Attendance Management"). It is worth

mentioning that this framework emphasizes on the employee relations, by having a separate business process category that refers to these processes, something that we only see in more detailed frameworks, such as PCF and HCBRM.

Turning now to the COBIT framework, it is structured differently than the others, because as we mentioned it is IT-oriented. Two out of the six HR-related process groups include processes regarding the IT usage within the company, something that we didn't come across in any of the other frameworks we studied. What is more, COBIT doesn't include processes about employee time management.

The next framework we studied is HCBRM. Even though it is designed specifically for the US government's human capital management, it is the one that comes closest to the PCF structure. As shown in Table 2, HCBRM's process categories are similar to PCF ones. However, HCBRM doesn't include processes about employee time management, payroll management and employee mobility.

As for the Signavio model, we can see that it covers most of the "Human Resources" basic processes. However, it doesn't include processes regarding the employee relations and communication, something that we can see in PCF. What is more, it has a separate payroll process category, which belongs and will be studied in the "Finance" section of the support process areas, as it refers to accounting processes.

As far as the Oracle PeopleSoft framework is concerned, even though it includes only four process categories, it is structured in such a way as to include all basic HR processes, minus the ones about personnel dismissal.

The part of Software AG's human resources framework we were able to find includes processes about employee recruitments, but not for employee payments and separation.

Last but not least, the SAP solution package we chose to study seems to cover all basic HR processes, even though only 17 are included while for instance PCF includes 135. What is more, the processes about time management are way more detailed than the rest of the frameworks we discussed, whereas the processes concerning company policies and strategies are more concise.

5.2. Finance

According to Kurt (2019) “Finance is a broad term that describes activities associated with banking, leverage or debt, credit, capital markets, money, and investments. Basically, finance represents money management and the process of acquiring needed funds”.

Finance is divided into three sub-categories, which are: (1) Personal, (2) Corporate and (3) Public. The second category is the one of interest to us for studying the “Finance” process area of an enterprise. According to Kurt (2019) “Corporate finance refers to the financial activities related to running a corporation, usually with a division or department set up to oversee the financial activities”.

5.2.1. Frameworks

We will now present seven frameworks that will be used for the “Finance” comparison, which are: (1) IMM Approach, (2) PCF, (3) SCOR, (4) eTOM, (5) COBIT, (6) Oracle and (7) SAP.

The frameworks were selected based on their structure, as the analysis and the levels of hierarchy they include offer a common ground based on which a comparison will take place in the next chapter of the thesis. For each of the frameworks we provide all the relevant links in the “List of References” section. Any additional links needed will be added as a footnote in the text.

5.2.1.1. Integrated Modeling Method (IMM™)

The 4th group of processes in the IMM Approach (“Manage Revenue”) contains all the processes that refer to the financial management of the company. As it was shown in Figure 5 of Chapter 3, there are three process categories in this group, which are: (1) bill customer for products supplied, (2) collect payments from customers and (3) monitor financial performance.

5.2.1.2. APQC's Process Classification Framework (PCF)

The 9th group of processes in PCF, "9.0 Manage Financial Resources", contains 11 process categories (Figure 121). These are: (1) perform planning and management accounting, (2) perform revenue accounting, (3) perform general accounting and reporting, (4) manage fixed-asset project accounting, (5) process payroll, (6) process accounts payable and expense reimbursements, (7) manage treasury operations, (8) manage internal controls, (9) manage taxes, (10) manage international funds/consolidation and (11) perform global trade services.

Each of these categories includes between two and 10 process sub-groups. In general, PCF's Manage Financial Resources group contains 269 processes.

9.0 Manage Financial Resources (17058)

9.1 Perform planning and management accounting (10728)

- 9.1.1 Perform planning/budgeting/forecasting (10738)
  - 9.1.1.1 Develop and maintain budget policies and procedures (10771)
  - 9.1.1.2 Prepare periodic budgets and plans (10772)
  - 9.1.1.3 Operationalize and implement plans to achieve budget (20135)
  - 9.1.1.4 Prepare periodic financial forecasts (10773)
  - 9.1.1.5 Perform variance analysis against forecasts and budgets (20136)
- 9.1.2 Perform cost accounting and control (10739)
  - 9.1.2.1 Perform inventory accounting (10774)
  - 9.1.2.2 Perform profit center accounting (14057)
  - 9.1.2.3 Perform cost of sales analysis (10775)
  - 9.1.2.4 Perform product costing (10776)
  - 9.1.2.5 Perform variance analysis (10777)
  - 9.1.2.6 Report on profitability (11175)
- 9.1.3 Perform cost management (10740)
  - 9.1.3.1 Determine key cost drivers (10778)
  - 9.1.3.2 Measure cost drivers (10779)
  - 9.1.3.3 Determine critical activities (10780)
  - 9.1.3.4 Manage asset resource deployment and utilization (10781)
- 9.1.4 Evaluate and manage financial performance (10741)
  - 9.1.4.1 Assess customer and product profitability (10782)
  - 9.1.4.2 Evaluate new products (10783)
  - 9.1.4.3 Perform life cycle costing (10784)
  - 9.1.4.4 Optimize customer and product mix (10785)
  - 9.1.4.5 Track performance of new-customer and product strategies (10786)
  - 9.1.4.6 Prepare activity-based performance measures (10787)
  - 9.1.4.7 Manage continuous cost improvement (10788)

9.2 Perform revenue accounting (10729)

- 9.2.1 Process customer credit (10742)
  - 9.2.1.1 Establish credit policies (10789)
  - 9.2.1.2 Analyze/Approve new account applications (10790)
  - 9.2.1.3 Analyze credit scoring history (14187)
  - 9.2.1.4 Forecast credit scoring requirement (14188)
  - 9.2.1.5 Review existing accounts (10791)
  - 9.2.1.6 Produce credit/collection reports (10792)
  - 9.2.1.7 Reinstate or suspend accounts based on credit policies (10793)
- 9.2.2 Invoice customer (10743)
  - 9.2.2.1 Maintain customer/product master files (10794)
  - 9.2.2.2 Generate customer billing data (10795)
  - 9.2.2.3 Transmit billing data to customers (10796)
  - 9.2.2.4 Post receivable entries (10797)
  - 9.2.2.5 Resolve customer billing inquiries (10798)
- 9.2.3 Process accounts receivable (AR) (10744)
  - 9.2.3.1 Establish AR policies (10799)
  - 9.2.3.2 Receive/Deposit customer payments (10800)
  - 9.2.3.3 Apply cash remittances (10801)
  - 9.2.3.4 Prepare AR reports (10802)
  - 9.2.3.5 Post AR activity to the general ledger (10803)
- 9.2.4 Manage and process collections (10745)
  - 9.2.4.1 Establish policies for delinquent accounts (10804)
  - 9.2.4.2 Analyze delinquent account balances (10805)
  - 9.2.4.3 Correspond/Negotiate with delinquent accounts (10806)
  - 9.2.4.4 Discuss account resolution with internal parties (10807)
  - 9.2.4.5 Process adjustments/write off balances (10808)
  - 9.2.4.6 Perform recovery workout (14007)
  - 9.2.4.7 Manage default accounts (14008)
- 9.2.5 Manage and process adjustments/deductions (10746)
  - 9.2.5.1 Establish policies/procedures for adjustments (10809)
  - 9.2.5.2 Analyze adjustments (10810)
  - 9.2.5.3 Correspond/Negotiate with customer (10811)
  - 9.2.5.4 Discuss resolution with internal parties (10812)
  - 9.2.5.5 Prepare chargeback invoices (10813)
  - 9.2.5.6 Process related entries (10814)

9.3 Perform general accounting and reporting (10730)

- 9.3.1 Manage policies and procedures (10747)
  - 9.3.1.1 Negotiate service-level agreements (10815)
  - 9.3.1.2 Establish accounting policies (10816)
  - 9.3.1.3 Publish accounting policies (20604)
  - 9.3.1.4 Establish common financial systems (10818)
- 9.3.2 Perform general accounting (10748)
  - 9.3.2.1 Maintain chart of accounts (10819)
  - 9.3.2.2 Process journal entries (10820)
  - 9.3.2.3 Process allocations (10821)
  - 9.3.2.4 Process period end adjustments (10822)
  - 9.3.2.5 Post and reconcile intercompany transactions (10823)
  - 9.3.2.6 Reconcile general ledger accounts (10824)
  - 9.3.2.7 Perform consolidations and process eliminations (10825)
  - 9.3.2.8 Prepare trial balance (10826)
  - 9.3.2.9 Prepare and post management adjustments (10827)
- 9.3.3 Perform fixed-asset accounting (10749)
  - 9.3.3.1 Establish fixed-asset policies and procedures (10828)

9.3.3.2 Maintain fixed-asset master data files (10829)
9.3.3.3 Process and record fixed-asset additions and retires (10830)
9.3.3.4 Process and record fixed-asset adjustments, enhancements, revaluations, and transfers (10831)
9.3.3.5 Process and record fixed-asset maintenance and repair expenses (10832)
9.3.3.6 Calculate and record depreciation expense (10833)
9.3.3.7 Reconcile fixed-asset ledger (10834)
9.3.3.8 Track fixed-assets including physical inventory (10835)
9.3.3.9 Provide fixed-asset data to support tax, statutory, and regulatory reporting (10836)

9.3.4 Perform financial reporting (10750)
9.3.4.1 Prepare business unit financial statements (10837)
9.3.4.2 Prepare consolidated financial statements (10838)
9.3.4.3 Perform business unit reporting/review management reports (10839)
9.3.4.4 Perform consolidated reporting/review of cost management reports (10840)
9.3.4.5 Prepare statements for board review (10841)
9.3.4.6 Produce quarterly/annual filings and shareholder reports (10842)
9.3.4.7 Produce regulatory reports (10843)
9.3.4.8 Perform legal and management consolidation (14074)

9.4 Manage fixed-asset project accounting (10731)

9.4.1 Perform capital planning and project approval (10751)
9.4.1.1 Develop capital investment policies and procedures (10844)
9.4.1.2 Develop and approve capital expenditure plans and budgets (10845)
9.4.1.3 Review and approve capital projects and fixed-asset acquisitions (10846)
9.4.1.4 Conduct financial justification for project approval (10847)

9.4.2 Perform capital project accounting (10752)
9.4.2.1 Create project account codes (10848)
9.4.2.2 Record project-related transactions (10849)
9.4.2.3 Monitor and track capital projects and budget spending (10850)
9.4.2.4 Close/capitalize projects (10851)
9.4.2.5 Measure financial returns on completed capital projects (10852)

9.5 Process payroll (10732)

9.5.1 Report time (10753)
9.5.1.1 Establish policies and procedures (10853)
9.5.1.2 Collect and record employee time worked (10854)
9.5.1.3 Analyze and report paid and unpaid leave (10855)
9.5.1.4 Monitor regular, overtime, and other hours (10856)
9.5.1.5 Analyze and report employee utilization (10857)

9.5.2 Manage pay (10754)
9.5.2.1 Enter employee time worked into payroll system (10858)
9.5.2.2 Maintain and administer employee earnings information (10859)
9.5.2.3 Maintain and administer applicable deductions (10860)
9.5.2.4 Monitor changes in tax status of employees (10861)
9.5.2.5 Process and distribute payments (10862)
9.5.2.6 Process and distribute manual checks (10863)
9.5.2.7 Process period-end adjustments (10864)
9.5.2.8 Respond to employee payroll inquiries (10865)

9.5.3 Manage and process payroll taxes (10755)
9.5.3.1 Develop tax plan (14075)
9.5.3.2 Manage tax plan (14076)
9.5.3.3 Calculate and pay applicable payroll taxes (10866)
9.5.3.4 Produce and distribute employee annual tax statements (10867)
9.5.3.5 File regulatory payroll tax forms (10868)

9.6 Process accounts payable and expense reimbursements (10733)

9.6.1 Process accounts payable (AP) (10756)
9.6.1.1 Verify AP pay file with purchase order vendor master file (10869)
9.6.1.2 Maintain/Manage electronic commerce (10870)
9.6.1.3 Audit invoices and key data in AP system (10871)
9.6.1.4 Approve payments (10872)
9.6.1.5 Process financial accruals and reversals (10873)
9.6.1.6 Process payables taxes (10874)
9.6.1.7 Research/Resolve payable exceptions (10875)
9.6.1.8 Process payments (10876)
9.6.1.9 Respond to AP inquiries (10877)
9.6.1.10 Retain records (10878)
9.6.1.11 Adjust accounting records (10879)

9.6.2 Process expense reimbursements (10757)
9.6.2.1 Establish and communicate expense reimbursement policies and approval limits (10880)
9.6.2.2 Capture and report relevant tax data (10881)
9.6.2.3 Approve reimbursements and advances (10882)
9.6.2.4 Process reimbursements and advances (10883)
9.6.2.5 Manage personnel accounts (10884)

9.6.3 Manage corporate credit cards (20929)
9.6.3.1 Establish corporate credit card policies and

approval limits (20930)

9.6.3.2 Process corporate credit card requests (20931)

9.6.3.3 Order corporate credit cards (20932)

9.6.3.4 Manage corporate credit card accounts (20933)

9.6.3.5 Approve/Change credit limits (20934)

9.6.3.6 Cancel/Deactivate credit card (20935)

9.7 Manage treasury operations (10734)

9.7.1 Manage treasury policies and procedures (10758)

9.7.1.1 Establish scope and governance of treasury operations (10885)

9.7.1.2 Establish and publish treasury policies (10886)

9.7.1.3 Develop treasury procedures (10887)

9.7.1.4 Monitor treasury procedures (10888)

9.7.1.5 Audit treasury procedures (10889)

9.7.1.6 Revise treasury procedures (10890)

9.7.1.7 Develop and confirm internal controls for treasury (10891)

9.7.1.8 Define system security requirements (10892)

9.7.2 Manage cash (10759)

9.7.2.1 Manage and reconcile cash positions (10893)

9.7.2.2 Manage cash equivalents (10894)

9.7.2.3 Process and oversee electronic fund transfers (EFTs) (10895)

9.7.2.4 Develop cash flow forecasts (10896)

9.7.2.5 Manage cash flows (10897)

9.7.2.6 Produce cash management accounting transactions and reports (10898)

9.7.2.7 Manage and oversee banking relationships (10899)

9.7.2.8 Analyze, negotiate, resolve, and confirm bank fees (10900)

9.7.3 Manage in-house bank accounts (10760)

9.7.3.1 Manage in-house bank accounts for subsidiaries (10901)

9.7.3.2 Manage and facilitate inter-company borrowing transactions (10902)

9.7.3.3 Manage centralized outgoing payments on behalf of subsidiaries (10903)

9.7.3.4 Manage central incoming payments on behalf of subsidiaries (10904)

9.7.3.5 Manage internal payments and netting transactions (10905)

9.7.3.6 Calculate interest and fees for in-house bank accounts (10906)

9.7.3.7 Provide account statements for in-house bank accounts (10907)

9.7.4 Manage debt and investment (10761)

9.7.4.1 Establish investment policy (14079)

9.7.4.2 Manage financial intermediary relationships (10908)

9.7.4.3 Manage liquidity (10909)

9.7.4.4 Manage issuer exposure (10910)

9.7.4.5 Process and oversee debt and investment transactions (10911)

9.7.4.6 Process and oversee foreign currency transactions (10912)

9.7.4.7 Produce debt and investment accounting transaction reports (10913)

9.7.4.8 Process and oversee interest rate transactions (14210)

9.7.5 Monitor and execute risk and hedging transactions (11208)

9.7.5.1 Develop risk management/hedging strategy (12974)

9.7.5.2 Manage interest rate risk (11209)

9.7.5.2.1 Manage interest rate market data (19575)

9.7.5.2.2 Determine interest rate exposure for all markets (19576)

9.7.5.2.3 Determine interest rate hedge requirements in accordance with risk policy (19577)

9.7.5.2.4 Execute interest rate trades (19578)

9.7.5.3 Manage foreign exchange risk (11210)

9.7.5.3.1 Manage foreign exchange market data (19579)

9.7.5.3.2 Determine foreign exchange exposure for all currencies (19580)

9.7.5.3.3 Determine foreign exchange hedge requirements in accordance with risk policy (19581)

9.7.5.3.4 Execute foreign exchange trades (19582)

9.7.5.3.5 Manage foreign exchange balance sheet risk (19583)

9.7.5.4 Manage exposure risk (11211)

9.7.5.4.1 Determine current customer exposures and limit exceptions (19584)

9.7.5.4.2 Resolve customer exposure limit violations (19585)

9.7.5.4.3 Manage customer collateral (19586)

9.7.5.4.4 Perform annual customer credit reviews (19587)

9.7.5.5 Execute hedging transactions (20137)

9.7.5.5.1 Measure physical positions (19588)

9.7.5.5.2 Establish hedges (19589)

9.7.5.5.3 Unwind hedges (19590)

9.7.5.5.4 Evaluate and refine hedging positions (11213)

9.7.5.5.5 Monitor credit (11215)

9.7.5.6 Produce hedge accounting transactions and reports (11214)

9.7.6 Manage financial fraud/dispute cases (16958)

9.8 Manage internal controls (10735)

- 9.8.1 Establish internal controls, policies, and procedures (10762)
  - 9.8.1.1 Establish board of directors and audit committee (10914)
  - 9.8.1.2 Define and communicate code of ethics (10915)
  - 9.8.1.3 Assign roles and responsibility for internal controls (10916)
  - 9.8.1.4 Define business process objectives and risks (11250)
  - 9.8.1.5 Define entity/unit risk tolerances (11251)
- 9.8.2 Operate controls and monitor compliance with internal controls policies and procedures (10763)
  - 9.8.2.1 Design and implement control activities (10917)
  - 9.8.2.2 Monitor control effectiveness (10918)
  - 9.8.2.3 Remediate control deficiencies (10919)
  - 9.8.2.4 Create compliance function (10920)
  - 9.8.2.5 Operate compliance function (10921)
  - 9.8.2.6 Implement and maintain controls-related enabling technologies and tools (10922)
- 9.8.3 Report on internal controls compliance (10764)
  - 9.8.3.1 Report to external auditors (10923)
  - 9.8.3.2 Report to regulators, share-/debt-holders, securities exchanges, etc. (10924)
  - 9.8.3.3 Report to third parties (10925)
  - 9.8.3.4 Report to internal management (10926)

9.9 Manage taxes (10736)

- 9.9.1 Develop tax strategy and plan (10765)
  - 9.9.1.1 Develop foreign, national, state, and local tax strategy (10927)
  - 9.9.1.2 Consolidate and optimize total tax plan (10928)
  - 9.9.1.3 Maintain tax master data (10929)
- 9.9.2 Process taxes (10766)
  - 9.9.2.1 Perform tax planning/strategy (10930)
  - 9.9.2.2 Prepare tax returns (10931)
  - 9.9.2.3 Prepare foreign taxes (10932)
  - 9.9.2.4 Calculate deferred taxes (10933)
  - 9.9.2.5 Account for taxes (10934)
  - 9.9.2.6 Monitor tax compliance (10935)
  - 9.9.2.7 Address tax inquiries (10936)

9.10 Manage international funds/consolidation (10737)

- 9.10.1 Monitor international rates (10767)
- 9.10.2 Manage transactions (10768)
- 9.10.3 Monitor currency exposure/hedge currency (10769)
- 9.10.4 Report results (10770)

9.11 Perform global trade services (17059)

- 9.11.1 Screen sanctioned party list (14090)
- 9.11.2 Control exports and imports (14091)
- 9.11.3 Classify products (14092)
- 9.11.4 Perform currency conversion (19593)
- 9.11.5 Calculate duty (14093)
- 9.11.6 Communicate with customs (14094)
- 9.11.7 Document trade (14095)
- 9.11.8 Process trade preferences (14096)
- 9.11.9 Handle restitution (14097)
- 9.11.10 Prepare letter of credit (14098)

Figure 121: 9.0 Manage Financial Resources (APQC, 2018, p.23-26)

5.2.1.3. SCOR

SCOR is very concise when it comes to operations within the company that are not supply-chain oriented, as it is a supply-chain management model. As long as the financial management is concerned, SCOR doesn't have a separate category with the relevant processes. However, there are some processes included in the "Deliver" category, as shown in Figure 122.

Figure 122: The process groups included in the category "Deliver" of the SCOR model (APICS, 2017, p.3)

There are also some processes regarding the vendor payments in the "Source" category, as shown in Figure 123.

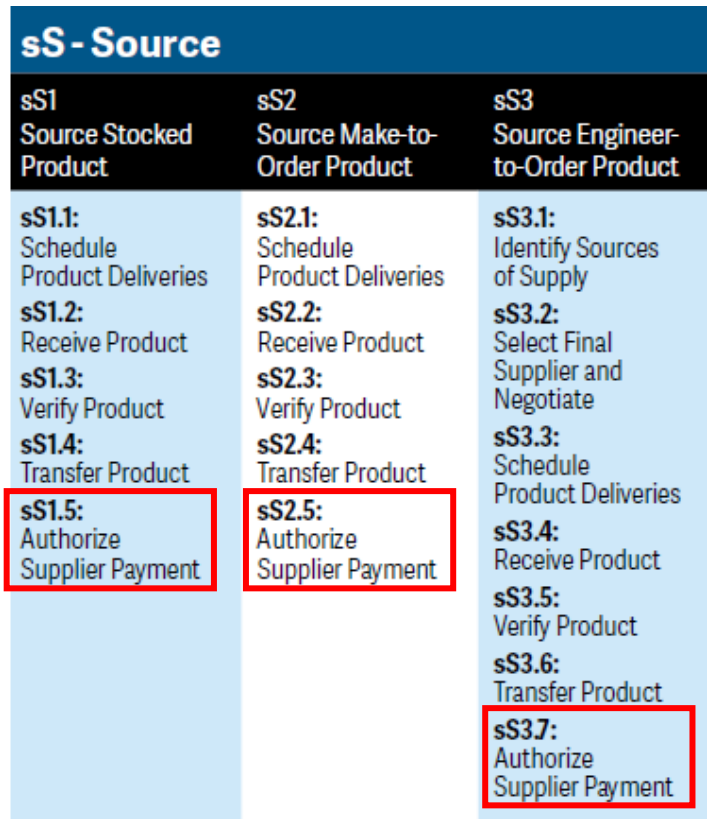


Figure 123: The process groups included in the category "Source" of the SCOR model (APICS, 2017)

In Chapter 3, where we presented the model we mentioned that apart from the "Process", there are other three sections called "Performance", "Practices" and "People". In these sections there are also some finance-related practices (Figure 124), but since they are performance metrics, management practices and people-related skills we will not study them.

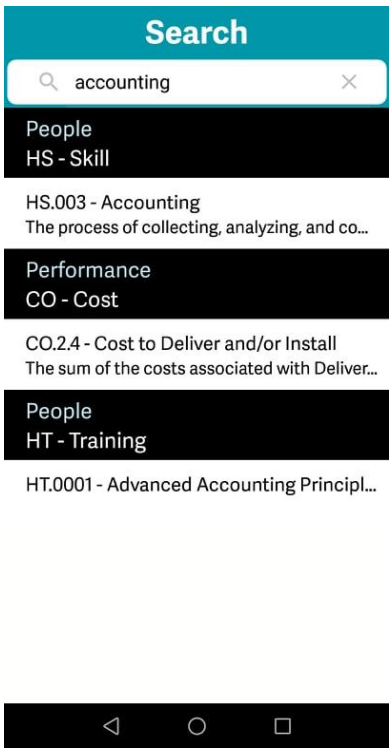


Figure 124: Some accounting-related skills and metrics from the APICS SCOR app (APICS, 2018)

5.2.1.4. Business Process Framework (eTOM)

If we now look at the "Enterprise Domain" of the eTOM framework, and more precisely the 5th process group, which is "Financial and Asset Management", we see that it includes three process groups (Figure 125).

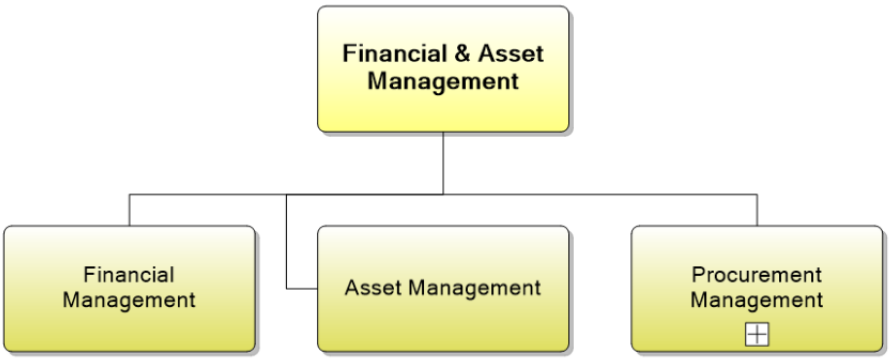


Figure 125: The Financial & Asset Management category of the eTOM framework (TM Forum, 2016)

The "Financial Management" group refers to the management of financial aspects of the company, such as treasury, banking, payroll, financial planning and accounting operations. The "Asset Management" group includes processes that help define asset management policies. These processes need to be aligned with the supply

chain development and management processes for all aspects related to purchasing (TM Forum, 2018). Last but not least, the "Procurement Management" process group, the structure of which is shown in Figure 126, includes processes that define procurement and logistics policies regarding purchases, warehousing, transport and physical resource distribution as well as supervise their application.

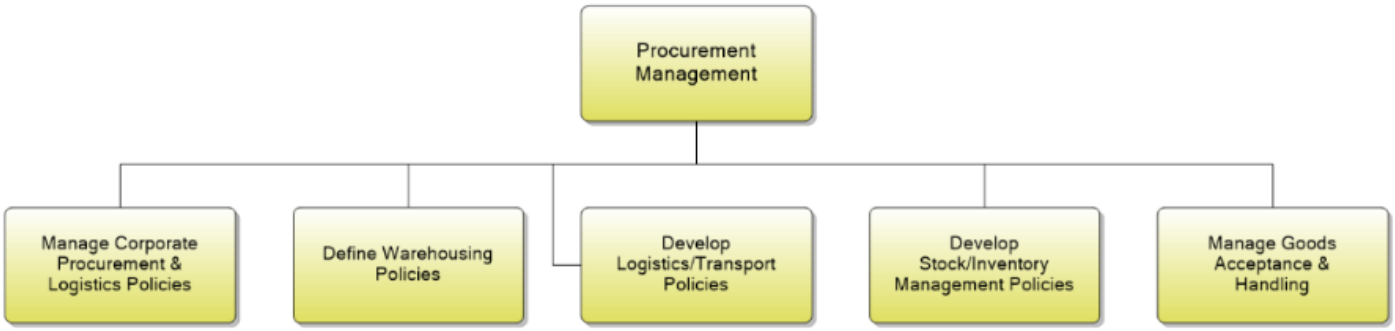


Figure 126: The "Procurement Management" group of processes (TM Forum, 2016)

There are also some financial processes in the "Customer Management" domain, as presented in Figure 30 of the "Marketing" domain, concerning the customer billing and customer invoice management. The process groups we will study are the: (1) bill invoice management, (2) bill payments and receivables management, (3) bill inquiry handling, (4) manage billing events, (5) charging and (6) order handling. In total these groups include 29 process sub-groups. Figure 127-Figure 132 show the contents of each group.

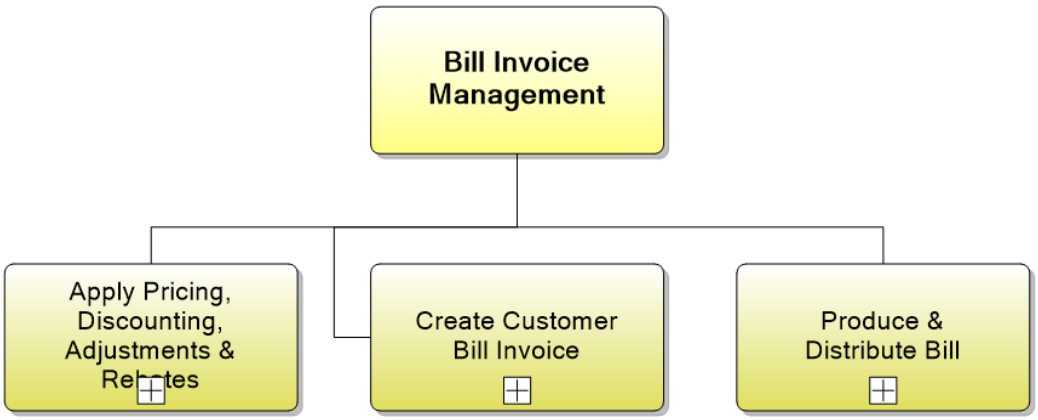


Figure 127: The "Bill Invoice Management" group of processes (TM Forum, 2016)

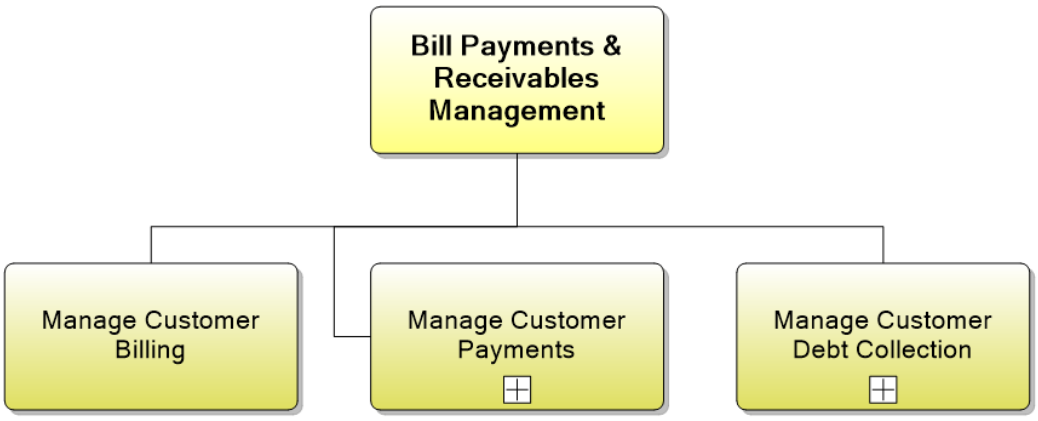


Figure 128: The "Bill Payments & Receivables Management" group of processes (TM Forum, 2016)

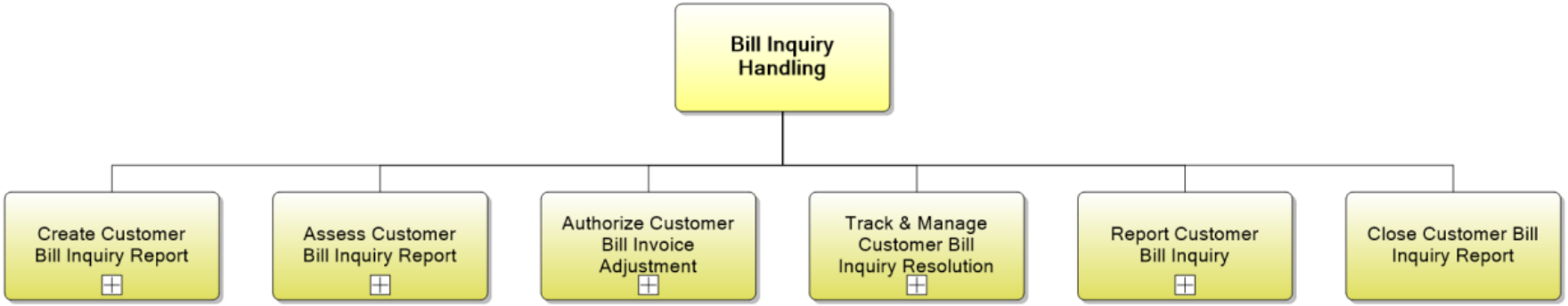


Figure 129: The "Bill Inquiry Handling" group of processes (TM Forum, 2016)

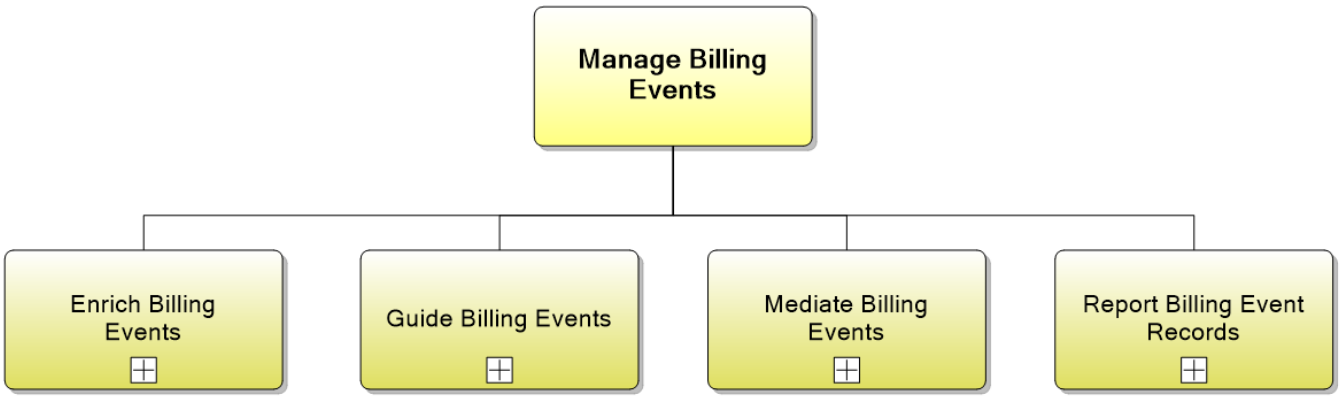


Figure 130: The "Manage Billing Events" group of processes (TM Forum, 2016)

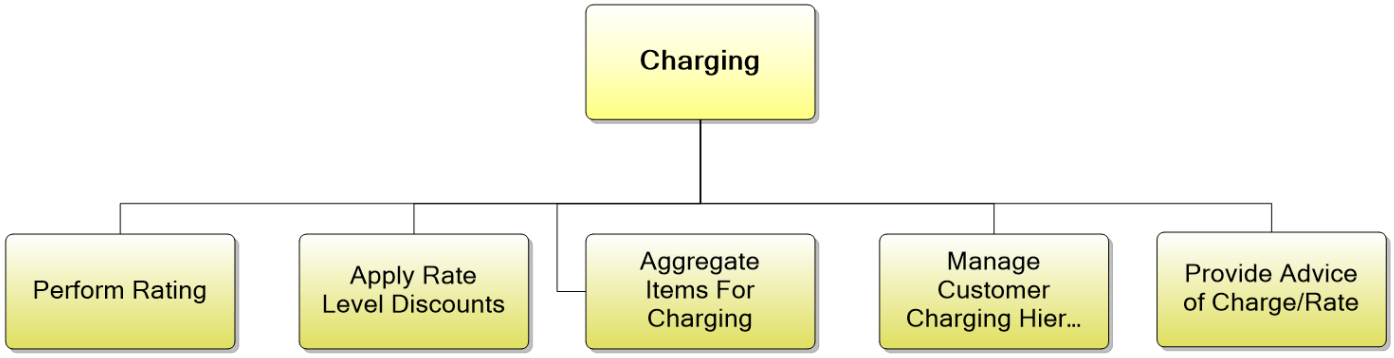


Figure 131: The "Charging" group of processes (TM Forum, 2016)

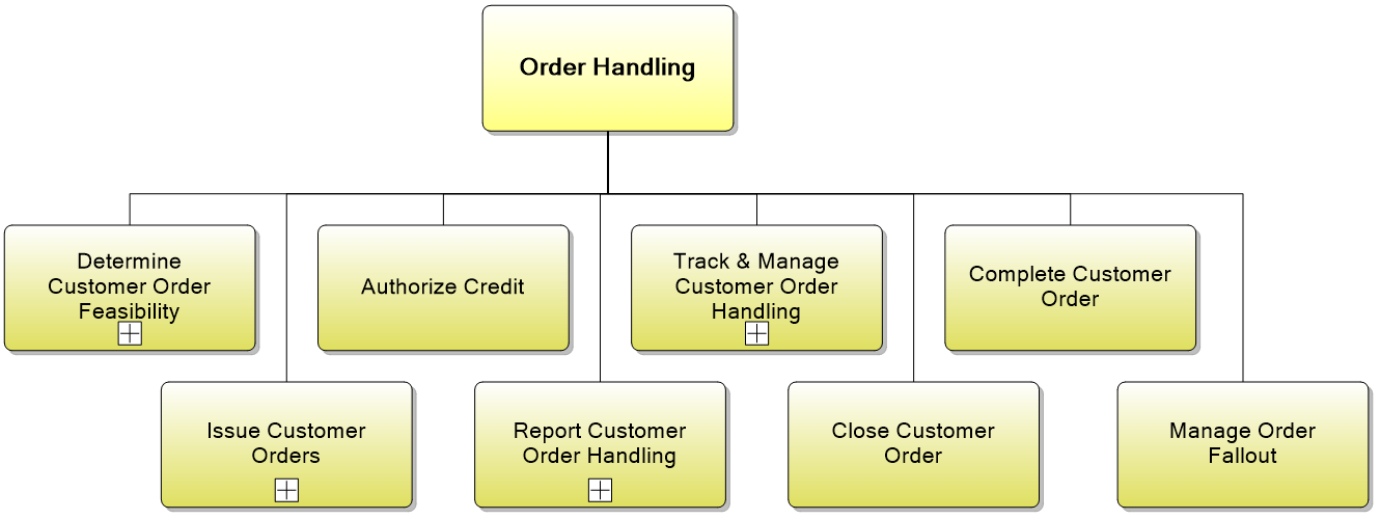


Figure 132: The "Order Handling" group of processes (TM Forum, 2016)

Last but not least, there are some process groups about financial activities in the “Party Revenue Management” group of the “Engaged party” domain, which are shown in Figure 133. In total, the “Party Revenue Management” group includes 35 process sub-groups.

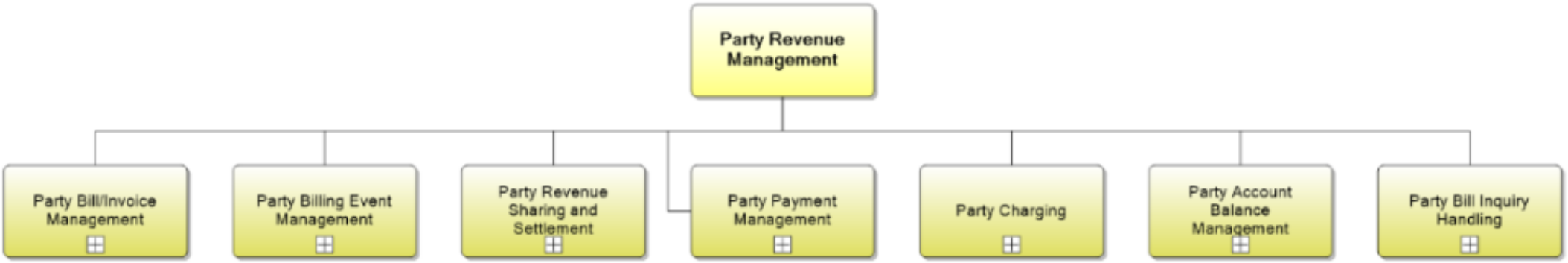


Figure 133: The "Party Revenue Management" group of processes (TM Forum, 2016)

5.2.1.5. COBIT

Moving on to the COBIT framework, we will focus on two process groups that are part of the Align, Plan & Organize (APO) domain, the “APO05 - Managed Portfolio” and the “APO06 - Managed Budget and Costs”, and one that is part of the Evaluate, Direct & Monitor (EDM) domain of the model, the “EDM04 - Ensured Resource Optimization”.

According to ISACA (2018, p.87 and p.93) APO05 aids the enterprise to “execute the strategic direction set for investments in line with the enterprise architecture vision and I&T road map”. Figure 134 shows the contents of this group.

Key Management Practice
APO05.01 Determine the availability and sources of funds.
APO05.02 Evaluate and select programs to fund.
APO05.03 Monitor, optimize and report on investment portfolio performance.
APO05.04 Maintain portfolios.
APO05.05 Manage benefits achievement.

Figure 134: "APO05 - Managed Portfolio" group of processes (ISACA, 2018, p.90)

The process group APO06 helps to “manage the I&T-related financial activities in both the business and IT functions, covering budget, cost and benefit management and prioritization of spending through the use of formal budgeting practices and a fair and equitable system of allocating costs to the enterprise”. Figure 135 demonstrates the processes included in this group.

Key Management Practice
APO06.01 Manage finance and accounting.
APO06.02 Prioritize resource allocation.
APO06.03 Create and maintain budgets.
APO06.04 Model and allocate costs.
APO06.05 Manage costs.

Figure 135: APO06 – “Managed Budget and Costs” group of processes (ISACA, 2018, p.96)

The last group we will study, the EDM04, includes processes that determine the effective use of the available resources. As shown in Figure 136, it includes only three processes. These processes refer to both human and financial resources.

Key Governance Practice
EDM04.01 Evaluate resource management.
EDM04.02 Direct resource management.
EDM04.03 Monitor resource management.

Figure 136: "EDM04 - Ensured Resource Optimization" group of processes (ISACA, 2018, p.47)

5.2.1.6. Oracle

By looking at the process maps provided by Oracle, regarding their PeopleSoft Financials and Supply Chain Management (FSCM) software[27], we see that all the processes that refer to financial operations are included in three modules. The first one is the "Financial Control and Reporting" module (Figure 137). There are eight process categories here, which are: (1) financial control and reporting overview, (2) manage internal controls, (3) manage budgets, (4) capture transactions, (5) close accounting period, (6) prepare financial reports, (7) analyze financial information and (8) manage grants.

27 https://docs.oracle.com/cd/F16439_01/fscm92pbr31/eng/fscm/bpms/bpm_FSCM_001206_01.html (Accessed 7 June 2019)

Figure 137: The "Financial Control and Reporting" module by PeopleSoft Financial and Supply Chain Management 9.2 process map (Oracle, 2019)

As Figure 138 demonstrates, these categories include between two and eight processes, of the 32 in total.

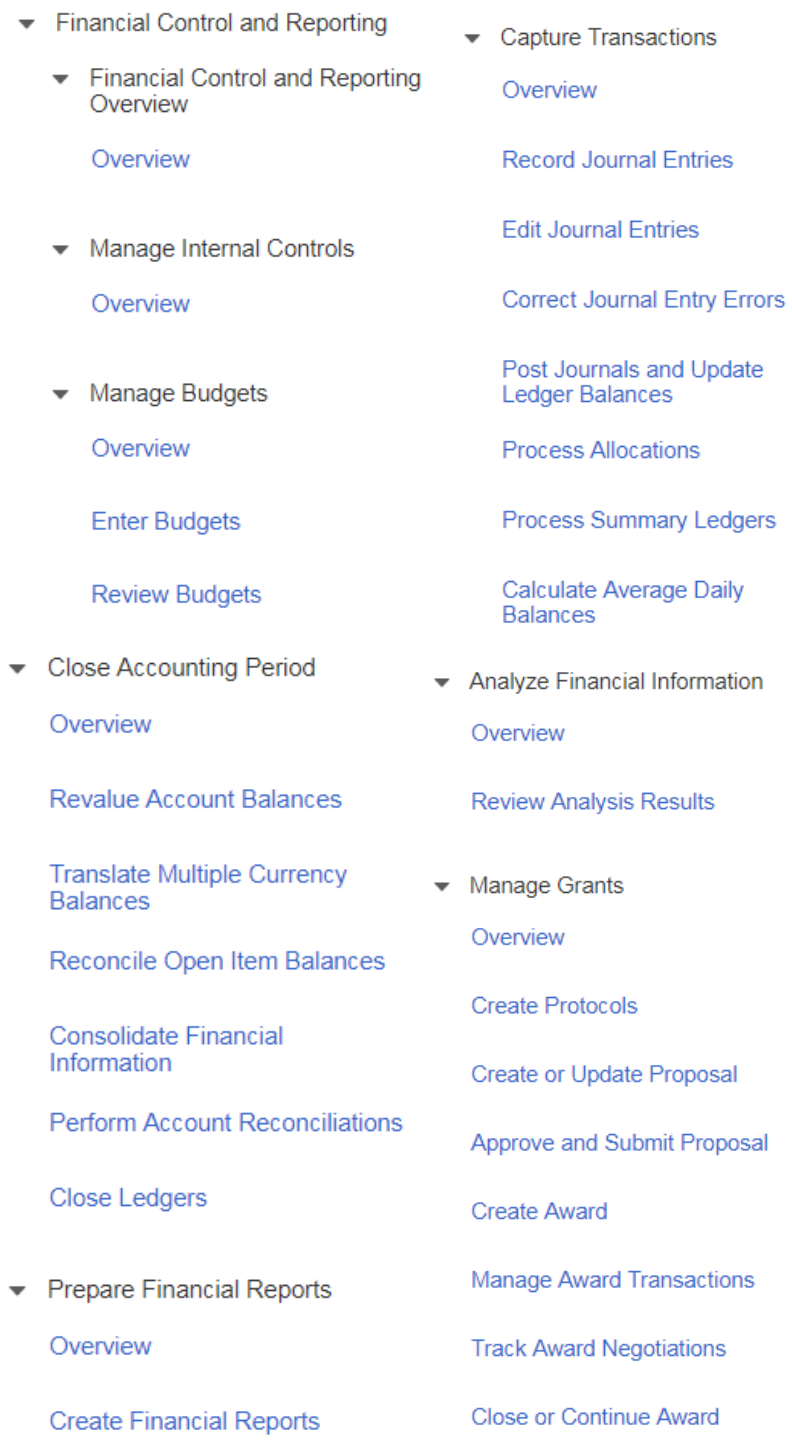


Figure 138: The processes included in the "Financial Control and Reporting" module, PeopleSoft Financial and Supply Chain Management 9.2 (Oracle, 2019)

The second module we will discuss is the “Order fulfillment” (Figure 139). The process categories that are of interest to us in this module are: (1) invoice customer, (2) receive and pay invoice, (3) process customer payments and (4) manage customer financial relationship.

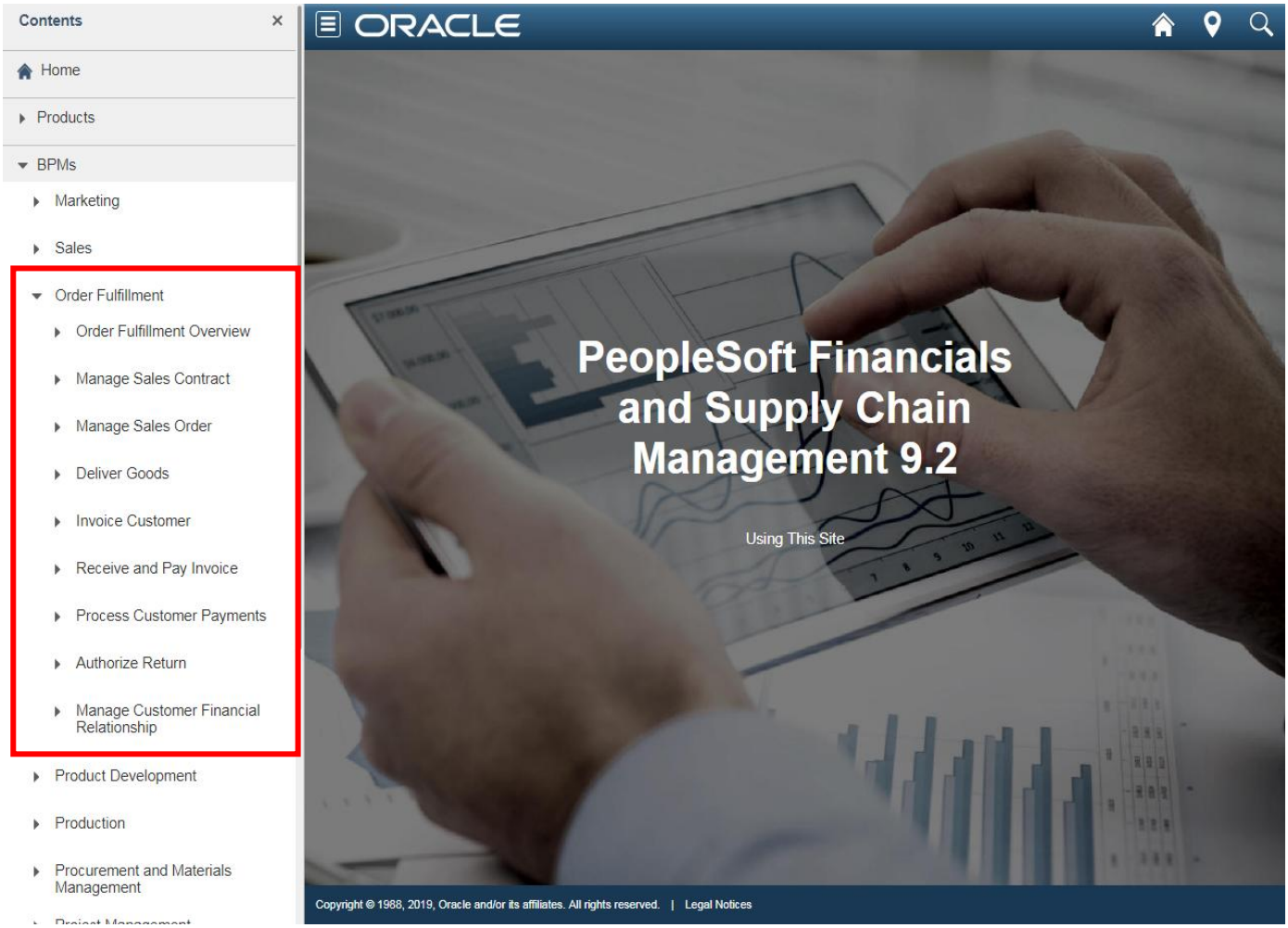


Figure 139: The "Order Fulfillment" module by PeopleSoft Financial and Supply Chain Management 9.2 process map (Oracle, 2019)

Figure 140 provides an overview of the contents of these categories. Each of these categories includes between four and nine processes, of the 26 in total.

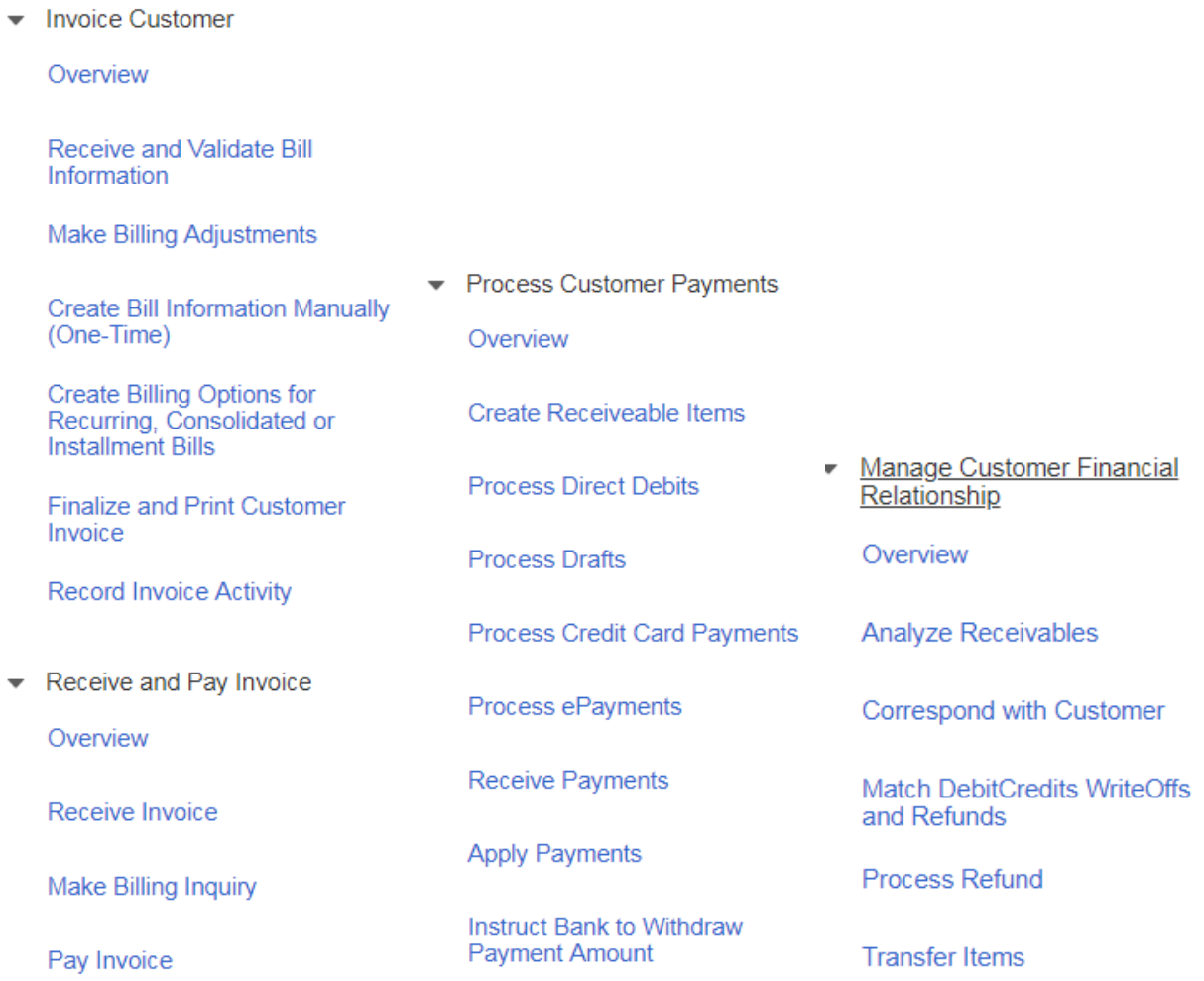


Figure 140: Some of the processes included in the "Order Fulfillment" module, PeopleSoft Financial and Supply Chain Management 9.2 (Oracle, 2019)

Another module we will focus on is the “Treasury” (Figure 141). Here we find processes about treasury and risk management, along with processes about actions regarding the bank. The categories included are: (1) treasury overview, (2) determine cash position, (3) manage deals, (4) execute transfers, (5) analyze risk, (6) process cash sweep, (7) manage settlements, (8) manage electronic banking, (9) manage treasury accounting, (10) perform bank reconciliation and (11) administer netting.

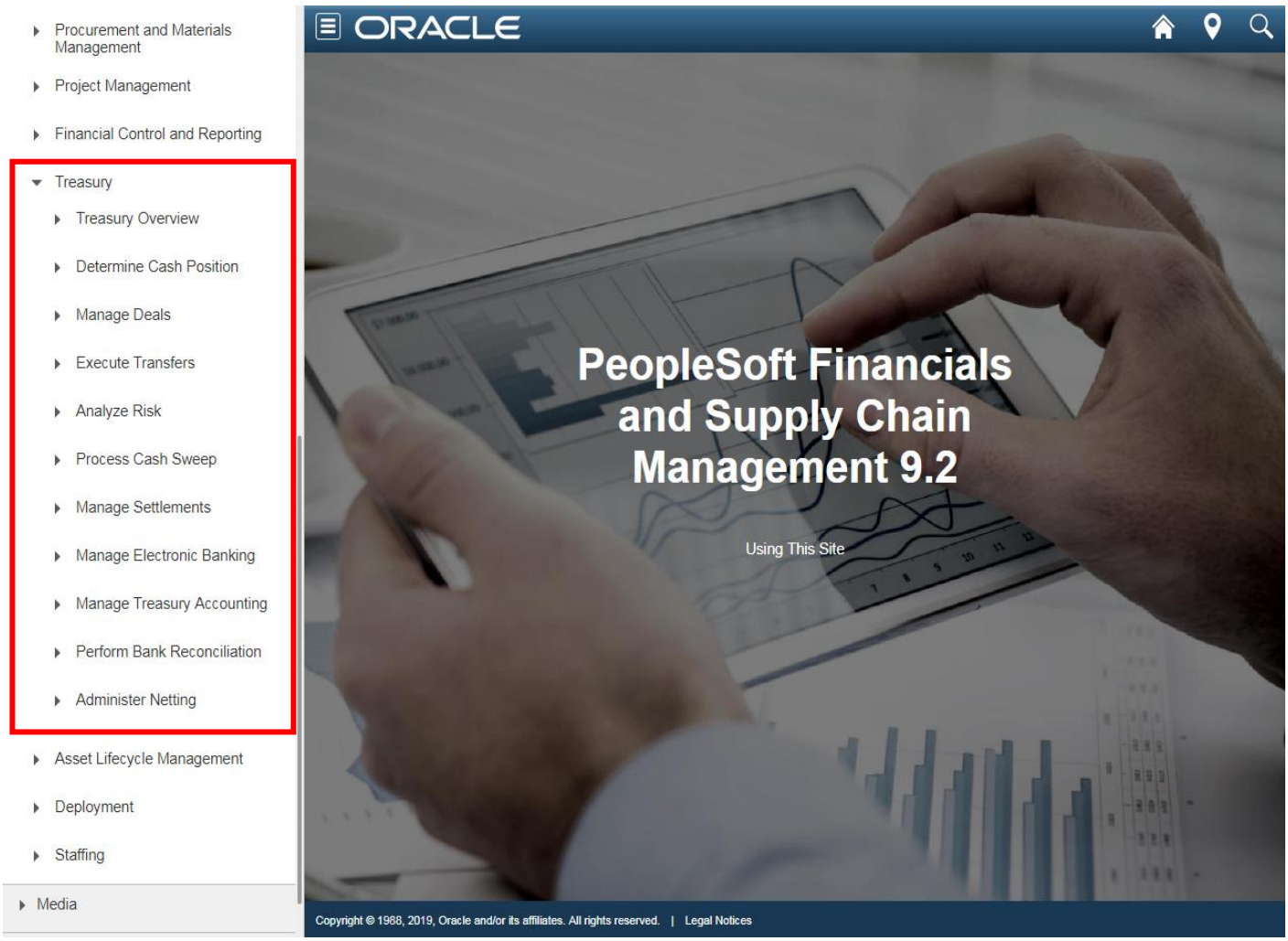


Figure 141: The "Treasury" module by PeopleSoft Financial and Supply Chain Management 9.2 process map (Oracle, 2019)

Figure 142 provides an overview of the processes included in the “Treasury” module. Each of the categories mentioned before includes between one and six processes, of the 33 in total.

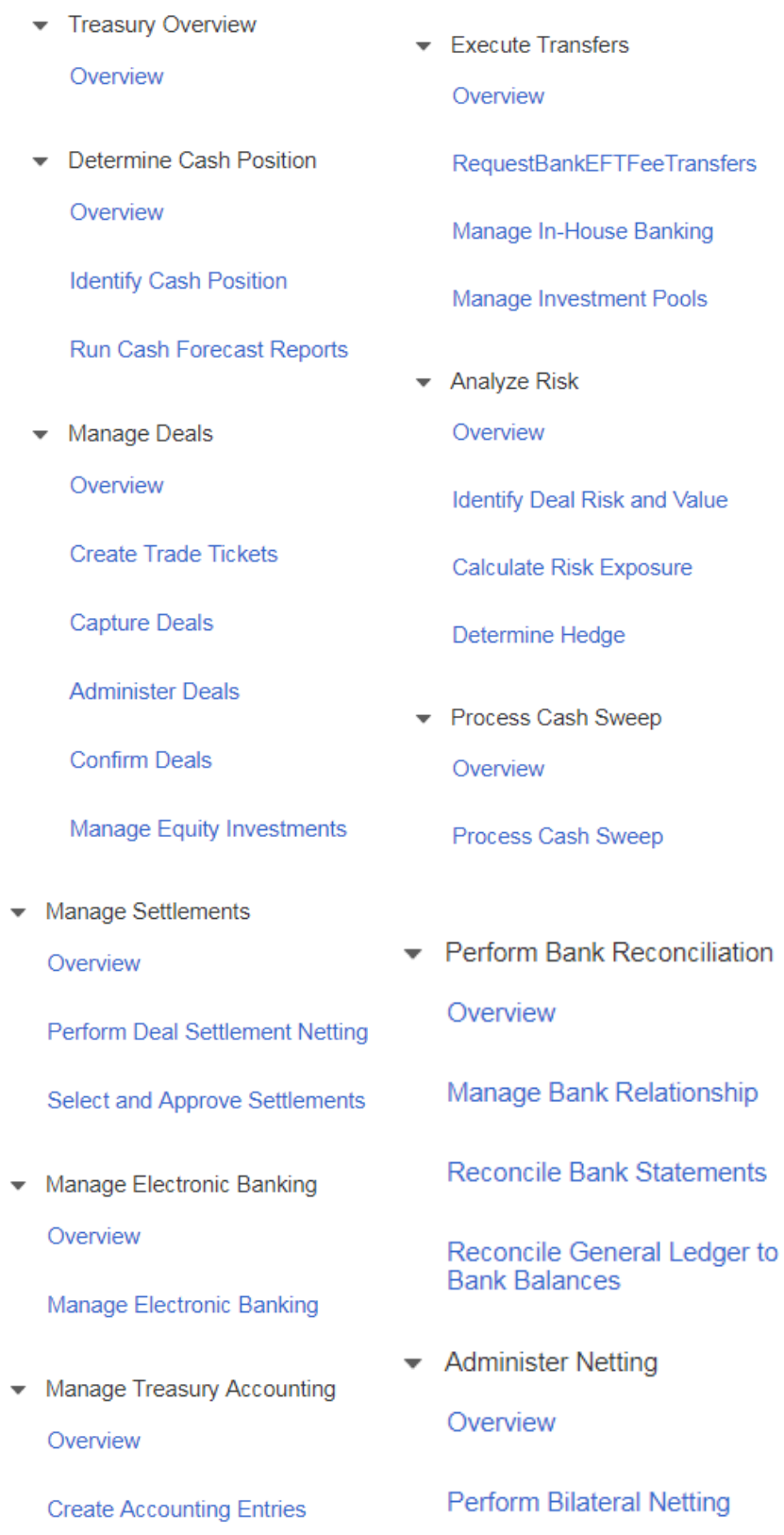


Figure 142: The list of processes included in the "Treasury" module, PeopleSoft Financial and Supply Chain Management 9.2 (Oracle, 2019)

Last but not least, some financial operations are also included in the module "Staffing". Here we can find some processes concerning the payroll management (Figure 143). More specifically, the category "Manage Billing and Payroll" refers to the reporting that is necessary in order to conduct the payroll activities.

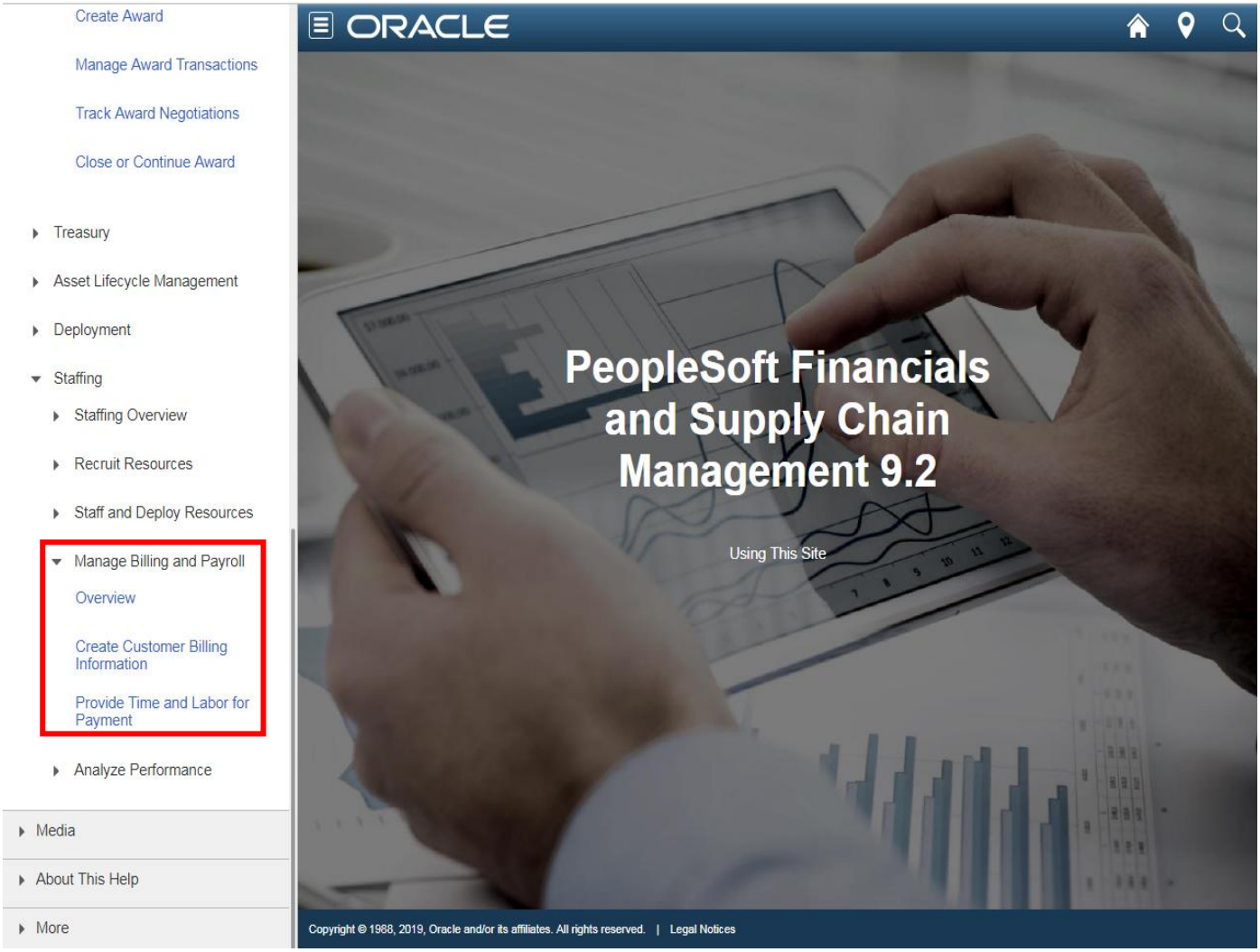


Figure 143: Some of the processes included in the "Staffing" module by PeopleSoft Financial and Supply Chain Management 9.2 process map (Oracle, 2019)

Last but not least, there are some processes regarding the vendor payments in the module "Procurement and Materials Management" and more specifically in the category "Receive Goods and Services" (Figure 144).

Figure 144: Some of the processes included in the "Procurement and Materials Management" module by PeopleSoft Financial and Supply Chain Management 9.2 process map (Oracle, 2019)

Oracle also offers PeopleSoft solutions for individual financial operations (Figure 145). However, we will use the modules mentioned before, as they provide a more holistic view of the enterprise's financial management.

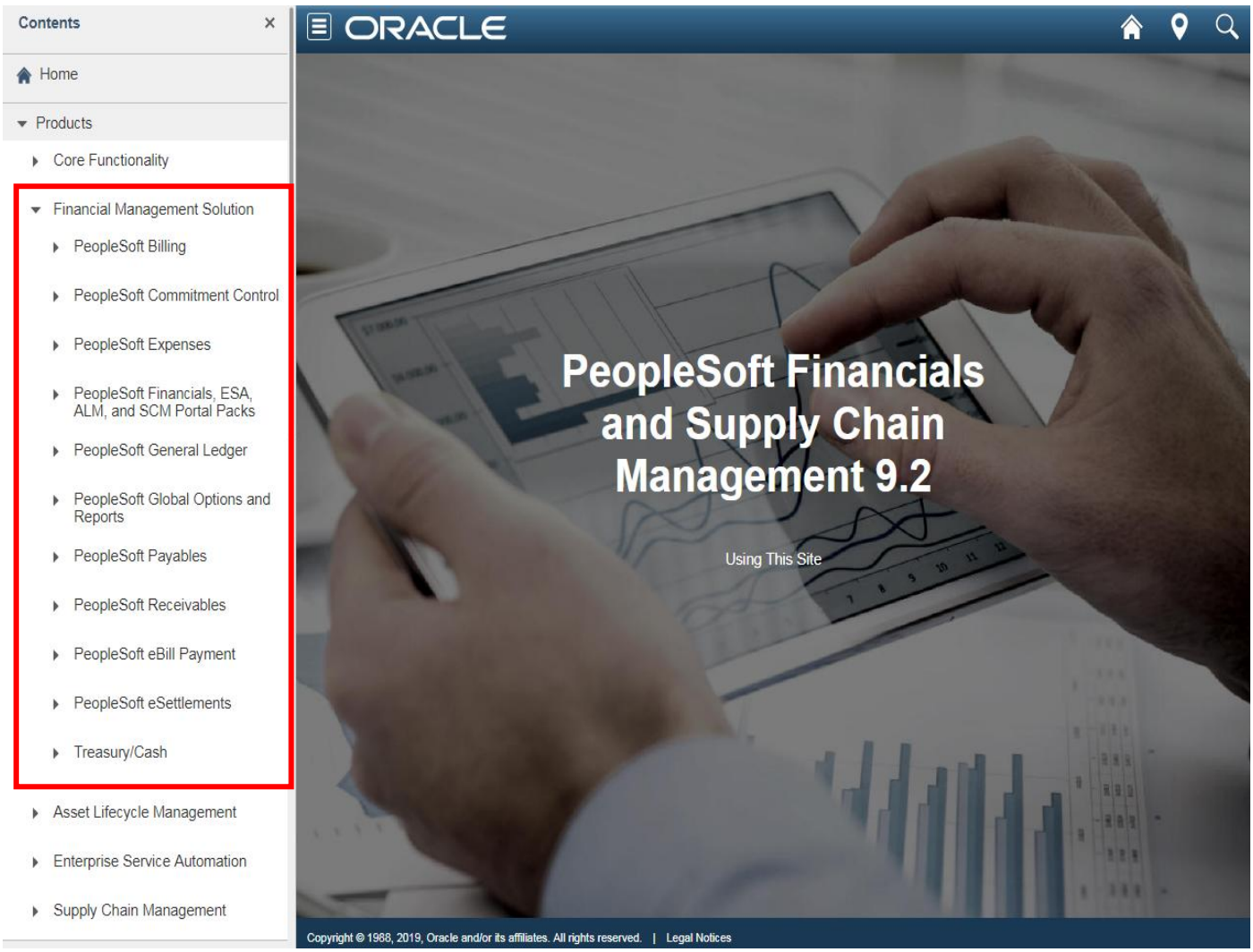


Figure 145: The "Financial Management Solutions" offered by PeopleSoft Financial and Supply Chain Management 9.2 (Oracle, 2019)

5.2.1.7. SAP

As mentioned before, SAP offers a variety of solution packages that cover the needs of every enterprise. We will focus on the SAP Best Practices for SAP S/4HANA (on premise) solution, as shown in Figure 18, includes a Finance module with all the financial management processes.

There are eight process categories in Finance (Figure 146), which are: (1) accounting and financial close, (2) advanced accounting and financial close, (3) financial operations, (4) advanced financial operations, (5) cost management and profitability analysis, (6) enterprise risk and compliance, (7) treasury management and (8) LoB

Finance / Financial Planning and Analysis. These categories include between one and 24 processes, of the 79 in total.

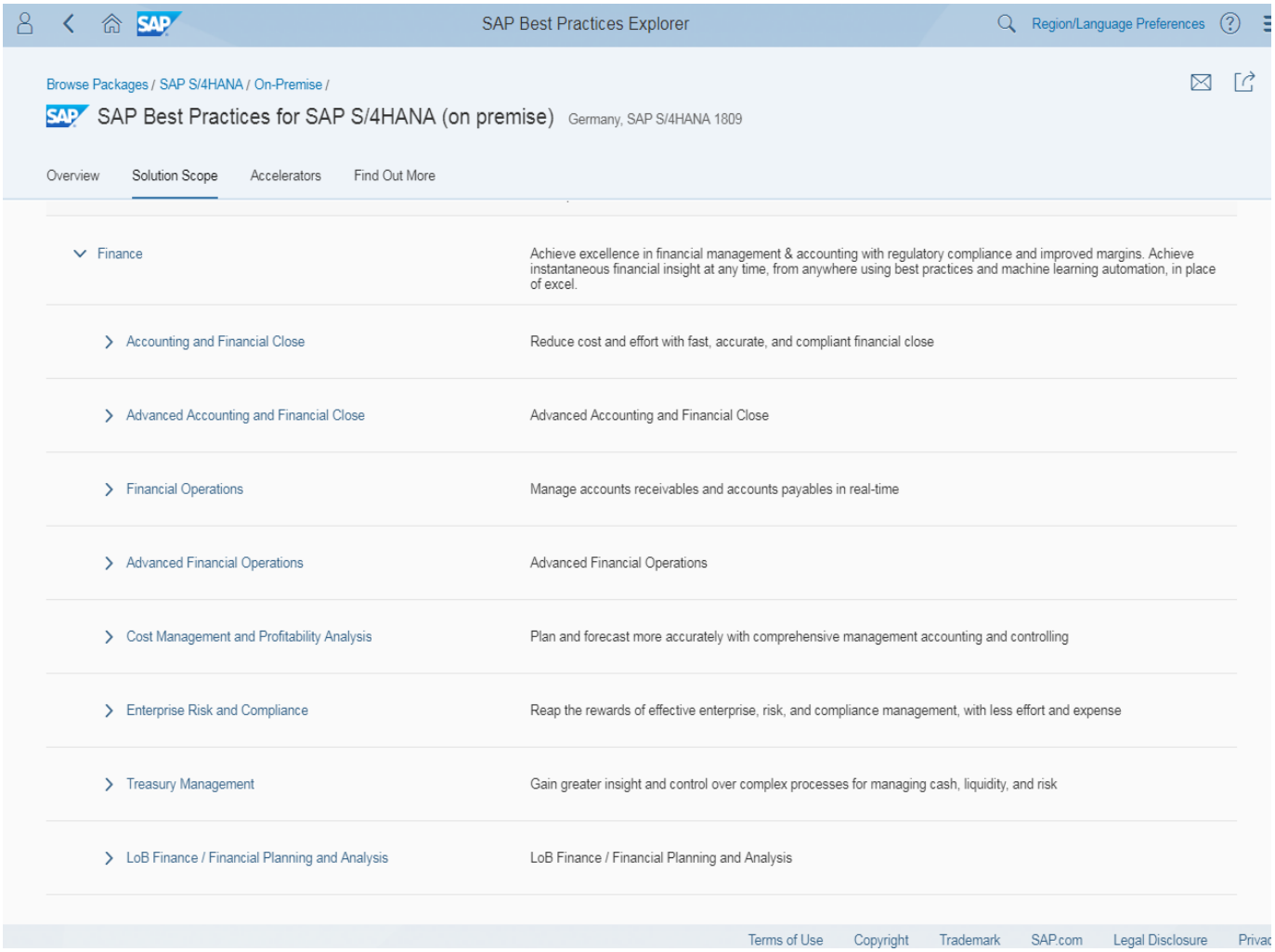
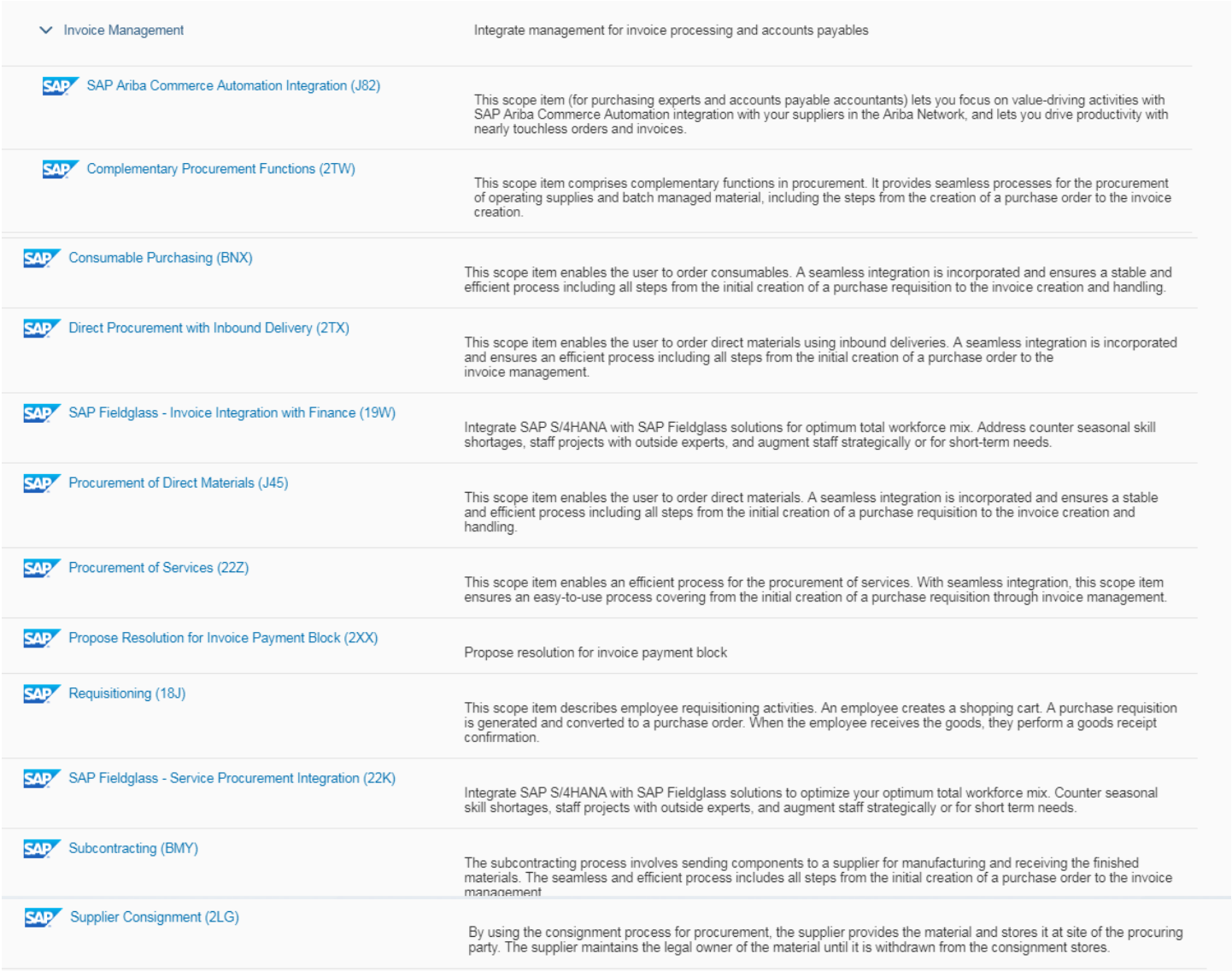


Figure 146: The "Finance" module of SAP Best Practices for SAP S/4HANA (on premise) solution package (SAP, 2019)

Another module we will mention in this section is the “Sales”, and that is because SAP creates the customer invoice right after the customer order thus all the billing processes are there. What is more, this module contains processes regarding refunds, for instance the “Debit Memo Processing” process. There is only one process category in the sales category, which is: (1) order and contract management, as we’ve already seen in the “Sales” section of the thesis (Figure 50).

The last module we will use is the “Sourcing and Procurement”, as it includes one process group named “Invoice Management”. It consists of 12 processes, some of

which refer to the management of the invoices created by procurement actions. The contents of the group are shown in Figure 147.



Invoice Management	Integrate management for invoice processing and accounts payables
SAP Ariba Commerce Automation Integration (J82)	This scope item (for purchasing experts and accounts payable accountants) lets you focus on value-driving activities with SAP Ariba Commerce Automation integration with your suppliers in the Ariba Network, and lets you drive productivity with nearly touchless orders and invoices.
Complementary Procurement Functions (2TW)	This scope item comprises complementary functions in procurement. It provides seamless processes for the procurement of operating supplies and batch managed material, including the steps from the creation of a purchase order to the invoice creation.
Consumable Purchasing (BNX)	This scope item enables the user to order consumables. A seamless integration is incorporated and ensures a stable and efficient process including all steps from the initial creation of a purchase requisition to the invoice creation and handling.
Direct Procurement with Inbound Delivery (2TX)	This scope item enables the user to order direct materials using inbound deliveries. A seamless integration is incorporated and ensures an efficient process including all steps from the initial creation of a purchase order to the invoice management.
SAP Fieldglass - Invoice Integration with Finance (19W)	Integrate SAP S/4HANA with SAP Fieldglass solutions for optimum total workforce mix. Address counter seasonal skill shortages, staff projects with outside experts, and augment staff strategically or for short-term needs.
Procurement of Direct Materials (J45)	This scope item enables the user to order direct materials. A seamless integration is incorporated and ensures a stable and efficient process including all steps from the initial creation of a purchase requisition to the invoice creation and handling.
Procurement of Services (22Z)	This scope item enables an efficient process for the procurement of services. With seamless integration, this scope item ensures an easy-to-use process covering from the initial creation of a purchase requisition through invoice management.
Propose Resolution for Invoice Payment Block (2XX)	Propose resolution for invoice payment block
Requisitioning (18J)	This scope item describes employee requisitioning activities. An employee creates a shopping cart. A purchase requisition is generated and converted to a purchase order. When the employee receives the goods, they perform a goods receipt confirmation.
SAP Fieldglass - Service Procurement Integration (22K)	Integrate SAP S/4HANA with SAP Fieldglass solutions to optimize your optimum total workforce mix. Counter seasonal skill shortages, staff projects with outside experts, and augment staff strategically or for short term needs.
Subcontracting (BMY)	The subcontracting process involves sending components to a supplier for manufacturing and receiving the finished materials. The seamless and efficient process includes all steps from the initial creation of a purchase order to the invoice management
Supplier Consignment (2LG)	By using the consignment process for procurement, the supplier provides the material and stores it at site of the procuring party. The supplier maintains the legal owner of the material until it is withdrawn from the consignment stores.

Figure 147: The list of processes included in the "Invoice Management" group of processes, of the "Sourcing and Procurement" module of SAP Best Practices for SAP S/4HANA (on premise) solution package (SAP, 2019)

5.2.2. Comparison

We will now move on to compare the frameworks. PCF is used as a base for the comparison that is presented in Table 12.

For the SAP framework when we refer to the “Finance” module we also mention the relevant process category. For the “Sales” module we just refer its name, as there is only one process category included.

What is more, we also included in the comparison the Signavio process category that was mentioned in the section 5.1.1.8 of the “Human Resources” (Figure 115). This category includes processes regarding the employee payments.

Table 12: Finance frameworks comparison

PCF	IMM	SCOR	eTOM		COBIT		*Signavio*	Oracle		SAP	
9.1. Perform planning and management accounting	3.Monitor Financial Performance **(CONCISE)**	**MISSING**	Financial & Asset Management	Financial Management	APO05. Managed Portfolio	APO05.02. Evaluate and select programs to fund **(EXTENSIVE)**	**MISSING**	Financial Control and Reporting	Manage Budgets	Finance	Cost Management and Profitability Analysis
						APO05.05. Manage benefits achievement					
					APO06. Managed Budget and Costs	APO06.03. Create and maintain budgets **(CONCISE)**					LoB Finance/ Financial Planning and Analysis
						APO06.04. Model and allocate costs **(CONCISE)**					
						APO06.05. Manage costs					
					EDM04. Ensured Resource Optimization	EDM04.01. Evaluate resource management **(EXTENSIVE)**					
						EDM04.02. Direct resource management **(EXTENSIVE)**					
						EDM04.03. Monitor resource management **(EXTENSIVE)**					

PCF	IMM	SCOR	eTOM		COBIT		*Signavio*	Oracle		SAP	
9.2. Perform revenue accounting	1.Bill Customer for Products Supplied	4.Deliver **(CONCISE)**	Financial & Asset Management	Financial Management	**MISSING**		**MISSING**	Financial Control and Reporting	Capture Transactions	Sales	
	2. Collect Payments from Customers		Customer Domain	Bill Invoice Management				Order Fulfillment	Invoice Customer	Finance	Financial Operations
				Bill Inquiry Handling					Receive and Pay		
				Order Handling					Process Customer Payments		Accounting and Financial Close
				Bill Payments & Receivables Management							
				Charging **(EXTENSIVE)**							
9.3. Perform general accounting and reporting	3.Monitor Financial Performance	**MISSING**	Financial & Asset Management	Financial Management	APO06. Managed Budget and Costs	APO06.01. Manage finance and accounting	**MISSING**	Financial Control and Reporting	Prepare Financial Reports	Finance	Accounting and Financial Close
				Asset Management **(CONCISE)**					Close Accounting Period		Advanced Accounting and Financial Close
									Capture Transactions		Cost Management and Profitability

PCF	IMM	SCOR	eTOM	COBIT	*Signavio*	Oracle	SAP
9.4. Manage fixed-asset project accounting	**MISSING**	**MISSING**	Financial & Asset Management: Financial Management; Asset Management **(CONCISE)**	APO05. Managed Portfolio: APO05.03. Monitor, optimize and report on investment portfolio; APO05.04. Maintain portfolios	**MISSING**	Financial Control and Reporting: Capture Transactions **(CONCISE)**	Finance: Accounting and Financial Close
9.5. Process payroll	*Provide Human Resources*: *Pay Personnel*	**MISSING**	Financial & Asset Management: Financial Management	**MISSING**	*Payroll Accounting*: *Payment of Salaries*; *Payment of Bonuses*	Financial Control and Reporting: Capture Transactions **(CONCISE)**; *Staffing*: *Manage Billing and Payroll* ***(CONCISE)***	Finance: Accounting and Financial Close; *SAP SuccessFactors Employee*: *Payroll Processing* **(HR)**
9.6. Process accounts payable and expense reimbursements	**MISSING**	2.Source **(CONCISE)**	Financial & Asset Management: Financial Management	**MISSING**	**MISSING**	Procurement and Materials Management: Receive Goods and Services	Finance: Accounting and Financial Close; Financial Operations; Sourcing and Procurement: Invoice Management **(CONCISE)**
9.7. Manage treasury operations	**MISSING**	**MISSING**	Financial Management	APO05.01 Determine the availability and sources of funds	**MISSING**	Treasury **(IDENTICAL)**	Enterprise Risk & Compliance **(CONCISE)**

PCF	IMM	SCOR	eTOM		COBIT		*Signavio*	Oracle		SAP	
			Financial & Asset Management		APO05. Managed Portfolio	APO05.03. Monitor, optimize and report on investment portfolio				Finance	
						APO05.04. Maintain portfolios					
					EDM04. Ensured Resource Optimization	EDM04.01. Evaluate resource management		Financial Control and Reporting	Capture Transactions **(CONCISE)**		
						EDM04.02. Direct resource management			Manage Internal Controls **(CONCISE)**		Treasury Management **(EXTENSIVE)**
						EDM04.03. Monitor resource management					
9.8. Manage internal controls	3.Monitor Financial Performance	**MISSING**	Financial & Asset Management	Financial Management	EDM04. Ensured Resource Optimization	EDM04.03. Monitor resource management **(CONCISE)**	**MISSING**	Financial Control and Reporting	Manage Internal Controls	**MISSING**	
9.9. Manage taxes	**MISSING**	**MISSING**	**MISSING**		**MISSING**		**MISSING**	**MISSING**		Finance	Accounting and Financial Close
9.10. Manage international funds/ consolidation	**MISSING**	**MISSING**	**MISSING**		**MISSING**		**MISSING**	Financial Control and Reporting	Manage Internal Controls **(CONCISE)**	Finance	Accounting and Financial Close

PCF	IMM	SCOR	eTOM	COBIT	*Signavio*	Oracle	SAP
9.11.Perform global trade services	**MISSING**	**MISSING**	**MISSING**	**MISSING**	**MISSING**	**MISSING**	Finance: Financial Operations
MISSING	**MISSING**	**MISSING**	Financial & Asset Management: Procurement Management	**MISSING**	**MISSING**	**MISSING**	**MISSING**
MISSING	**MISSING**	**MISSING**	Customer Domain: Manage Billing Events	APO06. Managed Budget and Costs: APO06.04. Model and allocate costs (IDENTICAL)	**MISSING**	**MISSING**	**MISSING**
MISSING	**MISSING**	**MISSING**	**MISSING**	APO06. Managed Budget and Costs: APO06.02. Prioritize resource allocation		**MISSING**	**MISSING**
MISSING	**MISSING**	**MISSING**	**MISSING**	**MISSING**		Financial Control and Reporting: Manage Grants	**MISSING**
MISSING	**MISSING**	**MISSING**	**MISSING**	**MISSING**		Order Fulfillment: Manage Customer Financial Relationship	Sales
MISSING	**MISSING**	**MISSING**	**MISSING**	**MISSING**		**MISSING**	Finance: Advanced Financial Operations

We can see once again here that the PCF is the most detailed framework of the ones we've studied so far. Now let's take a closer look at the table, at each of the frameworks separately:

The IMM Approach is the most concise framework regarding the financial management, yet it includes three basic process categories about customer billing, collection of payments and financial performance monitoring. There are no processes regarding the employee payment, since they are all included in the "Provide Human Resources" category.

Moving on to the SCOR framework, we can see that it is incomplete as far as the financial processes are concerned, which stems from the fact that SCOR is a supply chain management model. The only financial processes included are the ones concerning vendor payments and customer billing.

By looking at the eTOM model, we can see that it includes most of the processes that PCF proposes for the financial management of the enterprise. Since it is a model developed for the telecommunications industry, it also includes processes regarding the billing events, which are measuring the usage of a network resource by a customer (ALTHOS[28], 2009). The only other framework that includes something like this is COBIT, as it is IT-related.

As far as COBIT framework is concerned, we can see that it doesn't include any group of processes regarding the revenue management, vendor payments and payroll, probably because of the IT-orientation of the model.

If we now take a look at the Oracle framework, we can see that the module "Treasury" is identical to the "9.7-Manage treasury operations" category of PCF. A difference between the two models is that Oracle doesn't include processes regarding the enterprise's strategies and policies, like PCF does. Another important difference is that even though Oracle includes processes that need to take place

[28] http://www.billingdictionary.com/BillingDictionary-Billing-Event-Definition.html (Accessed 10 June 2019)

before the payroll, there are no processes depicting the actual employee payments. The payroll is included in the Staffing module, that's why both of these categories are mentioned. What is more, we can see that Oracle includes the customer invoice creation in the "Order Fulfillment" module, right after the "Sales" procedures, whilst PCF has all invoice-related processes in its' "9.0 Manage Financial Resources" module. Last but not least, Oracle doesn't seem to contain separate processes about the international funds management. All the relevant transactions are included in the "Manage Transactions" category of the "Financial Control and Reporting" module.

The last framework we studied, SAP, seems to have many similarities with the Oracle one. This could derive from the fact that both frameworks are based on software. Like Oracle, SAP doesn't include any processes regarding the enterprise's strategies and policies. SAP's "Treasury Management" module is also identical to the "9.7-Manage treasury operations" category of PCF. A major difference between SAP and the other frameworks is that the first one includes processes about Analytical apps, giving the enterprise the ability to have a real time overview of its "Financial" operations. Another difference is that the processes regarding the employee payments are conducted in the "Human Resources" module and not in the "Financial Management". That's why in the PCF category "9.5. Process payroll" we mention the solution package we studied in the HR section of the thesis, along with the relevant category. The "Financial Management" process categories we mention include tax-related processes. What is more, SAP has no internal control processes, like PCF. Last but not least, SAP includes a separate process category, the "Advanced Financial Operations" with processes related to leasing; something that we didn't see in any other framework.

5.3. Information Technology (IT) & Data

According to Wang (2008) “Information Technology (IT) is concerned with the use of technology in managing and processing information, especially in large organizations. In particular, IT deals with the use of electronic computers and computer software to convert, store, protect, process, transmit, and retrieve information”.

According to Galetto (2016) “Data management is an administrative process that includes acquiring, validating, storing, protecting, and processing required data to ensure the accessibility, reliability, and timeliness of the data for its users”.

These are the functions managed by the “Information Technology & Data” process area.

5.3.1. Frameworks

We will now present the six frameworks that will be used for the Information Technology (IT) management comparison. These are: (1) IMM Approach, (2) PCF, (3) SCOR, (4) eTOM, (5) COBIT and (6) SAP. Most of the frameworks also include in this category the processes regarding data management.

The frameworks were selected based on their categorization and their structure. For each of the frameworks we provide all the relevant links in the “List of References” section. Any additional links needed will be added as a footnote in the text.

5.3.1.1. Integrated Modeling Method (IMM™)

The 6th group of processes in the IMM Approach, “6.Provide IT Resources & Services”, is the one referring to IT management within the enterprise. There are three process groups included, which are: (1) provide IT help desk services, (2) develop business application and (3) provide IT infrastructure (Figure 5 of Chapter 3).

5.3.1.2. APQC's Process Classification Framework (PCF)

The 8th process category in PCF, "8.0 – Manage Information Technology (IT)", is the one referring to IT management (Figure 148). It includes seven process groups, which are: (1) develop and manage IT customer relationships, (2) develop and manage IT business strategy, (3) develop and manage IT resilience and risk, (4) manage information, (5) develop and manage services/solutions, (6) deploy services/ solutions and (7) create and manage support services/ solutions.

8.0 Manage Information Technology (IT) (10008)

8.1 Develop and manage IT customer relationships (20608)

- 8.1.1 Understand IT customer needs (20609)
  - 8.1.1.1 Understand IT customer communities (20610)
  - 8.1.1.2 Assess IT customer operational capabilities (20611)
- 8.1.2 Identify IT customer transformation needs (20612)
  - 8.1.2.1 Understand business requirements for IT capabilities (20613)
  - 8.1.2.2 Understand IT landscape(20614)
  - 8.1.2.3 Develop IT visioning (20615)
  - 8.1.2.4 Outline IT service expectations (20616)
- 8.1.3 Plan and communicate IT services (20617)
  - 8.1.3.1 Manage IT customer expectations (20618)
  - 8.1.3.2 Define future IT services (20619)
  - 8.1.3.3 Determine IT performance indicators (20620)
  - 8.1.3.4 Create IT marketing messages (20621)
  - 8.1.3.5 Create IT service marketing plan (20622)
- 8.1.4 Provide IT transformation guidance (20623)
  - 8.1.4.1 Develop IT transformation plans (20624)
  - 8.1.4.2 Collect IT customer requirements (20625)
  - 8.1.4.3 Analyze IT customer requirements (20937)
  - 8.1.4.4 Identify and prioritize IT opportunities (20626)
  - 8.1.4.5 Facilitate solution design activities (20627)
  - 8.1.4.6 Prioritize IT outcomes (20628)
  - 8.1.4.7 Develop business cases (20629)
  - 8.1.4.8 Support business case (20630)
  - 8.1.4.9 Develop transformation roadmap (20631)
- 8.1.5 Develop and manage IT service levels (20632)
  - 8.1.5.1 Understand IT service requirements (20633)
  - 8.1.5.2 Forecast IT service demand (20634)
  - 8.1.5.3 Maintain IT services catalog (20635)
  - 8.1.5.4 Define service level agreement (20636)
  - 8.1.5.5 Maintain IT customer contracts (20637)
  - 8.1.5.6 Negotiate and establish service level agreements (20638)
  - 8.1.5.7 Develop and maintain improvement processes (20640)
- 8.1.6 Manage IT customer relationships (20641)
  - 8.1.6.1 Establish relationship management mechanisms (20642)
  - 8.1.6.2 Understand IT customer strategy (20643)
  - 8.1.6.3 Understand IT customer environment (20644)
  - 8.1.6.4 Communicate IT capabilities (20645)
  - 8.1.6.5 Manage IT requirements (20646)
- 8.1.7 Analyze service performance (20648)
  - 8.1.7.1 Assess SLA compliance (20649)
  - 8.1.7.2 Triage SLA compliance issues (20650)
  - 8.1.7.3 Collect feedback about IT products and services (20647)
  - 8.1.7.4 Synthesize and distribute IT performance information (20938)

8.2 Develop and manage IT business strategy (20652)

- 8.2.1 Define business technology and governance strategy (20653)
  - 8.2.1.1 Build and maintain IT strategic intelligence (20654)
  - 8.2.1.2 Monitor and map current and emerging technologies (20655)
  - 8.2.1.3 Define and communicate digital transformation strategy (20656)
  - 8.2.1.4 Develop IT strategic alignment (20657)
  - 8.2.1.5 Articulate IT alignment principles (20658)
  - 8.2.1.6 Maintain IT strategic alignment (20659)
- 8.2.2 Manage IT portfolio strategy (20660)
  - 8.2.2.1 Establish and validate IT value criteria (20661)
  - 8.2.2.2 Determine IT portfolio investment balance (20662)
  - 8.2.2.3 Evaluate proposed IT investment projects (20663)
  - 8.2.2.4 Prioritize IT projects (20664)
  - 8.2.2.5 Align IT resources to strategic priorities (20665)
  - 8.2.2.6 Align IT portfolio to business objectives (20667)
- 8.2.3 Define and maintain enterprise architecture (20668)
  - 8.2.3.1 Create and publish enterprise architecture principles (20670)
  - 8.2.3.2 Establish and operate enterprise architecture governance (20671)
  - 8.2.3.3 Research technologies to innovate IT services and solutions (20672)
  - 8.2.3.4 Provide input to definition and prioritization of IT projects (20673)
- 8.2.4 Define IT service management strategy (20674)
  - 8.2.4.1 Establish IT service management strategy and goals (20675)
  - 8.2.4.2 Identify IT service operating and process requirements (20676)
  - 8.2.4.3 Define IT service catalog (20677)
  - 8.2.4.4 Establish IT service management framework (20678)
  - 8.2.4.5 Define and implement IT service management (20679)
  - 8.2.4.6 Define and deploy support service management process tools and methods (20680)
  - 8.2.4.7 Monitor and report IT performance (20681)
- 8.2.5 Control IT management system (20682)
  - 8.2.5.1 Determine IT performance measures (20683)
  - 8.2.5.2 Define IT control points and assurance procedures governance model (20684)

8.2.5.3 Monitor and analyze overall IT performance (20685)

8.2.5.4 Monitor and analyze IT financial performance (20686)

8.2.5.5 Monitor and analyze IT value and benefits (20687)

8.2.5.6 Optimize IT resource allocation (20688)

8.2.5.7 Manage IT projects and services interdependencies (20689)

8.2.5.8 Report IT service and project performance (20690)

8.2.5.9 Select, deploy, and operate IT performance analytics tools (20692)

8.2.6 Manage IT value portfolio (20693)

8.2.6.1 Assess performance against IT service and project value criteria (20694)

8.2.6.2 Quantify value of IT service and project portfolio investments (20695)

8.2.6.3 Communicate business technology value contribution (20696)

8.2.6.4 Determine and implement IT portfolio adjustments (20697)

8.2.7 Define and manage technology innovation (20699)

8.2.7.1 Establish selection criteria for research initiatives (20700)

8.2.7.2 Analyze emerging technology concepts (20701)

8.2.7.3 Identify technology concepts and capabilities (20702)

8.2.7.4 Execute IT research projects (20703)

8.2.7.5 Evaluate IT research project outcomes (20939)

8.2.7.6 Identify and promote viable concepts (20704)

8.2.7.7 Develop and plan IT investment projects (20705)

8.3 Develop and manage IT resilience and risk (20706)

8.3.1 Develop IT compliance, risk, and security strategy (20707)

8.3.1.1 Determine and evaluate IT regulatory and audit requirements (20708)

8.3.1.2 Understand business unit risk tolerance (20940)

8.3.1.3 Establish IT risk tolerance (20709)

8.3.1.4 Establish risk ownership (20710)

8.3.1.5 Establish and maintain risk management roles (20711)

8.3.1.6 Establish compliance objectives (20712)

8.3.1.7 Identify systems to support compliance (20941)

8.3.1.8 Identify and evaluate IT risk (20713)

8.3.1.9 Evaluate IT-related risks resiliency (20714)

8.3.1.10 Create IT risk mitigation strategies and approaches (20715)

8.3.2 Develop IT resilience strategy (20716)

8.3.2.1 Determine IT delivery resiliency (20717)

8.3.2.2 Determine critical IT risks (20718)

8.3.2.3 Prioritize IT risks (20719)

8.3.2.4 Establish mitigation approaches for IT risks (20720)

8.3.3 Control IT risk, compliance, and security (20721)

8.3.3.1 Evaluate enterprise regulatory and compliance obligations (20722)

8.3.3.2 Analyze IT security threat impact (20723)

8.3.3.3 Create and maintain IT compliance requirements (20724)

8.3.3.4 Create and maintain IT security policies, standards, and procedures (20942)

8.3.3.5 Develop and deploy risk management training (20725)

8.3.3.6 Establish risk reporting capabilities and responsibilities (20726)

8.3.3.7 Establish communication standards (20727)

8.3.3.8 Conduct IT risk and threat assessments (20728)

8.3.3.9 Monitor and manage IT activity risk (20729)

8.3.3.10 Identify, supervise and monitor IT risk mitigation measures (20730)

8.3.4 Plan and manage IT continuity (20731)

8.3.4.1 Evaluate IT continuity (20732)

8.3.4.2 Identify IT continuity gaps (20733)

8.3.4.3 Manage IT business continuity (20734)

8.3.5 Develop and manage IT security, privacy, and data protection (20735)

8.3.5.1 Assess IT regulatory and confidentiality requirements and policies (20736)

8.3.5.2 Create IT security, privacy, and data protection risk governance (20737)

8.3.5.3 Define IT data security and privacy policies, standards, and procedures (20738)

8.3.5.4 Review and monitor physical and logical IT data security measures (20739)

8.3.5.5 Review and monitor application security controls (20740)

8.3.5.6 Review and monitor IT physical environment security controls (20741)

8.3.5.7 Monitor/analyze network intrusion detection data and resolve threats (20742)

8.3.6 Conduct and analyze IT compliance assessments (20743)

8.3.6.1 Conduct projects to enhance IT compliance and remediate risk (20744)

8.3.6.2 Conduct IT compliance control auditing of internal and external services (20745)

8.3.6.3 Perform IT compliance reporting (20746)

8.3.6.4 Identify and escalate IT compliance issues and remediation requirements (20747)

8.3.6.5 Support external audits and reports (20748)

8.3.7 Develop and execute IT resilience and continuity operations (20749)

8.3.7.1 Conduct IT resilience improvement projects (20750)

8.3.7.2 Develop, document, and maintain IT business

continuity planning (20751)

8.3.7.3 Implement and enforce change control procedures (20752)

8.3.7.4 Execute recurring IT service provider business continuity (20753)

8.3.7.5 Provide IT resilience training (20754)

8.3.7.6 Execute recurring IT business operations continuity (20755)

8.3.8 Manage IT user identity and authorization (20756)

8.3.8.1 Support integration of identity and authorization policies (20757)

8.3.8.2 Manage IT user directory (20758)

8.3.8.3 Manage IT user authorization (20759)

8.3.8.4 Manage IT user authentication mechanisms (20760)

8.3.8.5 Audit IT user identity and authorization systems (20761)

8.3.8.6 Respond to IT information security and network breaches (20762)

8.3.8.7 Conduct penetration testing (20763)

8.3.8.8 Audit integration of user identity and authorization systems (20764)

8.4 Manage information (20765)

8.4.1 Define business information and analytics strategy (20766)

8.4.1.1 Establish data, information, and analytic objectives (20767)

8.4.1.2 Establish data, information, and analytic governance (20768)

8.4.1.3 Access IT data/analytic capabilities (20769)

8.4.2 Define and maintain business information architecture (20770)

8.4.2.1 Determine enterprise business information requirements (20771)

8.4.2.2 Define enterprise data models (20772)

8.4.2.3 Identify and understand external data sources (20773)

8.4.2.4 Establish data ownership and stewardship responsibilities (20774)

8.4.2.5 Maintain and evolve enterprise data and information architecture (20775)

8.4.3 Define and execute business information lifecycle planning and control (20776)

8.4.3.1 Define and maintain enterprise information policies, standards, and procedures (20777)

8.4.3.2 Implement and execute data administration responsibilities (20778)

8.4.4 Manage business information content (20779)

8.4.4.1 Monitor and control business information (20780)

8.4.4.2 Maintain business information feeds and repositories (20781)

8.4.4.3 Perform internal usage audits (20782)

8.4.4.4 Implement and administer business information access (20783)

8.5 Develop and manage services/solutions (20784)

8.5.1 Develop service/solution and integration strategy (20785)

8.5.1.1 Determine IT service/solution development (20786)

8.5.1.2 Define IT service/solution development processes/standards (20787)

8.5.1.3 Identify, deploy, and support development methodologies and tools (20788)

8.5.1.4 Establish service component criteria (20789)

8.5.1.5 Understand and select reusable service components (20790)

8.5.1.6 Maintain service component portfolio (20791)

8.5.1.7 Establish development standards exception governance (20792)

8.5.2 Manage service/solution lifecycle planning (20793)

8.5.2.1 Monitor and track emerging technology capabilities (20794)

8.5.2.2 Identify IT services/solutions (20795)

8.5.2.3 Determine IT service/solution approach (20796)

8.5.2.4 Define IT solution lifecycle (20797)

8.5.2.5 Develop IT service/solution "sunset" plans (20798)

8.5.3 Develop and manage service/solution architecture (20799)

8.5.3.1 Assess IT application and infrastructure architecture constraints (20800)

8.5.3.2 Assess business constraints on IT service/solution (20801)

8.5.3.3 Determine IT component integration requirements (20802)

8.5.3.4 Identify opportunities for IT component reuse (20803)

8.5.3.5 Promote adoption of existing service/solution architecture (20804)

8.5.3.6 Develop and maintain service/solution architectures (20805)

8.5.3.7 Assess IT service/solution architecture conformance (20806)

8.5.3.8 Manage architectural exceptions (20807)

8.5.4 Execute IT service/solution creation and testing (20808)

8.5.4.1 Execute IT service/solution development lifecycle (20809)

8.5.4.1.1 Assess and validate IT service/solution requirements (20810)

8.5.4.1.2 Create service/solution design (20811)

8.5.4.1.3 Build and test IT service/solution components (20812)

8.5.4.1.4 Integrate IT components and services (20813)

8.5.4.1.5 Execute IT service/solution validation (20814)

8.5.4.1.6 Bundle service/solution deployment packaging (20815)

8.5.4.1.7 Manage service/solution process exceptions (20816)

8.5.5 Perform service/solution maintenance and testing (20817)

8.5.5.1 Execute IT service/solution maintenance lifecycle (20818)

8.5.5.1.1 Assess IT remediation (20819)

8.5.5.1.2 Modify service/solution design (20820)

8.5.5.1.3 Perform IT service/solution remediation (20821)

8.5.5.1.4 Manage service/solution operations (20822)

8.5.5.1.5 Prepare fixed/enhanced service/solution packaging (20823)

8.6 Deploy services/solutions (20824)

8.6.1 Develop and manage service/solution deployment strategy (20825)

8.6.1.1 Assess IT deployment business impact (20826)

8.6.1.2 Establish IT deployment policies (20827)

8.6.1.3 Define and create deployment procedure workflow (20828)

8.6.1.4 Define IT change/release standards (20829)

8.6.1.5 Assign deployment approval responsibilities (20830)

8.6.1.6 Analyze deployments outcomes (20831)

8.6.2 Plan service and solution implementation (20832)

8.6.2.1 Assess IT deployment risk (20833)

8.6.2.2 Define implementation schedule and roll-out sequence (20834)

8.6.2.3 Determine implementation requirements (20835)

8.6.2.4 Plan and align user testing and resources (20836)

8.6.2.5 Develop IT training (20837)

8.6.2.6 Create implementation communications (20838)

8.6.2.7 Manage IT roll-back procedures (20839)

8.6.3 Manage change deployment control (20840)

8.6.3.1 Assess IT change/release impact (20841)

8.6.3.2 Confirm change/release compliance (20842)

8.6.3.3 Assess IT change/release risk (20843)

8.6.3.4 Consolidate IT change (20844)

8.6.3.5 Create and communicate deployment schedule (20845)

8.6.3.6 Approve change/release deployment (20846)

8.6.3.7 Document IT change/release outcome (20847)

8.6.4 Implement technology solutions (20848)

8.6.4.1 Confirm hardware/software operational status (20849)

8.6.4.2 Confirm operational availability (20850)

8.6.4.3 Execute internal IT implementation plan (20851)

8.6.4.4 Confirm implementation completion (20852)

8.6.4.5 Implement software change/release (20853)

8.6.4.6 Perform post-installation testing (20854)

8.6.4.7 Distribute software components network-wide (20855)

8.6.4.8 Verify change/release implementation success (20856)

8.6.4.9 Execute roll-back plan (20857)

8.6.5 Perform service and solution rollout (20858)

8.6.5.1 Conduct IT training (20859)

8.6.5.2 Prepare and distribute service/solution communications (20860)

8.6.5.3 Support organizational changes (20861)

8.6.5.4 Execute rollout plans (20862)

8.6.5.5 Provide rollout support (20863)

8.6.5.6 Manage rollout support capabilities (20864)

8.6.5.7 Monitor and record rollout issues (20865)

8.7 Create and manage support services/solutions (20866)

8.7.1 Define and establish service delivery strategy (20867)

8.7.1.1 Assess business objectives and IT service delivery (20868)

8.7.1.2 Define IT service delivery portfolio (20869)

8.7.1.3 Create and maintain IT service delivery model (20870)

8.7.1.4 Determine IT service delivery locations and activities (20871)

8.7.1.5 Define IT service delivery sourcing strategy (20872)

8.7.2 Define and develop service support strategy (20873)

8.7.2.1 Assess business objectives and IT service support delivery (20874)

8.7.2.2 Define IT service support portfolio (20875)

8.7.2.3 Create and maintain IT support model (20876)

8.7.2.4 Develop IT support service sourcing strategy (20877)

8.7.2.5 Establish support service framework (20878)

8.7.2.6 Provide service support tools and technology (20879)

8.7.3 Plan and manage service delivery control (20880)

8.7.3.1 Plan operational activities for IT service delivery (20881)

8.7.3.1.1 Schedule service delivery resources (20882)

8.7.3.1.2 Maintain/optimize batch job schedule (20883)

8.7.3.1.3 Schedule change/release windows (20884)

8.7.3.1.4 Schedule/optimize backup and archive activities (20885)

8.7.3.1.5 Balance operational workloads across available infrastructure components (20886)

8.7.3.1.6 Determine specific problem support procedures (20887)

8.7.4 Develop and manage infrastructure resource planning (20888)
- 8.7.4.1 Develop IT service delivery strategy (20889)
- 8.7.4.2 Assess IT infrastructure business objectives (20890)
- 8.7.4.3 Determine ongoing IT infrastructure capabilities (20891)
- 8.7.4.4 Plan IT infrastructure change (20892)
- 8.7.4.5 Plan and budget IT license usage volumes (20893)

8.7.5 Define service support planning (20895)
- 8.7.5.1 Understand IT support demand patterns (20896)
- 8.7.5.2 Determine required support resource levels, responsibilities, and capabilities (20897)
- 8.7.5.3 Maintain service support knowledge repository (20898)
- 8.7.5.4 Maintain service support learning (20943)
- 8.7.5.5 Communicate service support needs (20899)
- 8.7.5.6 Define IT escalation mechanisms (20900)
- 8.7.5.7 Manage IT service support resources (20901)
- 8.7.5.8 Coordinate with external support providers (20902)
- 8.7.5.9 Triage IT service delivery incidents (20903)
- 8.7.5.10 Monitor IT service support performance (20904)

8.7.6 Develop and manage service delivery operations (20905)
- 8.7.6.1 Operate and monitor online systems (20906)
- 8.7.6.2 Run and monitor batch job schedule (20907)
- 8.7.6.3 Manage service delivery workloads (20908)
- 8.7.6.4 Manage infrastructure performance and capacity (20909)
- 8.7.6.5 Respond to unplanned operational issues (20910)
- 8.7.6.6 Produce and distribute output media (20911)
- 8.7.6.7 Monitor IT infrastructure security (20912)
- 8.7.6.8 Manage IT infrastructure/data recovery (20913)

8.7.7 Manage infrastructure resource administration (20914)
- 8.7.7.1 Manage infrastructure configuration (20915)
- 8.7.7.2 Perform infrastructure component maintenance (20916)
- 8.7.7.3 Install/configure/upgrade infrastructure components (20917)
- 8.7.7.4 Maintain IT asset records (20918)
- 8.7.7.5 Administer IT licenses/user agreements (20919)
- 8.7.7.6 Provide IT infrastructure service and capabilities (20920)

8.7.8 Operate IT user support (20921)
- 8.7.8.1 Triage IT issues/requests (20922)
- 8.7.8.2 Provide IT resolution capabilities (20923)
- 8.7.8.3 Manage IT user requests (20925)
- 8.7.8.4 Escalate IT requests (20926)
- 8.7.8.5 Resolve IT issues/requests (20927)
- 8.7.8.6 Execute IT continuity and recovery action (20928)

Figure 148: 8.0 Manage Information Technology (IT) (APQC, 2018, p.18-22)

Each of these process groups includes between four and eight process sub-groups, of the 44 in total. In general PCF has 320 processes for IT management.

5.3.1.3. SCOR

Moving on to the SCOR model, there are two process groups in the "Enable" category that are useful for this chapter's comparison, the "sE3 – Manage Supply Chain Data and Information" and the "sE11 – Manage Supply Chain Technology".

The first one includes six process groups and the second one seven, as shown in Figure 149.

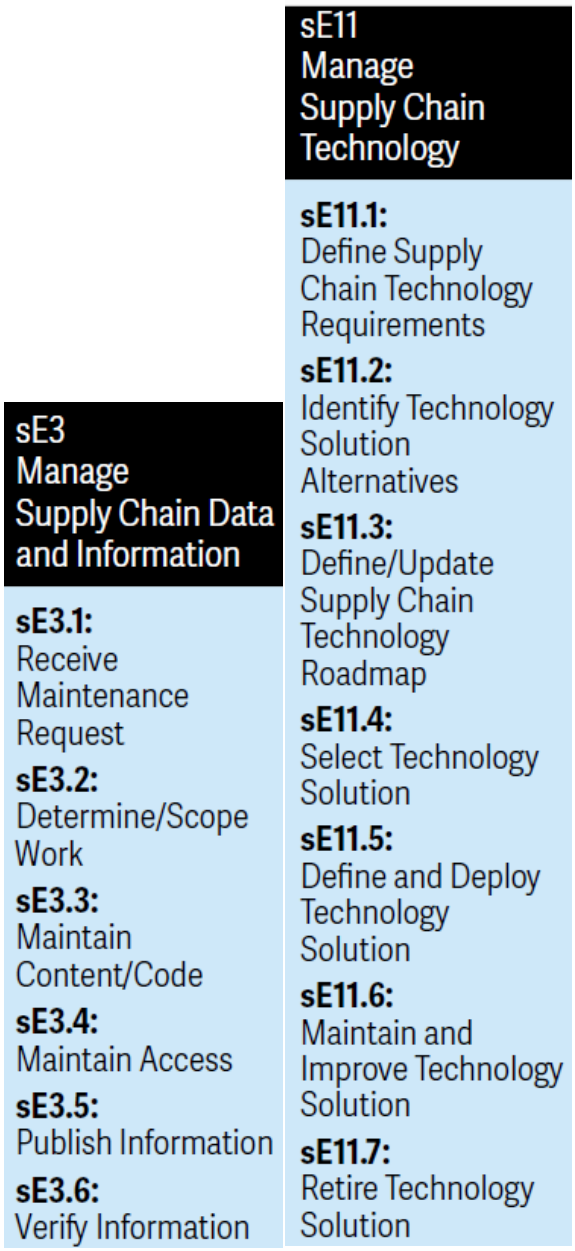


Figure 149: The process groups included in the categories sE3 and sE11 of the SCOR model (APICS, 2017, p.3)

As mentioned before, this is the highest level of analysis in the SCOR model. If a company chooses to use SCOR, they have to define their own processes at this point.

5.3.1.4. Business Process Framework (eTOM)

If we now turn to eTOM framework, we can see that the "Enterprise Domain" includes a business process category with data- related processes, and the "Common Enterprise Processes" (Figure 150). We will study three process groups for the comparison of the frameworks, which are: (1) data analytics, (2) data governance

and (3) data management. The contents of each group are shown in Figure 151, Figure 152 and Figure 153.

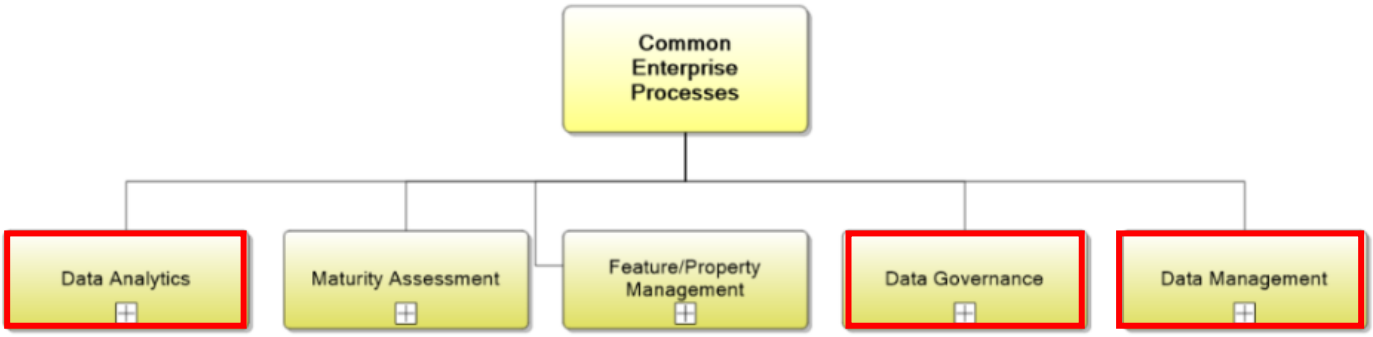


Figure 150: The "Common Enterprise Processes" category of processes (TM Forum, 2016)

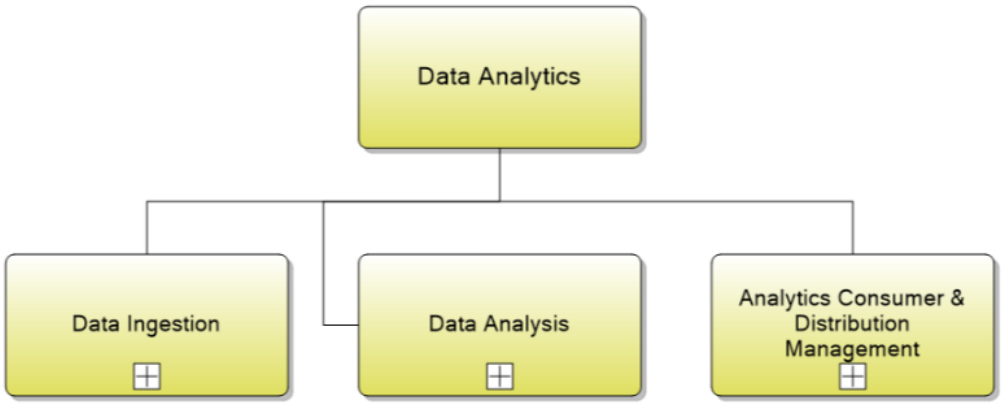


Figure 151: The "Data Analytics" group of processes (TM Forum, 2016)

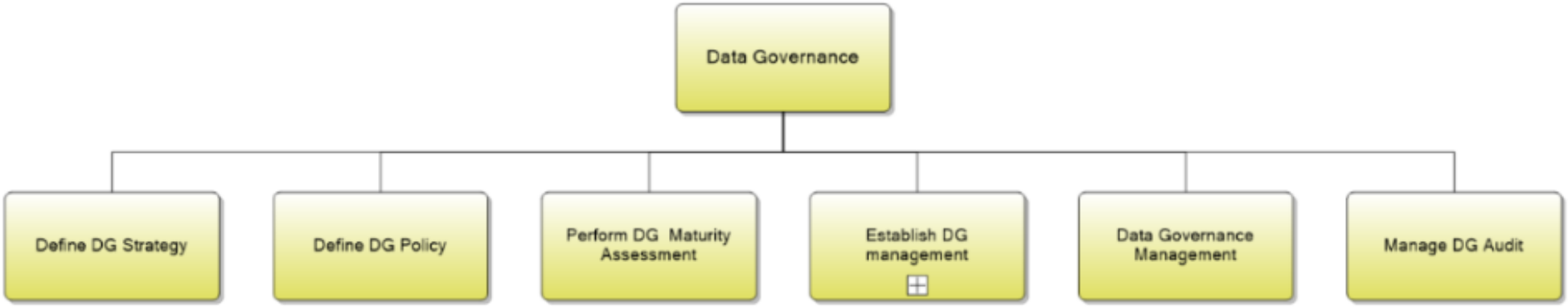


Figure 152: The "Data Governance" group of processes (TM Forum, 2016)

Figure 153: The "Data Management" group of processes (TM Forum, 2016)

Moving on to the “IT management”, we will study all the process groups from the “Resource Domain” (Figure 154), apart from the “Workforce Management” that is no IT-relevant. The contents of each group are shown in Figure 155-Figure 163.

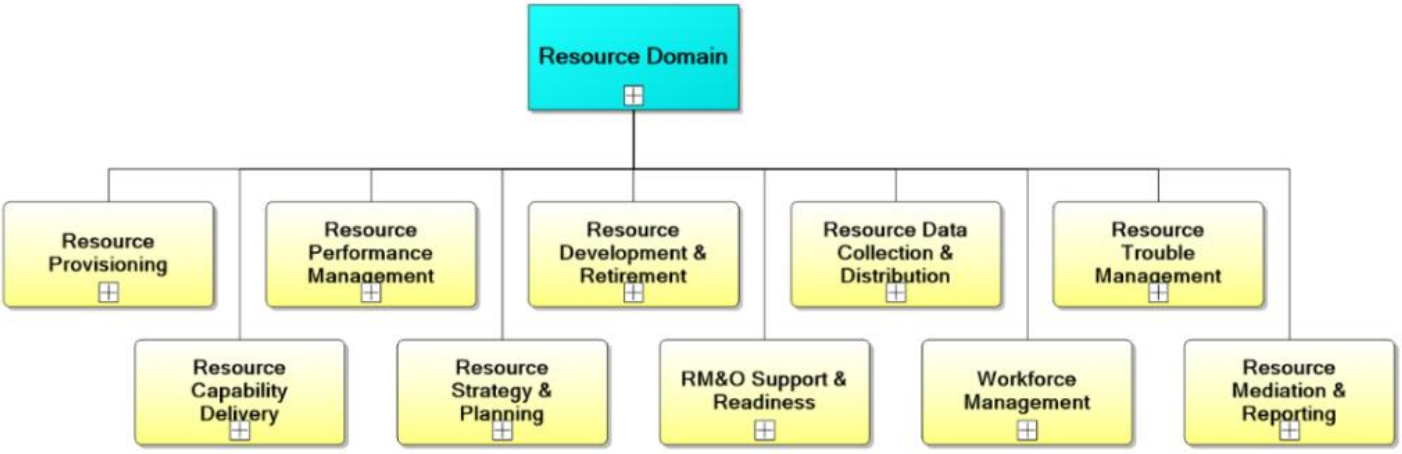


Figure 154: The "Resource Domain" of the eTOM model (TM Forum, 2016)

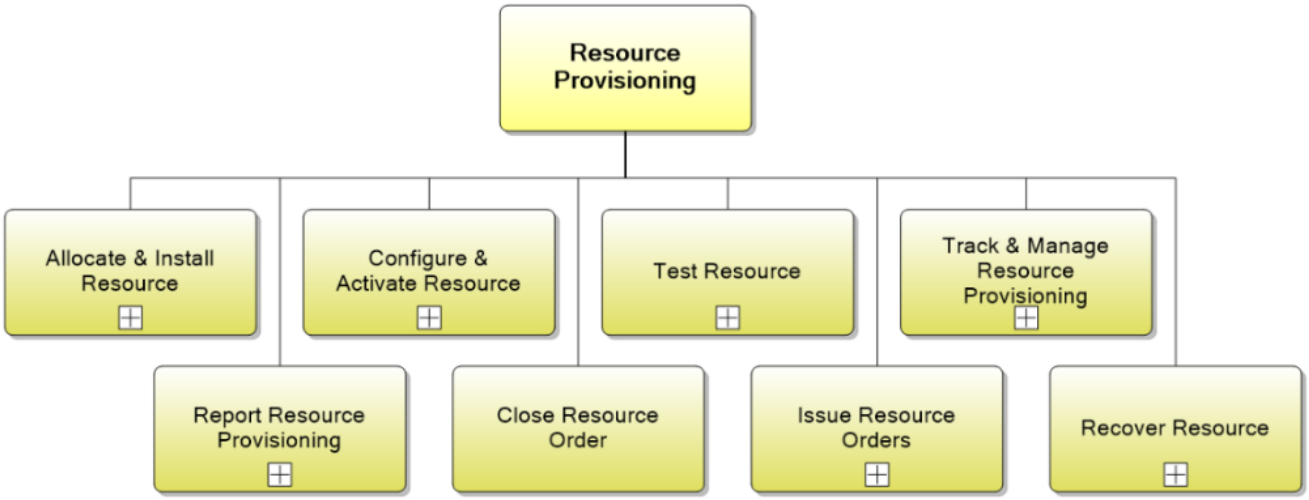


Figure 155: The "Resource Provisioning" group of processes (TM Forum, 2016)

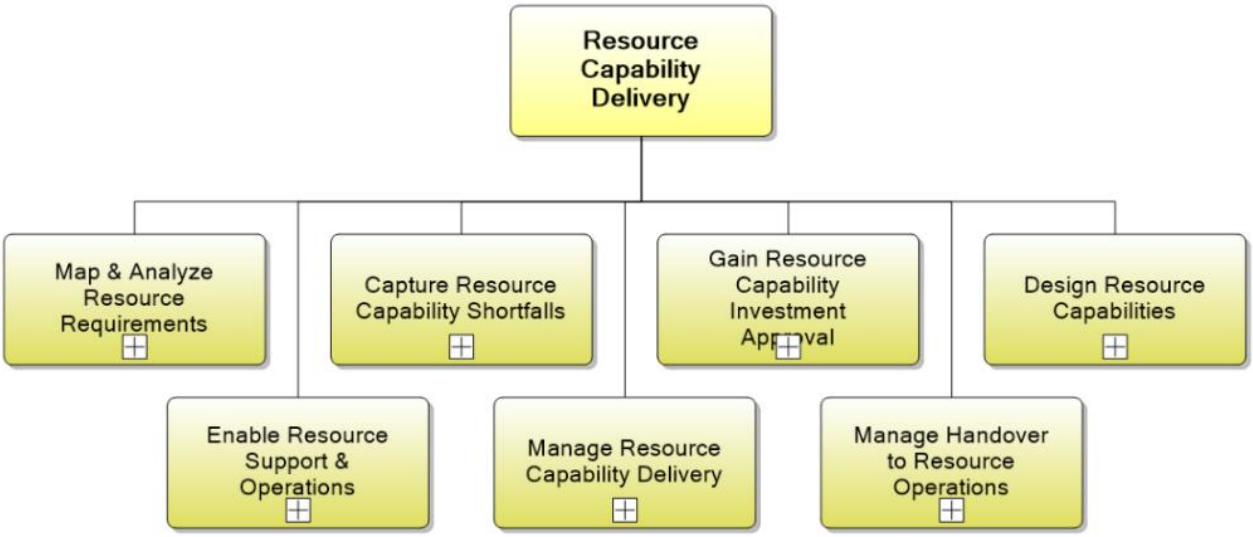


Figure 156: The "Resource Capability Delivery" group of processes (TM Forum, 2016)

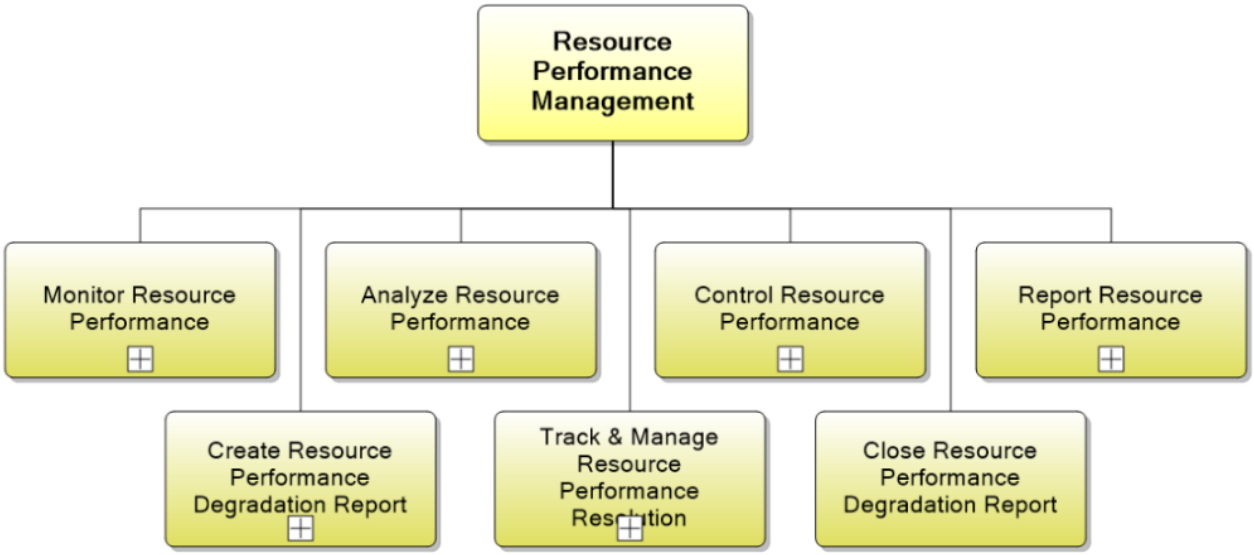


Figure 157: The "Resource Performance Management" group of processes (TM Forum, 2016)

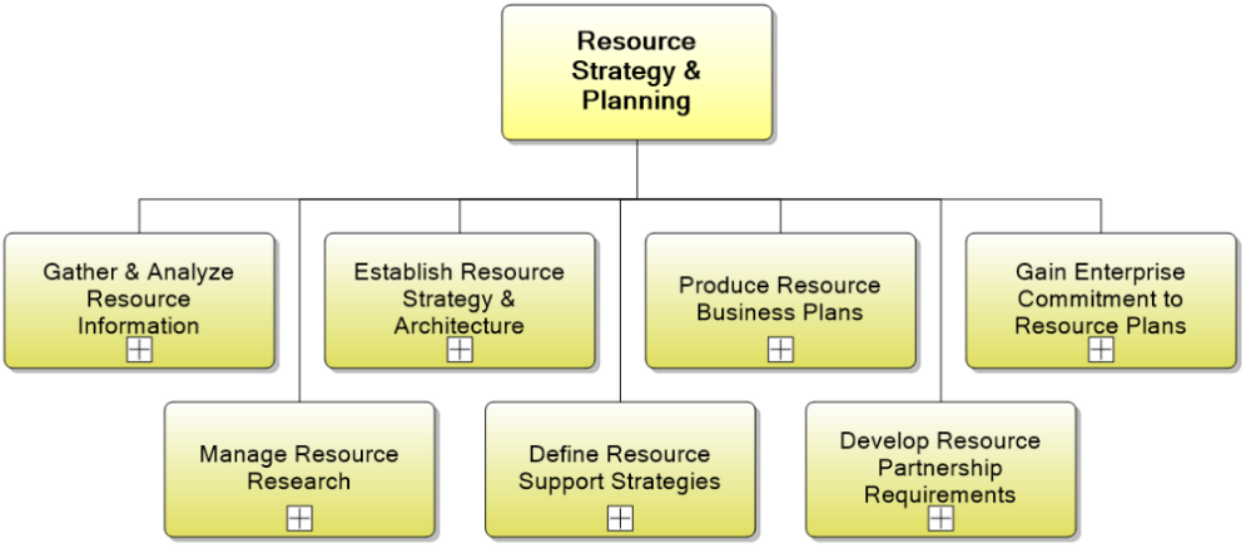


Figure 158: The "Resource Strategy & Planning" group of processes (TM Forum, 2016)

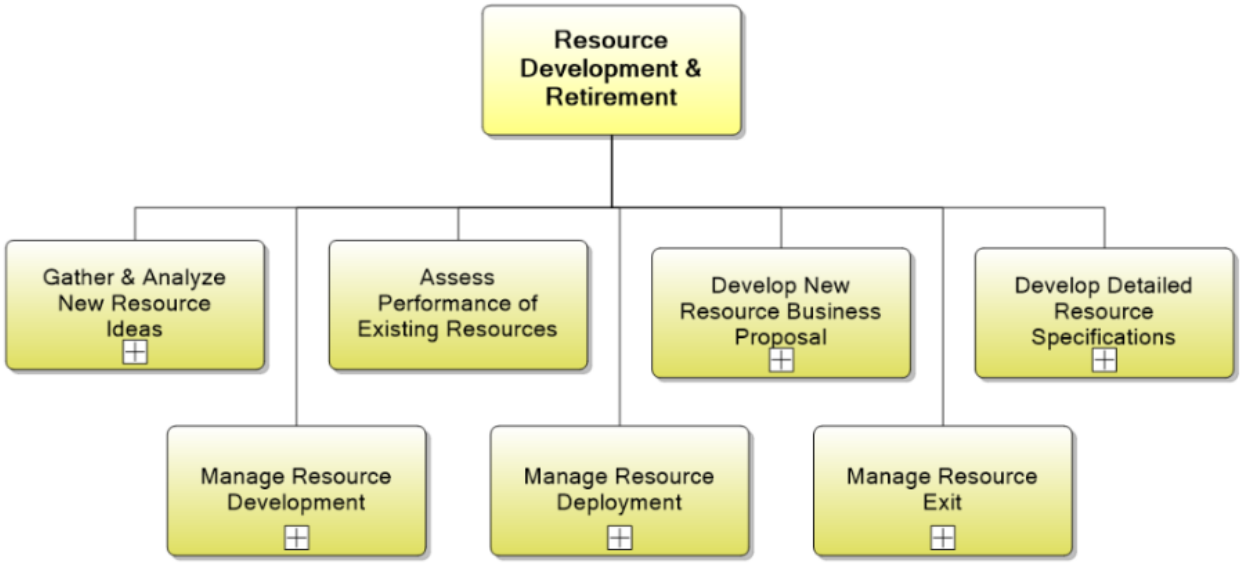


Figure 159: The "Resource Development & Retirement" group of processes (TM Forum, 2016)

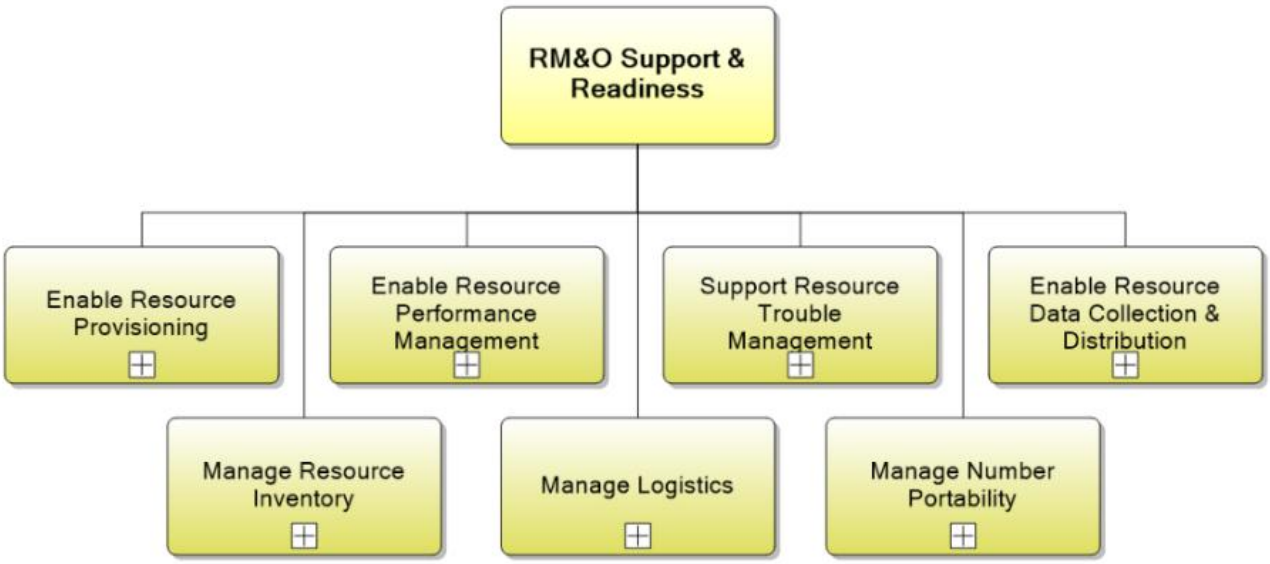


Figure 160: The "RM&O Support & Readiness" group of processes (TM Forum, 2016)

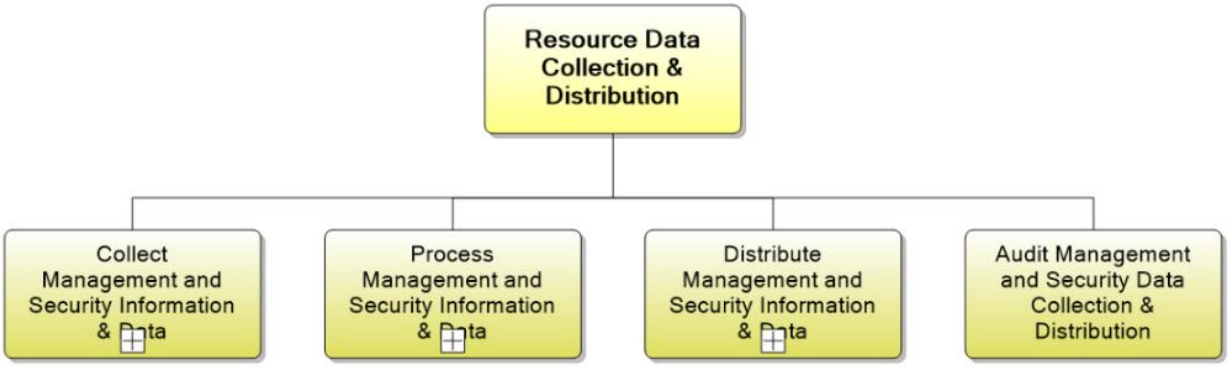


Figure 161: The "Resource Data Collection & Distribution" group of processes (TM Forum, 2016)

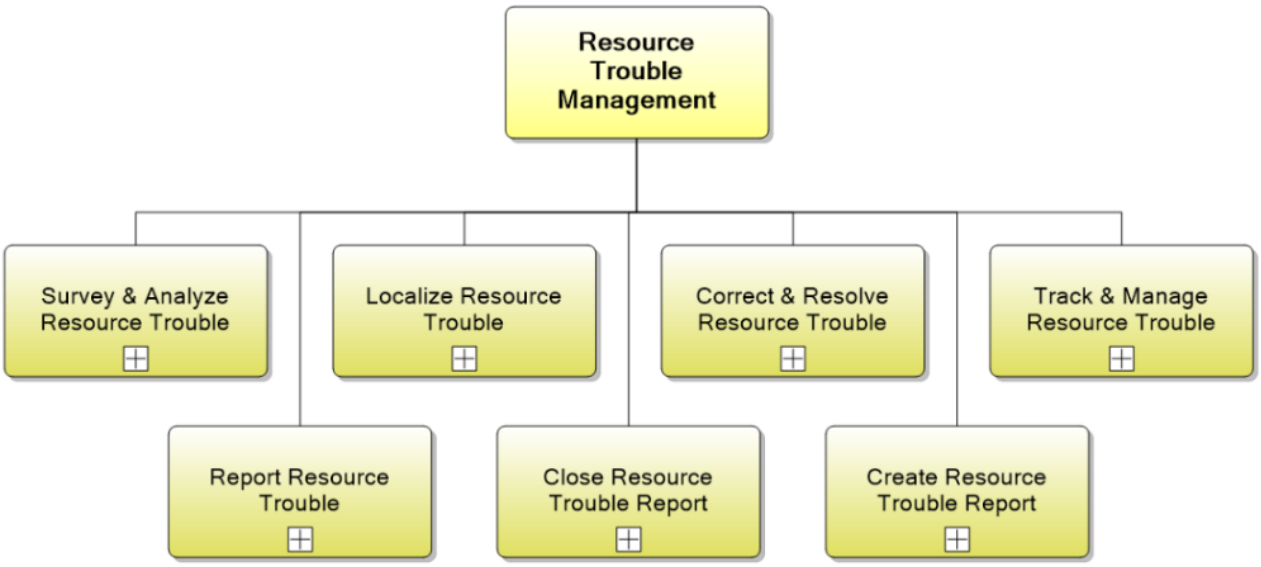


Figure 162: The "Resource Trouble Management" group of processes (TM Forum, 2016)

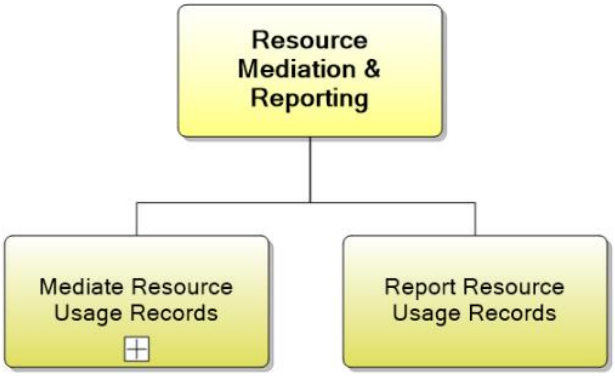


Figure 163: The "Resource Mediation & Reporting" group of processes (TM Forum, 2016)

The eTOM framework also includes some of the Information Technology Infrastructure Library (ITIL) processes, for the enterprises that wish to follow these guidelines. However, since ITIL is a different model, we will not include those processes in the comparison.

5.3.1.5. COBIT

As mentioned before, COBIT is an IT management framework. It helps organizations in achieving their IT-related goals. This is the reason why this model is the most detailed one regarding the "Information Technology" process area. For the comparison of the frameworks we will study 17 process categories, as these were the ones including processes about IT systems and data management.

These categories are: (1) EDM02 - Ensured Benefits Delivery, (2) EDM04 - Ensured Resource Optimization, (3) APO01 - Managed I&T Management Framework, (4) APO03 - Managed Enterprise Architecture, (5) APO09 - Managed Service Agreements, (6) APO10 - Managed Vendors, (7) APO11 - Managed Quality, (8) APO12 - Managed Risk, (9) APO13 - Managed Security, (10) APO14 - Managed Data, (11) BAI04 - Managed Availability and Capacity, (12) BAI06 - Managed IT Changes, (13) BAI07 - Managed IT Change Acceptance and Transitioning, (14) BAI10. Managed Configuration, (15) BAI08 - Managed Knowledge, (16) DSS01 - Managed Operations, (17) DSS04 - Managed Continuity and (18) DSS05 - Managed Security Services.

The 14th group was presented in the "Product Management" process area (Figure 68). The contents of the rest of the categories are shown in Figure 164-Figure 180.

Key Governance Practice
EDM02.01 Establish the target investment mix.
EDM02.02 Evaluate value optimization.
EDM02.03 Direct value optimization.
EDM02.04 Monitor value optimization.

Figure 164: "EDM02 - Ensured Benefits Delivery" group of processes (ISACA, 2018, p.37)

Key Governance Practice
EDM04.01 Evaluate resource management.
EDM04.02 Direct resource management.
EDM04.03 Monitor resource management.

Figure 165: "EDM04 - Ensured Resource Optimization" group of processes (ISACA, 2018, p.47)

Key Management Practice
APO01.01 Design the management system for enterprise I&T.
APO01.02 Communicate management objectives, direction and decisions made.
APO01.03 Implement management processes (to support the achievement of governance and management objectives).
APO01.04 Define and implement the organizational structures.
APO01.05 Establish roles and responsibilities.
APO01.06 Optimize the placement of the IT function.
APO01.07 Define information (data) and system ownership.
APO01.08 Define target skills and competencies.
APO01.09 Define and communicate policies and procedures.
APO01.10 Define and implement infrastructure, services and applications to support the governance and management system.
APO01.11 Manage continual improvement of the I&T management system.

Figure 166: "APO01 - Managed I&T Management Framework" group of processes (ISACA, 2018, p.60)

Key Management Practice
APO03.01 Develop the enterprise architecture vision.
APO03.02 Define reference architecture.
APO03.03 Select opportunities and solutions.
APO03.04 Define architecture implementation.
APO03.05 Provide enterprise architecture services.

Figure 167: "APO03 - Managed Enterprise Architecture" group of processes (ISACA, 2018, p.77)

Key Management Practice
APO09.01 Identify I&T services.
APO09.02 Catalog I&T-enabled services.
APO09.03 Define and prepare service agreements.
APO09.04 Monitor and report service levels.
APO09.05 Review service agreements and contracts.

Figure 168: "APO09 - Managed Service Agreements" group of processes (ISACA, 2018, p.115)

Key Management Practice
APO10.01 Identify and evaluate vendor relationships and contracts.
APO10.02 Select vendors.
APO10.03 Manage vendor relationships and contracts.
APO10.04 Manage vendor risk.
APO10.05 Monitor vendor performance and compliance.

Figure 169: "APO10 - Managed Vendors" group of processes (ISACA, 2018, p.122)

Key Management Practice
APO11.01 Establish a quality management system (QMS).
APO11.02 Focus quality management on customers.
APO11.03 Manage quality standards, practices and procedures and integrate quality management into key processes and solutions.
APO11.04 Perform quality monitoring, control and reviews.
APO11.05 Maintain continuous improvement.

Figure 170: "APO11 - Managed Quality" group of processes (ISACA, 2018, p.128)

Key Management Practice
APO12.01 Collect data.
APO12.02 Analyze risk.
APO12.03 Maintain a risk profile.
APO12.04 Articulate risk.
APO12.05 Define a risk management action portfolio.
APO12.06 Respond to risk.

Figure 171: "APO12 - Managed Risk" group of processes (ISACA, 2018, p.134)

Key Management Practice
APO13.01 Establish and maintain an information security management system (ISMS).
APO13.02 Define and manage an information security and privacy risk treatment plan.
APO13.03 Monitor and review the information security management system (ISMS).

Figure 172: "APO13 - Managed Security" group of processes (ISACA, 2018, p.141)

Key Management Practice
APO14.01 Define and communicate the organization's data management strategy and roles and responsibilities.
APO14.02 Define and maintain a consistent business glossary.
APO14.03 Establish the processes and infrastructure for metadata management.
APO14.04 Define a data quality strategy.
APO14.05 Establish data profiling methodologies, processes and tools.
APO14.06 Ensure a data quality assessment approach.
APO14.07 Define the data cleansing approach.
APO14.08 Manage the life cycle of data assets.
APO14.09 Support data archiving and retention.
APO14.10 Manage data backup and restore arrangements.

Figure 173: "APO14 - Managed Data" group of processes (ISACA, 2018, p.147)

Key Management Practice
BAI04.01 Assess current availability, performance and capacity and create a baseline.
BAI04.02 Assess business impact.
BAI04.03 Plan for new or changed service requirements.
BAI04.04 Monitor and review availability and capacity.
BAI04.05 Investigate and address availability, performance and capacity issues.

Figure 174: "BAI04 - Managed Availability and Capacity" group of processes (ISACA, 2018, p.183)

Key Management Practice
BAI06.01 Evaluate, prioritize and authorize change requests.
BAI06.02 Manage emergency changes.
BAI06.03 Track and report change status.
BAI06.04 Close and document the changes.

Figure 175: "BAI06 - Managed IT Changes" group of processes (ISACA, 2018, p.195)

Key Management Practice
BAI07.01 Establish an implementation plan.
BAI07.02 Plan business process, system and data conversion.
BAI07.03 Plan acceptance tests.
BAI07.04 Establish a test environment.
BAI07.05 Perform acceptance tests.
BAI07.06 Promote to production and manage releases.
BAI07.07 Provide early production support.
BAI07.08 Perform a post-implementation review.

Figure 176: "BAI07 - Managed IT Change Acceptance and Transitioning" group of processes (ISACA, 2018, p.202)

Key Management Practice
BAI08.01 Identify and classify sources of information for governance and management of I&T.
BAI08.02 Organize and contextualize information into knowledge.
BAI08.03 Use and share knowledge.
BAI08.04 Evaluate and update or retire information.

Figure 177: "BAI08 - Managed Knowledge" group of processes (ISACA, 2018, p.207)

Key Management Practice
DSS01.01 Perform operational procedures.
DSS01.02 Manage outsourced I&T services.
DSS01.03 Monitor I&T infrastructure.
DSS01.04 Manage the environment.
DSS01.05 Manage facilities.

Figure 178: "DSS01 - Managed Operations" group of processes (ISACA, 2018, p.234)

Key Management Practice
DSS04.01 Define the business continuity policy, objectives and scope.
DSS04.02 Maintain business resilience.
DSS04.03 Develop and implement a business continuity response.
DSS04.04 Exercise, test and review the business continuity plan (BCP) and disaster response plan (DRP).
DSS04.05 Review, maintain and improve the continuity plans.
DSS04.06 Conduct continuity plan training.
DSS04.07 Manage backup arrangements.
DSS04.08 Conduct post-resumption review.

Figure 179: "DSS04 - Managed Continuity" group of processes (ISACA, 2018, p.253)

Key Management Practice
DSS05.01 Protect against malicious software.
DSS05.02 Manage network and connectivity security.
DSS05.03 Manage endpoint security.
DSS05.04 Manage user identity and logical access.
DSS05.05 Manage physical access to I&T assets.
DSS05.06 Manage sensitive documents and output devices.
DSS05.07 Manage vulnerabilities and monitor the infrastructure for security-related events.

Figure 180: "DSS05 - Managed Security Services" group of processes (ISACA, 2018, p.262)

Each of these categories includes between three and 11 processes, of the 93 in total.

There is also one more process group that has one IT-related process, which we will mention in the comparison. The process is named “BAI03.11 Define IT products and services and maintain the service portfolio” and the group it belongs to is “BAI03. Managed Solutions Identification and Build”. We already studied this group in the “Product Management” process area.

5.3.1.6. SAP

By looking at the SAP Best Practices for SAP S/4HANA (on premise) solution package[29], as this is the one we are studying for most of the sections, we see that there are two modules regarding the IT and data management: (1) Application platform and infrastructure and (2) Database and data management.

The first one consists of one process group, which includes three processes (Figure 181). The second one also consists of one process group that has seven processes (Figure 182).

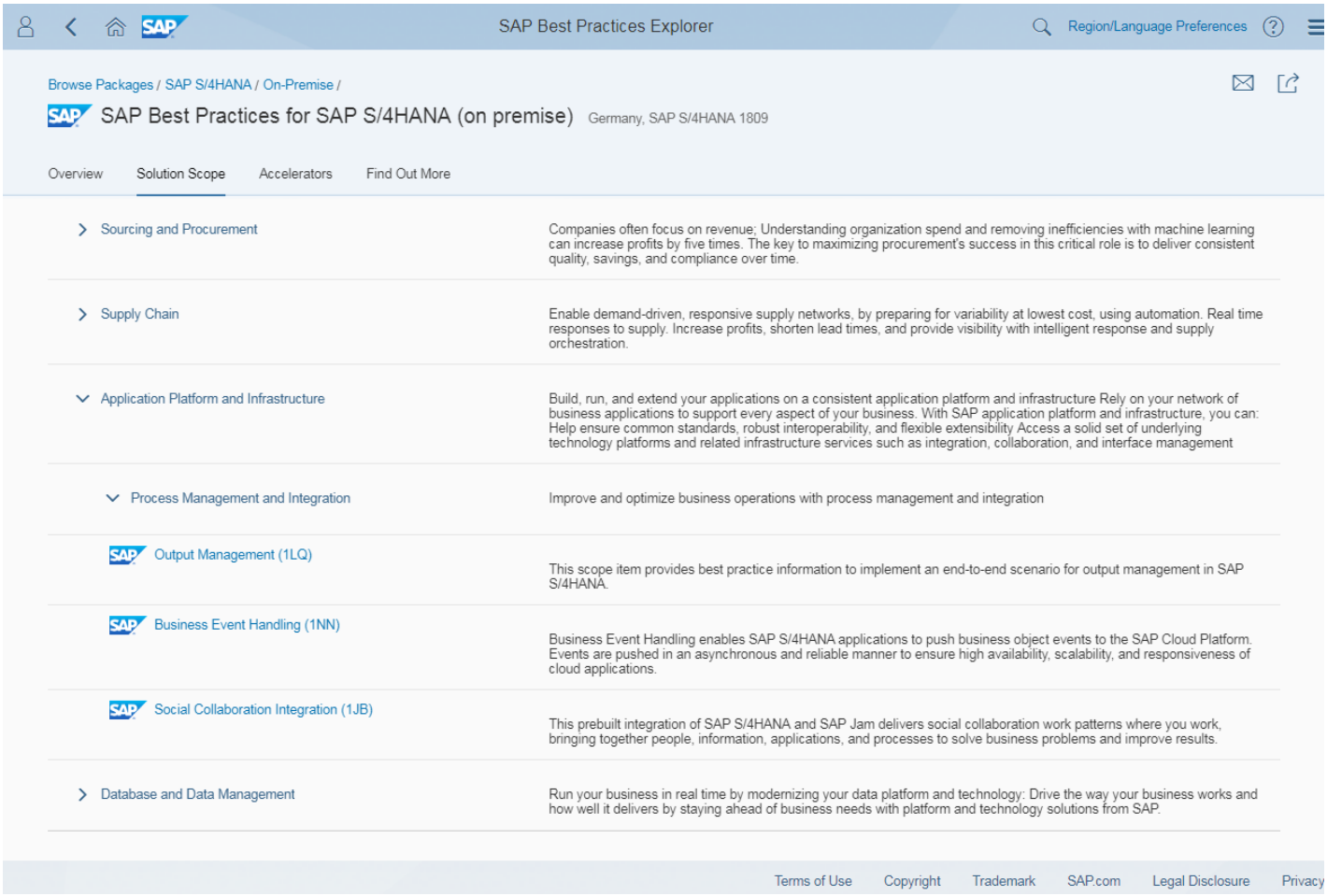


Figure 181: The list of processes included in the "Application and Infrastructure" process group (SAP, 2019)

[29] https://rapid.sap.com/bp/BP_OP_ENTPR (Accessed 24 June 2019)

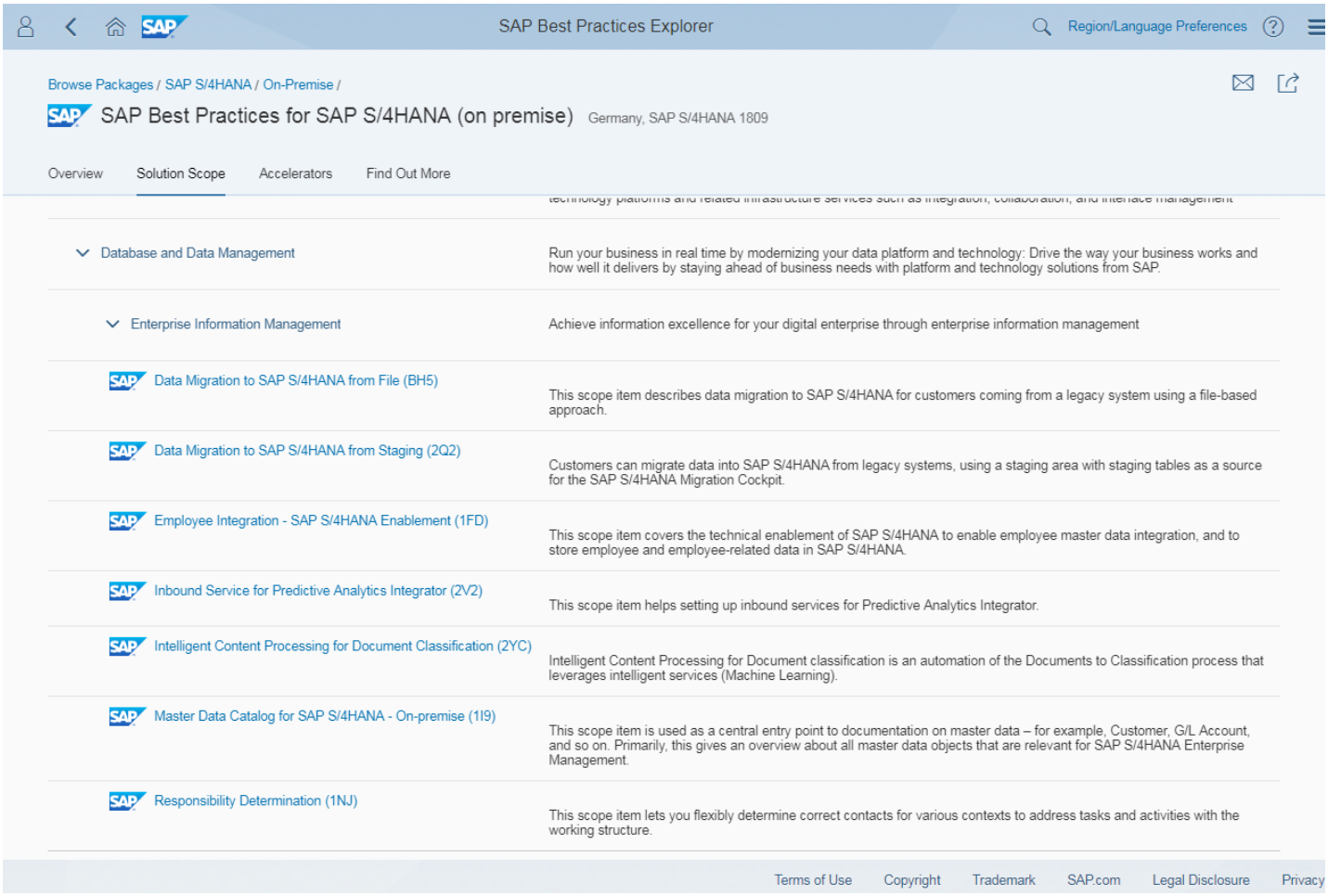


Figure 182: The list of processes included in the "Database and Data Management" process group (SAP, 2019)

5.3.2. Comparison

We will now move on to compare the frameworks. PCF is used as a base for the comparison, as it is the most well known business process framework. The comparison is presented in Table 13.

Table 13: Information Technology & Data frameworks comparison

PCF	IMM	SCOR		eTOM		COBIT		SAP
8.1. Develop and manage IT customer relationships	**MISSING**	**MISSING**		**MISSING**		**MISSING**		**MISSING**
8.2. Develop and manage IT business strategy	**MISSING**	sE11. Manage Supply Chain Technology	sE11.1. Define Supply Chain Technology Requirements	Resource Domain	Resource Provisioning	EDM02. Ensured Benefits Delivery	EDM02.01. Establish the target investment mix	**MISSING**
							EDM02.02. Evaluate value optimization	
							EDM02.03. Direct value optimization	
							EDM02.04. Monitor value optimization	
						EDM04. Ensured Resource Optimizatio	EDM04.01. Evaluate resource management	
					Resource Capability Delivery		EDM04.02. Direct resource management	
							EDM04.03. Monitor resource management	
			sE11.2. Identify Technology Solution Alternatives **(CONCISE)**			APO01. Managed I&T Management Framework	APO01.01. Design the management system for enterprise I&T	
							APO01.02. Communicate management objectives, direction and decisions made	
							APO01.03. Implement management processes	
					Resource Performance Management		APO01.04. Define and implement the organizational structures	
							APO01.06. Optimize the placement of the IT function	
							APO01.08. Define target skills and competencies	

PCF	IMM	SCOR		eTOM		COBIT		SAP
							APO01.11. Manage continual improvement of the I&T management system	
			sE11.3. Define/Update Supply Chain Technology Roadmap **(CONCISE)**		Resource Strategy & Planning **(CONCISE)**	APO03. Managed Enterprise Architecture	APO03.01. Develop the enterprise architecture vision	
							APO03.02. Define reference architecture	
							APO03.03. Select opportunities and solutions	
							APO03.04. Define architecture implementation	
							APO03.05. Provide enterprise architecture services	
						BAI03.Managed Solutions Identification and Build	BAI03.11 Define IT products and services and maintain the service portfolio	
						BAI04. Managed Availability and Capacity	BAI04.01. Assess current availability, performance and capacity and create a baseline	
8.3. Develop and manage IT resilience and risk	**MISSING**	sE3. Manage Supply Chain Data and Information	sE3.5. Publish Information	Common Enterprise Processes	Data management	APO01. Managed I&T Management Framework	APO01.05. Establish roles and responsibilities	**MISSING**
							APO01.09. Define and communicate policies and procedures	
							APO01.11. Manage continual improvement of the I&T management system	

PCF	IMM	SCOR		eTOM		COBIT		SAP
						APO03.Managed Enterprise Architecture	APO03.05. Provide enterprise architecture services	
						APO11. Managed Quality	APO11.01 Establish a quality management system (QMS)	
							APO11.05. Maintain continuous improvement	
						APO12. Managed Risk	APO12.01. Collect data	
							APO12.02. Analyze risk	
							APO12.03. Maintain a risk profile	
							APO12.04. Articulate risk	
							APO12.05. Define a risk management action portfolio	
							APO12.06. Respond to risk	
		sE11. Manage Supply Chain Technology	sE11.6. Maintain and Improve Technology Solution **(CONCISE)**	Resource Domain	Resource Data Collection & Distribution	APO13. Managed Security	APO13.01. Establish and maintain an information security management system (ISMS)	
							APO13.02. Define and manage an information security and privacy risk treatment plan	
							APO13.03. Monitor and review the information security management system (ISMS)	

PCF	IMM	SCOR		eTOM		COBIT		SAP
					Resource Strategy & Planning **(CONCISE)**	DSS01. Managed Operations	DSS01.04. Manage the environment	
							DSS01.05. Manage facilities	
						DSS04. Managed Continuity	DSS04.01. Define the business continuity policy, objectives and scope	
							DSS04.02. Maintain business resilience	
							DSS04.03. Develop and implement a business continuity response	
							DSS04.04. Exercise, test and review the business continuity plan (BCP) and disaster response plan (DRP)	
							DSS04.05. Review, maintain and improve the continuity plans	
							DSS04.06. Conduct continuity plan training	
							DSS04.07. Manage backup arrangements	
							DSS04.08. Conduct post-resumption review	
						DSS05. Managed Security Services	DSS05.01. Protect against malicious software	
							DSS05.04. Manage user identity and logical access	
							DSS05.05. Manage physical access to I&T assets **(CONCISE)**	
8.4. Manage information	**MISSING**	sE3. Manage Supply Chain Data and Information	sE3.4. Maintain Access	Common Enterprise Processes	Data Analytics	APO11. Managed Quality	APO01.07. Define information (data) and system ownership	Database and Data Management **(CONCISE)**

PCF	IMM	SCOR		eTOM		COBIT		SAP
							APO01.09. Define and communicate policies and procedures	
		sE11. Manage Supply Chain Technology	sE11.1. Define Supply Chain Technology Requirements		Data Governance	APO14. Managed Data	APO14.01. Define and communicate the organization's data management strategy and roles and responsibilities	
					Data Management		APO14.02. Define and maintain a consistent business glossary	
							APO14.04. Define a data quality strategy	
							APO14.05. Establish data profiling methodologies, processes and tools	
							APO14.06. Ensure a data quality assessment approach	
			sE11.6. Maintain and Improve Technology Solution	Resource Domain	Resource Data Collection & Distribution	BAI08. Managed Knowledge	BAI08.01. Identify and classify sources of information for governance and management of I&T	
							BAI08.02. Organize and contextualize information into knowledge	
					Resource Mediation & Reporting		BAI08.03. Use and share knowledge	
							BAI08.04. Evaluate and update or retire information	
8.5. Develop and manage services/solutions	2. Develop Business Application	sE3. Manage Supply Chain Data and Information	sE3.1. Receive	Resource Domain	Resource Capability Delivery	APO03. Managed Enterprise Architecture	APO03.01. Develop the enterprise architecture vision	**MISSING**
			sE3.2. Determine/Scope Work				APO03.02. Define reference architecture	
							APO03.03. Select opportunities and solutions	
			sE3.3. Maintain Content/ Code		Resource Strategy & Planning **(CONCISE)**		APO03.04. Define architecture implementation	
							APO03.05. Provide enterprise architecture services	

PCF	IMM	SCOR		eTOM		COBIT		SAP
		sE11. Manage Supply Chain Technology	sE11.2. Identify Technology Solution Alternatives **(CONCISE)**		Resource Development & Retirement	APO09. Managed Service Agreements	APO09.01. Identify I&T services	
							APO09.02. Catalog I&T-enabled services	
							APO09.03. Define and prepare service agreements	
			sE11.4. Select Technology Solution		RM&O Support & Readiness		APO09.04. Monitor and report service levels	
			sE11.5. Define and Deploy Technology				APO09.05. Review service agreements and contracts	
8.6. Deploy services/solutions	2. Develop Business Application	sE3. Manage Supply Chain Data and Information	sE3.6. Verify Information	Resource Domain	Resource Provisioning	APO01. Managed I&T Management Framework	APO01.05. Establish roles and responsibilities	**MISSING**
							APO01.09. Define and communicate policies and procedures	
						BAI04. Managed Availability and Capacity	BAI04.02. Assess business impact	
						BAI06. Managed IT Changes	BAI06.01. Evaluate, prioritize and authorize change requests	
							BAI06.03. Track and report change status	
					Resource Strategy & Planning **(CONCISE)**		BAI06.04. Close and document the changes	

PCF	IMM	SCOR		eTOM		COBIT		SAP
		sE11. Manage Supply Chain Technology	sE11.5. Define and Deploy Technology Solution			BAI07. Managed IT Change Acceptance and Transitioning	BAI07.01. Establish an implementation plan	
							BAI07.02. Plan business process, system and data conversion	
							BAI07.03. Plan acceptance tests **(CONCISE)**	
							BAI07.04. Establish a test environment **(CONCISE)**	
							BAI07.05. Perform acceptance tests **(CONCISE)**	
							BAI07.06. Promote to production and manage releases	
							BAI07.07. Provide early production support	
							BAI07.08. Perform a post-implementation review	
						DSS01. Managed Operations	DSS01.01. Perform operational procedures	
8.7. Create and manage support services/solutions	1. Provide IT Help Desk Services	sE11. Manage Supply Chain Technology	sE11.7. Retire Technology Solution **(CONCISE)**	Resource Domain	Resource Capability Delivery	APO01. Managed I&T Management Framework	APO01.05. Establish roles and responsibilities	Application Platform and Infrastructure **(CONCISE)**
					Resource Performance Management		APO01.10. Define and implement infrastructure, services and applications to support the governance and management system	
					Resource Strategy & Planning	APO03. Managed Enterprise Architecture	APO03.05. Provide enterprise architecture services	

PCF	IMM	SCOR		eTOM		COBIT		SAP
						APO14. Managed Data	APO14.10. Manage data backup and restore arrangements **(CONCISE)**	
	3. Provide IT Infrastructure			RM&O Support & Readiness		BAI04. Managed Availability and Capacity	BAI04.01. Assess current availability, performance and capacity and create a baseline	
							BAI04.03. Plan for new or changed service requirements	
							BAI04.04. Monitor and review availability and capacity	
				Resource Trouble Management			BAI04.05. Investigate and address availability, performance and capacity issues	
						BAI06. Managed IT Changes	BAI06.01. Evaluate, prioritize and authorize change requests	
						BAI10. Managed Configuration **(EXTENSIVE)**	BAI10.01. Establish and maintain a configuration model	
							BAI10.02. Establish and maintain a configuration repository and baseline	
							BAI10.03. Maintain and control configuration items	
							BAI10.04. Produce status and configuration reports	
							BAI10.05. Verify and review integrity of the configuration repository	
				Resource Mediation & Reporting		DSS01. Managed Operations	DSS01.03. Monitor I&T infrastructure	

PCF	IMM	SCOR	eTOM	COBIT	SAP
				DSS05. Managed Security Services: DSS05.07. Manage vulnerabilities and monitor the infrastructure for security-related events	
MISSING	**MISSING**	**MISSING**	Resource Domain: Resource Provisioning **(CONCISE)**	APO10. Managed Vendors: APO10.01. Identify and evaluate vendor relationships and contracts. APO10.02. Select vendors APO10.03. Manage vendor relationships and contracts APO10.04. Manage vendor risk APO10.05. Monitor vendor performance and compliance	**MISSING**
6.0.Manage Customer Service: *6.2. Plan and manage customer service contacts*	**MISSING**	**MISSING**	*Customer Domain*: *Customer QoS/SLA Management*	APO11. Managed Quality: APO11.02. Focus quality management on customers APO11.03. Manage quality standards, practices and procedures and integrate quality management into key processes and solutions APO11.04. Perform quality monitoring, control and reviews	**MISSING**
MISSING	**MISSING**	**MISSING**		DSS05. Managed Security Services: DSS05.02. Manage network and connectivity security DSS05.03. Manage endpoint security DSS05.06. Manage sensitive documents and output devices	**MISSING**
MISSING	**MISSING**	**MISSING**	**MISSING**	APO14. Managed Data: APO14.03. Establish the processes and infrastructure for metadata management	**MISSING**

PCF	IMM	SCOR	eTOM	COBIT		SAP
					APO14.07. Define the data cleansing approach	
					APO14.08. Manage the life cycle of data assets	
					APO14.09. Support data archiving and retention	
MISSING	**MISSING**	**MISSING**	**MISSING**	BAI06. Managed IT Changes	BAI06.02. Manage emergency changes	**MISSING**
MISSING	**MISSING**	**MISSING**	**MISSING**	DSS01. Managed Operations	DSS01.02. Manage outsourced I&T services	**MISSING**

PCF includes most of the processes needed for the IT and data management of an enterprise. The main difference between this and the rest of the frameworks is that apart from the processes for solution development according to the enterprise's needs, it also has the category "8.1. Develop and manage IT customer relationships". This category refers to "creating and administering relationships with IT customers" (APICS, 2018) and includes processes regarding customer needs for IT transformation, something that none of the other frameworks has.

The IMM Approach is once again the most concise one of the frameworks, as it only includes only three business process groups and none of them is about data management. However, they cover the basic IT management needs of an enterprise.

SCOR includes process groups that cover most of the PCF processes, apart from the "IT customer relationships". However, it is not very detailed as it omits processes regarding the IT vendors, outputs and IT security.

The eTOM framework also covers most of the PCF processes, both for IT and data management. However, it is more concise as the processes it has are not as detailed. It also includes processes regarding IT vendors, similar to the ones we found in the COBIT model.

Moving on to the COBIT model, it is the most detailed one for the IT management, as we mentioned before. It has 15 process groups referring to IT-related processes that include 85 process sub-groups. The main difference between PCF and COBIT is that the second one has a category, "APO10. Managed Vendors" that refers to enterprise's IT vendors, as well as some processes regarding outsourcing IT services. The PCF model doesn't refer to vendors and outsourcing at all, as the processes indicate that the enterprise is the one that develops any IT-related material. Also, COBIT is way more detailed regarding data management, as it also refers to metadata and data backup, archiving and cleansing. Last but not least, COBIT refers to some processes regarding quality control for customers. The respective PCF category is included in "6.0.Manage Customer Service".

As far as SAP is concerned, “Application Platform and Infrastructure” and “Database and Data Management”, both include one process group. That’s the reason why we only mention the name of the module and not the process group. The main difference between SAP framework and the other models we studied is that SAP was created based on the SAP software. Thus, it doesn’t include any processes regarding software/ solutions development and support. What is more, SAP doesn’t have any processes regarding data archiving and cleansing, as SAP software doesn’t allow the user to automatically delete any data. Last but not least, the “Application Platform and Infrastructure” module also refers to data migration, an option that is also included in eTOM (data integration and data import).

6. Business process framework: a proposal

In this chapter we will move on to propose a business process framework for the following eight process areas: (1) Marketing, (2) Sales, (3) Research & Development, (4) Product Management, (5) Logistics, (6) Production, (7) Customer Service and (8) Human Resources.

The development of the proposals is based on an in depth study of the frameworks that were presented in the previous chapters, so as to see which processes are included in each of these areas.

The proposed frameworks can be of use to any company, regardless the sector they belong to. In addition to the proposed processes, more processes can be included in each of the process categories, based on the business needs of the enterprise.

6.1. Marketing

The proposal for this area was developed using the PCF, Oracle and eTOM frameworks as reference models. The frameworks were selected based on their categorization and their structure. The proposed framework is presented in Table 14.

Table 14: Marketing business process framework - a proposal

Process group	Process sub-groups	Proposed processes
1. Marketing strategy	1.1 Define pricing strategy	Define pricing policies
		Define pricing for promotions
		…
	1.2. Define marketing strategy	Define marketing goals
		Define marketing budget policies
		…
	1.3. Define marketing channels strategy	Define channel goals
		Define business needs
		Define performance indicators and metrics
		…
	1.4. Define promotions strategy	Define promotion performance metrics
		…
	1.5. Define campaign/events strategy	Define campaign/events performance metrics
		…
	1.6. Define market strategy	Define market management policies
		Define market indicators
		Define product indicators
		…
	1.7. Define consumer strategy	Define target customer policies
		Define consumer activity metrics
		…
	1.8. Define communication strategy	Define customer communication policies
		Define competitor communication policies

Process group	Process sub-groups	Proposed processes
		…
2. Marketing management	2.1. Create marketing budget	Cost analysis
		Set a budget
		…
	2.2. Product management	Product images management
		Context management
		…
	2.3. Product presentation management	Design the presentation of the products (e.g. packaging)
		Calculate product revenue
		Study presentation acceptance by the consumers
		Redesign the product presentation
		…
	2.4. Channel management	Channel study
		Choose the channels based on business needs
		Performance analysis
		Redefine channels
		…
	2.5. Campaign/event management	Design campaign
		Execute campaign
		Performance analysis
		Redesign campaign
		End campaign
		…
	2.6. Promotions management	Design promotion

Process group	Process sub-groups	Proposed processes
		Execute promotion
		Performance analysis
		Redesign promotion
		End promotion
		…
	2.7. Pricing management	Define retail pricing
		Define wholesale pricing
		Define promotion pricing
		Performance analysis
		Redesign pricing
		…
3. Market management	3.1. Market analysis	Information validity check
		Information analysis
		Identify market opportunities
		Market trends analysis
		Define the opportunities that align with the business strategy and goals
		…
	3.2. Business analysis	Study business performance
		Study the position of the business in the market
		Internal environment analysis
		External environment analysis
		…
	3.3. Competition analysis	Information validity check
		Analyse competing organizations

Process group	Process sub-groups	Proposed processes
		Analyse competitive products
		…
4. Consumer management	4.1. Market analysis	Information validity check
		Study consumer needs
		Define consumer groups
		Target consumer groups
		…
	4.2. Consumer behaviour analysis	Analyse consumer information
		Predict consumer behaviour
		…
	4.3. Customer behaviour analysis	Determine customer loylaty
		Determine revenue from customer
		…
	4.4. Online activity analysis	Analyse findings
		Analyse social media activity
		Analyse website activity
		Pattern analysis
		Develop personalised offers
		…
	4.5. Customer loyalty programme management	Member enrollment
		Define value for members
		Define value for the enterprise
		Cost analysis
		Evaluate the programme

Process group	Process sub-groups	Proposed processes
		Redesign/improve the programme
		…
5. Communication management	5.1. Customer communication management	Define ways to communicate with customers
		Evaluate communication
		Redesign/improve communication
		…
	5.2. Public relations management	Managing the partnerships with influencers
		…
	5.3. Internal communication management	…

All three of the frameworks we used as reference for this proposal follow the same basic Marketing processes. PCF and Oracle both present the processes in chronological order, whilst eTOM only presents which processes exist in each process group. In general, as far as the Marketing process area is concerned, the PCF is the most detailed and Oracle is the most concise. eTOM turned out to be very useful, but it also contains some processes that are telecommunications-specific. It is worth mentioning that PCF and eTOM have a separate process category that includes both the Marketing and Sales processes, while Oracle follows a different categorization that separates the two.

After studying every group and process that these frameworks propose, we came to the conclusion that there are five main process groups in the Marketing process area, which are: (1) marketing strategy, (2) marketing management, (3) market management, (4) consumer management and (5) communication management. More precisely:

i. Marketing strategy

The first process group helps the enterprise to develop and define which strategies will be followed for marketing purposes.

There is a process category for this in every one of the frameworks.

ii. Marketing management

The second group helps the enterprise to manage all the basic marketing functions. In includes processes regarding budgets, product management, product presentation, marketing channels, campaign and events, promotions and product pricing.

These processes are included in multiple process groups in each of the frameworks we studied. However, Oracle doesn't propose any processes for marketing channels management and product pricing.

iii. Market management

The third group of processes helps the enterprise to conduct market research. The processes included refer to market study and analysis, as far as both the enterprise and the competitors are concerned.

eTOM has one group about market research which contains all these processes. PCF has multiple process groups and sub-groups that refer to market management. Last but not least, Oracle doesn't have any similar processes.

iv. Consumer management

This is a process group that helps the enterprise to better understand the consumers and potential customers. It includes processes regarding target consumer groups, consumer and customer behaviour, online activity tracking and loyalty programmes.

PCF and eTOM both include these processes, whilst Oracle only refers to customer groups.

v. Communication management

The fifth, and last, process group is about the management of communications relevant to marketing. It includes processes regarding internal and external communications.

PCF and eTOM both include these processes in separate process groups. However, Oracle doesn't refer to communications and the relevant processes.

6.2. Sales

The proposal for this area was developed using the PCF, Oracle and eTOM frameworks as reference models. The frameworks were selected based on their categorization and their structure. The proposed framework is presented in Table 15.

Table 15: Sales business process framework - a proposal

Process group	Process sub-groups	Proposed processes
1. Sales strategy	1.1. Define alliance management strategy	Define alliance policies
		Define alliance performance evaluation metrics
		…
	1.2. Define sales management strategy	Define sales policies
		Define sales targets
		Define sales performance evaluation metrics
		…
	1.3. Define customer management strategy	Define customer activity indicators
		Define customer satisfaction indicators
		…
2. Customer management	2.1. Market analysis	Information validity check
		Search for new customers/opportunities
		Define key-customers
		…
	2.2. Customer contracts management	Negotiate contracts
		Define contract terms
		Create contract
		…
	2.3. Customer accounts management	Customer data validity check
		Customer data management
		…
	2.4. End relationship with customer	…
3. Sales management	3.1. Market analysis	Information validity check
		Search for new opportunities
		Define the opportunities that align with the business strategy and goals
		…
	3.2. Financial management	Sales forecasting
		Calculate product's market share

Process group	Process sub-groups	Proposed processes
		Calculate costs/revenue
		Create sales budget
		…
	3.3. Sales proposal management	Define customer needs
		Develop proposals
		Calculate and analyse costs
		Check proposal
		Approve proposal
		Present proposal to the customer
		…
	3.4. Sales calls management	Carry out sales calls
		Carry out sales meetings
		Close sale
		Record results
		…
	3.5. In-person sales management	Visit customer
		Check customer data by communicating with the company's call centre
		Payment management
		…
	3.6. Order management	Accept order
		Enter order in the system
		Check product availability
		Track order
		Order completion check
		Manage incomplete orders
		Customer query management
		Customer charging
		Returns management
		…
	3.7. Sales evaluation	Evaluate sales performance

Process group	Process sub-groups	Proposed processes
		Improve sales process
		…
4. Alliance management	4.1. Develop alliances/partnerships	Choose alliances
		Create partnership
		…
	4.2. Train partners	…
	4.3. Evaluate partner performance	…
	4.4. Partnership data management	…
	4.5. End partnership	…

All three of the frameworks we used as reference for this proposal follow the same basic Sales processes. PCF and Oracle again present the processes in chronological order, whilst eTOM only shows which processes exist in each process group. In general, as far as the Sales process area is concerned, the PCF is again the most detailed of the frameworks and Oracle the most concise. Same as the Marketing process area, eTOM contains some processes that are telecommunications-specific. It should be mentioned again that PCF and eTOM have a separate process category that includes both the Marketing and Sales processes, while Oracle follows a different categorization that separates the two.

After studying every group and process that these frameworks propose, we came to the conclusion that there are four main process groups in the Sales process area, which are: (1) sales strategy, (2) customer management, (3) sales management and (4) alliance management. More precisely:

i. Sales strategy

The first process group helps the enterprise to develop and define which strategies will be followed for the sales function.

There is a process category for this in all three of the frameworks.

ii. Customer management

The second group of processes contains all the customer-relevant processes. It includes everything from market analysis to determine which consumers are potential customers, as well as customer contract and account management.

There are more than one process categories in all of the frameworks with such processes.

iii. Sales management

The third group of processes helps the enterprise to manage the actual sales process. Processes about market analysis, defining market share, forecasting, sales proposals, sales calls, in person sales and order management are included here.

What is more, there are processes regarding performance evaluation and sales process redesign.

These processes are included in more than one process groups in all of the frameworks we studied. PCF is the one that includes the most processes, which are very detailed. Oracle also includes processes regarding order delivery and customer charging, both processes that are not a part of the “Sales” area in this proposed framework.

iv. Alliance management

The fourth group of processes is designed to help enterprises manage their external relationships, specifically the ones regarding partnerships.

These processes can only be found in PCF in detail. However, eTOM also has a process group called “Brand management”, but without any processes included. Oracle doesn’t have any of those processes.

6.3. Research & Development

The proposal for this area was developed using the PCF, Oracle, SAP, eTOM and COBIT frameworks as reference models. The frameworks were selected based on their categorization and their structure. The proposed framework is presented in Table 16.

Table 16: Research & Development business process framework - a proposal

Process category	Process sub-groups	Proposed processes
1. Research & Development strategy	1.1. Define costs strategy	Plan cost for product development
		Define cost evaluation metrics
		…
2. Market management	2.1. Market analysis	Gather market information
		Analyse information/data
		Study new technologies
		Check for opportunities
		…
3. Manage new products/services	3.1. Develop new products/services	Develop new ideas
		Evaluate new ideas based on market analysis
		Study product feasibility
		Define alternative plans
		Create product development plan
		Define product specifications
		…
4. Product data management	4.1. Master data management	Product specifications
		Related documents
		…
	4.2. Data access management	Check and control data access
		…

As mentioned while presenting and studying the frameworks, the R&D process area consists of all the processes regarding the product ideas management and it ends just before an actual product is produced.

All five of the frameworks we used as reference for this proposal follow the same basic R&D processes. Like before, PCF and Oracle present the processes in chronological order, whilst eTOM, COBIT and SAP don't. What is more, since eTOM is a telecommunications-specific it contains some processes designed specifically for this sector. Also COBIT includes processes regarding the development of IT products, since it is an IT management framework.

After studying every group and process that these frameworks propose, we came to the conclusion that there are four main process groups in the R&D process area, which are: (1) research & development strategy, (2) market management, (3) manage new products/services and (4) product data management. More precisely:

i. Research & Development strategy

The first process group helps the enterprise to develop and define which strategies will be followed for the R&D function.

These processes are part of all the frameworks studied, apart from the Oracle one.

ii. Market management

The second group of processes contains all the processes related to market analysis, with the purpose of finding new opportunities in the market for product development.

There are more than one process categories in all of the frameworks with such processes.

iii. Manage new products/services

The third group of processes helps the enterprise to manage the creation of new products, by developing new product ideas, studying the market for this new idea, finding alternatives and defining the product specifications.

These processes are included in more than one process groups in all of the frameworks we studied.

iv. Product data management

The last group of processes is designed to help enterprises with their product data management. This includes the data regarding the product specifications and all documents that are product related.

These processes can only be found in PCF in detail. The other frameworks don't propose any process groups for this purpose.

6.4. Product Management

The proposal for this area was developed using the PCF, Oracle, eTOM and COBIT frameworks as reference models. The frameworks were selected based on their categorization and their structure. The proposed framework is presented in Table 17.

Table 17: Product Management business process framework - a proposal

Process category	Process sub-groups	Proposed processes
1. Product Management strategy	1.1. Define Research & Development strategy	Define product development timeframe
		Define policies for improvements of existing products
		Define product performance metrics
		…
	1.2. Define product quality strategy	Define product quality policies
		Define product quality metrics
		…
2. Manage existing products	2.1. Product management	Evaluate product based on market needs
		Evaluate if product align with business strategies
		Identify opportunities to improve product
		…
	2.2. Product lifecycle management	Withdraw product
		…
3. Manage new products/services	3.1. Develop new products/services	Check availability of necessary resources
		Conduct necessary product checks
		Obtain necessary licences
		Product manufacturing design
		Collaborate with third parties for product design
		Create prototype
		Check prototype production
		Find a solution for any production problems
		Check product quality
		Find a solution for any quality problems
		Study and evaluate the product
		Test market acceptance
		Get suppliers/partners feedback
		Get customer feedback
		Finalise product specifications

		…
	3.2. Prepare for production	Define necessary equipment/materials
		Acquire necessary equipment/materials
		Study and evaluate production process
		Improve production process
		…
	3.3. Product lifecycle management	Present new product
		Evaluate product after presentation
		Check consumer acceptance
		Check supply chain and delivery
		Evaluate product development process
		Improve product development process
		…
	3.4. Copyright management	Check product for copyright infringement
		Patent product
		…
4. Product data management	4.1. Master data management	Raw materials
		Bill of materials
		Routing
		Related documents
		…
	4.2. Data access management	Check and control data access
		…

As mentioned while presenting and studying the frameworks, the Product Management process area begins with the creation of a prototype product and includes all the necessary processes about quality management and product redesign, until the product is ready for mass production. These processes are about new as well as existing products.

All four of the frameworks we used as reference for this proposal follow the same basic R&D processes. Again, PCF and Oracle present the processes in chronological order, whilst eTOM and COBIT don't. What is more, since eTOM is a telecommunications-specific it contains some processes designed specifically for this sector. Also COBIT includes processes regarding the management of IT products, since it is an IT management framework.

After studying every group and process that these frameworks propose, we came to the conclusion that there are four main process groups in the Product Management process area, which are: (1) product management strategy, (2) manage existing products, (3) manage new products/services and (4) product data management. More precisely:

i. Product management strategy

The first process group helps the enterprise to develop and define which strategies will be followed for the Product Management function.

All the frameworks we studied include similar processes.

ii. Manage existing products

The second group of processes helps the enterprise to manage the products that already exist and are being offered to the customers. It includes processes about continual supporting those products and withdrawing them when necessary.

PCF is the only framework that proposes a process group for managing the existing products.

iii. Manage new products/services

The third group of processes helps the enterprise to manage the creation of new products, by developing a product prototype, conducting the necessary tests for quality and market acceptance and preparing the final product that will be produced. There are also some processes for copyright management.

These processes are included in more than one process groups in all of the frameworks we studied, apart from the copyright ones that are proposed only by the PCF framework.

iv. Product data management

The last group of processes is designed to help enterprises with their product data and document management.

These processes can only be found in PCF in detail. The other frameworks don't propose any process groups for this purpose.

6.5. Production

The proposal for this area was developed using the PCF, Oracle and SCOR frameworks as reference models. The frameworks were once again selected based on their categorization and their structure. The proposed framework is presented in Table 18.

Table 18: Production business process framework - a proposal

Process group	Process sub-groups	Proposed processes
1. Production strategy	1.1. Define production strategy	Define production targets
		Define labour policies
		Define materials policies
		Define outsourcing policies
		Define capacity policies
		Define materials restrictions
		Define basic production process
		Define necessary infrastructure
		…
	1.2. Define materials strategy	Define materials needed for production
		Create procurement control plan
		…
	1.3. Define quality strategy	Define quality targets
		Define quality control processes
		…
	1.4. Define cost strategy	Determine production costs
		…
2. Market management	2.1. Forecast management	Forecast market demand
		Forecast customer demand
		Monitor irregular activity
		Evaluate forecasts
		Redefine forecasts
		…
	2.2. Product management	Determine stock based on forecasts
		…
3. Production management	3.1. Materials management	Secure supplies
		Inventory of raw materials
		…

	3.2. Production plan management	Create a production plan
		Check and optimize production plan
		Configuration of production units
		Schedule production of orders
		Schedule necessary production unit maintenance
		…
	3.3. Production process management	Execute production plan
		Report production problems
		Execute maintenance
		Report maintenance problems
		Reproduction of defective products
		Monitor production process
		Evaluate performance of production process
		Optimize production process
		…
	3.4. Product quality management	Configuration of maintenance equipment
		Product sample management
		Product quality check
		Record results
		Deviation analysis
		Study reasons for deviation
		…
	3.5. Lot management	Develop lot numbering system
		…
	3.6. Document management	Manage production documents
		Manage quality documents
		…

The Production process area includes all the processes that are used to convert raw materials into finished products.

All frameworks used as reference for this proposal follow the same basic Production processes and they present them in chronological order.

After studying every group and process that PCF, Oracle and SCOR propose, we came to the conclusion that there are three main process groups in the Production process area, which are: (1) production strategy, (2) market management and (3) production management. More precisely:

i. Production strategy

The first process group helps the enterprise to develop and define which strategies will be followed for the Production function, regarding production, materials, cost and quality management.

Both frameworks we studied include similar processes. However, Oracle is very concise regarding the strategy processes apart from the ones about production costs.

ii. Market management

The second group of processes helps the enterprise understand the market and the product demand. It includes mainly processes about forecasting demand, in order to adjust the production accordingly

PCF is the only framework that proposes processes for market management in detail. SCOR also includes some processes for forecasting. Oracle doesn't have any processes for thit purpose.

iii. Production management

The third group of processes helps the enterprise to manage the production, as it includes processes about materials, production plan, production process, product quality, product numbering and managing production-related documents.

These processes are included in more than one process groups in all of the frameworks we studied. However, Oracle doesn't propose any lot numbering processes, as well as processes about document management.

6.6. Logistics

The proposal for this area was developed using the PCF, Oracle and SCOR frameworks as reference models. The frameworks were selected based on their categorization and their structure. The proposed framework is presented in Table 19.

Table 19: Logistics business process framework - a proposal

Process group	Process sub-groups	Proposed processes
1. Logistics strategy	1.1. Define incoming product strategy	Define incoming product policies
		Create financial plan for incoming products
		Define incoming products performance metrics
		…
	1.2. Define delivery strategy	Define delivery policies
		Define delivery performance metrics
		Create financial plan for deliveries
		Define return policies
		…
2. Logistics management	2.1. Logistics network/plan management	Design logistics network/plan
		Outsourcing
		Improve network/plan
		Optimize costs
		…
3. Incoming product management	3.1. Incoming materials management	Incoming materials transportation
		Evaluate incoming materials management performance
		…
	3.2. Returns management	Accept returned products
		Check returned products
		Repair returned products
		Return fixed product to customer
		Return fixed product to storage
		…
	3.3. Product storage	Inventory

		Check products
		Store products
		Check stock
		Sort products
		Pack products
		Manage inbound deliveries
		…
4. Delivery management	4.1. Manage transportation fleet	Check deliveries
		Place product on the means of transport
		Define delivery schedule/routes
		Delivery document management
		…

The Logistics process area includes all the necessary processes responsible for acquiring, storing, transporting and delivering the products.

Once again, PCF and Oracle present the processes in chronological order, whilst SCOR doesn't. What is more, since SCOR is a supply chain management framework, it is very detailed as far as this process area is concerned.

After studying every group and process that these frameworks propose, we came to the conclusion that there are four main process groups in the Logistics process area, which are: (1) logistics strategy, (2) logistics management, (3) incoming product management and (4) delivery management. More precisely:

i. Logistics strategy

The first process group helps the enterprise to develop and define which strategies will be followed for the Logistics function.

All the frameworks we studied, apart from Oracle include similar processes.

ii. Logistics management

The second group of processes helps the enterprise plan the logistics network, with processes regarding network designing, outsourcing and optimizing the costs.

PCF and SCOR are the two reference frameworks that include such processes.

iii. Incoming product management

The third group of processes helps the enterprise manage the products that are received, whether these are raw materials or returned products. This group includes processes regarding transporting and storing those products and checking the available stock. Moreover, repairing returned products and delivering them again to the customer or storing them is also a part of this section.

These processes are included in more than one process groups in PCF and SCOR. Oracle only includes two processes about returns management and one process that is stock-related.

iv. Delivery management

The last group of processes is designed to help enterprises manage their transportation fleet.

These processes can be found in all three of the frameworks, described in detail.

6.7. Customer Service

The proposal for this area was developed using the PCF, Oracle, eTOM and COBIT frameworks as reference models. The frameworks were selected based on their categorization and their structure. The proposed framework is presented in Table 20.

Table 20: Customer Service business process framework - a proposal

Process group	Process sub-groups	Proposed processes
1. Customer Service strategy	1.1. Define Human Resources strategy	Define necessary skills for customer service
		Define necessary resources for customer service
		Define customer service policies, procedures and rules
		…
	1.2. Define warranty strategy	Define warranty policies (general)
		Define warranty policies for every product
		Define warranty responsibilities of the supplier
		…
	1.3. Define maintenance strategy	Define necessary resources for maintenance
		…
	1.4. Define recalls strategy	Define recalls policies
		…
	1.5. Define customer strategy	Define customer satisfaction metrics
		…
2. Customer Service management	2.1. Human Resources Management	Forecast customer service demand
		Schedule human resources based on forecast
		Check human resources utilisation
		Check customer communication with business representatives
		Evaluate communications performance
		…
	2.2. Customer problems/requests management	Accept request
		Forward request to responsible employee
		Check for solution

		Give an answer to the customer
		Offer alternative service (free)
		Offer alternative service (charge)
		…
	2.3. Customer complaints management	Accept complaint
		Forward complaint to responsible employee
		Check for solution
		Give an answer to the customer
		Analyse complaints
		Improve services
		…
	2.4. Returns management	Authorise return
		Process return
		…
3. Product service management	3.1. Warranty management	Check warranty
		Accept warranty
		Define the problem of the product
		Schedule product testing
		Receive defective product
		Authorise customer refund
		Close request
		Check false requests/claims
		…
	3.2. Supplier management	Recover cost from supplier
		…

	3.3. Product maintenance	Process customer request
		Create a maintenance order
		Check maintenance resources
		Create a daily maintenance schedule
		…
4. Product recalls management		Start recall
		Assess potential risks
		Manage communication for recalls
		Submit recall reports/documents
		Check recall effectiveness
		End recall
		Assess recall effectiveness
		…
5. Customer management	5.1. Customer communication management	Authenticate customer
		Enter communication in the system
		Update communication
		End communication
		…
	5.2. Customer satisfaction management	Get customer feedback
		Analyse customer data
		Search opportunities for improvement
		Forward results to departments concerned
		…

The Customer Service process area consists of all the processes that ensure customer satisfaction.

Like before, PCF and Oracle present the processes in chronological order, whilst eTOM and COBIT don't. Again, eTOM includes processes that are telecommunications-specific.

After studying every group and process that these frameworks propose, we came to the conclusion that there are five main process groups in the Customer Service process area, which are: (1) customer service strategy, (2) customer service management, (3) product service management , (4) product recalls management and (5) customer management. More precisely:

i. Customer service strategy

The first process group helps the enterprise to develop and define which strategies will be followed for the Customer Service function.

PCF and eTOM are very detailed regarding these processes. COBIT has some quality related processes that help the enterprise define its strategy. Oracle doesn't propose such processes.

ii. Customer service management

The second group of processes contains all the processes related to Customer Service personnel management, customer problems and complaints management and returns management.

There are more than one process categories in PCF, eTOM and COBIT with such processes. Oracle focuses only on the returns management processes.

iii. Product service management

The third group of processes focuses on the service of the defective products purchased and returned by the customers. In this group there are processes included regarding warranty management, supplier management and product maintenance.

These processes are included in detail in PCF. eTOM refers specifically to telecommunications products. Likewise, COBIT refers to IT products service. Oracle doesn't have any product service-related processes.

iv. Product recalls management

The fourth group of processes is designed to help enterprises with product recalls and it includes all the relevant processes.

These processes can only be found in PCF in detail. The other frameworks don't propose any process groups for this purpose.

v. Customer management

The last group of processes refers to the communication with customers. It includes processes about managing the communications and ensuring customer satisfaction by getting customer feedback and using it for improving the services offered.

These processes can be found in detail in eTOM, but PCF and COBIT also include such processes.

6.8. Human Resources

The proposal for this area, which is the only proposal developed for a support process area, has a slightly different structure compared to the previous ones. It was developed using the IMM, PCF, eTOM, COBIT, HCBRM, Software AG, Signavio, Oracle and SCOR frameworks as reference models. The frameworks were selected based on their categorization and their structure. Table 21 shows the proposed process categories, briefly describing each of them, as well as the respective categories of the frameworks that were used as a reference.

Table 21: Human Resources business process framework - a proposal

Proposed framework		Based on	
Process group	**Description**	**Name**	**Reference category**
1.HR Strategy and Structure	Company structure and policy-oriented processes	PCF	7.1. Develop and manage human resources planning, policies, and strategies
		SCOR	sE4.1. Identify skills/ resource requirement
		SAP	3. Organizational Data Management
		eTOM	2. Organization Development
			3. Workforce Strategy
		COBIT	APO07.01. Acquire and maintain adequate and appropriate staffing
		Signavio	Employee Recruitment
		HCBRM	A1. Agency HC Strategy, Policies and Operation Plan
		Oracle	3. Development
2.Workforce Management	Permanent and temporary personnel management	PCF	7.2. Recruit, source, and select employees
			7.6. Redeploy and retire employees
		SCOR	sE4.2. Identify available skills/ resources
			sE4.3. Match skills/ resources
			sE4.4. Determine hiring/ redeployment
		SAP	1. HR Administration
			3. Organizational Data Management
			4. Global Mobility
			5. Contingent Workforce Management
		IMM Approach	1. Recruit
			4. Dismiss
		eTOM	1. HR Policies & Practices

Proposed framework		Based on	
Process group	**Description**	**Name**	**Reference category**
		COBIT	APO07.01. Acquire and maintain adequate and appropriate staffing
			APO07.02. Identify key IT personnel
			APO07.03. Maintain skills and competencies of personnel
			APO07.06. Manage contract staff
		HCBRM	A2. Talent Acquisition
			A6. Separation and Retirement
		Software AG	1. New Employee Recruitment
		Signavio	Employee Recruitment
		Oracle	1. Recruiting
			2. Deployment
3.Workforce Development	Personnel training and evaluation processes	PCF	7.3. Manage employee on boarding, development, and training
		SAP	1. HR Administration
		SCOR	sE4.5. Determine training/ education
			sE4.6. Approve, prioritize and launch
		IMM Approach	2. Train
		eTOM	4. Workforce Development
		COBIT	APO07.02. Identify key IT personnel
			APO07.03. Maintain skills and competencies of personnel
			APO07.04. Assess and recognize/ reward employee job performance
		HCBRM	A2. Talent Acquisition
			A3. Talent Development
			A4. Employee Performance Management

Proposed framework		Based on	
Process group	**Description**	**Name**	**Reference category**
			A10. Agency Human Capital Evaluation
		Software AG	2. Employee Onboarding
			3. Performance Management
		Signavio	Employee Development
		Oracle	3. Development
4.Payment and Rewards	Time management, employee schedules and payroll management processes	PCF	7.5. Reward and retain employees
			7.7. Manage employee information and analytics
		SAP	1. HR Administration
			2. Time & Attendance Management
			6. Integration
		IMM Approach	3. Pay
		eTOM	1. HR Policies & Practices
		COBIT	APO07.01. Acquire and maintain adequate and appropriate staffing
			APO07.04. Assess and recognize/ reward employee job performance
		HCBRM	A4. Employee Performance Management
		Signavio	Payroll Accounting
		Oracle	2. Deployment
			4. Reward

The proposed framework includes four process categories, which are: (1) HR strategy and structure, (2) workforce management, (3) workforce development and (4) payment and rewards. More precisely:

i. HR Strategy and Structure

The first category of processes helps the company establish its HR strategies and policies. It includes processes concerning everything between job descriptions and requirements, payroll policies, training and evaluation programs to general strategy models and objectives.

This category can be found in PCF, SCOR, SAP, HCBRM, Signavio and Oracle frameworks. As far as eTOM is concerned, there are two categories that include the processes mentioned above, whereas COBIT includes all those processes in a different category. These processes are not mentioned in the IMM Approach and Software AG's framework.

ii. Workforce Management

The second category refers to personnel management, permanent as well as temporary. It includes the recruitment process, like posting job requisitions, interviewing candidates, hiring personnel, promoting and relocating employees, managing retirements and dismissals. Furthermore, it includes processes about maintaining records and personal data and information of the employees regarding their skills and experience.

The Software AG and eTOM frameworks include a distinct category that includes all of the above. The rest of the frameworks have between two and four categories of similar processes.

iii. Workforce Development

The third category includes processes regarding the employee training programs and the evaluation that follows.

All of the frameworks we studies in the previous chapter of the thesis include a separate category of processes that refer to the development of the personnel. Some of them take only the training into consideration, like SAP and SCOR, whereas others include also the evaluation, like PCF and Signavio. In COBIT and HCBRM these kind of processes are included in more than one categories.

iv. Payment and Rewards

In the last category of processes refers to managing the payments. Processes related to employee payroll, bonus, benefits and compensations can be found here. What is more, there are also processes regarding time management of the employees, namely the working hours, schedules and leaves.

All of the frameworks studied include one or more categories with processes related to personnel payments, with the exception of Software AG's framework and SCOR.

7. The consolut case

7.1. Introduction

As a gold SAP partner, consolut is a consultancy company that offers SAP solutions. It was founded in 1998 in Germany and now it has offices in Switzerland, Germany, US and as of 2018 in Greece, having 180 companies as customers (Karolidou, 2018). With 20 years of experience in consulting companies that have more than 2.000 employees and more than € 100 million revenue, consolut has developed its' own business process model. With this model consolut has been able to understand the processes that take place within the companies, optimize them and offer the best solution possible to each customer.

SAP also has developed a business process model of its' own, the one we have already discussed, presented and studied in the previous Chapters of the thesis. What is more, they have mapped the processes that the companies need in order to operate and this documentation is offered online[30].

For the purpose of this case study, consolut provided us with two of their Financial Accounting processes that are modeled with their business process model. Since the company is a SAP partner, it makes sense to find the SAP processes that align with theirs and compare the two. The aim of this study is to find their similarities and differences and later decide if consolut's processes need to be adjusted, so that they are more efficient and easily maintainable.

[30] https://rapid.sap.com (Accessed 26 August 2019)

7.2. Business Process Models comparison

The first step is to compare the graphical representation of the processes in the two business process models. They have some similarities regarding the structure and the notations, as they both use swimlanes, pools, processes, subroutines, events and decision nodes.

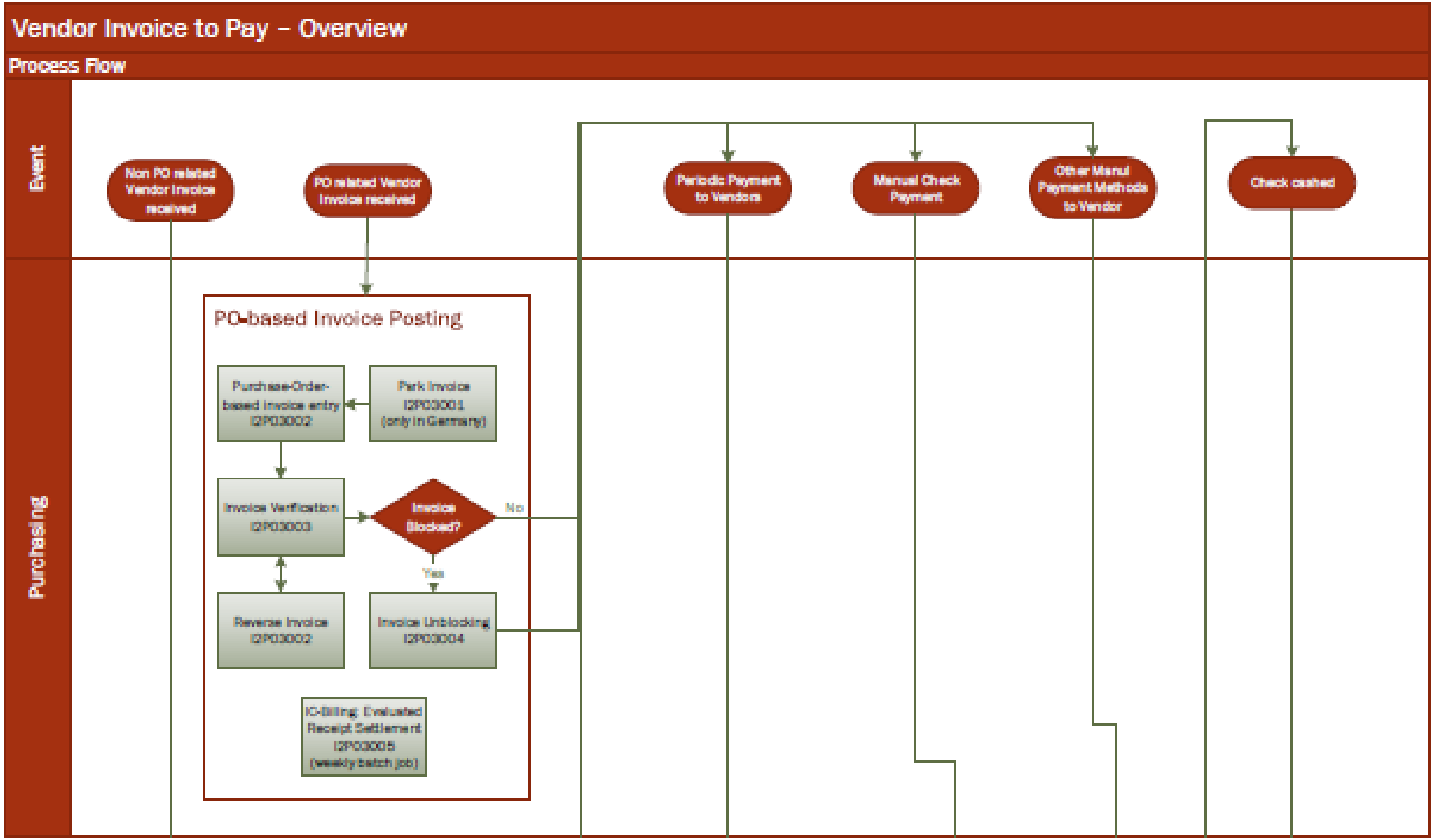
The main difference between the two models is that the SAP graphs are similar to Business Process Model and Notation (BPMN) graphs whereas consolut's notation is more similar to Event Driven Process Chain (EPC). In general, the SAP model seems to be more structured than the consolut one, as for instance it clearly shows the start and the end events of the process, whilst the consolut model doesn't. What is more, SAP offers an explanation of the sub-routines, below the main process, while consolut doesn't show the steps of the sub-routines.

Since both models show processes that take place in the SAP software, knowledge of the SAP environment is required. If someone is not familiar with the SAP system, it is very difficult to understand the process flow and all the objects and files that are being created during the processes.

7.3. Business Processes comparison

7.3.1. Vendor Invoice to Pay (I2P)

The first consolut process we will study, as shown in the Figure 183, is the Vendor Invoice to Pay (I2P). This process shows every step of the payment, starting from the moment an invoice is received, until the payment is cleared.


Vendor Invoice to Pay – Overview
Process Flow
Event
Purchasing
Non PO related Vendor Invoice received
PO related Vendor Invoice received
Periodic Payment to Vendors
Manual Check Payment
Other Manul Payment Methods to Vendor
Check cashed
PO-based Invoice Posting
Purchase-Order-based invoice entry I2P03002
Park Invoice I2P03001 (only in Germany)
Invoice Verification I2P03003
Invoice Blocked?
No
Yes
Reverse Invoice I2P03002
Invoice Unblocking I2P03004
IC-Billing: Evaluated Receipt Settlement I2P03005 (weekly batch job)

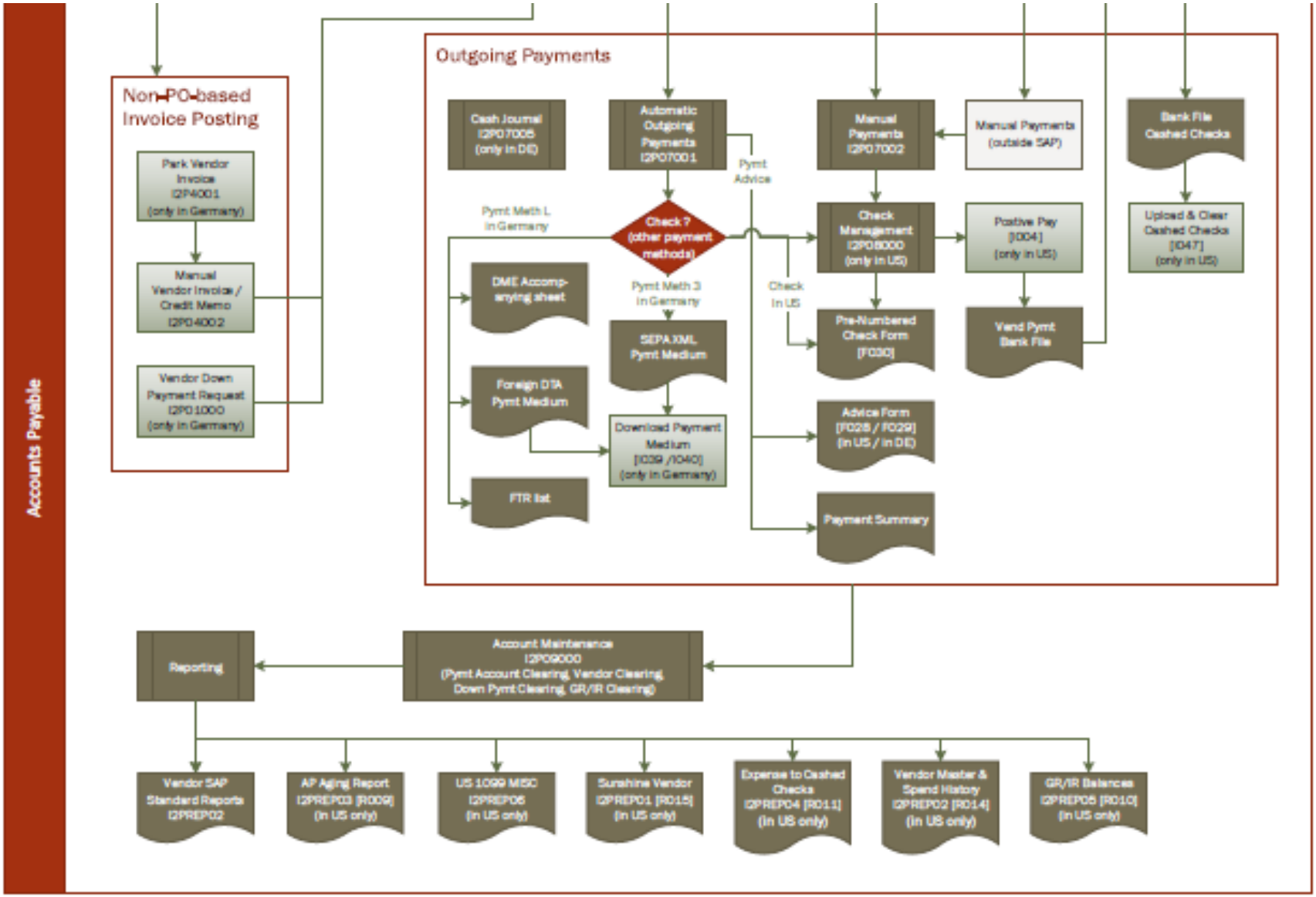


Figure 183: Vendor Invoice to Pay (I2P) process by consolut (consolut, 2019)

By searching the SAP Finance processes, as presented at rapid.sap.com, the SAP process that is similar to the first consolut process is the Accounts Payable (J60)[31], as presented in Figure 184. The main process is shown in Figure 185 and the sub-processes in Figure 186.

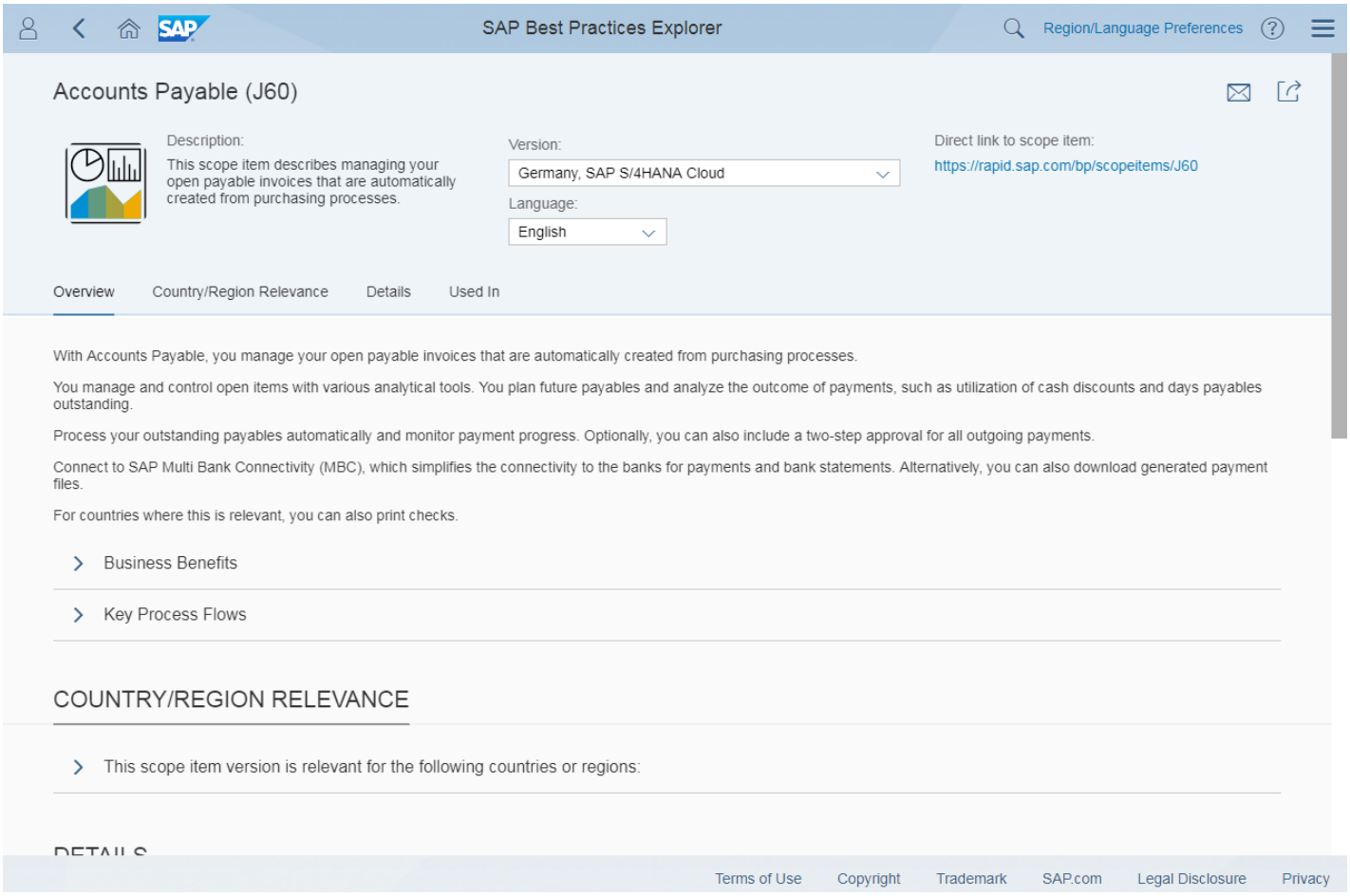
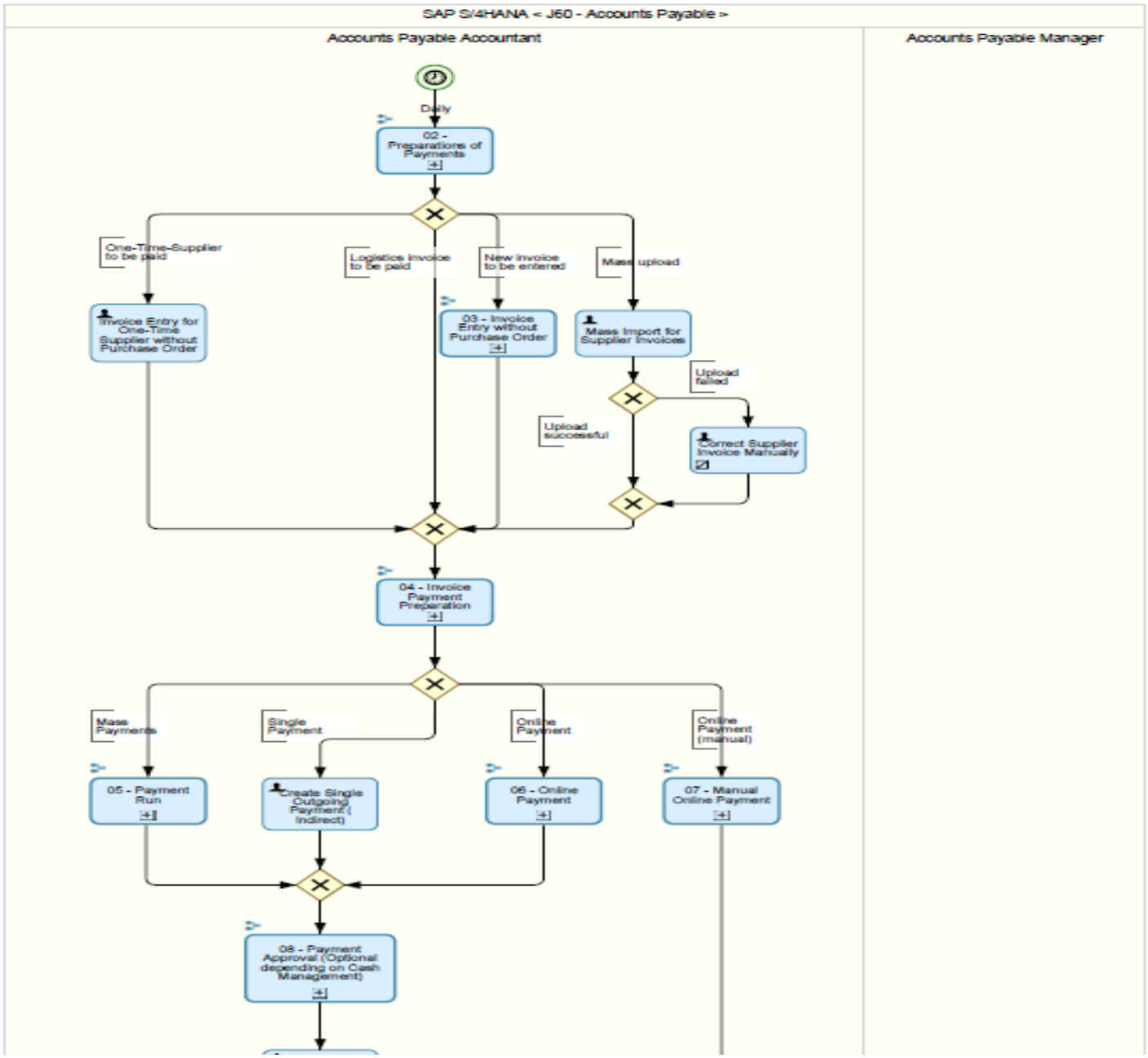


Figure 184: Accounts Payable (J60) process by SAP (SAP, 2019)

[31] https://rapid.sap.com/bp/#/browse/scopeitems/J60 (Accessed 4 June 2019)

01 - Main


SAP S/4HANA < J60 - Accounts Payable >
Accounts Payable Accountant
Accounts Payable Manager
Daily
02 - Preparations of Payments
One-Time-Supplier to be paid
Logistics invoice to be paid
New invoice to be entered
Mass upload
Invoice Entry for One-Time Supplier without Purchase Order
03 - Invoice Entry without Purchase Order
Mass Import for Supplier Invoices
Upload failed
Upload successful
Correct Supplier Invoice Manually
04 - Invoice Payment Preparation
Mass Payments
Single Payment
Online Payment
Online Payment (manual)
05 - Payment Run
Create Single Outgoing Payment (Indirect)
06 - Online Payment
07 - Manual Online Payment
08 - Payment Approval (Optional depending on Cash Management)

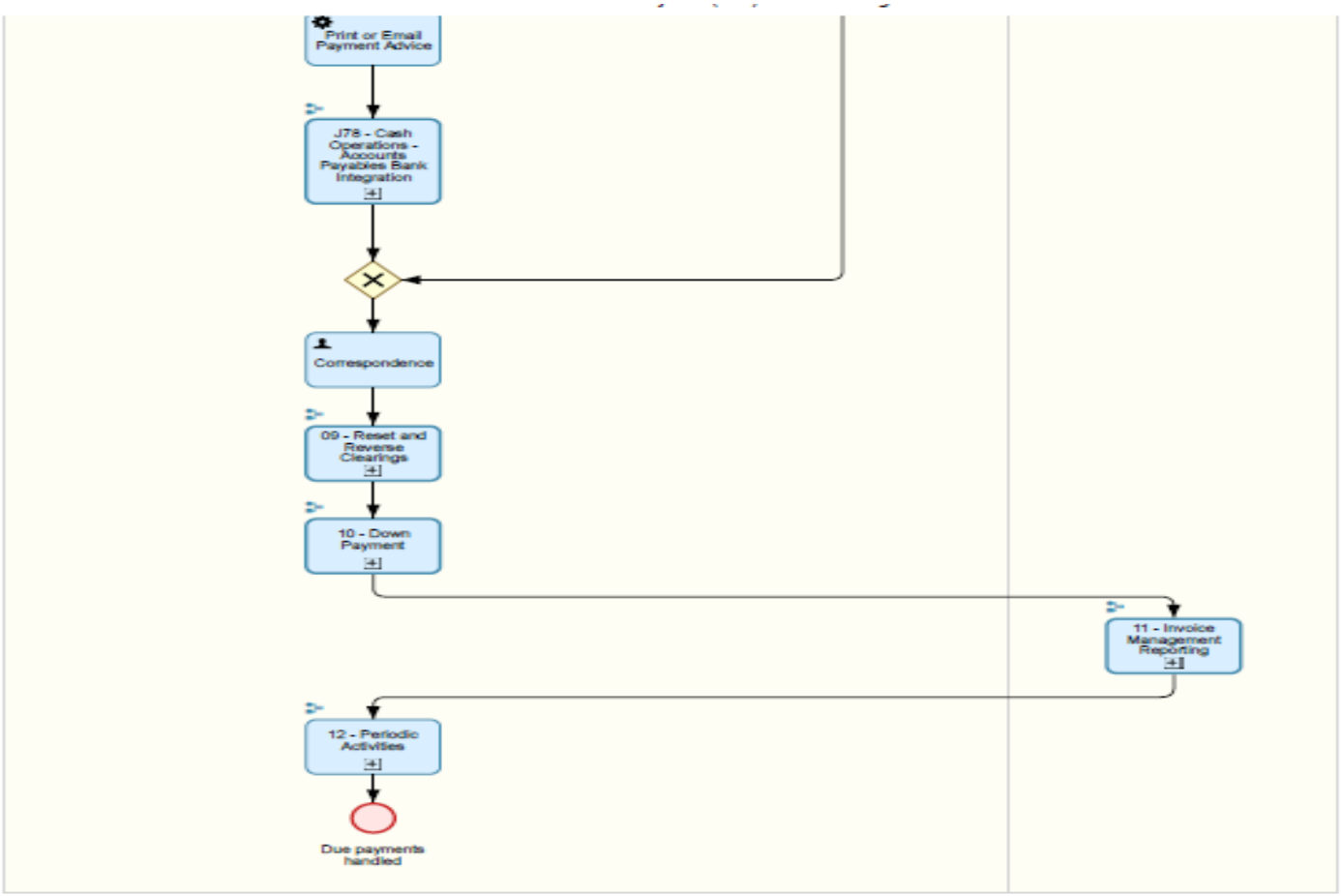
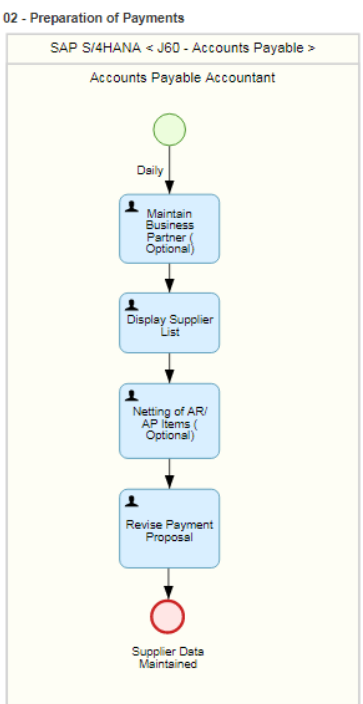
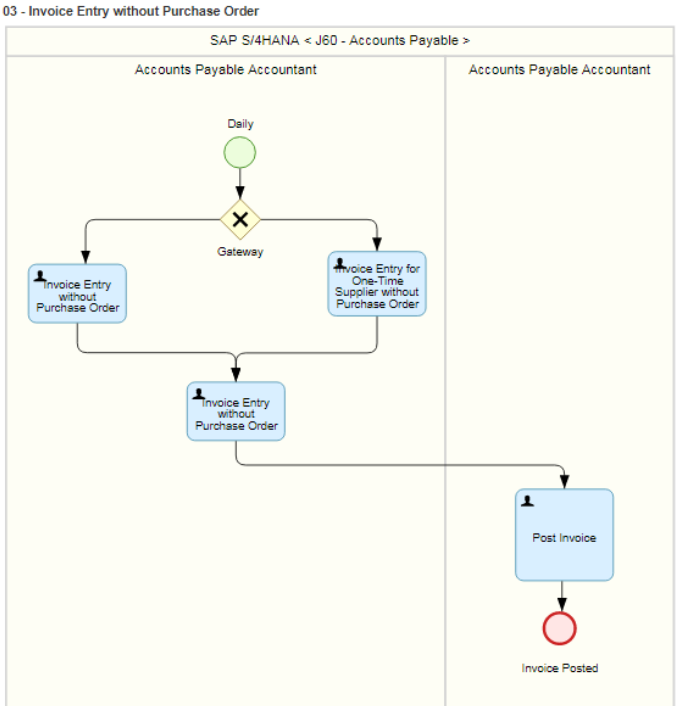
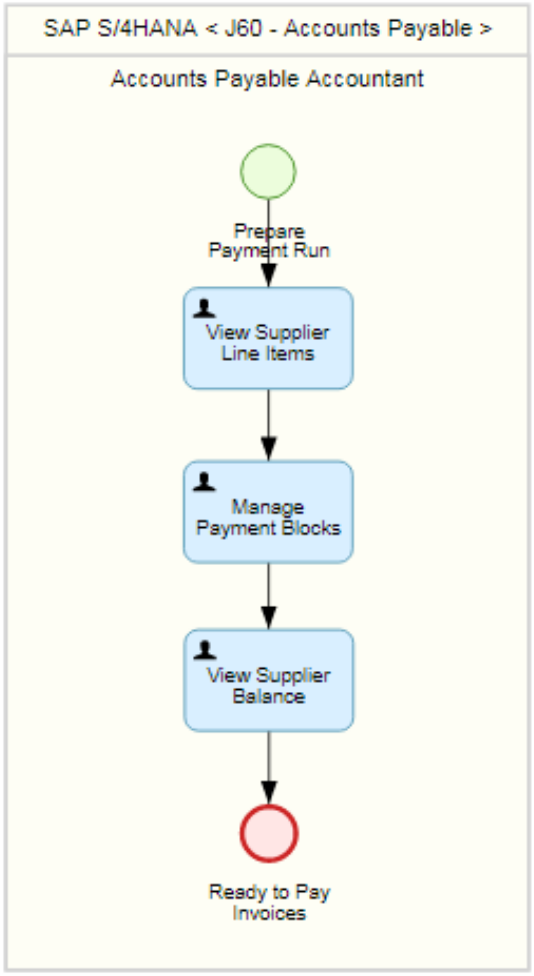


Figure 185: The main process flow diagram for Accounts Payable (J60) by SAP (SAP, 2019)

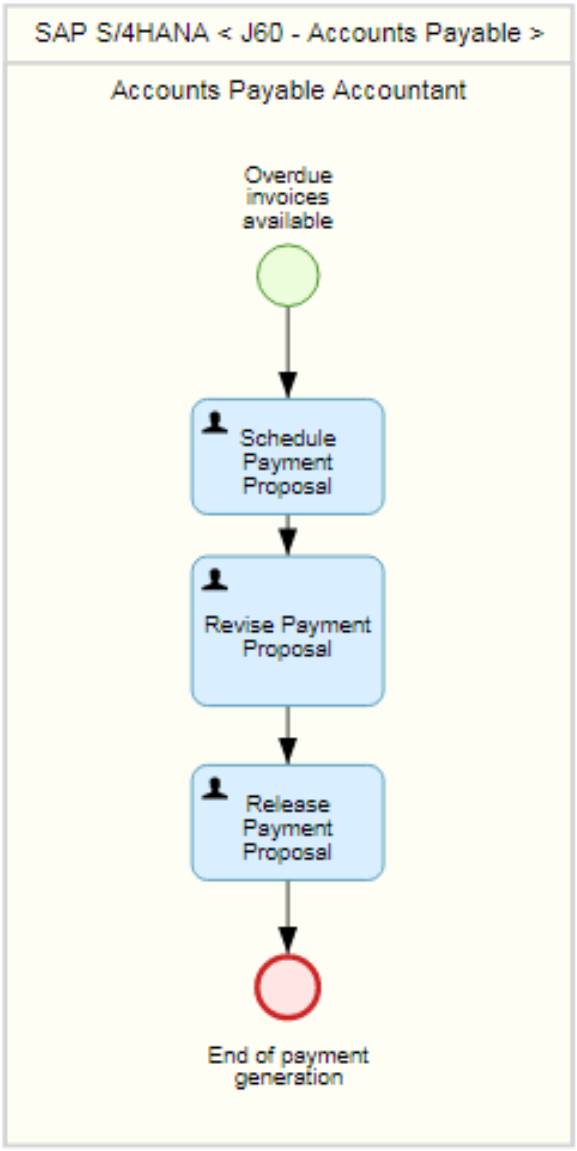




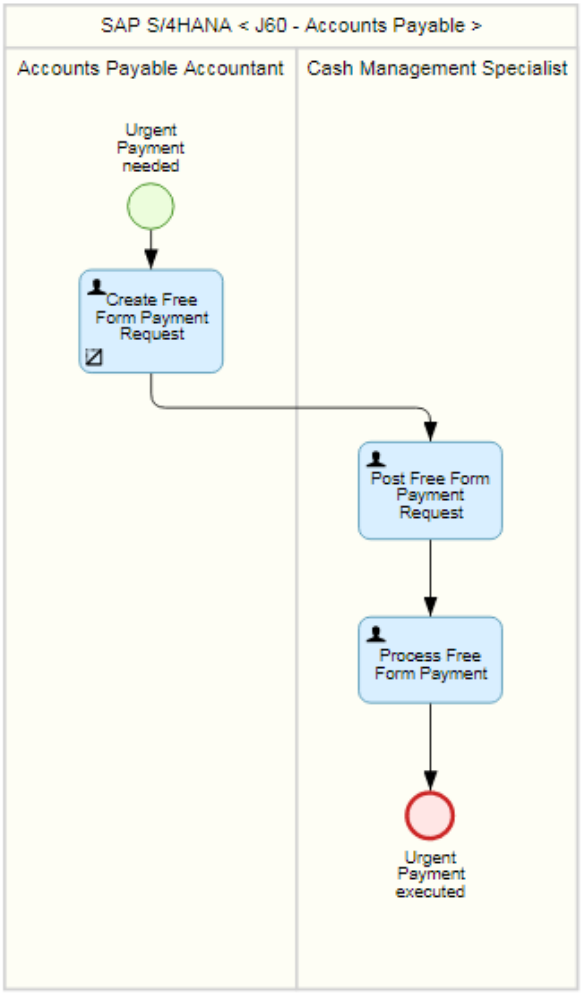
04 - Invoice Payment Preparation



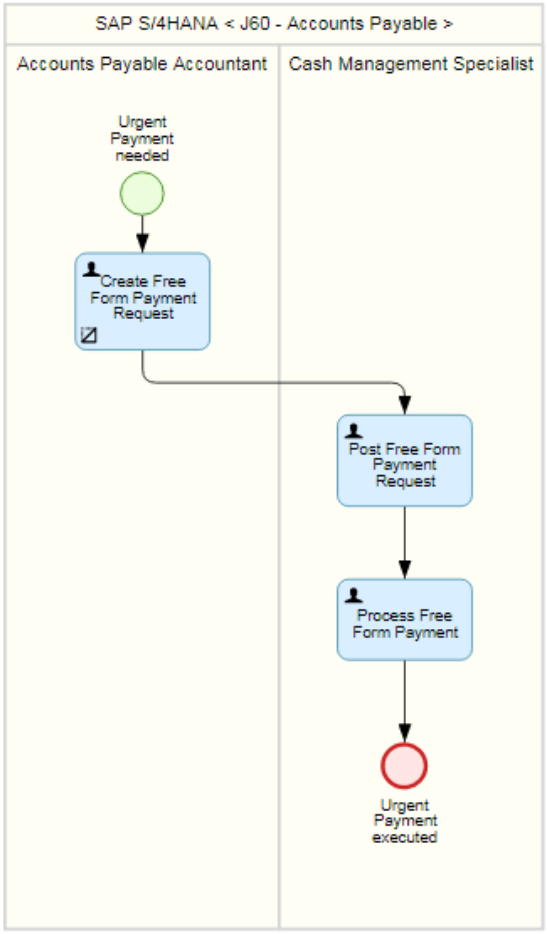
05 - Payment Run



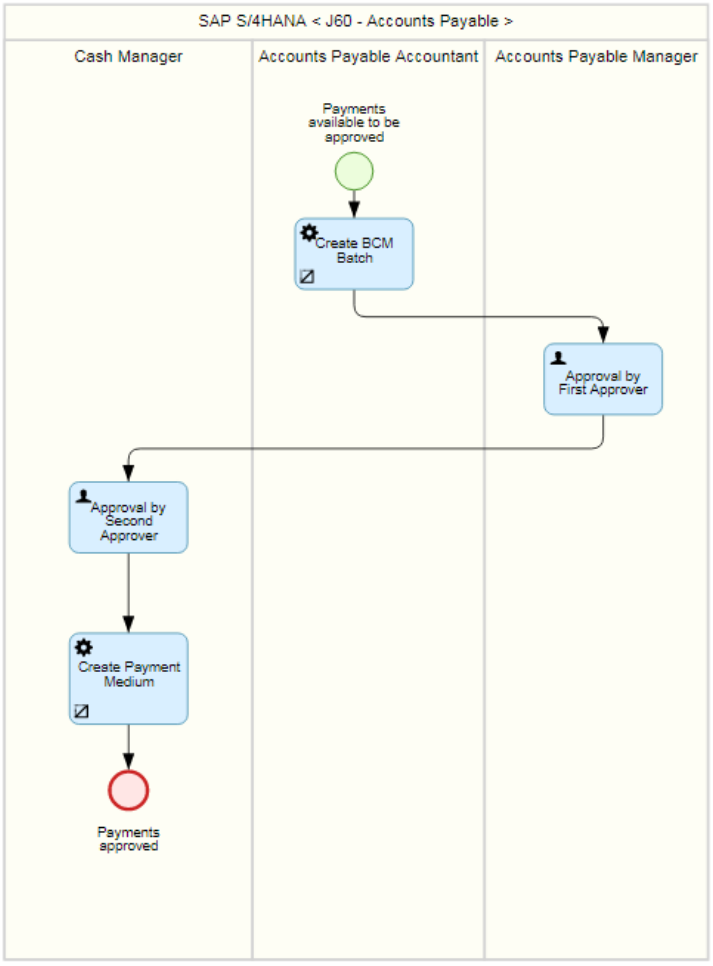
06 - Online Payments



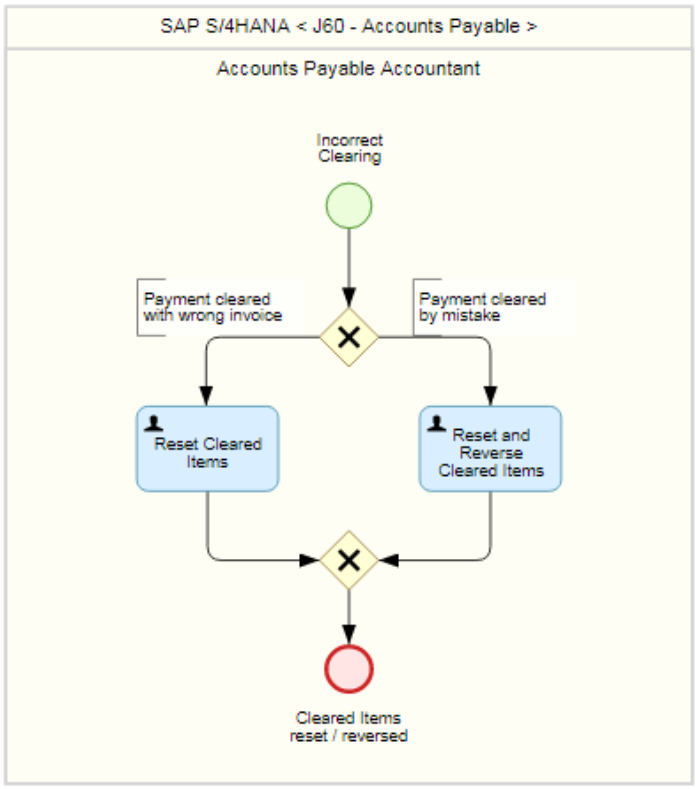
06 - Online Payments



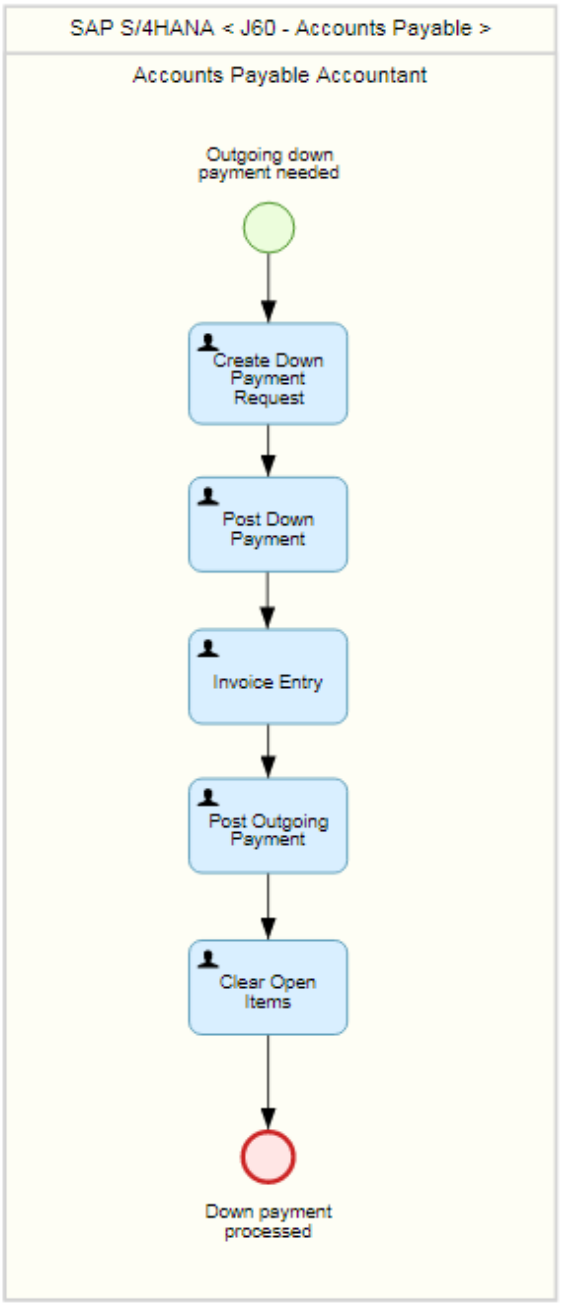
08 - Payment Approval (Optional depending on Cash Management)



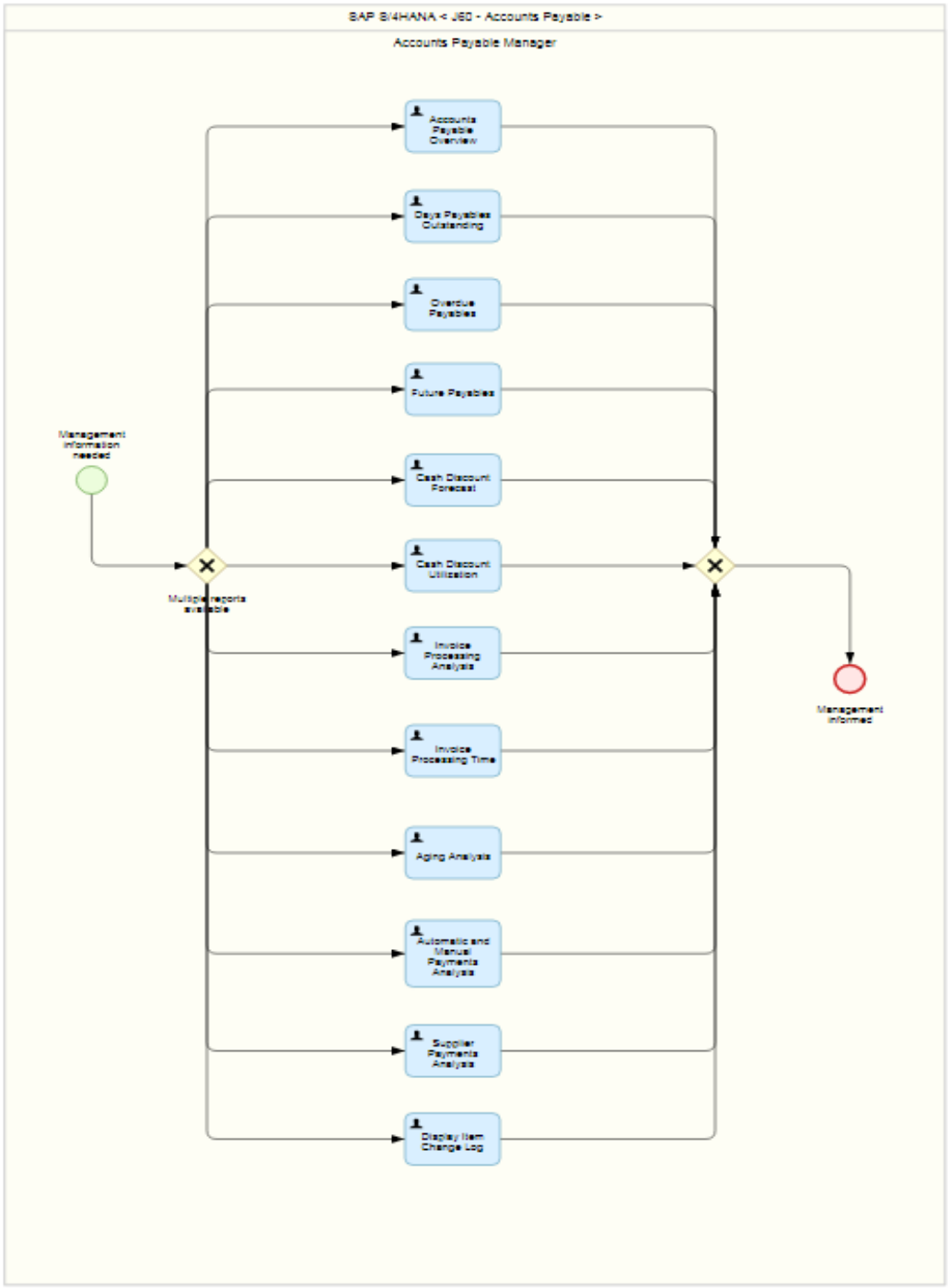
09 - Incorrect Posting



10 - Down Payment



11 - Invoice Management Reporting



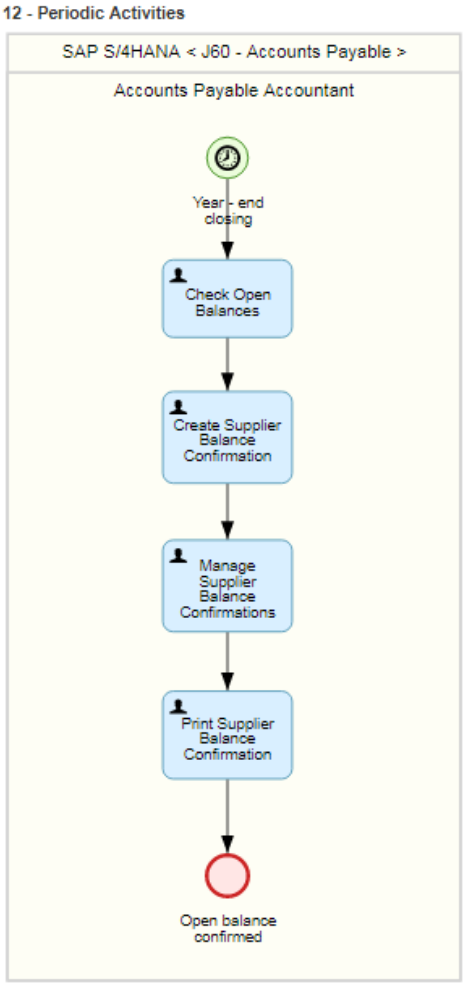


Figure 186: The sub-processes of the Accounts Payable (J60) process (SAP, 2019)

As we can see in Figure 183, consolut's process starts by defining if the received invoice is purchase order (PO) based or not. Then, the payment is being sorted into the following three categories: (1) periodic payment to vendors, (2) manual check-payment and (3) other manual payment methods to vendor, all of which lead to a number of steps regarding the actual steps of the payment, such as the upload of the various necessary bank files. Finally, the next steps refer to the reporting that is being conducted after the payment, followed by the SAP files that are being created.

On the other hand, the SAP process begins by sorting the received invoice into four different categories, which are: (1) one-time-supplier to be paid, (2) logistics invoice to be paid, (3) new invoice to be entered and (4) mass upload. In the categories (1) and (3) it is also determined if the invoice is linked to a purchase order. After that, SAP sorts the payment respectively into four categories, which are: (1) mass

payments, (2) single payment, (3) online payment and (4) online payment (manual), all of which, besides the option (2), are sub-processes. Then, the payment approval and the cash operations take place. The latter is a separate process in SAP[32], the main process of which is shown in Figure 187, and it includes steps regarding the bank transfers and payments.

[32] https://rapid.sap.com/bp/#/browse/scopeitems/J78 (Accessed 4 June 2019)

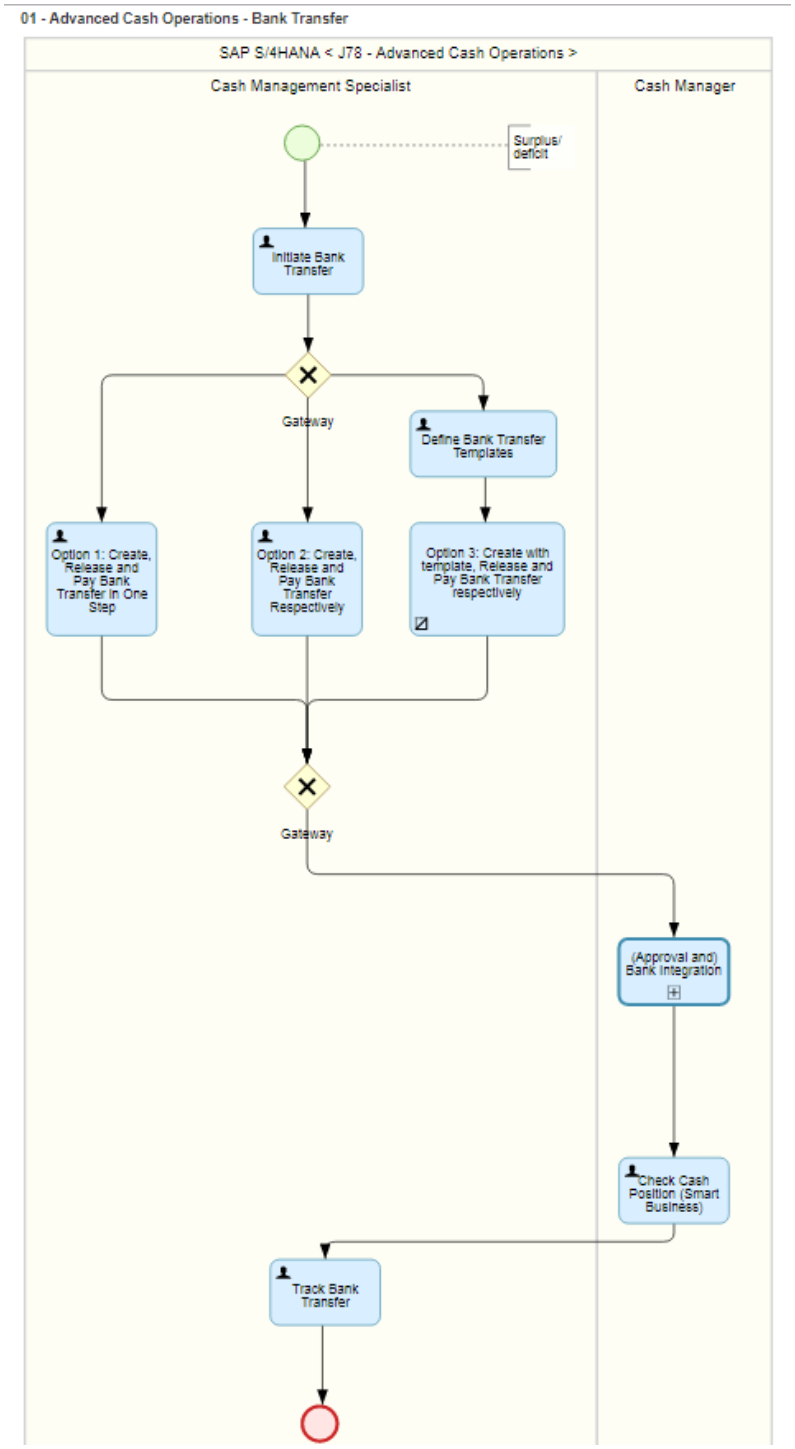


Figure 187: The main process flow diagram for Advanced Cash Operations (J78) by SAP (SAP, 2019)

There are a number of similarities between the two processes that we studied. First of all, the processes share the same purpose, starting from the moment an invoice is received until the reporting after the payment has been conducted. The basic steps of the processes are to the same, such as the categorization of the invoices, the fact

that both processes include the basic payment methods and the periodic activities that follow every payment. Both processes include steps for invoice resetting, vendor down payments and reporting.

The two processes are different in a number of respects. First of all, the consolut process involves both the Purchasing and the Accounts Payable department whereas the main SAP process takes place only within the Accounts Payable department. In some of the SAP sub-routines the Cash Management department is also involved. Another important difference is that the SAP process is more detailed than the consolut one, as it includes more steps and tasks. It also includes the process flow of the sub-processes, as it was mentioned before, many of which are for payment preparation purposes. SAP also has a more detailed payment run, for instance steps and sub-processes for online payments.

Another difference is that since consolut adjusts each process to the customer's needs, they list points and include steps that might not be important when studying the process from a general perspective, like SAP does. For instance, this particular process that we study is Germany and US-specific, as many of the steps, as well as payment methods shown are specifically for these countries, an important feature for this customer since they are active in these countries.

What is more, consolut shows all the SAP files that are created by this process, something that we don’ see in the SAP process. Also, SAP includes payment approvals, steps for resetting and reversing cleanings and some payment methods that consolut doesn’t.

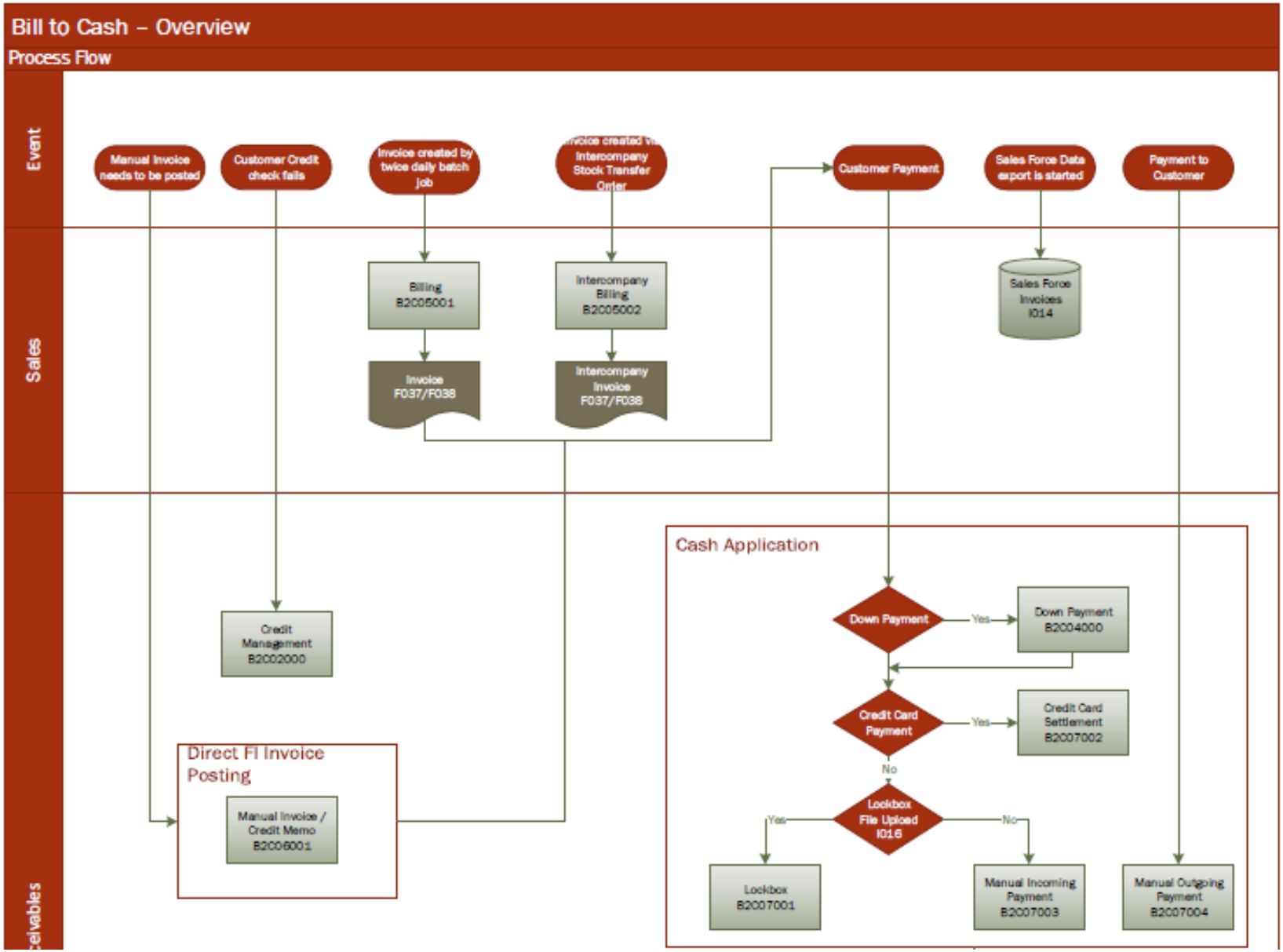
Last but not least, if we take a look at the process IDs that consolut is using, we can see that they are not similar to the SAP ones. They are system-oriented, as they refer to a specific consolut’s tool where they use their own process and process-step definitions.

In general, we can say that the consolut process includes the majority of the steps that SAP indicates are necessary to conduct the Vendor to Pay process. All the steps

and the sub-processes included seem to follow a logical order. However, it is concise compared to the SAP process, as it is customer-specific and includes important steps for this specific implementation. SAP is more detailed, complicated and contains more options, steps and sub-processes, as they present this process from a general point of view.

7.3.2. Bill to Cash (B2C)

The second consolut process we will study is the Bill to Cash (B2C), as shown in Figure 188. This process describes the steps for customer payments, incoming as well as outgoing.


Bill to Cash – Overview
Process Flow
Event
Sales
Receivables
Manual Invoice needs to be posted
Customer Credit check fails
Invoice created by twice daily batch job
Intercompany Stock Transfer Order
Customer Payment
Sales Force Data export is started
Payment to Customer
Billing B2005001
Intercompany Billing B2005002
Sales Force Invoices I014
Invoice F037/F038
Intercompany Invoice F037/F038
Credit Management B2002000
Direct FI Invoice Posting
Manual Invoice / Credit Memo B2006001
Cash Application
Down Payment
Yes
Down Payment B2004000
Credit Card Payment
Yes
Credit Card Settlement B2007002
No
Lockbox File Upload I016
Yes
No
Lockbox B2007001
Manual Incoming Payment B2007003
Manual Outgoing Payment B2007004

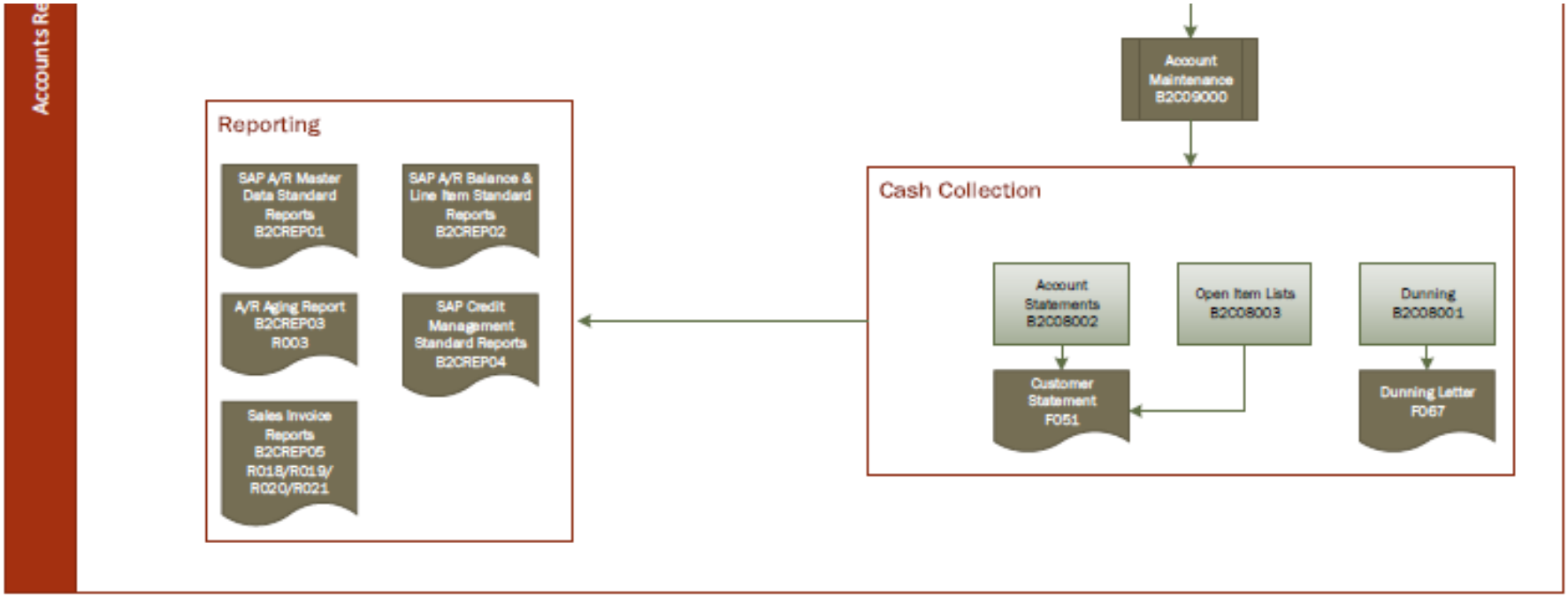


Figure 188: Bill to Cash (B2C) process by consolut (consolut, 2019)

By searching the SAP Finance processes, as presented at rapid.sap.com, the SAP process that is similar to consolut's process "Bill to Cash" is the Accounts Receivable (J59)[33], as shown in Figure 189, Figure 190 and Figure 191.

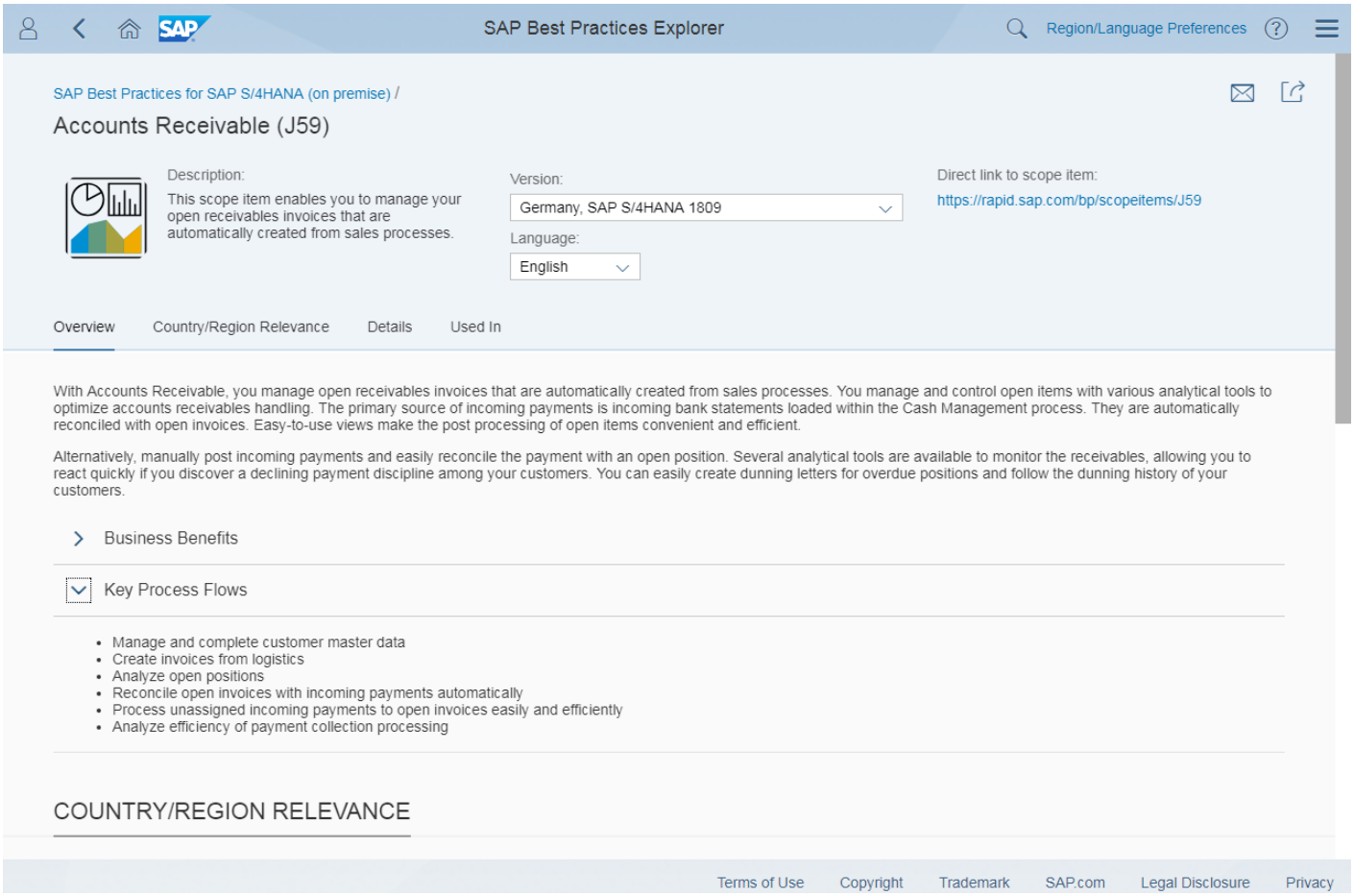


Figure 189: Accounts Receivable (J59) process by SAP (SAP, 2019)

[33] https://rapid.sap.com/bp/#/browse/categories/sap_s%254hana/areas/on-premise/packageversions/BP_OP_ENTPR/S4HANA/1809/DE/5/EN/scopeitems/J59 (Accessed May 7 2019)

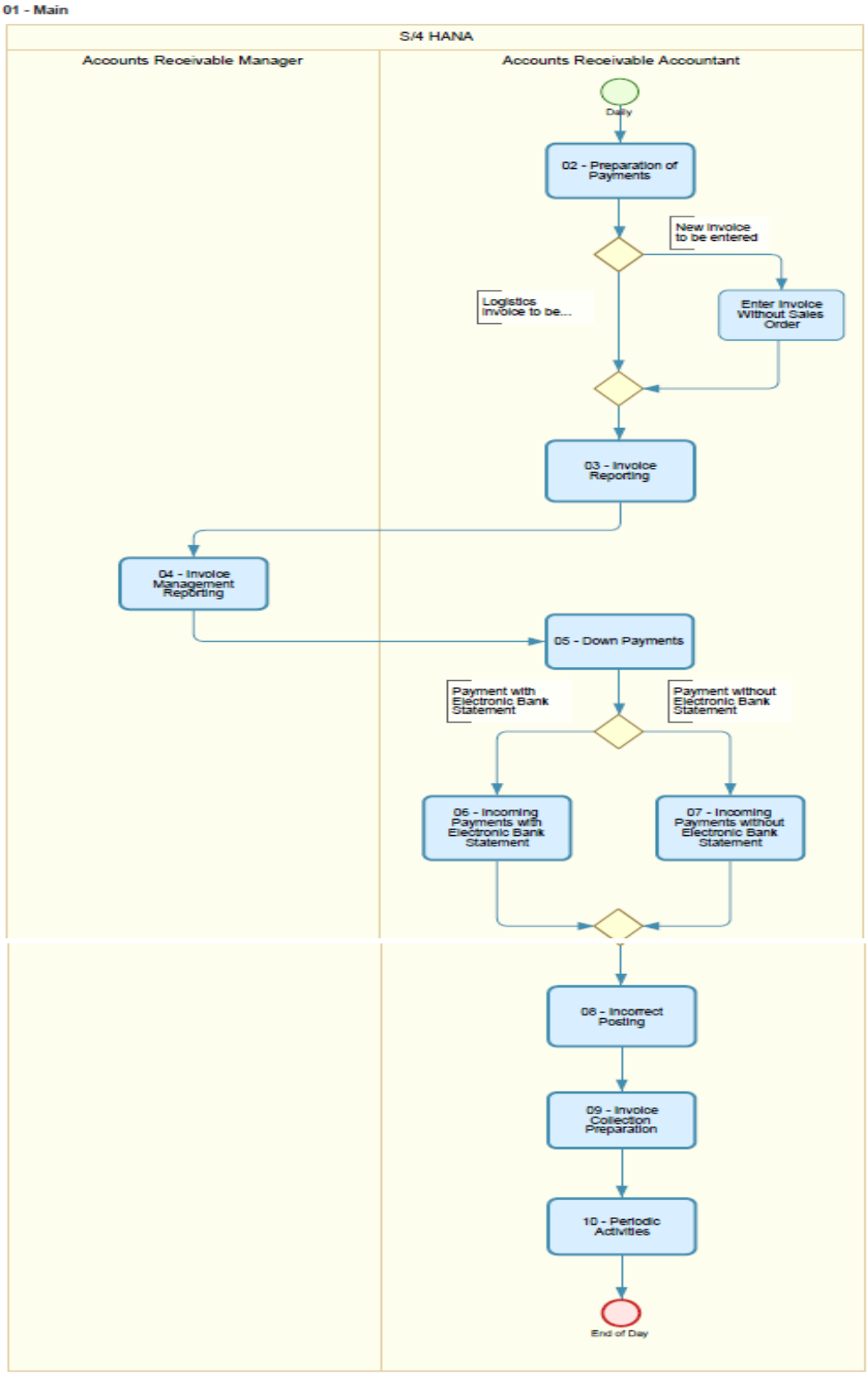
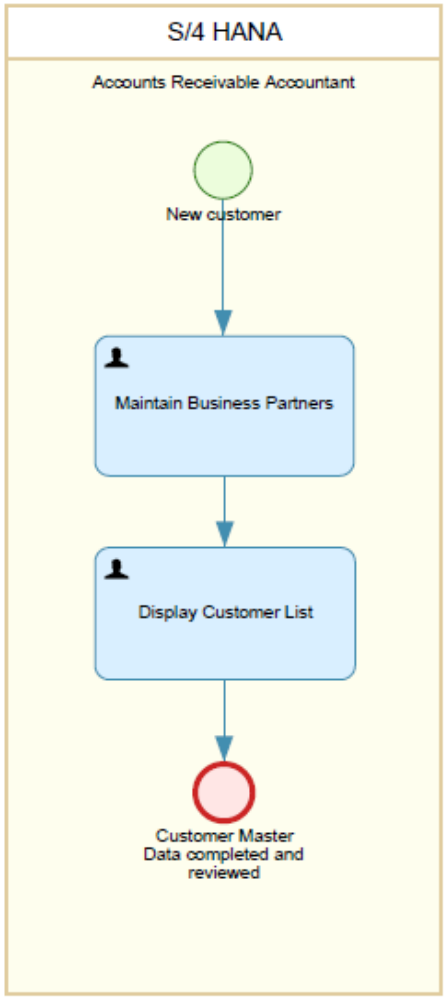
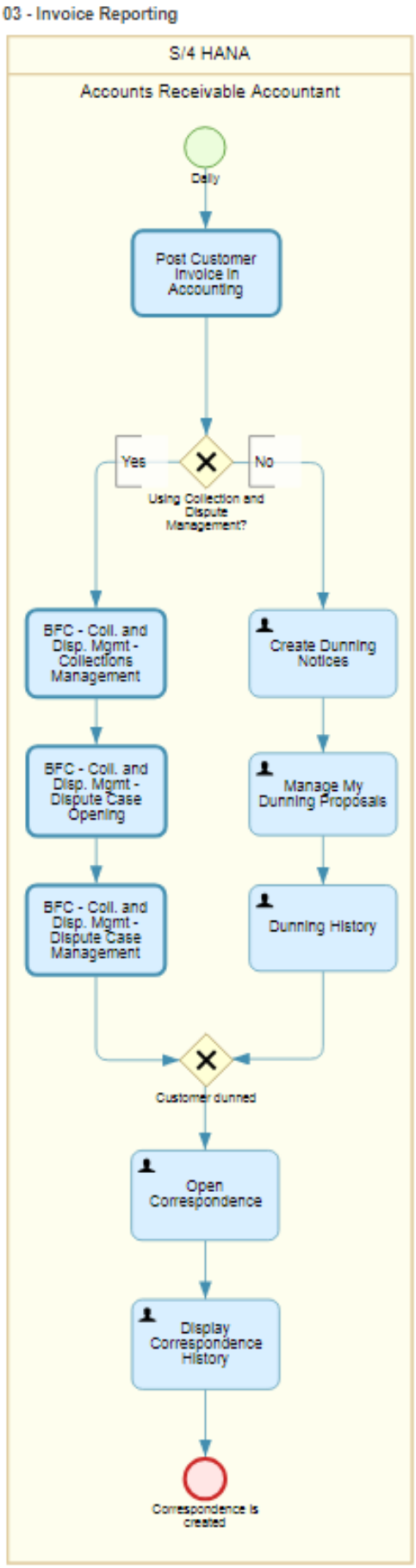
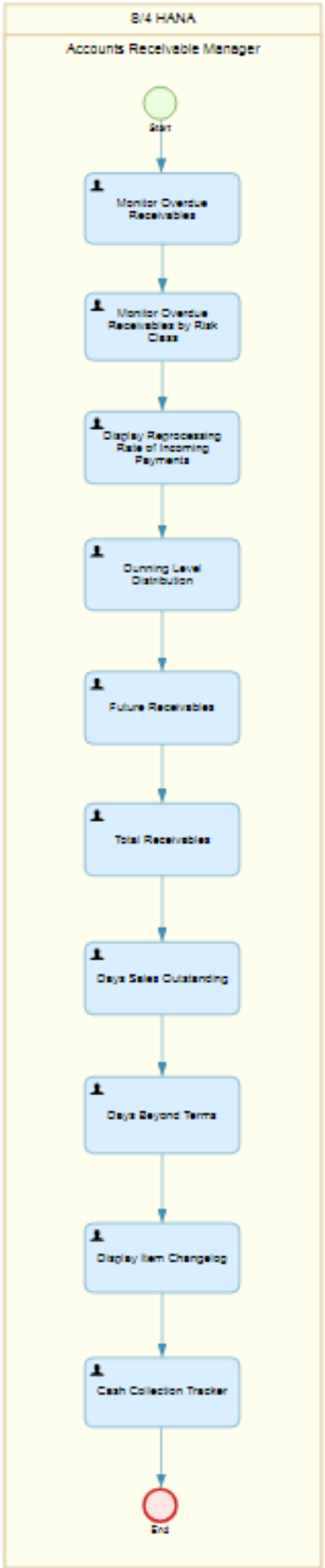


Figure 190: The main process flow diagram for Accounts Receivable (J59) by SAP (SAP, 2019)

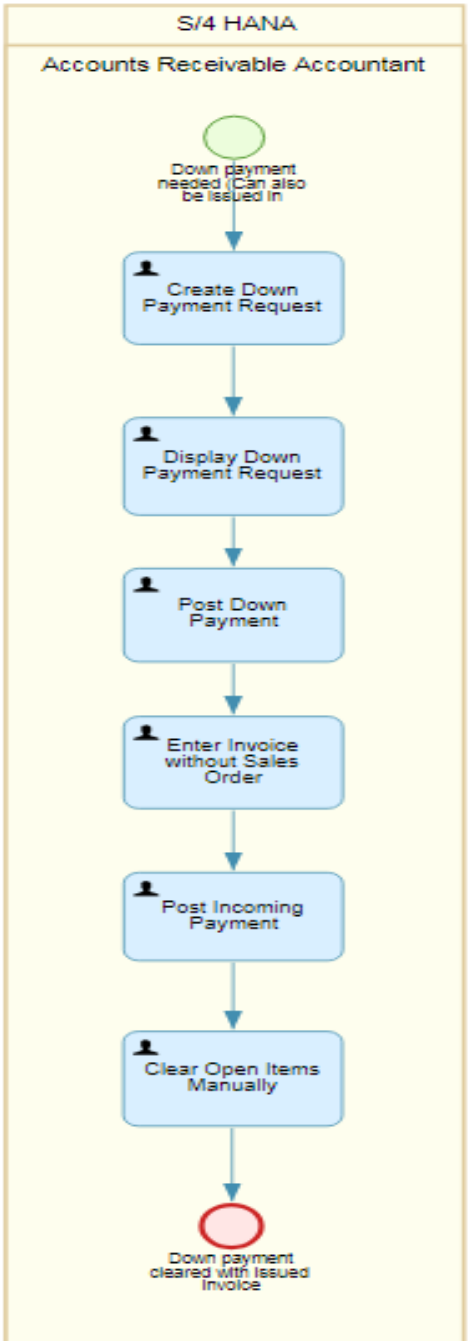

02 - Preparation of Payments
S/4 HANA
Accounts Receivable Accountant
New customer
Maintain Business Partners
Display Customer List
Customer Master Data completed and reviewed


03 - Invoice Reporting
S/4 HANA
Accounts Receivable Accountant
Daily
Post Customer Invoice in Accounting
Yes
No
Using Collection and Dispute Management?
BFC - Coll. and Disp. Mgmt - Collections Management
BFC - Coll. and Disp. Mgmt - Dispute Case Opening
BFC - Coll. and Disp. Mgmt - Dispute Case Management
Create Dunning Notices
Manage My Dunning Proposals
Dunning History
Customer dunned
Open Correspondence
Display Correspondence History
Correspondence is created

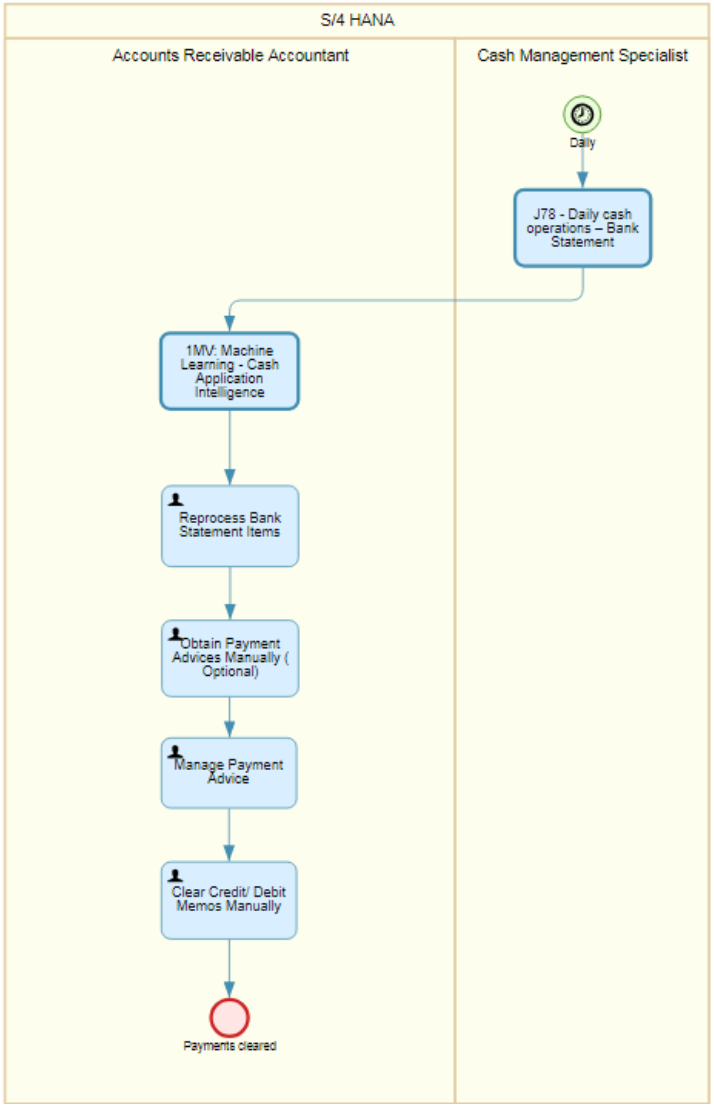
04 - Invoice Management Reporting



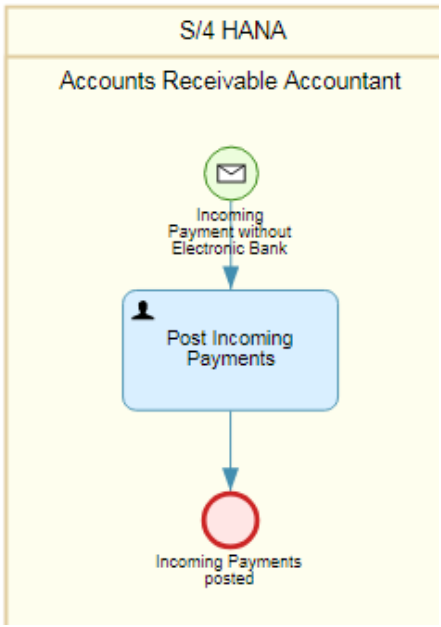
05 - Down Payment



06 - Incoming Payment with Electronic Bank Statement



07 - Incoming Payment without Electronic



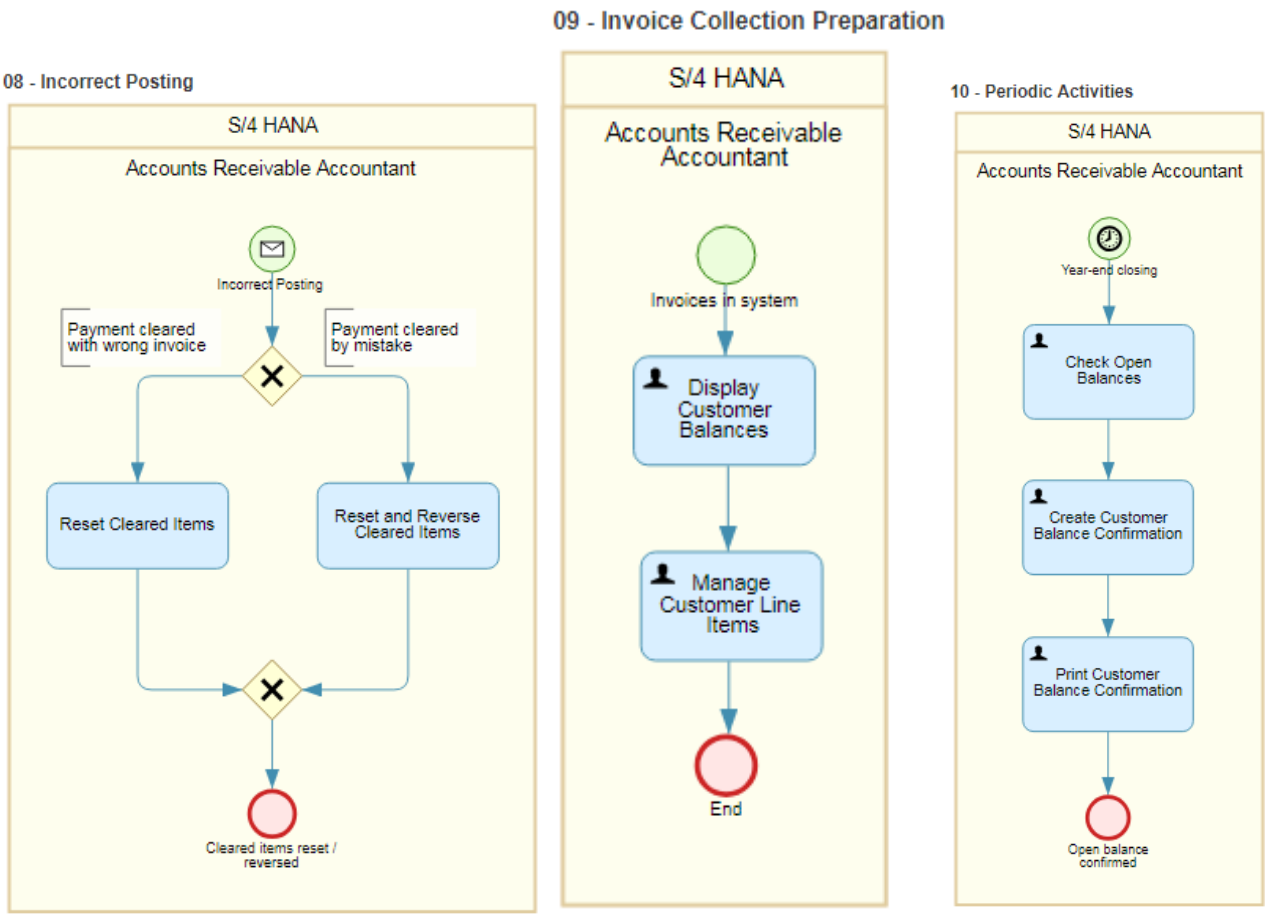


Figure 191: The subprocesses of the Accounts Receivable (J59) process (SAP, 2019)

The two processes share the same scope, as both process flows show the payments from the customers to the company. What is more, both SAP and consolut include steps for reporting in their process.

As seen in Figure 188, consolut's process starts by defining the type of the invoice. There are three types, which are: (1) manual invoice needs to be posted, (2) invoice created by twice daily batch job and (3) Invoice created via Intercompany Stock Transfer Order. All these categories are being followed by steps regarding the customer payments, or outgoing payments to customers, the collection of the payment and the reporting that follows.

On the other hand, the SAP process begins by sorting the invoice to be paid into four different categories, which are: (1) one-time-supplier to be paid, (2) logistic invoice to be paid, (3) new invoice to be entered and (4) mass upload. After that, there are

steps fro the payment preparation, the actual payment, the approval and finally the periodic activities that follow.

There are a number of differences between the two processes. First of all, the SAP process is again more detailed consolut's. It includes extra steps for payment preparation, as well as for reversing and resetting the items created in case of incorrect postings, something that we don't see in the consolut process. What is more, the main SAP process involves only the Accounts Receivables department, whereas the consolut one involves both the Accounts Receivables and the Sales department.

An important difference between the two processes is that the consolut one includes steps for outgoing payments to customers as well as intercompany stock transfers, two cases that are not represented in the SAP Accounts Receivable (J59) process.

There is a SAP process presented at rapid.sap.com, concerning the creation of debit memo request for the customer. This is the Debit Memo Processing (1F1)[34] process, as shown in Figure 192 and Figure 193, which starts with the creation of the debit memo and ends with the Accounts Receivable (J59) process. This suggests that the latter process is also used for outgoing payments to customers.

[34] https://rapid.sap.com/bp/#/browse/categories/sap_s%254hana/areas/on-premise/packageversions/BP_OP_ENTPR/S4HANA/1809/DE/5/EN/scopeitems/1F1 (Accessed May 7 2019)

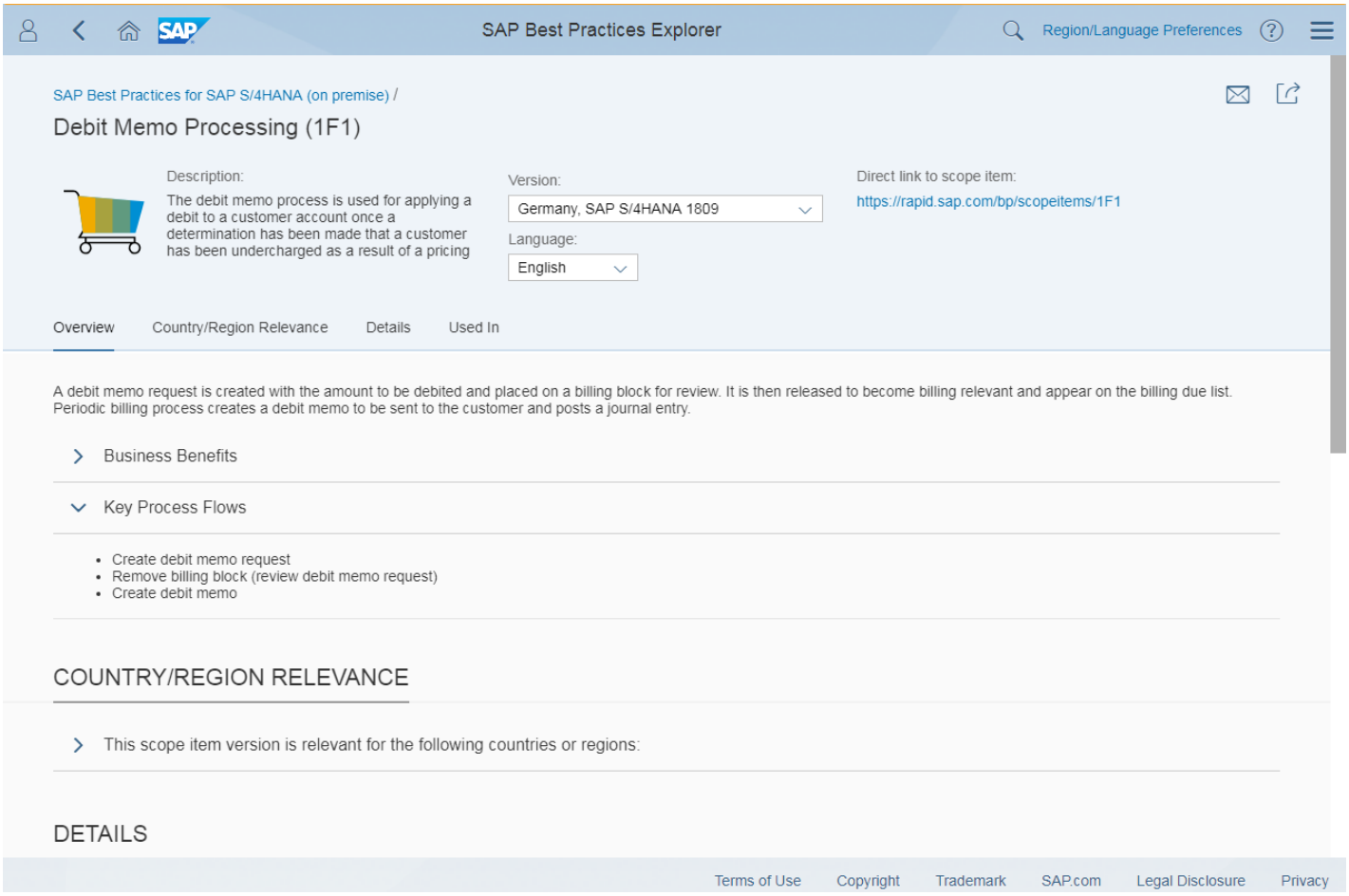


Figure 192: Debit Memo Processing (1F1) process by SAP (SAP, 2019)

Debit Memo Processing

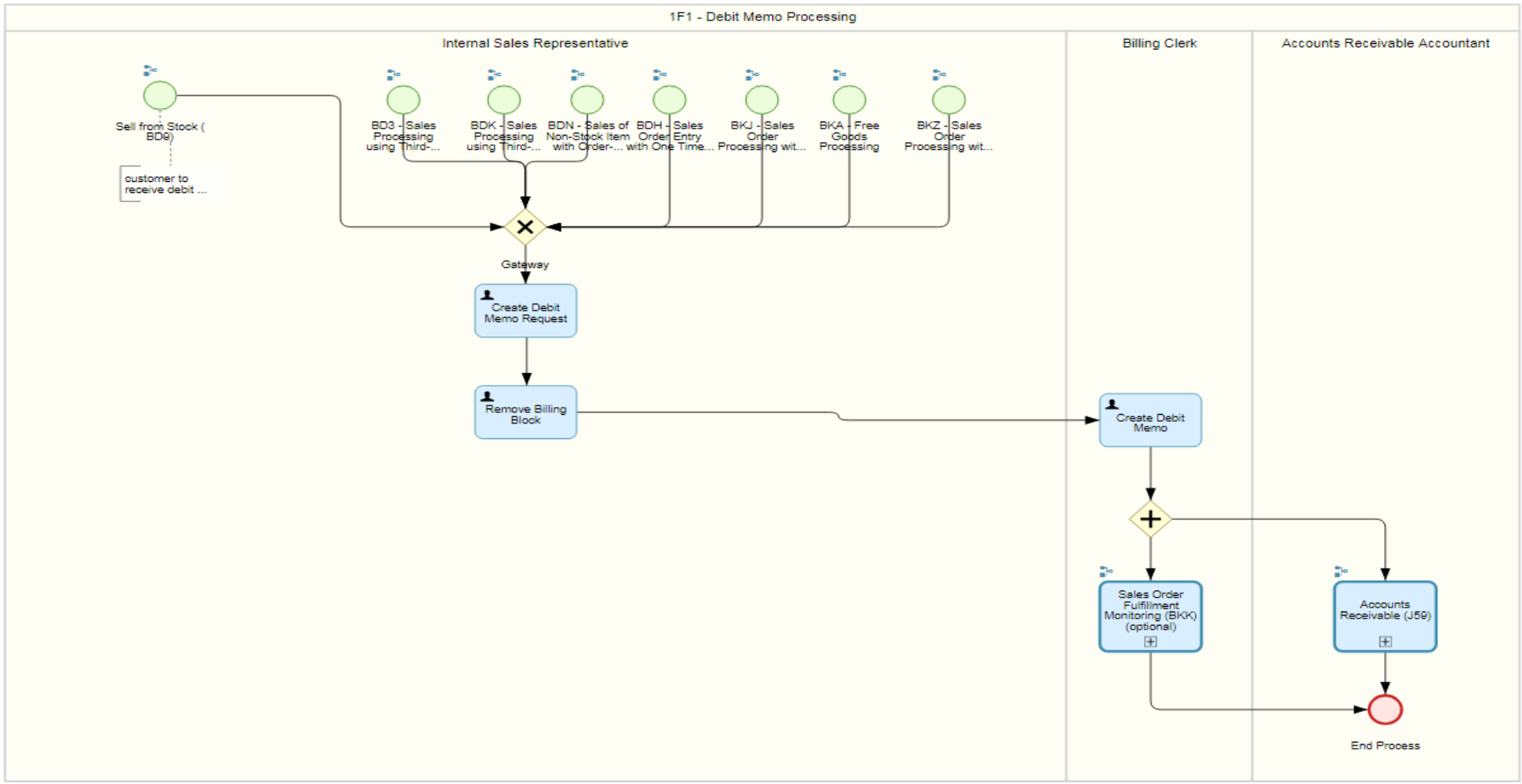


Figure 193: The process flow diagram for the Debit Memo Processing (1F1) by SAP (SAP, 2019)

In general, this consolut process could be described as concise compared to the SAP one, as it involves less steps and sub-processes. Like in the Vendor Invoice to Pay process, all the steps and the sub-processes included seem to follow a logical order. We should note once again that consolut's process is customer-specific and includes all the important steps for a specific implementation-project while SAP is more detailed and contains more options, steps and sub-processes, as they present this process from a general point of view.

7.4. Suggestions for future implementations

This comparison has shown that generally the model used for business process mapping by consolut has a lot of significant differences with the one used by SAP.

There is a list of adjustments that consolut can make in order to keep a more easily maintainable model. First of all, there are some SAP steps that could prove to be useful in a project for SAP implementation, for instance the steps about resetting and reversing items created by incorrect postings. The only consolut process that includes such steps is the Invoice to Pay, for verifying and deleting an invoice. This could be something useful to include also in the rest of their processes.

What is more, as we already discussed, SAP uses a different categorization for the payment options. A suggestion for consolut would be to consider following the same categorization, as this way it would be easier to use the SAP model as a reference for future implementations.

Last but not least, consolut involves more departments than SAP in a process. For example, in the Bill to Cash process consolut involves both the Accounts Receivables and the Sales department, whilst SAP involves only the first one. Considering limiting the number of the departments, where possible, will make the maintenance of the process easier and reduce the cost. However, this is not always applicable, as limiting the departments could make the process incorrect. Further investigation and experimentation is needed for each implementation separately, to establish whether it is possible to run the process in fewer departments.

It should be noted that the suggestions are from a general perspective. The major limitation of this study is the fact that consolut adjusts their model for each customer, based on their needs, while SAP keeps a general point of view. More research on this topic needs to be undertaken by consolut before deciding to follow these suggestions.

8. Conclusions and future work

The main goal of this study was to determine which business processes exist in an enterprise and understand the way the latter is structured by studying each process area separately. This study has shown that many business process frameworks have been developed in order to be used as reference models for business process mapping.

As expected, this study has found that there are many differences between the frameworks; depending on their main area of focus (e.g. eTOM is developed for the telecommunications industry) and their reason for existence (e.g. PCF is used as a performance indicator whilst SAP's framework is focused on the respective software). Apart from the findings we mentioned at the end of each chapter, the most interesting finding was that while the business process frameworks we studied appeared to have many differences between them in the core process areas, they had a similar structure in the support process areas. This leads us to believe that in many cases the boundaries of the core process areas are not as clear as the support ones.

Another significant finding that emerged from this study is that according to the business process hierarchy that was presented in the literature review, most of the frameworks analyze the high-level and the mid-level of the processes. The only frameworks that move on to analyze the procedures, tasks and steps of the processes are the ones that were developed based on a specific software, for example Oracle and SAP. The rest of the frameworks leave this up to the enterprises that choose to use them.

In general, many business process frameworks have been developed as management tools, with different structure and purpose. We demonstrated how they can be used as reference for an enterprise's business process mapping. The business process framework that should be used differs from case to case, depending on the enterprise's business needs and the reason for attempting the business process mapping. As we've seen in the sixth chapter, where a business process framework is

developed, using a combination of frameworks as reference models can also prove to be useful, as it will provide the enterprise with different points of view on the same topic. The proposals of this thesis should be interpreted and used for implementations with caution, as not all enterprises have the same needs, something that is also confirmed by the consolut case study.

A future study that proposes a business process framework for the rest of the process areas, like the one we presented in Chapter 6, would be very interesting. What is more, a natural progression of this proposal would be to include lower levels of business process analysis than the ones we studied.

Moreover, further research might explore the costs of using such business process frameworks. This could produce interesting findings that would be useful for the enterprises that consider mapping their business processes.

This research can serve as a base for future business process frameworks studies. Although the study has successfully demonstrated that business process frameworks are a powerful and a valuable manager's tool and they can prove to be essential for an enterprise's development, it has certain limitations in terms of the number of the existing business process frameworks studied. This leads us to another possible area of future research, which would be to enrich the theoretical base we provided in this thesis by searching and analyzing more business process frameworks.

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