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eTOM – Enhanced Telecom Operations Map: Design
und Erstellung von Telekom-Referenzprozessen.

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1 Preface

1.1 Competition

Modern business world faces several new challenges that were unknown or underestimated only a few decades ago. The essential point for a business to make profit is to have a competitive advantage which is based on a surplus of information.

This affects not only competitive businesses but everybody. For example if I had the knowledge to operate a telephone line between my house and my shop I would probably do it.

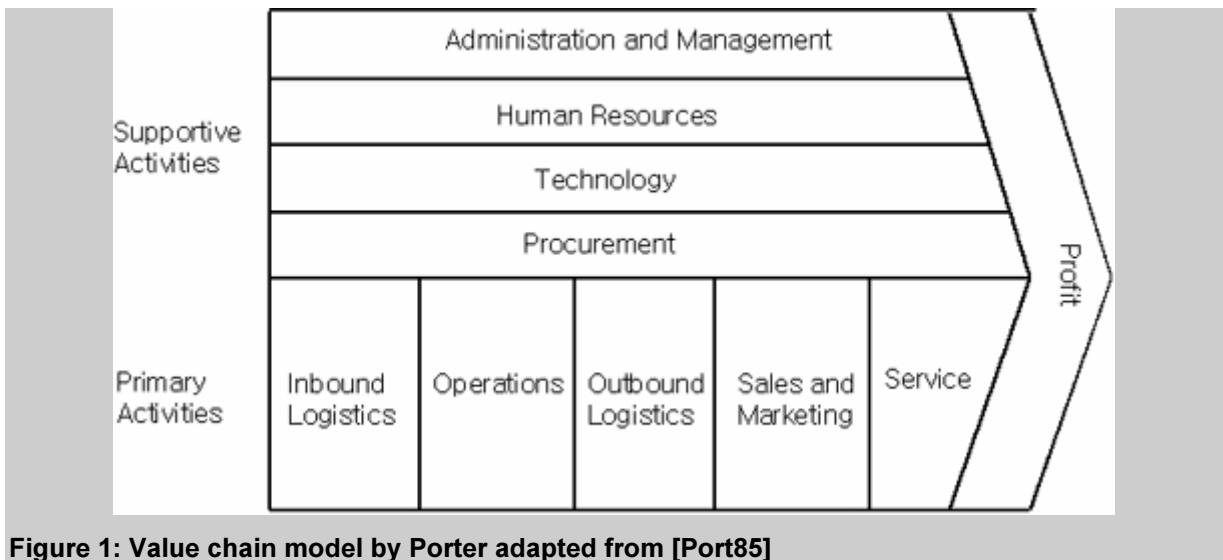
But there are firms that are in the business for many years, who know about legal set-up and have employees who can do the work because of their know-how and experience.

Information technology has changed our lives a lot and, depending on the product or service I am looking for, I can now choose between up to hundreds of suppliers. Going back to the example this means, that even if I do not operate the line myself, I can choose out of several similar products and make my decision almost exclusively dependant on the price.

This increasing competition reduces the marginal revenue (the extra revenue that an additional unit of a product will bring to a firm). Microeconomics believe, that in an economy with perfect information (everybody has information on everything) marginal revenue will be zero. Although we do not have perfect information, it has reached a universal level. In the telecommunication business this has decreased marginal revenue to single-digit shares as a consequence.

The graph below shows how the marginal revenue (profit) is generated. According to Michael E. Porter [Port1985] profit can be made in two ways:

- By holding the cost-leadership. Your customer buys from you because you offer the product he desires at the best price. Your business processes have to be very tight to remain the cost-leader.
- By holding the technology-leadership. Because of a new/unique technology the customer buys from you. You need to invest great sums in development to keep up with technological progress.



1.2 Efficiency

If we consider such a narrow profit margin the impact of efficiency increases the pressure on firms. To keep track of events and flows within the business, departments are eventually being converted into economically autonomous cost-centers [Hell04, p.2]. Former internal departments have to compete with external suppliers thereby. Both have to file tenders and the management cannot afford to choose the internal department if the external suppliers offers similar products at lower costs.

When it comes to accounting many companies in the Telecommunication Industry use the United States of America Generally Accepted Accounting Principles (US-GAAP). These accounting rules claim to consider every business unit as a separate economic entity [KPMG99, p.162] as a consequence of the “matching principle”. None of these entities should have a deficit for longer periods even if the entire company’s economic situation is brilliant.

But the call for more efficiency is much older. In the 1960s and 1970s high acquisition and operational costs of mainframe-systems already required a high level of organization to provide computing time to all departments in an optimal way [Hell04, p.3].

1.3 Challenges and Business Process Management

If we consider the Telecommunication Industry we think of technical challenges in the first place. Software and hardware components need to be developed and integrated in the existing IT-environment.

As a second point we also have to think of the business challenges like business process analysis, optimization, redesign and reengineering (BPR). [Kebe04, p.3]

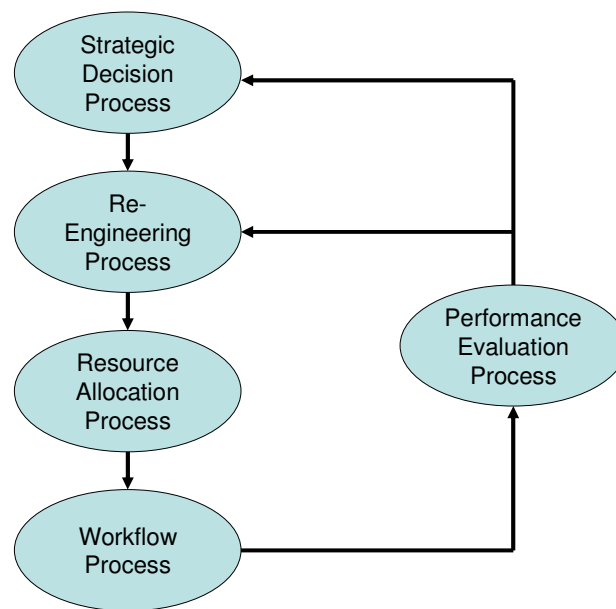


Figure 2: The BPMS Paradigm, adapted from [Kara04]

- Strategic Decision Process: Definition of basic conditions, factors of success and substantial criteria for business processes. This corresponds with eTOM Level 0 (see chapter 2.3).
- Re - Engineering Process: Documentation, adaption, modeling and functional optimization of business processes, identification of potential for reorganization. This corresponds with eTOM Level 1 (see chapter 2.4).
- Resource Allocation Process: Realization of business processes concerning organization and IT. Allocation of resources and infrastructure. This corresponds with eTOM Level 2 (see chapter 2.4).
- Workflow Process: Execution of business processes in the operative environment. Collecting essential operative data as for further analysis. This corresponds with eTOM Level 3 and 4 (see chapter 2.4).

- Performance Evaluation Process: Aggregation, extraction and preparation of process data, measures and metrics.

The essential point of the BPMS Paradigm adduced in [Kara04] is the continuous Feedback control system which allows a dual re-entry at either the Re - Engineering Process for minor reengineering issues or the Strategic Decision Process for major redesign work (BPR).

“By 2006 more than 50% of CRM deployments will be considered as failures due to (among other reasons) lack of business process redesign (Gartner Group, probability=0.8).” [Kebe04, p.3]

This study punctuates the essential role of BPR in IT projects.

1.4 Analyzing Business Processes

In the 1980s the British government commissioned a study on IT business processes at the Central Computer and Telecommunications Agency (CCTA – later part of the Office of Government Commerce OGC). The outcomes were dozens of documents that laid the cornerstone for the IT Infrastructure Library (ITIL) [Lamm07, p.4].

After the first version of ITIL was released in 1989 acceptance throughout the industry was rather frugal [Lamm07, p.5]. But with the extensive growth in the mobile telephone business and diffusion of Internet technologies in the 1990s a systematic build-up of standardized procedures was required [Hell04, p.3].

ITIL was eventually developed to Version 3 and will be condensed to five books in the current version for 2007. It has become a *de facto standard* with the release of version 2 in 2000.

While ITIL was becoming more and more important the Telecom industry was still missing a distinct business process framework tailored to fit their specific needs.

The extraordinary growth in the business required a systematic Analysis of standard processes. So all major companies in the Telecommunication business affiliated in the TeleManagement Forum (TMF) to analyze these processes and standardize them [Hell04, p.3]. Beyond that TMF is dealing with all fields of management, specifications and realization of IT-services.

All efforts of the TMF incorporated in NGOSS (New Generation Operations Systems and Software program), a standard for realization of the SoA (Service oriented architecture) concept.

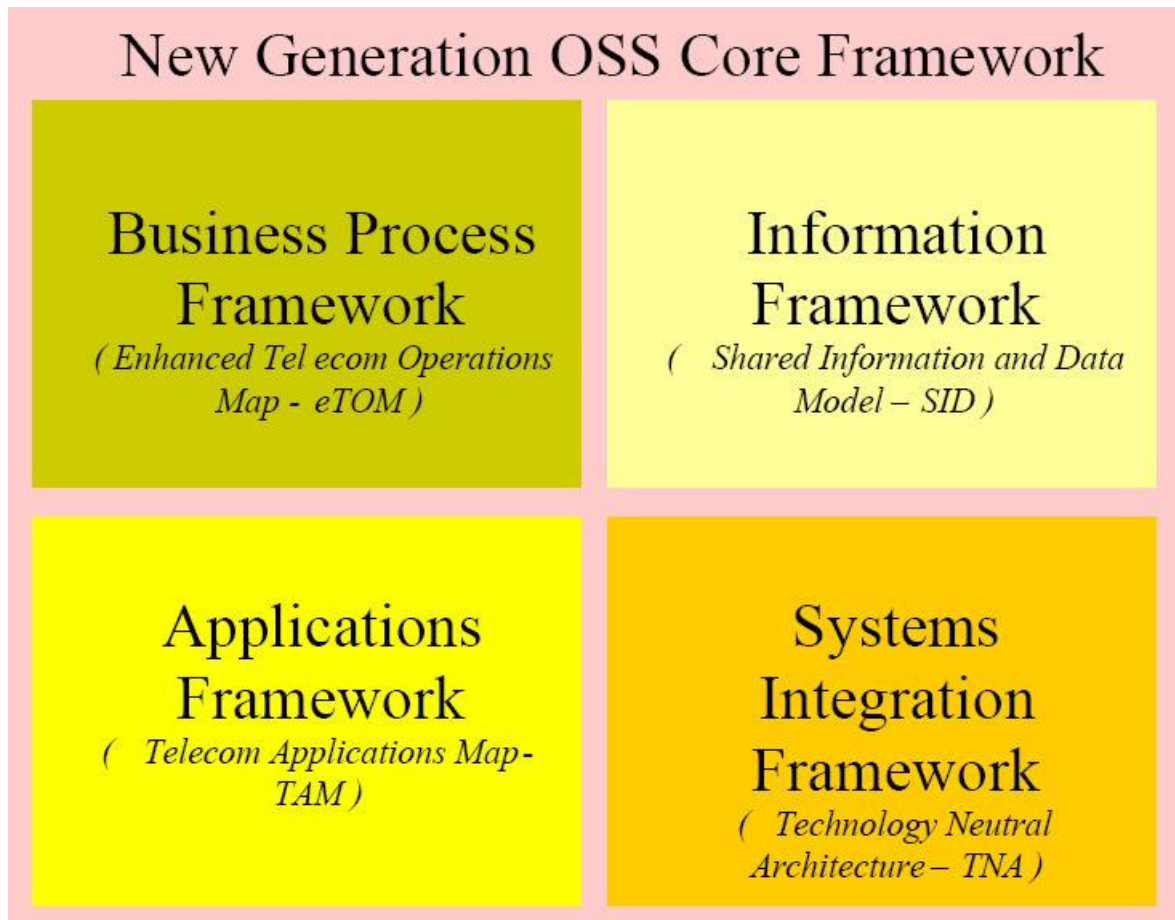


Figure 3: NGOSS components [RN303, p.10]

NGOSS framework consists of four parts:

- Business Process Framework: enhanced Telecom Operations Map eTOM deals with analysis and design of reference processes – This part will be covered within this document.
- Information Framework: Shared Information and Data Model SID
- Application Framework: Telecom Applications Map TAM
- Systems Integrations Framework: Technology Neutral Architecture TNA

2 The eTOM Framework

2.1 History and development

The eTOM framework was developed by the TeleManagement Forum.

Research started in the 1990s. From the initial Business process model which was distilled from worldwide Service Provider views the Telecom Operation Map (TOM) evolved.

Although the TOM framework was widely accepted in the industry its scope was too narrow and so at the beginning of the new Millennium TM Forum presented eTOM – the Enhanced Telecom Operations Map.

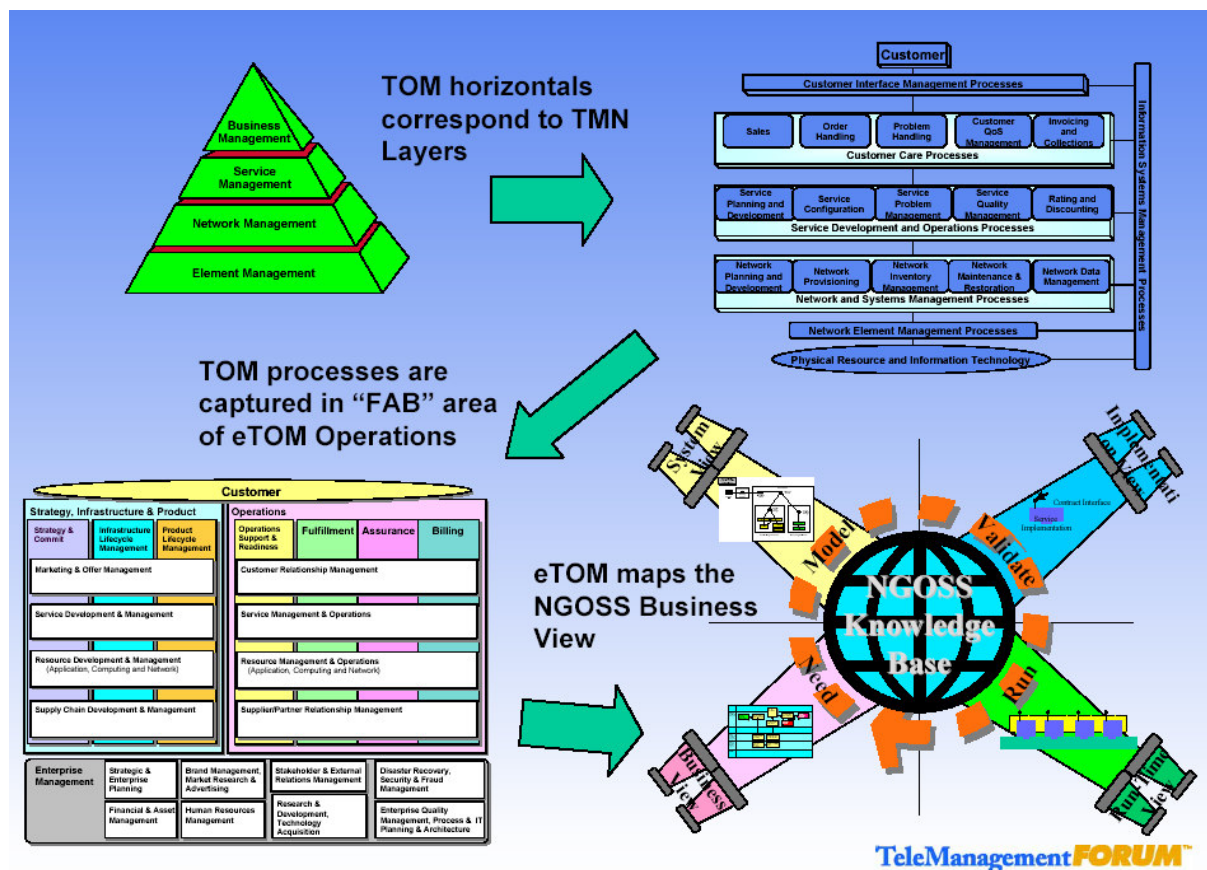


Figure 4: From TOM to eTOM [TM Forum]

By now the TM Forum releases approximately one version per year. The actual version is Release 7 (TMF member evaluation version Feb, 27 2007) and development still goes on focusing on a maximum benefit for prospective and existing eTOM users. Version 7.1 was released on Feb, 27 2007 as an evaluation

version for TMF members, this document will be based on the verified and documented version 6.1 [GB921].

2.2 eTOM and related products

If we look upon business process frameworks that have evolved in the past decades, we will find plenty of standards. They can be scaled as per their level of abstraction (how generic are they) and level of IT Relevance. Some examples are displayed in the figure below.

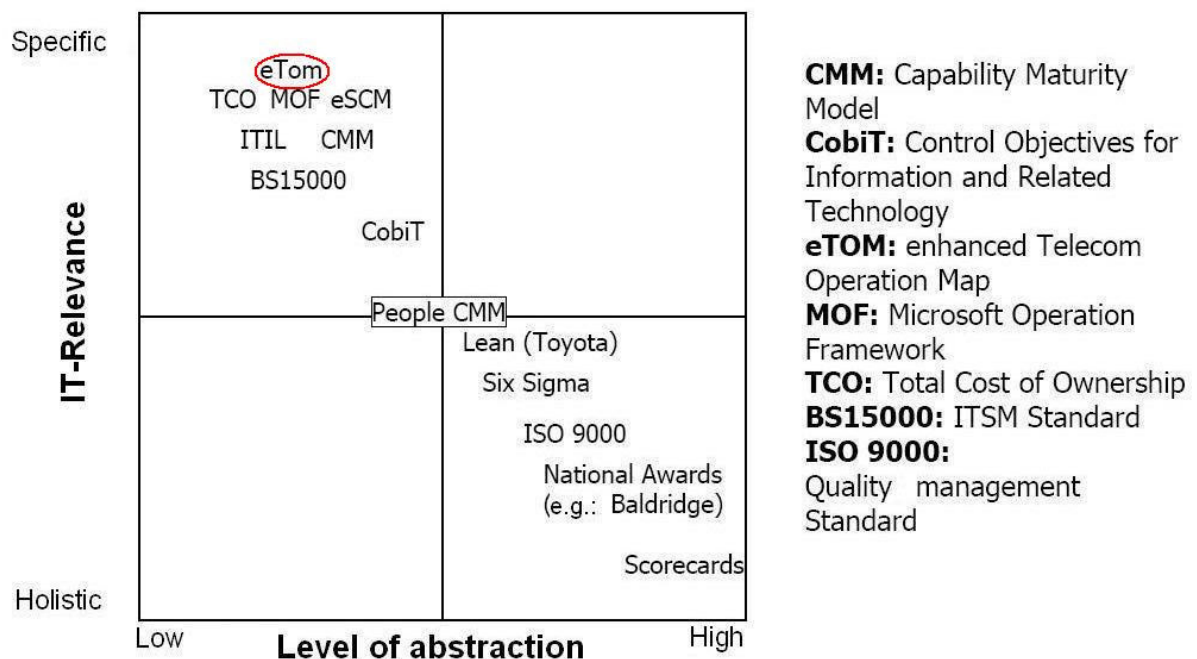


Figure 5: How generic is eTOM? Adapted from [Plam05, p. 14]

2.3 Why use eTOM?

- eTOM is the best known and most widespread standard in the industry
- The application of eTOM enables the user to simplify development, communication and integration with other companies in the industry by using standard processes and interfaces.
- eTOM was accepted as recommendation M.3050 by the International Telecommunication Union (ITU) [M.3050]. M.3050 is part of the M.3000 series which include all ITU recommendations related to TMN.

2.4 eTOM architecture

The eTOM is structured in levels whereas a higher level represents a more detailed view of the map. In lower levels process areas will be the same in all businesses throughout the industry. In high levels on the contrary processes can be quite different in similar companies.

2.4.1 eTOM process denotation

eTOM process denotation is based on a simple scheme. The more detailed the process the longer the name. For every level one or two numbers/characters are added.

Breakdown of a process named *1.F.3.2.7* would indicate the following level 3 process:

- 1 for *Operations* process area on level 0
- F for *Fulfillment* out of the FAB vertical process grouping on level 1
- 3 for the horizontal process grouping *Resource Management & Operations* on level 1
- 2 for the second Level 2 process *Resource provisioning* within the *Resource Management & Operations* process grouping
- 7 for the 7th Level 3 process *Close resource order* within the *Resource provisioning* process.

2.4.2 Level 0

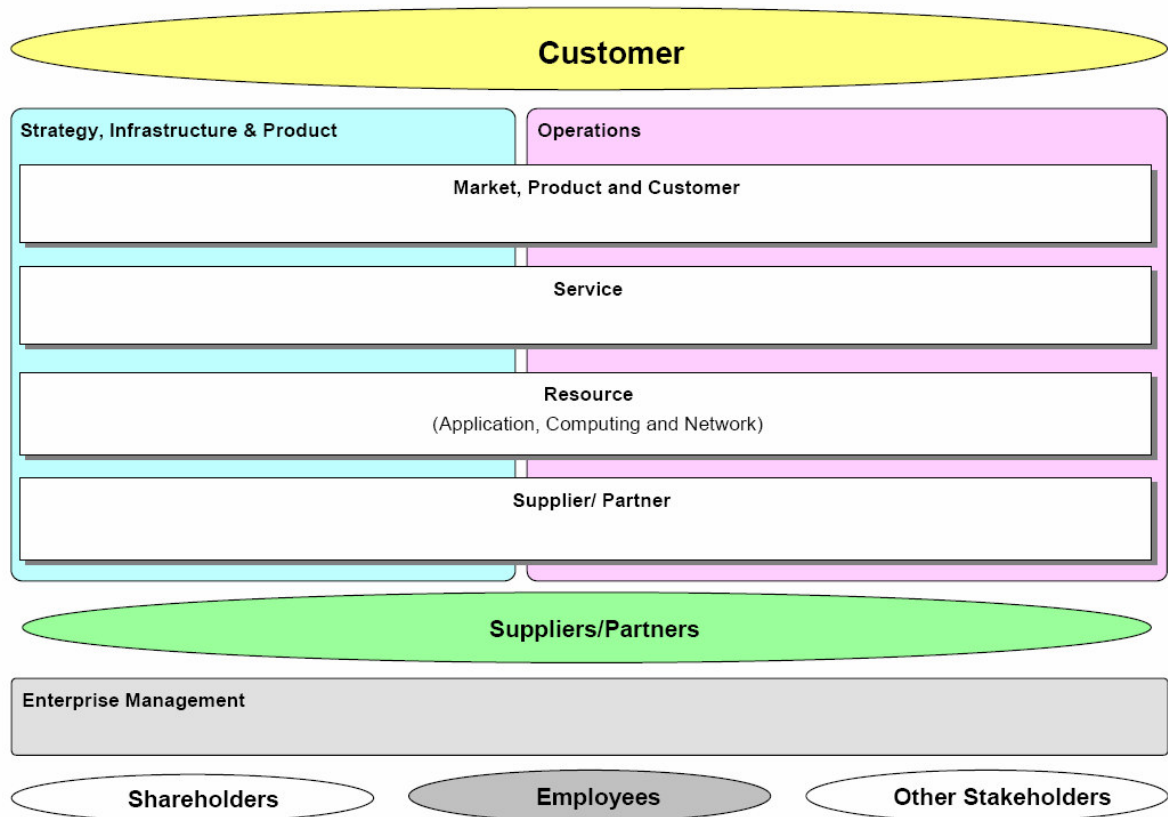


Figure 6: Conceptual structure of eTOM in Level 0 [GB921, p.16]

At the conceptual level three major process areas can be made out:

- Strategy, Infrastructure and Product: planning and lifecycle management
- Operations: core of operational management, focus of this paper
- Enterprise Management: how to manage and run large businesses

2.4.3 Level 1

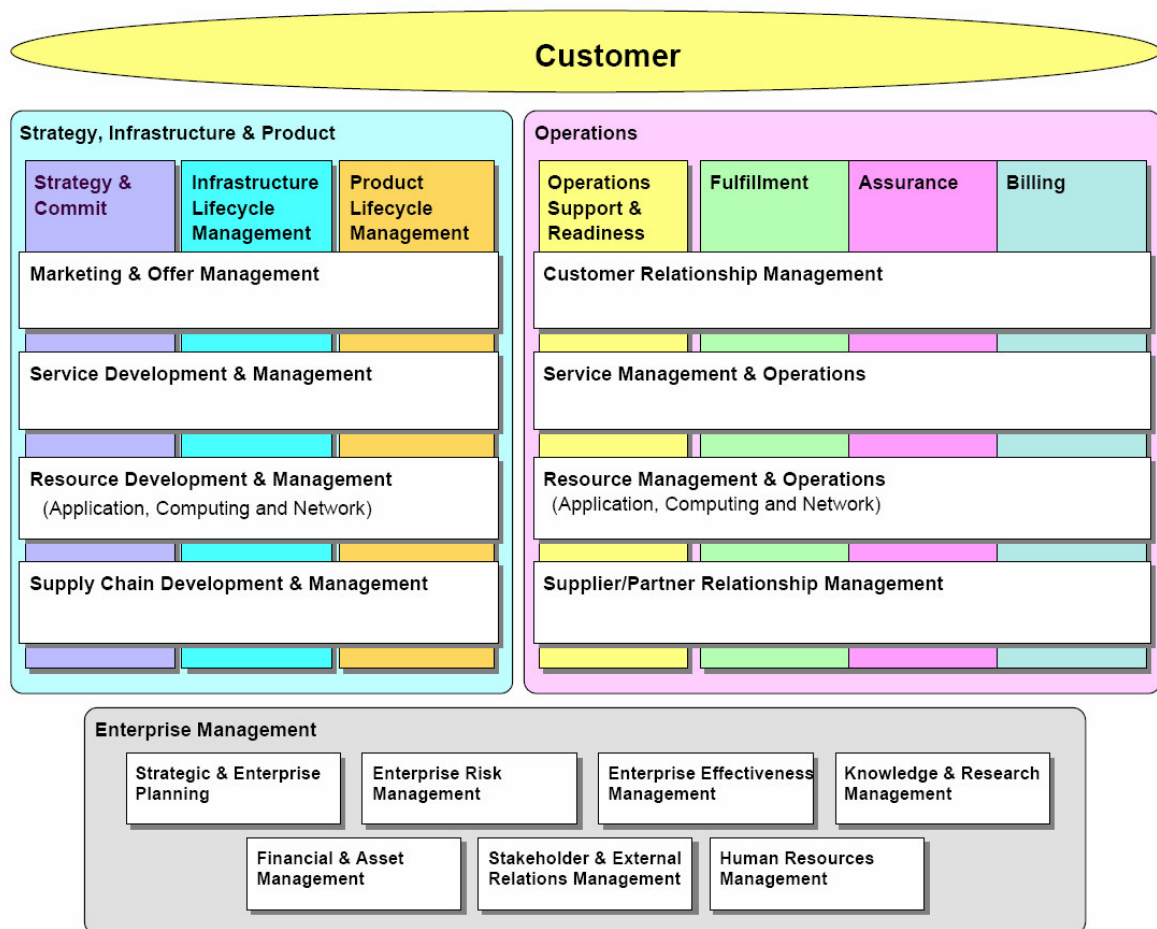


Figure 7: eTOM Level 1 Process Characteristics [GB921, p.26]

The most popular view of eTOM is the Level 1 view. In this view the two alignments of eTOM can be distinguished.

- Horizontal Level 1 process groupings represent the view of functionally related processes within the business and often represent the CIO's view.
- Vertical Level 1 process groupings represent the view of end-to-end processes within the business and often represent the CEO's view of the eTOM framework [GB921, p.27].

If horizontal and vertical process groupings are overlaid, the inherent matrix structure of eTOM is born.

2.4.4 Level 2

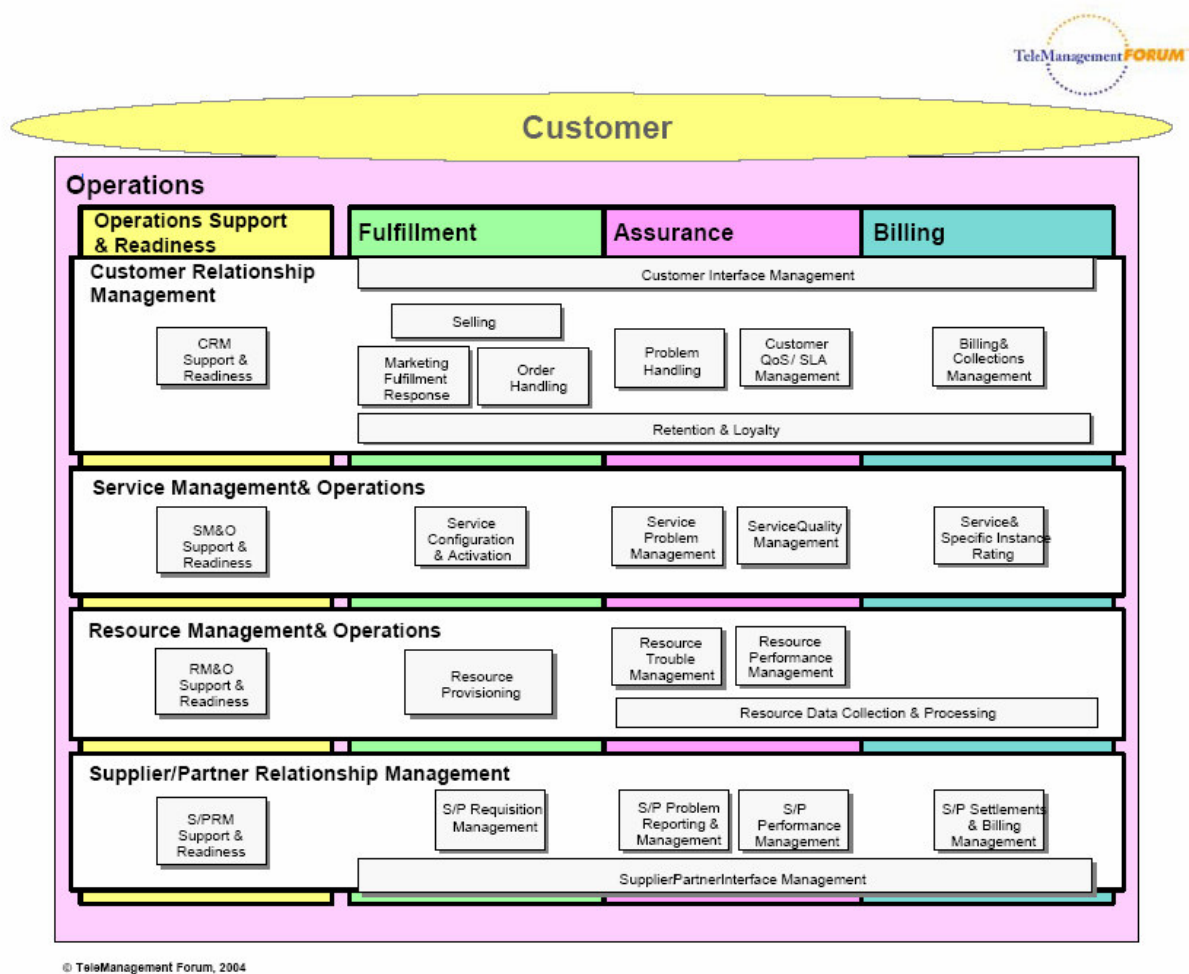


Figure 8: The Operations Process Area in eTOM Level 2 [GB921, p.57]

On this level eTOM is already too big to display it on one screen. Because of this I selected Operations Process area to demonstrate higher levels and further structures.

“Operations” is the oldest and most frequently applied component of the eTOM framework. A special focus lies on the customer and the processes that directly support the customer. The three process groupings Fulfillment, Assurance and Billing (FAB) directly support the customer and are the priority focus of the enterprise.

On this level Figure 8 refers to end-to-end processes for the first time. Possible Process Interactions are indicated by the vertical arrows in Figure 9. These flows are called process flow-throughs.

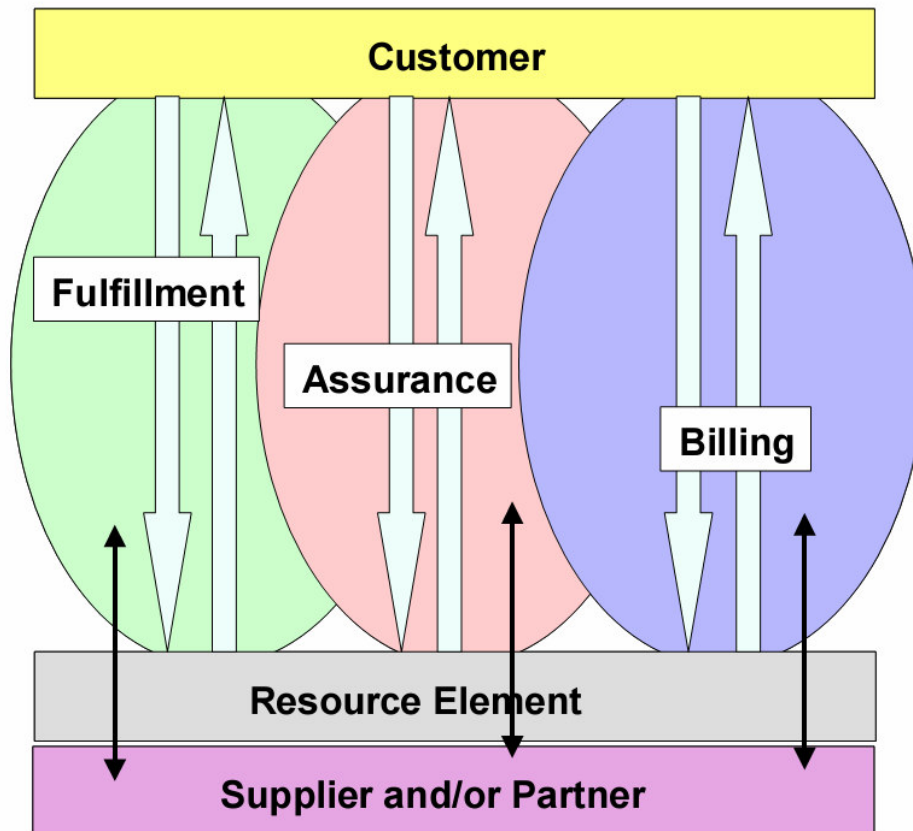


Figure 9: FAB End-To-End Process Flows

2.4.5 Level 3

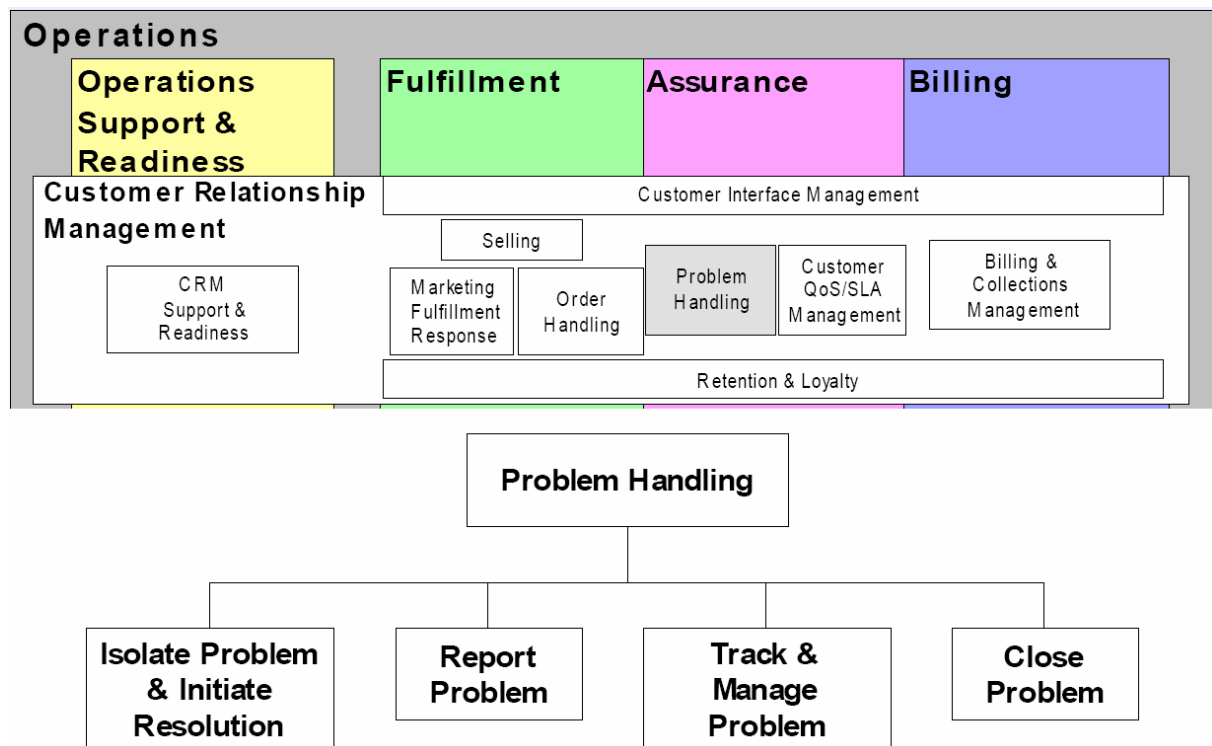


Figure 10: A simplified example for eTOM Level 3 [TM Forum]

Level 3 is the top-level that is fully formed by TM Forum. Level 2 processes are subdivided to provide a more detailed description of these processes. Figure 10 shows an example of how Level 2 process “Problem Handling” is subdivided into sub processes.

If the scheme from 2.4.1 is applied here

- Customer Relationship Management is classified as 1.OFAB.1
- Problem Handling is classified as 1.A.1.6
- Report (Customer) Problem is classified as 1.A.1.6.2

2.4.6 Level 4 and above

No agreed Level 4 process decompositions are developed and published yet. Among the efforts of TM Forum is the claim to keep eTOM as generic as possible, whereas level 4 and 5 process decompositions have to be tailored to every separate business. As a consequence TM Forum is only moving to increased detail in some areas of the eTOM Framework, in association with work on specific topics. This will give some further insight around particular processes, or in conjunction with particular scenarios. Outcome of this research will be published in future eTOM releases.

In chapter 4 I will make an approach to enlarge upon levels 4 and above. For some processes I will even go as deep as level 7.

3 eTOM and ITIL relationship

ITIL (Information Technology Infrastructure Library) was developed by Central Computing and Telecommunications Agency (CCTA) - now Office of Government Commerce (OGC) in the 1980s. As a public domain standard it has become the most widely accepted approach to IT service management in the world [GB921V, p.13].

eTOM and ITIL are no contradiction, they are supposed to be complementary. eTOM can be called a Full Enterprise Framework [Krcm05, p.362] because it allows a view that illustrates coherences between intra- and inter company processes.

eTOM's high level of abstraction allows a holistic, integrative view on the business, but is a delicate matter in terms of measuring and quality management, because of missing best practices.

ITIL on the other hand is a best practice framework for the definition and operation of IT processes and services. That way ITIL already provides predefined reference processes where eTOM gives more general definitions.

eTOM provides examples of process flows, a repository of process elements, a hierarchy of process definitions and a common language for business processes [GB921V, p.14]. ITIL holds a set of methods for delivering controlled and optimizable services, supports and drives quality and repeatability and wants to provide high quality services with a particular focus on Customer relationships [GB921V, p.15].

Table 1: eTOM and ITIL, comparison of architecture, adapted from [Hell03, p.11]

Architecture	eTOM	ITIL
Origin	Holistic Business process model in the Telco industry	Focus on Operations process area
Prevalence	Increasing Prevalence in the Telco industry	Wide Prevalence in the IT environment
Width	Getting wider, incorporates all processes a service provider will use	Focus on Operations process area
Depth	Depth differs, some areas are developed to high granularity, some are still flat	The incorporated processes are detailed and matured

Professional services	Few consultants, no structured training program	Many consultants, structured training program
Tool - support	Good prerequisites for tools due to the parallel development of eTOM and SID.	No recommendation, ongoing discussions.

3.1 Terminology

Some process definitions in eTOM can be mapped to their ITIL counterpart par for par, for others mapping is almost impossible. Every business can decide for themselves which process definition they prefer to use, but they should be aware of the different terms used by each framework.

Table 2: eTOM and ITIL, comparison of terminology, adapted from [GB921V, p.23ff]

Terminology	eTOM	ITIL
Homonyms (same name, different meaning)	Problem	Problem
ITIL concepts without counterpart in eTOM	-	Incident, Change Management
eTOM Terms that can be used to extend ITIL	Supply chain management	-
Synonyms (same meaning, different name)	Alarm	Alert

A complete listing of all eTOM terms with their eTOM equivalent can be found in [GB921V, Annex 1] and would go beyond the scope of this paper.

3.2 Process element mappings

The following figure gives an overview over the eTOM Operations process area and corresponding ITIL processes. Outside the Operations process area rather low correlation will be found because of the ITIL scope on the operation of IT processes and services.

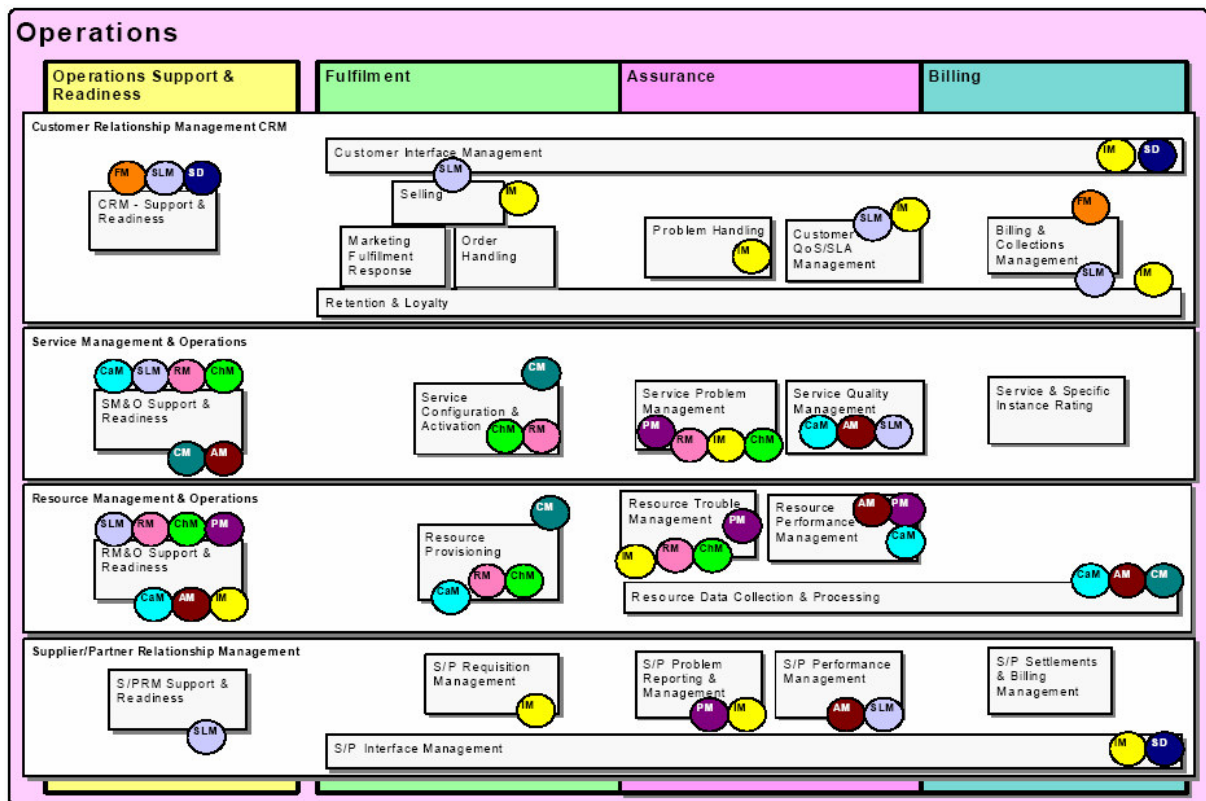


Figure 11: eTOM Level 2 processes and their corresponding ITIL equivalents [GB921V, p.25]



Figure 12: Legend

Most of the eTOM processes that have an ITIL equivalent can be found inside the Operations process area. Outside there are a few strongly correspondent processes in the Strategy Infrastructure & Product process area in the vertical swim lanes “Infrastructure Lifecycle Management” and “Product Lifecycle Management”. Enterprise management also houses a couple of weak correlations. An outline on the process areas can be found in Figure 7.

In the other direction all correlations from the eTOM Operations process area point to the two ITIL process areas Service Delivery and Service Support. The following graph depicts this coherence.

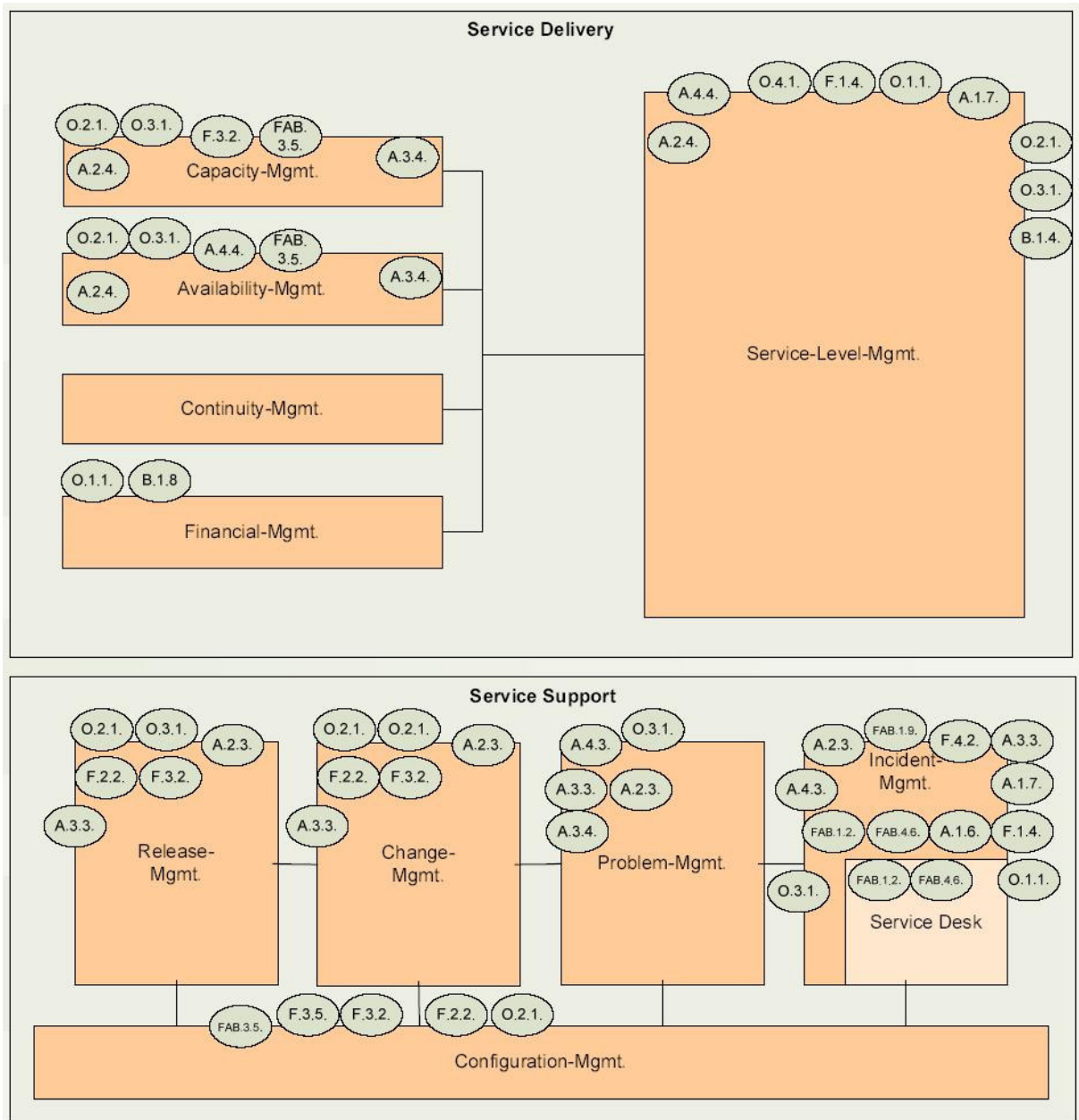


Figure 13: ITIL processes and their corresponding eTOM Level 2 equivalents

Again a strong correlation is visualized by the ellipse being totally inside the box whereas an ellipse on the very edge of the box represents a weak correlation.

3.3 Combining eTOM and ITIL process approaches

Text

4 eTOM reference processes

In this Section I made an approach to implement and illustrate the eTOM architecture. I started at level 0, the most general overview level and advanced as far as level 7 in some process groupings.

Technically I used ADOit® Student Version 2.1 in German. The fact that the software was in German was no disadvantage except for some minor concerns like the variable definition and allocation where the expression “Diskret” appears instead of “Discrete”, “Ja” instead of “Yes” and “Nein” instead of “No”. From level 0 to level 3 I followed the eTOM process definitions and structure introduced in [GB921] and [GB921D, p.18-134]. These levels are also linked bidirectional for faster Navigation.

For levels 4 and above I complemented the eTOM process definitions with ITIL process definitions and accredited definitions from various sources.

Up to level 3 I used ADOit® IT-service-process-architecture (“IT-Service-Prozessarchitektur”) model-types. Level 3 is implemented in both ADOit® IT-service-process-architecture and ADOit® IT-service-process (“IT-Service-Prozess”) to master the transition from process architecture to process flows. For level 4 and above I considered the ADOit® IT-service-process.

To make navigation easier every ADOit® process / process architecture contains a small notice which indicates the level.

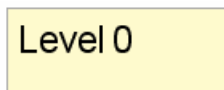


Figure 14: This note indicates the level for every process

The colors used are identical with the colors used by TMF to make it more understandable.

4.1 Level 0

Level 0 Processes were absorbed from [GB921, p.16]. To import the concept into ADOit® I used ADOit® IT-service-process-architecture and represented the process groupings by “Blocks”.

Only one link is available for navigation. This link in the right upper corner takes the user to level 1, which is also available as the “big picture”. This means that the entire

eTOM and not only one partition is represented in one ADOit® IT-service-process-architecture screen.



Figure 15: The link to level 1

Table 3: ADOit® IT service process architecture model-type symbols

Symbol	Short Description	Long Description
	Process without reference	For this process no higher level of detail is available.
	Process without reference	For this process no higher level of detail is available.
	Process with reference / Call for different model	By clicking on this process the underlying process will be expanded. In many cases this will be a higher level.
	Process with reference / Call for different model	By clicking on this process the underlying process will be expanded. In many cases this will be a higher level.
	Has process	Connector between a hierarchically higher process and its subordinated processes.
	Data flow	Information interchanges in direction of the arrow.
	Resource	All kinds of resources, local or global. Typical resources are databases or IT systems.
	Note	Used for notes and hints. Indicates the current eTOM level.

Summarizing level 0 provides a very general view of eTOM. It makes no sense to define process flows at this level or look for common issues with ITIL.



Figure 16: Level 0 ADOit® representation

4.2 Level 1

Although level 1 still has a general view on eTOM the user will already be able to recognize umbrella terms for process groupings and departments here.

On this level an uplink to level 0 on the right upper corner is available as well as a downlink to level 2 Operations process area.

The pattern for ADOit® Level1 processes was taken from [GB921, p.17].

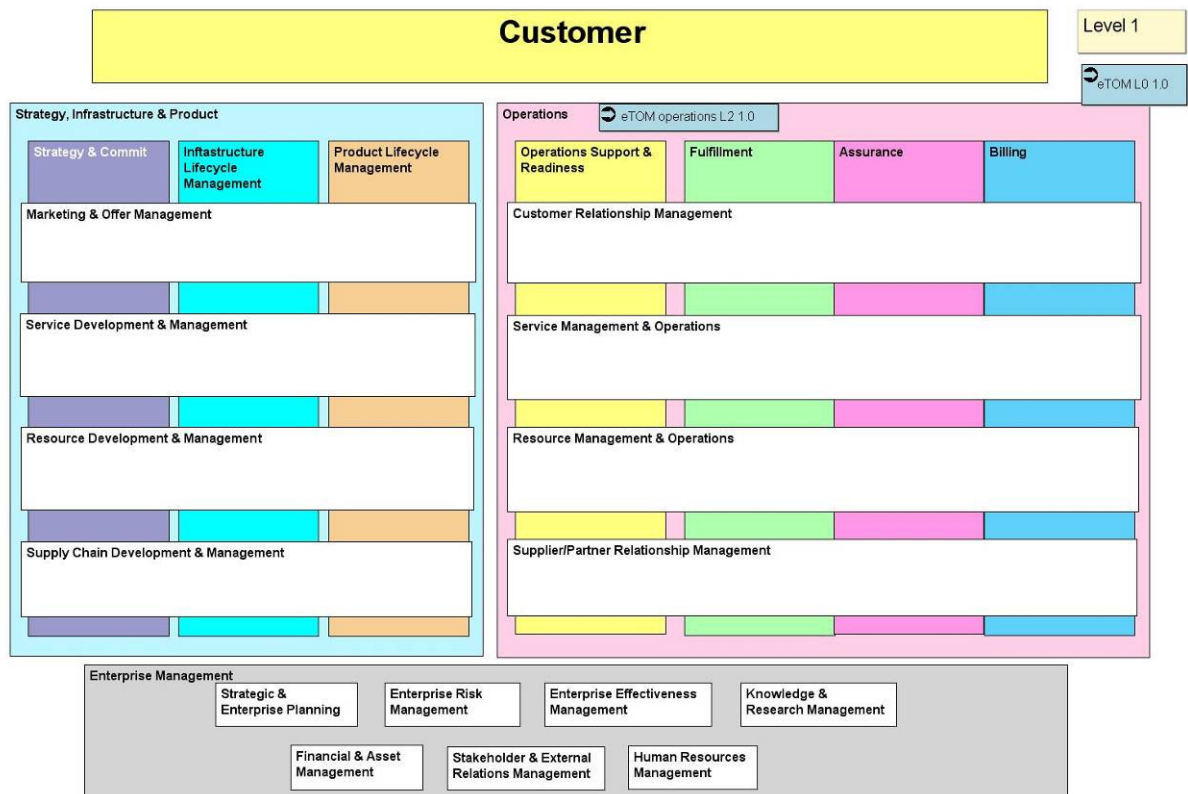


Figure 17: Level 1 ADOit® representation

In order to make eTOM level 1 not too cluttered, I extracted the EM (Enterprise Management) part to a separate ADOit sheet.

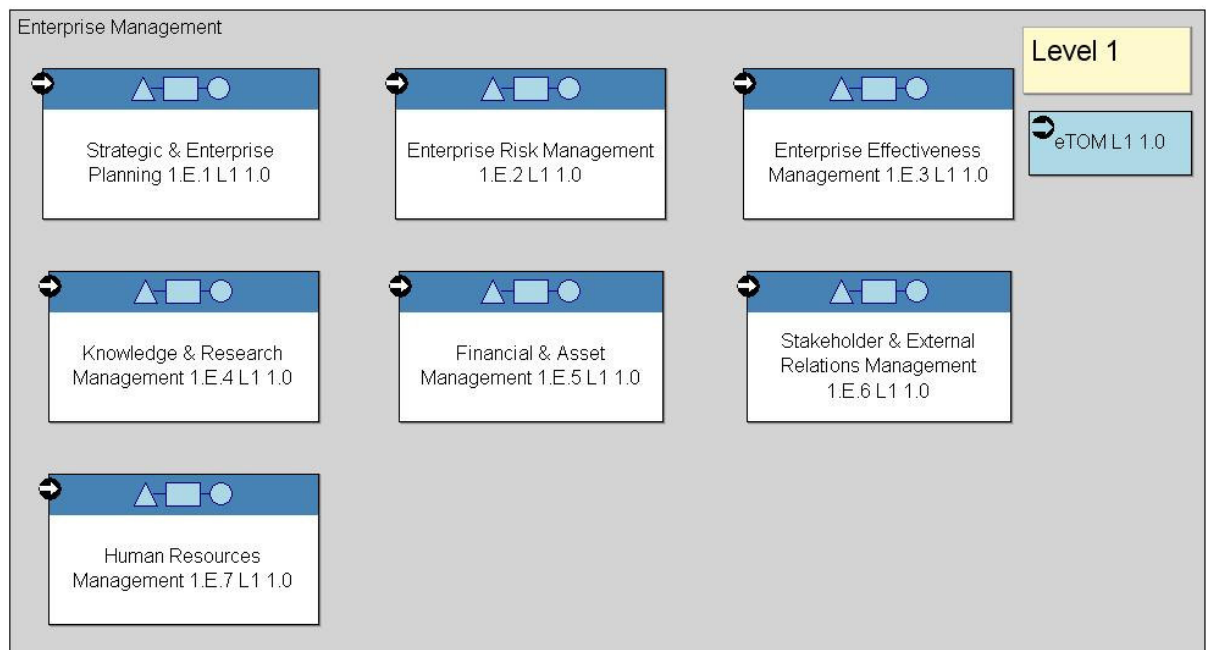


Figure 18: Level 1 EM ADOit® representation

4.3 Level 2

At level 2 eTOM has already reached a respectable size – too big to display on one screen and too copious to look upon the whole structure. So I will focus on the Operations process area for this paper and the corresponding ADOit® implementation. An isolated view of the Operations process area is not possible because a breakdown of ITIL process definitions often includes eTOM definitions from other sections such as SIP and EM.

4.3.1 Operations process area

As I already stated in chapter 2.4.4 the Operations process area is the oldest part of eTOM respectively it's predecessor TOM and was, considering its main features, already part of the very first releases in the 1990s. Therefore Operations process area has already reached a high level of maturity at level 2 and I did not see any necessity to overrule this well established structure.

As a result the ADOit® implementation of Operations level 2 still looks similar to the TMF Operations process breakdown like displayed in [GB921, p.57]. All Level 2 processes are linked to level 3 ADOit® process architecture sheets. An additional link will take the user one level up to level 1.

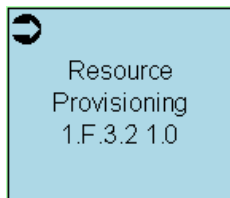


Figure 19: Level 2 process with link to level 3 process decomposition

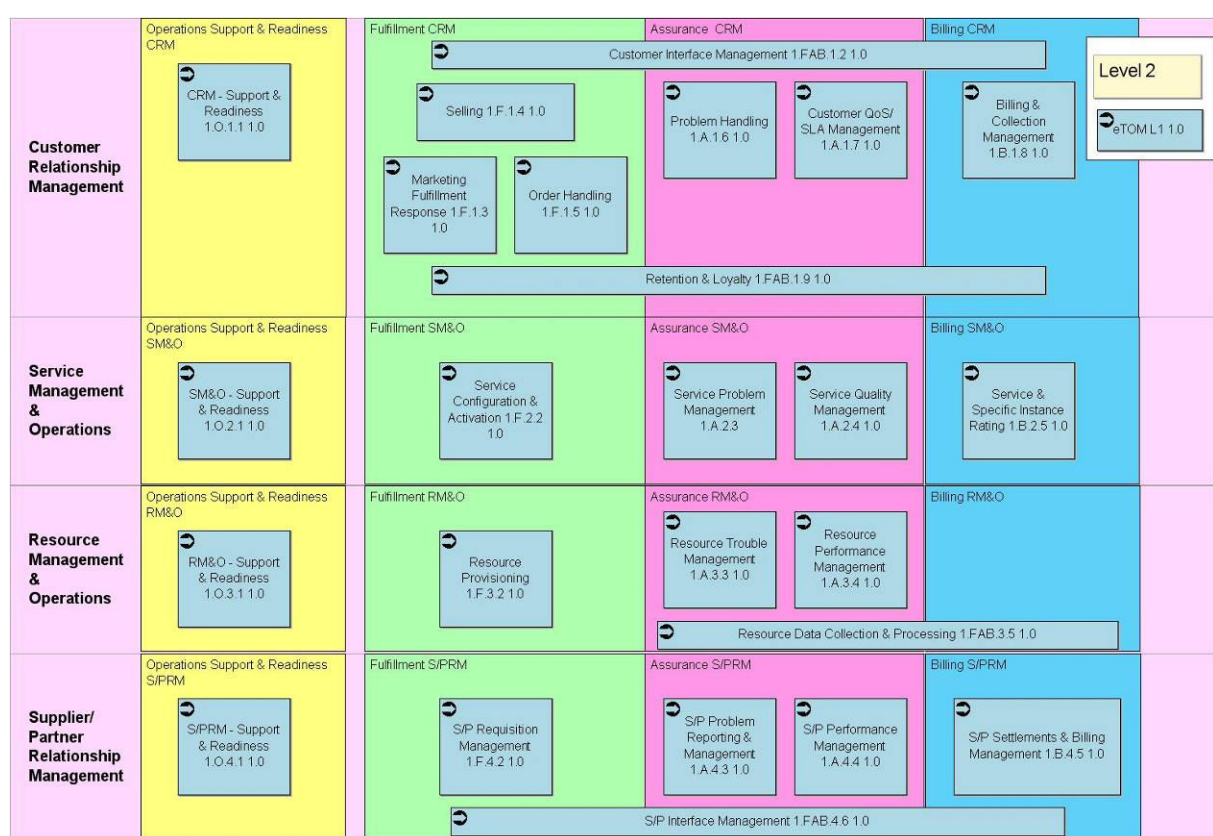


Figure 20: Level 2 Operations ADOit® representation

4.3.2 SIP process area

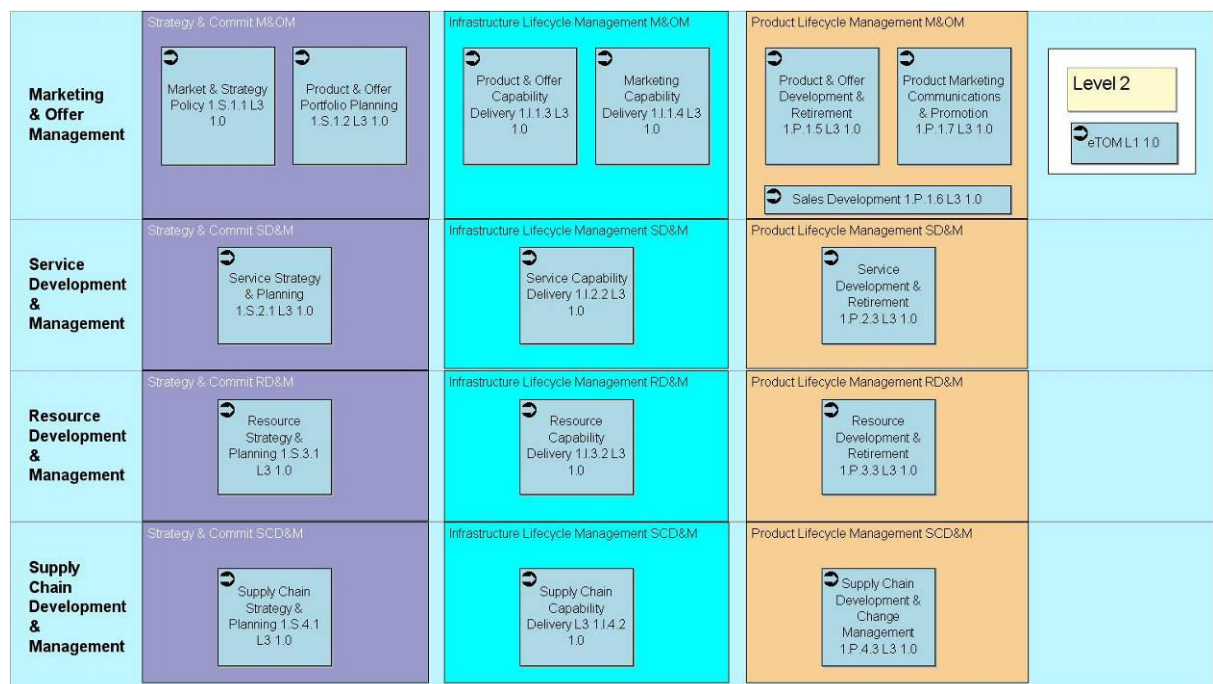


Figure 21: Level 2 SIP ADOit® representation

Like with the Operations process area, the SIP concept in [GB921] and related documents by TMF is mature and widely accepted throughout the industry. So I kept the original structure and color-scheme for the ADOit® implementation of SIP level 2.

4.3.3 EM process area

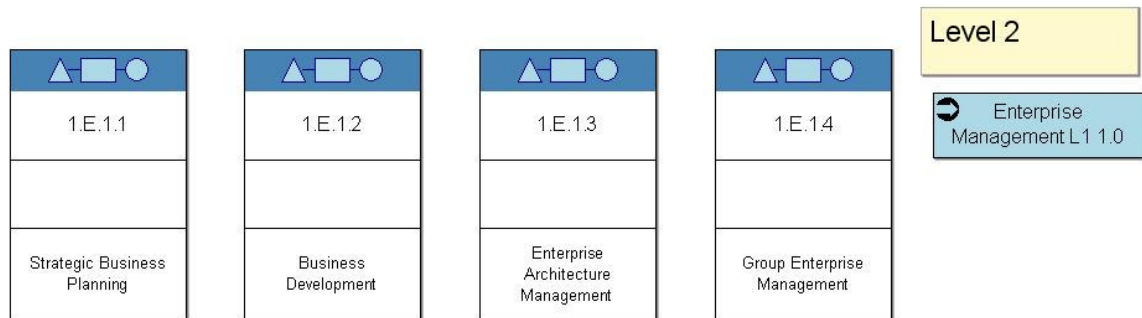


Figure 22: 1.E.1 Level 2 Strategic & Enterprise Planning ADOit representation

If EM process area is compared to Operations and SIP it is obvious that EM leaves out one level. This makes EM's level 2 look like Operations' and SIP's level 3.

Figure 22 is an example of how an EM level 2 process looks like represented by an ADOit® IT service process architecture model-type. For further EM level 2 processes see Employees will not like being told that what they have been doing for years was wrong and try to prove the opposite or refuse to change the way your processes suggest.

- The focus of eTOM lies on the customer. So it is your turn to think of other stakeholders.
- Take your time for simulation of your processes and process flows.
- Simulation can only be as good as simulation data. Check data quality as often and as precise as you can. Making business process redesign dependant on wrong simulation data can seriously harm your company, endanger your job and is bad for the reputation of Business Process Management and eTOM.

- Observe the feedback circuit of the BPMS paradigm introduced in chapter 1.3 and be prepared to take back changes if the Performance Evaluation Process indicates no improvement due to your reengineering.

If all of the above issues are being respected you can seriously improve efficiency and service quality of your telco/service provider. This will make eTOM the tool to give your company competitive advantage on one of the toughest markets in the world.

5 Appendix A: EM Level 2 processes

5.1 Level 3

For the Operations process area TM Forum provides a complete set of level 3 processes. All of these level 3 processes have been implemented in terms of ADOit® process architecture sheets. As already introduced in upper levels I used ADOit® IT service process architecture model-types to depict process hierarchy. On level 3 processes cannot only be put together in a hierarchic structure. Processes will also interact as process flows here. To provide both options without abandoning information I implemented selected level 3 processes also as ADOit® IT service process model-types. The link on the top level process like Resource Provisioning in Figure 23 links the two model types.

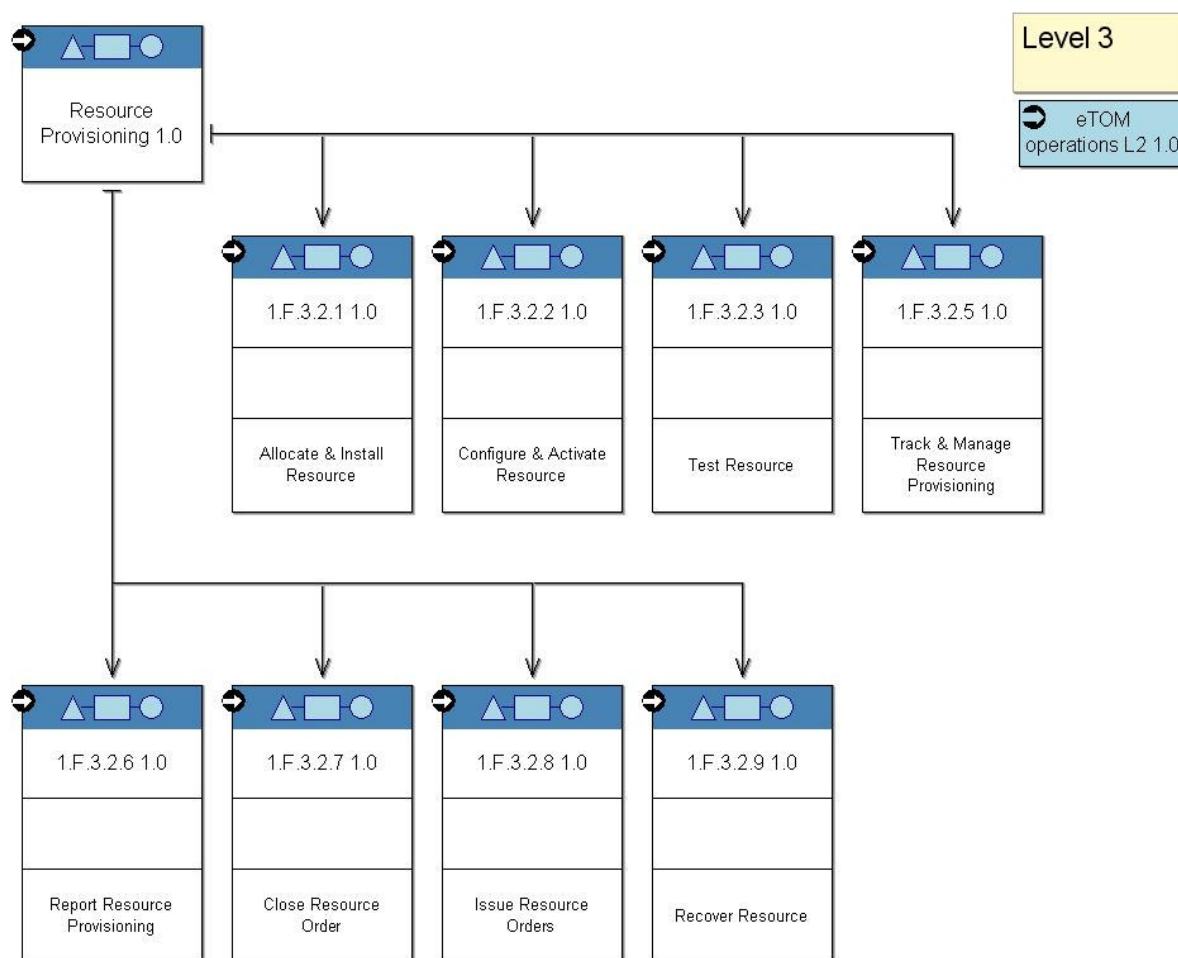


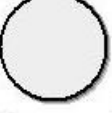
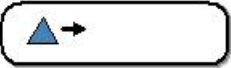
Figure 23: Resource Provisioning Level 3 IT Service Process architecture

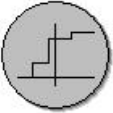
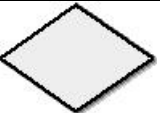
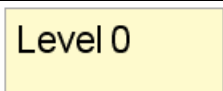
All Operations level 3 process decompositions can be found in Appendix C: Operations Level 3 processes.

Figure 24 is an example for an Operations level 3 process represented by an ADOit® IT service process model-type. Here the main difference between ADOit® IT service process architecture and ADOit® IT service process model-types becomes apparent. While the former is more or less a static list of processes, process areas and process hierarchies the latter also depicts process flows.

With the introduction of eTOM process flows a number of symbols are used in ADOit® IT service process model-types. The following table will give an overview over the symbols:

Table 4: ADOit® IT service process model-type symbols

Symbol	Short Description	Long Description
	Process Start	Execution starts here.
	Process End	End of execution, return to invoking process.
	Begin of Parallelism	Two or more activities will be executed in parallel after this symbol.
	End of Parallelism	Two or more parallel activities reunite to one.
	Process Flow	Flow connector between a predecessor and its successor at the tip of the arrow.
	Information Flow	Information interchanges in direction of the arrow.
	Successor / Predecessor	Before execution starts or after execution ends this symbol will be used occasionally for clarity.
	Activity	For this activity no higher level of detail is available. All level 7 processes use this symbol.
	Sub process / Call for different model	By clicking on this process the underlying process will be expanded. In many cases this will be a higher level.
	Variable	Decisions require and parallelisms sometimes require variables that determine further process flows. Variables can be defined local or global.

	Variable Allocation	Values and the type of distribution are allocated to variables.
	Variable Allocation	Arrow between Variable Allocations and Variable.
	Allocation	Arrow between Variable Allocations and decision/parallelism.
	Decision	Depending on a Variable two or more alternate flows are possible.
	Resource	All kinds of resources, local or global. Typical resources are databases or IT systems.
	Uses Resource	Connector between resource and process.
	Note	Used for notes and hints. Indicates the current eTOM level.

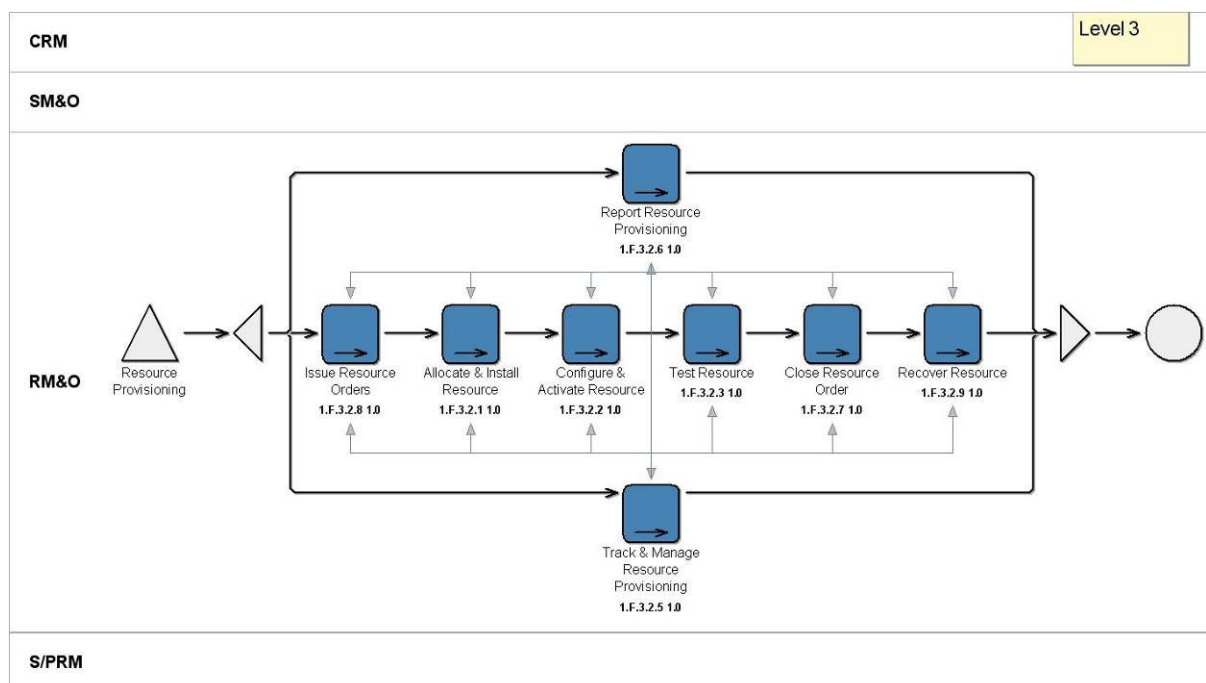


Figure 24: Resource Provisioning Level 3 IT Service Process

Resource Provisioning is an exemplary eTOM Level 3 process. While most of the processes are executed sequential, the two processes *Report Resource Provisioning* and *Track and Manage Resource Provisioning* proceed in parallel to the rest of the other level 3 processes.

5.2 Level 4 and above selected reference processes by the example of “Test resource 1.F.3.2.3”

Until now all processes were more or less predefined by the Tele Management Forum and only needed to be applied to the current situation. With this chapter we are entering virgin soil. Above level 3 only rough sketches of eTOM exist in eTOM Release 6, but in order to implement an actual system according to this, more detailed definitions are required. This affects business processes as well as the flow between the processes.

A typical example reveals with the “Test resource” process 1.F.3.2.3. Tele management forum only gives the following information stated in the box [GB921D, p.94].

3-2-3-OPS L3- Test Resource (RM&O- F)

Process Identifier: 1.F.3.2.3

Brief Description

Test specific resources to ensure they are operating within normal parameters

Extended Description

The responsibility of the Test Resource processes is to test specific resources to ensure they are operating within normal parameters. The objective is to verify whether the resources are working correctly and meet the appropriate performance levels.

These processes test specific resources against supplier/partner defined test plans, or against test plans developed by the service provider. Where appropriate test plans are not available these processes are responsible for developing appropriate test plans. These processes are also responsible for capturing and storing the test results for historical and downstream testing comparison purposes.

If these tests succeed, the specific resources will be marked as in-service which means the specific resources are available for use.

To keep track of the setup every figure in this chapter is amended with a tree structure of the relating eTOM area.

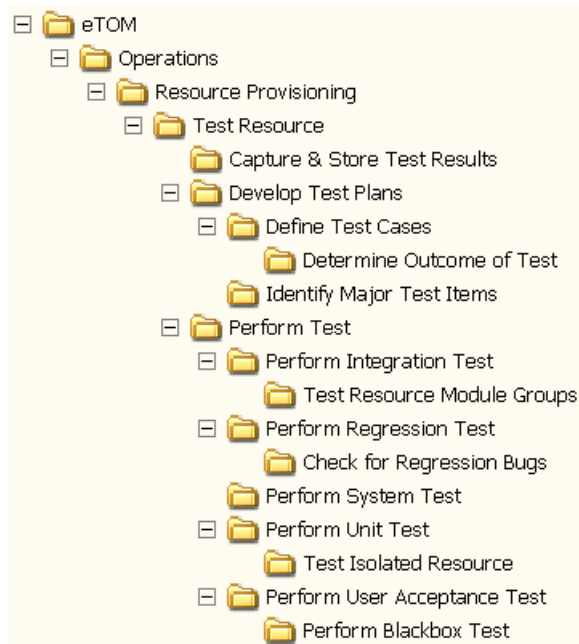


Figure 25: Tree structure of *Test Resource* processes

5.2.1 *Test Resource* reference processes

According to ANSI/IEEE Std. 610.12-1990 testing is

„the process of operating a system or component under specified conditions, observing or recording the results and making an evaluation of some aspects of the system or component.“

Testing is an essential part within the lifecycle of resources. ITIL provides a great variety of testing defaults [OGC1]. These defaults often aim for software testing but can also be applied on testing of all kinds of resources.

The reference processes in this chapter try to be as generic as possible but are based on the idea of software testing. For hardware resources like IT- equipment and similar devices tests proceed analogically. Human resources have to be tested in a different way although many concepts are identical.

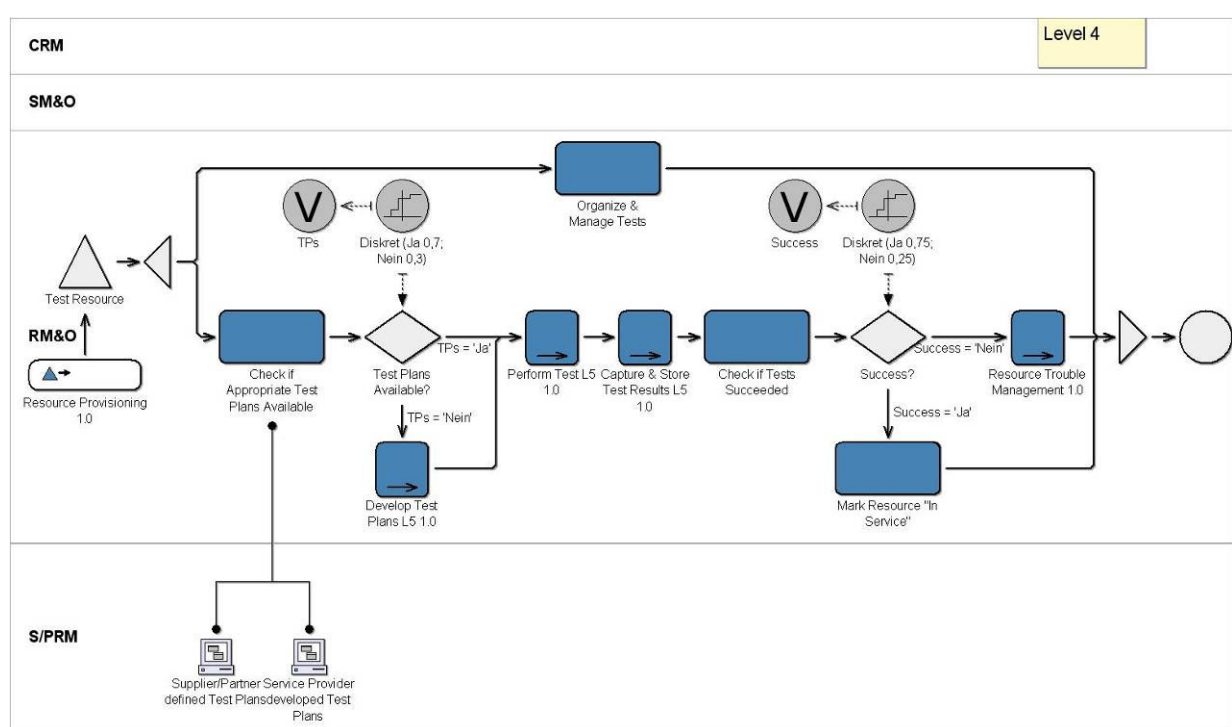
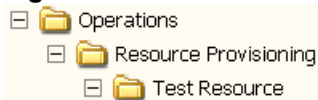


Figure 26: Test Resource Level 4 process



The concept for this reference process is based on test plans. If no test plan for the desired resource is available it has to be developed. Afterwards tests are performed following these test plans. The activity *Organize & Manage Tests* corresponds with all other activities and process-calls.

The development of test plans proceeds the following way and has been developed according to IEEE 829-1998 and [BS7925] standards:

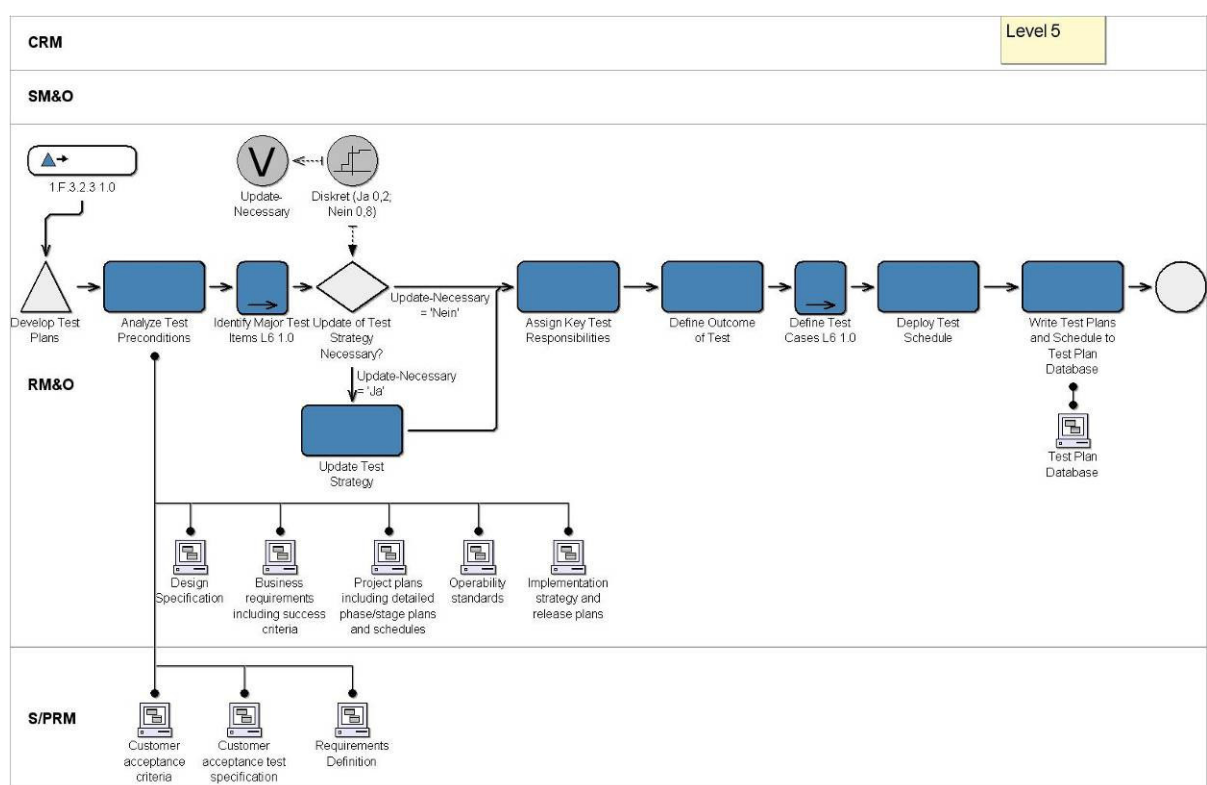
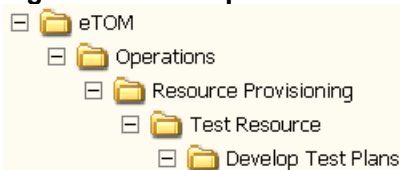


Figure 27: Develop Test Plans Level 5



To establish test plans all affected resources have to be put into consideration. This regards internal resources like design specifications, strategies, standards and plans as well as external resources like customer specifications and requirement definitions. Subsequently we have to find out, which types of tests to perform. This happens in the level 6 process *Identify Major Test Items* (see Figure 28).

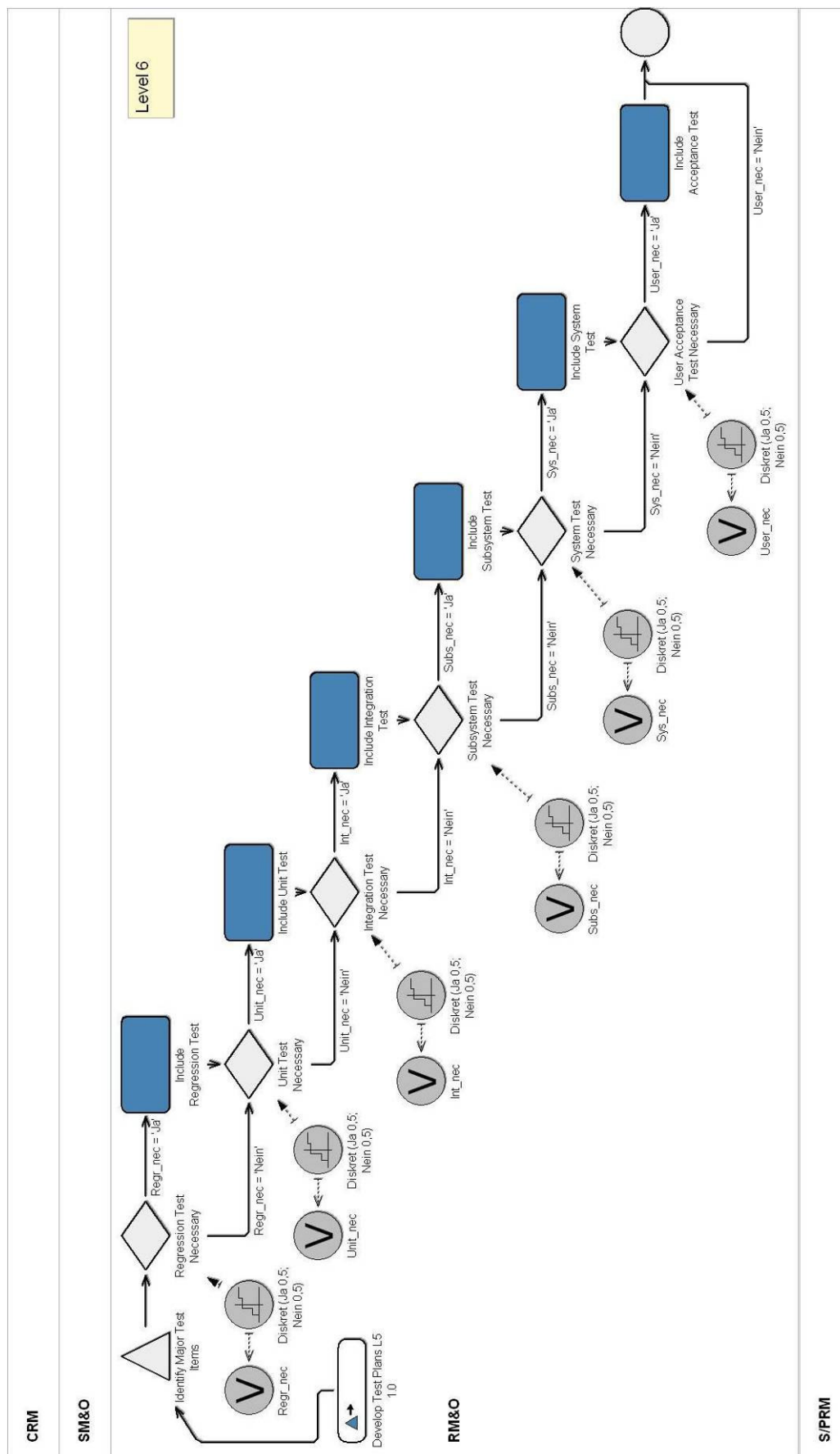
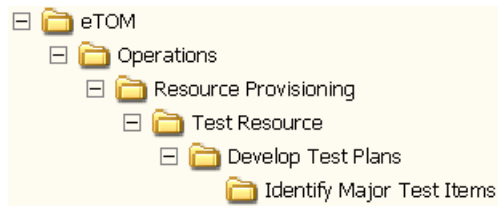


Figure 28: Identify Major Test Items Level 6



As tests have to comply with the current strategy, this issue is checked every time and updated if necessary.

The next step is a matter of human resources to assign the key test responsibilities. To know what to look for, tests need a predefined output. Individual test cases have to yield this output afterwards. For now these test cases are defined in the next step (Figure 29). As the last task in this process a test schedule will be deployed to elaborate a timetable for testing.

Finally all plans and schedules are written into the test plan database. These artifacts outline the outcome of this process. They will be used by different processes as input later.

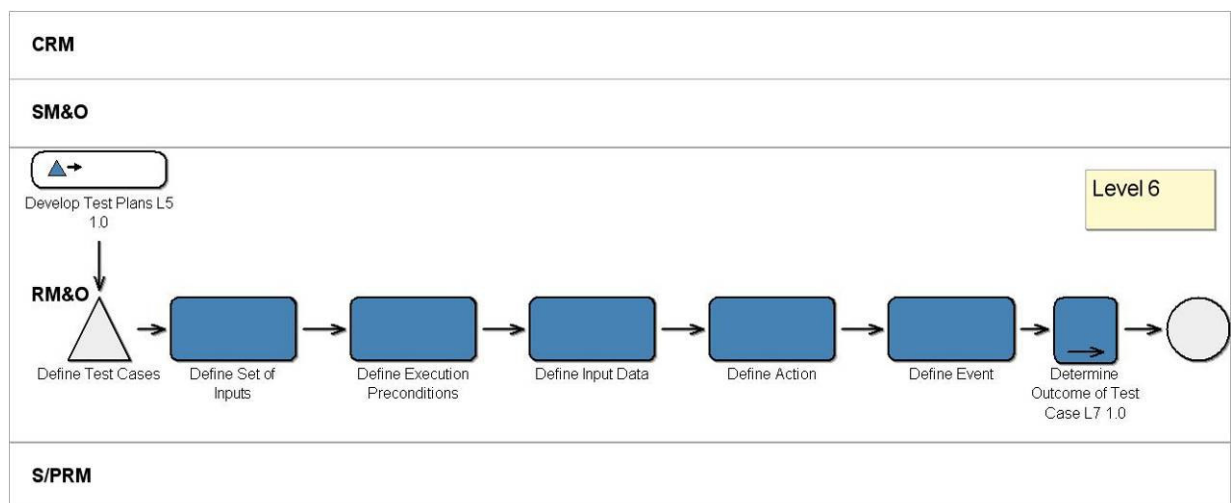
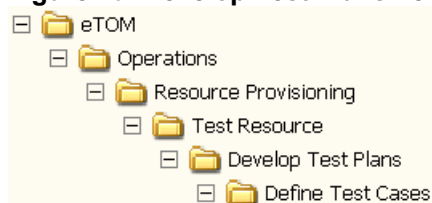


Figure 29: Develop Test Plans Level 6



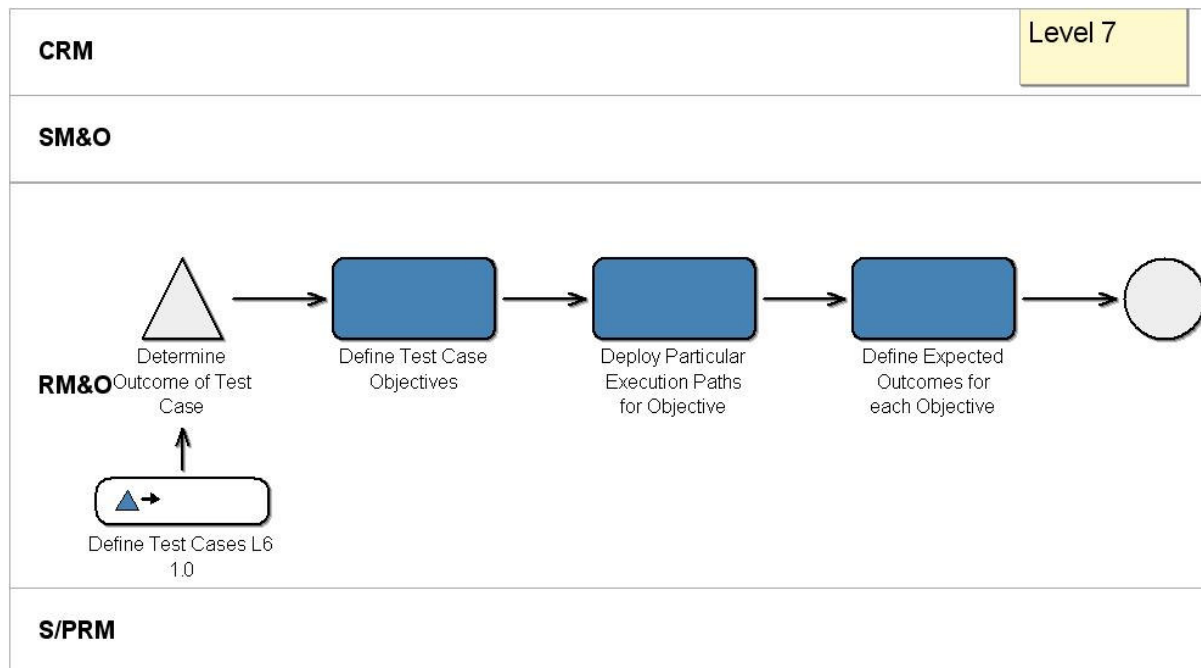
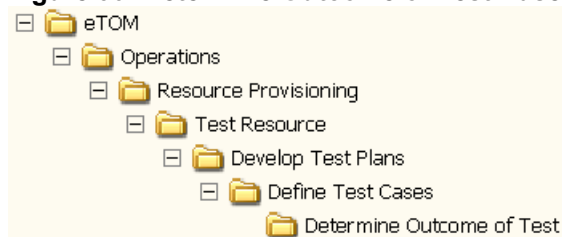


Figure 30: Determine Outcome of Test Case Level 7



Let's go into detail for the *Perform Test* process. To find out the applicable test methods [OGC1], [Wiki1] [Wiki2], [Wiki3], [Wiki4], [Wiki5] and [Wiki6] were consulted. Hereby the following methods and items were selected:

- Regression Test
- Unit Test
- Integration Test
- System Test
- User Acceptance Test

These methods have been introduced in the *Identify Major Test Items* (see Figure 28) process and now taken over into the *Perform Test* process (Figure 31).

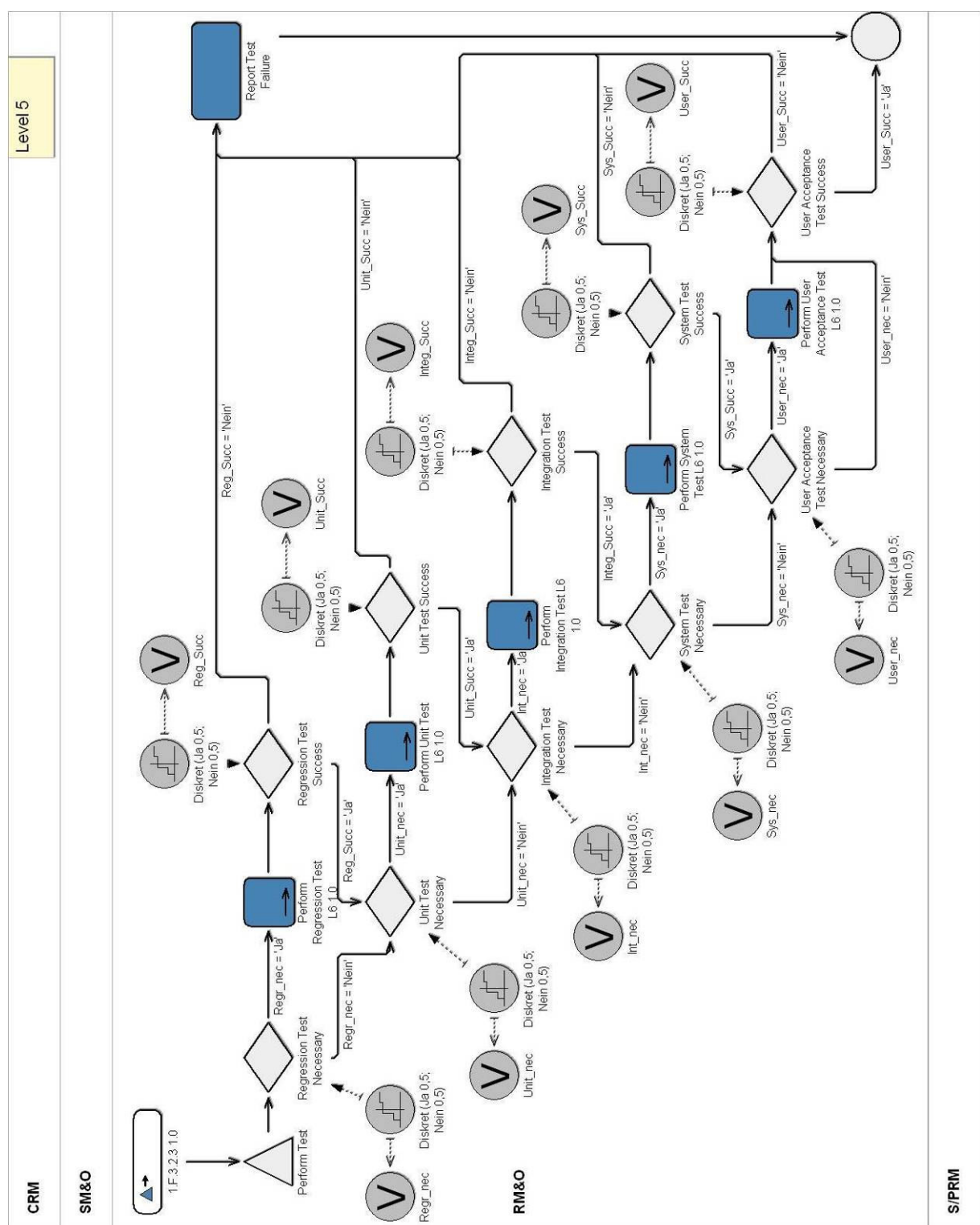


Figure 31: Perform Test Level 5

- ☐ eTOM
 - ☐ Operations
 - ☐ Resource Provisioning
 - ☐ Test Resource
 - ☐ Perform Test

According to the decisions made in the *Identify Major Test Items* process (Figure 28) here the different kinds of tests are checked by their necessity and, if necessary, performed in the following processes.

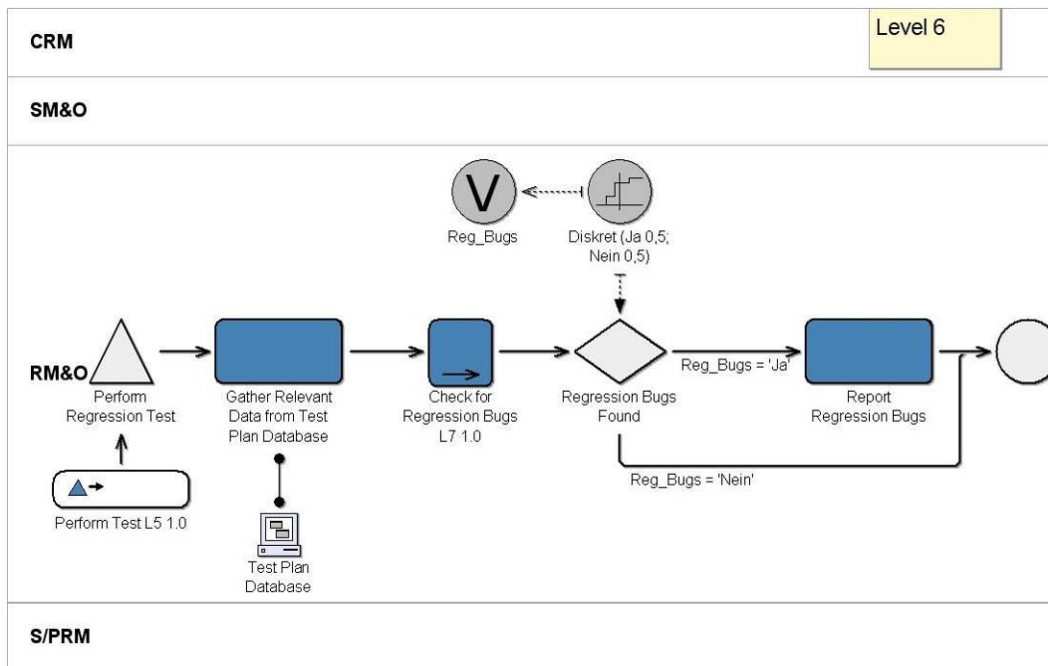
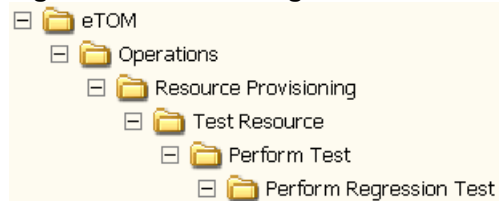


Figure 32: Perform Regression Test Level 6



On the next level checks for regression bugs are performed. There are three types of regression bugs according to [Wiki1].

- New Bugs Introduced by Changes
- Previously Existing Bugs Unmasked by Changes
- New Remote Bugs Introduced by Changes

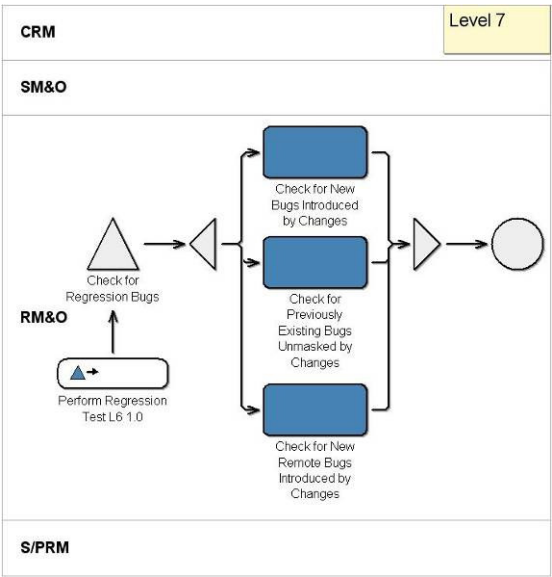
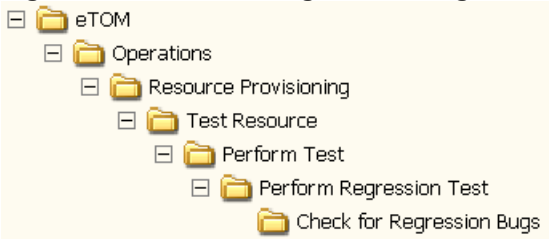


Figure 33: Check for Regression Bugs Level 7



After Regression Test the Unit Test is performed to evaluate if the individual unit will work properly. This can be done using mock objects or test harnesses to simulate the necessary environment.

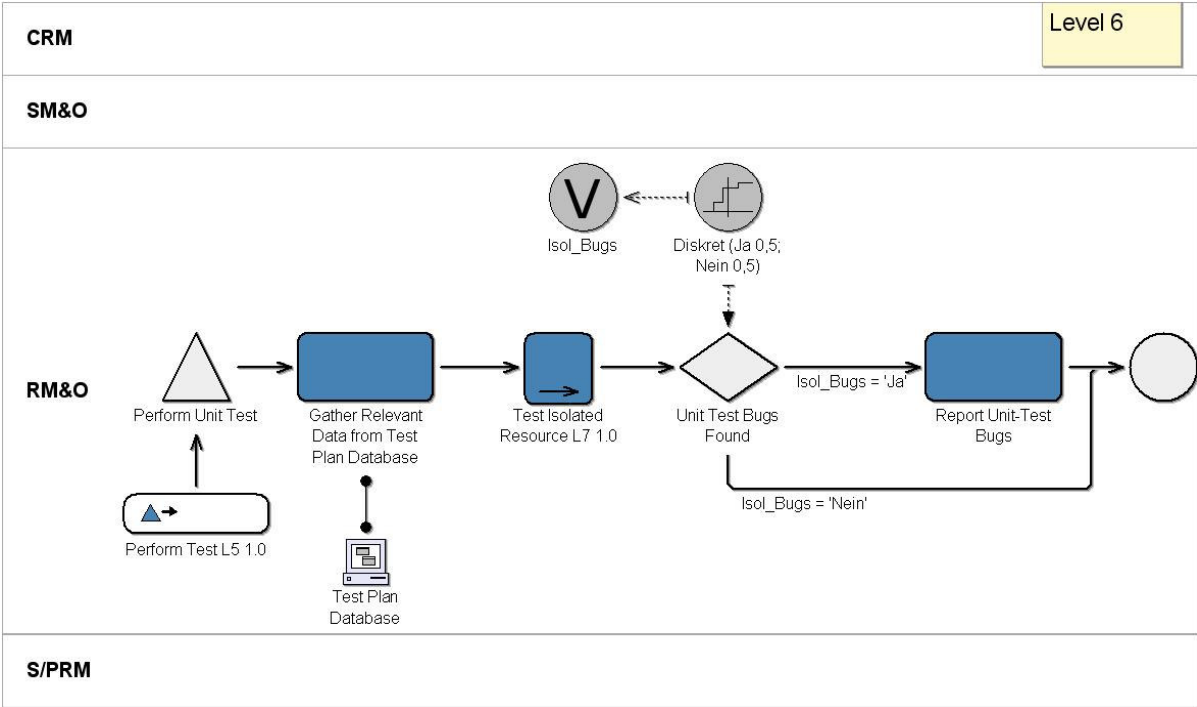
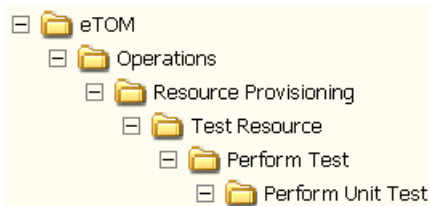


Figure 34: Perform Unit Test Level 6



The essence of Unit Testing is to test the resource in an isolated environment. For this purpose the smallest testable parts have to be found out by splitting and addressed for testing.

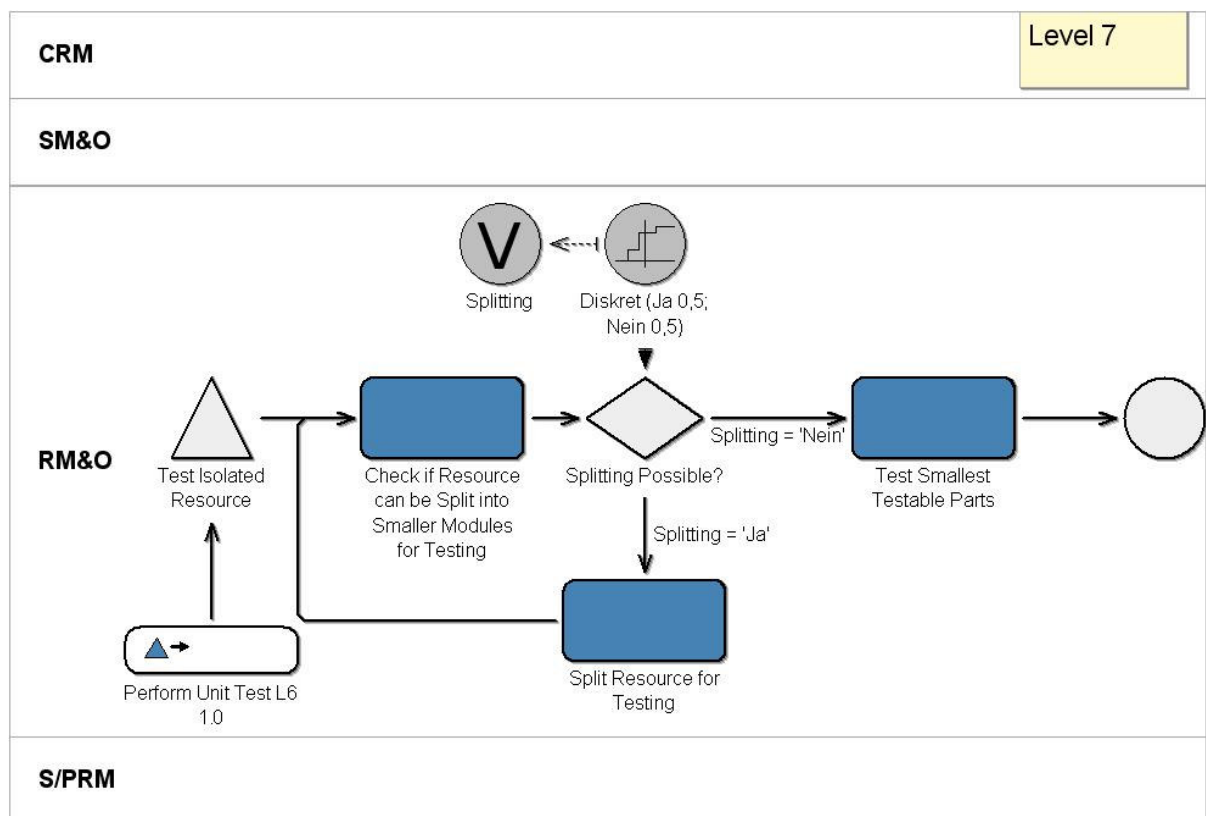
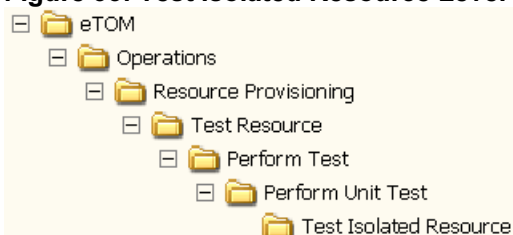


Figure 35: Test Isolated Resource Level 7



After unit testing the integration test is performed. Every Resource Module Group is tested on its own.

In the *Test Resource Module Groups* process (Figure 37) *Resource Module Groups* are combined to build up scenarios that could be useful during operation of the resource.

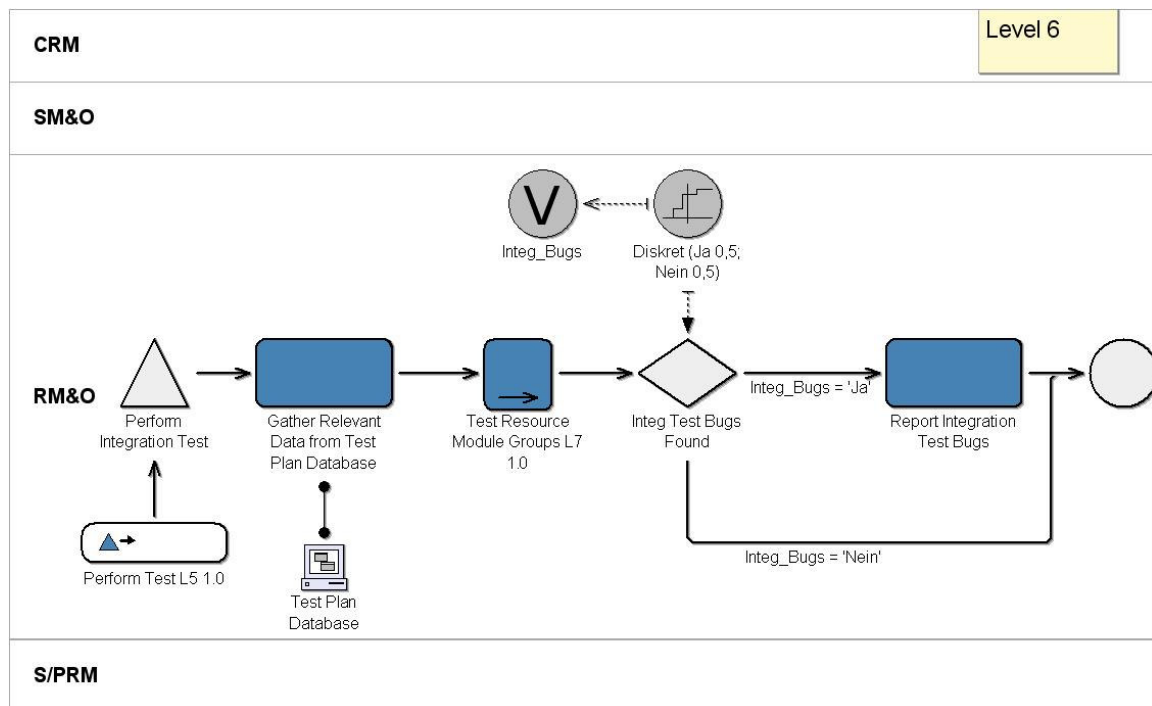


Figure 36: Perform Integration Test Level 6

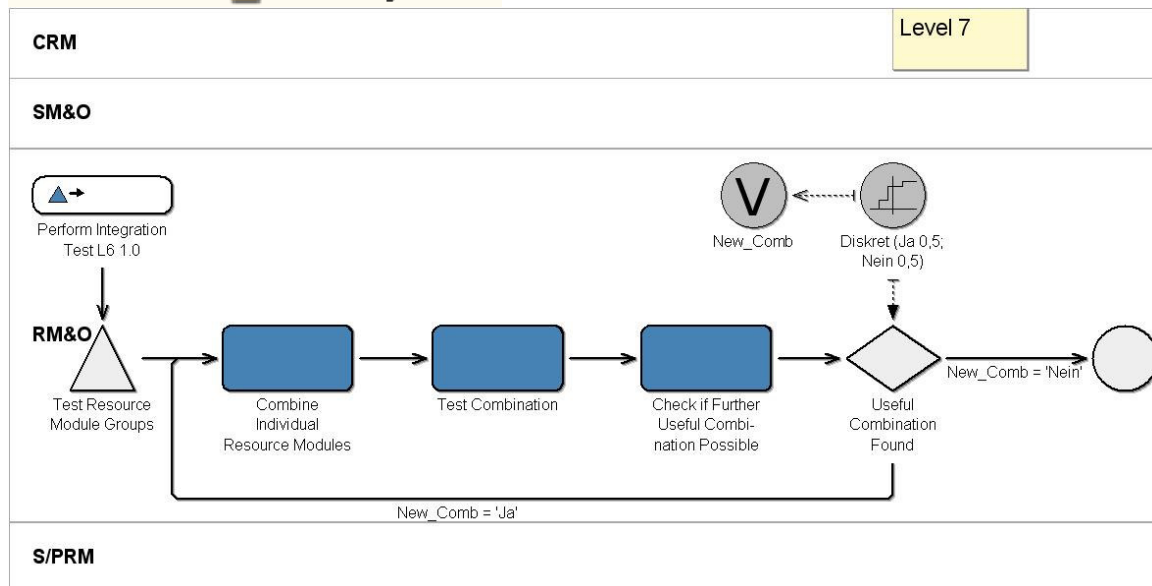
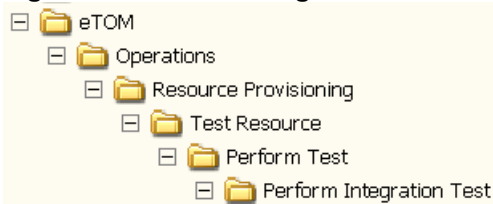
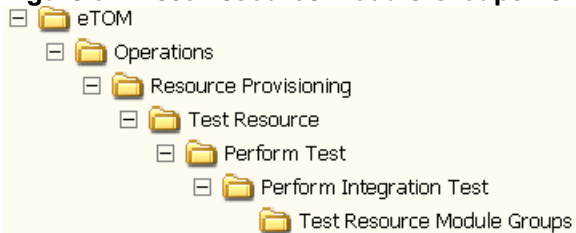


Figure 37: Test Resource Module Groups Level 7



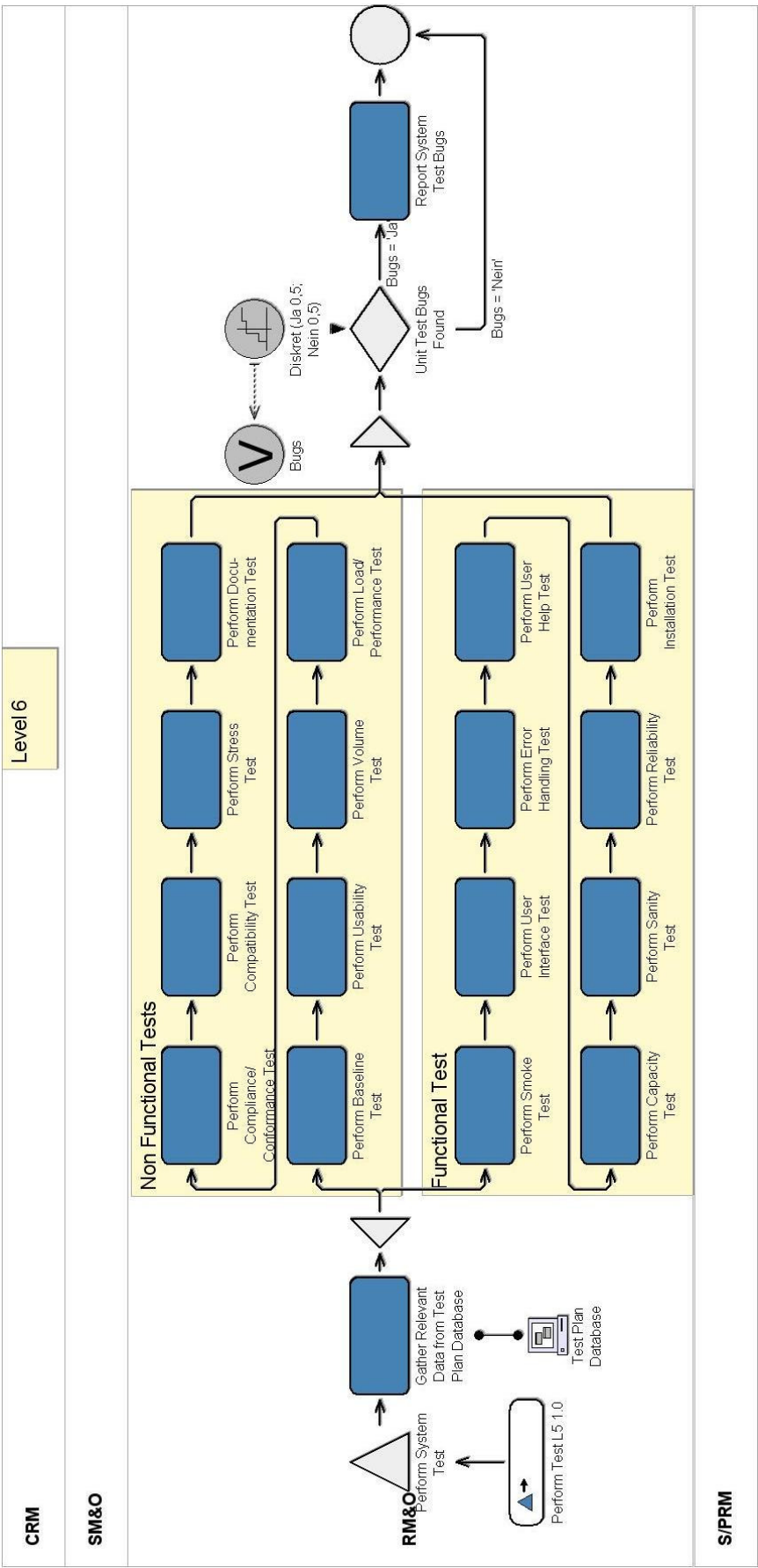
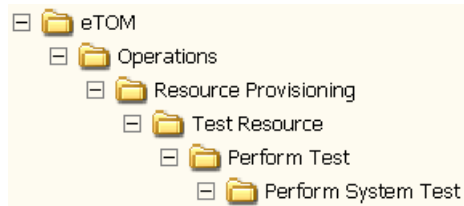


Figure 38: Perform System Test Level 6



System test can be considered to be the core part of resource testing. The two main branches are the *Functional Tests* and the *Non Functional Tests* [Wiki4]. Unlike the Unit Test, System Test is performed on a complete, integrated system.

Table 5: Particular modules of System Test [Wiki7].

Functional Tests	Non Functional Tests
Perform Compliance/Conformance Test	Perform Smoke Test
Perform Compatibility Test	Perform User Interface Test
Perform Stress Test	Perform Error Handling Test
Perform Documentation Test	Perform User Help Test
Perform Baseline Test	Perform Capacity Test
Perform Usability Test	Perform Sanity Test
Perform Volume Test	Perform Reliability Test
Perform Load/Performance Test	Perform Installation Test

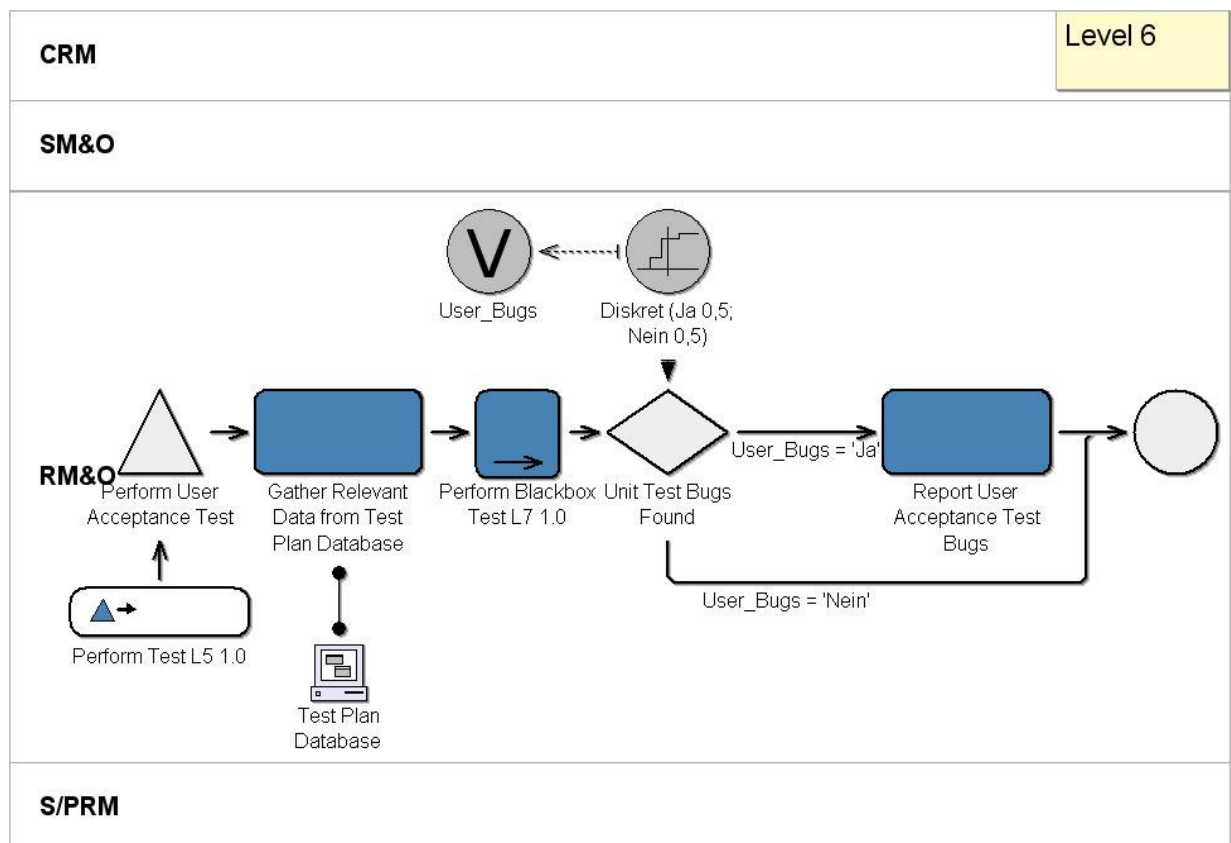


Figure 39: Perform User Acceptance Test Level 6

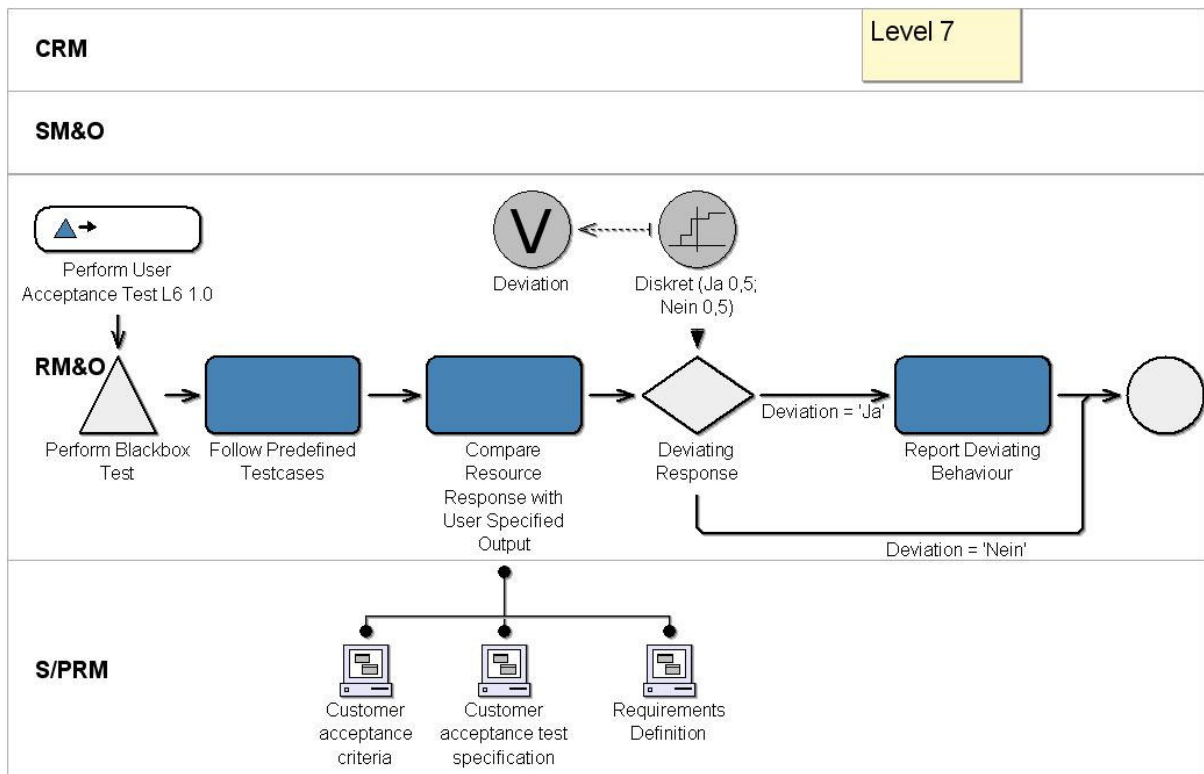
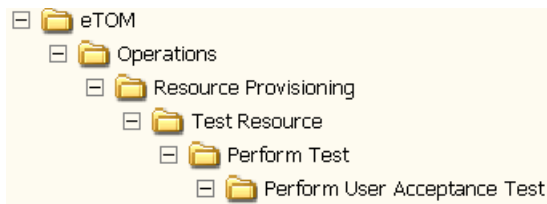
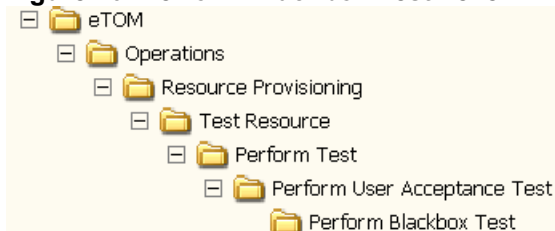


Figure 40: Perform Blackbox Test Level 7



User acceptance test shall simulate how the user will work with the resource. As the user has no knowledge of the test object's internal structure, the resource itself will work like a Blackbox shown in Figure 41. A specified input must lead to a predefined output. This is the only method to evaluate the correct operation of the resource.



Figure 41: Blackbox diagram [Wiki8]

5.3 Simulation of level 4 and above selected reference processes

According to the standards and guidelines of Six Sigma (6 σ) and Design for Six Sigma (DFSS) IT Applications data and figures were entered into the time/cost notebook.

Analyze Test Preconditions (Aktivität)

Aktivitätszeiten

Bearbeitungszeit: 00:00:02:00:00

Wartezeit: 00:00:02:00:00

Liegezeit: 00:00:00:00:00

Transportzeit: 00:00:00:00:00

Aktivitätskosten

Kosten: 200.000000

Prozeßkostenanalyse

EDV-Transaktionskosten: 0.000000

EDV-Batch-Kosten: 0.000000

Druckkosten: 0.000000

Versandkosten: 0.000000

Sidebar (right):

- Beschreibung
- Darstellung
- Zielsetzung
- Input/Output
- Zeiten/Kosten
- Arbeitsumgebung
- Sonstige Simulationsdaten
- Auswertungsergebnisse
- Externe Toolanbindung
- English

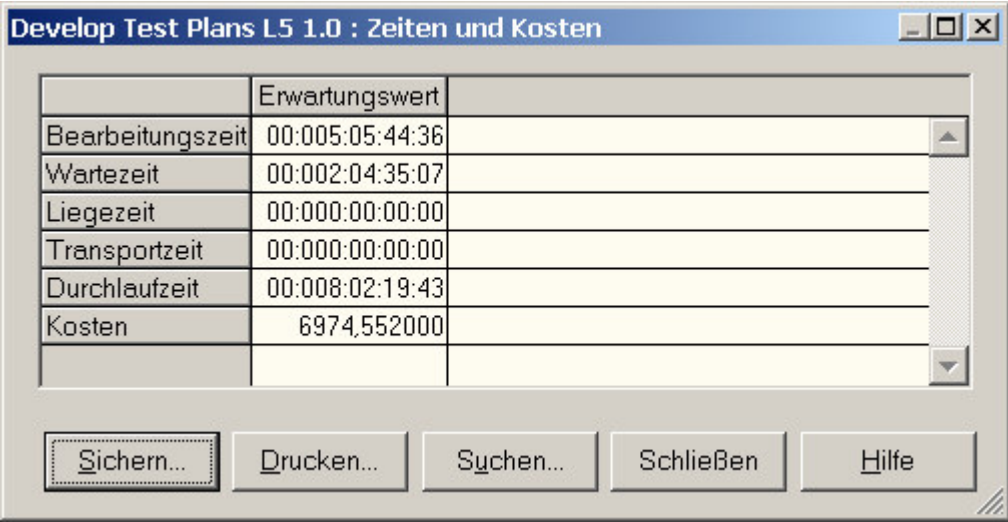
Buttons: Schließen, Zurücksetzen

Figure 42: Example: *Analyze Test Preconditions* time/cost notebook

In the notebook estimated values were entered. Primarily this affected processing time (Bearbeitungszeit), waiting time (Wartezeit) and cost (Kosten).

5.3.1 *Test Resource* reference processes

Let us assume the following scenario for demonstration of the simulation to assess plausible values for the corresponding efforts: In our fictitious company lots of expert know-how is existent. An external consultant discovers that this know how is rather unstructured and therefore suggests application of knowledge management techniques. The choice falls upon a so called *Yellow pages system* that works like an online database and collects information about experts by analyzing documents and emails. Additionally every employee can and is requested to review and edit his or her profile where required. No product available on the market matches all requirements and so the system is developed within the company. Due to the many necessary interfaces and complex functionality testing turns out to have various facets.



The screenshot shows a software window titled "Develop Test Plans L5 1.0 : Zeiten und Kosten". It contains a table with two columns: a label column and a value column. The values are time durations for various activities and a cost value. Below the table are five buttons: "Sichern...", "Drucken...", "Suchen...", "Schließen", and "Hilfe".

	Erwartungswert
Bearbeitungszeit	00:005:05:44:36
Wartezeit	00:002:04:35:07
Liegezeit	00:000:00:00:00
Transportzeit	00:000:00:00:00
Durchlaufzeit	00:008:02:19:43
Kosten	6974,552000

Figure 43: *Develop Test Plans* simulation results

6 Example: Real world use case (Korea Telecom)

6.1 Introduction

As already mentioned before, eTOM is an open standard. This offers telcos the opportunity to adopt eTOM principles and process areas as they wish. Every company can select several issues for themselves. Some of these issues are listed below.

- Choose process areas
- Choose level of detail
- Choose correspondence with other standards like ITIL or COBIT
- Align processes to eTOM or just
- Depict existing processes using eTOM terminology.

In early 2006, Mr. Kisang Ok, an employee at Korea Telecom was given the assignment to explore the ins and outs of eTOM and draw up a scenario for Korea Telecom. Over the next months he worked out a couple of extensive documents which were the main source for this real world use case. Unlike the TM Forum he was less guided by the idealistic mission to put the entire standard into action but more by strict guidelines and economic considerations. All sources in this chapter refer to [Ok06] or to communication with Mr. Ok over the TMF eTOM Community forum.

His pragmatic eTOM implementation looks like this:

- Only use the FAB section out of the Operations process area (Fulfillment, Assurance and Booking; this decision is going back on TOM tradition, which also excluded other process areas).
- Keep footing by the use of existing Korea Telecom terminology and do not care too much about other standards like ITIL.
- Arrange existing FAB processes according to eTOM first (AS-IS processes)
- Use eTOM gently to renew processes (TO-BE processes).

6.2 The author's view and understanding of the environment

Mr. Ok describes how NGOSS can be used and realized by telcos.

He suggests the following:

Standards are only of use if the industry accepts them. Industry leaders are of the opinion, that open standards may meet today's OSS/BSS challenges.

Nowadays, with global competition and developing technology, business management settings are changing at a fast rate while the customer's voice is of more importance. "Change" is currently the only trend that doesn't change.

Ultimately, agility, efficiency and flexibility have replaced stability in this changing environment. Thus, business competitiveness relies on how flexibly and efficiently a company addresses its customers' demands.

TM Forum suggests NGOSS as a guideline, to show trends and demands in the telecommunications sector. NGOSS defines the core principles for attaining business agility and efficiency.

Principles that are related to the software architectural view include:

- The Common Communication Vehicle (CCV): this can be realized by the use of Enterprise Application Integration (EAI) technology
- The Externalized Process Control: can be carried out by using Business Process Management (BPM) technology.
- The Contract defined interface and registration, trading principle: can be reached by the usage of Service Oriented Architecture (SOA) technology.

These principles are all part of the software architectural view. This architecture can also be relevant for other domains, e.g. ERP, the financial and the telecommunication domain.

So, how can a telco's OSS application, based on this general architecture, be realized? This is where eTOM and SID (Shared Information/Data) come in. These models provide the scheme for this. eTOM offers a business process framework for the use especially by service providers. SID presents all the information needed to implement use cases based on eTOM processes.

What eTOM describes is quite theoretical and more useful for high level business processes. Up until now SID has also stayed in the business view.

Unfortunately it is still very difficult to implement OSS systems by using present eTOM and SID as they are still too abstract and general.

Mr. Ok concludes that this is the reason why it is tricky to find a NGOSS compliant OSS system in the real world.

Thus, this is why Korea Telecom decided to define detailed procedures for specifying and implementing eTOM business processes into an existent OSS system.

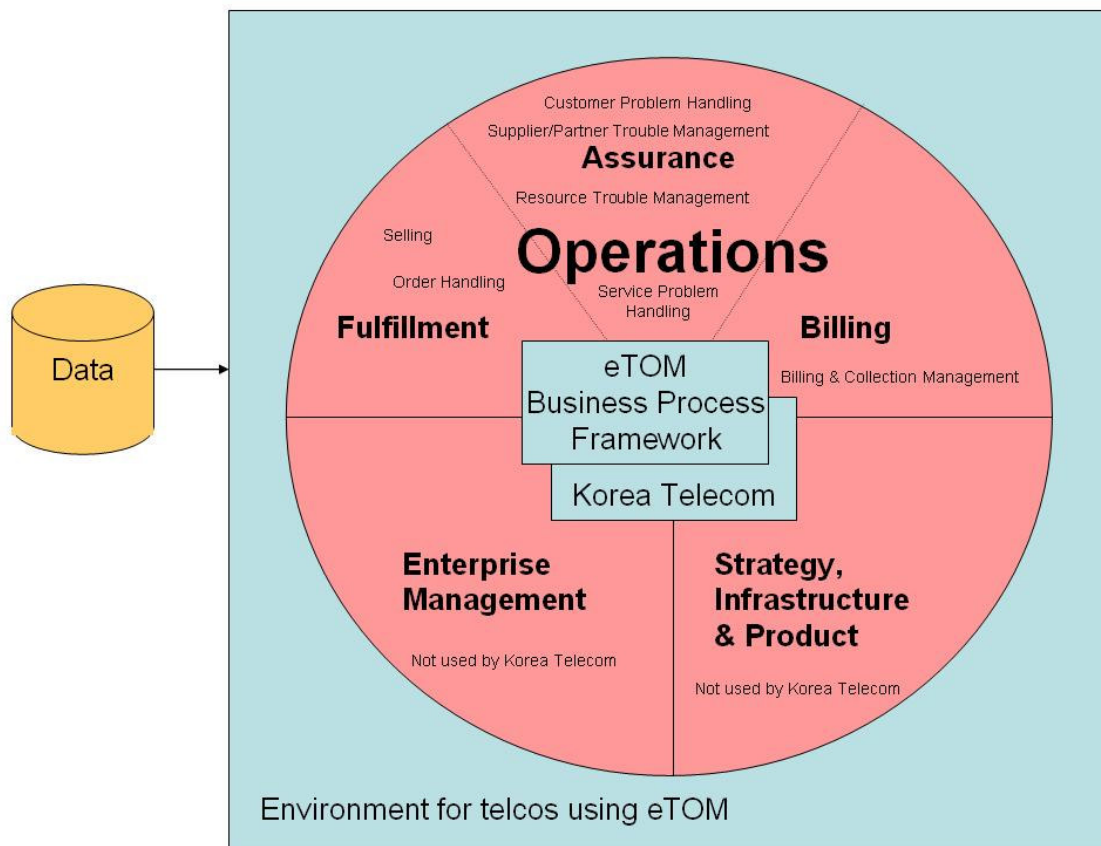


Figure 44: Korea Telecom and eTOM

6.3 How is NGOSS to be realized?

The NGOSS core principle may be put into practice as the BPM architecture. BPM refers to activities that are carried out by businesses to optimize and adapt their processes.

This includes Process Management which shows the processes, Process Execution that performs the process, Process Monitoring and Analysis that checks and analysis the state of the process, and Repository that stores process models and rules put into detail by eTOM.

The business processes that are necessary for the service provider's fulfillment, assurance and billing are specified and systemized in a special procedure which is shown in the image below.

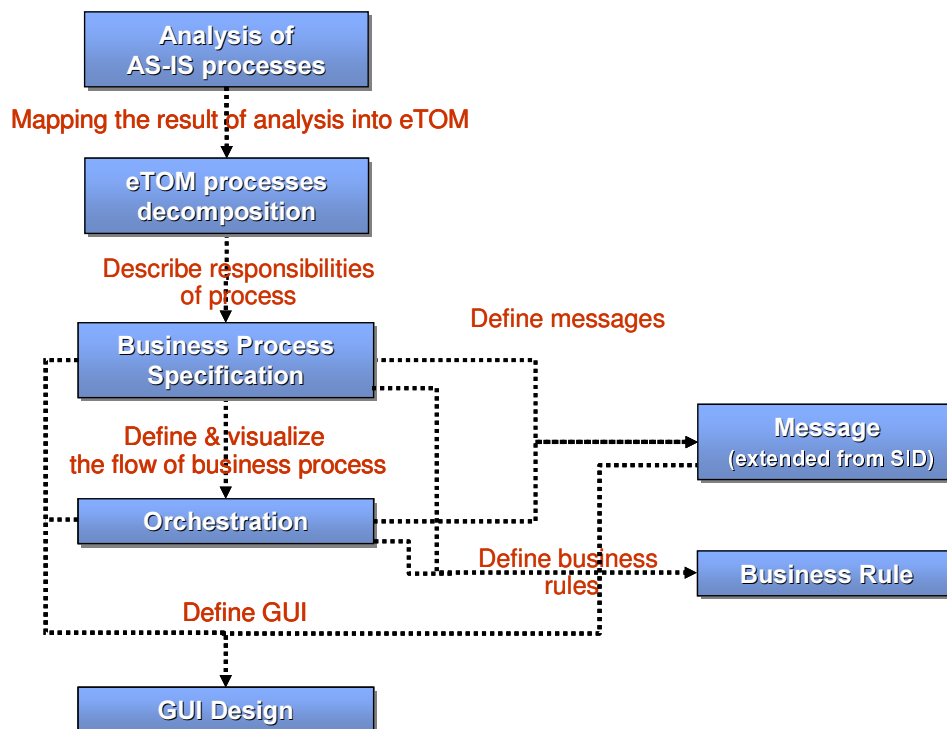


Figure 45: Procedure for specifying and implementing the business processes

One can divide this procedure into the AS-IS process analysis stage and the stage of designing the TO-BE process that is based on the result of the analysis of present business processes and eTOM.

At the stage of AS-IS process analysis it is required that for each service provider the state of already existing OSS and business processes are analyzed.

The TO-BE Process designing stage includes the rearrangement of the specifically examined results of the AS-IS process according to the eTOM process classification. It also includes the mapping of integrated or separated parts of the existing process to eTOM, which is followed by the definition of the responsibility of each process for

system implementation and decomposing of eTOM processes into more precise stages according to the defined responsibilities.

According to Mr. Ok the next step is process specification. This is essential for each process in fulfilling its given responsibility and orchestration. This is where categories for process input and output have to be defined in order to set the basis for “Extended SID”, which is an extension of NGOSS SID. To create patterns for suitable applications for each process, it is important to repeat the step of extracting the message and rule from the business process specification and orchestration.

At last, business processes are optimized by abstraction.

The image below gives a detailed explanation of how business process specification and implementation are applied in eTOM’s Assurance area.

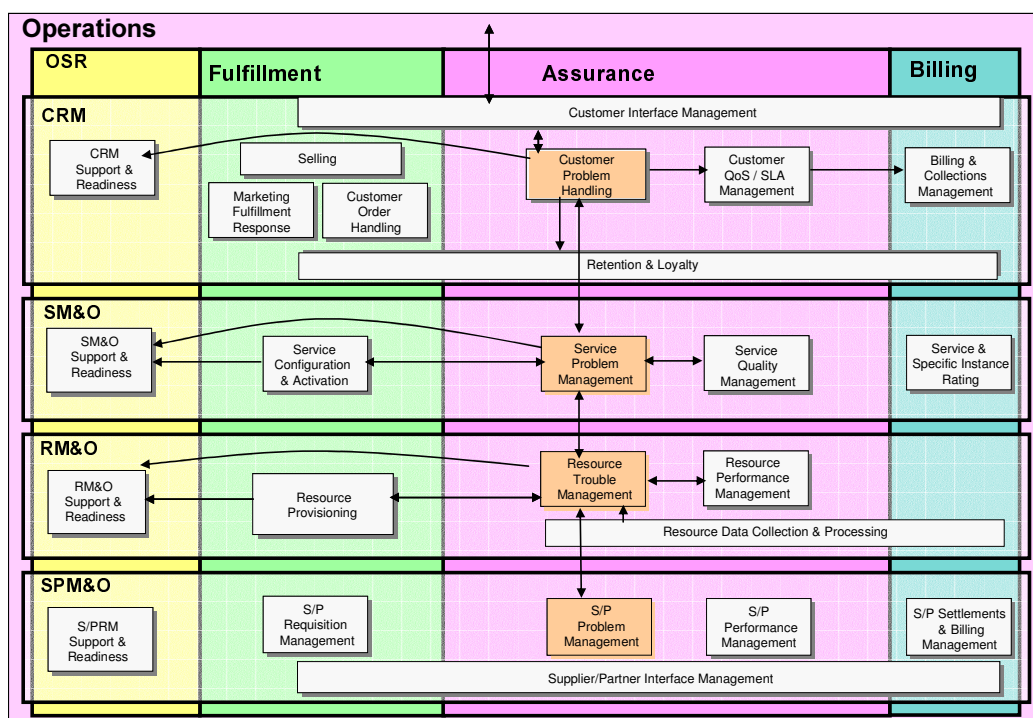


Figure 46: Process interaction for service assurance based on eTOM level 2 business processes

6.4 Implementation and decomposition of eTOM Business Processes

Mr. Ok explains that eTOM is an ongoing TM (TeleManagement) Forum initiative. It provides a business process framework that may be used by service providers and others within the telecommunications industry. eTOM describes the enterprise processes that are needed by a service provider and analyses them in different levels of detail according to their importance and priority for the business.

Presently, eTOM Release 6 defines business processes up to level 3, though in order to implement the actual system each needs to be defined in more detail. The business process and the flow between the processes have to be defined as well.

6.4.1 Analysis of AS-IS business processes

The first step of the procedure that is described by Mr. Ok, is the analysis of AS-IS business processes and their existing OSS. Once this is done, one can design the optimized and robust business processes. By mapping the business processes into eTOM the weakness and lack of AS-IS business processes can be recognized.

On the following pages the Assurance process area is used to demonstrate how Mr. Ok proceeded with Korea Telecom's business processes.

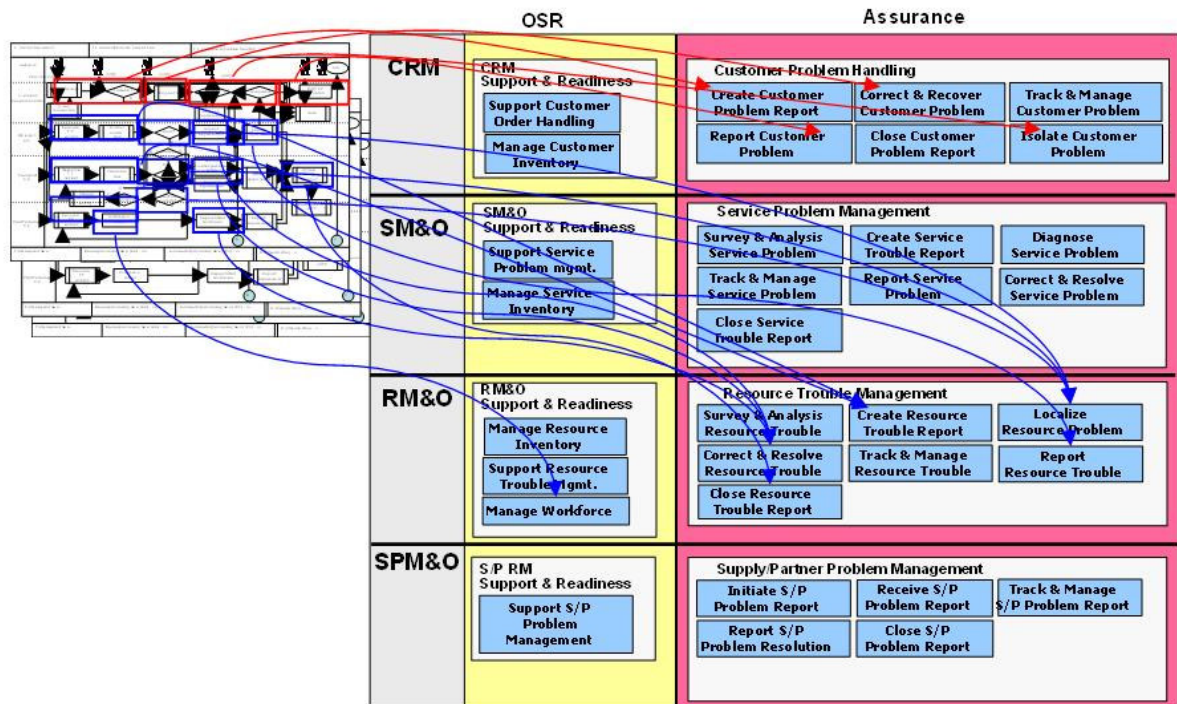


Figure 47: Mapping the AS-IS business processes into eTOM to recognize the weakness and lack of AS-IS business processes

In the previous figure one can see clearly that some parts of the management area are missed or not defined properly such as the service management and operation (SM) and the Supplier/Partner management and operation (SPM&O) domain.

Furthermore, based on the result of analysis, Mr. Ok explains how one can define which part of the management area should be designed for TO-BE business processes.

This is shown in the following image:

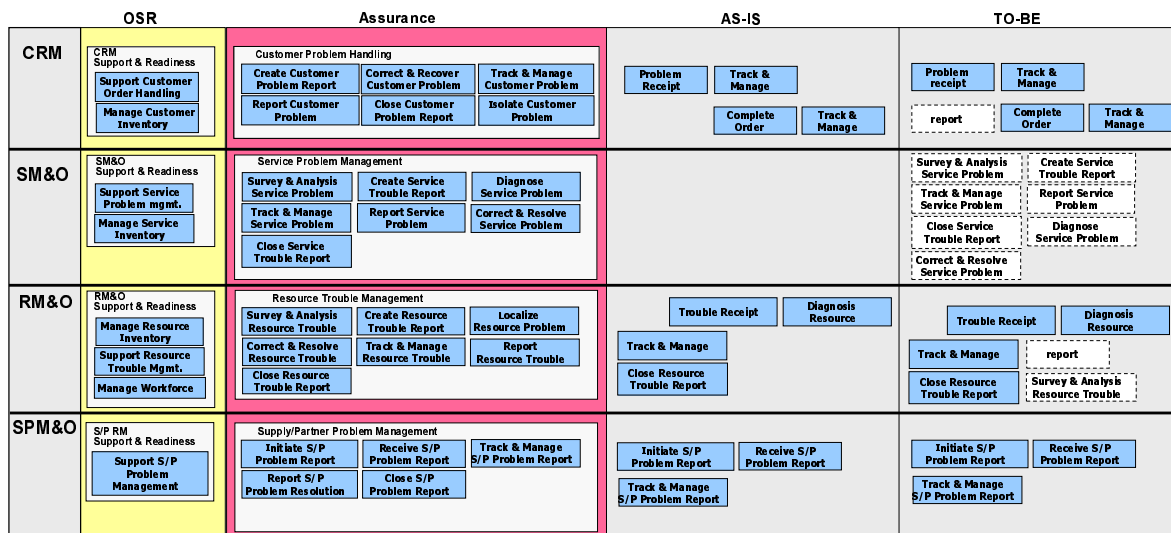


Figure 48: Comparison of AS-IS and TO-BE business processes in the Assurance process area

eTOM offers process design guidelines to a lot of service providers in order to optimize their business processes, as eTOM is a generalized systematic display of complex activities carried out throughout the service provider's organization.

It is quite difficult to set a standard to which such specification can be applied, as definitions and flows of processes vary.

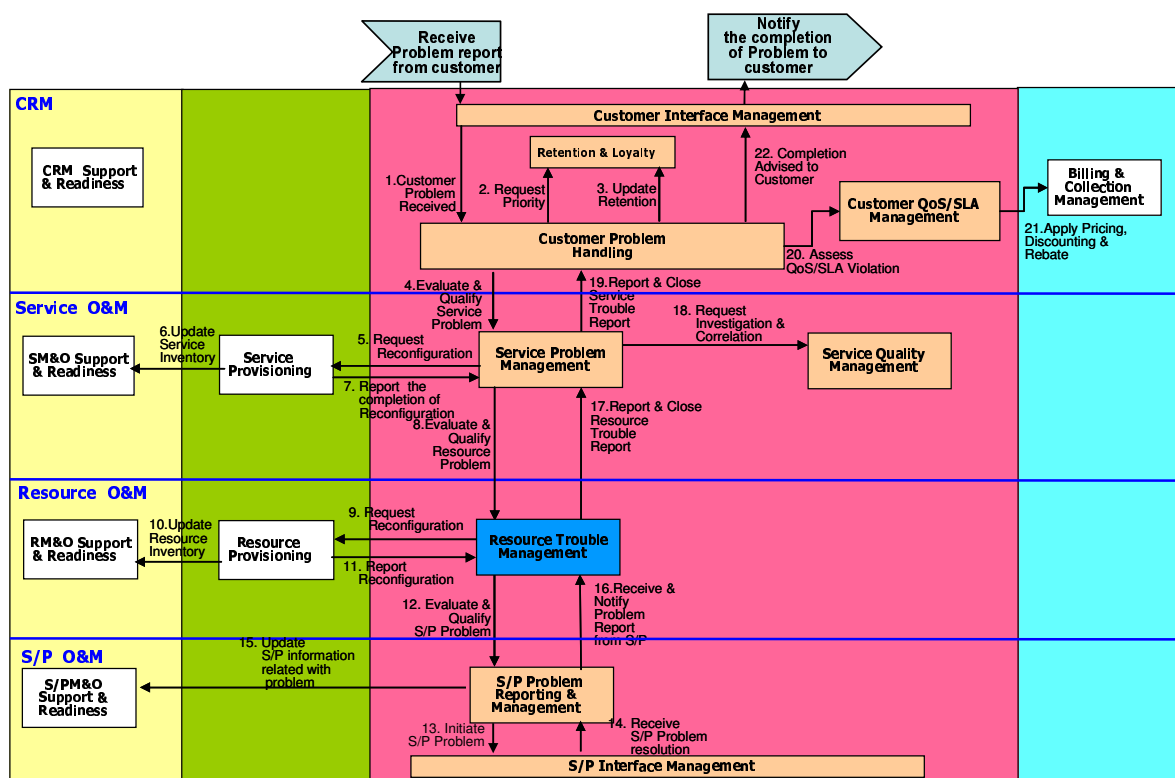


Figure 49: Problem handling from customer report among eTOM level 2 processes

Among processes that are related to problem handling, the “Resource Trouble Management Process” is divided into seven level 3 business processes. According to the Operation Process Pattern this includes “Survey and Analyze Resource Trouble”, “Create Resource Trouble Report”, “Localize Resource Trouble”, “Correct and Resolve Resource Trouble”, “Track and Manage Resource Trouble”, “Report Resource Trouble” and “Close Resource Trouble Report”.

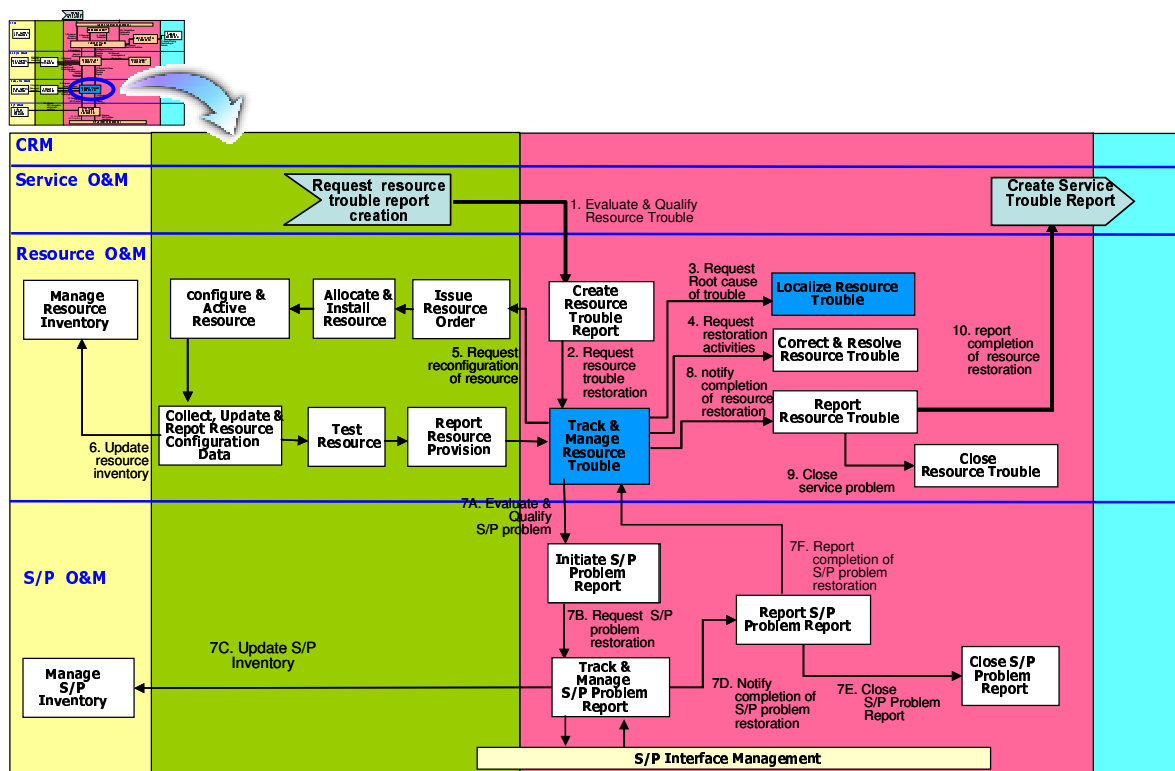


Figure 50: Resource trouble management among eTOM level 3 processes

As already shown in Figure 47, Mr. Ok explicates that business processes were extracted from the analysis of AS-IS business processes and mapped into eTOM. Based on this, level 4 business processes can be decomposed from level 3 business processes that are defined on eTOM.

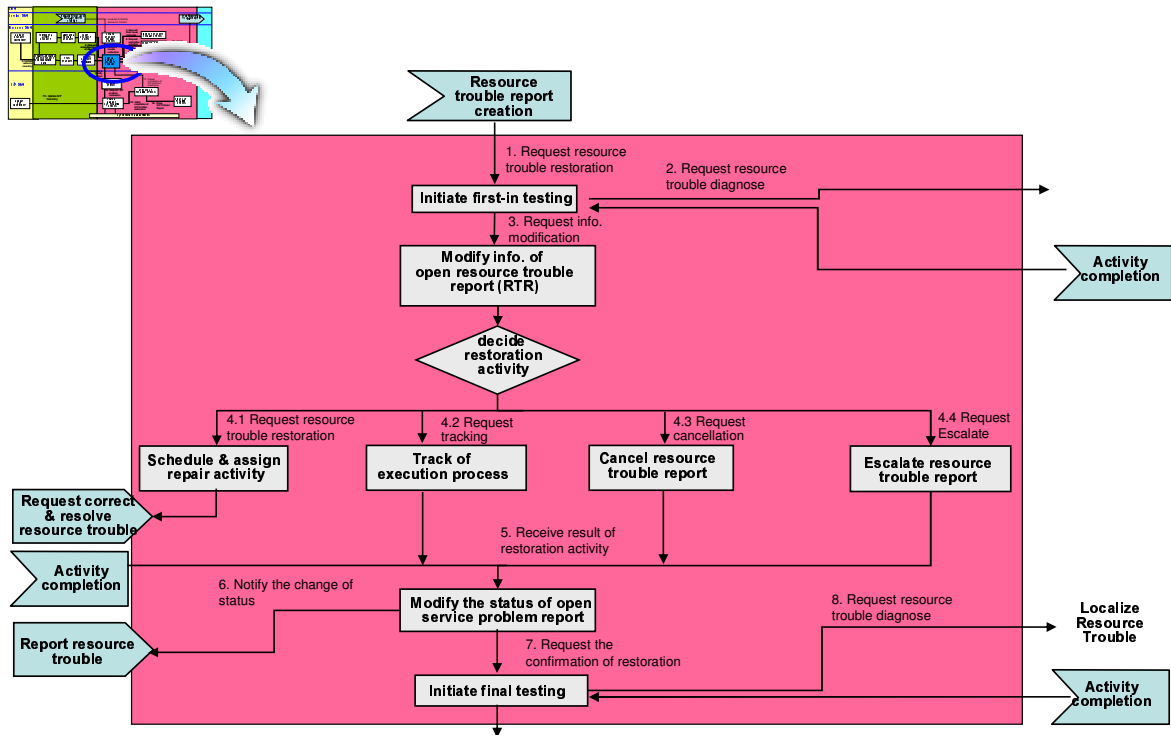


Figure 51: Track & Manage Resource Trouble among eTOM level 4 processes

These defined level 4 business processes can be further decomposed into more detail according to each domain, for instance product, service and resource. To make this clear, Mr. Ok uses the example of the CRM domain. For this domain processes dedicated for a specific product could be decomposed into level 5 business processes.

For the SM&O domain, processes for a specific service could be decomposed into level 5 business processes.

An example of eTOM business process decomposition is given in the following table:

Business Processes Level	Decomposition Criteria	remark
Level 4 Processes	Based on the responsibilities of eTOM Level 3 Processes described on the GB921D document.	
Level 5 Processes	processes unit for specific product, service or resource -CRM: dedicated process for specific	Referenced from the business processes of KT and their operation

	product -SM&O: dedicated process for specific services -RM&O: dedicated process for specific resources	experiences
Level 6 Processes	Decomposed processes if need to be decomposed from level 5 processes	Referenced from the business processes of KT and their operation experiences

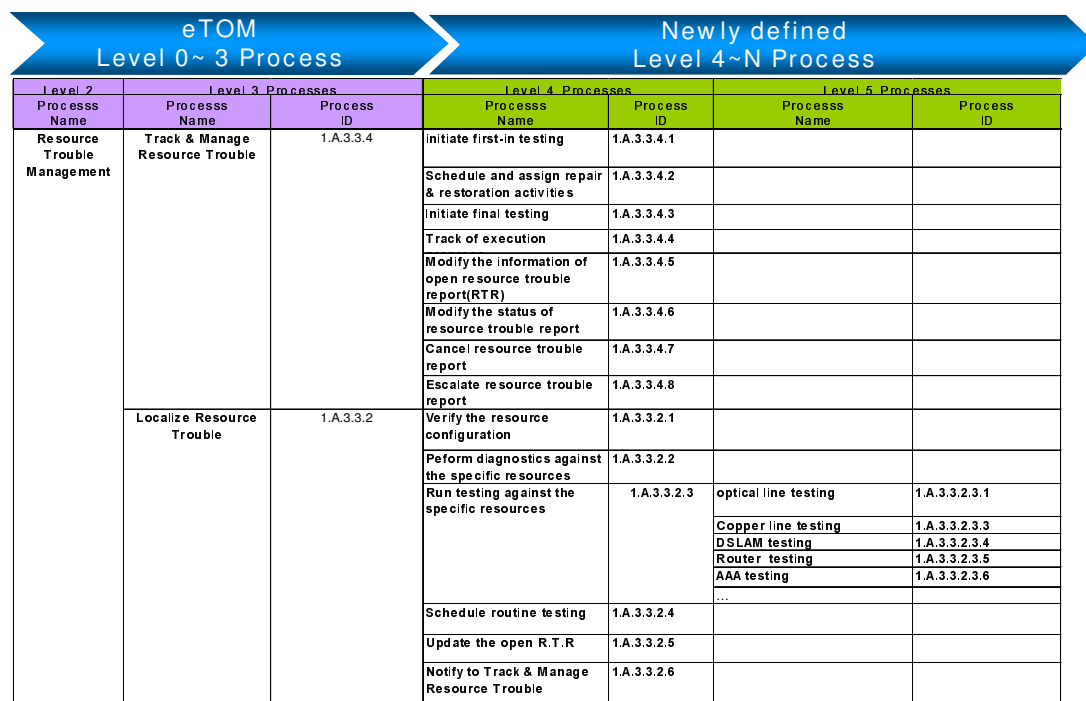


Figure 52: Example of decomposed business processes

6.4.2 The first step Specification of the decomposed business processes

It is important to define the responsibility of every decomposed business process, the basic process flow for its implementation, and the message that is sent among internal- or inter-business processes. In order to define the responsibility, message and flow, Mr. Ok refers to the already defined document template, which – at Korea Telecom – they call the “business process specification”. By using this template, it was possible to describe all the activities for the business process.

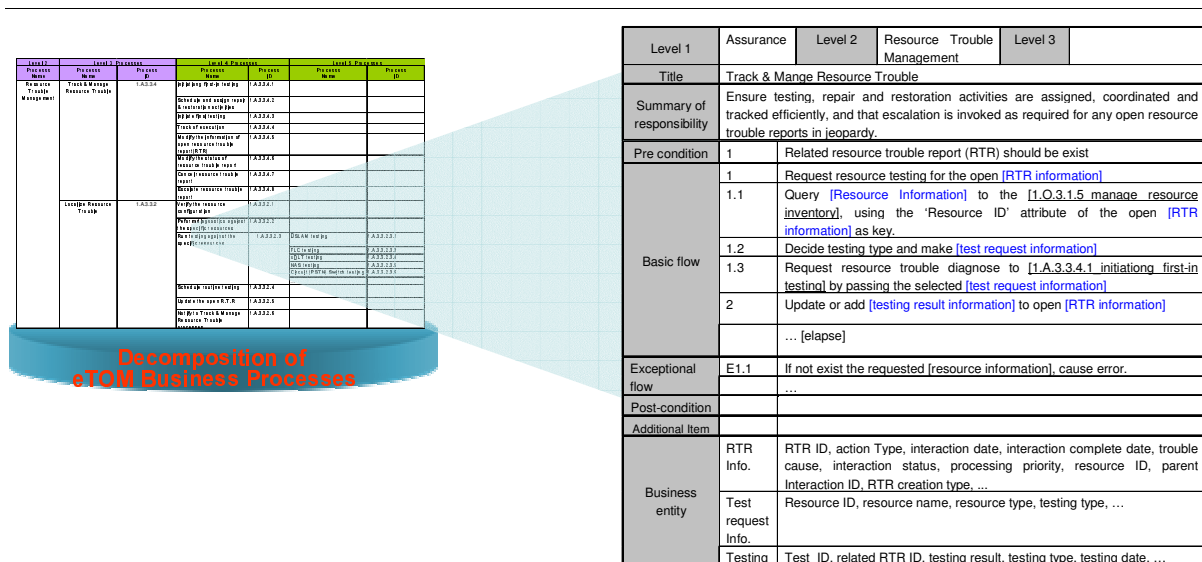


Figure 53: Template for Business process specification

This template is made up of a summary, the pre-condition, basic flow, exception flow, post-condition and business entity.

In the basic flow section, the flow of the business process is described. The business entity that is used in business processes is described in the business entity section. In the template of Korea Telecom this business entity was written in blue color and used to pass information between different processes.

Mr. Ok explains that “orchestration” means, based on the business process specification, the flow of business processes that were defined and visualized. At Korea Telecom, all orchestration was designed by using a process modeling tool. In this case the Microsoft BizTalk’s orchestration designer was applied.

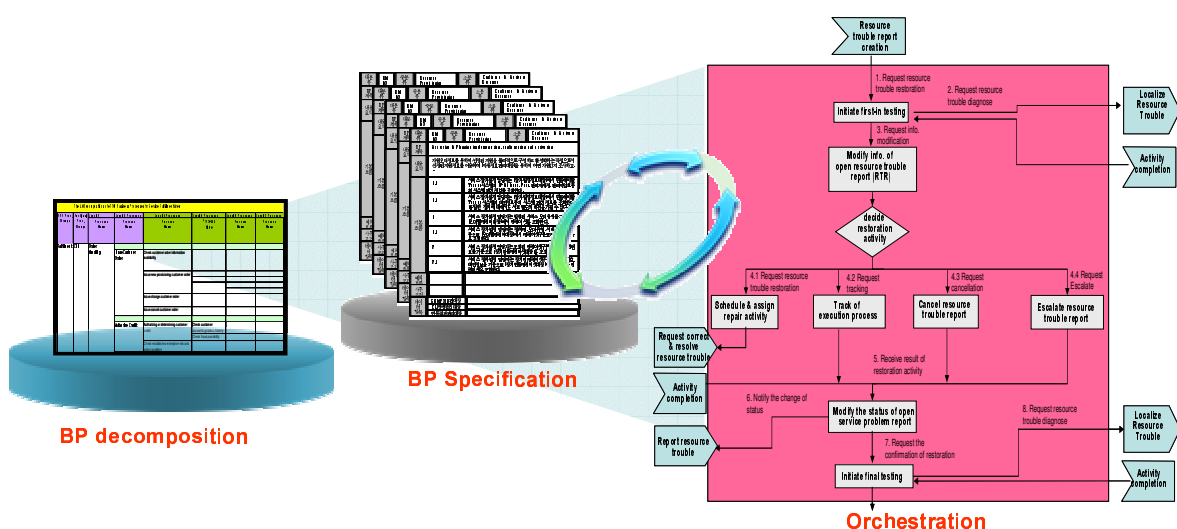


Figure 54: Definition of business process flow

As shown in the previous image, the results and the problems that occurred in this step and the definition of business process flow step, give a feedback to the previous step, the specification of the decomposed business process step. After this result is reviewed, the specification of the decomposed business process may be changed if this is necessary. To optimize the business process the interaction of these steps needs to be repeated.

6.4.3 Definition of business entity

eTOM business processes are driven by business entity. Business entity means that information can be exchanged among business processes. So as to define the business entities in more detail, Mr. Ok introduces the document template which, at Korea Telecom, is called “business entity specification”.

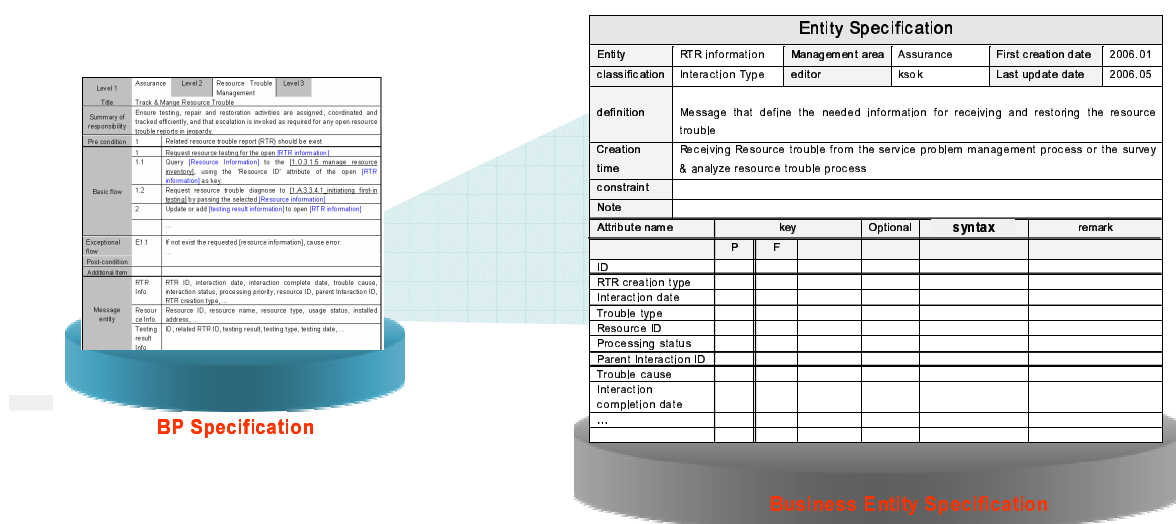


Figure 55: Definition of a Business entity

This business entity specification template consists of the definition of business entity, its creation time, attributes and their syntax. This business entity is going to be used as a messenger between business processes.

Mr. Ok sums it all up that eTOM can be used as a reliable process design guide. In the past everything was network focused and most services were long lived and there was a relatively simple mixture of them. But nowadays everything seems to be

focused on service. Most services are rather short-lived services and there is a somewhat complex mixture of them.

In the case of Korea Telecom it appears that there is no explicit definition of the product, service and their differences. Thus, one gets the impression that more flexibility for adopting these changes is needed. As suggested on eTOM and SID, the concept of product and service is required. Especially the “Customer Facing Service” and the “Resource Facing Service” concept need to be applied.

One of the issues one might consider when using a BPM, workflow engine, is which level of functionality should be made visible to the workflow engine. Especially in an environment where there is vast amount of traffic and important transactions this is of significance. To be able to do this a large amount of business logics are of necessity. Therefore processes become slow and inefficient by the overhead and payload of the workflow engine. This produces negative impacts on the scalability.

The coarse grain approach has a few limitations concerning flexibility, but the simplified processes offer lower traffic volumes for the workflow engine and are thus better for the scalability.

6.5 Designing User Interfaces based on eTOM business processes

Among the NGOSS core principles the “Externalized Process Control” refers to the ability to separate the business logic and the component implementation. It is also able to externally control the defined business logic. This can be realized through the BPM technology.

In this process, the change of the business process logic may cause a change of a user’s screen. In order to support these changes efficiently, a mechanism is needed which adopts the changes easily into a user interface (UI) and its flow. In other words, the user interface and its navigation have to actively reflect this change of the business logic by means of external controls. The image below shows how this was realized at Korea Telecom.

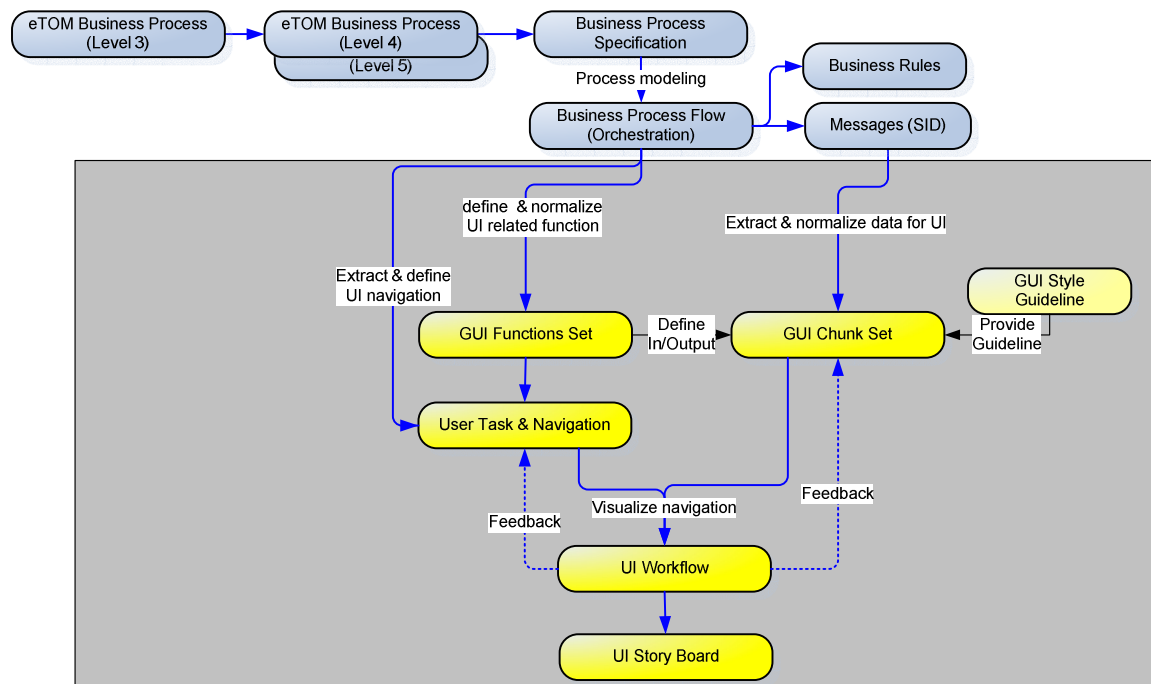


Figure 56: Methodology for extracting and defining user interfaces from business process specifications

GUI functions are inferred from the business process specification and orchestration which defines the responsibility and flow of business processes in each specific stage. These GUI functions are then normalized into small units that can be reused. Due to this process, a collection of reusable GUI functions may be defined.

By extracting the attributes from the messages of the business process specification, and taking the relationship of these attributes into account, some of the GUI units could be grouped in to the reusable atomic units. Mr. Ok explains that this unit is referred to as the “GUI chunk”.

Every GUI function defines the display category and screen layout of input and output as a GUI chunk or as a collection of GUI chunks.

Based on such a GUI function set and a GUI chunk set, plus the analysis of each business process specification, the flow of user interface related parts, which are either entered by users or are displayed, are defined in “user task & navigation”.

The UI workflow groups “user task & navigation” into page units after taking user entry convenience and the correlation of information for output, into consideration. It then decides on the arrangement of GUI functions which are to be displayed in each page. The layout information used for these GUI functions is the XML format. Thus,

the UI-related section regarding process logic change is also registered in the UI workflow in the XML format in order to external control. The UI workflow needs an upgrading of related information whenever there is a change in the business process specification.

The image below shows how to extract and normalize the GUI function and the GUI chunk set.

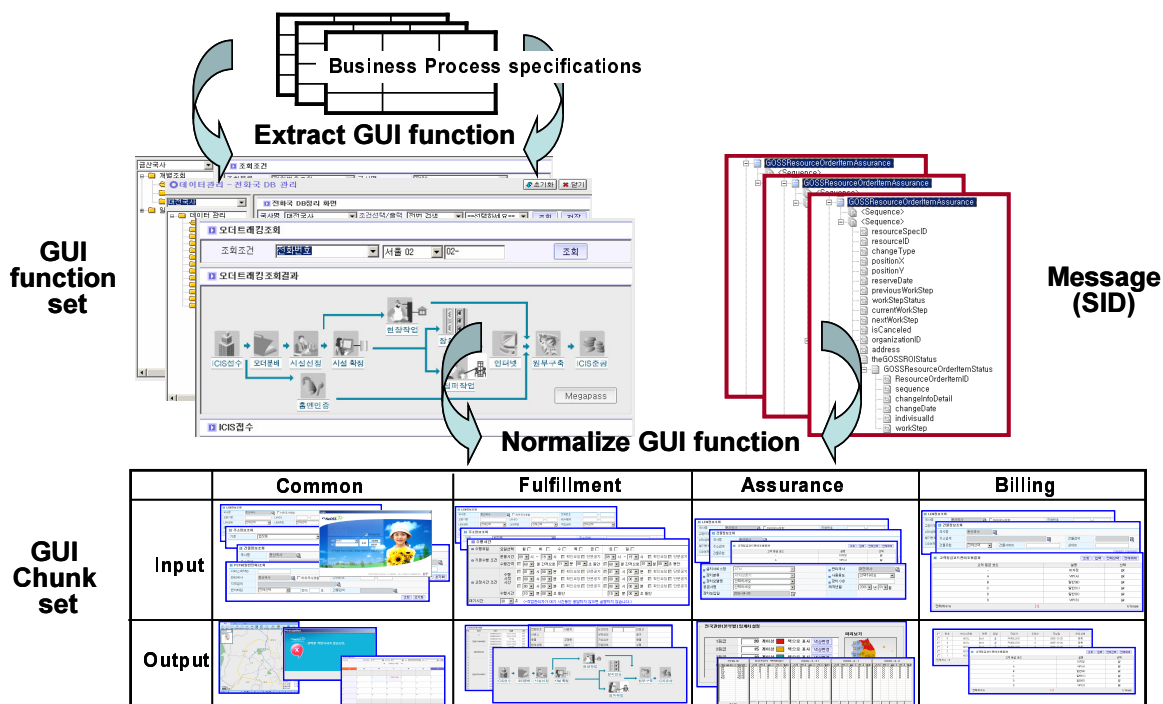


Figure 57: Extraction and normalization of GUI chunk from the business process and existing OSS

6.6 Effects of the introduction of eTOM on KT's KPIs and KQIs

Late 2006 Mr Ok started to use eTOM at Korea Telekom. To measure performance and quality KT uses Balanced Scorecards. For reasons of data security Mr. Ok was not able to provide numbers or detailed information about the effects of the Business process redesign.

Internet speculations estimate the gain of profit for KT to be a two digit percentage number while quality of service was increased.

7 Future perspectives and conclusion

The telecommunication branch is currently going through a minor depression. This makes it important to make work within the branch more efficient. Promoters of eTOM see a good chance that a sensible application of a business process framework could represent a way into a brighter future for the entire industry.

But eTOM only offers a very generic view on a telco or service provider's processes and process flows. Thus the business process analyst must not act too hasty. Following Mr. OK's example from chapter 5 every step in the eTOM implementation must be thought over in detail to avoid being trapped by one of the following issues:

- Implementing eTOM will not automatically make your company run more efficient.
- Be prepared to be confronted with doubts or even sabotage concerning your ideas and plans from both colleagues and managers.
- Analyze carefully before you change something because the processes and process flows you will find might also be good and will not need Business process redesign.
- Employees will not like being told that what they have been doing for years was wrong and try to prove the opposite or refuse to change the way your processes suggest.
- The focus of eTOM lies on the customer. So it is your turn to think of other stakeholders.
- Take your time for simulation of your processes and process flows.
- Simulation can only be as good as simulation data. Check data quality as often and as precise as you can. Making business process redesign dependant on wrong simulation data can seriously harm your company, endanger your job and is bad for the reputation of Business Process Management and eTOM.
- Observe the feedback circuit of the BPMS paradigm introduced in chapter 1.3 and be prepared to take back changes if the Performance Evaluation Process indicates no improvement due to your reengineering.

If all of the above issues are being respected you can seriously improve efficiency and service quality of your telco/service provider. This will make eTOM the tool to give your company competitive advantage on one of the toughest markets in the world.

8 Appendix A: EM Level 2 processes

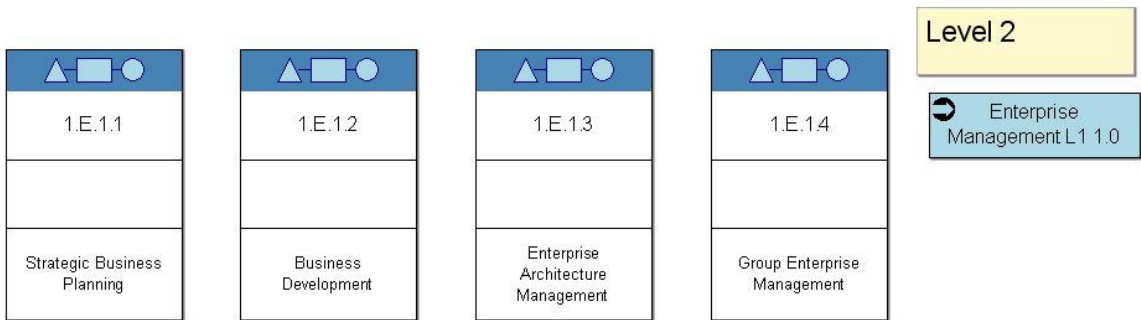


Figure 58: Strategic & Enterprise Planning ADOit representation 1.E.1

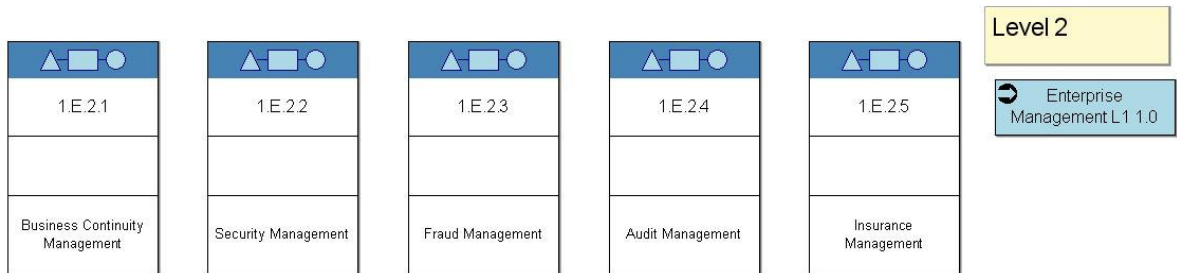


Figure 59: Enterprise Risk Management ADOit representation 1.E.2

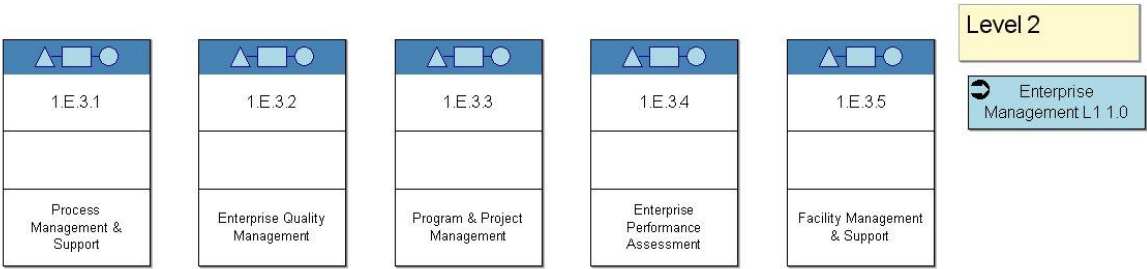


Figure 60: Enterprise Effectiveness Management ADOit representation 1.E.3

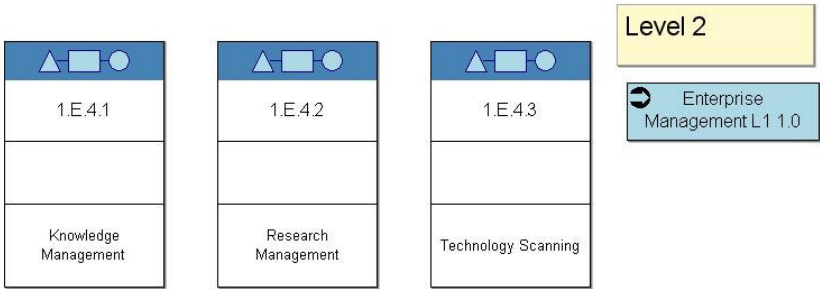


Figure 61: 1.E.4 Knowledge & Research Management ADOit representation

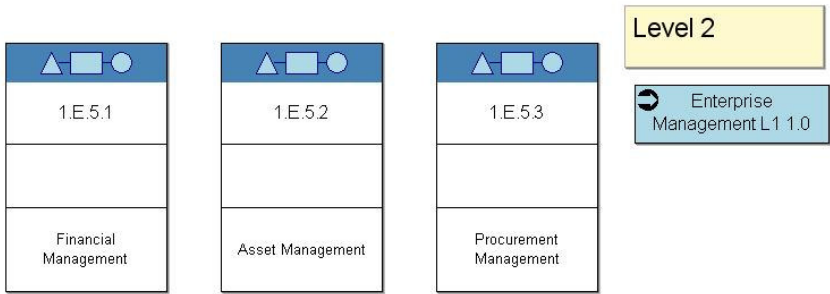


Figure 62: Financial & Asset Management ADOit representation 1.E.5

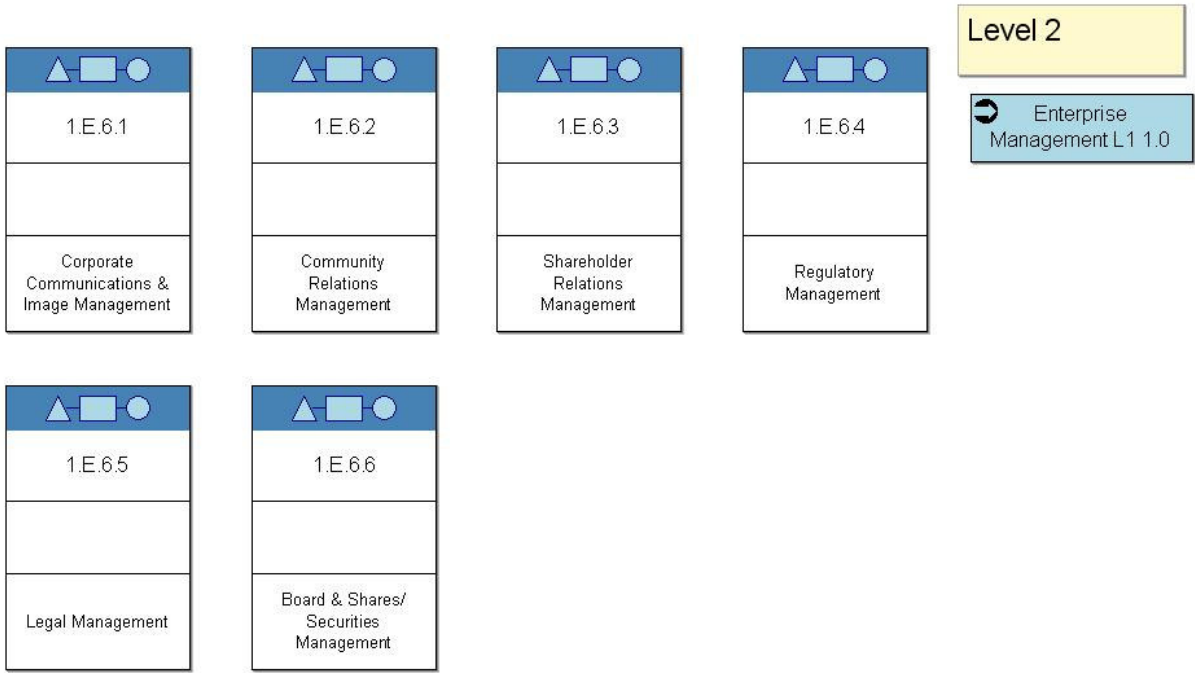


Figure 63: Stakeholder & External Relations Management ADOit representation 1.E.6

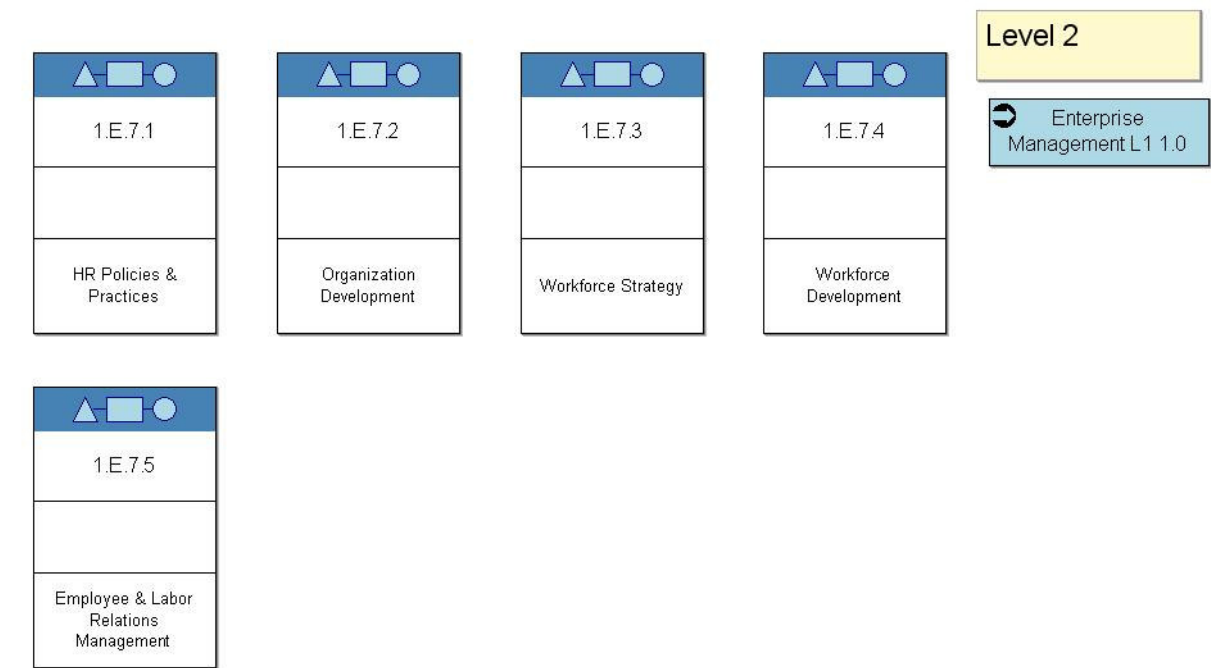


Figure 64: Human Resources Management ADOit representation 1.E.7

9 Appendix B: SIP Level 3 processes

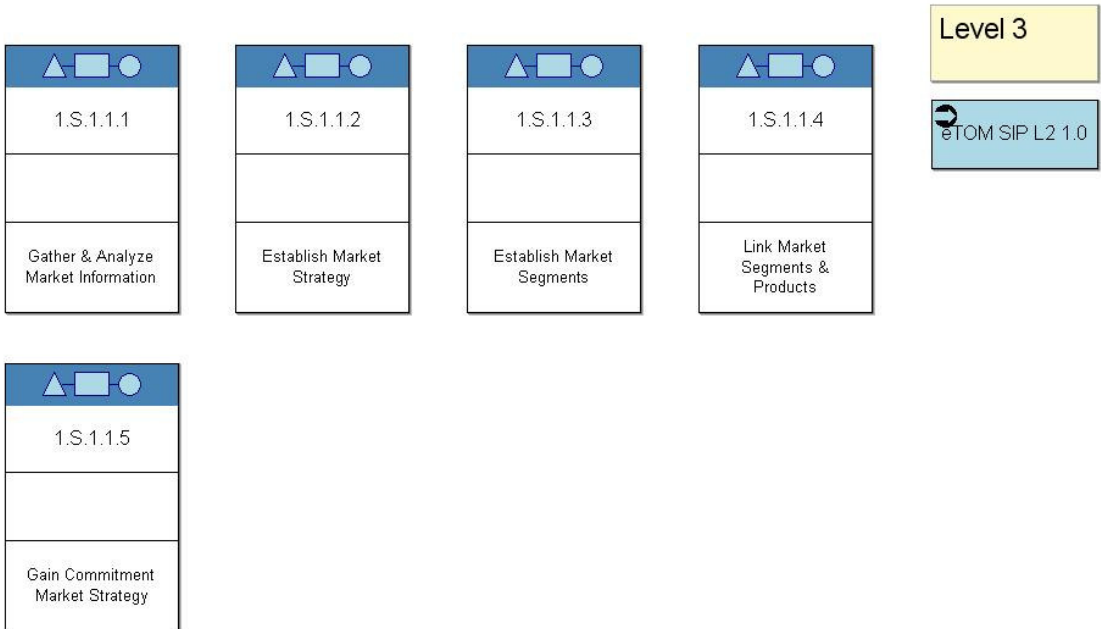


Figure 65: Market & Strategy Policy 1.S.1.1

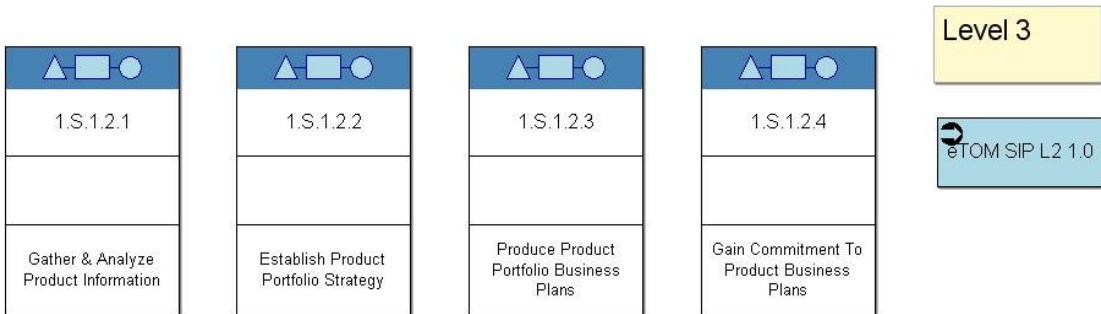


Figure 66: Product & Offer Portfolio Planning 1.S.1.2

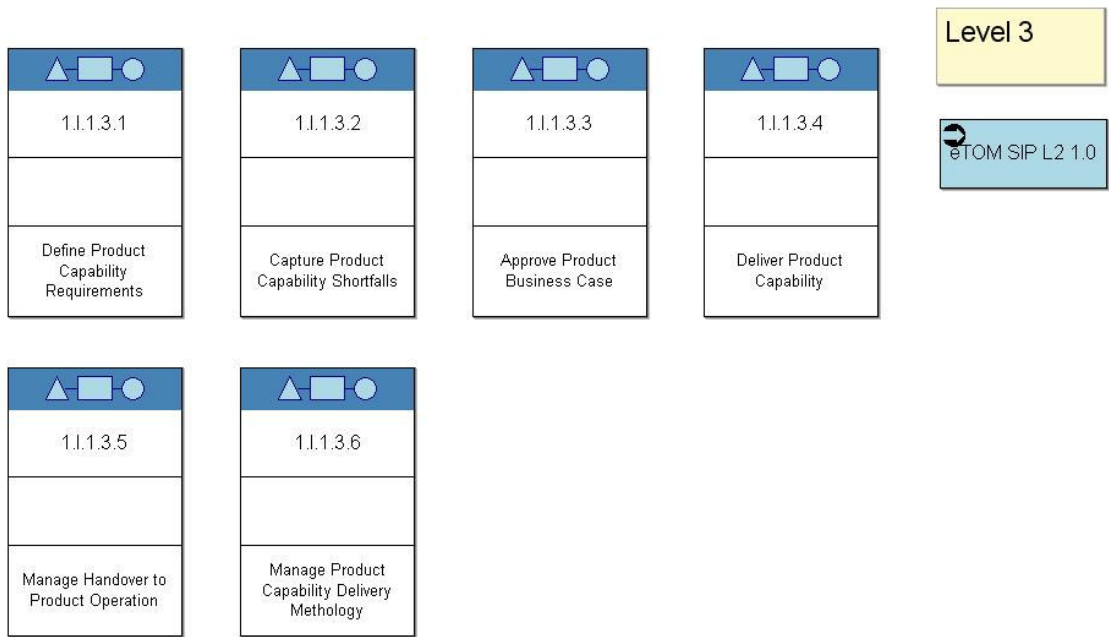


Figure 67: Product & Offer Capability Delivery 1.1.1.3



Figure 68: Marketing Capability Delivery 1.1.1.4



Figure 69: Product & Offer Development & Retirement 1.P.1.5

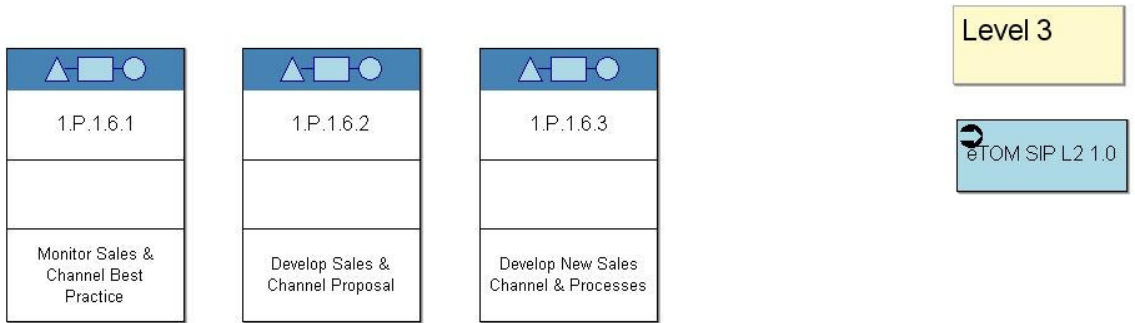


Figure 70: Sales Development 1.P.1.6

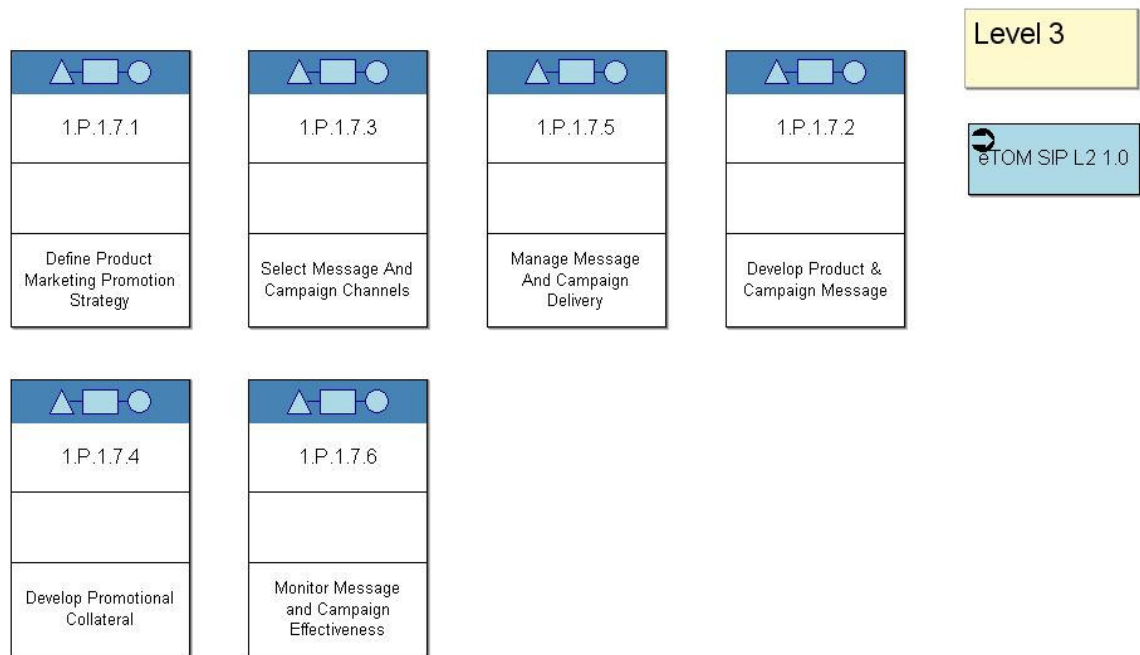


Figure 71: Product Marketing Communications & Promotion 1.P.1.7

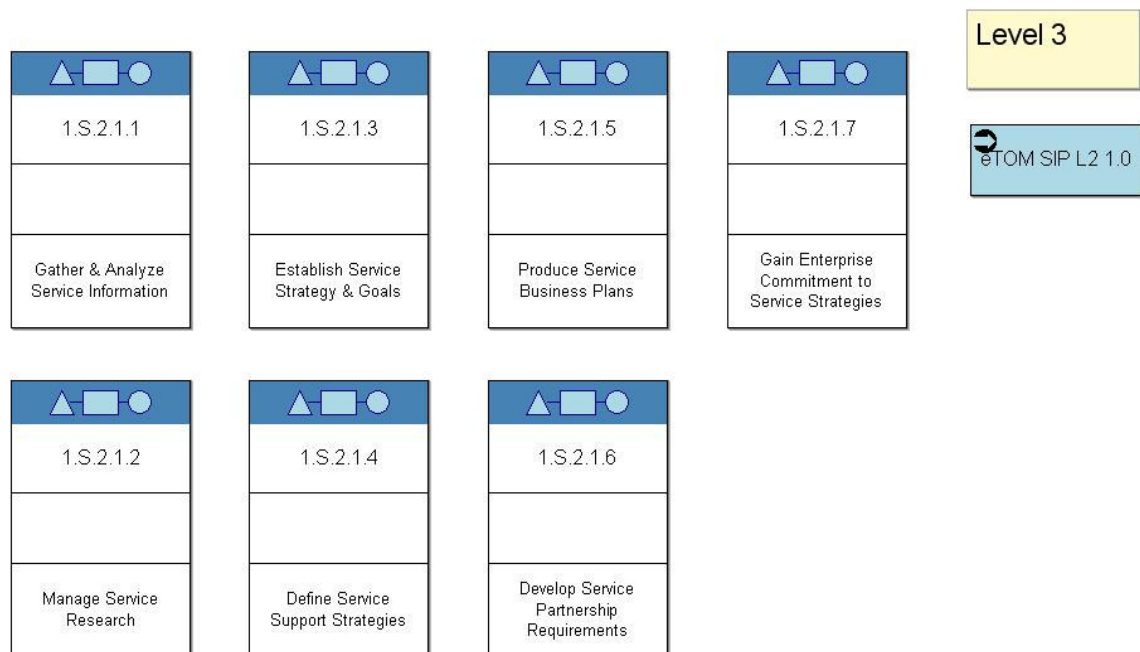


Figure 72: Service Strategy & Planning 1.S.2.1

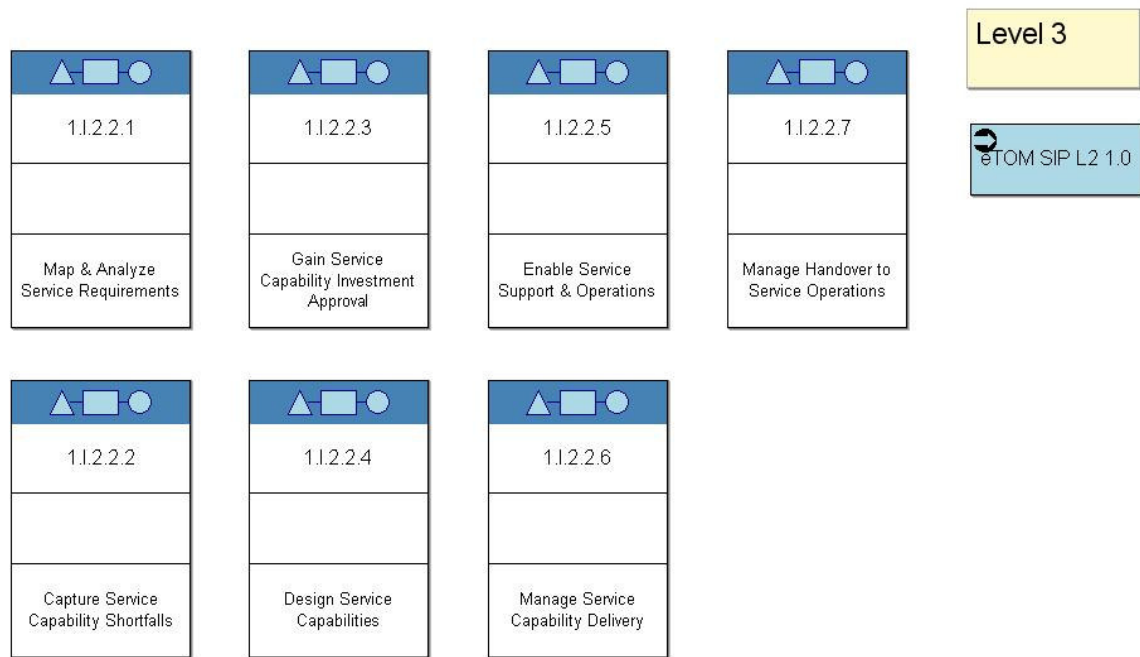


Figure 73: Service Capability Delivery 1.1.2.2

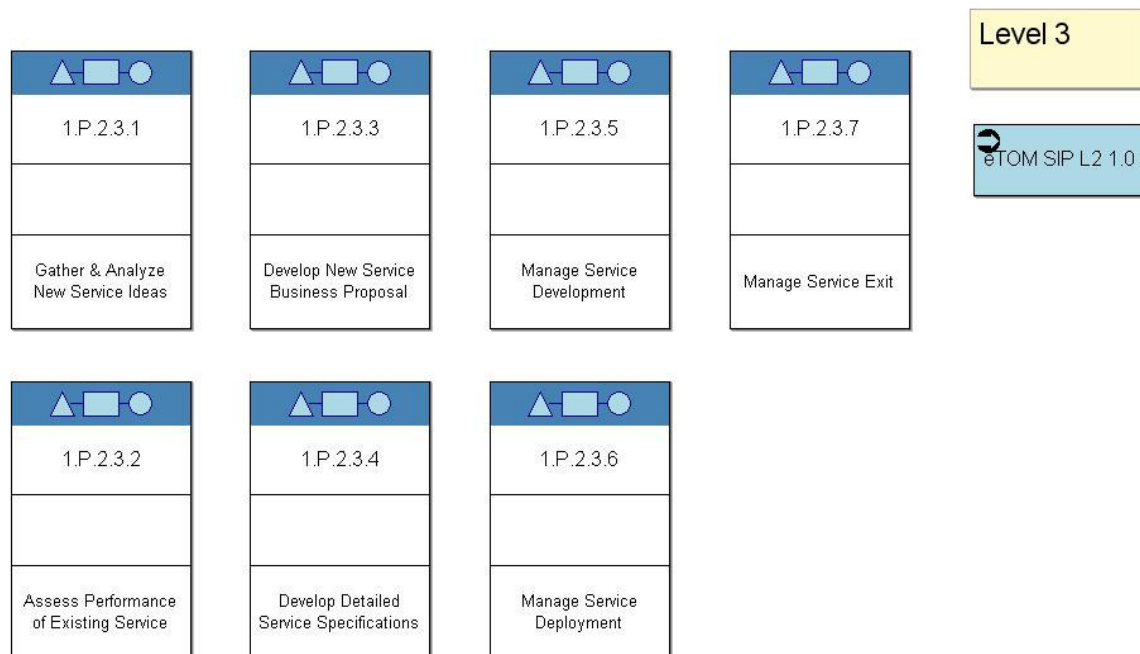


Figure 74: Service Development & Retirement 1.P.2.3

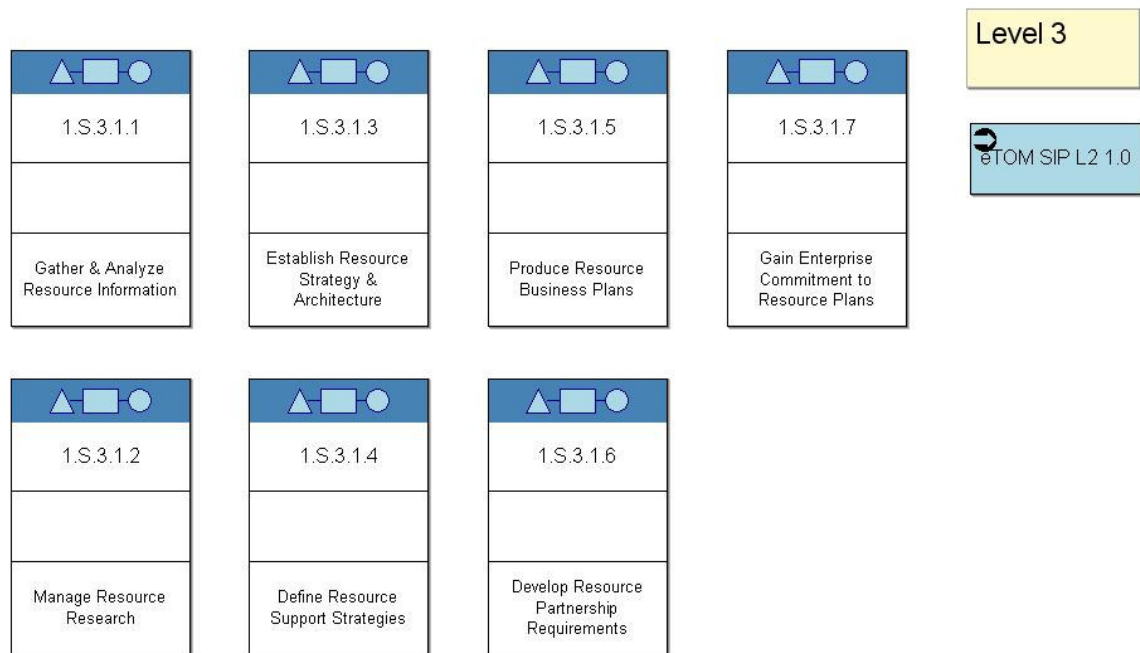


Figure 75: Resource Strategy & Planning 1.S.3.1

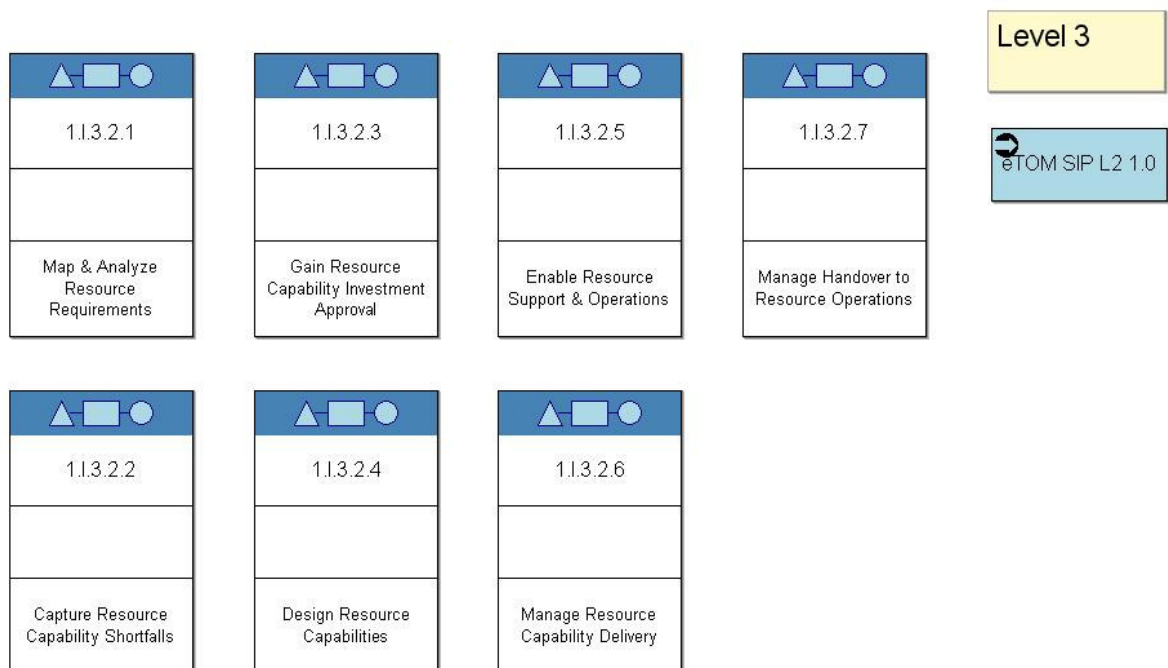


Figure 76: Resource Capability Delivery 1.I.3.2

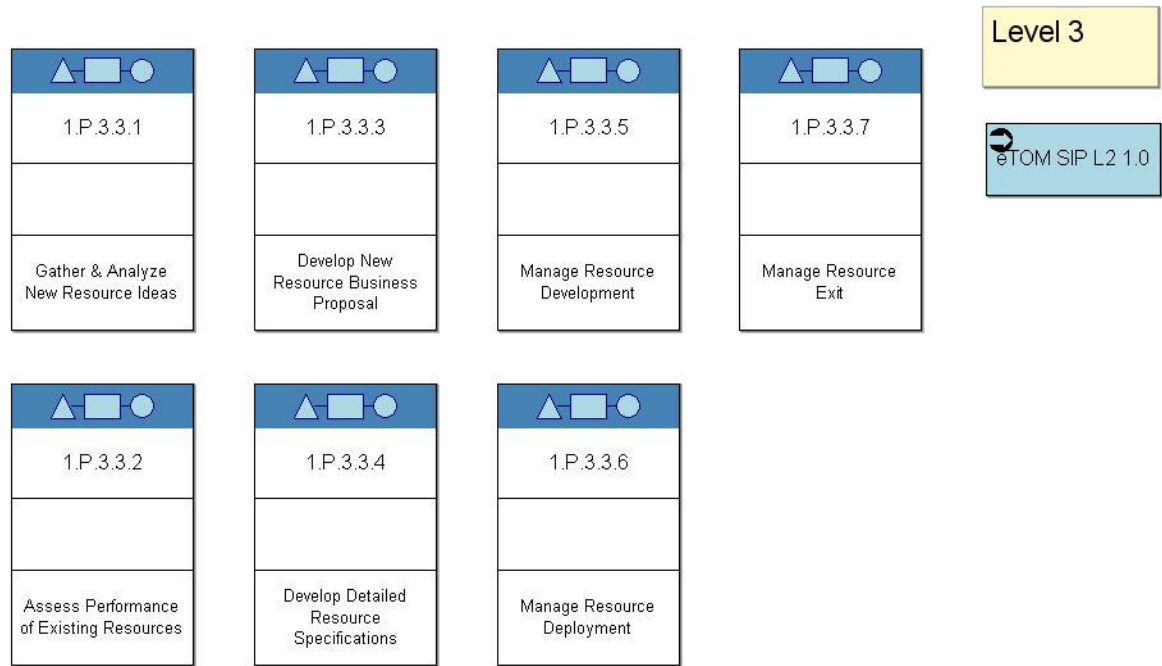


Figure 77: Resource Development & Retirement 1.P.3.3

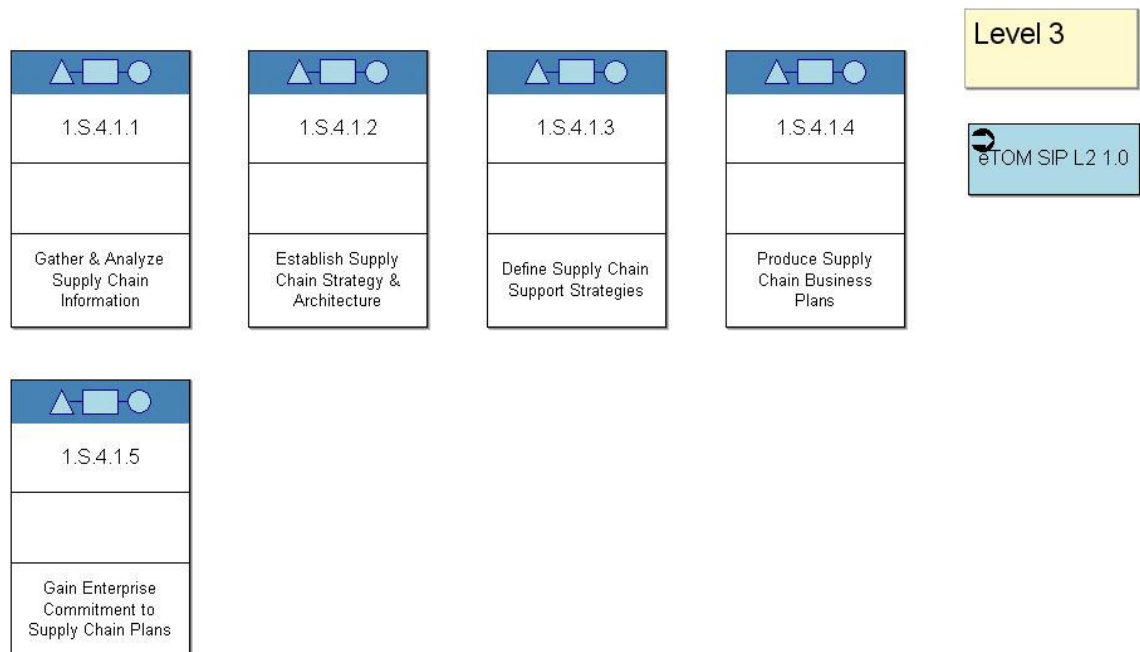


Figure 78: Supply Chain Strategy & Planning 1.S.4.1

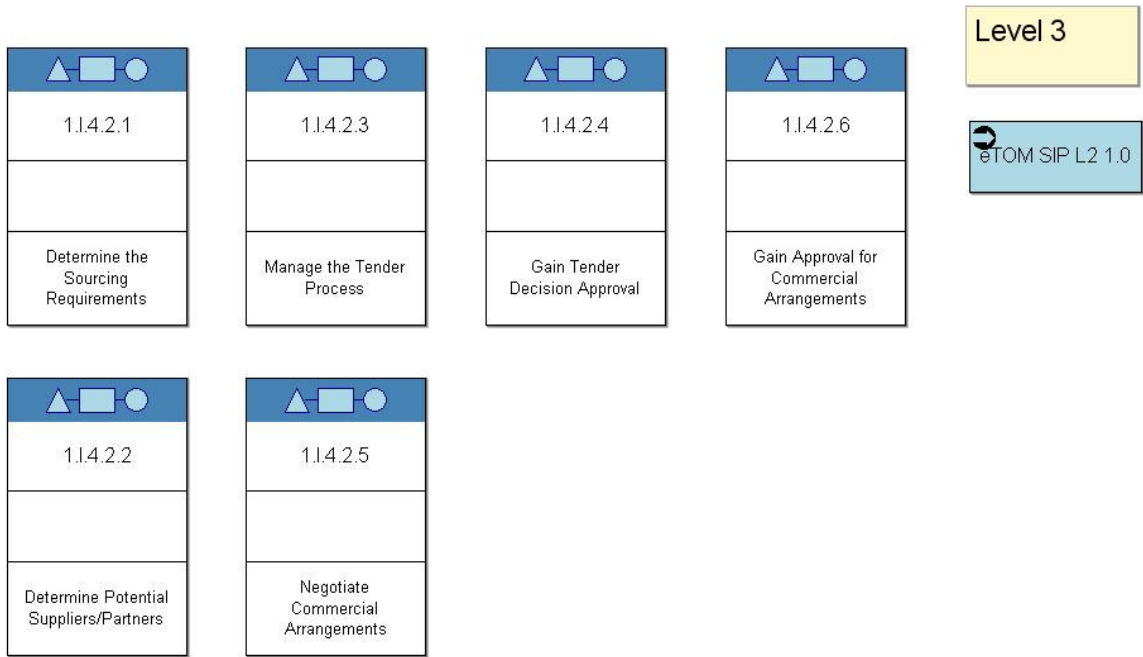


Figure 79: Supply Chain Capability Delivery 1.I.4.2

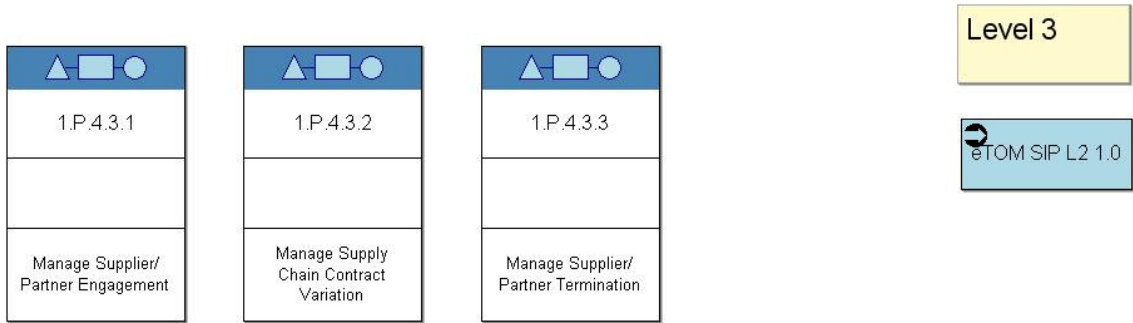


Figure 80: Supply Chain Development & Change Management 1.P.4.3

10Appendix C: Operations Level 3 processes

10.1 Customer Relationship Management

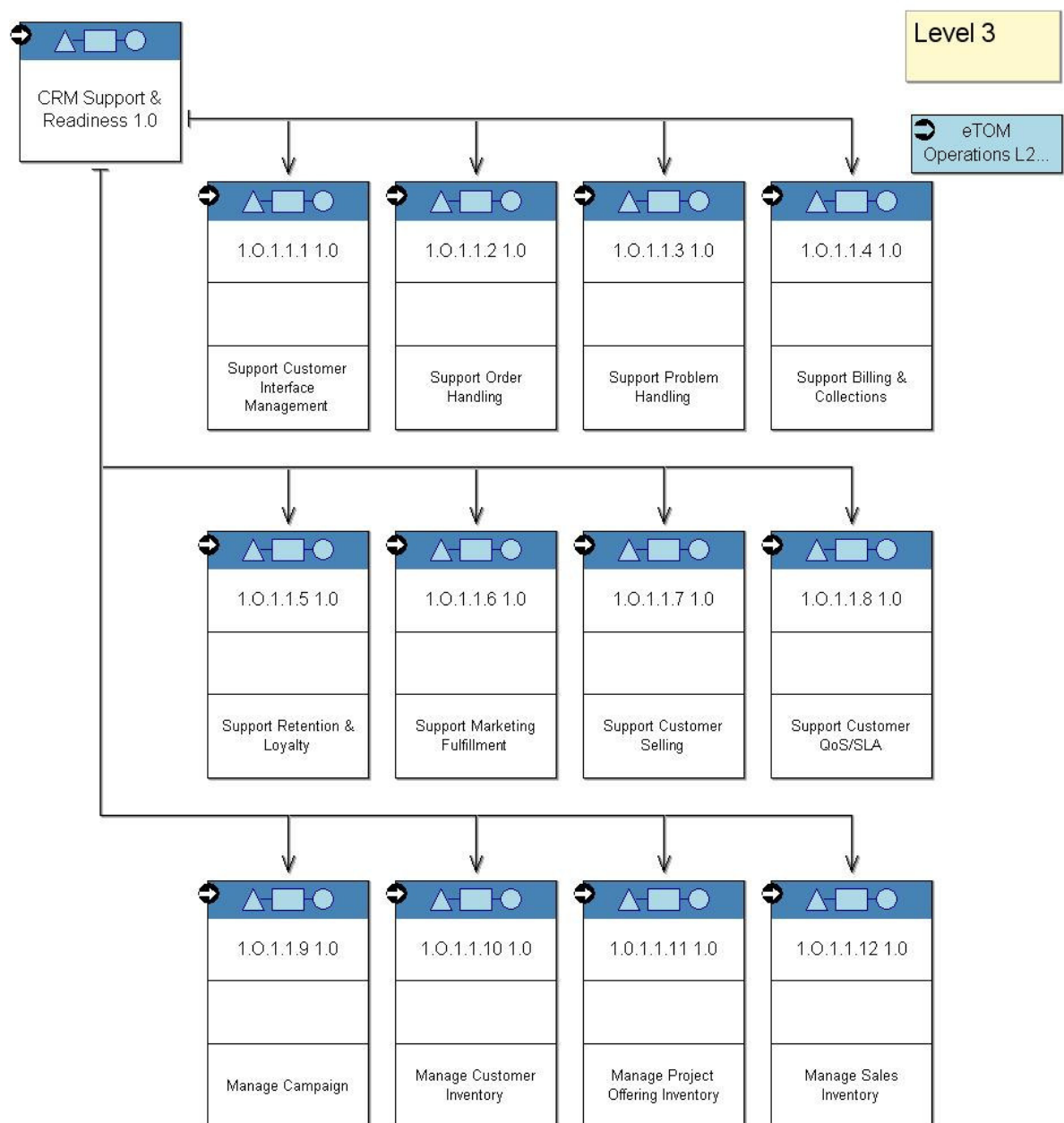


Figure 81: CRM - Support & Readiness 1.O.1.1

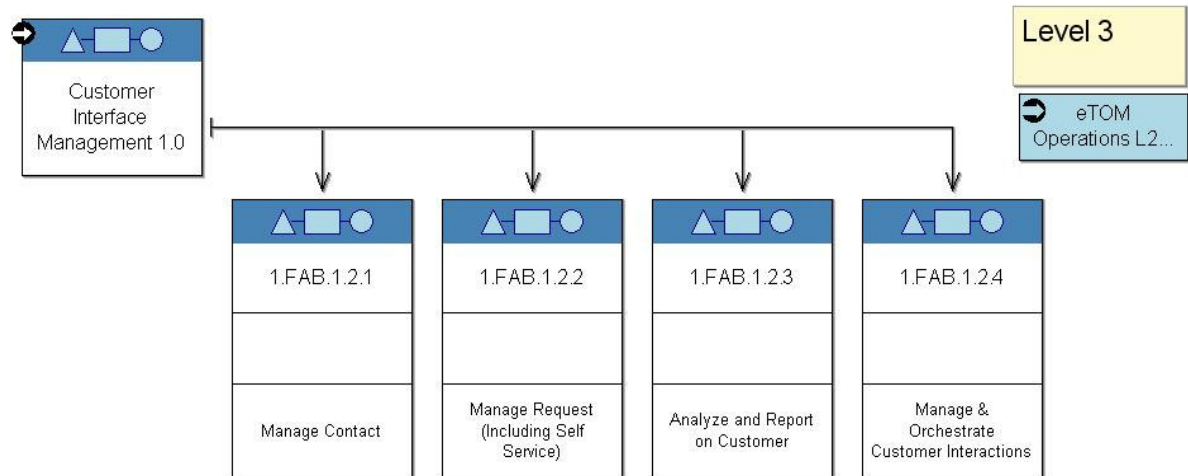


Figure 82: Customer Interface Management 1.FAB.1.2

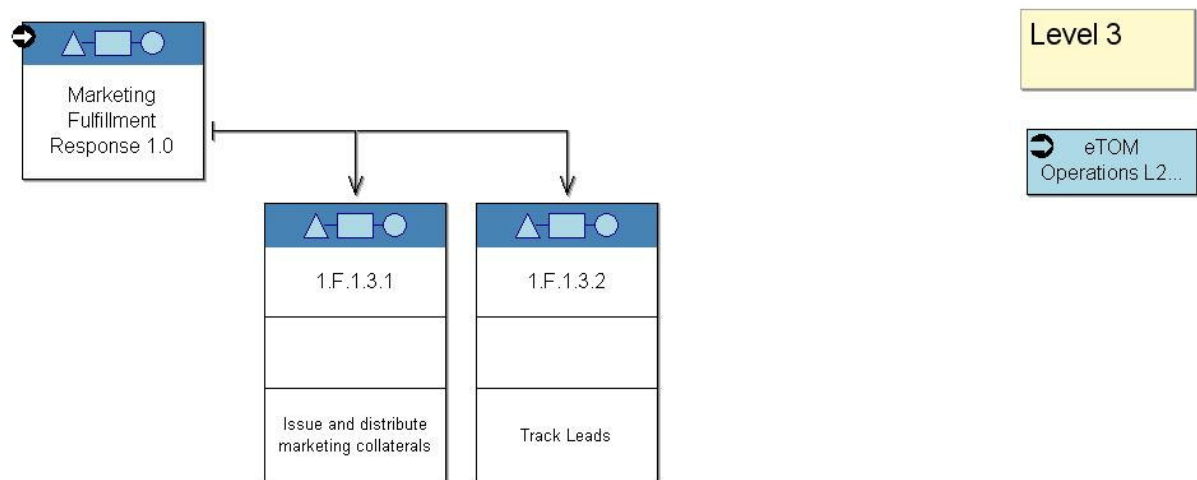


Figure 83: Marketing Fulfillment Response 1.F.1.3

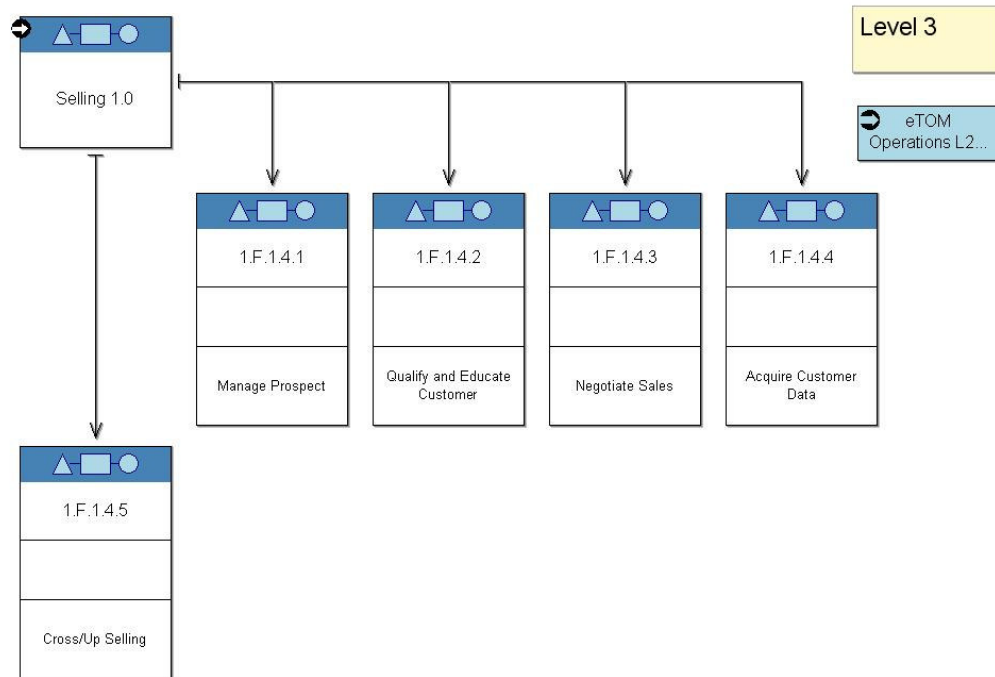


Figure 84: Selling 1.F.1.4

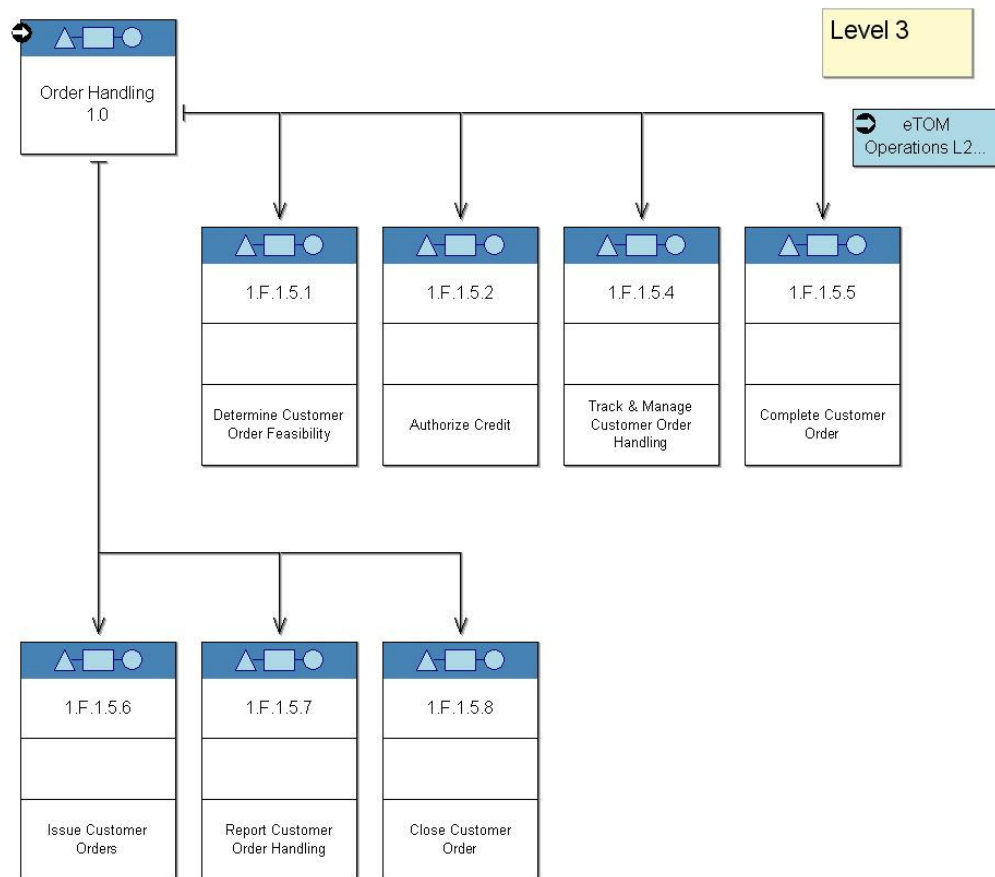


Figure 85: Order Handling 1.F.1.5

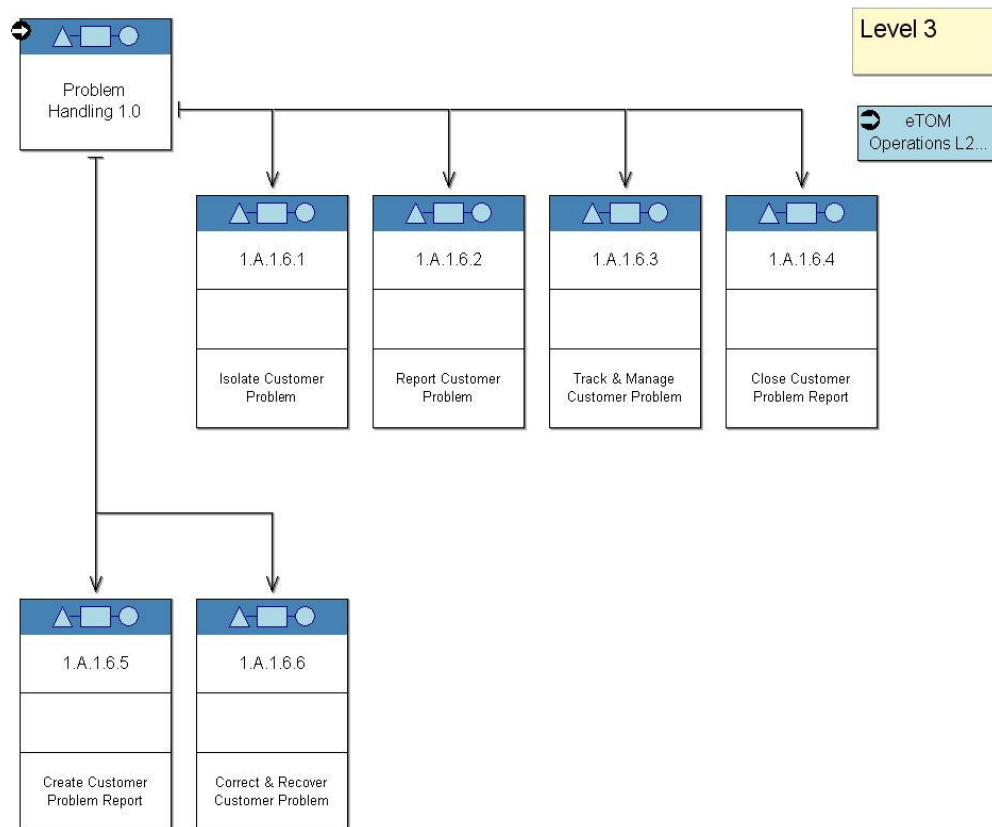


Figure 86: Problem Handling 1.A.1.6

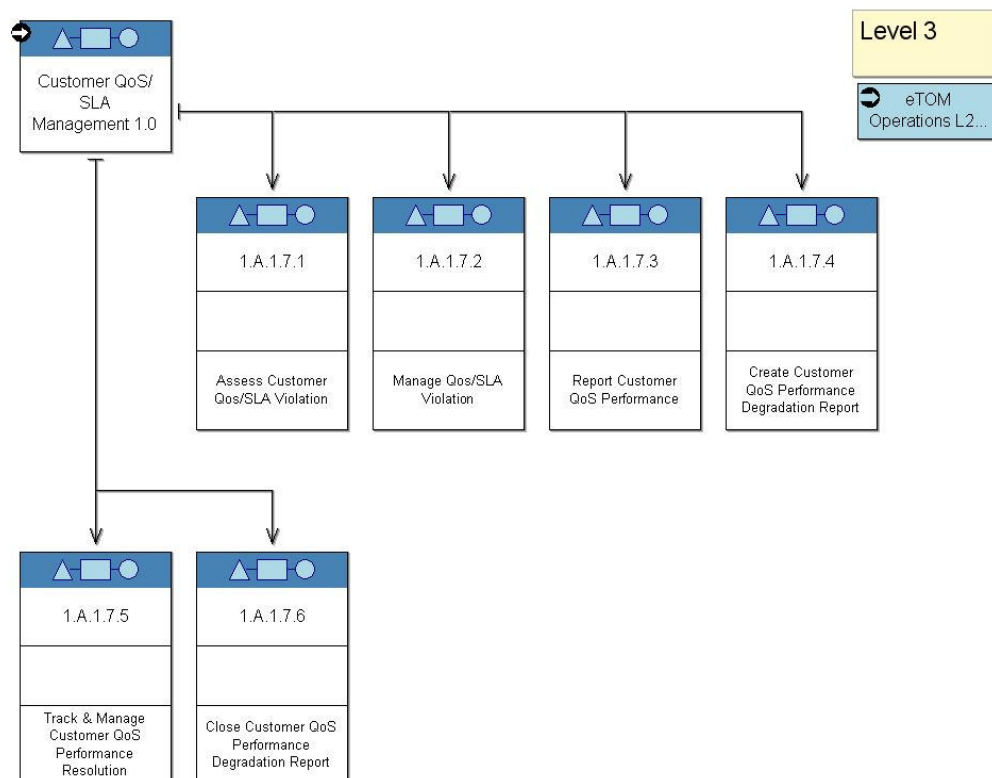


Figure 87: Customer QoS/SLA Management 1.A.1.7

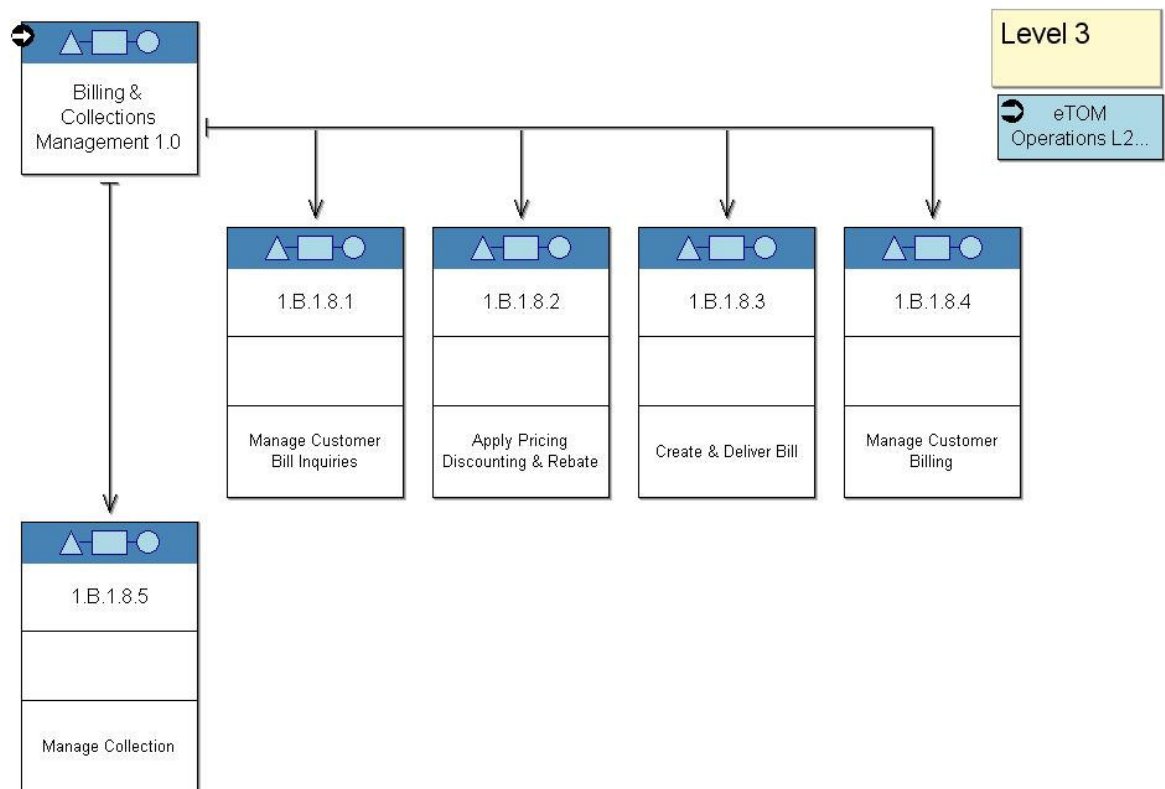


Figure 88: Billing & Collection Management 1.B.1.8

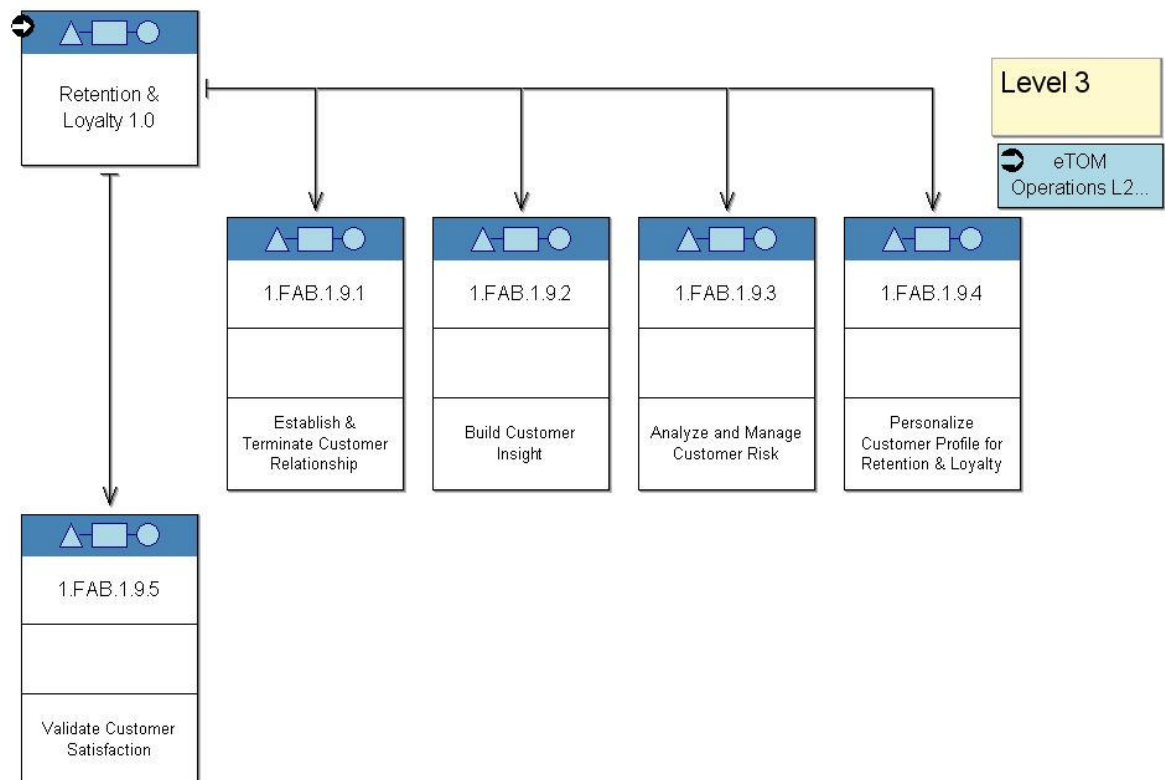


Figure 89: Retention & Loyalty 1.FAB.1.9

10.2 Service Management & Operations

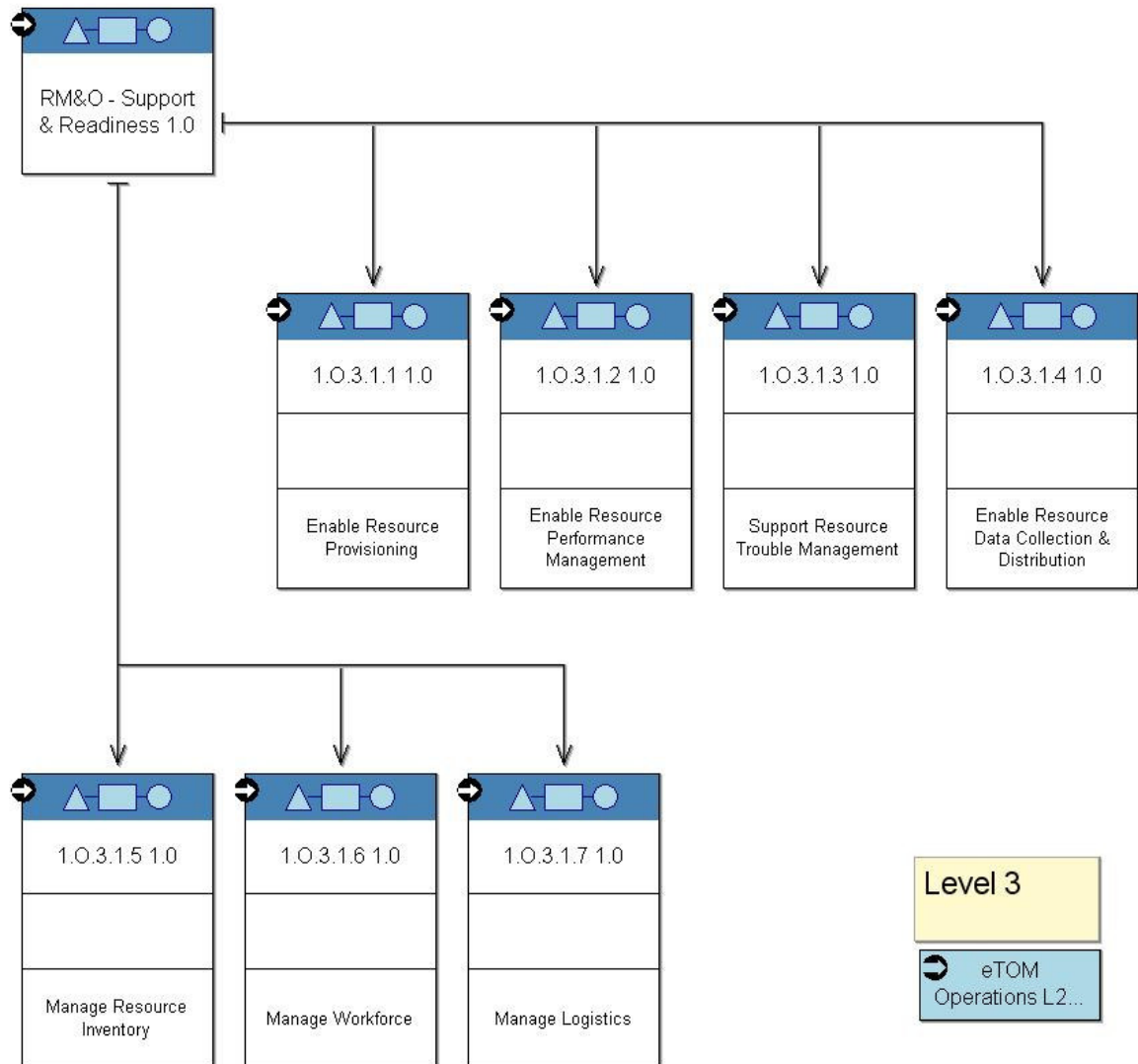


Figure 90: Resource Trouble Management 1.A.3.3

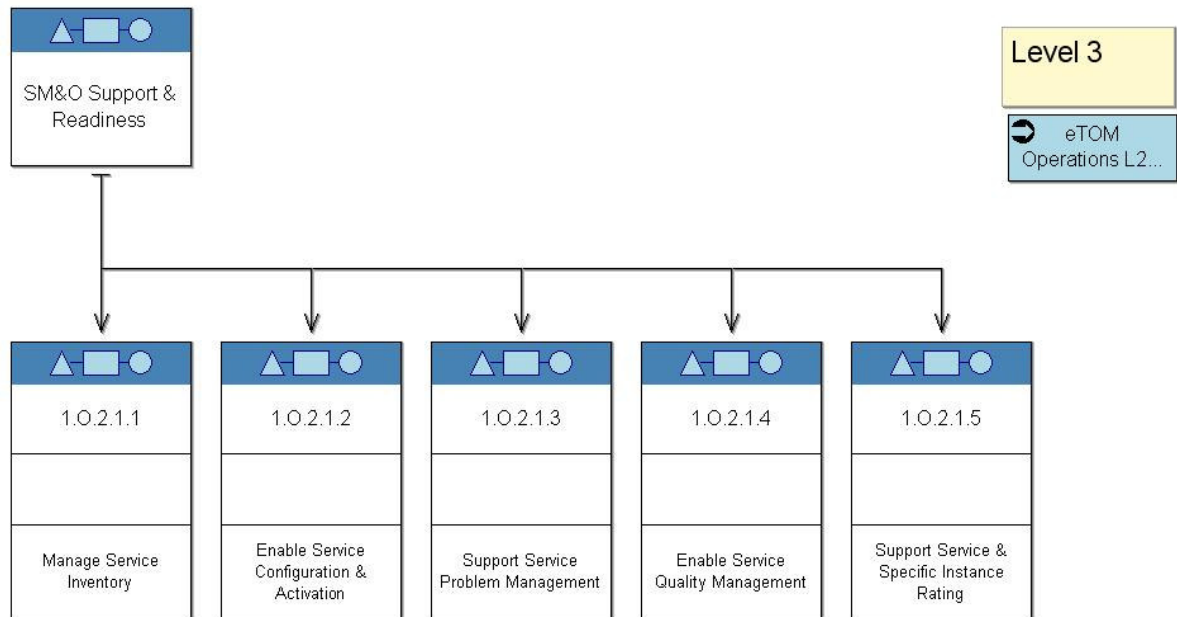


Figure 91: SM&O - Support & Readiness 1.O.2.1

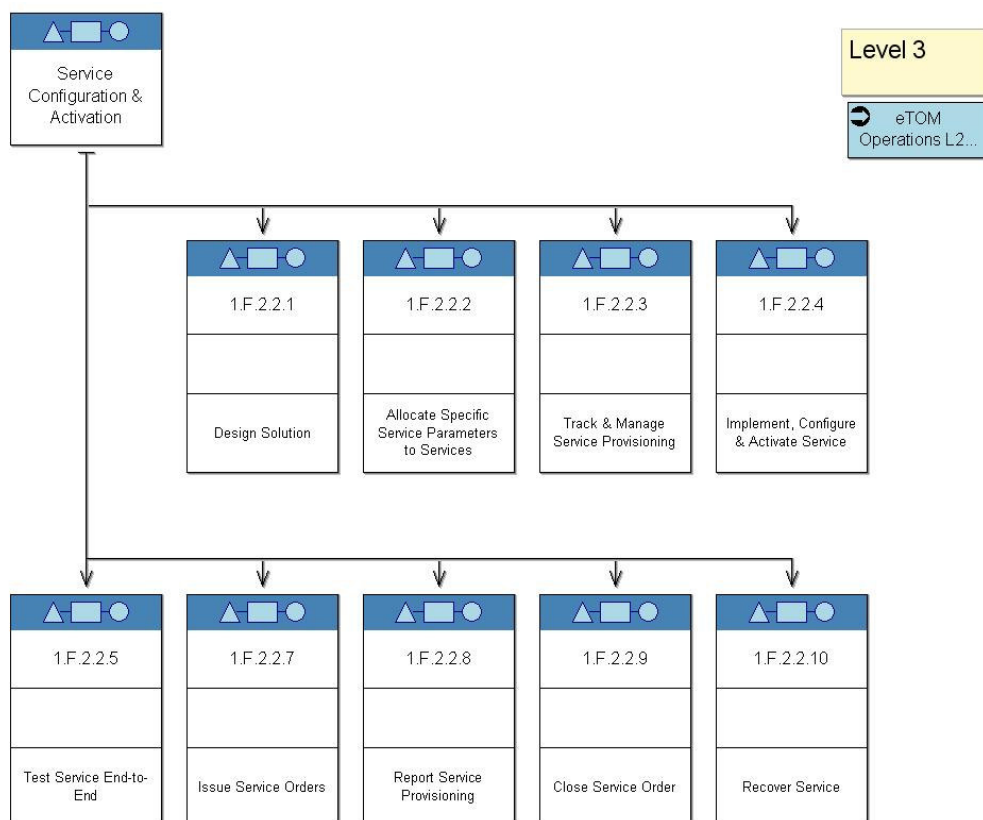


Figure 92: Service Configuration & Activation 1.F.2.2

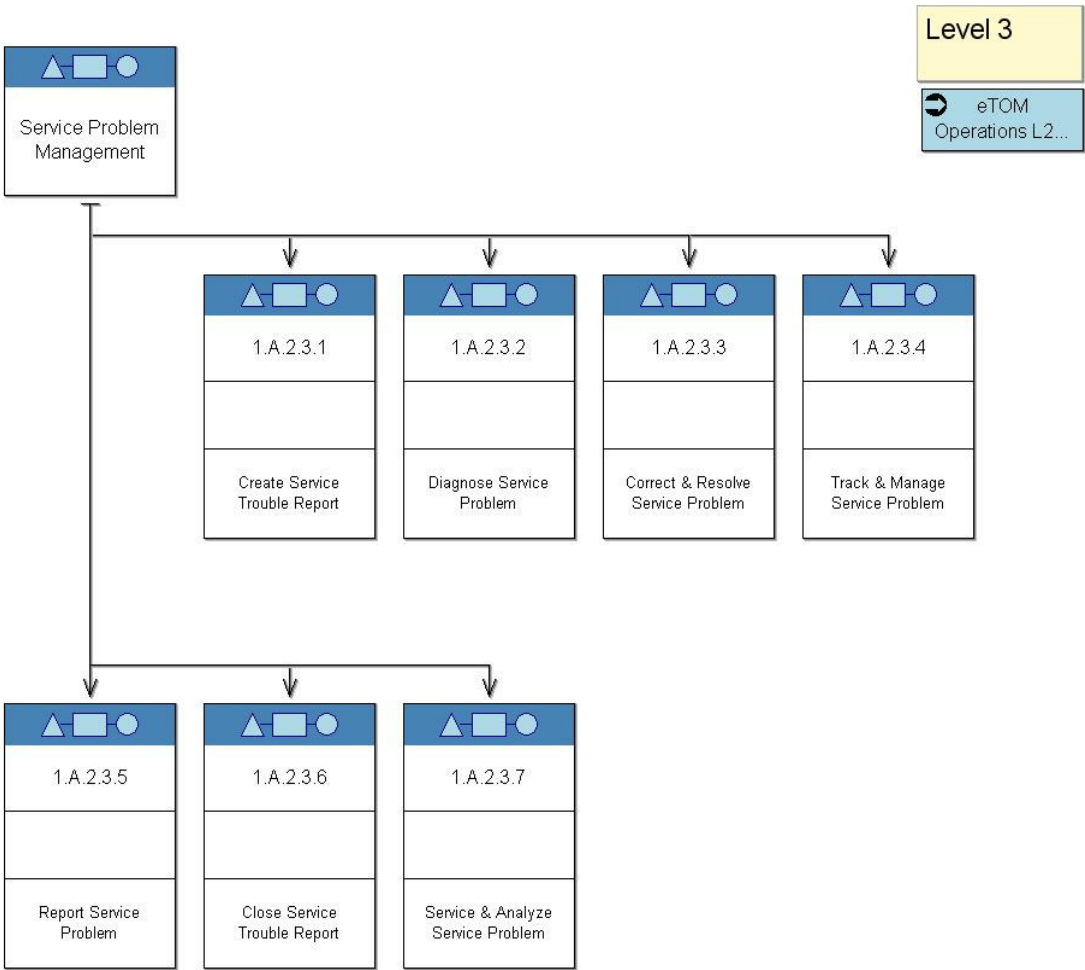


Figure 93: Service Problem Management 1.A.2.3

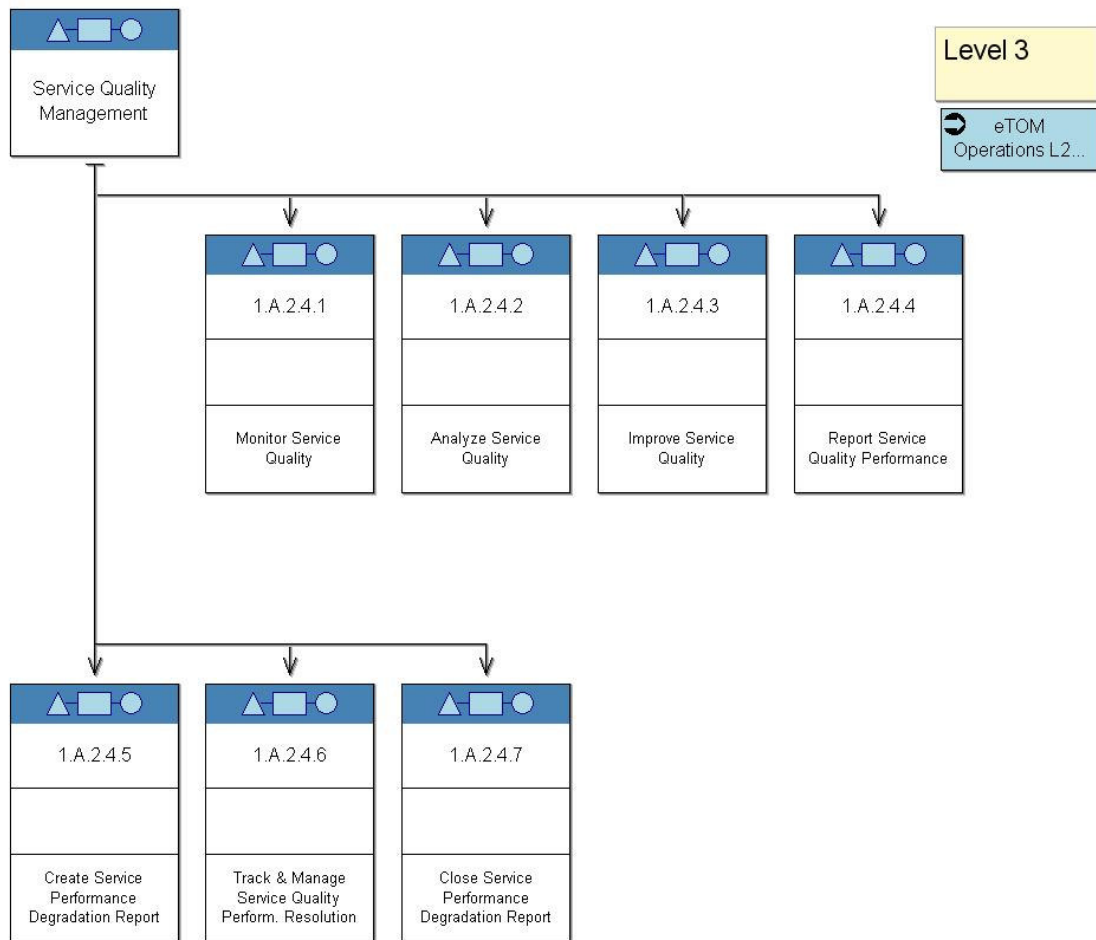


Figure 94: Service Quality Management 1.A.2.4

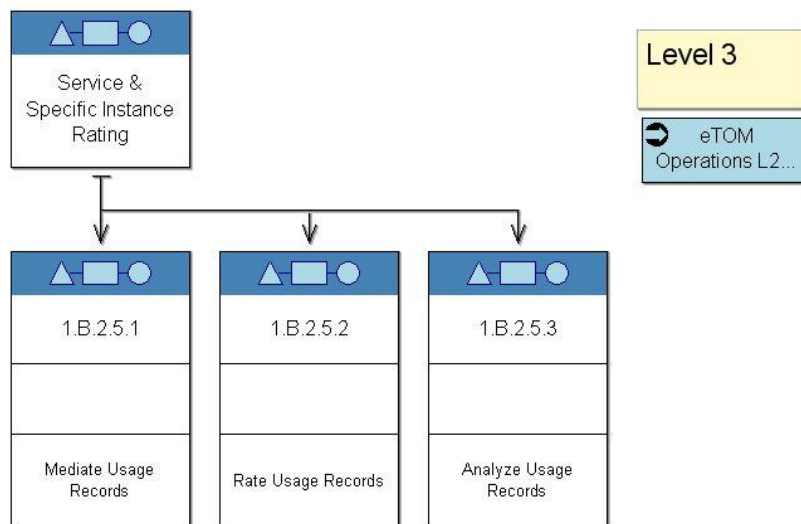


Figure 95: Service & Specific Instance Rating 1.B.2.5

10.3 Resource Management & Operations

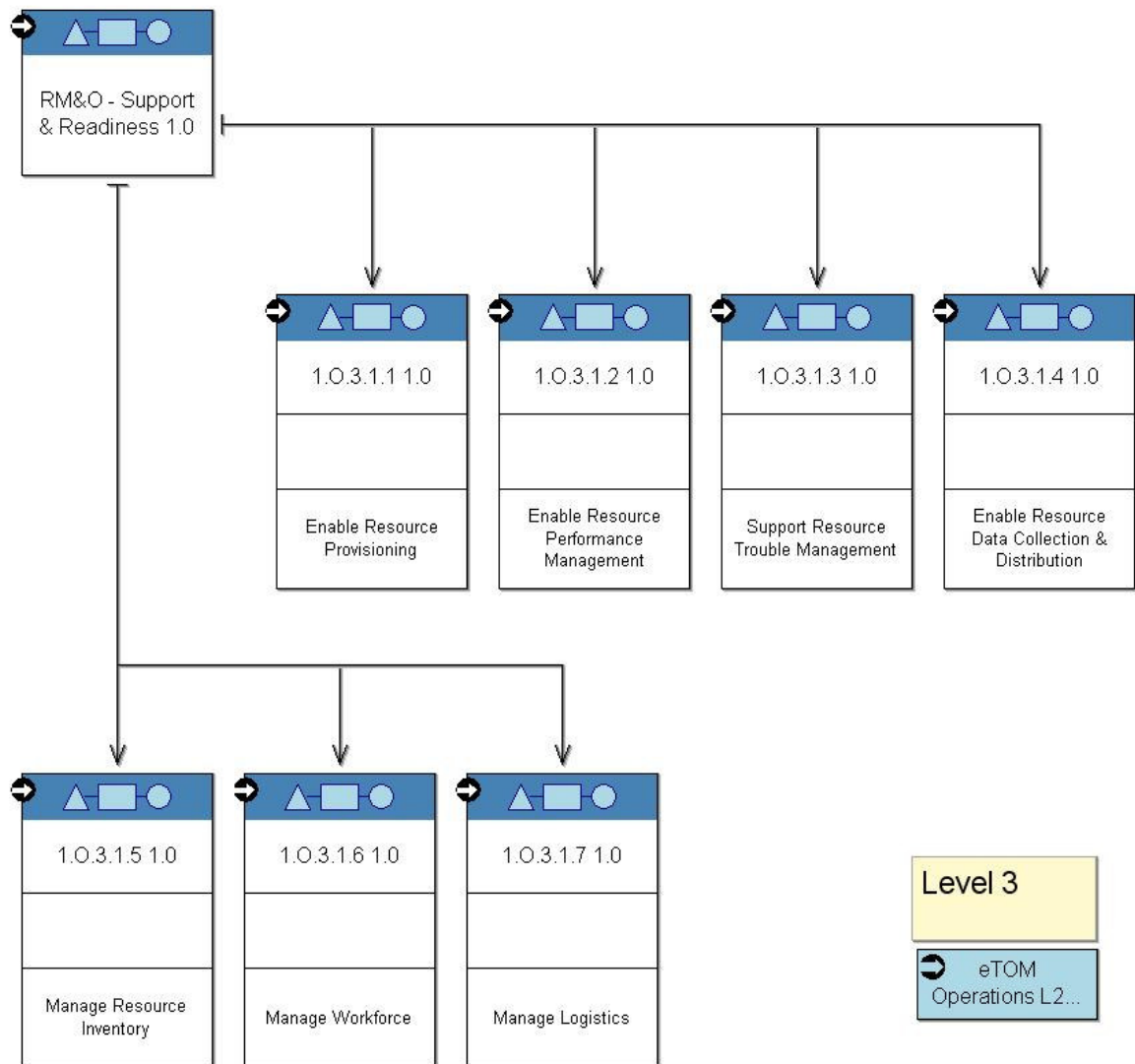


Figure 96: RM&O - Support & Readiness 1.0.3.1

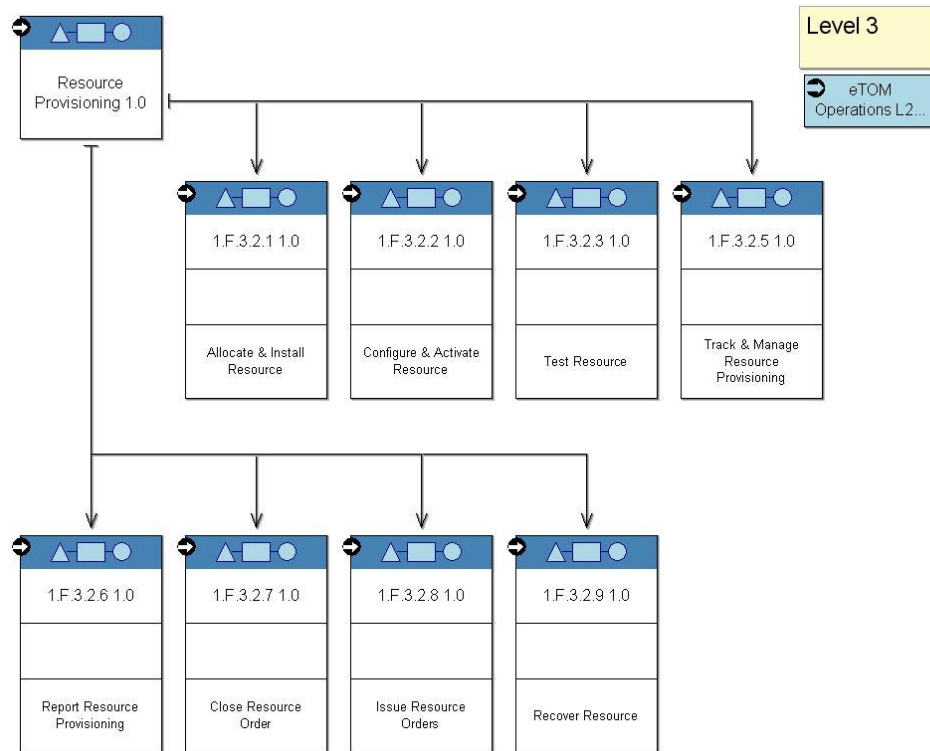


Figure 97: Resource Provisioning 1.F.3.2

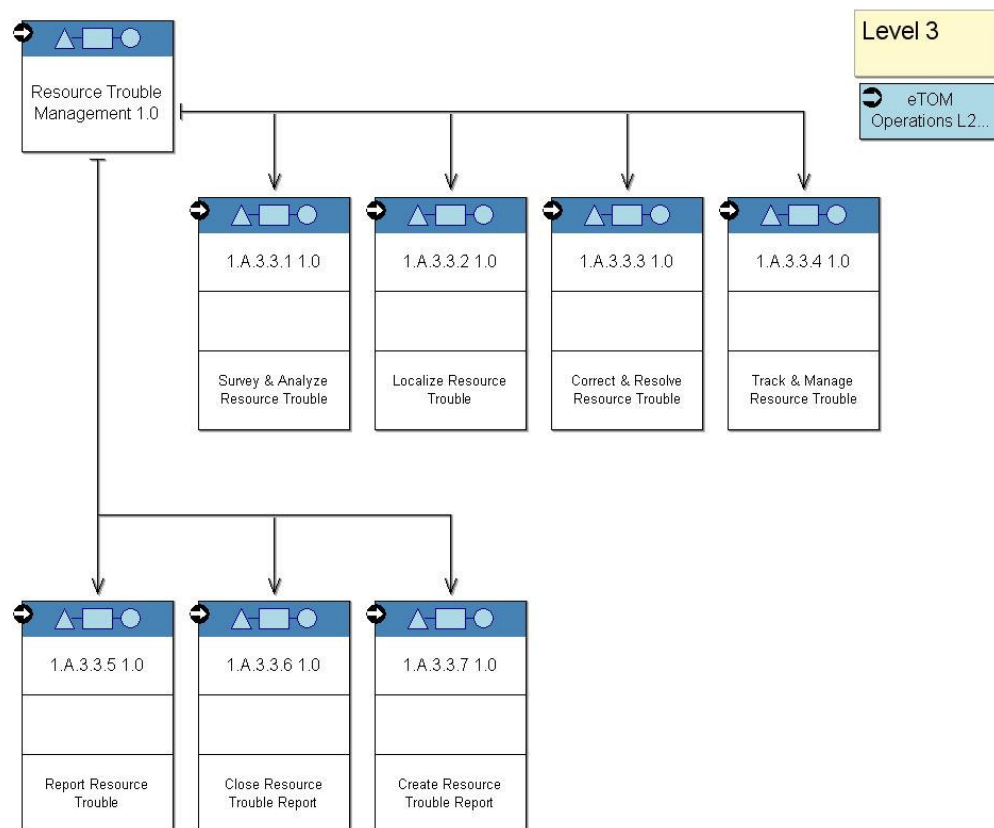


Figure 98: Resource Trouble Management 1.A.3.3

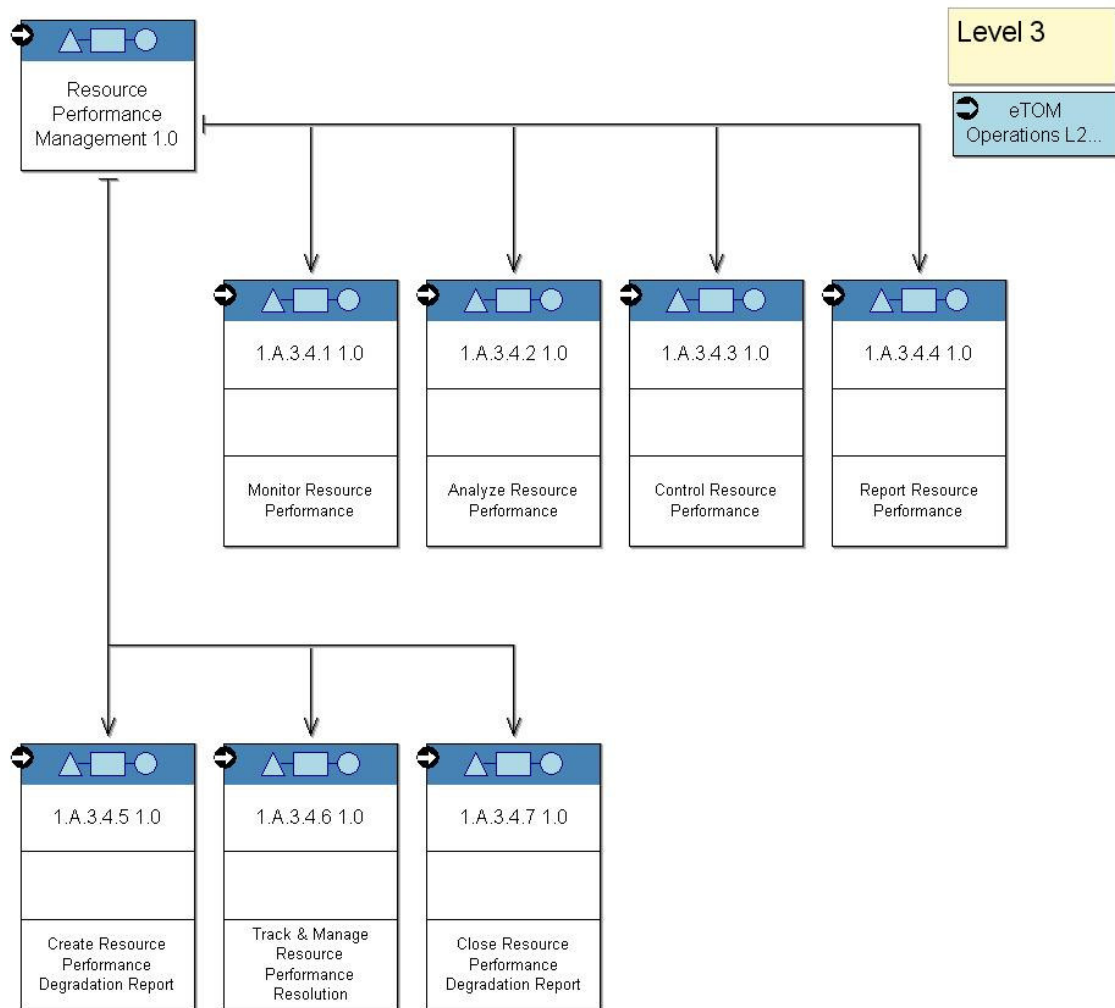


Figure 99: Resource Performance Management 1.A.3.4

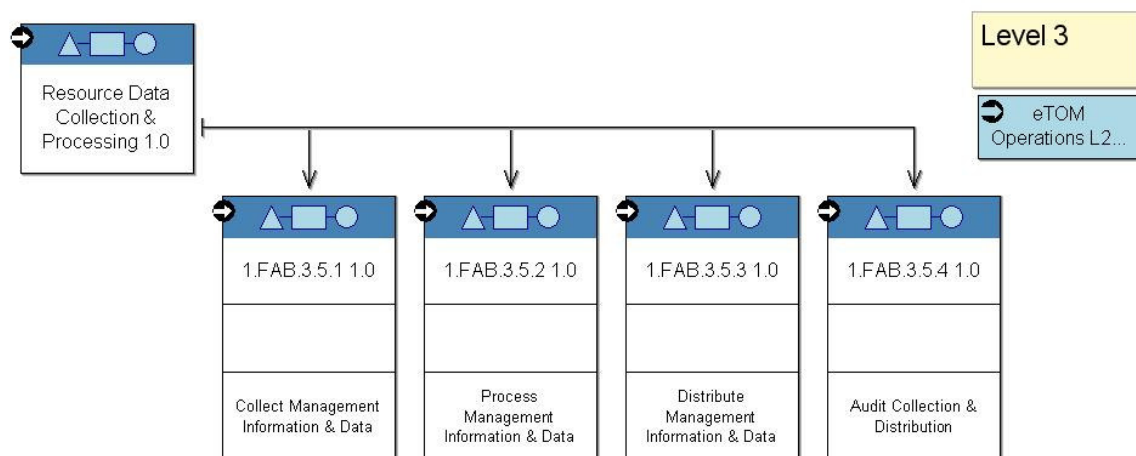


Figure 100: Resource Data Collection & Processing 1.FAB.3.5

10.4 Supplier/Partner Relationship Management

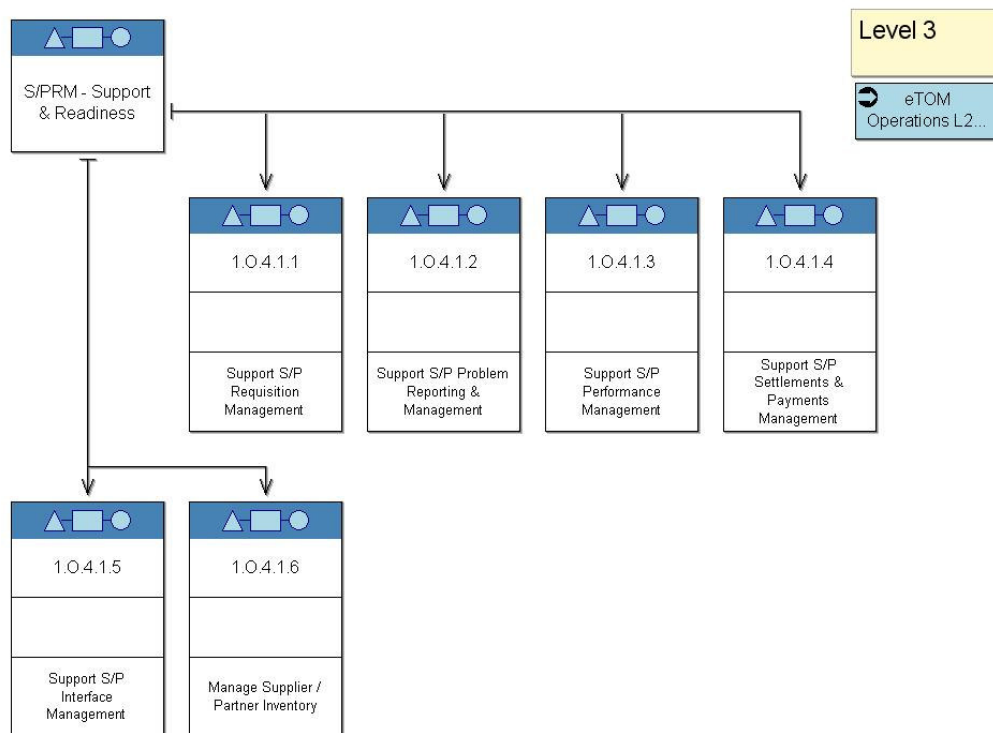


Figure 101: S/PRM - Support & Readiness 1.O.4.1

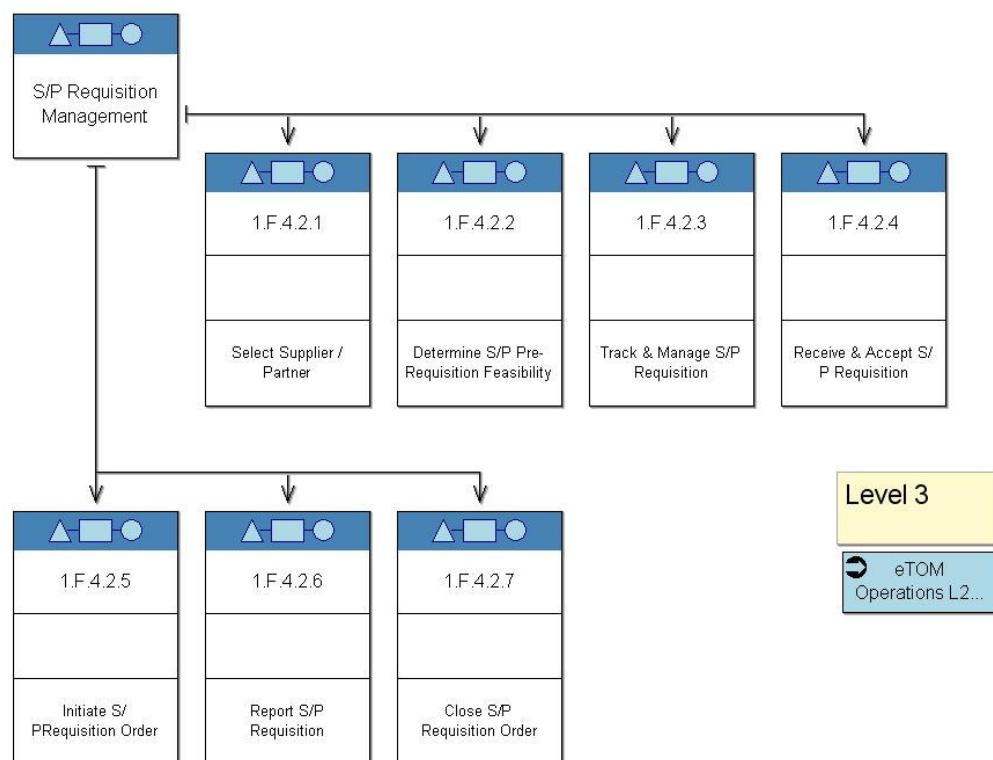


Figure 102: S/P Requisition Management 1.F.4.2

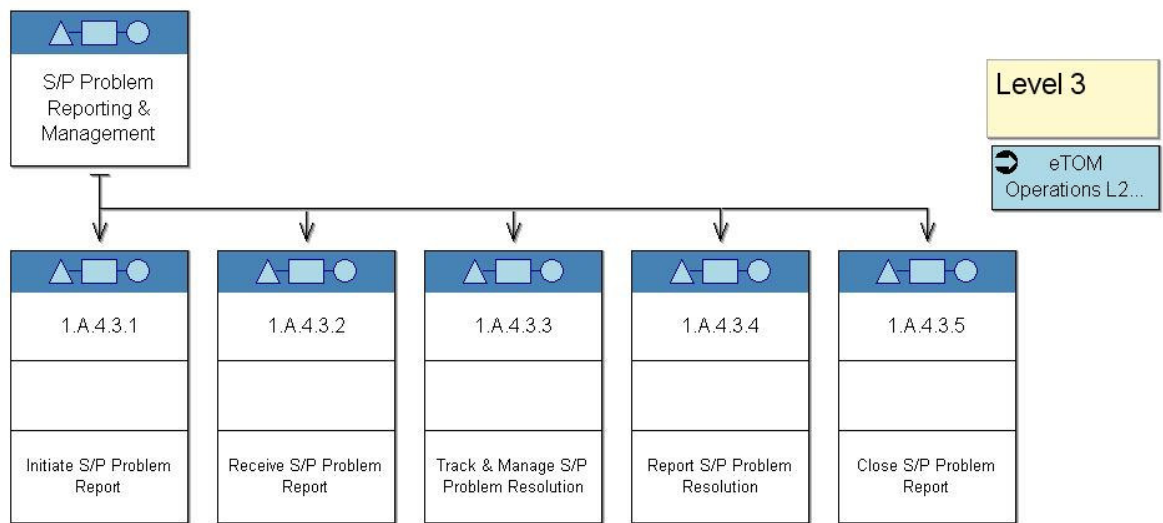


Figure 103: S/P Problem Reporting & Management 1.A.4.3

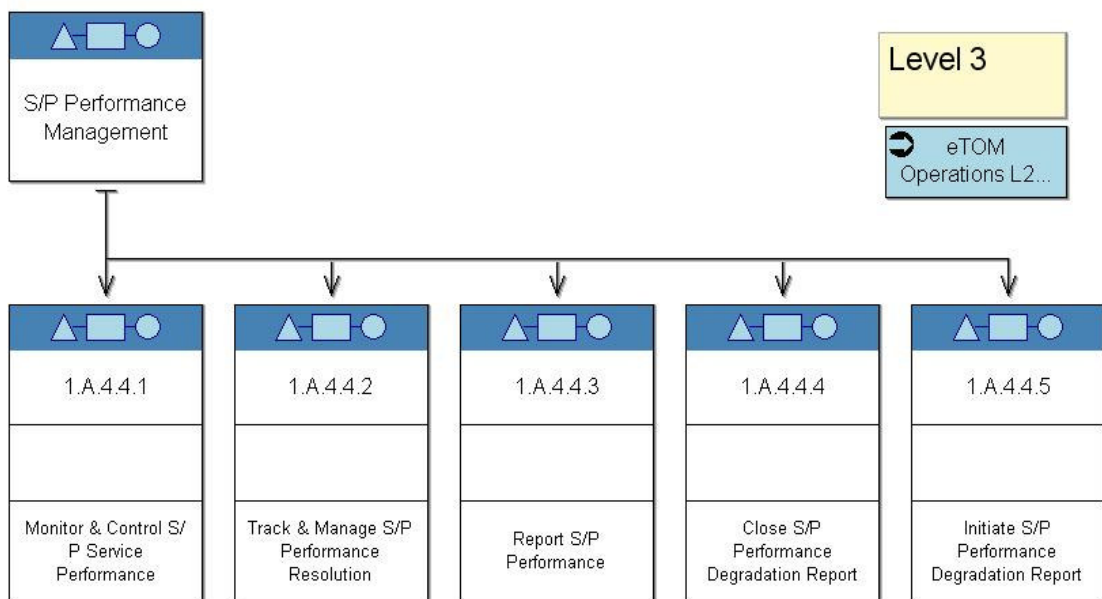


Figure 104: S/P Performance Management 1.A.4.4

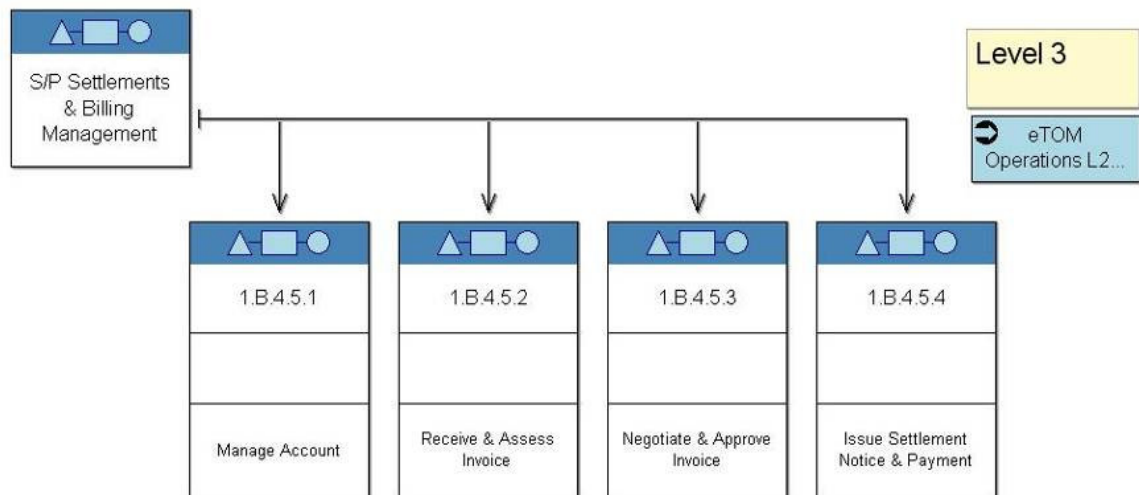


Figure 105: S/P Settlements & Billing Management 1.B.4.5

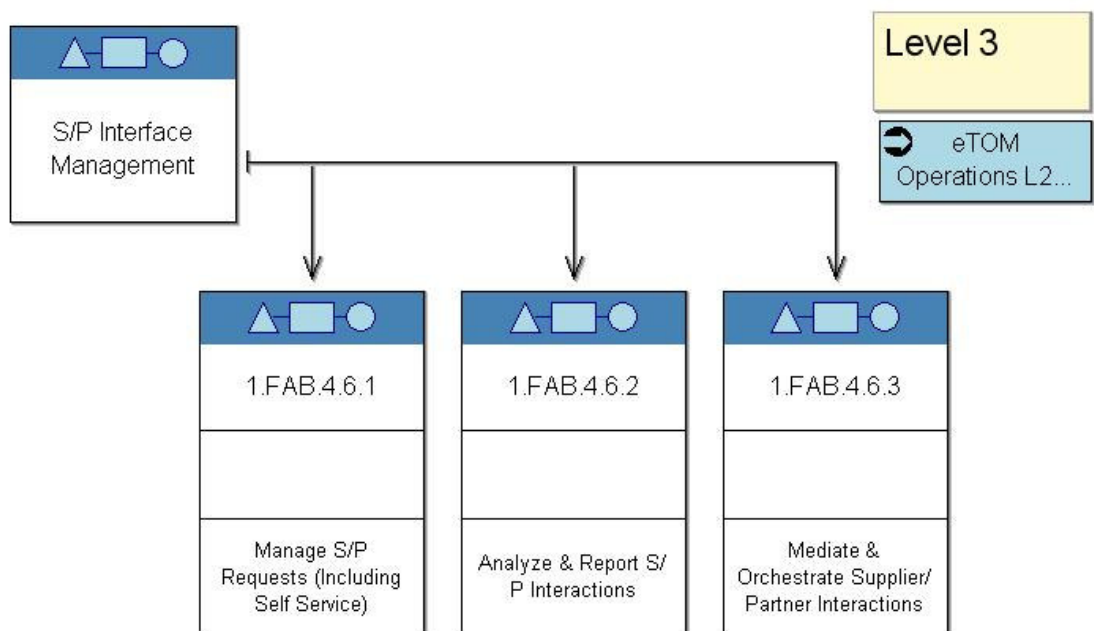


Figure 106: S/P Interface Management 1.FAB.4.6

11Disclaimer

All quotations have been adapted to the current orthography. In cases where this would have altered the meaning the original orthography was retained and flagged by “sig!”.

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12 Abbreviations

ADOit®	integrated IT-service- and architecture management-toolkit © BOC ITC GmbH
BPM	Business Process Management
BPMS	Business Process Management System
BPR	Business Process Reengineering/Redesign
BSS	Business Support System
CCTA	Central Computer and Telecommunications Agency
CEO	Chief Executive Officer
CIO	Chief Information Officer
CRM	Customer Relationship Management
EM	Enterprise Management
eTOM	enhanced Telecom Operations Map
GUI	Graphical User Interface
ICT	Information and Communications Technology
ISO	International Organization for Standardization
IT	Information Technology
ITU	International Telecommunication Union
ITU-T	ITU Telecommunication Standardization Sector
ITIL	IT Infrastructure Library
ITSM	IT Service Management
KPI	Key Performance Indicator
KT	Korea Telecom
KQI	Key Quality Indicator
NGOSS	New Generation Operations Systems and Software
OGC	(British government) Office of Government Commerce
OSI	Open Systems Interconnection Reference Model
OSS	Operation Support System
RM&O	Resource Management & Operation
SID	Shared Information and Data Model
SIP	Strategy, Infrastructure & Product
SM&O	Service Management & Operation

SP	(Telco) Service Provider
S/PRM	Supplier/Partner Relationship Management
SOA	Service Oriented Architecture
TAM	Telekom Applications Map
Telco	Telecommunications (company)
TMF	TeleManagement Forum (www.tmforum.org)
TMN	Telecommunication Management Network
TNA	Technology Neutral Architecture
TOM	Telekom Operations Map
UI	User Interface
URL	Uniform Resource Locator
US-GAAP	United States of America Generally Accepted Accounting Principles

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14 Resources

14.1 Documents by the TeleManagement Forum

- [GB921] Enhanced Telecom Operations Map (eTOM). The Business Process Framework. Version 6.1 Morristown, NJ 2005
- [GB921D] Enhanced Telecom Operations Map (eTOM). The Business Process Framework. Addendum to [GB 921]. Process Decompositions and Descriptions. Version 6.1 Morristown, NJ 2005
- [GB921P] Enhanced Telecom Operations Map (eTOM). The Business Process Framework. Addendum to [GB 921]. An eTOM Primer. Version 4.6.1 Morristown, NJ 2004
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- [M.3050] Telecommunications management network M.3050 Supplement 3 eTOM to M.3400 mapping. Geneva, 2004

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- [Ok06] Ok, K.: NGOSS Real world use case (KT). Korea Telekom, Daejeon 2006
- [Plam05] Plamberger, A.: IT Service Management nach ITIL. ACT Management Consulting, Wien 2005
- [Port85] Porter, M.E.: Competitive advantage. Free Press, New York 1985
- [Sche98] Scheer A.W.: Wirtschaftsinformatik. Referenzmodelle für industrielle Geschäftsprozesse. Springer, Berlin, Heidelberg 1998

14.4 Online resources

As far as general topics were concerned I also resorted to Internet resources. I believe that a frugal and considerate use of Internet resources can improve any scientific document and, going on step further, abandonment of online resources entails a restriction to printed documents. Books and research papers sometimes are out of date, and represent the understanding of a few authors.

If Web 2.0 resources like *Wikipedia* are considered, the self-regulating mechanisms allow participation of many co-authors. This results in high quality and common understanding of many Web 2.0 articles.

Name	URL	Visited
[Wiki1]	http://en.wikipedia.org/wiki/Regression_testing	24.07.2007
[Wiki2]	http://en.wikipedia.org/wiki/Unit_testing	24.07.2007
[Wiki3]	http://en.wikipedia.org/wiki/Integration_testing	24.07.2007
[Wiki4]	http://en.wikipedia.org/wiki/System_testing	23.07.2007
[Wiki5]	http://en.wikipedia.org/wiki/Acceptance_testing	24.07.2007
[Wiki6]	http://en.wikipedia.org/wiki/Software_testing	23.07.2007
[OGC1]	http://www.ogc.gov.uk/documentation_and_templates_testing_strategy___test_plan.asp	23.07.2007
[BS7925]	http://www.ruleworks.co.uk/testguide/BS7925-2.htm	05.10.2007
[Wiki7]	http://en.wikipedia.org/wiki/Non-functional_tests	17.10.2007
[Wiki8]	http://en.wikipedia.org/wiki/Black_box_testing	18.10.2007

Abstract Diplomarbeit Furlinger Bernhard

14.5 Geschichte und Entwicklung

Das eTOM Framework wurde vom Tele Management Forum entwickelt.

Die Forschung begann in den 1990er Jahren. Vom ursprünglichen Business process Modell, das aus den Erkenntnissen weltweiter Service Provider generiert wurde, entwickelte sich die Telecom Operation Map (TOM).

Obwohl das TOM Framework in der Branche weitgehend akzeptiert wurde, war der Betrachtungshorizont zu eng gewählt und so präsentierte das TM Forum Anfang des neuen Jahrtausends als verbesserte Version die eTOM – die Enhanced Telecom Operations Map.

Mittlerweile gibt das TM Forum circa eine Version pro Jahr. Die aktuelle Version ist Release 7 (27. Februar 2007) und die Entwicklung geht nach wie vor weiter, um aktuellen und zukünftigen eTOM Verwendern ein Maximum an wirtschaftlichem Nutzen zu bieten.

14.6 Beziehung zwischen eTOM und ITIL

ITIL (Information Technology Infrastructure Library) wurde von der Central Computing and Telecommunications Agency (CCTA) - mittlerweile Office of Government Commerce (OGC), einer Behörde der britischen Regierung in den 1980er Jahren ins Leben gerufen. Als Public Domain Standard wurde es schnell der am weitesten verbreitete Standard am Gebiet des IT Service Management weltweit. ITIL enthält standardisierte Abläufe, Prozessdefinitionen und Best Practices für das IT Service Management.

eTOM und ITIL sind kein Widerspruch, sie ergänzen sich. In manchen Bereichen überlappen sich beide. Jeder Benutzer kann selbst entscheiden, welche Prozesse aus welchem Standard er/sie verwenden will.

Meine Diplomarbeit zeigt Unterschiede auf und vergleicht Gemeinsamkeiten in beiden Standards.

14.7 Implementierung in ADOit

Teil dieser Arbeit ist die Umsetzung der gesamten offiziell publizierten eTOM in ADOit der Firma BOC. eTOM ist in Levels nach dem Detaillierungsgrad gegliedert. Der vom Tele Management Forum ausgearbeitete Detaillierungsgrad ist nicht in allen Bereichen gleich und beträgt zwischen 3 und 5 Levels. Anhand von Beispielen unter Verwendung von Six-Sigma und ITIL Elementen geht die vorliegende ADOit Implementierung in manchen Bereichen bis Level 7.

14.8 Beispiel Korea Telekom

Viele Service Provider verwenden mittlerweile eTOM. Die unterschiedlichen Ansätze der Benutzer zeigen die Vielfältigkeit dieses Frameworks. Für diese Arbeit habe ich Korea Telekom ausgewählt, die ihre Erfahrungen bei der Umsetzung und Angleichung ihrer Prozesse über das Tele-Management-Forum publiziert haben. In diesem Beispiel kann man sehr deutlich den Prozess von der Bestandsaufnahme der Prozesse bis hin zu den überarbeiteten, an Standards ausgerichteten Prozessen beobachten.

Wien im April 2008

EU- LEBENS LAUF



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• Wichtigste Tätigkeiten und Zuständigkeiten	Softwareproduktion, Dokumentation, FreigabeprozEDUREN

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