

Process Modeling in the telco industry

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Abstract: Over the last years the telecommunications industry has shifted from technology driven and incumbent operators to business driven service providers. There is a need for mature, consistent and complete business process models that are able to describe the strategic, planning and operational processes areas of an operator. This need is addressed by the NGOSS program of the TM Forum, which as emerged as the de facto industry standard. This article addresses some lessons learned for successful realization of the NGOSS concepts in IT implementation projects.

1 Industry Standards and Modeling Concepts

1.1 Evolution of telecommunication industry process standards

The telecommunications industry has developed industry standards from its early days. As the value propositions have shifted from technology to business service providers, the traditionally technology oriented standards had to be supplemented by business and process oriented models.

This evolution becomes evident when looking at the key important standards that have emerged over the last decade and the focus within these standards.

The first notable standard that was introducing the notion of a business view was the Telecommunications Management Network (TMN). It started in 1985 and is a protocol model defined by ITU-T [ITU-T] for managing open systems in a communications network.. The first TMN recommendation [TMN-1] was published in 1988, it was developed further until 1996 [TMN-2].

The TMN model consists of four layers.

Business Management. It performs functions related to business aspects, analyzes trends and quality issues (e.g., Finance, HR).

Service Management. It performs functions for the handling of services in the network like definition, administration and charging of services (e.g., Order Handling, SLA).

Network Management. It performs functions for distribution of network resources: configuration, control and supervision of the network. (e.g., Planning, Maintenance, Statistics, Error recovery).

Element Management. It contains functions for the handling of individual network elements. This includes alarm management, handling of information, backup, logging, and maintenance of hardware and software.

From a top down approach, each layer imposes requirements on the layer below while from a bottom up approach, each layer provides capabilities to the layer above.

The next step in evolution of telco process models was the Telecommunications Operations Map, called TOM. The main development happened between 1995 and 1998 by the Telemanagement Forum [TMF]. By 1999 TOM was considered to be stable.

TOM was using the TMN model as a foundation and added operations support and management for any communications service.

The key enhancement towards TMN was the introduction of the customer perspective. Instead of only looking at the internal management aspects of networks, the acknowledgement of customer needs was introduced into the modeling context.

The TOM process framework is independent of organization, services and technology. It provides the framework for modeling end to end business processes from a top down, and customer oriented standpoint.

The evolution continued in the year 2000 with the introduction of the enhanced enhanced Telecom Operation Map, called eTOM [eTOM].

The eTOM is a broader framework and more complex than the TOM.

It integrates e-business and internet opportunities while maintaining the top orientation of business processes. The eTOM further strengthens the customer driver approach since e-business has shifted markets from a supply orientation to a demand orientation or push versus pull.

Most importantly might be the introduction of the Strategy, Infrastructure and Planning process domain (SIP). In this domain the required processes for managing product life cycles over the layers from market to technology are defined.

Today eTOM is the most widely used and accepted standard for business processes in the telecommunications industry. The eTOM model describes the full scope of business processes required by a service provider and defines key elements and how they interact.

The eTOM Business Process Framework serves as the blueprint for process direction and the starting point for development and integration of Business and Operations Support System (BSS and OSS respectively) and helps to drive TM Forum members work to develop NGOSS solutions.

NGOSS is an industry-agreed, business/systems solution framework and aims to coordinate the elements involved in developing and delivering OSS solution in an integrated structure [NGOSS].

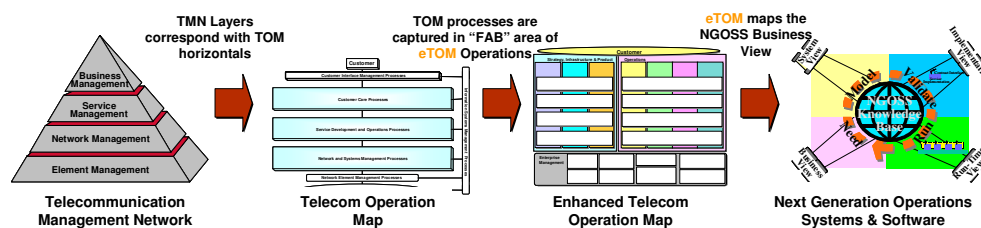


figure 1: evolution of telco business process models

1.2 Evolution of formal modelling languages

As the above mentioned standards provide concepts and frameworks to address the business context and content of the telecommunication service provider industry, they do not prescribe a modeling standard in form of a formal modeling language.

To support the modeling of management, system and process models there is a myriad of various standards available.

Some of the more prominent formal modeling languages and concepts are for instance

- PetriNet (Carl Adam Petri, 1962)

- ERD (Peter Chen, 1976)
- Value Chain (Michael Porter, 1985)
- EPK (August Wilhelm Scheer, 1992)
- Booch (Grady Booch, 1993)
- UML 0.8 until UML 2.0 (OMG, 1995 – 2005)
- BPMN 1.0 – 2.0 (OMG, 2001 – 2008)

The main focus of the modeling standards varies. Some address the need for definition of organizational processes, some address information models, others are geared for the specification of technical systems.

One communality is the formal definition of syntax and grammar. The development of formal modeling languages has been influenced by the needs of business process reengineering and modeling.

In the earlier days the main focus of a modeling language was to describe the formal execution of workflows, object states, involved departments as well as the required control processes. Organizational analysis by the creation of process maps and process descriptions is an essential element for enabling process driven organizations.

The newer standards put a stronger emphasis on the need for tool support and IT enabled process automation. This is accompanied by newer software development paradigms such as object orientation and IT standardizations such as XML and Webservices or architectural styles like Service Oriented Architecture (SOA) [SOA].

2 Objectives and constraints of IT realization projects

One would expect that the formal modeling languages are the ideal substitute to successfully apply the business specific models and holistically describe the processes and IT systems of telco operators.

Reality at the majority of service providers looks different however. Many telco companies make no or limited use of the industry standards and only few have adopted an end to end modeling approach (from business perspective to IT implementation).

In a common scenario the business department is using Aris, Powerpoint and Word as the IT department uses Visio and UML . Even if case tools are used, they are deployed in silos and the scope of modeling is limited. The created models normally don't interlink between the tiers, there is no traceability between strategic business goals, business processes and IT. To make it worse, the IT guys don't understand the business process documentation and vice versa.

Over the last ten years we (Marcus and Sven) have been involved in quite a number of large scale OSS / BSS projects. We fulfilled various roles such as business and system process modeler, designer or architect.

One key experience that we have gained so far is:

Perfectionism does not equal efficiency

As an example: Though neither of us (Marcus or Sven) are native English speakers but able to converse to some degree of accuracy we can communicate and efficiently exchange relevant information with each other. The key to success lies rather with the adoption of mutually agreed communication patterns than perfect grammar.

The same applies to IT realization projects. A project's objective is not to implement the NGOSS standard to 100% accuracy or apply the formal modeling language to perfection. The success of a project is measured based on delivered functionality, required time and budget. It requires a smart application of concepts and standards that is understood and accepted by all involved stakeholders.

Striving to implement perfect business modeling connotation is not wrong but will not necessarily be very efficient. For example when we started advocating the use eTOM, it was based on the sole motivation that it is the standard for telco business processes. The initiative did not find much support from the IT implementation projects since the link to their practical needs was missing.

One would probably not be too far off saying that the average IT project business case is not about introducing UML modeling as a standard either.

It is common to create RfPs for the specification of deliverables for an external vendor. These are normally IT deliverables and get defined by the IT department. Even though there is a requirement that the technical specification must be linked to the business requirements, a linkage to eTOM appears to deliver too little or no value. It is simple - if the stakeholders don't see the value they will not support it.

It is particularly important to acknowledge that the available skill set might be limited to a certain extent. One would in only on very rare occasions find project members that are familiar with the concepts of the TM Forum, UML modeling, business requirements management, etc. at the same time.

3 Realization of the concepts

As described above the challenge is to address the modeling and industry standards to a point that it can be adopted by the involved stakeholders. For example a UML Sequence diagram looks too technical to the CIO while the eTOM based process decomposition are too abstract and generic to the developer.

Our approach is to acknowledge that there are different stakeholders with different levels of understanding and particular needs. This is addressed by mutually agreeing on artifacts that are still correct connotation wise to a certain degree and apply to the particular problems. We extend the understanding of the required artifacts so that all stakeholders can benefit of the work. Finally we create a set of (often proprietary) diagrams that link these different views so that we get traceability and a sort of 'red' thread that enables the stakeholders to communicate better and more efficiently.

Our experience is that the concepts of the TM Forum can be expressed by a formal modeling language such as UML. It is however required to relax the notation especially to onboard the non technical users of the documentation.

In the following we will outline some examples of this concept from previous projects.

3.1 Example: Scoping a project

The objective of this phase is to agree on the scope of the project and the requirements to be addressed. This is done by agreeing on the functional areas of the eTOM process map. Since purpose and content of the processes are already documented by the standard process framework there is little need for further elaboration.

Business requirements are derived from strategic and tactical enterprise goals, they vary in granularity, type and priority. The process modeling should start by capturing the requirements and defining adequate categories. The requirements should be grouped into different domains. The eTOM process map provides an ideal structure for the grouping.

This is done by using the UML requirement artifact. The use of stereotypes allows simple classification. The information can be captured and grouped by the business analyst. He is using UML artifacts but the quality of his delivery is not gauged on the correct use of UML.

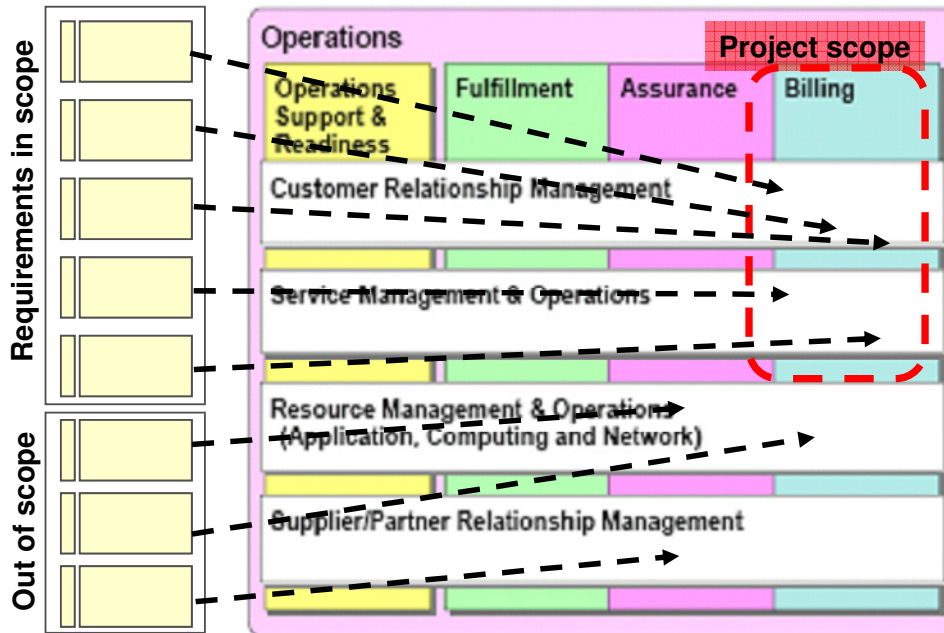


figure 2: Mapping UML requirements to eTOM processes

As a result of the scoping phase the functional scope and the covered requirements have been documented in a consistent and complete manner. Even though the UML requirements artifact is used, the representation is intuitive and does not look any technical. This looks trivial (in fact it is) but is a critical success factor for an accurate and accepted project scope.

3.2 Example: eTOM Process decomposition

The objective of this phase is to decompose the process elements and model the process flow in accordance with the requirements.

The eTOM process elements provide the building blocks for the definition of the end to end processes. By using a case tool with imported eTOM process elements, the composition of the L3 process becomes a fast and straight forward process. Most tools allow to drag – drop them into diagrams.

In our example we have modeled the eTOM process elements as UML activities. The beginning and end of a flow is marked with an event. For modeling the flow, we create instances of the activities. The activity contains the eTOM process definition, the process specific documentation is captured in the activity instance. That way one activity definition can be reused in multiple flow definitions.

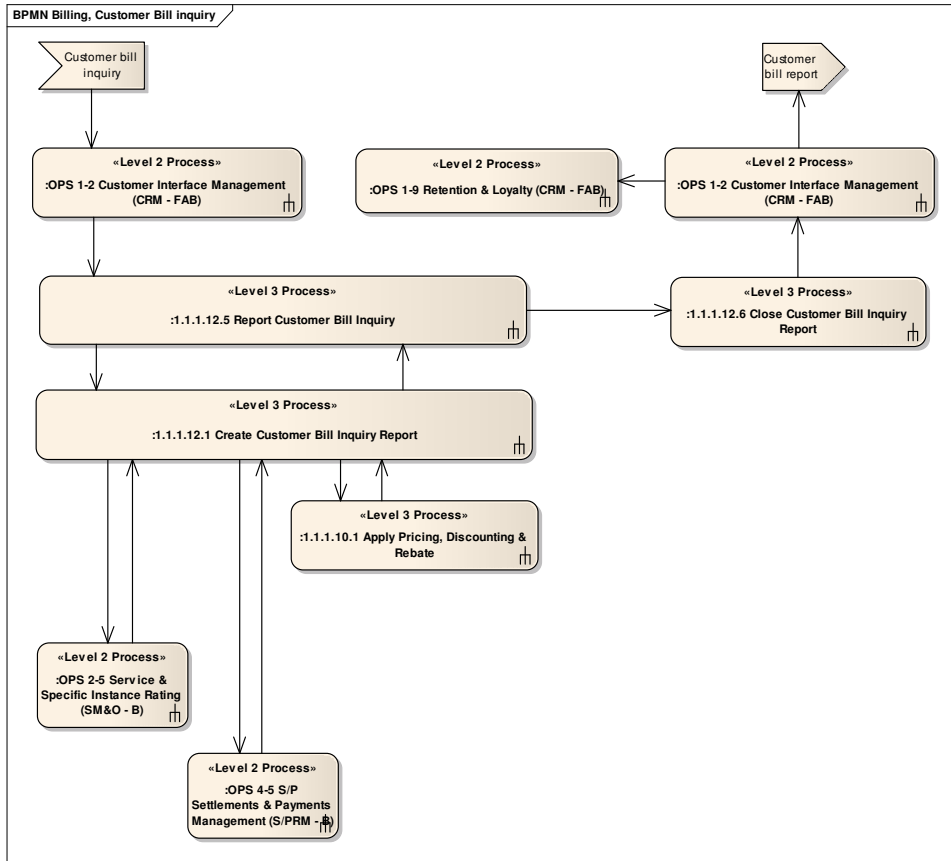


figure 3: eTOM process decomposition with UML activity diagram

One can argue if this representation is really in line with the UML specification. This view however is intuitive and fully specifies the required flow.

3.3 Key to success: Governance

It is a challenge to make the application of the NGOSS standards and use of a formal modeling language based modeling approach a success for the specific company context. Our experience shows that it is not as simple as to dig out a couple of standards such as UML and eTOM, send the staff on a training course and expect that they will make a successful implementation of it.

Within a company it is not unusual to find a number of people with some tie to a standard or a modeling language. As already discussed it is also not uncommon to find that these people also have different views on how these should be adopted by an organization. Often they work for different stakeholders and therefore make it even more difficult to come to a common understanding, agreement and way forward.

In order to support the introduction and continuous improvement of a modeling standard it is important to setup the adequate governance structure. The governance board should consist of experts for the use of industry standards and modeling methodology, yet not hard headed academics. These experts must have the ability of listening to the organization and adapt as described above.

Key responsibilities of the modeling governance are to secure the buy-in and ongoing support of top management, the quality of the deliverables and the motivation of the involved modelers and other stakeholders. It cannot be emphasized enough how important it is to get top managements support in order to make this a success and therefore it is vital that the governance board should have opportunity on a regular basis to meet with them.

This is achieved by certain key activities such as

- Definition of company specific standards. These are aligned to the applicable industry standard but are relaxed in order to make them understandable and usable for the involved parties.

- Define the purpose and use of the standards. It should be clear to everyone why a set of standards have been chosen and what they are meant to represent.

- Regular review of the deliverables. This is important to ensure the consistent quality and is also a tool to train the modeler on the job.

- Regular identification of improvement opportunities. As the teams evolve with their level of maturity, they will suggest on how to better solve previously identified problems. They should be motivated to recommend more efficient ways of documenting their interests. As a result of this the company specific guidelines must be updated, communicated and distributed within the organization.

Please note that unless the company is really small or a start-up it **IS NOT** the governance board's responsibility to do the actual modeling and documentation. Remember, one should not document for documenting sake. This is a common trap many companies step into. It often happens that the governance board becomes a department that does the documentation within the organization commonly known as 'process departments or groups'. Some reason why a process department often fails are listed below but are also given based on what has been written earlier.

- Limited detailed understanding of the actual process itself
- Will have limited success to get people to use the documented process since it often gets documented in a way that is not practical to the stakeholders
- Maintenance becomes unsustainable since improvement or changes to the 'actual' process are hard to pick since they are too remote to the daily activities

The use of standards has to be introduced in phases through learning while doing it. As the involved stakeholders acknowledge the success of one level of maturity, they are willing and keen to go to the next level. Therefore it is also critical to find 'champions' within each stakeholder's organization that internally help with the re-enforcement of the need to stay aligned with the company standards.

4 Conclusions and way ahead

The NGOSS process models and formal modeling standards are extremely important since they deliver industry best practice and enable sustainable process documentation.

However.

Most important to achieve success in a project introducing business process modeling is to ensure that it is done at a level that can be adopted by all the stakeholders and that it supports their particular needs.

An efficient way of achieving this is to first agree on a common language within the organization based on standards and modeling language. Then implement a process that gradually increases the organizations maturity of applying the standards, governed or guided by a set of internal experts that can listen and adapt to the businesses needs and that have the ears of top management.

Don't talk, just do it.

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