

Telecom Operations Map



GB910

Evaluation Version 1.1

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Document Life Cycle

The Telecom Operations Map is being issued as Evaluation Version 1.1. The TeleManagement Forum ("TM Forum") expects to update it to reflect:

- Comments from implementation experience
- Additional member comment and public comment
- Enhancements or companion documents based on work currently in progress in the TM Forum

The Telecom Operations Map supersedes the NMF Service Management Business Process Model and the TM Forum Telecom Operations Map Evaluation Version 1.0 in their entirety.

The purpose of an Evaluation Version is to encourage input based on experiences of members and the public as they begin to use the document. Following the Evaluation Period, documents that are seen to deliver value, especially based on implementation experience, are candidates for formal approval by the TM Forum. All documents approved by the TM Forum (as well as those previously approved by NMF) undergo a formal review and approval process.

This document will continue under formal change control. Supporting work will be issued as companions to this document. A document of this type is a "living document," capturing and communicating current knowledge, views and practices. Further inputs will be made because of detailed work ongoing in the TM Forum and the industry.

Individuals or companies who are not members of the TM Forum are encouraged to provide comments on this document. However, in order for their comments to be considered, a signed waiver must be on file with TM Forum pertaining to intellectual property rights. To obtain this form, please contact the TM Forum.

Time Stamp

This version of the Telecom Operations Map can be considered valid until September 30, 1999.

Document History

Version	Date	Purpose
Version 0.1	1/98	1/98 Initial draft for input to Miami meeting
Version 0.1b	2/98	Updates for team check post Miami
Version 0.1c	3/98	For formal team comment
Version 0.2	3/98	For formal member comment
Version 0.2a	4/98	Copy incorporating formal member comments input to Paris
Version 0.2b	4/98	Stable copy post team and board review and informal agreement
Evaluation Version 1.0	10/98	Evaluation Version released to public for comment
Evaluation Version 1.1	4/99	Update to Public Evaluation Version for member comments and work done to validate all input/output diagrams

Acknowledgments

Telecom Operations Map Evaluation Version 1.1 Contributors

The release of the Telecom Operations Map Evaluation Version 1.1 is due to the work of 4 key people:

- Don Batorsky, Telcordia Technologies
- Mike Kelly, Nortel UK
- David Milham, BT
- John Reilly, MetaSolv

Their expertise and involvement in validating the input/output diagrams is greatly appreciated.

Special Recognition to John Reilly of MetaSolv for inputting all the 'spider diagrams' (euphemistic name for the input/output diagrams) into the Paradigm tool and for leading the validation reviews. He is the 'Spiderman' of the TM Forum.

We continue to receive excellent input and enhancements for the Map. Of particular note, the TM Forum Mobile Management working team has provided significant inputs, many of which have been included in this release. The Telecom Operations Map team looks forward to continued work with this team and appreciates their significant contributions.

Thank you for making the Telecom Operations Map the acknowledged, best framework for Telecom Operations support and management.

Looking Forward to Further Development of the Map,

Debbie Deland

TM Forum

Telecom Operations Map Evaluation Version 1.0 Contributors

The evolution of the Service Management Business Process Model to become the Telecom Operations Map has involved inputs or contributions from many teams, outside organizations and numerous individuals. It is just not possible to recognize all the organizations and individuals that have contributed or influenced the Telecom Operations Map. We apologize to any person or organization we inadvertently missed in these acknowledgments.

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- Mike Kelly, Nortel UK
- David Milham, BT
- Bruce Murrill, NMF—the project leader through April, 1998
- Elizabeth Adams, NMF – the project leader of the initial Service Management Business Process Model published in 1995

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The following TeleManagement Forum Teams provided review and input to support release of Evaluation Version 1.0 of the Telecom Operations Map. There are many people on each team, team members change over time and not every team member of each team can all be listed here. The name of the team and the team leader are shown below to acknowledge the inputs, the reviews, and the approval to release provided by these teams.

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Peer to Peer Service Configuration Team	Mike Best, Newbridge Networks

Quality of Service Team	Hans Ruedi Stucki, Swisscom
Billing Team	Peter Muehleemann, Nexus Telecom
Mobile Management Team	Tim Powers, Motorola

Although not directly used within this document, access to documentation and work from standards bodies and other forums have contributed to the evolution of the Telecom Operations Map. This access was via public information or TM Forum members' knowledge. This list of standards bodies and forums is not inclusive and does *not* imply review and concurrence by these organizations or their representatives. It is important however to acknowledge their work and their influence on TeleManagement Forum work:

- International Telecommunications Union Telecommunications (ITU-T)
- European Telecommunications Standards Institute (ETSI)
- EURESCOM
- Alliance for Telecommunications Industry Solutions (ATIS), principally OBF and ECIC

A special credit is given to Bellcore for multiple contributions and for use of Bellcore documentation, especially GR 2869.

Special reference note on Business Process Mapping to Corporate Renaissance Management Consultants.

Thank you to all,
Debbie Deland
TeleManagement Forum

Related or Source Documents

The Telecom Operations Map uses a lot of the work done in the NMF Service Management Business Process Model (published in 1995 and superseded by this document) for which we thank the contributors to that document. It also uses a great deal of work from the Network Management Detailed Operations Map, a companion document to the Telecom Operations Map that includes specific acknowledgments to that work's superb team.

References

A Service Management Business Process Model, NMF, GB901, 1995

SMART TMN™ Telecom Operations Map, NMF, GB910, Evaluation Version 1.0, October 1998

SMART TMN™ Technology Integration Map, NMF, GB909, Issue 1, April, 1998

ITU-T TMN Recommendation M.3400 (TMN Management Functions, ITU-T, 4/97), M.3010 (Principles for a telecommunication management network, ITU-T), M.3200 (TMN Management Services, ITU-T, 1996) and Related Recommendations

Bellcore GR-2869, Generic Requirements for Operations Based Telecommunications Management Network (TMN) Architecture

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Preface

The Telecom Operations Map serves as the blueprint for process direction. For Service Providers, it provides a politically neutral reference point as they consider internal process reengineering needs, partnerships, alliances, and general working agreements with other providers. For suppliers, the Telecom Operations Map outlines potential boundaries of software components, and the required functions, inputs, and outputs that must be supported by products. It consists of:

- A description of the role of the Telecom Operations Map
- A high-level, static view of Communications Operations processes and sub-processes that is top down, customer centric, and function based.
- A high-level “skeleton” that illustrates the primary end-to-end processes of fulfillment, assurance, and billing, and identifies sub-processes within each.
- A dimensional approach to understanding the functions involved in certain Service Provider deliverables
- Illustrative examples of process flows that show end-to-end process
- A more detailed view of the functions of each sub-process, including functions or activities of each sub-process box, as well as its inputs and outputs to other sub-process boxes
- Uses of the map

Service Management Business Process Model Superseded

The Telecom Operations Map supersedes the NMF Service Management Business Process Model in its entirety. The foundation of the Service Management Business Process Model and much of its content is carried forward into the Telecom Operations Map.

The telecom operations model in the Service Management Business Process Model, issued in 1995, remains with relatively few conceptual or major process changes. The basic model continues to be valid even as the telecommunications industry has changed, largely because it:

- Uses a high level and generic approach
- Reflects a broad range of operations views
- Reflects the way service providers run their businesses
- Is widely used

Changes from the Service Management Business Process Model

Beyond reformatting, text changes and additions, the key changes in the Telecom Operations Map document from the Service Management Business Process Model document are:

- Addition of 'spider diagrams' (See Process Description, Input and Output Diagrams in Chapter 7) for the Network and Systems Management Processes based on the work done in the Network Management Detailed Operations Map
- Updates and changes to all 'spider diagrams'
- Inclusion of considerations for Mobile/Wireless Services
- Inclusion of more process related diagrams and information
- Removal of automation priorities (an updated view may be issued separately)

Clarification changes to names on the static Telecom Operations Map diagram are important to delineate:

Although assumed previously, for clarity an oval layer was added to the Physical Network and Information Technology oval called Element Management/Technology Related to reflect this functional or process layer. Functions or processes within this layer may need to be added to the map. At this time, showing the layer is considered sufficient.

Customer Quality of Service Management replaced Performance Reporting and is understood to mean quality of service across all areas of the map.

In Network and Systems Management Processes layer of the map:

- Network Provisioning replaces Network/Systems Administration
- Network Inventory Management replaces Installation/ Maintenance
- Network Maintenance and Restoration replaces Network Monitoring/Problem Resolution
- Network Data Management replaces Usage/Performance Data Collection

Telecom Operations Map Evaluation Version 1.0 Superseded

This Evaluation Version 1.1 release of the Telecom Operations Map supercedes the Telecom Operations Map Evaluation Version 1.0 in its entirety. The content of the document is the same. There are no major concept changes or additions.

Changes from the Telecom Operations Map Evaluation Version 1.0

Beyond minimal text changes, formatting additions and editing, the key changes in the Telecom Operations Map document from the Telecom Operations Map Evaluation Version 1.0 are:

- All Telecom Operations Map spiders have now been input to the Paradigm tool and will be managed from that tool.
- Changes to the input/output spiders to insure input and output synchronization, to capture more activities for each process and to make all the wording consistent. There also some diagram format changes, since we are using the Paradigm tool. The significant changes are:
- Sales: Assumed Activity Shown—Close Sale, take service request, CQoS input added for planning and reports, joint service agreements/SLAs input from Service Planning and Development
- Order Handling: Processes behind Service Configuration removed for consistency with approach to all diagrams
- Problem Handling: Suspend or Request for Service Suspension was added to activities and an output to support this to Service Problem Resolution
- Customer QoS Management: Triggered reports was added to output to Customer Interface Management, SLA Results Review and Fraud/Credit Line associated activities were added to Customer QoS Management activities
- Service Planning and Development Processes: Note was added to highlight linkage to a Product Management function or process, Service related cost and capacity support was added, wording was changed to clarify that process applies to new service, new feature, service enhancements or upgrades/maintenance, the accountability for joint service agreements, particularly SLAs was added to clarify this accountability as part of Service Planning and Development. In addition, the accountability to develop and implement changes other than technical or network was clarified with an addition in the process activities.
- Service Configuration: Added input from Network Planning and Development for Pre-ordered engineering assignments, added feasibility and due date to output to Order Handling, Completion Notification to Service Problem Resolution was changed to Reconfiguration Completion
- Service Problem Resolution: Suspend Service activity was added, Problem Data on output to Customer QoS was changed to Service Problem data and planned maintenance was removed
- Service Quality Management: A note was added to clarify when life cycle management begins and ends, cost accountability was added, Determine Service QoS violations was added to activities within this process, Performance data and requests was added to both input and output with other Service Providers, Credit Line Exceeded was added

as an output to Problem Handling, Request for Service Suspension was added to the activities shown for this process

- Network Inventory management: Testing and calibration associated activity and inputs were added
- Network Maintenance and Restoration: Problem trend output to Service quality Management was added
- Inclusion of some considerations for Mobile/Wireless Services

Note: This list of changes does not include edit changes to make wording of inputs and outputs agree and does not include changes for better wording clarity.

Expectations for Future Additions

The Telecom Operations Map is a living document and member expectations for continued development of the map are high. Expectations for 1999 updates to the Telecom Operations Map document or separately issued documents include:

- Validation of Input/Output Diagrams—complete and issued
- Network Management Detailed Operations Map—complete and issued
- Mobile/Wireless Considerations companion document to the Telecom Operations Map
- Definition of generic, core business processes, and their end-to-end process flows
- Definition of unique needs or specific considerations for varying technologies, e.g., IP Services
- Assess and update for comments from members and wider industry
- Assessment and update for changes indicated by lessons learned as a result of Catalyst Projects or other implementation experience
- Updates for stronger consistency between the Telecom Operations Map and the Network Management Detailed Operations Map

TeleManagement Forum

The TeleManagement Forum is an international non-profit organization serving the communications industry. Its mission is to help service providers and network operators automate their business processes in a cost- and time-effective way. Specifically, the work of the TM Forum includes:

- establishing operational guidance on the shape of business processes
- agreeing on information that needs to flow from one function to another
- identifying a realistic systems environment to support the interconnection of operational support systems

- enabling the development of a market and real products for automating telecom operations processes
- TM Forum makes use of international and regional standards when available, and provides input to standards bodies whenever new technical work is done.

The members of TM Forum include service providers, network operators and suppliers of equipment and software to the communications industry. With that combination of buyers and suppliers of operational support systems, TM Forum is able to achieve results in a pragmatic way that leads to product offerings (from member companies) as well as paper specifications.

The TM Forum Approach

TM Forum uses a holistic, business-driven approach to achieving end-to-end automation using integrated Commercial Off-the-shelf (COTS) software. It provides investment direction as well as development specifications needed to produce management systems that can work together to produce the operational result needed by service providers and operators.

The TM Forum approach starts with the layered TMN model, but goes further, to address concrete business problems in a pragmatic way. Specifically, three key elements are brought to bear on the TMN layered model:

A business process-driven approach. TM Forum starts from the premise that Service Providers and Network Operators need to automate their business processes, which means information needs to flow from end-to-end across many different systems. Only when a process is understood and the linkages are clear, is it possible to apply standards in a way that delivers business value. Unless that is known, a great deal of money can be spent implementing standards that simply don't contribute to the overall business objective.

Technology-independent agreements. Business agreements about what information will flow between processes must be kept independent of the protocols used to implement those agreements. Technology will continue to change, becoming cheaper and easier to use, and delivering more power. TM Forum technology guidance helps software developers apply 'the right technology for the job' instead of forcing a single technology to serve every need. Further the TM Forum approach documents all agreements in technology-neutral form, so that the same agreement can be implemented in multiple technologies as they continue to evolve.

Products, not just paper. A main premise of the TeleManagement Forum and its members is that paper standards are not sufficient to solve business problems. Products, not paper, are the end goal, provided documentation is produced to support the replication of industry agreements across multiple software suppliers' products.

TM Forum Approach

In order to address all three of these principles, the TM Forum approach to doing work for the industry consists of multiple components as shown in Figure P.1:

High-level direction – a sense of ‘which way is west’ to enable service providers and suppliers to make basic investment decisions about their business processes and technology choices. This direction takes the form of the Telecom Operations Map and Technology Integration Map

Specific agreements – precise specifications of what information is to be exchanged between any two processes or systems, provided in technology-neutral form and accessible through the Central Information Facility. In addition, specifications for technology integration points are provided.

Catalyst projects – an environment in which to gain development experience to test the precepts of the ‘Maps’ and the viability of specific information agreements.

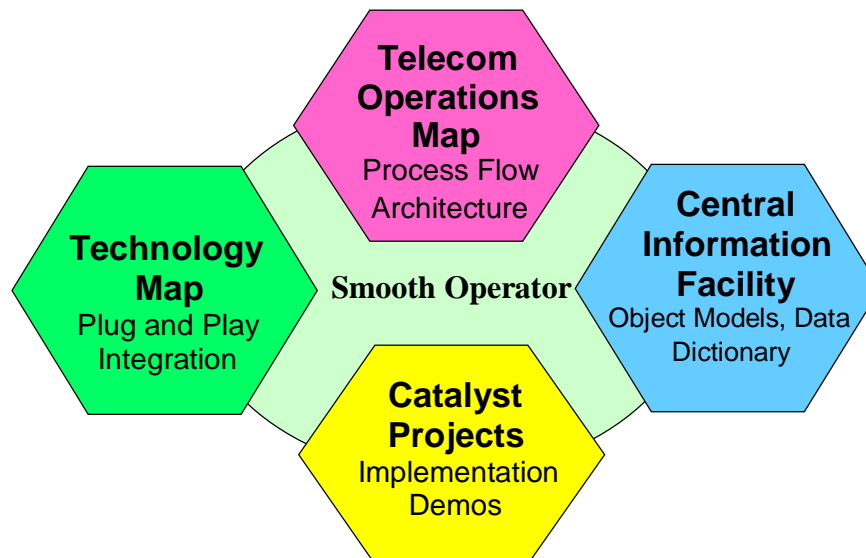


Figure P.1: TeleManagement Forum Approach Components

Telecom Operations Map

The Telecom Operations Map is the common model for communications operations process and the guide for all other work within TM Forum. It provides the common language and framework for supporting implementation of end-to-end communications operations automation that Service Providers desperately need.

Technology Integration Map

In the area of technology, TM Forum hosted the SPIRIT (Service Providers' Integrated Requirements for Information Technology) initiative to examine the needs of communications Service Providers for 'off-the-shelf' (OTS) technology. This emphasis on general-purpose IT grew into a direction statement, which is one part of the Technology Integration Map. The Technology Integration Map makes recommendations concerning which technologies are most appropriate to use in specific situations and how they should be integrated together.

Central Information Facility (CIF)

TM Forum made a bold advancement in information modeling. With years of experience in modeling information agreements in protocol-specific terms, the TM Forum decided to capture its agreements in protocol-neutral terms, using readily accepted graphical modeling techniques.

TM Forum encourages and trains its members on the use of its licensed modeling tool and corresponding modeling methods. Improved ease of use of the tools and methods is a near term goal as TM Forum completes its deployment of a web-based Central Information Facility (CIF). The CIF is the TM Forum's repository for object models, Business Agreements, Information Agreements and Technical Specifications.

Catalyst Projects

Catalyst Projects are a deliberate effort to take some risks and experiment. They are primarily designed to gain quick experience in areas where no work has been done. They also provide a valuable way for existing teams to test their conclusions. Catalyst projects allow 'plug and play' trials based on a common model providing market visibility of real products, leading to more real products and solutions. Catalyst projects may go on to be full development and implementation projects. Catalyst projects also encourage experimentation in important areas without the risk of significant up-front investment.

Chapter 1- Document Objectives

Objectives of this document

Service Providers faced with ever-increasing competition continue to see the value of well-automated operations processes. They are struggling to move from a manual-intensive, inconsistent, inflexible environment to one that provides significant improvement in service quality, costs, and time to market. They also see the need to do business electronically with trading partners, suppliers and wholesale and retail customers.

The leading focus of The TeleManagement Forum's mission is to enable end-to-end process automation of communications operations processes. The Telecom Operations Map is the framework for accomplishing this mission.

The focus of the Telecom Operations Map document is on the business processes used by Service Providers, the linkages between these processes, the identification of interfaces, and the use of customer, network or service information by multiple processes. The objectives of the Telecom Operations Map are to continue the progress made in establishing:

- An 'industry owned' common business process model.
- Common process definitions to describe functions of a service provider.
- Agreement on the basic information required to perform each function.
- A process framework for identifying which processes and interfaces are in most need of automation, and most dependent on industry agreement.
- Sufficient high level information to serve as the starting point for detailed requirements and information model development, and the satisfaction of those requirements through industry agreement.

This document describes the 'points of interconnection' and 'black boxes' that make up the end-to-end fulfillment, assurance, billing for Service and Network Management processes across the process layers of the Telecom Operations Map. It identifies the major functions and interfaces that make up an end-to-end process. Service Providers need this common map of processes to enable doing business efficiently and effectively with other entities and to enable the development and use of third-party software without the need for major customization.

The purpose of this document is to continue to set a vision for the communications industry for competing successfully through the implementation of process driven

approaches to operations management. This includes ensuring good linkage among all vital operations support systems concerned with service delivery.

Define Common Terminology

This document also provides the definition of common terms concerning communications processes and the functions performed within each process. Common terminology makes it easier for Service Providers to negotiate with customers, third party suppliers, and other Service Providers.

Consensus Tool

The TM Forum produced this document initially as a consensus tool for discussion and agreement among Service Providers and Network Operators. Its broad consensus of support continues to grow. The map enables:

- Focused work to be carried out in TM Forum teams to define detailed business requirements information agreements (exchanges between applications or systems) and to review those outputs for consistency
- Relating business needs to available or required standards
- Equipment suppliers, applications builders and integrators to build management systems by combining 3rd party and in-house developments

The anticipated result is that the products purchased by Service Providers and Network Operators for operational management of their networks and services will integrate better into their environment, enabling the cost benefits of end-to-end automation. Furthermore, a common industry view on processes and data will facilitate operator-to-operator and operator-to-supplier process interconnection, which is essential for rapid service provisioning and problem handling in a competitive global environment.

Using This Document

The document is *not* intended to be prescriptive about how the tasks are carried out; how a Provider or Operator is organized, or how the tasks are identified in any one organization. A service provider's specific process architecture and organization structure is highly proprietary, since both these business aspects are critical drivers of a provider's competitiveness. However, the Telecom Operations Map is a common, functional view of communications operations processes that can easily translate to an individual provider's internal approaches.

This document is not a specification. It is a snapshot of industry views expected to evolve based on changes in the industry. It is not intended to be too detailed, more a directional statement for the industry. Thus, it should not be the subject of supplier conformance statements. It is expected to be the starting point of detailed work that

lead to an integrated set of specifications that will provide real benefit to both suppliers and procurers in enhancing industry operational management capability.

Intended Audience

The Telecom Operations Map aims at a wide audience of communications specialists. Primarily, it is aimed at decision makers who need to know and input to the common business process model used to enable communications operations automation in a cost efficient way. The document or model supports, and is consistent with, many efforts under way in the industry supporting this automation goal.

For experienced telecommunications professionals the Telecom Operations Map proves to be intuitive, a strong, common model of communications operations processes.

The Telecom Operations Map is also aimed at designers and integrators of operational management systems software and equipment suppliers, who benefit from understanding how management processes and applications need to work together to deliver business benefit to Service Providers.

Furthermore, it continues to give providers and suppliers a common model for discussing complex business needs. This is becoming more necessary as operators move from developing their own operations systems software, to a more procurement and systems integration approach. This move away from developing internally is to react to market forces that are driving down systems and operational costs and time to market for new services

The document should interest Service and Network Provider business process re-engineering, operations, and procurement staffs for:

- Understanding the common business process model being used to drive automation
- Getting involved in providing inputs, priorities and requirements

It should also be of keen interest to suppliers of management applications, management systems, and networking equipment, who need to understand the deployment environment for their products and solutions.

Relationship to Standardization Activities

Much of the management infrastructure upon which systems will be built is expected to be based on standard interfaces. Relating business needs to available, or necessary standards is a primary goal of the TM Forum in promoting a standards-based approach to communications services management. Where applicable, the

TM Forum uses industry standards in its work to promote the acceptance of standards and to minimize redundant work. People active in management standardization (in the broadest sense) will find the document useful in setting a top down, customer centric context of how management specifications need to work together.

Terms and Definitions

Service Provider

In this document, the term Service Provider refers to companies who provide communications services as a business. Service Providers may operate networks, or they may integrate the services of Other Providers (who operate networks) in order to deliver a total service to their customers.

Providing communications service to any one end-customer may involve multiple Service Providers, where one provider may "sub-contract" with Other Providers to fulfill the customer's needs. When necessary to account for this relationship, the term Service Provider is used in this document to describe the company responsible to provide service to an end-customer. The term Other Provider is used to denote companies which have a sub-contractual responsibility. (See also 'TM Forum Glossary of Terms' on the TM Forum Internet site at <http://www.tmforum.org>)

End-to-end Process Flow

TM Forum uses the term 'end-to-end process flow' to include all processes and functions (shown in layers on the process map), and the sequence of all activities required to accomplish a task from initial inputs to required outputs. TM Forum uses flow-through to mean automation across an interface or set of interfaces.

For term and acronym definitions not explained within this document, please refer to the TeleManagement Forum Glossary. The TeleManagement Forum Glossary can be found through the TM Forum web site, www.tmform.com.

Chapter 2 – The TMN Model

The communications industry has embraced the Telecommunications Management Network (TMN) model as a way to think logically about how the business of a service provider is managed. The TMN model consists of four layers, usually arranged in a triangle or pyramid, with business management at the apex, service management the second layer, network management the third layer, and element management at the bottom. The idea is that management decisions at each layer are different but interrelated. For example, detailed information is needed to keep a switch operating (at the element management layer), but only a subset of that information is needed to keep the network operating (e.g. is the switch operating at full capacity). Working from the top down, each layer imposes requirements on the layer below. Working from the bottom up, each layer provides a capability to the layer above.

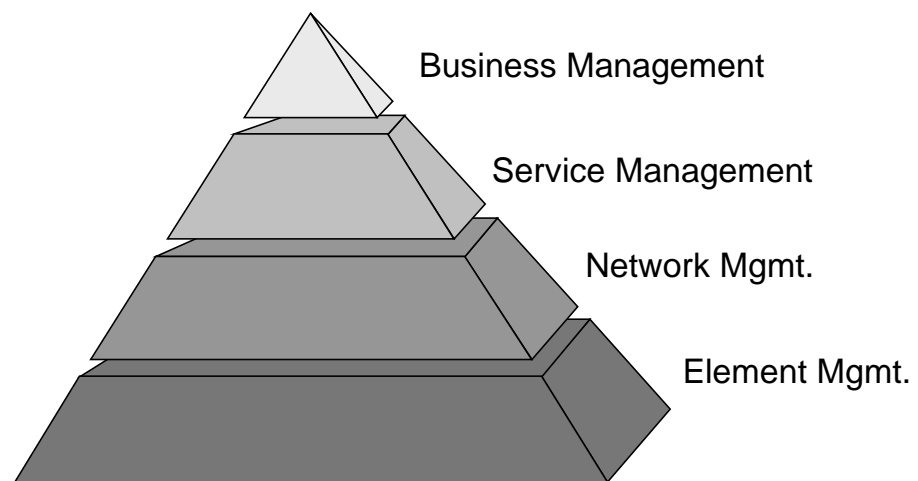


Figure 2.1: Basic TMN Model

The TMN model is simple, although its implementation is complex. The sheer number of standards now available that address the various interfaces between management systems sometimes makes it difficult to see and appreciate the big picture. These ITU-T standards are mainly concentrated in the element management and network management layers. They have been developed from the bottom up, making it difficult to apply the standards as part of a business case. It is also difficult to have a customer centric focus.

The Telecom Operations Map, using the TMN model as a foundation, addresses operation support and management for any communications service from a top down, customer oriented standpoint.

Chapter 3 – Business Drivers

The Business Challenge

The communications industry is rapidly changing with new rules, new competitors, new customers, and unprecedented demands. Service Providers worldwide all face similar challenges, risks, and struggles to remain profitable in the face of more competition, falling market share, and price pressures. As the Providers face these challenges, their suppliers must find innovative ways to deliver value or they may also go out of business.

The importance of service

The core of a communications provider is service. The key objectives are 'more for less' -- faster service introduction, improved quality of service at a lower cost. Achieving these objectives requires automation of customer care and operational support processes, and a strong automated linkage between the management of customer service offerings and the underlying networking assets. The level of automation in the current environment of almost all Service Providers is much lower than expectation and lower than what providers need to remain competitive. Many Service Providers are now actively engaged in re-engineering their business processes for maximum efficiency and effectiveness.

Some Service Providers also choose to operate their own network infrastructure, while others choose to outsource this segment of their business. The effective exploitation of this network infrastructure, whether directly operated or outsourced, is an integral part of the service delivery chain and directly influences the service quality and cost perceived by the end customer.

Linking objectives and requirements

Making a link between communications business objectives and the requirements typically stated for operational management systems is a challenge. Systematic process models are an essential source of solutions to this challenge. They can be used to positively influence a service provider's organization in many ways such as:

- Simplifying internal communications and communications with suppliers or other outside parties
- Revealing the way the organization performs, particularly from a customer point of view

- Identifying process and functional interfaces, particularly all points of contact of the process and its customers
- Identifying control points and critical performance metrics
- Targeting productivity and quality improvements
- Providing a framework to assess automation opportunities
- Allowing less experienced staff to be quickly effective, and so on.

Operational management systems and third party applications, becoming available in the market place today, are maturing in terms of their ability to support these business process models and needs.

Business process models

The use of systematic business process models makes it easier to evaluate and improve the processes themselves. Employing business process modeling techniques contributes to the goals and profitability of Service Providers. Using the same modeling techniques for business development and information system development brings noticeable efficiency improvements and removes barriers within those organizations and across cooperative, inter-organizational projects.

Service Providers that use systematic business process modeling to manage and improve their businesses have a much greater chance of success in today's marketplace.

Chapter 4 - The Business Relationship Reference Model

The relevant business relationships for this simple Business Reference Model are between:

- Service Providers
- Service Customers and Service Providers
- Service Providers and their Suppliers

Service Providers face very different regulatory pressures and their approaches to competitive threats will continue to be quite distinct. In general, Service Providers share three characteristics. Service Providers are:

- heavily dependent upon effective management of information and communications networks to stay competitive
- adopting a service oriented approach to the way they run their business and their networks
- automating their service and network management processes, sometimes undertaking a complete re-engineering of the way they do business.

Establishing common specifications

Current interfaces for exchanging management information, on which service and network infrastructure providers depend, tend to be manual or involve proprietary, low-level interactions. There is an opportunity to establish common specifications and agreements allowing providers, their customers, and their suppliers to work together more effectively than is currently possible. Achieving this goal depends first on identifying the business objective of each interface and establishing roles. It is then possible to ensure that technical work to implement electronic interfaces is suitable and delivers the required business benefits.

Standardizing process interfaces

The Business Reference Model shown in Figure 4.1 illustrates the principal points of contact between Service Providers, their customers, and their suppliers. A wide range of automation opportunities exists among the business roles and relationships shown. Each has a specific business objective dictating the level and type of management information exchanged, the robustness required of the management interface, and the priority with which industry agreements are pursued in the area concerned.

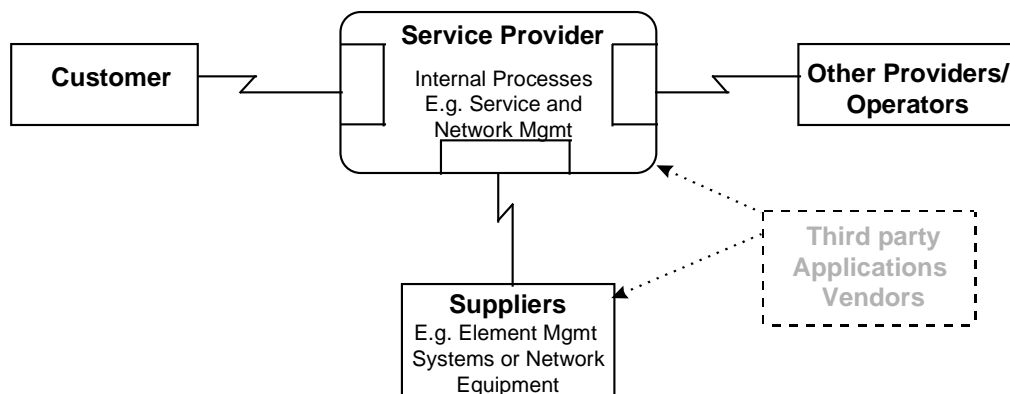


Figure 4.1: The Business Reference Model

For Service Providers to benefit from the ability to procure lower cost software from applications vendors, agreements are required to standard internal interfaces and functions for common or widely implemented management capabilities. From a systems cost standpoint, it is not enough just to outsource custom development. Applications such as trouble ticketing could easily be standardized internally, as well as across external boundaries, with resultant savings in development, people and software lifecycle costs.

Management value chain

These process interfaces are part of the 'management value chain' from the customer, through service management to network management, and subsequently to the externally sourced suppliers' equipment, supplying the communications service. This chain may also include other Service Providers (or network operators) in delivering the end to end service.

Supplier interfaces

The interfaces to suppliers and other providers/operators are external. These are initially 'procurement' interfaces, but after deployment, become much more a part of the internal operation. The suppliers of these products or services need to ensure that their management systems directly support the service provider's business processes to ensure the most efficient service delivery. The interfaces are likely to be points at which different applications vendors' software need to be able to exchange information. This may involve agreeing to a common applications infrastructure, within which the applications will reside, as well as agreeing on the information to be exchanged. There are potential benefits to all by agreeing upon an open set of processes and information flows. For the service provider, it reduces development cost, enlarges the source of potential suppliers and the product functionality available. For the supplier, it creates a larger potential customer base for their products.

Chapter 5 – Telecom Operations Process Model

A communications service provider efficiently and effectively conducts business by managing its essential business processes. These processes can be aggregated to deliver the major requirements common to any service-oriented business, which include:

- Service Fulfillment (timely delivery of what the customer ordered)
- Service Assurance (maintaining the service--timely response and resolution of customer or network triggered problems, managing and reporting performance for all aspects of a service)
- Billing for the service (timely and accurate bills, including invoicing, timely adjustment handling and payment collections)

Figure 4.1 shows the overall Telecom Operations Map that is the framework for understanding the relationships among individual process flows.

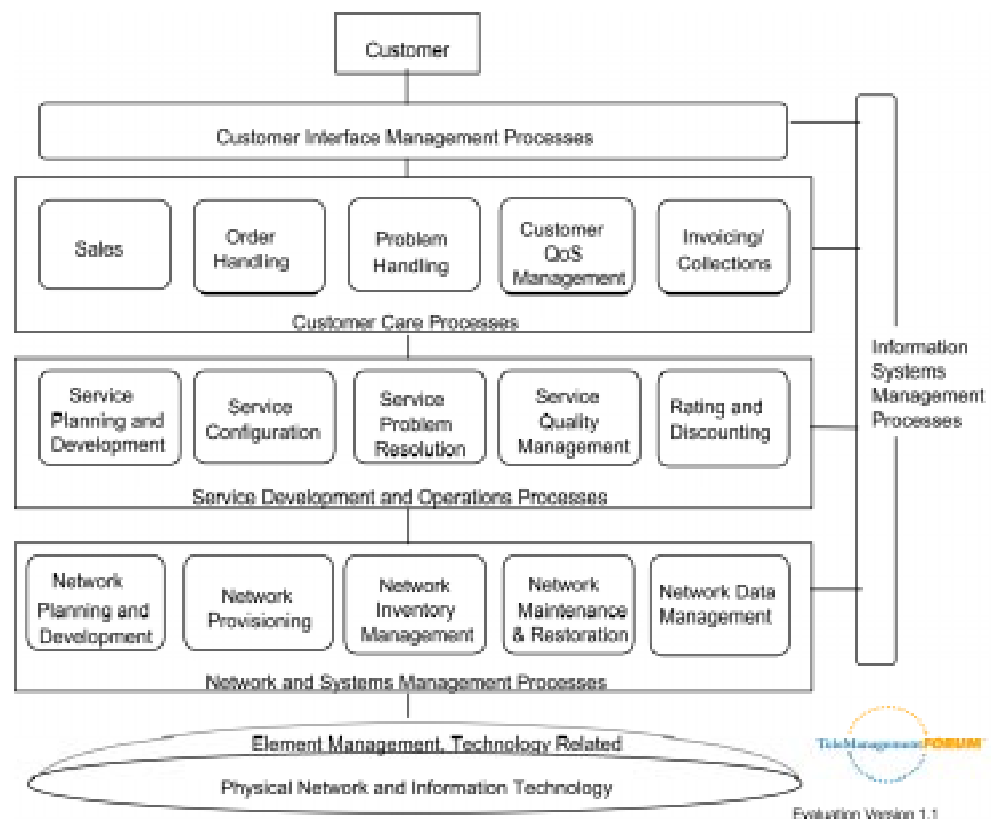


Figure 5.1: Static Business Process Model

Note: Sub-processes are shown for each core process layer. Minor changes have been made in the high level Telecom Operations Map diagram, since it was issued as part of the SMBPM. For details of changes, please refer to the preface. Changes were not significant except perhaps in the renaming of the Network and Systems Management sub-process boxes.

The Telecom Operations Map uses the layers of the TMN model as core business processes, but divides the service management layer into 2 parts: Customer Care and Service Development and Operations. In the simplest sense the division reflects differences between processes triggered by individual customer needs from those applied to a group of customers subscribed to a single service or service family. It also reflects the accountability for direct customer contact handling in Customer Care processes. Depending on the provider, Customer Interface Management may be managed within the individual Customer Care sub-process or, in combination across one or more of the Customer Care sub-processes. For this reason, Customer Interface Management is separately delineated.

Today, the processes of most Service Providers remain very manual. No one has fully automated end-to-end processes across the majority of the functions depicted on the Telecom Operations Map, nor for all the services a Service Provider offers. In addition, some processes (such as the Service Development processes) may never be candidates for extensive automation.

Telecom Operations Map Dimensions

There are many dimensions of communications operations and, therefore, the Telecom Operations Map. This document is not intended to capture all of the many dimensions involved with communications operations processes. Some of the dimensions to consider in relation to the Map are:

- Service or technology specific views, e.g., broadband, IP, mobile/wireless
- Systems, application view
- Information or data view
- Distributed function or deliverable view

A good example of specific service or technology considerations related to the map is provided by Mobile/Wireless Services Management. Roaming Agreement Management is unique to Mobile Services. Roaming is a service provided by mobile Service Providers, where customers of a home service provider may use the infrastructure of another. To make this happen, the home service provider and the serving service provider negotiate and enter into a contractual relationship, called a roaming agreement, either directly or through a clearinghouse. This occurs in the Service Planning and Development processes. The management of roaming agreements is complex, consisting of interfaces across all layers of the map. As with calling card specific processes, there are detailed process considerations for application of the Map to mobile services.

Fraud and all activities to detect and prevent fraud are common to most networks. Mobility and roaming add to the complexity and difficulty of detecting and preventing fraud and are crucial considerations for managing Mobile/Wireless services.

Due to the huge growth in partnerships, alliances, mergers/acquisitions and regulatory requirements to support interconnection, joint service arrangements are increasingly becoming the norm. Roaming functionality for Mobile/Wireless Services requires joint service arrangements. To provide service, one Service Provider may need to interface with one or more Service Providers and/or Network Operators. Service Providers may interface with different functions at multiple layers of the Telecom Operations Map, when providing a joint service or subcontracting services. For example, the interface points vary depending on:

- The size and sophistication of the Service Provider
- The service or technology being supported
- Whether they are acting in a wholesale or retail role
- Whether they are acting on behalf of their network infrastructure or in support of a specific customer service instance

At this level, the Telecom Operations Map does not specifically show the lower level functions that a Service Provider performs (e.g., spare management, faulty parts management, fraud management). These functions or processes are supported within the high level sub-processes on the map. It is expected that in future work on the Telecom Operations Map, detail that is important will be added as supporting documentation to the map and/or as part of the map itself.

Identifying automation opportunities

Not all of the processes shown in Figure 5.1 have equal priority for automation. Some of the processes are considered highly proprietary due to being seen as areas of competitive advantage. However, it is increasingly clear that some level of automation in all processes is necessary to be competitive. Automation will generally focus on those areas where:

- high repetition of basic information flows is a characteristic
- high value is perceived in ensuring rapid reaction
- high quality (accuracy and consistency) is required
- end customers demand it

Most Service Providers are becoming focused around a customer-oriented view in this very competitive environment. The processes need to work together to accomplish the objective of delivering high value through their process execution, as perceived by the customer, at a competitive price. Those who can consistently deliver the right service in the required time scale, can provide the required maintenance quality, and accurately bill for it, will have a chance to delight their customers. Those who do not are unlikely to have many customers in the longer term.

Internal process characteristics

Depending on any individual company's structure, process automation may be accomplished in different ways. One company may combine the service delivery and maintenance responsibility with customer care, while another may combine service delivery and maintenance with network and systems management. In some cases, management of the underlying IT support systems may be done by a separate organization, while in others it may be the responsibility of the using organizations. It is important that automation solutions allow Service Providers as much flexibility in configuring their businesses to satisfy their customers and be competitive.

The service and network management structure of a Service Provider depends on their corporate mission, target market and strategy. The basic operational functions identified within the Telecom Operations are process blocks that can be applied to the various Service Providers infrastructure. However, it is important to recognize that the specific process boundaries shown in the model do not necessarily correspond to organizational boundaries. In one service provider company, a single work group may have responsibility for order taking and receipt of problem notification from a customer. Another work group might be responsible for tracking the progress of an order and reporting its completion. Yet, another company might conduct all customer contact through one group, with all other processes providing input and taking instruction from that group. However, the basic function being executed is the same.

Each service provider needs to evaluate these processes and identify how they perform each process internally, including the business rules and policies that apply. By using common terms to describe the functions performed within each process, it should be easier for all Service Providers to negotiate with customers, third party suppliers, and other Service Providers to agree upon important interface information flows. By focusing on the customer orientation and common operations model, it is also easier to gain wider industry commitment to adopt a more standardized functional process approach (in both service providers and vendors). This will drive delivery of more solutions and products that support end-to-end process automation of telecom operations.

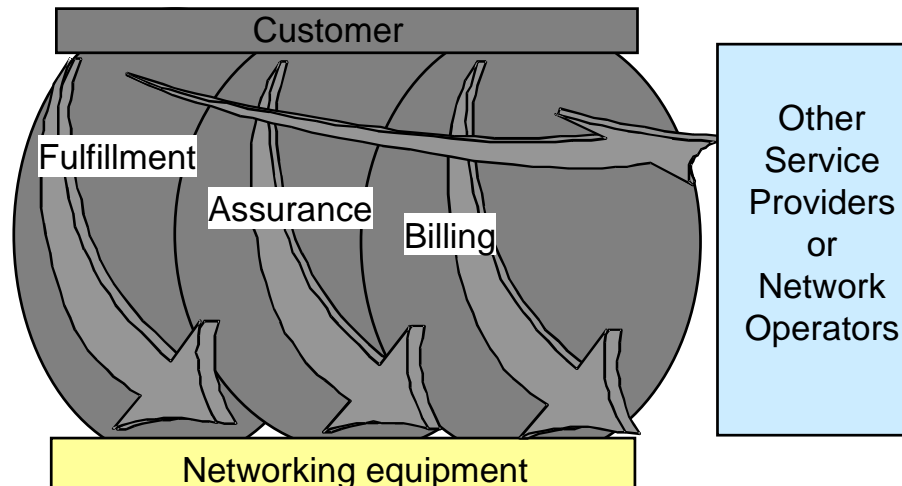


Figure 5.2: 'FAB' View, Cross-industry view of end-to-end processes

End-to-End Process Flow

The static view of the Telecom Operations Map does not get across the dynamic end-to-end process flow required to support service delivery. Figure 5.2 shows that flow requirement from Sale to Billing and between customer interface and implementation or support in a network element. With the overlapping balloons, the diagram also tries to represent that Fulfillment, Assurance, and Billing have sub-processes that are predominantly associated with its high level process, BUT all three high level processes have interfaces among many sub-processes across the map. It captures the idea of the end-to-end process flow and the interface flow through required for service delivery. Both aspects of process flow are required for automation.

High level process breakdown

Figure 5.3 shows a broad breakdown of the model into the three customer focused activities identified earlier. The purpose is to show in more detail the predominant processes that need to be involved in the end-to-end activity of supporting customer services. The Network Inventory Management and Network Data Management boxes are split to display their significant role, more than an interface, in both overarching processes, e.g., Network Inventory Management is important to both the Fulfillment and Assurance processes.

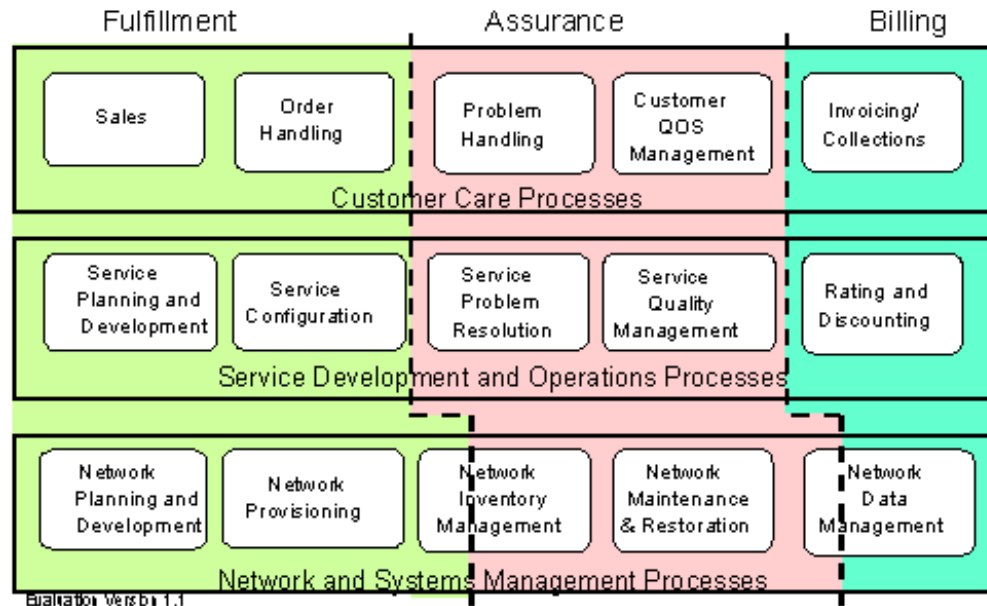


Figure 5.3: 'FAB' High-level process breakdown

Note: The interface to element management systems and the physical network are removed from this diagram for simplicity. Interaction to element management and the physical network support all three overarching processes.

3-D Telecom Operations Map

Although the 'FAB' view addresses 3 key processes, a "3-D" approach helps to show how a distributed activity can span sub-processes across the domains of fulfillment, assurance and billing processes. As shown in Figure 5.4, Service Level Agreement Management is a good example of an activity that Service Providers have to accomplish across multiple sub-processes of the map. The SLA may well require engineering process support to determine feasibility of SLA commitments, customer negotiation in the sales process and specific monitoring and reporting. An SLA may include measures for performance, pricing, installation intervals, billing timeliness, time to repair, call handling and many others.

This dimensional approach can also be used to look at capabilities required across the map. A good example of a capability required in all layers of the map and across all domains is test management.

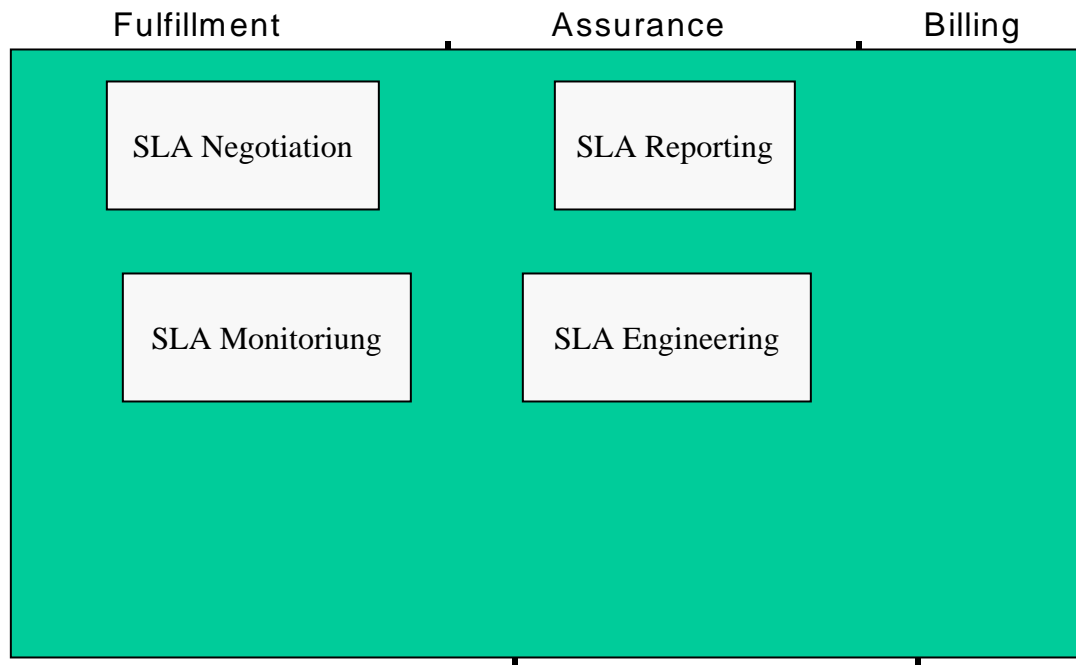


Figure 5.4. "3-D" Approach to Mapping--Service Level Agreements

Chapter 6 – Examples of FAB Process Flows

Sub-Process interactions

Figures 6.1 through 6.3 (the FAB process diagrams) provide a rough illustration of the principles of process flow. The presentation of flows is an initial step in the development of a methodology that will permit the traceability of Service Providers business needs to the identification of components that support automation. They identify the interactions and types of information flows that take place within and between a service provider's operations systems or functions, to support service to a customer. In particular, they outline some of typical activities for each high-level process providing further examples of the breakdown of those activities into discrete sub-processes that cooperate to fulfil the need. These rough examples of each overarching process should not be used as model process flows.

The process flows identified are consistent with those identified in Chapter 5 of this document, but do not necessarily capture all interactions. This is because they show a service instance for example purposes. Chapter 7 captures all lifecycle inputs and outputs for each process, whereas Figures 6.1-6.3 only capture a specific identified snapshot. Interactions between the FAB process diagrams are not comprehensively detailed other than to show examples of interactions. Chapter 7 includes detail on each sub-process.

These diagrams also make use of more detailed process flows identified in the Network Management Detailed Operations Map (Reference 2) that support Network Provisioning.

The TeleManagement Forum expects to develop robust process flows both at a generic level and in some more specific areas to provide more examples of process flow configurations. Based on member needs, there will be process flows that adapt the generic flows to a specific technology or service. These process flows will be representative, since every service provider architects their specific processes based on both the needs of their target customers and the strategic needs of their business. The TeleManagement Forum is using Business Process Mapping, which allows identification of essential and non-essential activities. Most importantly, it enables a concise view of the entire service process from a customer's perspective within the TelOps Map framework.

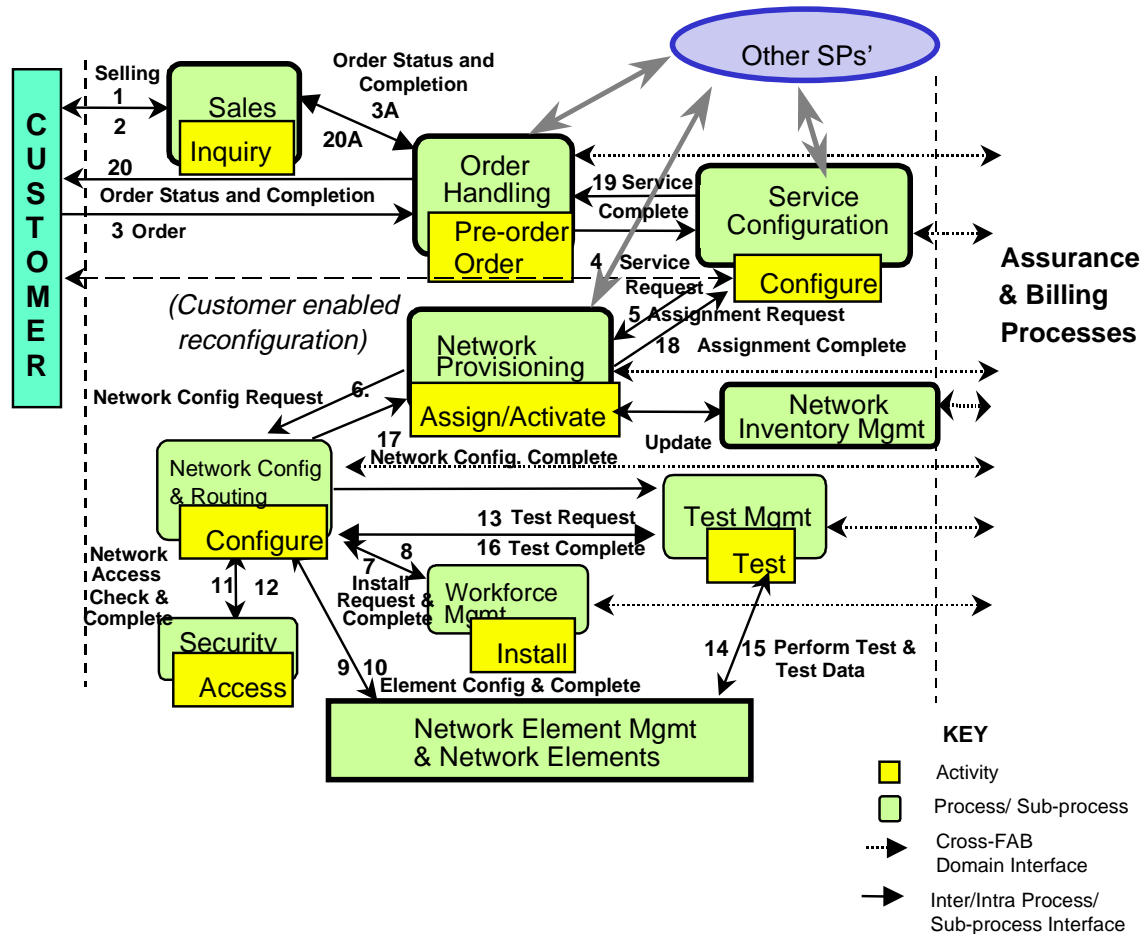


Figure 6.1: Rough Example of Fulfillment Process Flow

Order Request and Installation Example

This example of a fulfillment process shows a possible sequence of activities to support a customer inquiry, subsequent order for service, the configuration of the service, the installation and completion of the request. Depending on the Service Provider process, orders can be placed through the sales process and/or directly through the order management process. For a specific service provider, some customers may be supported by a specific sales team that places some or all orders for the customer and tracks them to completion. These dual trigger process interfaces and follow-ups are shown as 3/3A and 20/20A.

The complete fulfillment flow-through may not actually be required every time for some simple services, which have pre-assigned service capacity. For example, the flow for an instance of a service set-up could be bypassed at Network Provisioning, when configured and tested facilities have been pre-provisioned. This depends upon a particular provider's operational process and policy. It will also impact the timing of interactions with Network Inventory Management hence the interface sequence number has been omitted.

Interfaces may be required with other Service Providers or Network Operators when the service offered to a customer is one of many different kinds of joint service arrangements.

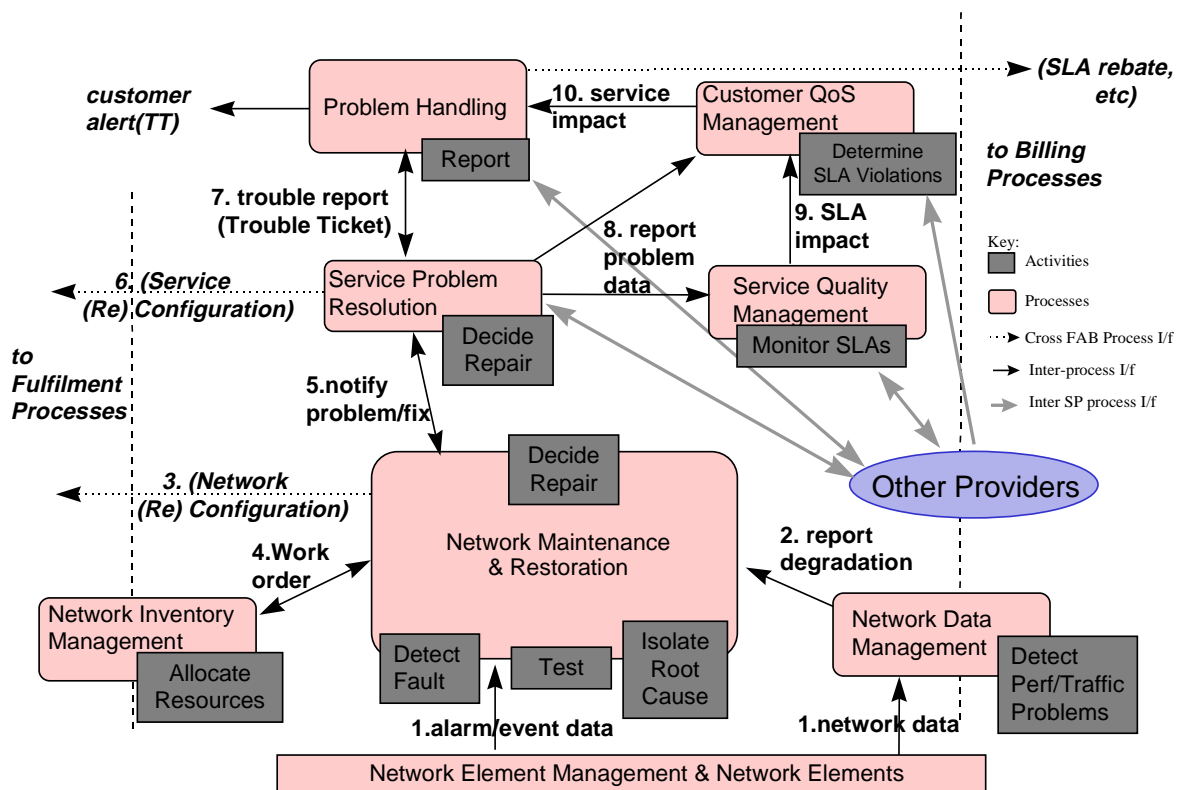


Figure 6.2: Rough Example of Service Assurance Process Flow

Network-Detected Fault/Quality of Service Problem Example

Figure 6.2 shows a possible sequence of activities in response to a network-detected problem. The problem could be non-service affecting because of inherent 'self healing' capabilities in the underlying network infrastructure (for example, SONET/SDH networks have some instant redirection capabilities). The service provider's policy could be to decide on how to repair the problem at the network layer and, subject to 'no-break in service', may not even inform the service layer of the event. The figure shows two ways a potential service affecting problem could be identified, i.e., by either an 'alarm event' or by synthesis of network data, through network data management. Neither is exclusive. Network data management logically collects and processes both performance and traffic data as well as usage data. The usage data is used as a logical part of the billing process.

Most Service Providers are driving their Service Assurance processes to become primarily proactive, meaning triggered by automation rather than triggered by the customer. This is important for improving service quality, customer perception of service and for lowering costs. Customer Care processes have been basically reactive. The extreme pressure on cost, customer demand for more control and customer demand for more proactive service support are driving a major shift to proactive support through automation. With the advent of Internet access, the goal for processes and automation is now customer interactive support, including giving the customer the ability to see and act on service performance.

If the service provided is one of many different joint service type arrangements, the main service provider must interface with other Service Providers or Network Operators to support the service provided.

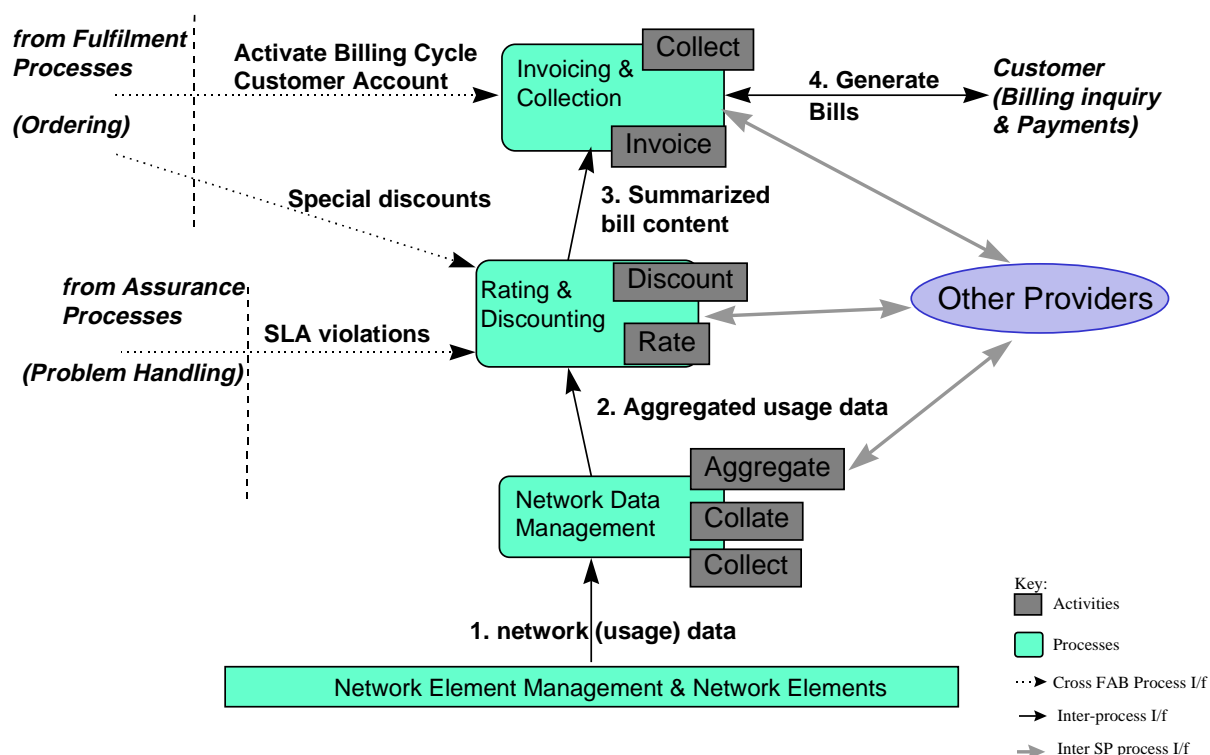


Figure 6.3: Rough Example of Billing Process Flow

Flat Rate, Usage and SLA Element Bill Generation Example

Figure 6.3 shows a typical sequence of activities to generate a bill that has flat rate elements (one-time installation, monthly recurring), usage charges and possible SLA adjustments. Service Providers may also choose to apply discounts or rebates (for outages and/or Service Level Agreement breaches) to a specific customer's bill, according to service type, by promotion, by customer relationship, according to its policy or customer contract.

When a service is provided by a combination of different Service Providers, usage and/or other billing data may be aggregated by the 'main' service provider from input by other 'secondary' Service Providers' and one bill presented to the customer. This is a trend, but depends on Service Provider billing strategy, customer wishes, the actual service arrangement provided, and/or service provider process capability and policy.

Chapter 7 - The Operational Processes

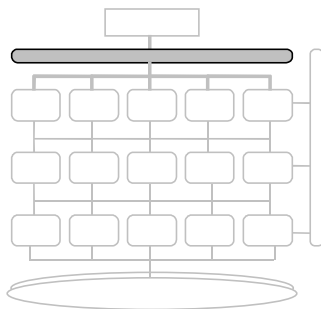
In this chapter the functions and interfaces of each process and sub-process block within the Telecom Operations Map is described, including the most common inputs and outputs. All of these processes involve *significant* work force management and planning activities at the global, sub-process and functional level.

The format and content of these Input-Output diagrams will evolve as the methodology for traceability evolves and experience provides new additional information to be captured.

Customer Care Processes

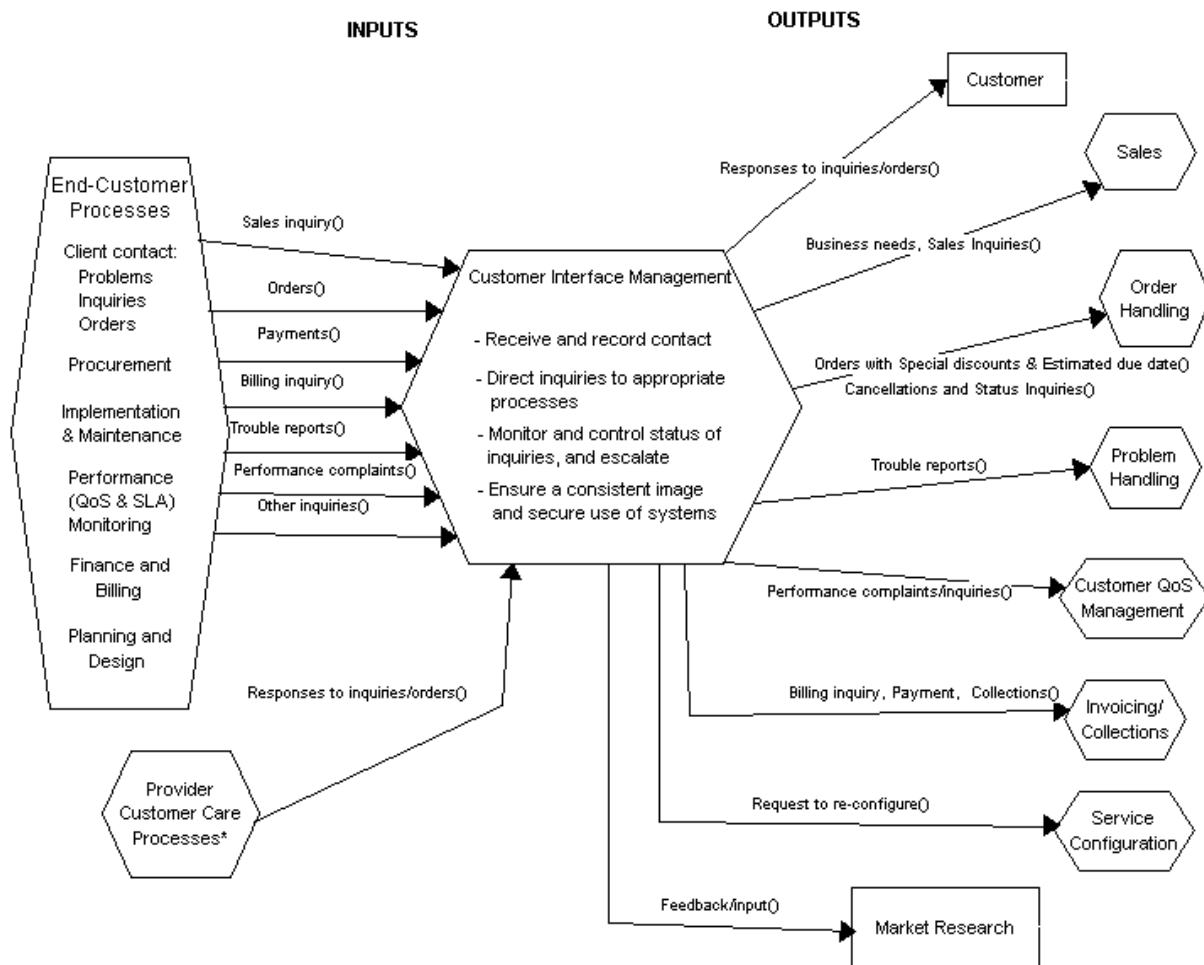
These processes involve direct interaction with an end-customer to provide, maintain, and bill for network services. The "end-customer" is the ultimate buyer of a communications service.

Customer Interface Management Processes



The Customer Interface Management Process may be a distinct process, or may be performed as part of the individual customer-care processes on an individual service or cross-service basis. These are the processes of directly interacting with customers and translating customer requests and inquiries into appropriate "events" such as, the creation of an order or trouble ticket or the adjustment of a bill. This process logs customer contacts, directs inquiries to the appropriate party, and tracks the status to completion. In those cases where customers are given direct access to service management systems, this process assures consistency of image across systems, and security to prevent a customer from harming their network or those of other customers. The aim is to provide meaningful and timely customer contact experiences as frequently as the customer requires.

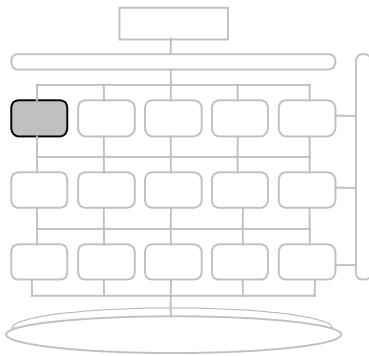
CUSTOMER INTERFACE MANAGEMENT



*Provider Customer Care Processes represent the collection of all Telops processes that provide information back to the Customer Interface Management Process. For example, in the Problem Handling process there is a Trouble Report flow back to Customer Interface Management.

Figure 7.1 Customer Interface Management Processes

Sales Process



The Sales Process encompasses learning about the needs of each customer, and educating the customer about the communications services that are available to meet those needs. It includes working to create a match between the customer's expectations and the service provider's ability to deliver. Depending on the Service Provider process it can be purely selling or can include various levels of support. The Sales process may include pre-order work and interfaces. The aim is to sell the correct service to suit the customer's need and to set appropriate expectations with the customer. SLA negotiation, RFP (Request for Proposal) management and negotiation are led from this process. The Sales function can be organizationally aligned by size of account, when functions provided for large accounts are different than for small accounts, for example. The aim is to identify customer needs, make a sale and take a service request that fulfill that need.

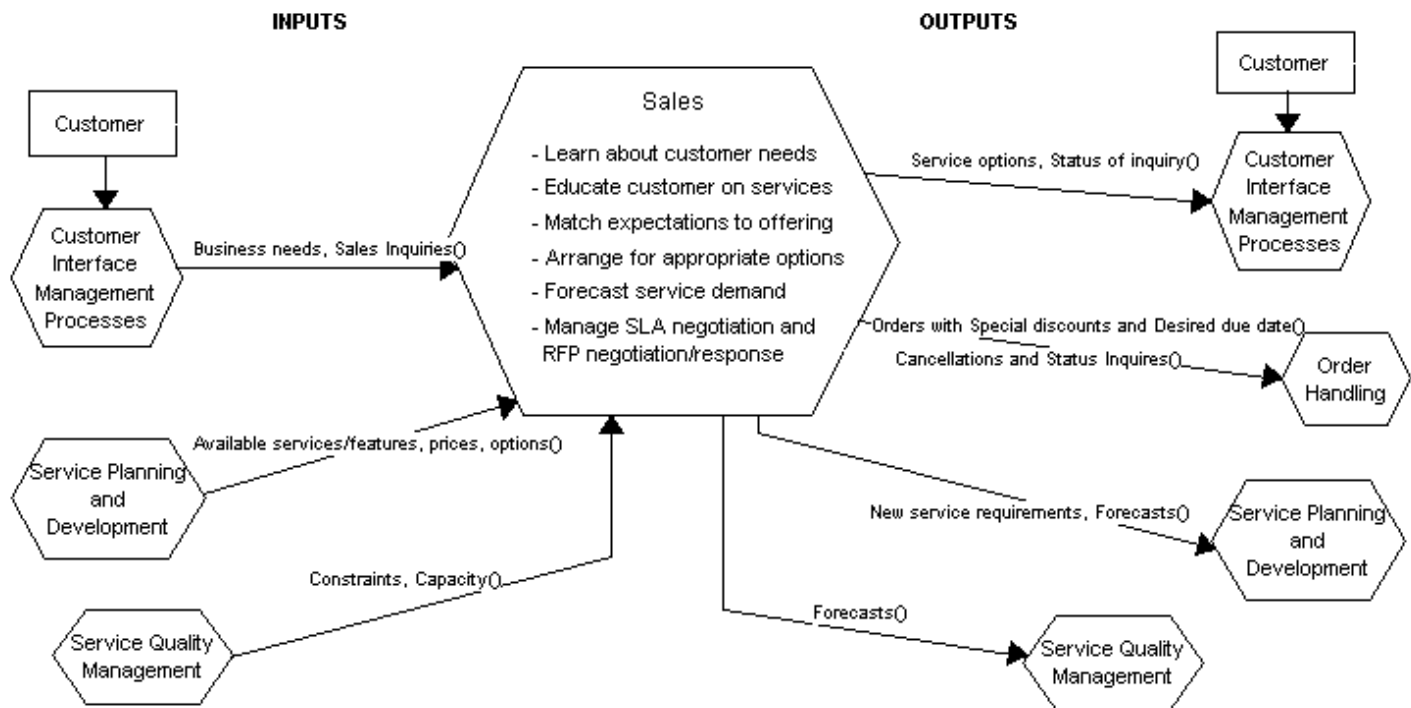
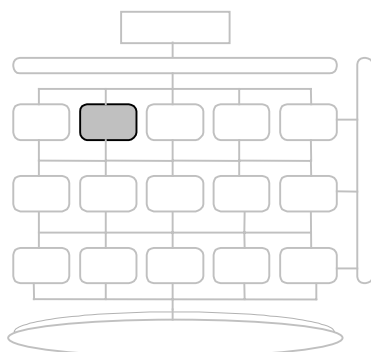
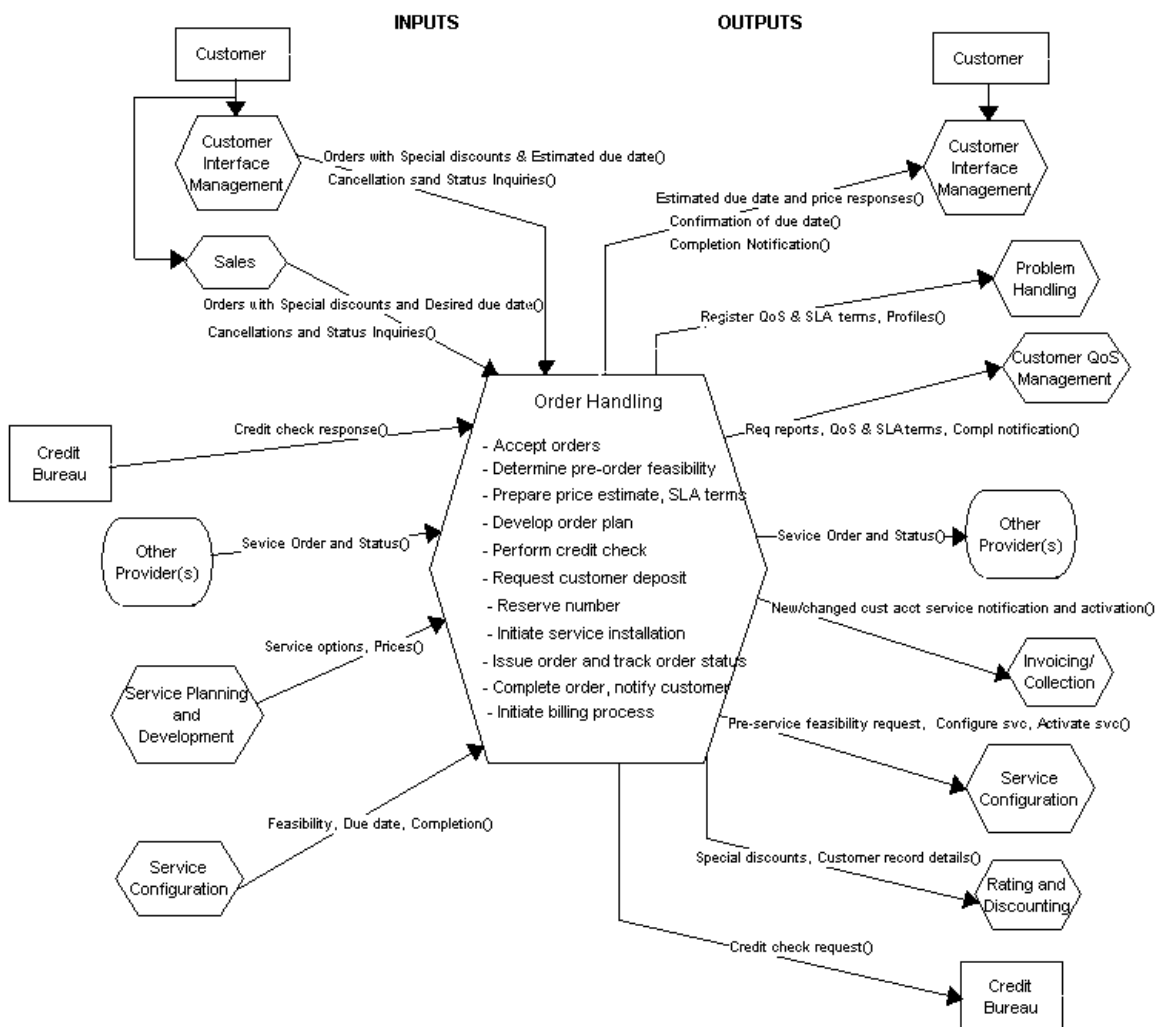


Figure 7.2: Sales Process

Ordering Process



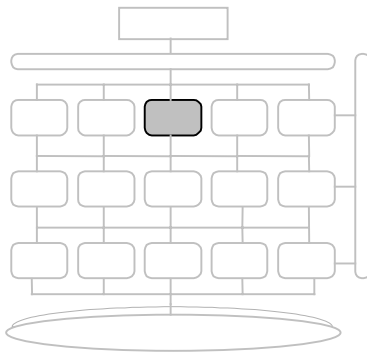
The Ordering Process includes all the functions of accepting a customer's order for service, tracking the progress of the order, and notifying the customer when the order is complete. Orders can include new, change and disconnect orders for all or part of a customer's service, as well as cancellations and modifications to orders. Pre-order activity that can be tracked is included in this process. The development of an order plan may be necessary when service installation is complex and/or is to be phased in. The need for preliminary feasibility requests and/or pricing estimates may be part of this process when certain services are ordered. The aim is to order the service the customer requested, support changes when necessary and to keep the customer informed with meaningful progress of their order, including its successful completion.



Service Orders to other providers can either be generated by the ordering process or by the service configuration process, depending on the nature of the service ordered by the customer. They can also be generated from Network and Systems Management processes when part of

Figure 7.3: Ordering Process

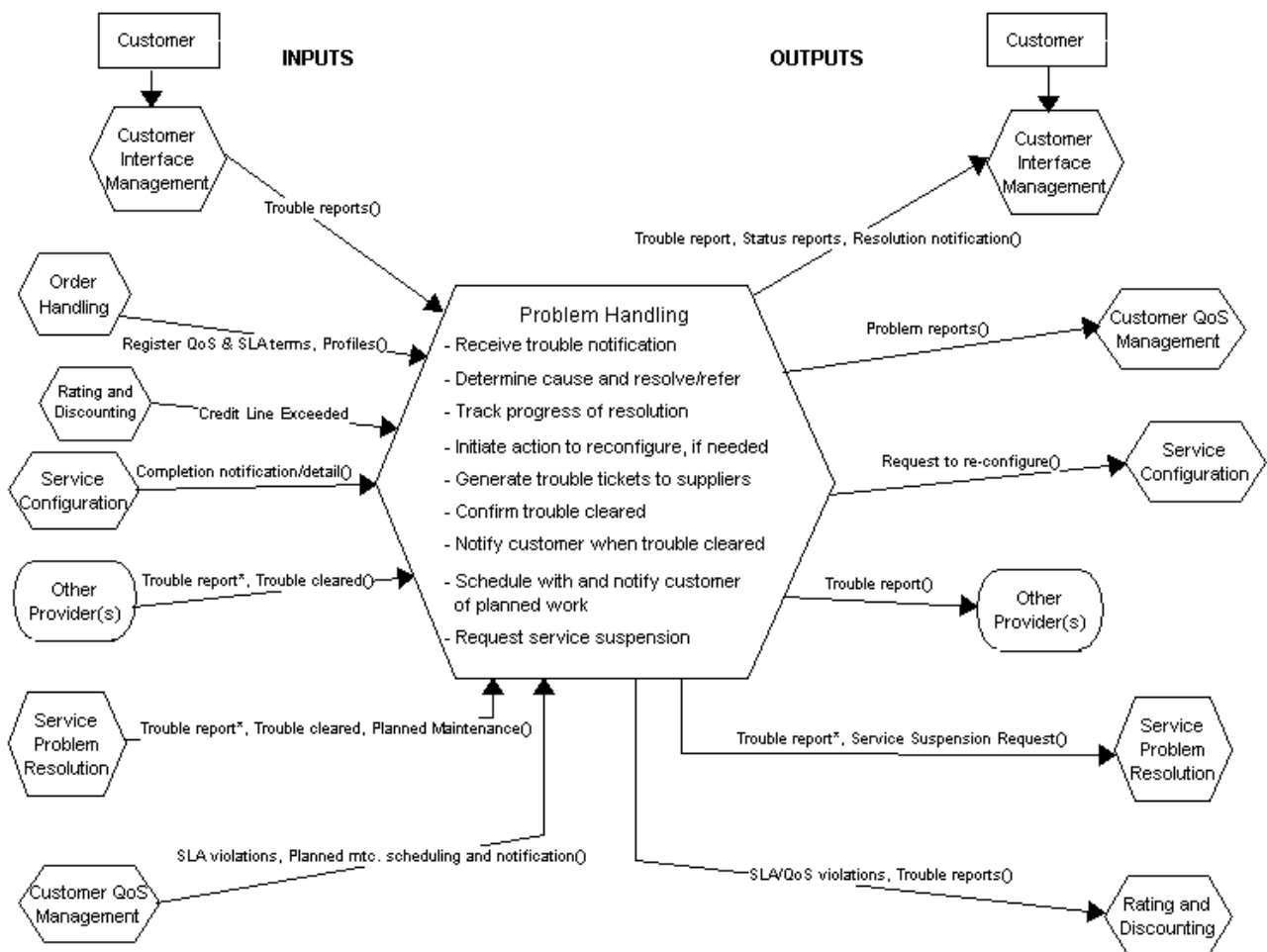
Problem Handling Process



The Problem Handling Process is responsible to receive service complaints from customers, resolve them to the customer's satisfaction and provide meaningful status on repair or restoration activity--reactive. This process is also responsible to be aware of any service-affecting problems, including

- notifying the customer in the event of a disruption (whether reported by the customer or not)
- resolving the problem to the customer's satisfaction
- providing meaningful status on repair or restoration activity.

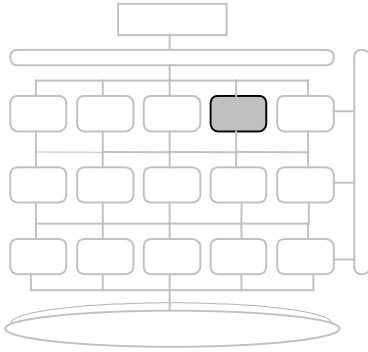
This proactive management also includes planned maintenance outages. The aim is to have the largest percentage of problems proactively identified and communicated to the customer, to provide meaningful status and to resolve the problem in the shortest timeframe.



* When a trouble is reported by the customer, a trouble report may be sent to Service Problem Resolution for correction. When a trouble is identified by Service Problem Resolution (via Service Quality Management or Network Maintenance and Restoration) then Problem Handling is notified in order to inform the customer of the problem.

Figure 7.4: Problem Handling Process

Customer Quality of Service (QoS) Management Process



This process encompasses monitoring, managing and reporting of quality of service as defined in Service Descriptions, Service Level Agreements (SLA), and other service-related documents. It includes network performance, but also performance across all of service parameters, e.g., Orders Completed On Time. Outputs of this process are standard (predefined) and exception reports, including; dashboards, performance of a service against an SLA, reports of any developing capacity problems, reports of customer usage patterns, etc. In addition, this process responds to performance inquiries from the customer. For SLA violations, the process supports notifying Problem Handling and, for QoS violations, notifying Service Quality Management. The aim is to provide effective monitoring. Monitoring and reporting must provide SP management and customers meaningful and timely performance information across the parameters of the services provided. The aim is also to manage service levels that meet specific SLA commitments and standard service commitments for the customer.

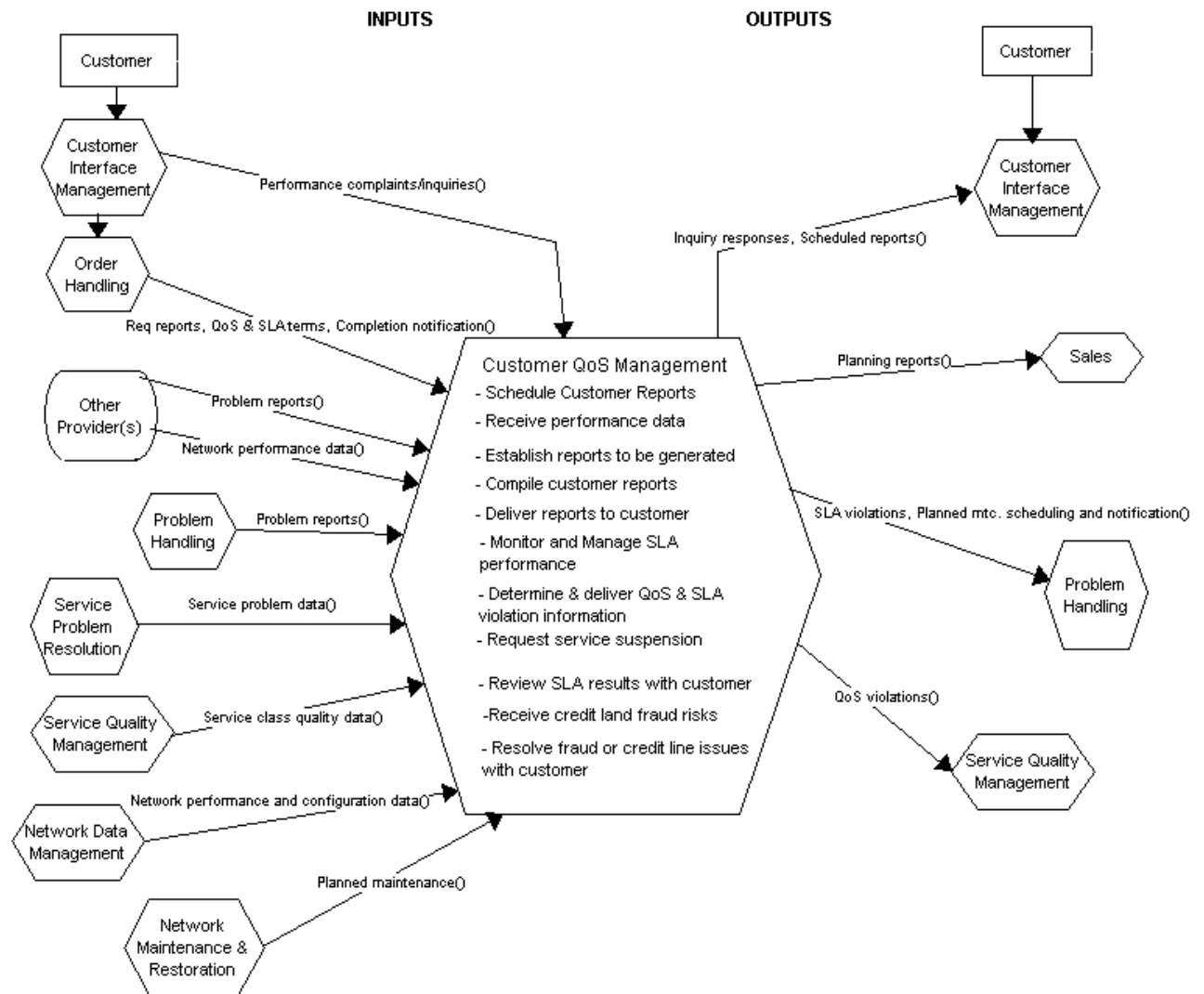
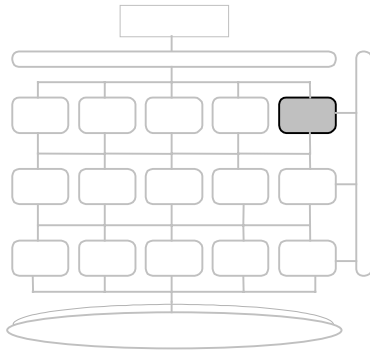


Figure 7.5: Customer Quality of Service Management Process

Invoicing and Collection Process



This process encompasses sending invoices to customers, processing their payments and performing payment collections. In addition, this process handles customer inquiries about bills, and is responsible to resolve billing problems to the customer's satisfaction. The aim is to provide a correct bill and, if there is a billing problem, resolve it quickly with appropriate status to the customer. An additional aim is to collect monies due the service provider in a professional and customer supportive manner.

Some providers provide invoicing and collections functions for other providers as a service. For joint service arrangements, billing, invoicing, settlements and reconciliation between Service Providers may be involved.

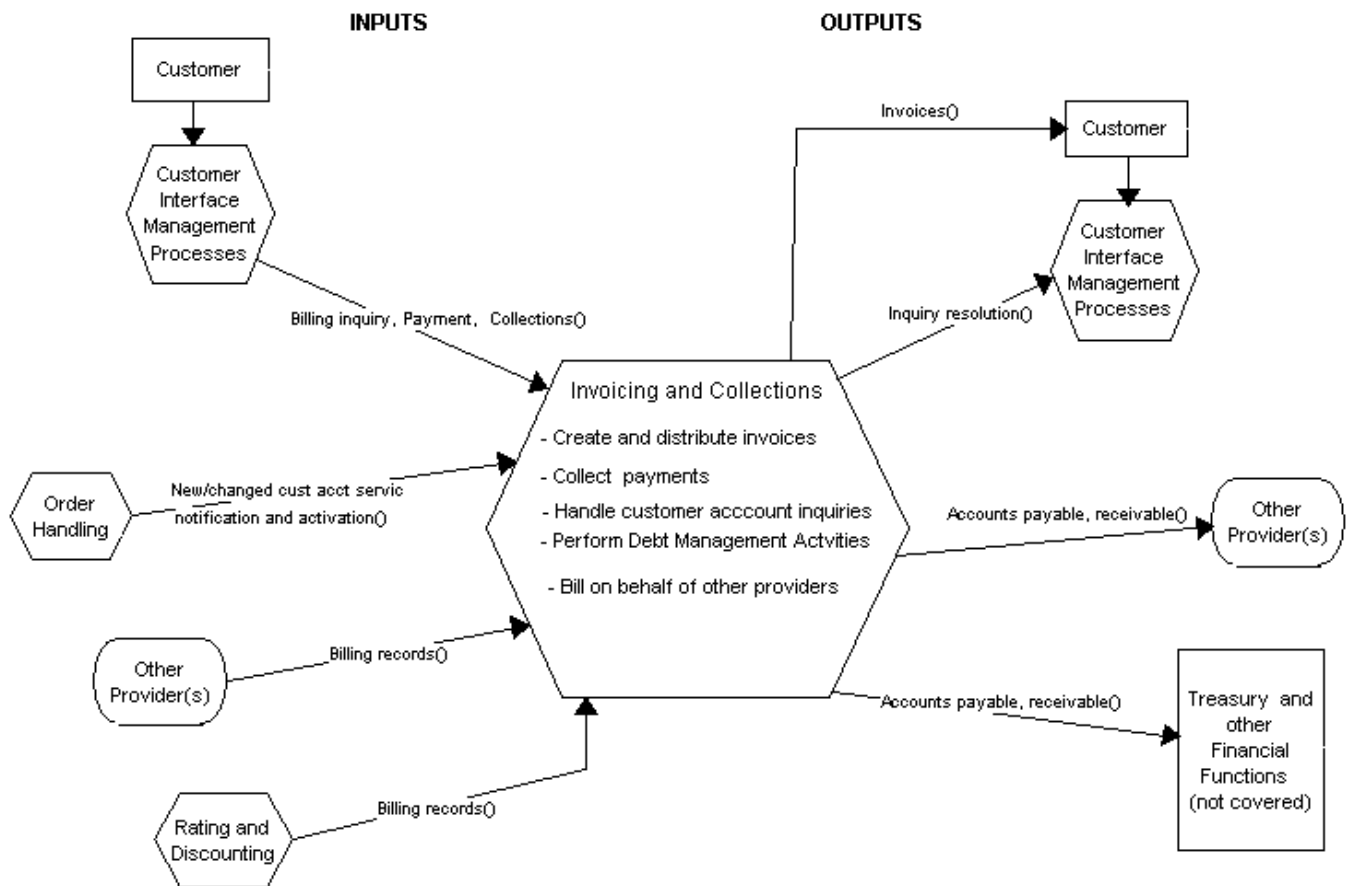
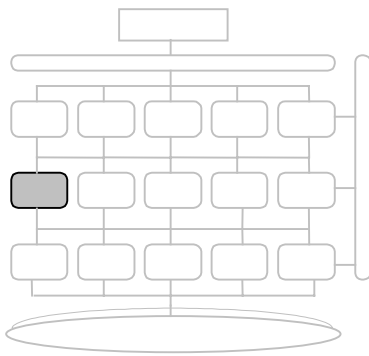


Figure 7.6: Invoicing and Collection Process

Service Development and Operations Processes

These processes are generally "one step removed" from day-to-day customer interaction. Focus is on service delivery and management as opposed to the management of the underlying network and information technology. Some of these functions are done on a one-time basis, like designing and delivering a new service or feature. Other functions involve the application of a service design to specific customers or managing service improvement initiatives, and are closely connected with the day-to-day customer experience.

Service Planning and Development Process



This process encompasses:

- Designing technical and non-technical capability to meet specified market need at desired cost. This can be a new service, new feature, service enhancement, upgrade or maintenance.
- Negotiating joint service arrangements, especially SLAs with other provider.
- Ensuring that the service (product) can be properly installed, monitored, controlled, and billed
- Initiating appropriate process and methods modifications, as well as initiating changes to levels of operations personnel and training required
- Initiating any modifications to the underlying network or information systems to support the requirements
- Performing pre-service testing that the technical capability works and that the operational support process and systems function properly. This usually is done in an Operations Readiness Test prior to first service.
- Ensuring that sufficient capacity is available to meet forecasted sales.

The aim is rapid development and deployment of new services, service enhancements and/or capacity at specified cost , support and quality requirements.

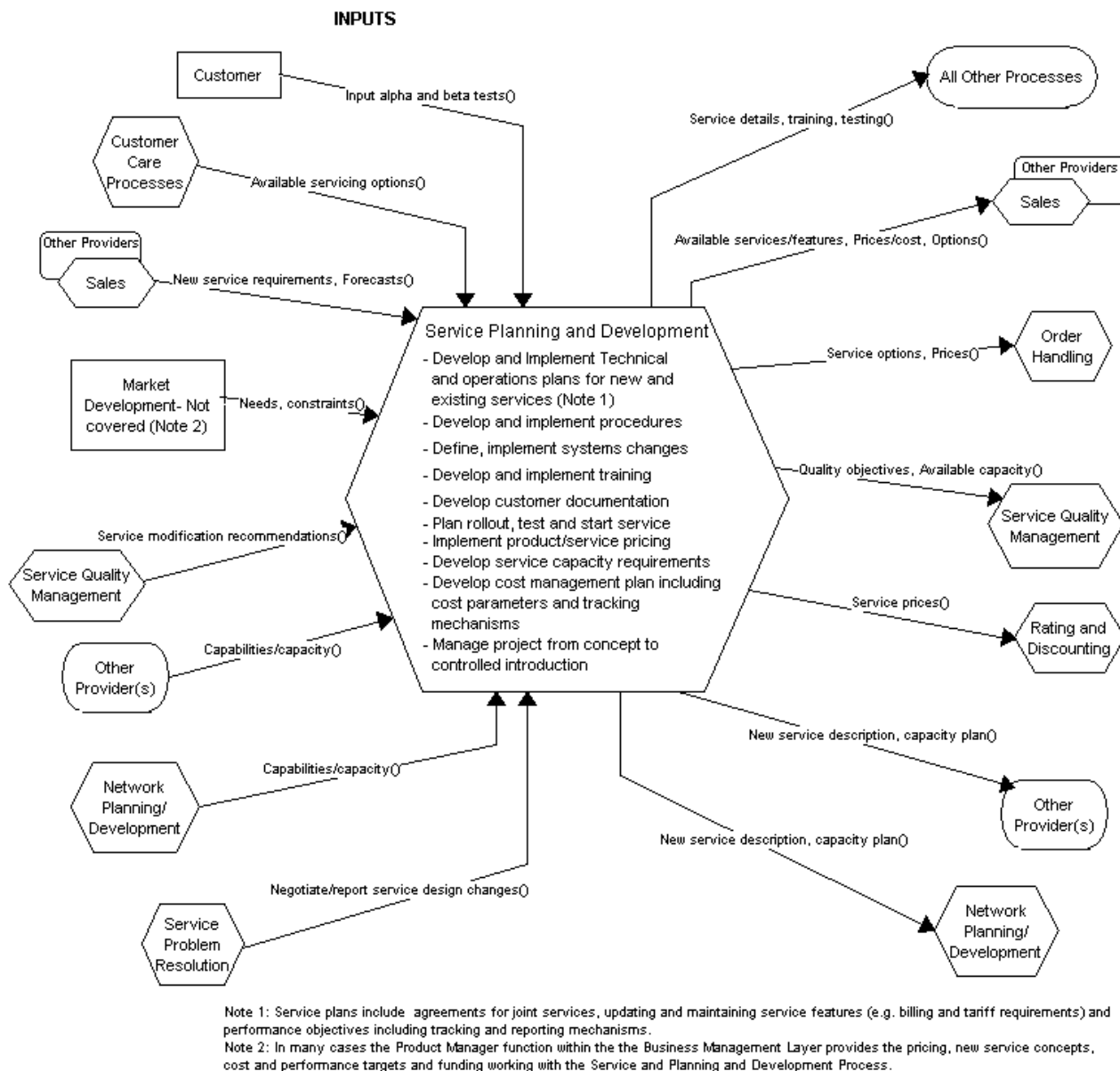
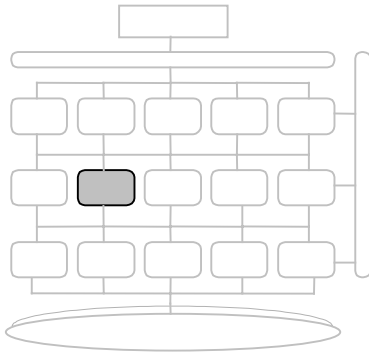


Figure 7.7: Service Planning and Development Process

Service Configuration Process



This process encompasses the installation and/or configuration of service for specific customers, including the installation/configuration of customer premises equipment. It also supports the re-configuration of service (either due to customer demand or problem resolution) after the initial service installation. The aim is to correctly provide service configuration, especially connection management within the timeframe required to meet ever-decreasing service intervals.

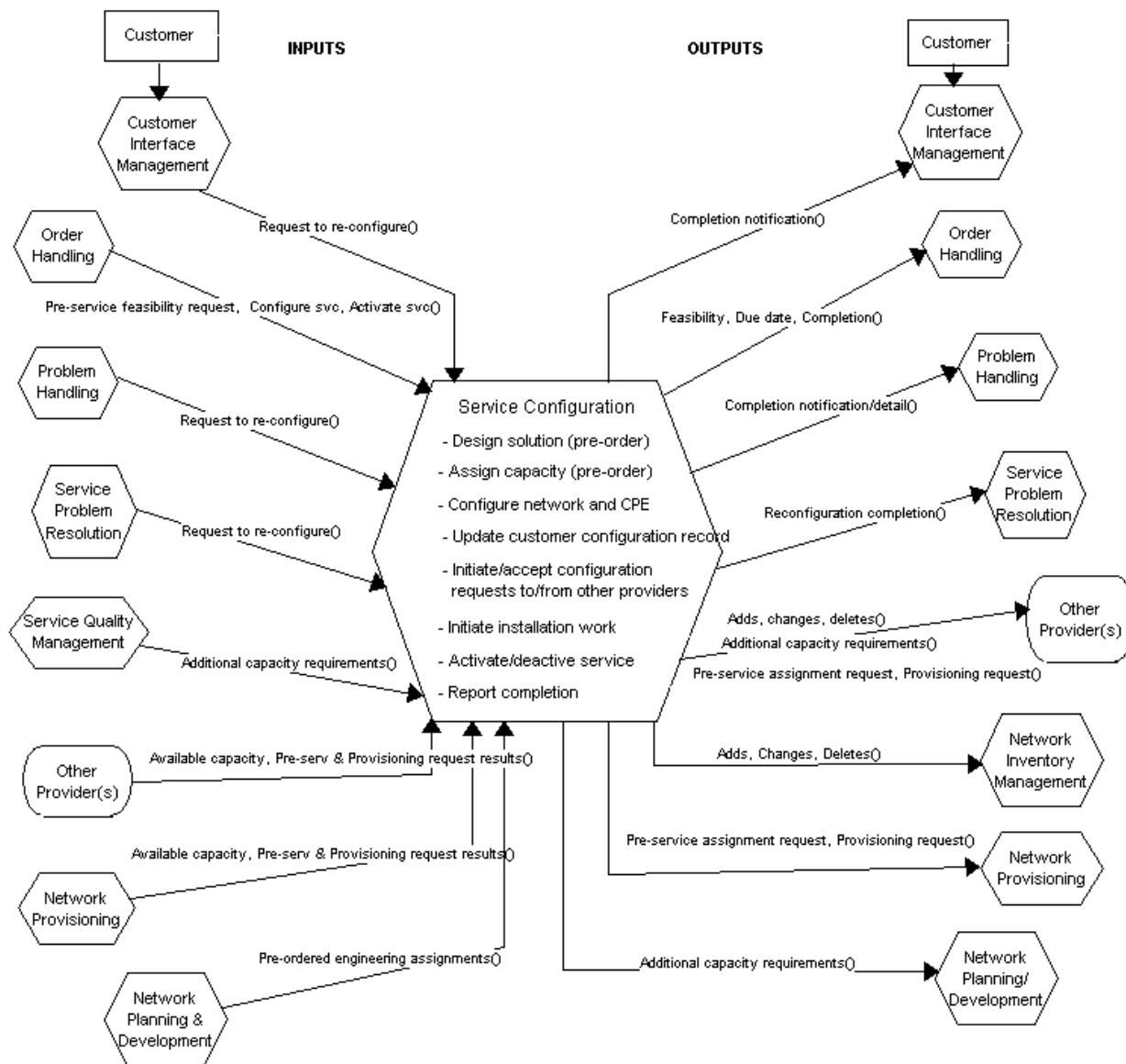
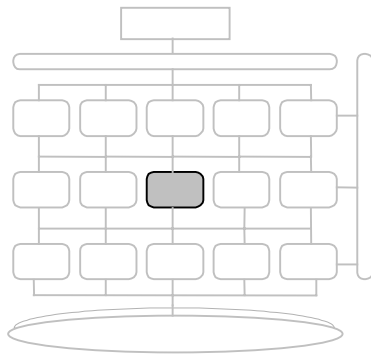
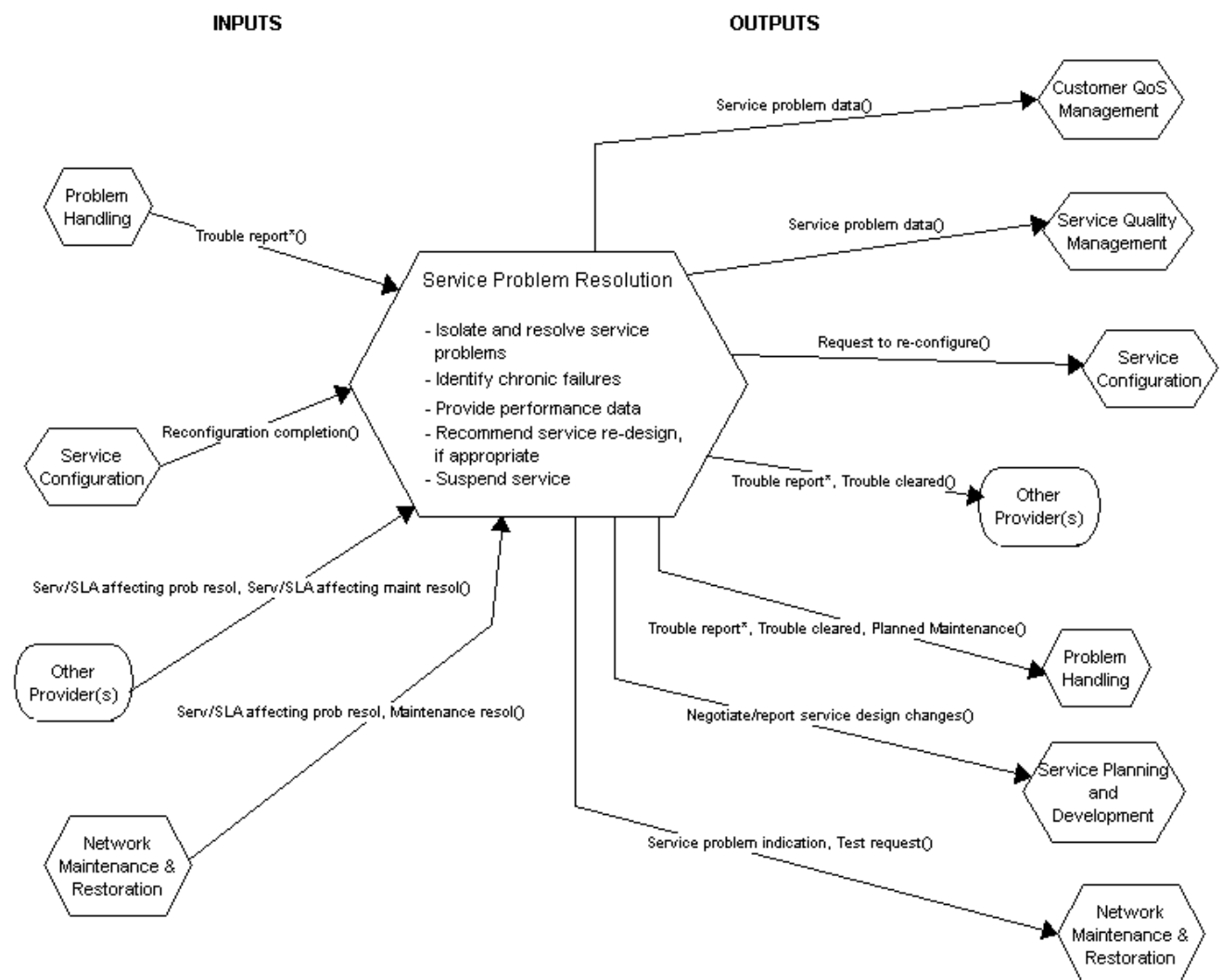


Figure 7.8: Service Configuration Process

Service Problem Resolution Process



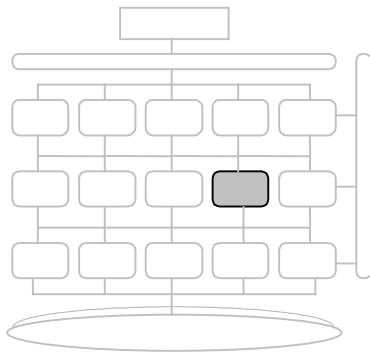
This process encompasses isolating the root cause of service affecting and non-service affecting failures and acting to resolve them. Typically, failures reported to this process affect multiple customers. Actions may include immediate reconfiguration or other corrective action. Longer-term modifications to the service design or to the network components associated with the service may also be required. The aim is to understand the causes impacting service performance and to implement immediate fixes or initiate quality improvement efforts.



* When multiple troubles are reported by customers of a service, a report may be sent from Problem Handling to Service Problem Resolution for correction. When a trouble is identified by Service Problem Resolution (via Network Maintenance & Restoration) then Service Problem Resolution notifies Problem Handling.

Figure 7.9: Service Problem Analysis and Resolution Process

Service Quality Management Process



This process supports monitoring service or product quality and cost on a service class basis in order to determine

- Whether service levels and costs are being met consistently
- Whether there are any general problems with the service or product
- Whether the sale and use of the service is tracking to forecasts.

This process also encompasses taking appropriate action to keep service levels within agreed targets for each service class and to either keep ahead of demand or alert the sales process to slow sales. The aim is to provide to provide effective service specific monitoring, to provide management and customers meaningful and timely performance information across the parameters of the specific service. The aim is also to manage service levels to meet SLA commitments and standard commitments for the specific service. Service Quality Management manages the service from first service to retirement of the service.

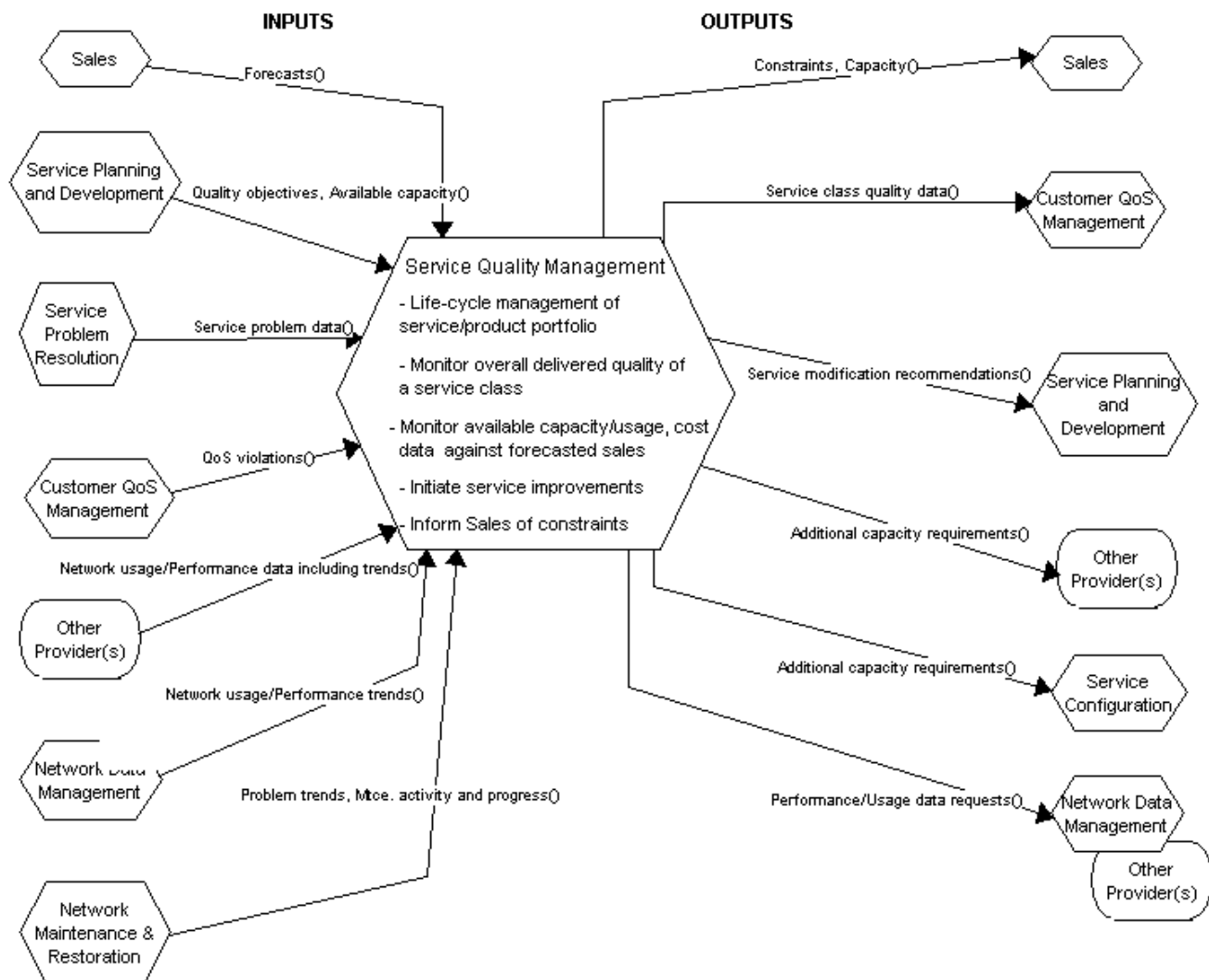
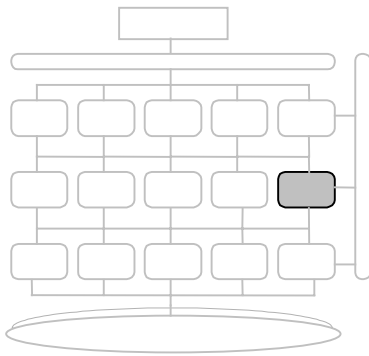


Figure 7.10: Service Quality Management Process

Rating and Discounting Process



This process encompasses

- Applying the correct rating rules to usage data on a customer-by-customer basis, as required
- Applying any discounts agreed to as part of the Ordering Process
- Applying promotional discounts and charges
- Applying outage credits
- Applying rebates due because service level agreements were not met
- Resolving unidentified usage

The aim is to correctly rate usage and to correctly apply discounts, promotions and credits.

Some providers provide rating and discounting functions for other providers as a service. For joint service arrangements, billing, invoicing, settlements and reconciliation between Service Providers may be involved.

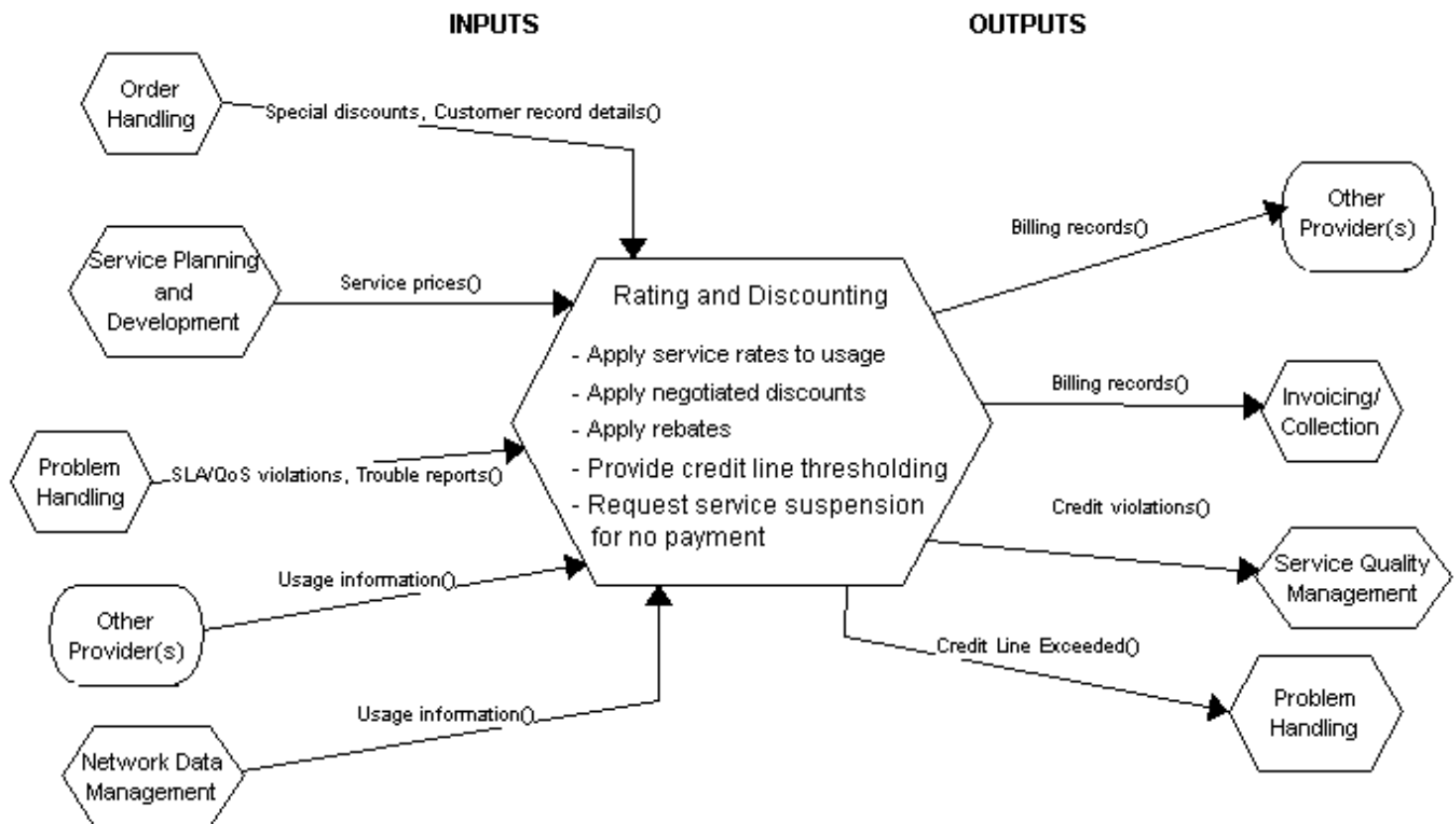


Figure 7.11: Rating and Discounting Process

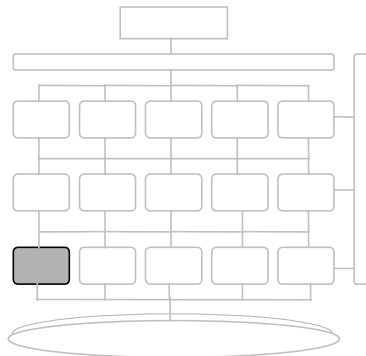
Network and Systems Management Processes

These processes are responsible for ensuring that the network infrastructure supports the end to end delivery of the required services. Network management is a key integration layer between the Element Management Layer and the Service Management Layer. Its basic function is to assemble information from the Element Management systems, and then integrate, correlate, and in many cases, summarize that data to pass on the relevant information to Service Management systems.

Network Management is more than just a mediator between the EML and SML. Network Management has its own responsibilities; for example, network provisioning and network fault management. The key issue is that management responsibility will be placed at a level where adequate information is present, instead of shifting all responsibilities to Service Management. At this point Systems Management (IT) is not explicitly addressed but would logically need to be integrated into the architecture at this point.

The Network and Systems Management processes manage the complete Service Provider network and sub-network. Much of the interface is through Element Management.

Network Planning & Development Process



This process encompasses development and acceptance of strategy, description of standard network configurations for operational use, definition of rules for network planning, installation and maintenance.

This process also deals with designing the network capability to meet a specified service need at the desired cost and for ensuring that the network can be properly installed, monitored, controlled, and billed. The process is also responsible for ensuring that enough network capacity will be available to meet the forecasted demand and supporting cases of unforecasted demand. Based on the required network capacity, orders are issued to suppliers or other network operators (ONO's) and site preparation and installation orders are issued to Network Inventory Management or a third party Network Constructor (work orders). A design of the logical network configuration is provided to Network Provisioning.

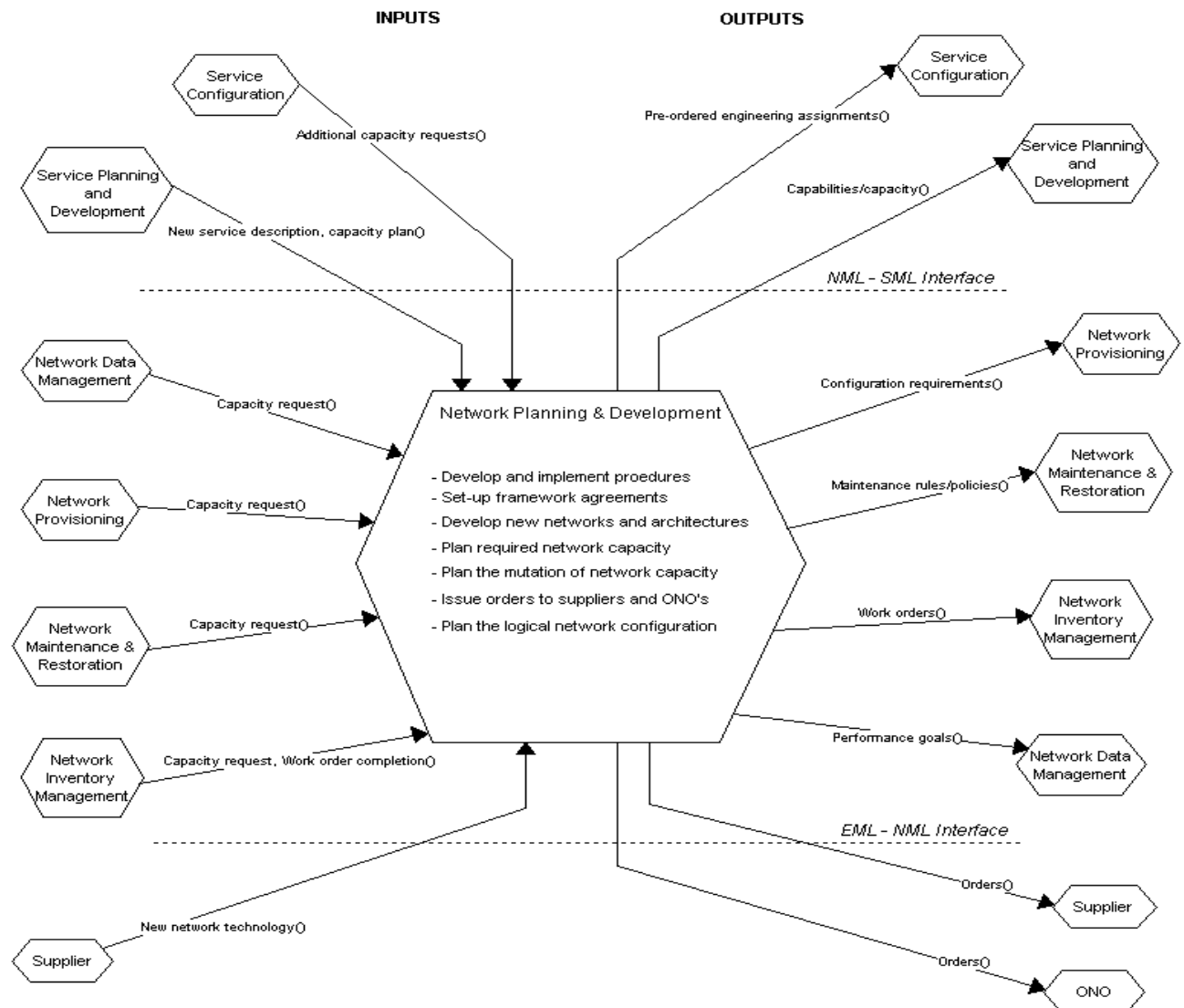
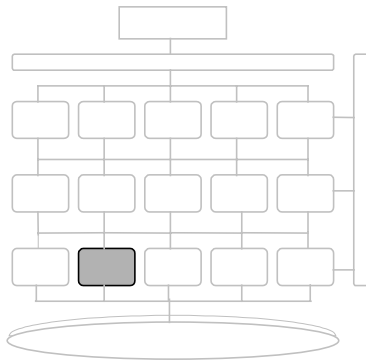


Figure 7.12: Network Planning & Development Process

Network Provisioning Process



This process encompasses the configuration of the network, to ensure that network capacity is ready for provisioning of services. It carries out network provisioning, as required, to fulfill specific service requests, and configuration changes to address network problems. The process must assign and administer identifiers for provisioned resources and make them available to other processes.

Note that the routine provisioning of specific instances of a customer service (especially 'simple' services such as POTS) may not normally involve Network Provisioning but may be handled directly by Service Provisioning or Customer Care, Order Handling from a pre-configured set.

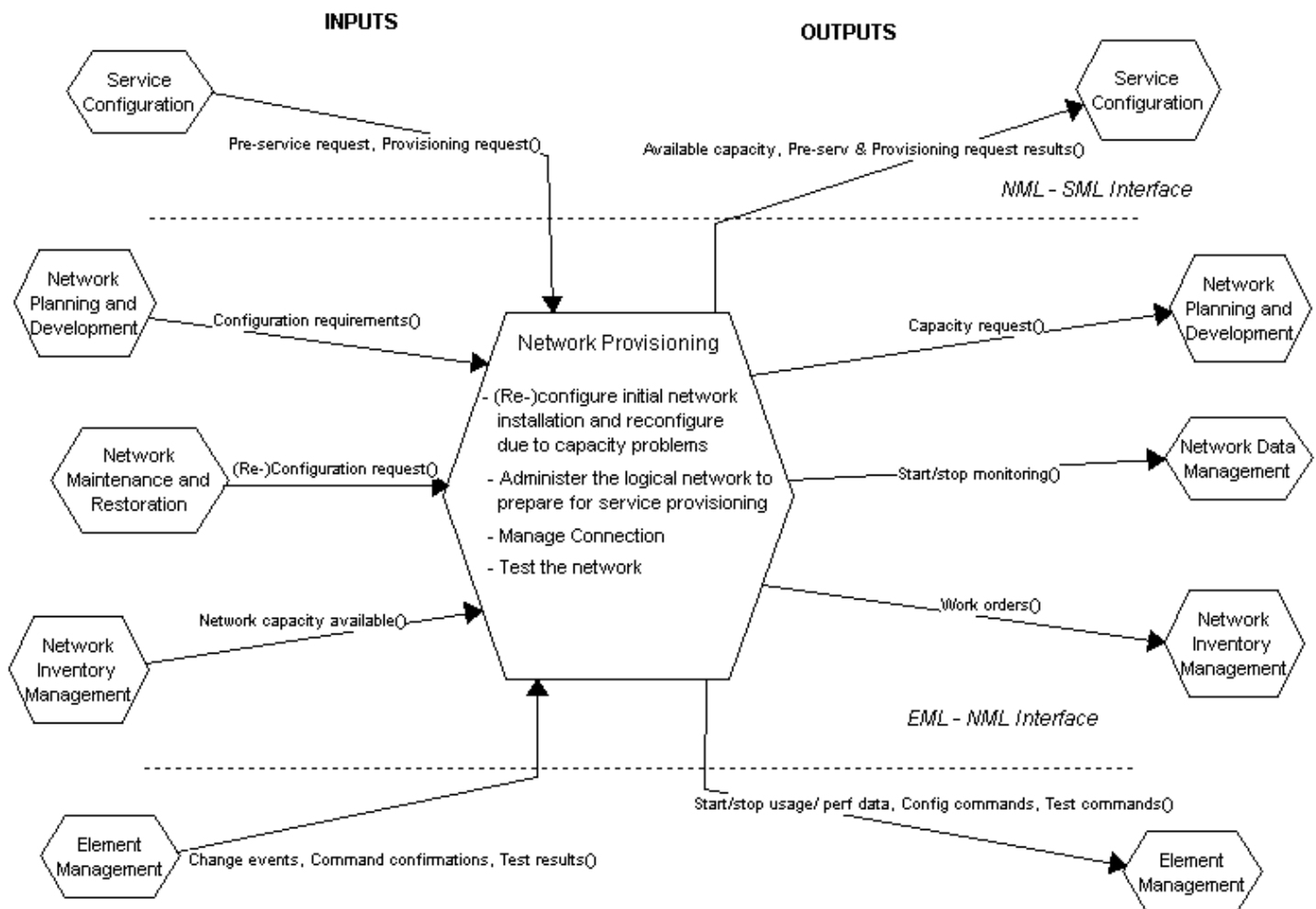
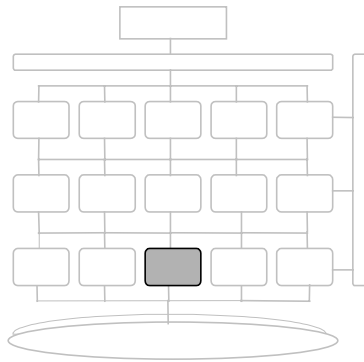


Figure 7.13: Network Provisioning Process

Network Inventory Management Process



This process encompasses anything to do with physical equipment and the administration of this equipment. The process is involved in the installation and acceptance of equipment, with the physical configuration of the network, and is also involved with the spare parts and the repair sub-processes. Software upgrades are also a responsibility of this process.

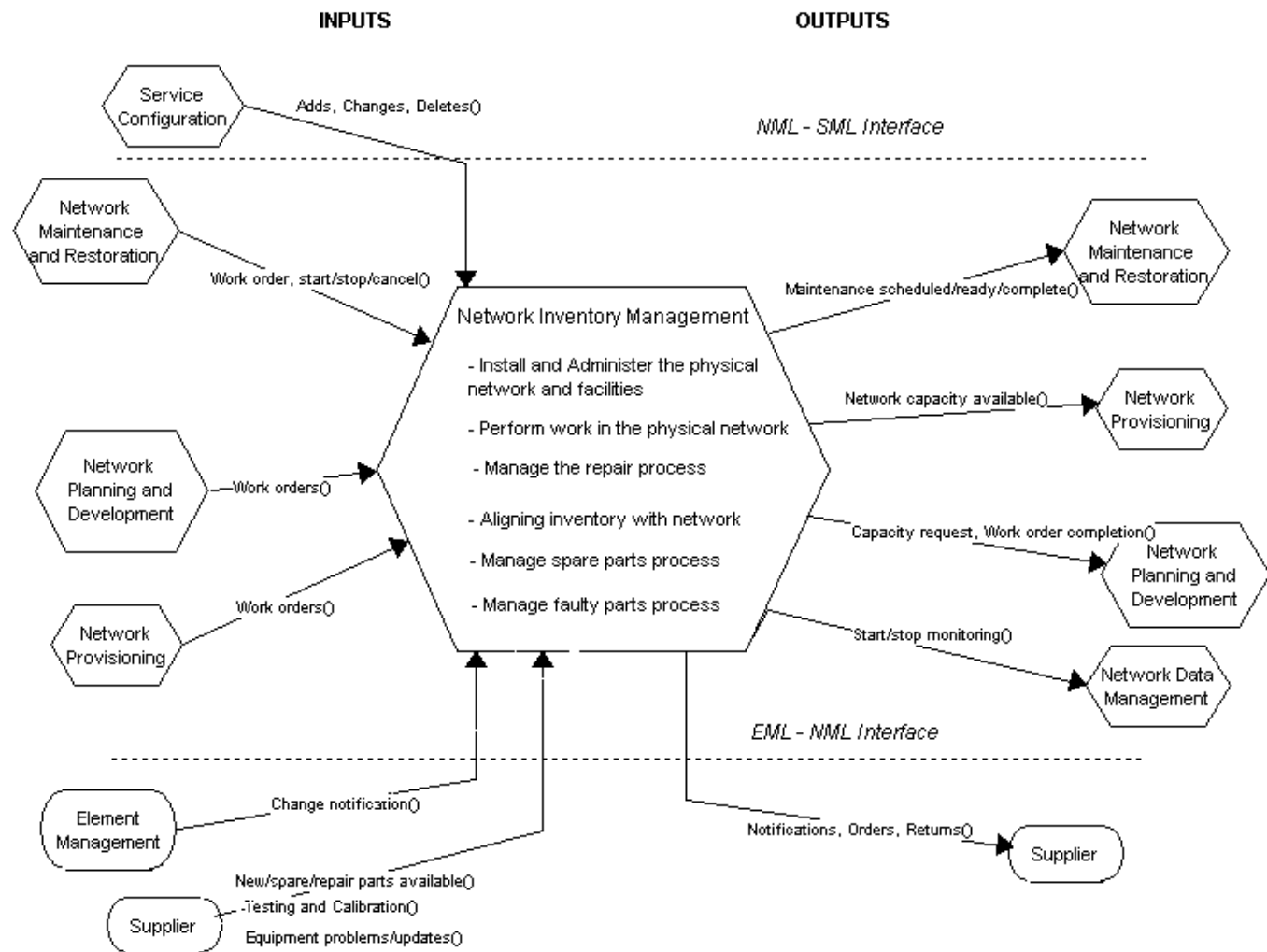
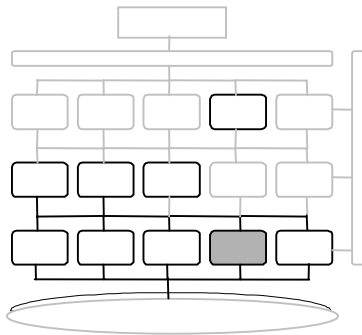


Figure 7.14: Network Inventory Management Process

Network Maintenance & Restoration Process



This process encompasses maintaining the operational quality of the network, in accordance with required network performance goals. Network performance goals are set to support the service levels of the services provided through the network infrastructure. Network maintenance activities can be preventative (such as scheduled routine maintenance) or corrective. Corrective maintenance can be in response to faults or to indications that problems may be developing (proactive). This process responds to problems, initiates tests, does analysis to determine the cause and impact of problems, and notifies Service Management of possible effects on quality. The process issues requests for corrective actions.

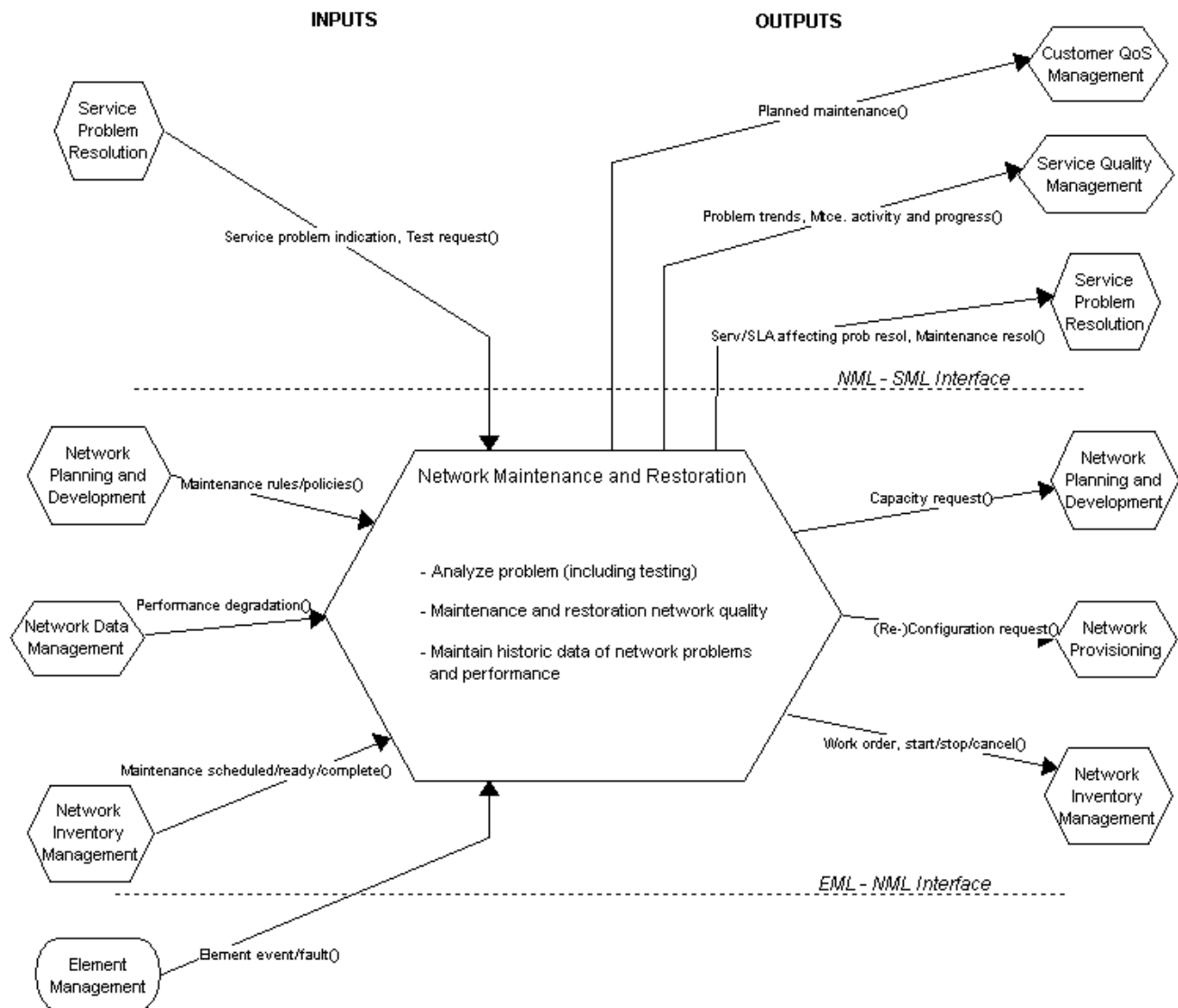
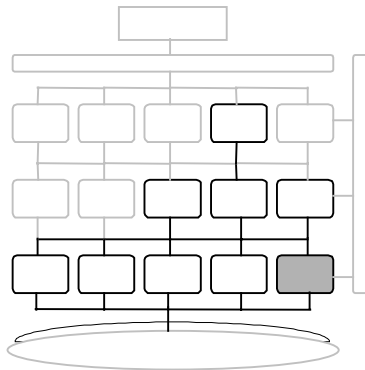


Figure 7.15: Network Maintenance & Restoration Process

Network Data Management Process



This process encompasses the collection of usage data and events for the purpose of network performance and traffic analysis. This data may also be an input to Billing (Rating and Discounting) processes at the Service Management Layer, depending on the service and its architecture.

The process must provide sufficient and relevant information to verify compliance/ non-compliance to Service Level Agreements and QoS levels. The Service Level Agreements themselves are not known at the NML. The process must provide sufficient usage information for rating and billing.

This process must ensure that the Network Performance goals are tracked, and that notification is provided when they are not met (threshold exceeded, performance degradation). This also includes thresholds and specific requirements for billing. This includes information on capacity, utilization, traffic and usage collection. In some cases, changes in traffic conditions may trigger changes to the network for the purpose of traffic control. Reduced levels of network capacity can result in requests to Network Planning for more resources.

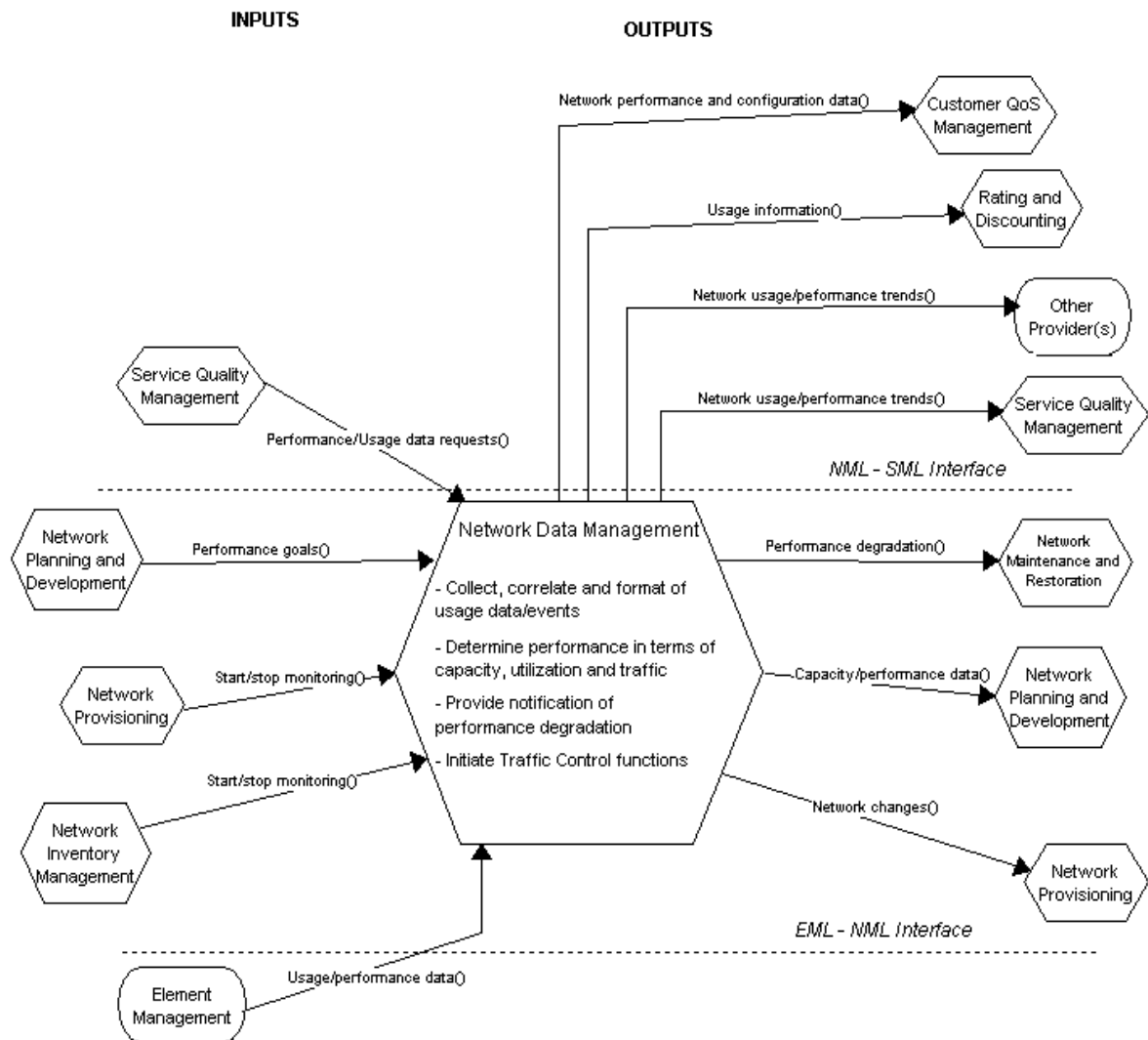


Figure 7.16: Network Data Management Process

Chapter 8 - Using the Telecom Operations Map

Strategically the Service Provider must introduce automation to be competitive. This must be done such that it enables differentiation where critical and enables use of common industry solutions to drive down system costs. Moreover, the interactions among Service Providers and between Service Providers and Suppliers must be based on a common understanding in order to avoid cost and delay associated with customized solutions and misunderstanding.

The map can be used in a variety of ways to support these objectives. Many uses have been highlighted already. The basic purpose of the map is to provide a common framework to drive end-to-end process automation for communications processes. It can be used by Service Providers internally and externally. It can be used by suppliers for identifying product developments and with their customers, the Service Providers. It is an excellent starting point for Service Providers to view their own process architecture and to architect or re-architect their processes, including determining their interface and automation requirements.

Evaluation Framework

Within TeleManagement Forum, the Telecom Operations Map will be used as a framework to evaluate and position all existing and future projects that may impact service and network management processes. In particular, the TeleManagement Forum program of 'implementation projects' has been set up to encourage vendors to demonstrate how their products can work together to deliver automated process flow-through and process/function automation for one or more interfaces of the map. These projects are expected to demonstrate how they support the process interactions shown in this and more detailed documents. The TM Forum encourages 'write a little, do or test a little.' The Telecom Operations Map is the framework for trying, for testing and for detailed documentation. The TM Forum process results in:

- Business Agreements, which document requirements
- Information Agreements, which document information models
- Solution demonstrations
- Real products in the market

In addition, the TeleManagement Forum has produced a companion document (The *Technology Integration Map*, Reference 3) addressing technology selection issues supporting the information flow at various points in the framework. The *Technology Integration Map* makes recommendations concerning which technologies are most appropriate to use in specific situations and how they should be integrated together (CMIP, CORBA, JAVA, WEB, etc). Application Building Block recommendations are

expected in the upcoming release of this document. Together these documents will be used to guide vendors to achieve integrated solutions that more effectively support the needs of the Service Providers.

Communicating results

The results of these projects have been and will continue to be publicly demonstrated. The details of the information flows between component applications are and will be documented for inclusion in TM Forum's Common Information Facility. Requirements and Information work from all TM Forum teams are and will be documented in the CIF. As the baseline population of the CIF is completed, more and more definition will be available for the detailed interfaces at various reference points within the map framework. Ensuring increasing availability of products that work together in a standardized way to support true end-to-end process automation is supported by this process of:

- Providing broad availability to Evaluation Version requirements and object models
- Subsequently making widely available quality assured, implementation tested requirements and common object models

This support will be both for interfaces that are external to a service provider (to a customer or another service provider) or internal, within or between operations processes and systems.

Many Service Providers and vendors have made use of the TM Forum's Service Management Business Process Model document (which this Telecom Operations Map supercedes) to lay out a way to progress to more effective operations systems. This enhanced version, which includes feedback from that experience and more detail of the network management processes, helps to further consolidate the direction of the industry for buyers and sellers. TM Forum is determined to ensure that its work will continue to link closely to this framework and that deliverables and demonstrated products will show real business benefits for those who choose to adopt such an approach.

A basis for discussions

Service Providers are particularly encouraged to continue to use the Telecom Operations Map in discussions with their suppliers as a common reference point and terminology for procurement. They can use it internally with their staff as a way to share a common vision of how their business needs to evolve to stay competitive in today's, and tomorrow's, marketplace. It should be used as the basis for discussion of service provider business process re-engineering, since it is the result of wide industry discussion among some of the world's leading experts.

For vendors the Operations Map gives unique insights about how Service Providers are structuring and restructuring their way of doing business now and in the future. It

gives valuable information that will enable the vendors to structure product offerings to meet those needs. It will also help vendors source third party applications which align with the Map, enabling them to build incremental solutions sales more cost effectively. Finally, the Telecom Operations Map provides everyone with an industry neutral terminology, reducing confusion and misunderstanding, and speeding up the procurement cycle.

Important Ways the Map is used

In summary, just some of the key ways Service Providers have and continue to use the TeleManagement Forum Telecom Operations Map are for:

- Internal and external discussion (reduce debate)
- Identifying and showing needs, developing requirements
- Developing interface requirements and information models
- Negotiating automated interfaces with partners
- Asking suppliers “where they fit on the map”

Just some of the key way suppliers have and continue to use the TeleManagement Forum Telecom Operations Map are for:

- Better understanding of how Service Providers operate and thus develop and provide solutions and products that meet the customer need
- Identifying interfaces for solution delivery with other suppliers
- Determining interface and automation needs of providers
- Showing customers ‘where they fit’

Supporting documentation

Supporting documentation for the Telecom Operations Map can be obtained from TM Forum via its web (<http://www.tmforum.org>) and FTP sites. A number of Business Agreements (requirements) and Information Agreements (protocol neutral information models) are already available for process interfaces to TM Forum members. In addition, TM Forum has produced a detailed operations map for network management (Network Management Detailed Operations Map, Reference 2). It provides more detail of supporting functions and processes for network management than can be found in this document. It should be of interest to developers and to those who have more need to understand the complexities of network operations management.