



INOVAÇÃO

NOSSIS Overview (Simplified)

Technical Product Description

Suite NOSSIS V2.0

01.06.2012

DOCUMENT VERSIONS HISTORY

Version	Date	Reason
1.0	2011-12-14	1st document version
1.1	2012-06-01	Document global revision

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GLOSSARY OF TERMS AND ABBREVIATIONS

Abbreviations

ADSL	Asymmetric Digital Subscriber Line
API	Application Programming Interface
BOT	Back Office Technician
BSS	Business Supporting System
CC	Call Centre
CRM	Customer Relationship Management
DW	Data Warehouse
E2E	End-To-End
eTOM	Enhanced Telecom Operations Map
FR	Fault Report/Request
GPS/GPRS	Global Positioning System / General Packet Radio Service
IP	Internet Protocol
KPI	Key Performance Indicator
KQI	Key Quality Indicator
MTBF	Mean Time Between Failures
MTTR	Mean Time To Repair
NA	Network Activator
NGOSS	New Generation Operations Systems and Software
OM	Order Manager
OMC	Operation and Maintenance Centre
OPEX	Operational EXpenditure

OS&R	Operations Support & Readiness
OSS	Operations Supporting System
OT	Work Order
QoE	Quality of Experience
QoS	Quality of Service
RFS	Ready for Service
SAP	Business Management Software Solutions
SID	TMF Shared Information Data Model
SLO	Service Level Objectives
SLA	Service Level Agreement
S/P	Supplier/Partner
S/R	Service/Resource
S/PM	Supplier/Partner Management
TAM	Telecom Applications Map
TMA	Average Response Time
TMF	TeleManagement Forum
TTK	Trouble Ticket
VOIP	Voice Over IP
VPN	Virtual Private Network
WFM	WorkForce Management

PT Inovação is a company with extensive experience in the development of systems and solutions designed to support operations (Operations Support Systems - OSS). The company's origins, including its various precursor organizations, stretch back to the 1980s. It has also been actively interested and involved in a number of standardization forums, particularly the Tele Management Forum (TMF), which has been of critical influence in shaping its product line.

This is the background to the development of the suite of products and solutions known as **NOSSIS® - Network Operations Support Systems Integrated Solutions**, the name given to full OSS system offer. These products are, today, the result of many years of experience in the field, in which it's main driver and objective has been to help build up its customers' competitive capabilities.

It has been ensured that it complies fully with even the most demanding requirements of **TM Forum's Frameworx**. These international standards, which are widely accepted as being the best set of international recommendations applicable to the field of telecommunications, underpin best practices and international standards in this global business.

The success of the **NOSSIS®** suite is primarily due to the experience built up through its various implementations in different parts of the world. The comments and suggestions received from customers have also played a key role in developing what OSS products has become today, something which has served to boost the competitive advantage enjoyed by these same customers. The suite has been built in such a way as to make processes as automatic as possible, a principle that applies to provisioning processes (zero-touch flow through provisioning), assurance processes (problem management, deterioration management and fault resolution), project and inventory management (including network discovery and reconciliation) and testing and diagnostics, amongst others.

It is a suite of modular flexible multi-technology and multi-provider products that offers rapid introduction of new services and resources, but without impacting on product architecture.

| 1.1 Readership

This document is aimed at readers who are interested in a brief description of the architecture used in the NOSSIS products, the standards and recommendations followed, the systems involved and the processes supported.

| 1.2 Related Documents

Further details on each product can be found in:

- The product datasheet

- The product roadmap
- White papers on the product
- Other OSS related documents

Any company offering products or services to its customers must compete on a daily basis if it is to increase its income stream. It is crucial that companies get the most out of their own resources, so they can maximize operational returns. This is particularly true of telecommunications operators for the following reasons:

- It is one of the sectors in which technological developments have the greatest impact.
- The sheer diversity of technologies, suppliers and services creates a complex operational map.
- The rate at which services are created and then changed demands a swift and adaptive response from the supporting infrastructure.
- The quantity and range of equipment in the network mean installed resources require careful control, in terms of both location and availability.

In order to respond to these, and other, specificities, operators need to invest in network resource management systems that are integrated with the operational processes of provisioning, maintenance and performance monitoring. The developmental effort has been centered, along these lines for over 30 years, and strives to offer its customers competitive solutions focused on optimizing physical (network infrastructure) and human (best practices in implementing operations processes) resources.

This effort has resulted in the NOSSIS® suite, an OSS architecture that includes a range of fully integrated, multi-technology and multiservice products for Operations Support and Readiness (OS&R), Fulfillment and Assurance.

The following sections cover the reference architecture used in NOSSIS and present each product in the suite. They also offer a number of illustrative examples, of both process themselves and the way in which the suite contributes to the execution of these.

Further details can be found in the specific documents for each product or solution.

| 3.1 TM Forum References

The NOSSIS applicational architecture is fully aligned with the TM Forum in general and more specifically with its TAM model and eTOM processes. This document is referenced to TAM version GB_929_Application_Framework_(TAM)_Release_4.5 .

The business processes described in this document are aligned with the eTOM framework, GG921. Process breakdown details are given down to level 3, based on the document GB921_D_Release_9.0_v9.1.doc – The Business Process Framework (eTOM), Addendum D. The examples of end-to-end process flows are based on the document GB921_E_Release_9.0_v9.1.doc – Business Process Framework (eTOM), Addendum E.

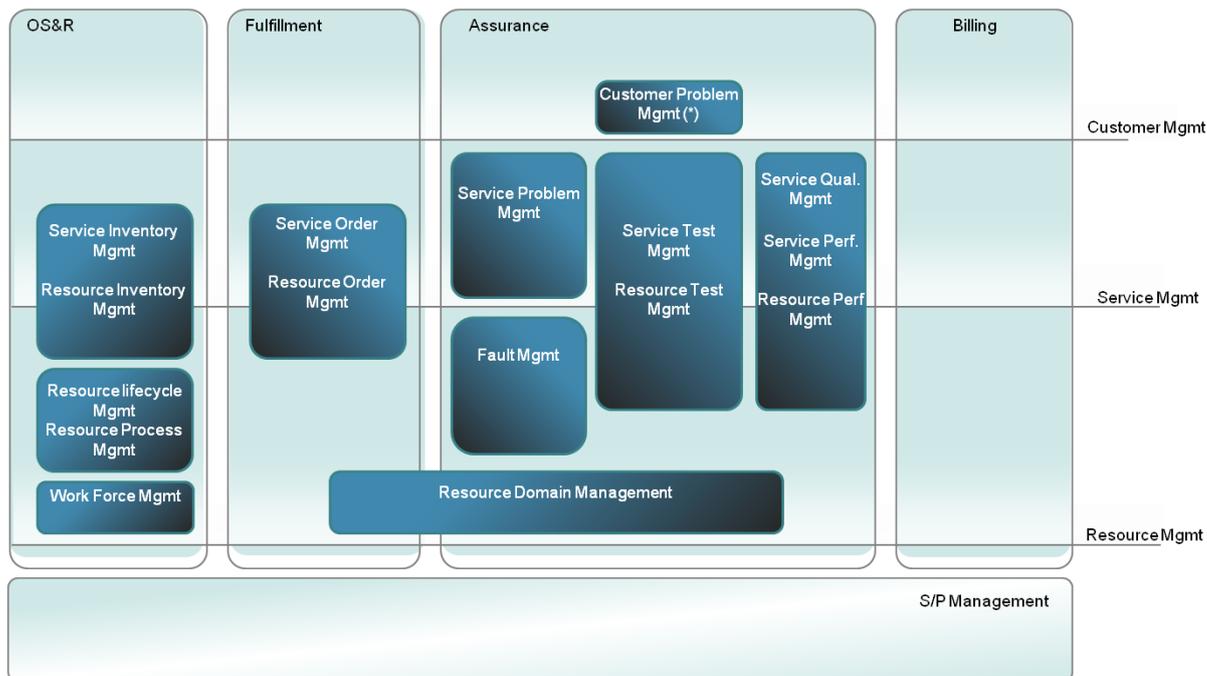
Future developments of the TAM and TOM models may also be incorporated into the NOSSIS suite. Thus, this document is not so much a technical specification of the product but more of an overview of the NOSSIS suite and its alignment with TM Forum concepts.

| 3.2 Applicational scope

The TAM applications map offers a standardized model for the grouping together of functions and data in applications or services, in a context in which next generation of digital services is obliging companies to collaborate with increasing numbers of partners, and in which a greater number of systems are involved. This makes critical the ability to identify functional shortcomings to all purchase and integration decisions. TAM defines an applicational map that covers a wide range of functionalities and applications, including BSS (Business Support Systems) and OSS.

By supplying a structure, on the basis of which the functionality of the support systems can be defined, the map helps guide service providers in their acquisition/development of new systems, from the definition of requirements/initial request for information through to implementation, via a comparison of systems.

This section presents the TAM-based reference architecture that describes the applicational environment of the NOSSIS suite. Of the full set of existing level 2 functions, Figure 1 show those which are covered by the applications making up the NOSSIS suite.



(*) – Only relevant to diagnostic scenarios

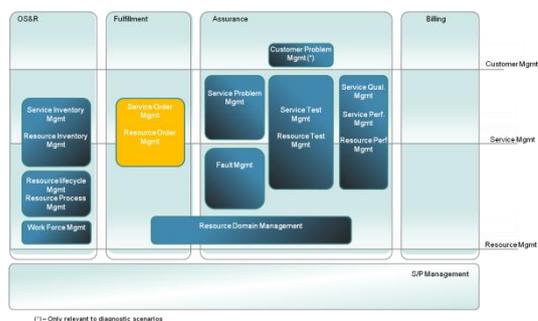
Figure 1 – NOSSIS applicational scope – Level 2 TAM Functions

The following sections describe the level 2 functions, and identify the level 3 functions, that are included in the scope of NOSSIS. These are grouped into the following NOSSIS functional groups.

- Order and provisioning management
- Activation and mediation
- Resource and service inventory
- Network project design and construction
- Workforce management
- Problem management
- Fault management
- Performance and QoS management
- Testing and diagnostics

| 3.2.1 Order and Provisioning Management

This includes the Service Order Management and Resource Order Management functions. These functions are associated with fulfillment and are typically used to orchestrate provisioning orders (such as activate, alter, suspend, re-establish, deactivate, change and migrate).

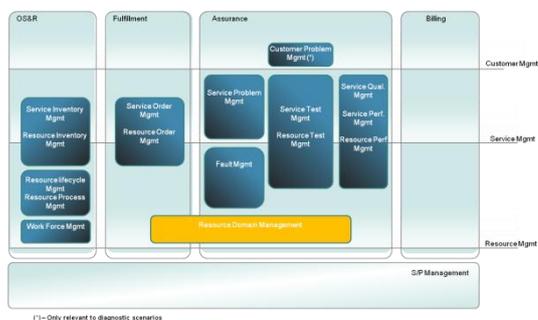


- ❖ Service Order Management Functions:
 - Service Conf. Mngt & Data Collection
 - Service Order Validation, Orchestration
 - Service Availability
 - Service Design/Assign
 - Service Activation Management
- ❖ Resource Order Management Functions :
 - Resource Order Validation & Orchestration
 - Resource Asset Design/Assign
 - Network Resource Activation

Figure 2 – Order and Provisioning Management – Functions

| 3.2.2 Activation and Mediation

This implements the mediation/interface between the other OSS domain applicational functions and the network elements and network management systems (OMCs). It is transversal and supports both fulfillment and assurance tasks, specifically those of configuration and activation (for network construction or service provision), those of mediation of assurance data (faults and performance and the carrying out of tests and the collection of the results of these) and those of synchronization between the information in the network and the information in inventory systems (self-discovery and support for reconciliation processes).

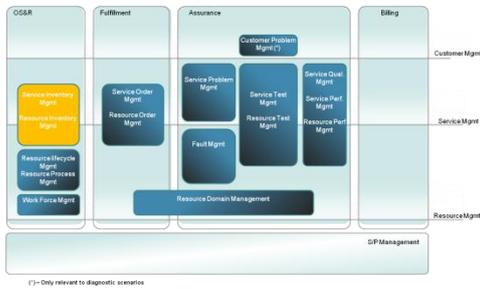


- ❖ Resource Domain Management Functions :
 - Resource Discovery
 - Resource Activation
 - Resource Fault & Performance Data Mediation
 - OSS Inventory/Data Synchronization Mngt

Figure 3 – Activation and Mediation – Functions

| 3.2.3 Resource and Service Inventory

This supports the other OSS functions, with the aim of maintaining and managing the network and service inventories. This function is unique and independent of the technology used or the services to be deployed. It centralizes, at a single location, all the resources and services information required for the proper functioning of the other applications. It includes reconciliation with the information residing in the network, as a way of guaranteeing its validity.

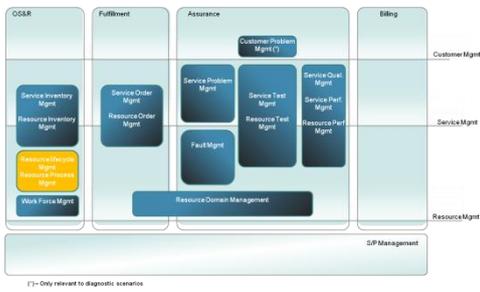


- ❖ Service Inventory Management Functions :
 - Service Resource Inventory
 - Service Inventory Reconciliation / Synchronization
 - ❖ Resource Inventory Management Functions
 - ❖ Service Catalogue Management Functions (*)
- (*) - Function transversal to the service management layer

Figure 4 – Resource and Service Inventory – Functions

| 3.2.4 Network Project Design and Construction

This supports everything from project design tasks (tactical planning) resulting from strategic planning of the network, a task that is not within the scope of the NOSSIS suite, to construction tasks (implementation planning), that manages the full workflow of tasks (resource process management) relating to the installation of entities (with catalogued stock – resource catalogue management and actual stock – spares & warehouse inventory) and the respective configuration of the network.

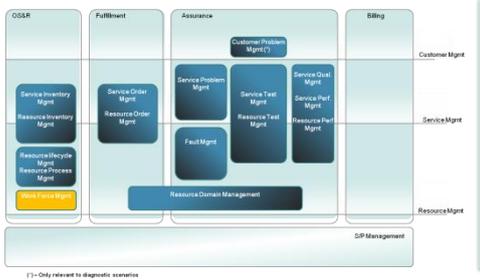


- ❖ Resource Lifecycle Management Functions (*):
 - Resource Catalogue Management
 - Implementation Planning
 - Spares & Warehouse Inventory
 - Resource Commissioning & Configuration
 - ❖ Resource Process Management Functions:
 - Resource Change Management
 - Resource Logistics
- (*) – only functions used in projects and construction have been included

Figure 5 – Network Project Design and Construction – Functions

| 3.2.5 Workforce Management

This is responsible for the definition, control and execution of tasks involving manual procedures carried out by work teams. These are tasks that support network construction, service provision (such as installations in the customer’s home) and repair and maintenance processes, amongst others. They may include remotely-executed network equipment tasks (by accessing the OMCs, for example) or by the field force for local work.



- ❖ Workforce Management Functions:
 - Workforce Schedule Management
 - Work Order Analysis
 - Work Order Assignment & Dispatch
 - Work Order Tracking & Management
 - Workforce Management Reporting
 - Workforce Configuration and Setup

Figure 6 – Workforce Management – Functions

| 3.2.6 Problem Management

This covers everything from the reception of faults - TTKs (arising from the processing of network alarms, customer complaints, the manual registration of problems identified by a

technician on the ground and also planned interventions/programmed downtimes), through to registration of these, analysis and processing, handling and resolution. It includes functions for the correlation and detection of root causes.

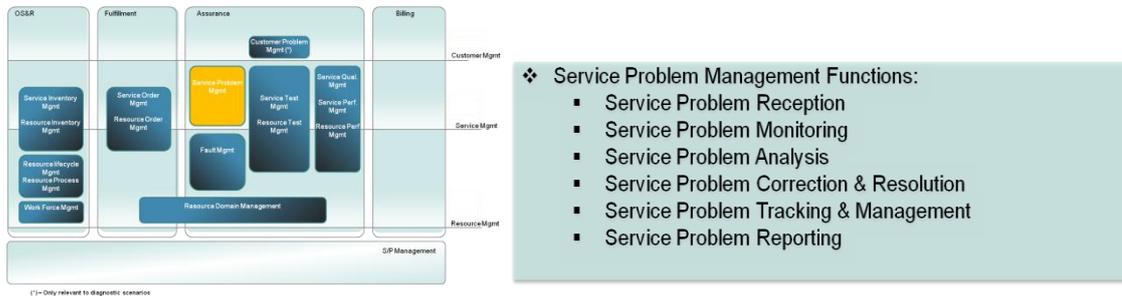


Figure 7 – Problem Management – Functions

| 3.2.7 Fault Management

This includes the reception of alarms coming from the network and the storage, handling, monitoring and correlation of faults. It manages the status, level of seriousness and other standardized alarm parameters. It is responsible for ensuring there is monitoring for faults, (network) problems are detected and fault TTKs opened.

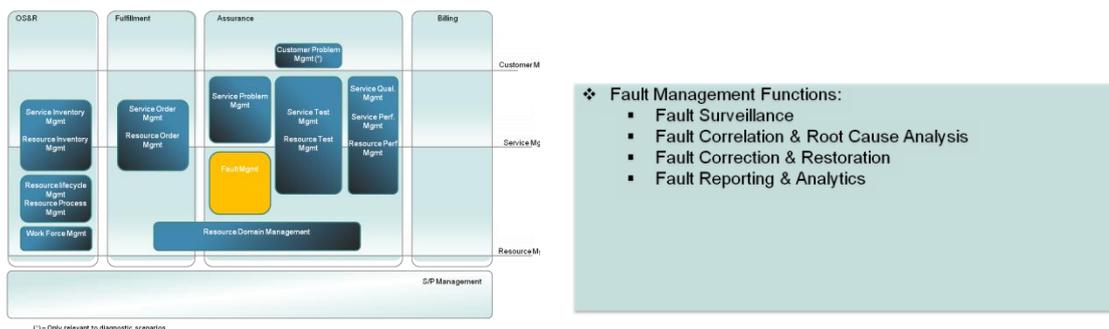


Figure 8 – Fault Management – Functions

| 3.2.8 Performance and QoS Management

This receives measurements relating to network performance and other elements (such as probing) and stores these in DW. It monitors and analyses the Quality of Service about service and service resources. It processes QoS figures, calculating KPIs and KQIs and the developments in these. It detects and reports on performance thresholds that are breached (SLAs). It draws up QoS reports and reports any performance downturn in the network or services.

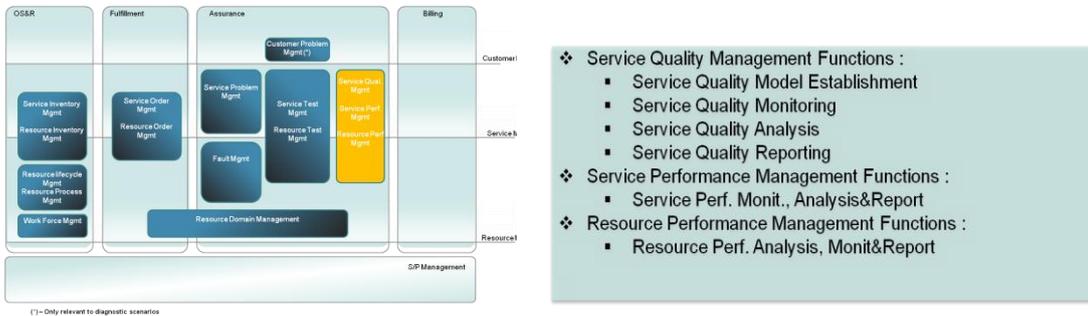


Figure 9 – Performance and QoS Management – Functions

| 3.2.9 Testing and Diagnostics

This carries out tests on the services and resources, when so requested, and generates E2E diagnostic reports. These tests and diagnostics are applied to a range of operations support processes. They are designed to ensure the success of construction and provisioning tasks, either in the sense of problem management (following a complaint) or in support of breakdown analysis (resulting, for example, from network alarms). They are also used in the validation of repair activities.

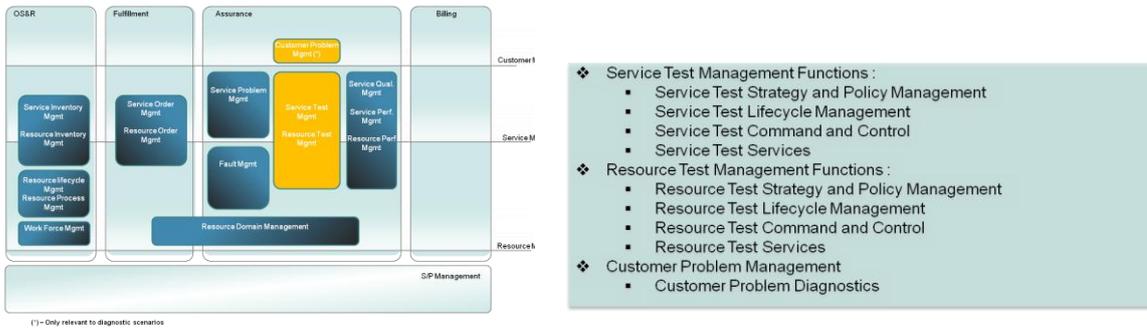


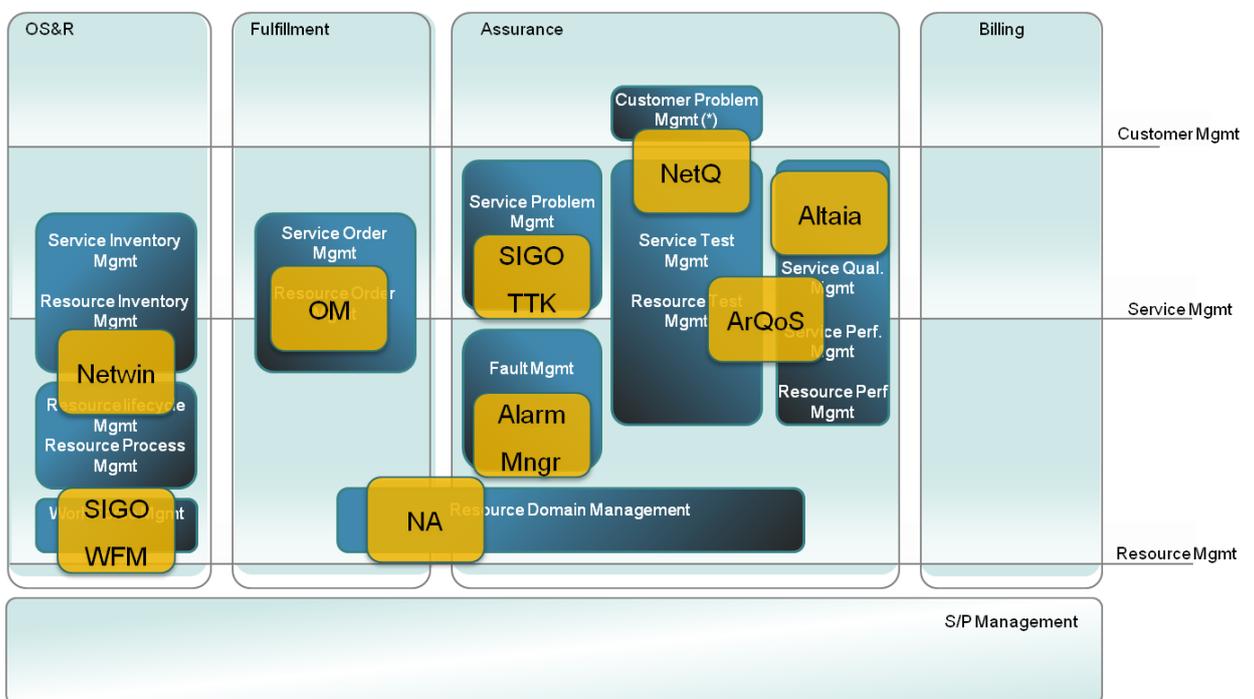
Figure 10 – Testing and Diagnostics – Functions

In its portfolio, PT Inovação has a family of OSS products called **NOSSIS® (Network Operations Support Systems Integrated Solutions)**. These products are, today, the result of many years of experience in the field, in which it's main driver and objective has been to help build up its customers' competitive capabilities.

It has been ensured that it complies fully with even the most demanding requirements of **TM Forum's international NGOSS** standard. This international standard, which is widely accepted as being the best set of international recommendations applicable to field of telecommunications, underpins best practices in this global business.

The success of the **NOSSIS®** suite is primarily due to the experience built up through its various implementations in different parts of the world. The comments and suggestions received from customers have also played a key role in developing what OSS products has become today, something which has served to boost the competitive advantage enjoyed by these same customers.

Below is a representation of the NOSSIS product suite superimposed on the reference map described in the previous section.



(*) – Only relevant to diagnostic scenarios

Figure 11 – NOSSIS suite superimposed on the reference map

A general description of each product in the NOSSIS suite is given in the following subsections.

| 4.1 Netwin

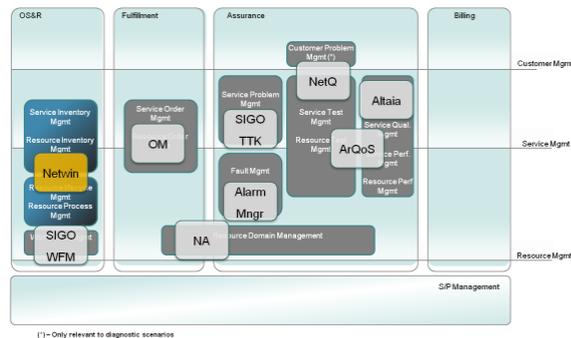


Figure 12 – NOSSIS Suite - Netwin

The Netwin solution is designed to handle the areas of inventory management and network construction and offers support to the following business processes: planning, provisioning and construction of the telecommunications network and services. The system offers a representation of the physical resources in georeferenced locations and/or the organizational structures associated with the business. The solution includes all levels of information inventories, from the inventory of the physical resources associated with the infrastructures (**Outside Plant and Inside Plant**), through the various physical and logical network levels (supporting a range of technical domains such as optical fiber, copper network, ATM, SDH, Ethernet, xDSL, MPLS, IP, etc.) to service management, thus providing overall end-to-end coverage.

| 4.1.1 Main Functionalities

- ✓ Input of business needs and network development planning data
- ✓ Project for physical and logical network infrastructure
- ✓ Network construction and resource allocation workflows
- ✓ Automatic incorporation of the project into the inventory Automatic integration with network activation processes
- ✓ Automatic integration with WFM and S/PM systems
- ✓ Project budgets and management
- ✓ Integration of various projects in a single network domain
- ✓ Short/mid-term projections of the network that incorporate changes from ongoing projects
- ✓ Inventory of infrastructures and physical network resources

- ✓ Georeferenced design of outdoor infrastructures
- ✓ Management of the resources and services catalogue
- ✓ Logical inventory of networks and services
- ✓ Multiservice, multi-technology and multivendor resources
- ✓ Guarantee of resource and service layering
- ✓ Management of the E2E aspect of the network and services
- ✓ Capacity management for physical and logical resources
- ✓ Extraction of information (network diagrams, reports, schematics and physical and logical structures)
- ✓ Reservation and resource allocation facilities (automated provisioning)
- ✓ Deployment of open APIs for accessing inventory information
- ✓ Inventory support equipment (air-conditioning, power supply, ...)
- ✓ Network reconciliation (usually via a mediating system)
- ✓ Interface with ERP
- ✓ Logistics management
- ✓ Centralized document store
- ✓ Access control

| 4.1.2 Business Benefits

- ✓ Master reference inventory for the whole company
- ✓ Service mapping – resources with easy navigation of all the information, from the physical infrastructure component through to the service logic
- ✓ E2E view of service composition
- ✓ Compatibility with a wide range of technologies
- ✓ Supports project design and planning of physical networks
- ✓ Physical and logical capacity management
- ✓ Information quality assurance

- ✓ Integration with external systems for inventory information lookup (master inventory for the company)
- ✓ Reconciliation of inventory and network information, with optional guaranteed integration with the Network Activator platform
- ✓ For full process management, Netwin may be enhanced with order management solution, known as 'Order Manager'

Further information can be found in the specific documentation for each product.

| 4.2 OM

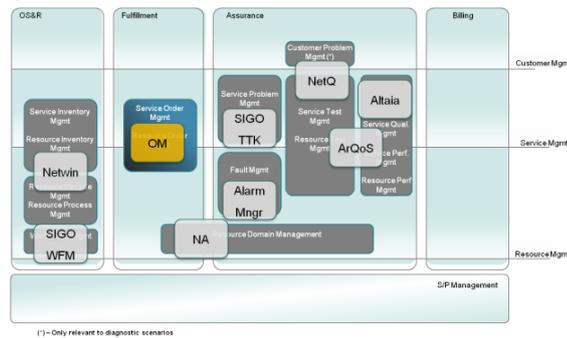


Figure 13 – NOSSIS Suite - OM

The OM - Order Manager solution has been designed to be an indispensable part of any OSS architecture. The solution is responsible for controlling the execution of customer service provision orders, offering end-to-end (E2E) coverage. It coordinates the workflow of activities distributed by the various intervening systems (inventory systems, activation systems and workforce management systems, amongst others) until the customer's request has been fully met. It facilitates the definition of the activities required in the implementation of new services, offering more expeditious control over the execution of these. It is now possible, at any time, to know the status of execution and to quickly draw up indicators and reports on both execution tasks and those carrying out the work. Processes can be redefined quickly and efficiently, thus enabling swift responses to business developments and, consequently, improved operational performance.

| 4.2.1 Main Functionalities

- ✓ Service and resource provisioning flow based on orchestration
- ✓ Breakdown of requests into elementary activities (management of service bundles)
- ✓ Management of orders and order dependencies
- ✓ Centralized control of task execution flow

- ✓ Definition of manual tasks
- ✓ Process monitoring
- ✓ Recovery of orders in an error state
- ✓ Process definition and editing
- ✓ Interfaces with all systems intervening in the provisioning process
- ✓ Graphical display of process development
- ✓ User notification via email or sms
- ✓ Jeopardy management.

| 4.2.2 Business Benefits

- ✓ Automatic end-to-end provisioning flow
- ✓ Reduction in human interventions
- ✓ Faster introduction of new services
- ✓ Centralized flow control
- ✓ Real-time applications possible
- ✓ Integration with external systems
- ✓ Graphical display of process development

Further information can be found in the specific documentation for each product.

| 4.3 NA

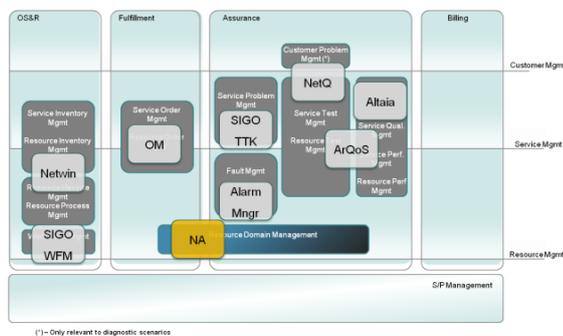


Figure 14 – NOSSIS Suite - NA

The NA is a service activation platform that also mediates between the various operations support systems (OSS) and the network. It allows telecommunications operators to implement automatic provisioning processes (zero-touch flow through provisioning) and network discovery as well as gather performance data, amongst other functions. It also facilitates the deployment of multiple services (IP VPNs, DSL, 3-play, 3G, etc.) in the same operational environment. By using this platform the telecommunications operator will no longer need to manage different activation systems for each network or manufacturer technology.

| 4.3.1 Main Functionalities

- ✓ OSS abstraction layer for resources
- ✓ Multiservice mediation and activation (VOIP, VPNs, DSL, 3-play, 3G...)
- ✓ Support for multiple network technologies (IP, MPLS, SDH, Ethernet, PSTN, GPON)
- ✓ Activation sequences for configurable services
- ✓ Synchronous (real-time) and asynchronous (bulk/mass provisioning) orders
- ✓ Prioritized and scheduled activation order handling
- ✓ Deploys southbound interfaces (SNMP, CLI, COPS, SOAP, MML, etc);
- ✓ Flexible configuration for transforming the common information model into specific resource commands
- ✓ Simple insertion and configuration of new resources without impacting on system availability
- ✓ Auto-discovery of new resources
- ✓ Interface with inventory reconciliation
- ✓ Plug-ins configurable by technology
- ✓ Flexible configuration of new services

| 4.3.2 Business Benefits

- ✓ Rapid integration of new technologies
- ✓ Inventory reconciliation
- ✓ Network auto-discovery
- ✓ Scalable, redundant architecture
- ✓ Plug-ins configurable by technology

- ✓ Flexible configuration of new services
- ✓ Fully automated service provisioning

Further information can be found in the specific documentation for each product.

| 4.4 SIGO WFM

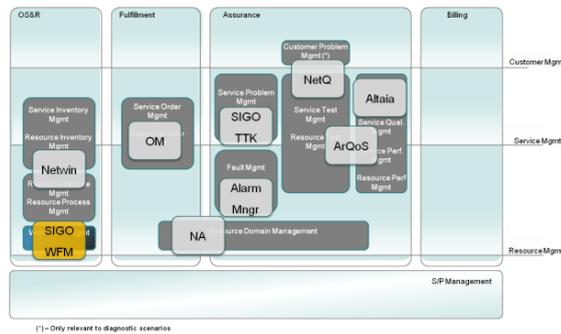


Figure 15 – NOSSIS Suite - SIGO WFM

This product is used for the creation, registration and direct and automatic allocation of OT (work orders) to the entity responsible for carrying them out. All aspects of the OT are managed, including: the control of task execution deadlines; the retrieval of OT contents and the export and printing of this content; the sending of automatic notifications to interested parties whenever there is a change in an OT's execution status; re-staging/notification after deadlines have been broken. It can be used to manage both users and teams. Groups of network elements can be allocated to teams/people, preventive intervention schedules can be set up and individualized tasks can be managed. It can also deploy functionalities for managing and locating teams in the field, using mobile units with GPS/GPRS.

| 4.4.1 Main Functionalities

- ✓ Management of work order (OT) workflows and dependencies between OTs
- ✓ Management of teams and profiles, scheduling / execution deadlines and preventive interventions scales
- ✓ Measurement and analysis of operational performance
- ✓ Real-time monitoring of execution with the possibility of automatic alerts and notifications to interested parties, via email/sms, whenever there is a change in an OT's status
- ✓ Automatic allocation of tasks with associated additional information files
- ✓ Estimation of execution time and control over the actual duration of tasks
- ✓ Management of the automatic creation of periodical OTs

- ✓ Automatic interaction with the inventory system(s)
- ✓ Management of team location and tracking of teams in the field
- ✓ Real-time communication with teams and/or vehicles
- ✓ Real-time allocation of work orders to a vehicle/team

| 4.4.2 Business Benefits

- ✓ Real-time control over the progress of work
- ✓ Improved monitoring and management of resources in the field
- ✓ Optimized allocation of work force resources
- ✓ Increased volume of work orders with the same resources
- ✓ Increase in the speed with which problems are resolved
- ✓ Improved working procedures
- ✓ Improved organizational efficiency
- ✓ Improved capability to meet customer needs

Further information can be found in the specific documentation for each product.

| 4.5 SIGO TTK

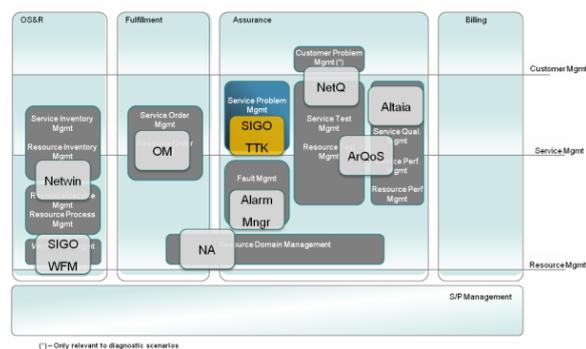


Figure 16 – NOSSIS Suite - SIGO TTK

The SIGO TTK solution has been designed for the management and centralization, in a single system, of all network and service faults/anomalies. Thus, in addition to the tickets originated in customer care complaint channels, the SIGO TTK can also be used to manage other tickets which might be arise, for example, from network element alarms (network resources), circuit faults, pre-planned network outages, the network preventive maintenance management

process or, in short, any process in which it is necessary to manage, register, control and assign any anomaly in the network or in a service.

In addition to allowing tickets to be created directly in the system, the SIGO TTK also offers automated creation and control of tickets coming in from external systems, via the open APIs deployed for the purpose.

SIGO TTK is also used to manage support services, as it has mechanisms for registering and forwarding tickets to suppliers, also known as FRs (fault-requests), as part of the corrective maintenance process. These processes make it possible to implement SLA (service level agreement) management functionalities with the supplier.

| 4.5.1 Main Functionalities

- ✓ Management of trouble tickets – registration and control over the execution of all the tasks involved in the process of managing service and resource faults
- ✓ Dispatch and control of intervention cycles
- ✓ Management of repair status and unavailability of services and resources
- ✓ Management of fault workflows arising from participation, failure, degradation, preventive maintenance or a planned action
- ✓ Control over deadlines for task execution, specifically the deadlines for resolving breakdown situations (SLAs)
- ✓ Management of scheduling and fault notification
- ✓ Identification of common faults / root causes for services and resources
- ✓ Association of TTKs to services
- ✓ Automatic interaction with the inventory system(s)
- ✓ Automatic notifications on changes to repair status, by email or by sms
- ✓ Management of fault request tickets for external suppliers
- ✓ Management of external supplier SLAs with control of configured objectives and resolution times
- ✓ Management of contractual documentation involving external suppliers, as part of fault report resolution procedures
- ✓ Possibility of connecting to asset management systems
- ✓ Open APIs, for integration with other systems

- ✓ High level of parameterization and configurability
- ✓ Preventive Maintenance activities are managed in sites and equipments

| 4.5.2 Business Benefits

- ✓ Real-time feedback on the progress of corrective work being undertaken in the network
- ✓ Real-time feedback on the network availability.
- ✓ Optimization and control of resources
- ✓ Increase in the number of tickets resolved per time unit and the speed of problem resolution
- ✓ System for supporting operations and management, with an associated workflow
- ✓ Control, recording, monitoring and management of tickets.
- ✓ Centralize in a single repository and harmonize concepts in the organization.
- ✓ Guaranteed management of preventive maintenance tasks, with routing of the execution of these to WFM, where necessary
- ✓ Automatic interaction with external suppliers
- ✓ Real-time detection of SLA violations
- ✓ Improved working procedures
- ✓ Improved organizational efficiency

Further information can be found in the specific documentation for each product.

| 4.6 Alarm Manager

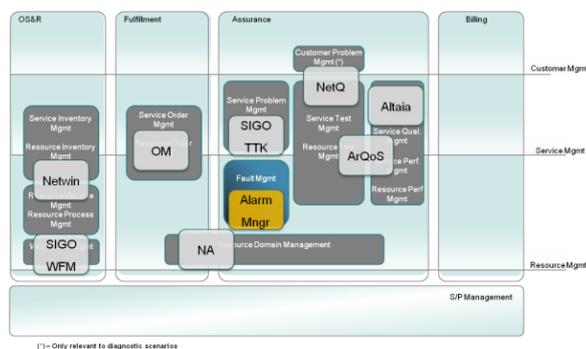


Figure 17 – NOSSIS Suite - Alarm Manager

The Alarm Manager system is responsible by the acquisition and processing of events received from the network and/or external systems. It offers advanced functionalities for associating events with alarms and failure points. It can be used to define the lifecycles of all the alarms created in the system and it also monitors the processing infrastructure as well as the various collection channels.

| 4.6.1 Main Functionalities

- ✓ Collection, filtering and centralized processing of alarms for all types of equipment and technologies
- ✓ Application of filters and counters to reduce the number of priority alarms sent to the operator
- ✓ Enrichment of alarms with inventory data
- ✓ Advanced correlation of alarms based on rules, making it easier to detect the original cause of the problem
- ✓ Management of alarm status
- ✓ Manual and automatic generation of trouble tickets – integration with the TTK system
- ✓ Analysis and determination of the impact on the service
- ✓ Advanced statistical analysis of alarms in order to detect failure curves
- ✓ Determination of the impact on the service of a given set/sequence of alarm notifications
- ✓ Production of indicators

| 4.6.2 Business Benefits

- ✓ Centralized management of alarms
- ✓ Real-time detection of problems and before the customer becomes aware of them
- ✓ Integrated view of the state of the network and the service
- ✓ Bidirectional Integration with the TTK system
- ✓ Determination of the root alarm and creating affinity relationships among correlated alarms
- ✓ Determination of the impact of the alarms on the service
- ✓ Reduction in average failure resolution times (MTTR) and increased service availability

- ✓ Optimization of network and service failure management processes and simplification of operational tasks

Further information can be found in the specific documentation for each product.

| 4.7 NetQ

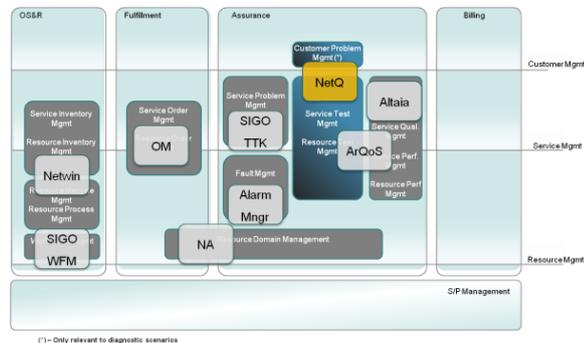


Figure 18 – NOSSIS Suite - NetQ

Network Qualifier is a centralized system for the technical supervision of the network, through automation of requests for E2E trialing and diagnostic testing of services. It collects and processes the main parameters for network and service elements, particularly the network's electrical parameters, broadband measurements, ADSL or fiber parameters and measurements from the service platforms. It processes these, according to configured rules, to give an overall diagnostic of the E2E service. It records the results, accompanied by inventory information, by service identifier.

It is used to test network lines to check the possibility of these supporting certain broadband services such as IPTV.

It is also able to carry out remote corrective actions, to give support either to an installation or to corrective maintenance (e.g. reset a port, change a technical class...)

| 4.7.1 Main Functionalities

- ✓ Remote testing of the physical and logical network resources, including support for multi-technology tests and diagnostics
- ✓ Flexible and configurable algorithms for E2E diagnosis of the service
- ✓ Easy and rapid accommodation of new tests and new diagnostic algorithms, through the use of plug-ins and algorithm configuration, thus offering coverage for new service offers
- ✓ Algorithms for technical feasibility, based on the tests carried out
- ✓ Deployment of interfaces for remote system access (e.g. applications for mobile phones/PDAs)

- ✓ Possibility of interacting remotely with (physical or logical) resources or services. Such interventions offer support to both installation and maintenance procedures.
- ✓ Deployment of problem-solving guides, drawn up on the basis of the automatic diagnosis and the actions that can be carried out remotely
- ✓ Automatic integration with the inventory and CRM
- ✓ Function for programming and scheduling periodic tests as part of a proactive maintenance process.
- ✓ Centralized management of requests for tests/actions above current capability, in terms of accessing physical and logical resources, taking into account the loads generated in these
- ✓ Test/action scheduling facility for groups of service identifiers
- ✓ Flexible parameterization of tests

| 4.7.2 Business Benefits

- ✓ End-to-end service testing and diagnostics
- ✓ Reduction in operating costs with minimum intervention of the field force
- ✓ Support for installation, either through diagnosis of potential problems or through auxiliary configurations of activities in the field, thus increasing technician autonomy and making the whole process faster, particularly as regards tasks that have to be carried out inside the customer's home
- ✓ Reduction in average repair times (MTTR)
- ✓ Reduction in fault reoccurrence rates
- ✓ Increased percentage of fault resolution
- ✓ Reduction in average response to customer time (TMA)
- ✓ Real-time monitoring and assessment of service status
- ✓ Offers the call centre (CC), the technical back office (BO) and the field force technicians the ability to intervene in configurations, which will then, remotely, solve a reported problem.
- ✓ Improved quality of experience (QoE) for the customer, in dealing with customer services provided by the operator.
- ✓ Reduction in OPEX (e.g. ready for service (RFS), tests for preventive maintenance, reduction in the number of calls to BOT, greater assertiveness in team in the field , reduction in number of reoccurrences, more platform interventions handled remotely...)

Further information can be found in the specific documentation for each product.

| 4.8 Altaia

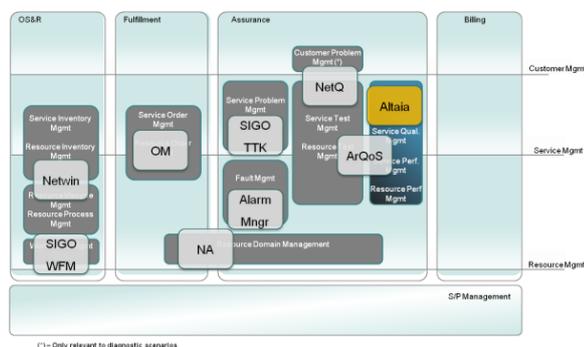


Figure 19 – NOSSIS Suite - Altaia

This platform is the solution for the performance and QoS management of telecommunications networks and services. It deploys a set of modules that, together, offer an integrated unified picture of: the analysis of counters and CDRs; traffic and network performance measurements; quality of service measurements; network and service usage measurements; service guarantee analyses; the generation of threshold alarms; the management of network and service metrics (KPIs and KQIs); the management of SLAs (service level agreements). ALTAIA's main objective is to provide the necessary information on network and service performance to operations, marketing and planning managers in order to help them make their business decisions.

| 4.8.1 Main Functionalities

- ✓ Collection of resource indicators and counters
- ✓ Inventory-based enrichment of data
- ✓ Definition of metrics dictionaries for the whole company
- ✓ Production of performance and QoS metrics
- ✓ Definition of threshold violation levels (SLAs)
- ✓ Detection and generation of degradation alarms
- ✓ DW of metrics with automatic "aging" of data
- ✓ Monitoring of resource and service indicators (intrusive and non-intrusive probing)
- ✓ Support for the management of network upgrade or maintenance activities
- ✓ Support for predictive analysis based on forecasts and trending techniques aimed at predicting any degradation of networks and/or services.

| 4.8.2 Business Benefits

- ✓ Integrated management of business and network performance and QoS
- ✓ End-to-end view of QoS and performance data
- ✓ Multi-supplier and multi-technology performance and QoS management
- ✓ Rapid integration of new indicators, KPI and KQI, using configuration tools
- ✓ Alarms for degraded performance and QoS based on the crossing of performance / QoS thresholds, available at the northbound interface for integration with OSS fault management systems
- ✓ Management of SLOs and SLAs
- ✓ Planning support, indicating metric forecasting based on historical performance, prediction of impact analysis and detection of seasonality
- ✓ Scalable solution based on web interfaces and offering multiplatform support.
- ✓ Flexibility, thanks to an architecture that is able to keep up with business changes and developments without requiring solution redesign.

Further information can be found in the specific documentation for each product.

| 4.9 ArQoS

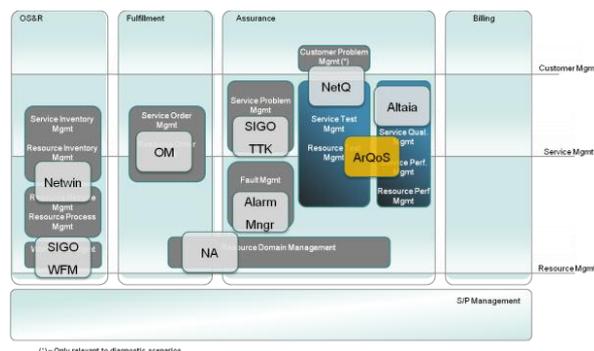


Figure 20 – NOSSIS Suite - ArQoS

This allows the operator to make probing calls/connections in order to monitor network and service performance, using various different types of technology (fixed/mobile/IP). It is used to determine the relevant quality of service parameters (KPI and KQI) and the functional aspects of the respective services, in accordance with ETSI/ITU-T/IETF standards and recommendations, wherever applicable.

| 4.9.1 Main Functionalities

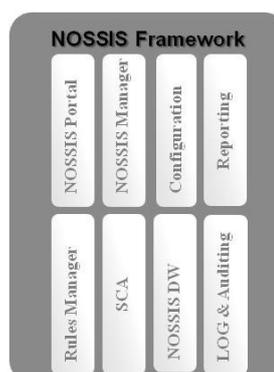
- ✓ Monitoring the network and services
- ✓ Intrusive and non-intrusive probing points
- ✓ Support for fixed network, mobile network and IP technologies
- ✓ Automated end-to-end preventive maintenance, service oriented
- ✓ Deployment of interfaces to diagnostic systems (such as NetQ)

| 4.9.2 Business Benefits

- ✓ Reduction of OPEX through automatic preventive maintenance (less human intervention), centered on end-to-end services, with reuse of the probing points for various services and with notifications being sent to customers (email, sms, e-alarms)
- ✓ Optimization of CAPEX through an understanding of the performance of the network and the various services, thus allowing the organization to make the most of its investments
- ✓ Upgrade and new services tests, from the customer's point of view, before these are put into production
- ✓ Benchmarking, a better understanding of the performance levels of the networks belonging to operators competitors (local or international)
- ✓ Revenue assurance, as an auditor mechanism for the invoicing process that detects anomalies that could lead to revenue losses or wrong billing
- ✓ Contribution to the improvement of the customer experience, by simulating the use of service and measuring QoE

Further information can be found in the specific documentation for each product.

| 4.10 NOSSIS® Framework



The **NOSSIS**[®] suite includes a set of modules that are common to the various products. In the specific case of the solution presented here there are two of these: the **NOSSIS**[®] **Portal**, responsible for access to all the systems in the suite, and the **SCA**[®] – Access Control System - which can be used as a single sign-on for the various platforms, or even others that are external to the **NOSSIS**[®] suite.

| 4.10.1 SCA

The control and management of access to the solution is based on the **SCA**[®] (Access Control System). This component is used to define, module by module, the permissions that each user has in terms of operation, display, administration, etc.

The **SCA**[®] is a security and access management solution for the independent and centralized administration of users and their privileges for one or more applications on a company's platform.

The **SCA**[®] is an integral part of a number of solutions. It can be re-used and integrated into any complex environment that calls for a single authentication point and centralized control of privileges.

The **SCA**[®] is based on a set of typical entities that need to be configured and administered, as a function of the access specifications and requirements of each management system.

In order to avoid attacks and hacking attempts, the **SCA**[®] has a password blocking mechanism that is activated if too many errors occur, and an alarm can also be set off. There are also configurable timeouts, by means of which a session will automatically close, and require a new login, if there is a certain period of inactivity.

Further information can be found in the specific documentation for each product.

In today's climate, it is crucial that companies get the most out of their resources, so as to be able to maximize operational returns. This is particularly true of telecommunications operators for the following reasons:

- It is one of the sectors in which technological developments have the greatest impact.
- The sheer diversity of technologies, suppliers and services creates a complex operational map.
- The rate at which services are created and then changed demands a swift and adaptive response from the supporting infrastructure.
- The quantity and range of equipment in the network mean installed resources require careful control, in terms of both localization and availability.
- The ecosystem of services is increasingly complex and broader in scale: no. of CPEs, access nodes, transport nodes, servers...and, to add to this, there are the constant changes in: new equipment, new releases, new network solutions, new services, new customers...

In order to respond to these, and other, specificities, operators need to invest in network resource management systems that are integrated with the operational processes of provisioning, maintenance and performance monitoring.

The NOSSIS solution presented contributes significantly to:

- Maximizing operational efficiency
- Reducing maintenance times and costs
- Improving problem resolution responses
- Reducing service activation times
- Increasing end customer satisfaction levels

Another point that should be mentioned is that the entire set of NOSSIS applications offers functional and scalability features that will allow it to absorb new technologies, services, networks, etc. This means it will be able to handle with ease any service provider's (SP) full range of services, from fixed telephony through to data services and TV, via mobile telephony, the internet and any others.

This characteristic will prove its worth, through the significant operational gains to be made by the SP.

- (1.) GB_g21_Getting_Started_with_eTOM_R9-0 – The Business Process Framework (eTOM) Suite, version 9.0, August 2010, TeleManagement Forum. Set of TMF documents that describe the eTOM business processes model, which covers the full range of a service provider's processes.
- (2.) GBg21_D_Release_9.0_v9.1.doc – The Business Process Framework (eTOM), Addendum D: Process Decompositions and Descriptions, version 9.1, August 2010, TeleManagement Forum This TMF document goes into the eTOM business processes model in greater depth and includes detailed descriptions of process down to eTOM level 3.
- (3.) GBg21_E_Release_9.0_v9.1.doc – Business Process Framework (eTOM), Addendum E: End-to-End Business Flows, version 9.1, August 2010, TeleManagement Forum. This TMF documents supplements the eTOM business processes model with recommendations on E2E flows centered on the customer and the network, and in conformity with eTOM level 3.
- (4.) GB_g29_Application_Framework_(TAM)_Release_4.5 – Application Framework (TAM), version 4.3, May 2011, TeleManagement Forum. TMF base document that describes the applicational framework for BSS/OSS systems in the context of the eTOM business processes model.

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