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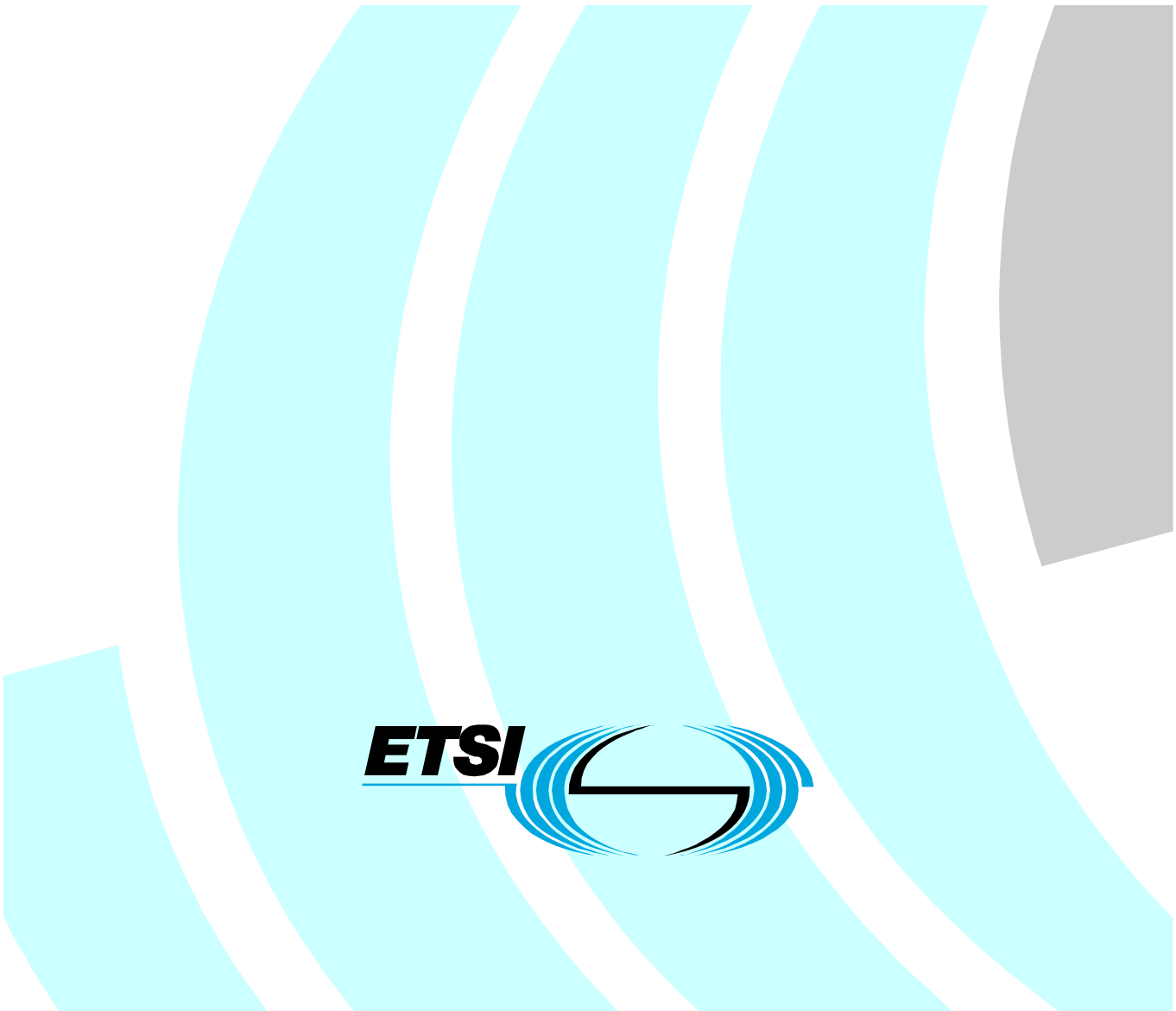
Technical Report

Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Network and Service Management; WG8 Specification Guidelines



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Contents

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Foreword

This Technical Report (TR) has been produced by ETSI Technical Committee Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN).

Introduction

The present document describes the specification methodology in ETSI TISPAN WG8. The present document includes guidelines for the specification of NGN OSS Service Interfaces (NOSI) throughout all the steps necessary for their standardization. The present document accompanies the specification process in WG8 by documenting the way of work.

Clause 1 outlines the background and motivation for the present document, and describes vision and scope for the specification guidelines.

Clauses 2 and 3 give references, definitions, and clarify abbreviations in the context of the present document.

Clause 4 develops the basic principles of the specification guidelines which are the foundation for the work in WG8.

Clause 5 elaborates the WG8 specification methodology by investigating each step in detail. Furthermore, a tool-based approach is introduced to ease and accelerate the standardization process by automation.

Clause 6 deals with naming conventions for the ETSI TISPAN WG8 documents, and the mapping of the methodology steps to existing and planned documents.

Annex A includes a description of existing methodologies and their importance for the work in WG8.

1 Scope

1.1 Motivation and Vision

In ETSI TISPAN WG8's current NGN Management related work, standards forming principles are being used implicitly. Therefore, Specification Guidelines are necessary to transform these implicitly existing principles to explicitly described principles. These WG8 Specification Guidelines should reflect and, if necessary, modify or unify explicit principles. Consequently, the basic driver and motivation for the evolution of such WG8 Specification Guidelines are the currently running WG8 standardization activities in the area of NGN OSS. From this point of view, the work on the Specification Guidelines has an accompanying character to WG8's regular standards forming process.

The vision standing behind this work is that ETSI TISPAN WG8 has a clear understanding of how to develop NOSIs from an idea to standard documents, following a set of guidelines which head, ease, and accelerate the whole standards developing process, and using a consistent terminology.

1.2 Scope

The present document puts on record the WG8 internal way how to develop ideas to standard documents.

The basis of the present document is a status-quo analysis of WG8's way to develop ideas to standards. Therefore, implicitly existing steps of the actual WG8 standardization activities have been identified and their purpose has been clarified. These implicit steps have then been reflected, consolidated, and transformed to explicit methodology elements.

The present document captures the above mentioned reflected, consolidated, explicit steps and bundles them to a consistent WG8 methodology. The present document sets the WG8 methodology in relation to a list of well-selected existing methodologies or wide-spread standards forming technologies, and considers the use of these methodologies in WG8. Furthermore, the present document provides guidelines how to map explicit methodology elements to standards documents.

The present document tracks how the WG8 specifications are currently produced, i.e. it describes the ongoing and it will direct the future work of ETSI TISPAN WG8. However, not all aspects of the WG8 methodology are already fully defined and ready to be documented. Those aspects are identified in the present document as "for further study".

The scope of the present document explained before is depicted in figure 1.

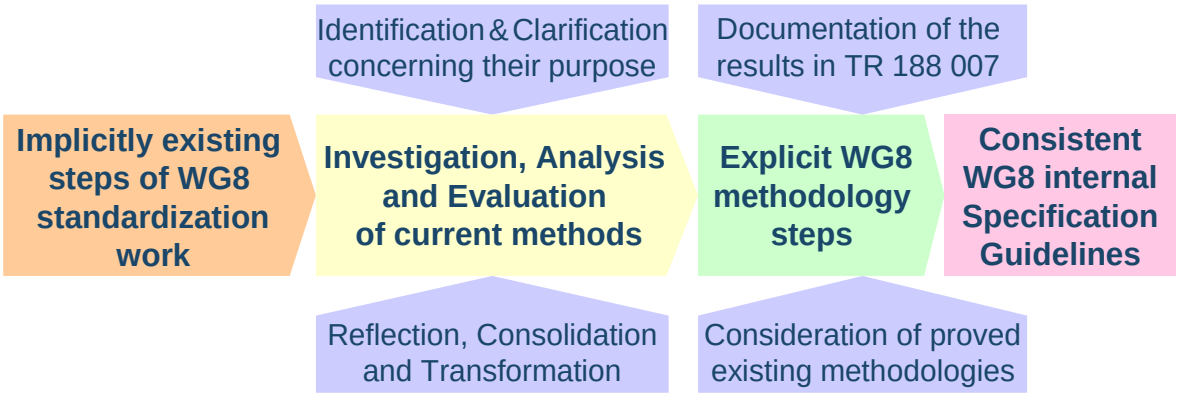

Figure 1: Scope of WG8 Specification Guidelines

1.3 Non-scope

The following items are out of the scope of the present document:

- Guidance for other ETSI WGs or standardization bodies than TISPAN WG8.
- Definition of a new standardization process in the sense of refining or formalizing the guidelines.

2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific.

- For a specific reference, subsequent revisions do not apply.
- Non-specific reference may be made only to a complete document or a part thereof and only in the following cases:
  - if it is accepted that it will be possible to use all future changes of the referenced document for the purposes of the referring document;
  - for informative references.

Referenced documents which are not found to be publicly available in the expected location might be found at http://docbox.etsi.org/Reference.

For online referenced documents, information sufficient to identify and locate the source shall be provided. Preferably, the primary source of the referenced document should be cited, in order to ensure traceability. Furthermore, the reference should, as far as possible, remain valid for the expected life of the document. The reference shall include the method of access to the referenced document and the full network address, with the same punctuation and use of upper case and lower case letters.

NOTE: While any hyperlinks included in this clause were valid at the time of publication ETSI cannot guarantee their long term validity.

2.1 Normative references

The following referenced documents are indispensable for the application of the present document. For dated references, only the edition cited applies. For non-specific references, the latest edition of the referenced document (including any amendments) applies.

Not applicable.

2.2 Informative references

The following referenced documents are not essential to the use of the present document but they assist the user with regard to a particular subject area**.** For non-specific references, the latest version of the referenced document (including any amendments) applies.

[i.1] ETSI TS 188 001: "Telecommunications and Internet Converged Services and Protocols for Advanced Networking (TISPAN); NGN management; Operations Support Systems Architecture".

[i.2] ETSI TS 188 002-1: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN Subscription Management; Part 1: Requirements".

[i.3] ETSI TS 188 002-2: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Network and Service Management; Subscription Management; Part 2: Information Model".

[i.4] ETSI TS 188 002-3: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Network and Service Management; Subscription Management; Part 3: Functional Architecture".

[i.5] ITU-T recommendation M.3020: "Management interface specification methodology".

[i.6] ETSI TS 132 150: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Telecommunication management; Integration Reference Point (IRP) Concept and definitions (3GPP TS 32.150)".

[i.7] TMF: "mTOP Specification methodology".

NOTE: Available at http://www.tmforum.org/.

[i.8] OASIS Standard: "Reference Model for Service Oriented Architecture 1.0".

[i.9] TMF Specification 053B: "Technology Neutral Architecture, Contract Description: Business and System Views, V4.4".

[i.10] OMG Specification: "Unified Modelling Language, V2.1.1".

[i.11] TMF Specification GB921: "Enhanced Telecom Operations Map, Release 7".

[i.12] 3GPP TS 32.155: "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Telecommunication management; Requirements template".

[i.13] TMF Specifications GB922 & GB926: "SID Solution Suite, Release 7.0".

[i.14] ETSI TS 132 101: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Telecommunication management; Principles and high level requirements (3GPP TS 32.101)".

[i.15] ETSI TS 132 151: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Telecommunication management; Integration Reference Point (IRP) Information Service (IS) template (3GPP TS 32.151)".

[i.16] ETSI TS 132 152: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Telecommunication management; Integration Reference Point (IRP) Information Service (IS) Unified Modelling Language (UML) repertoire (3GPP TS 32.152)".

[i.17] 3GPP TS 32.153: "3rd Generation Partnership Project; Technical Specification Group Services and system Aspects; Telecommunication management; Integration Reference Point (IRP) technology specific templates, rules and guidelines".

[i.18] ETSI TS 132 154: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Telecommunication management; Backward and Forward Compatibility (BFC); Concept and definitions (3GPP TS 32.154)".

[i.19] TMF Specification GB927: "TMF Lifecycle Methodology, V1.1".

[i.20] ETSI TR 188 004: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN Management; OSS vision".

[i.21] ETSI TR 102 647: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Network Management; Operation Support System Standards Overview and Gap Analysis".

[i.22] ETSI TS 188 003: "Telecommunications and Internet Converged Services and Protocols for Advanced Networking (TISPAN); OSS requirements; OSS definition of requirements and priorities for further network management specifications for NGN".

[i.23] ETSI TS 188 005-1: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN Management; Network Resource Model (NRM); Part 1: Requirements".

[i.24] ETSI TS 188 005-2: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Network and Service Management; Network Resource Model; Part 2: Information Service".

[i.25] ETSI TS 188 005-3: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Network and Service Management; Network Resource Model; Part 3: eXtensible Markup Language (XML) Schema definition".

[i.26] ETSI TS 132 732: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Telecommunication management; IP Multimedia Subsystem (IMS) Network Resource Model (NRM) Integration Reference Point (IRP): Information Service (IS) (3GPP TS 32.732)".

[i.27] ITU-T recommendation M.3060/Y.2401: "Principles for the Management of the Next Generation Networks".

[i.28] ETSI ES 282 001: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN Functional Architecture".

[i.29] 3GPP TR 32.809: "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Telecommunication management; Feasibility Study of XML-based (SOAP/HTTP) IRP Solution Sets".

[i.30] 3GPP TR 32.818: "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Telecommunication management; Study on 3GPP SA5/MTOSI XML harmonization".

[i.31] ETSI TS 188 008: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); IPTV Management; Context and Requirements".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

contract: fundamental unit of interoperability in an NGOSS system

NOTE: It is much more than a software interface specification. Rather, the contract is a specification of how a managed entity interacts with its environment. As such, it includes other aspects of the solution in addition to software [i.9].

guidelines: provide instructions and advice for performing a task or activity, and suggest possible approaches to reach a pre-defined goal

information model: conceptual/analysis/domain/semantic model that represents real-world objects. It includes things of interest (entities), relationships between these entities (associations), and details/characteristics of these entities (attributes)

NOTE: It provides a way of structuring information, standard definitions, and a consistent common terminology. There are several terms for an information model in different standardization organizations (e.g. information service, information agreement). In order to use a unique term, within the present document the term information model is used.

methodology: documented approach for performing activities in a coherent, consistent, accountable, and repeatable manner

NGN OSS Service Interface (NOSI): well defined grouping of related NGN OSS Operations and constant data which are necessary to deliver coherent business or system functionality [i.1]

Service Oriented Architecture (SOA): paradigm for organizing and utilizing distributed capabilities that may be under the control of different ownership domains [i.8]. It is an evolution of distributed computing and modular object-oriented programming

NOTE: SOA builds applications out of software services. Services are relatively large, intrinsically unassociated units of functionality, which have no calls to each other embedded in them. They typically implement functionalities as services. Instead of services embedding calls to each other in their source code, protocols are defined which describe how one or more services can talk to each other. This architecture then relies on a business process to link and sequence services, in a process known as orchestration, to meet a new or existing business system requirement.

SOA service interface concept: means for interacting with a service. It includes the specific protocols, commands, and information exchange by which actions are initiated that result in the real world effects as specified through the service functionality portion of the service description

NOTE: The specifics of the interface should be syntactically represented in a standard referenceable format prescribing what information needs to be provided to the service in order to access its capabilities and interpret responses. It is not specified how the consumer accesses the interface definition nor how the service itself is accessed. However, it is assumed that for a service to be usable, its interface is represented in a format that allows interpretation of the interface information by its consumers [i.8].

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

ASN.1	Abstract Syntax Notation No.1
BA	Business Agreement
CMIP	Common Management Information Protocol
CORBA	Common Object Request Broker Architecture
DDP	Document Delivery Package
eTOM	enhanced Telecom Operations Map
GDMO	Generic Definition of Managed Objects
IA	Information Agreement
IDL	Interface Definition Language
IIS	Interface Implementation Specification
IOC	Information Object Class
IRP	Integration Reference Point
IS	Information Service
JMS	Java Message Service
MIM	Management Information Model
MISM	Management Interface Specification Methodology
mTOP	multi Technology OSS Program
MTOSI	Multi-Technology Operations System Interfaces
NGN	Next Generation Network
NGOSS	New Generation Operations Systems and Software
NOSI	NGN OSS Service Interface
NRM	Network Resource Model
OSS	Operations Support System
SID	Shared Information and Data model
SNMP	Simple Network Management Protocol
SOA	Service Oriented Architecture
SOAP	Simple Object Access Protocol
SuM	Subscription Management
TIP	TeleManagement Forum Interface Program
TMF	TeleManagement Forum
UML	Unified Modelling Language
WS	Web Services
WSDL	Web Service Definition Language
XML	eXtensible Markup Language

4 Principles of the Guidelines

This clause clarifies and describes important principles of the WG8 Specification Guidelines in terms of basic methodology approach, re-use of existing specification methodologies, actual objects of standardization, modelling technologies used for the specification work as well as documentation of the standards developed in WG8.

4.1 Three-Step-Approach

During the development of standards in ETSI TISPAN WG8 basically a three-step-approach (see figure 2) is used. This approach comprises the following steps:

- **Step1 (Requirements):** This step includes the conceptual definitions, use cases and traceable requirements related to a certain aspect of NGN OSS standardization. In WG8 this is mainly related to NOSIs (see clause 4.3). Traceability of the requirements should be ensured in all subsequent phases. An update of the requirements may be needed, e.g. after discovery of new aspects during phase 2.

EXAMPLE 1: Use cases and requirements for Subscription Management [i.2].

- **Step 2 (Technology-independent modelling):** This step comprises the definition of information-bearing entities, their properties, and relationships between them, in a technology-independent way. In the context of SOA, this includes the identification and separation of operations (verbs) and attributes (nouns), according to particular NGN OSS Services. This work is based on the requirements in step 1 and allows finally the technology-independent definition of NOSIs (see clause 4.3).

EXAMPLE 2: Information model [i.3] and functional architecture for Subscription Management [i.4].

- **Step 3 (Technology-dependent modelling):** This step provides the mapping of the technology-independent NOSI definitions of step 2 to NOSI definitions in a specific interface technology.

EXAMPLE 3: Interface specification for Subscription Management in IDL, XML and WSDL.

As far as possible the activities in all three steps should be supported by tools which make a certain degree of automation possible (see clause 5.3). The three-step-approach is described in more detail in clause 5 of the present document.

This approach in ETSI TISPAN WG8 follows a SOA-based methodology (see figure A.2), as opposed to object-oriented methodology, with a composition of interfaces according to related NGN OSS services (see clause 5.3). The management entities as NGN OSS services are connected by well-defined interface agreements or contracts, which are the NOSIs (see clause 4.3). This proceeding is also in line with considerations in TMF NGOSS [i.9], TMF mTOP/TIP, and in ITU-T recommendation M.3060 [i.27].

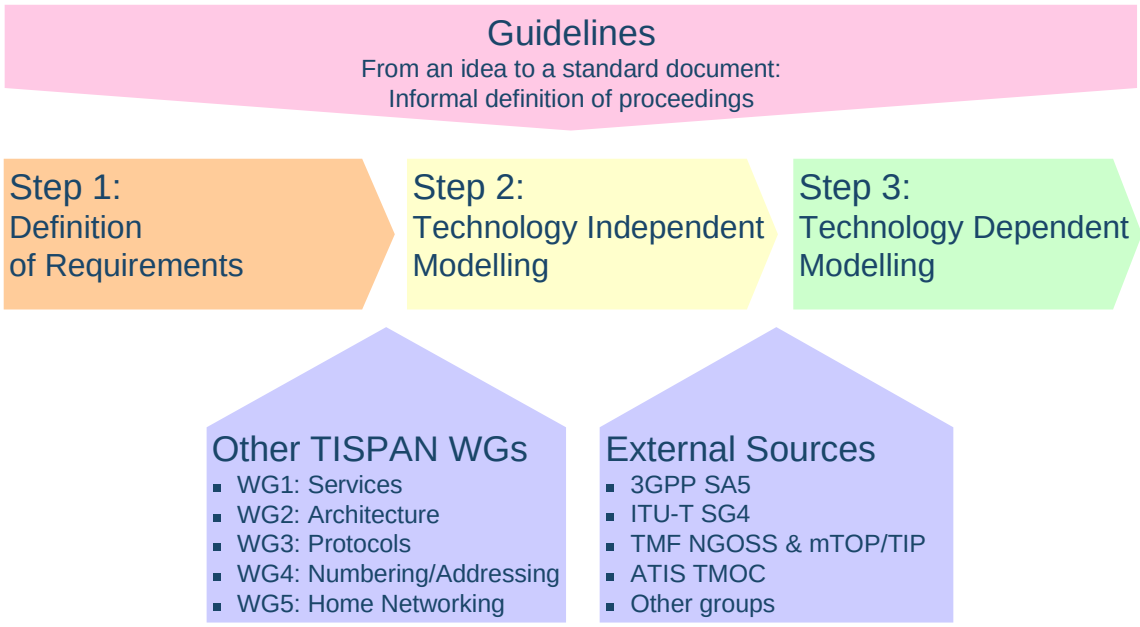

Figure 2: Three-Step-Approach

The Specification Guidelines provide an informal description of the proceedings in all three steps of this approach as outlined in clause 1 of the present document.

The standardization work is influenced by several other ETSI TISPAN Working Groups (WG), e.g. WG 1, 2, 3, 4, 5 and groups in other standardization bodies, e.g. 3GPP SA5, ITU-T SG4, and TMF NGOSS/mTOP/TIP. This influence can be of different nature, e.g.:

- The work can be the basis for WG8 specification activities, e.g. the NGN functional architecture of TISPAN WG2 [i.28] is the foundation for the Network Resource Model (NRM) specifications.
- There can be some similar activities in other bodies that require co-operation and harmonization, e.g. the subscription management work in 3GPP SA5 and TMF mTOP/TIP.

4.2 Reuse of Methodologies

In the area of OSS interface specification there are already methodologies in place in various standardization bodies. These are mainly the following:

- Management Interface Specification Methodology (MISM) by ITU-T SG4 in recommendation M.3020 [i.5].
- Integration Reference Point (IRP) concept by 3GPP SA5 in recommendation TS 132 150 [i.6].
- Interface Specification Guidelines by TMF mTOP [i.7].

They all use a kind of three-step-approach with different terminologies, but with similar content.

In the course of efficiency and to prevent unnecessary work as much as possible existing methodologies, or parts of them, should be re-used or adapted by ETSI TISPAN WG8.

Annex A investigates the existing methodologies listed above, and evaluates their use for the three steps (see figure 2) of WG8's specification methodology.

4.3 Units of Standardization

Within TISPAN WG8 it has been agreed (on TISPAN level) that the actual units of WG8 standardization are SOA-based NGN OSS Service Interfaces (NOSIs), in contrast to object-oriented interfaces.

According to the definition in [i.1] a NOSI (graphically depicted as a lollipop) is a well defined grouping of related NGN OSS Operations and constant data which are necessary to deliver coherent business or system functionality.

The NOSI is:

- The fundamental unit of standardization.
- An aggregation of functionality required for managing some coherent aspect of the NGN network or services. This functionality is provided through a set of related behaviour/functionality and is made publicly available for use by consumers of this service interface.
- Comprised of a set of mandatory NGN OSS Operations.
- Equivalent to the SOA service interface concept [i.8] and NGOSS Contract [i.9] (see clause A.4).

As output of ETSI TISPAN WG8 there will be technology-independent NOSI specifications as a result of phase 2 (see figure 2 and clause 5.2.2.2.2), and (ideally automatically generated) technology-dependent NOSI specifications as a result of phase 3 (see figure 2 and clause 5.2.3.2).

4.4 Modelling

Modelling is the preferred formal designing technique for ETSI TISPAN WG8. It will be mainly used for the technology-independent modelling in phase 2 (see figure 2).

The preferred language that is used for this modelling is UML [i.10]. It can be used for the design of information models with information object classes (IOC), for associated meta-models as well as for the protocol-agnostic description of NOSIs in phase 2 of the standard development process.

ETSI TISPAN WG8 is planning to use UML V2.x.

UML provides the basis for an automated tool-based approach (see clause 5.3), e.g. for generating technology-dependent phase 3 specifications from technology-independent phase 2 specifications with the help of commercial UML suites.

Furthermore, UML can be used for the description of use cases in phase 1 (see clause 5.2.1.2).

4.5 ETSI documentation of standards

All ETSI TISPAN WG8 technical documents that follow the three-step-approach (see clause 4.1) should be ETSI Technical Specifications (TS), at least the specifications for the context-specific aspects (see clause 5.1). The informal documents within the generic activities should be Technical Reports (TR).

Related to a specific NGN OSS functional area, e.g. subscription management or network resource management, within each step of the WG8 standard development process one or more TS documents will be produced as output:

- Phase 1: Use cases and Requirements (one document).
- Phase 2: Information Model, Functional Architecture (two documents).
- Phase 3: Technology-dependent definition (one document per technology).

In principle, phase 1, phase 2, and phase 3 documents depend on each other which implies sequential work on the documents. Nevertheless, all documents can be progressed in parallel if there is a sufficient degree of co-operation, exchange of information and harmonization.

Further details about the mapping from WG8 Methodology steps to WG8 Standards Documents, e.g. naming and terminology conventions, will be elaborated in clause 6 of the present document.

5 NGN Management Specification Methodologies

This clause describes NGN Management Specification Methodologies with focus on ETSI TISPAN WG8 Methodology following a best practise approach. The foundation for these methodologies is the three-step-approach which is briefly outlined in clause 4.1 of the present document (see figure 2). Clause 5.1 details the three-step-approach in terms of a differentiation between generic and context-specific activities. Within clause 5.2 the three-step-approach is elaborated in more detail for each step, concerning the work in ETSI TISPAN WG8. In clause 5.3 the tool-based approach is described which supports the work in all steps, and the transition from one step to the next one.

5.1 Generic Activities and Context Specific Activities

The basic three-step-approach described in clause 4.1 of the present document (see figure 2) can be divided into two horizontal streams (see figure 3):

- Kind a: Generic activities.
- Kind b: Context-specific activities.

Generic activities concern activities that are of common importance for all different kinds of context-specific activities. Generic activities can be for example generic requirements, common architecture principles, or overarching information models and meta-models.

Context-specific activities concern activities in the context of an interface specification for a specific NGN OSS functional area, for example subscription management, network resource management, charging, fault management, service quality management, or IPTV. These functional areas can be usually taken from the eTOM processes [i.11].

This differentiation is the basis for a further elaboration of the WG8 specification guidelines in clause 5.2.

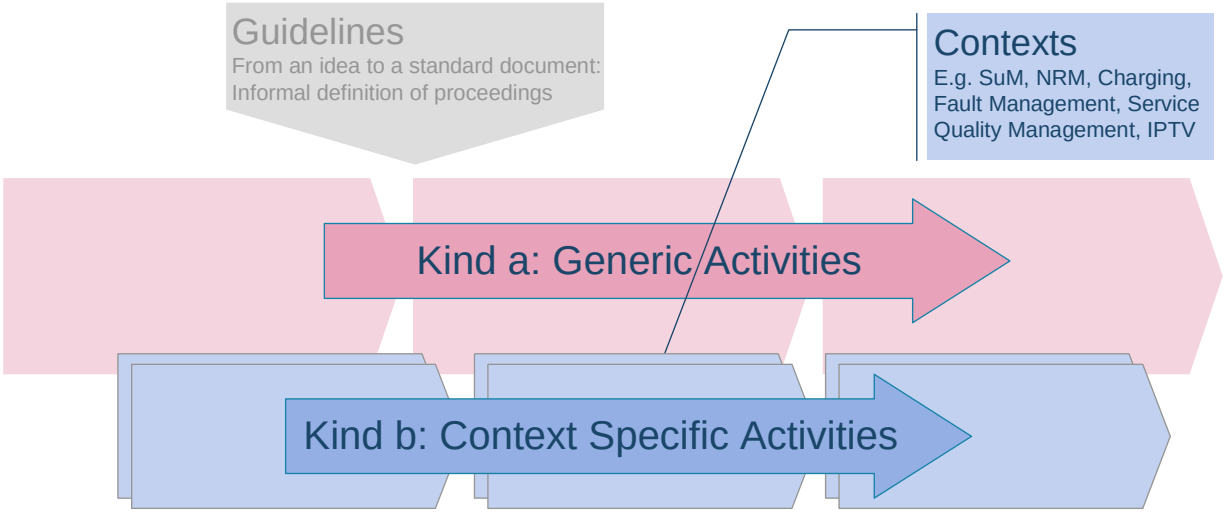

Figure 3: Generic and context specific activities

5.2 WG8 Methodology Details

This clause investigates the details of the specification methodology in ETSI TISPAN WG8. Figure 4 shows the integration of the three-step-approach (figure 2) with the introduction of common and context-specific activities (figure 3) that is applied to the work in ETSI TISPAN WG8. According to this structure the following clauses elaborate the single methodology steps in detail.

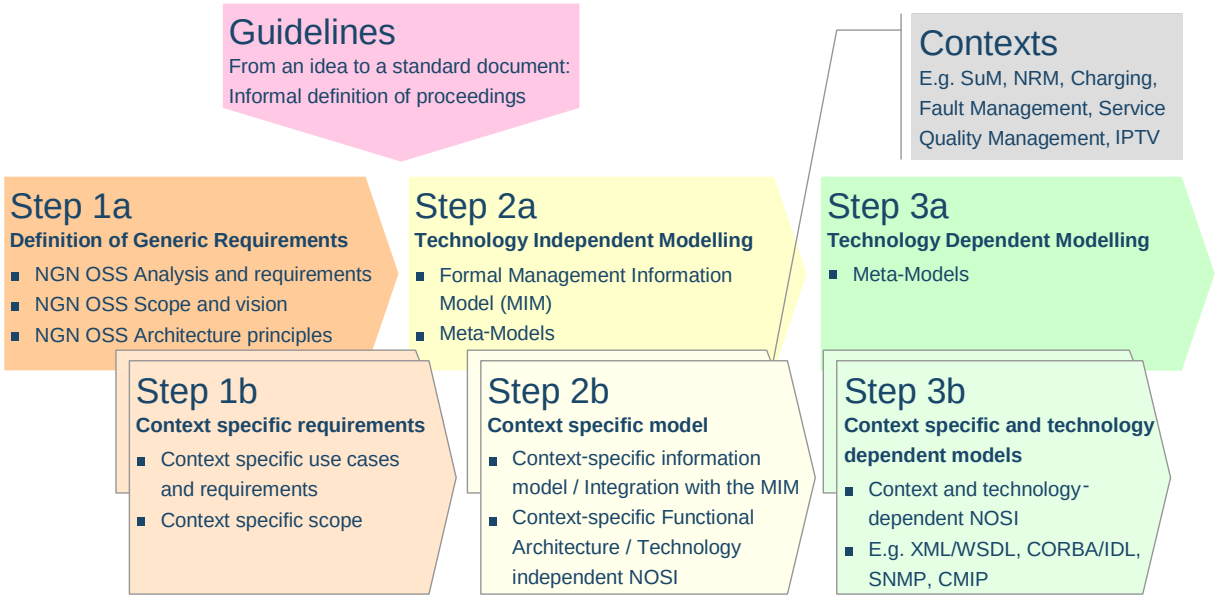

Figure 4: WG8 Methodology Details

5.2.1 Step 1: Requirements

5.2.1.1 Step 1a: Generic Requirements

Generic requirements in the context of ETSI TISPAN WG8 concern common requirements on NGN OSS in a broader sense, to sharpen and restrict the problem area as a whole. The work includes:

- An analysis of the problem area, in case of WG8 the NGN OSS, concerning existing standards and gaps.
- Scope and vision of the whole work in the NGN OSS area.
- Common requirements on NGN OSS to be met by all context-specific activities.
- Architecture principles that should apply to all context-specific activities in the area of NGN OSS.
- Requirements on a common Management Information Model (see clause 5.2.2.1.1).

5.2.1.2 Step 1b: Context-specific Requirements

The first step within the stream of context-specific activities is the development of requirements. This is to guide and ease the following steps.

An important issue is the traceability of requirements across all phases of the specification process to ensure the consideration of each requirement, e.g. by use of a suitable enumeration scheme for references. The aim is to have a bi-directional (forward and backward) referencing scheme.

It is recommended to define Use Cases to either derive or emphasize the requirements for the particular context, i.e. specific service interfaces for NGN OSS. The use cases should be defined with the help of UML use case diagrams.

For the definition of context-specific requirements in WG8, the requirements template (including the use case template) for the requirements phase in ITU-T recommendation M.3020, annex A [i.5] will be used. It is part of the Management Interface Specification Methodology (MISM) of ITU-T SG4 (see clause A.1). This template has also been completely taken over by 3GPP TS 32.155 [i.12] and will be used by 3GPP SA5 within its Integration Reference Point (IRP) methodology (see clause A.2).

The joint M.3020/3GPP template will be used by WG8 for all future context-specific requirement specifications.

An update of the requirements and use cases should be possible if new aspects rise in subsequent phases of the specification process.

5.2.2 Step 2: Technology Independent Modelling

5.2.2.1 Step 2a: Generic, Technology Independent Modelling

A generic technology-independent modelling in the context of ETSI TISPAN WG8 concerns the specification of a Management Information Model (MIM) from which the context-specific information models can be derived as well as the definition of a common meta-model as a kind of methodology for handling information models, to ease the integration of information models from different standardization bodies.

5.2.2.1.1 Management Information Model (MIM)

A TISPAN Management Information Model (MIM) would focus on designing and specifying an information abstraction and representation of the TISPAN management entities - their properties, operations, and relationships, independent of any specific repository, application, protocol, or platform. This is similar in scope to the TMF SID Business View and System View [i.13]. This information model also provides a linkage between services defined within ETSI TISPAN WG1 and TISPAN management entities.

Candidates to be considered for the MIM are TMF SID [i.13] and 3GPP NRM [i.26]. SID seems to be a reasonable basis for the decomposition of the MIM into different domains, whereas for the resource domain the integration between NRM and SID seems to be appropriate. Thus, a combination of SID and NRM with some enhancements could represent the MIM from which specific information models, e.g. for SuM, can be derived.

To specify the MIM, consolidated requirements (see clause 5.2.1.1) and an information model in UML have to be elaborated. Both activities are for further study.

5.2.2.1.2 Meta-Model

A meta-model is a model that describes abstract syntax and semantics of a domain. An information model is an instance of a meta-model. A meta-model defines the concepts for modelling an information model.

The UML language of TISPAN, 3GPP and SID domains could be represented by a meta-model and provides a way of integration between these models. A meta-model could ease the further development of SuM, NRM and MIM information models, and achieve a harmonization of the different terminologies.

From such a common meta-model aspects of different information models for specific contexts can be derived where necessary.

Until now no final decision has been made about the development of a common meta-model in ETSI TISPAN WG8 (for further study). A candidate to be considered is the TMF NGOSS meta-model.

5.2.2.2 Step 2b: Context Specific, Technology Independent Modelling

The second step within the stream of context-specific activities is the protocol-independent modelling of a particular context, i.e. NOSIs, based on the requirements of step 1b (see clause 5.2.1.2). For each context-specific aspect, an information model in UML and a functional architecture with a technology-independent definition of NOSIs have to be elaborated.

5.2.2.2.1 UML Information Model

An information model for the context-specific aspect is an abstract, but formal representation of the entities needed for the particular aspect or context, including their properties and relationships. It comprises the UML definition of the Information object classes (IOC) which include the attributes for the NOSI definition (in clause 5.2.2.2.2).

For the definition of context-specific, technology-independent information models in WG8, the Information Service (IS) template in TS 132 151 [i.15] and the UML repertoire in TS 132 152 [i.16] will be used. It is part of the Integration Reference Point (IRP) methodology (see clause A.2) in 3GPP SA5, and will in all probability be taken over by the Management Interface Specification Methodology (MISM) of ITU-T SG4 (see clause A.1) in ITU-T Recommendation M.3020 [i.5] for the analysis phase. Minor differences, e.g. concerning the traceability of requirements, are expected to be harmonized in near future.

The joint M.3020/3GPP template will be used by WG8 for all future context-specific, technology-independent information model specifications. Existing information model specifications (i.e. for SuM and NRM) in WG8 have already used this template, completely or partly.

If there will be a MIM and/or a Meta-Model specification in WG8 (see clause 5.2.2.1), context-specific information models can be derived from these models.

5.2.2.2.2 Functional Architecture/Technology-Independent NOSI

The functional architecture (FA) provides a technology-independent specification of the NOSIs for the particular context-specific aspect. This work eases the implementation process because it provides a kind of packaging of the context-specific interface functionalities by a well-thought grouping of operations and relevant information model data in the NOSIs, with an appropriate level of granularity.

The following work steps should be performed when elaborating the functional architecture and technology-independent NOSIs for a particular context-specific aspect:

- Identification of the eTOM processes and NGN functional entities that will be realized by the NOSIs, and of associated management applications which expose these NOSIs.
- Allocation of the functional capabilities that belong to the NOSIs, associated with the NGN functional entities and eTOM processes (dedicated management applications) identified in the step before. The source of information about the functional capabilities is the requirements and use cases of step 1b (see clause 5.2.1.2) as well as the eTOM model. The functional architecture is elaborated in parallel with the information model of step 2b (see clause 5.2.2.2.1).
- Identification of the NOSIs, and of their operations, for each set of NOSI functionalities identified in the step before. The level of granularity, i.e. how many NOSIs with which operations per management application, has to be defined here.
- Detailed definition of all NOSIs for the context-specific aspect. This step includes operations identified in the step before, input/output attributes identified through the IOCs in the context-specific information model (see clause 5.2.2.2.1) as well as pre-conditions, post-conditions, and mandatory/optional information.

NOTE: In Release 2 all information is defined as mandatory.

For each NOSI, its associated part of the Information Model (IOC) should be explicitly indicated.

A template for the NOSI identification and definition has to be provided. If the tables in the SuM Functional Architecture document can be taken over and formalized, as well as the traceability of the requirements at NOSI level, is for further study.

5.2.3 Step 3: Technology Dependent Modelling

5.2.3.1 Step 3a: Generic, Technology Dependent Modelling

The content of this clause is for further study.

5.2.3.2 Step 3b: Context Specific, Technology Dependent Modelling

The third step within the stream of context-specific activities is the protocol-dependent modelling of a particular context, i.e. NOSIs, based on the output of step 2b (see clause 5.2.2.2).

This includes the mapping of the technology-independent definitions of step 2b to definitions in a specific technology for particular protocols, for example: IDL/IIOP, XML/JMS, WSDL/SOAP. The output of step 3b will be technology-specific definitions for the NOSIs.

A tool support (see clause 5.3) for the automated generation of technology-dependent specifications from the technology-independent specifications in step 2b is helpful to increase the efficiency in step 3b.

It is recommended to use a template and guidelines for the context-specific requirement specifications. A candidate is the IRP technology specific template for the solution sets (SS) in 3GPP TS 32.153 [i.17] that is currently elaborated on in 3GPP Release 8 together with ITU-T SG4, with focus on XML and SOAP definitions. Furthermore, the results of the joint work between 3GPP SA5, ITU-T SG4, TMF mTOP/TIP, ATIS TMOC and TISPAN WG8 on XML guidelines will be considered here.

5.3 Tool-based Approach

ETSI TISPAN WG8 aims at a tool-based approach to support as far as possible a tool-based building of specifications, and an automated transformation between the different steps of the standardization methodology (see clause 4.1). This way of proceeding increases the efficiency of WG8's work in terms of time and cost savings, and the timely availability of standards. Furthermore, it improves the quality of standards and minimizes errors in the specifications.

The use of tools in WG8 is currently under study.

5.3.1 Tool Chain

Concerning the different phases of WG8 methodology (see clause 5.2) the following tool support is possible:

- Phase 1b:
  - Requirement Management Tools: Creation, versioning, changing, tracking and documentation of requirements (sometimes integrated in UML tools).
  - UML tools: Use case Diagrams for the definition of use cases and its documentation.
- Phase 2a/b:
  - UML tools: Class diagrams for the technology-independent design of information models and meta-models, protocol-agnostic description of NOSIs, and its documentation. Furthermore, the derivation of information models from meta-models can be supported.
- Phase 3b:
  - UML tools: Generation of protocol-specific object classes and interfaces from the technology-independent model, and its documentation.

The tool chain used in WG8 is for further study.

5.3.2 Tools

This clause lists the concrete tool products which are used in ETSI TISPAN WG8.

These tool products are for further study.

6 Mapping from WG8 Methodology Elements to WG8 Standards Documents

6.1 Titles and Objectives of documents

Table 1 shows the recommended titles (title part 3) and objectives of NGN OSS specifications in ETSI TISPAN WG8 for each step of the WG8 methodology (see clause 5.2) for the specification of NOSIs. Title part 1 is fixed as "Telecommunications and Internet Converged Services and Protocols for Advanced Networking (TISPAN)", title part 2 is fixed as "Network and Service Management".

Table 1: Titles (Part 3) and objectives of WG8 documents

Methodology Step	Title	Objective
1a	<problem area (see note 1)>; Standards and Gap Analysis <problem area>; Common Requirements <problem area>; Vision and Scope <problem area>; Architecture Principles Management Information Model; Requirements	See clause 5.2.1.1
1b	<context-specific aspect (see note 2)>; Requirements	See clause 5.2.1.2
2a	Management Information Model; Information Model Management Meta-Model	See clause 5.2.2.1.1 See clause 5.2.2.1.2
2b	<context-specific aspect)>; Information Model <context-specific aspect>; Functional Architecture	See clause 5.2.2.2.1 See clause 5.2.2.2.2
3a	for further study	See clause 5.2.3.1
3b	<context-specific aspect>; <specific technology definition (see note 3)>	See clause 5.2.3.2
NOTE 1: The problem area is for example NGN OSS, concerning WG8's current work. NOTE 2: The context-specific aspect is for example SuM or NRM, concerning WG8's current work. NOTE 3: The definition in a specific technology is for instance the XML schema definition.		

This terminology should apply to all future documents in ETSI TISPAN WG8 that aim at the specification of NOSIs.

6.2 Mapping to TISPAN WG8 documents

This clause shows the allocation of published, draft and known future ETSI TIPAN WG8 documents in the area of NGN OSS to the steps of the WG8 specification methodology. This kind of mapping is shown in table 2.

Table 2: Mapping of WG8 documents to methodology steps

Methodology Step	WG8 Document
1a	TR 188 004: NGN OSS Vision [i.20] TR 102 647: NGN OSS Analysis [i.21] TS 188 001: NGN OSS Architecture [i.1] TS 188 003: NGN OSS Requirements [i.22]
1b	TS 188 005-1: NRM Requirements [i.23] TS 188 002-1: SuM Requirements [i.2] DTS/TISPAN-08019-R3: IPTV Management, Context and Requirements [i.31]
2a	for further study
2b	TS 188 005-2: NRM Information Service [i.24] TS 188 002-2: SuM Information Model [i.3] TS 188 002-3: SuM Functional Architecture [i.4]
3a	for further study
3b	TS 188 005-3: NRM XML Schema Definition [i.25] DTS/TISPAN-08020-4-R3: SuM Solution Set

Annex A:
Existing Methodologies

In this annex, an overview about relevant specification methodologies and approaches in other standardization organizations are given. These methodologies will be described and evaluated concerning their use in WG8.

A.1 Management Interface Specification Methodology (ITU-T)

The Management Interface Specification Methodology (MISM) of ITU-T SG4 in ITU-T Recommendation M.3020 [i.5] includes the following phases:

- Requirements specification.
- Analysis specification.
- Design specification(s).

Concerning the requirements, a distinction has been made between two kinds of requirements:

- Business requirements: These requirements represent the needs of the management problem being solved.
- Specification requirements: These requirements provide sufficient details so that the interface definition in the analysis and design phases can be developed.

An important issue is to ensure the traceability of requirements:

- The final interface definition should be traceable to the requirements (traceability across the three phases).
- A suitable enumeration scheme is recommended.

The requirements in M.3020 have been divided in four categories:

- Conceptual (CON): Identifies a concept, data type, relationship, format, or structure.
- Functional (FUN): Identifies a functional capability, dynamic situation, a sequence, timing parameters, or an interaction.
- Non-functional (NON): Non-functional requirements, including abnormal conditions, error conditions and bounds of performance.
- Administrative (ADM): System administration and operational requirements not related to the use cases normal operations.

Annex A of ITU-T Recommendation M.3020 [i.5] includes Guidelines and templates for requirements structure and identification as well as guidelines and a template for use cases associated with the requirements. These templates will be used in ETSI TISPAN WG8 for the requirements step 1b (see clause 5.2.1.2), and have been completely taken over by 3GPP SA5 for the IRP requirements in TS 32.155 [i.12] (see clause A.2).

Within the analysis phase the requirements are used to identify interacting entities, their properties, and the relationships between them. The analysis phase should be independent of any design constraints. In general, the use of UML notation is recommended. Therefore, a UML repertoire has been defined in ITU-T Recommendation M.3020 [i.5], annex D, which has been taken over from TS 132 152 [i.16] (see clause A.2). Currently, M.3020 uses UML version 1.5.

The Information specified in the analysis phase includes:

- Class descriptions (includes operations, notifications, attributes, behaviour).
- Data definition.
- Class relationships.
- Interaction diagrams (sequence and/or collaboration diagrams).
- State transition diagrams.
- Activity diagrams.

The analysis template in annex B of ITU-T Recommendation M.3020 [i.5] is intended to be taken over from 3GPP Information Service (IS) template in TS 132 151 [i.15] (see clause A.2). Minor differences, e.g. concerning the traceability of requirements are expected to be harmonized soon. The joint template will be used in ETSI TISPAN WG8 for the technology-independent information modelling in step 2b (see clause 5.2.2.2).

The design phase in M.3020 deals with the specification of implementable interoperable interfaces. Therefore, the target specification language has to be selected. Within M.3020 the following examples are given: IDL for CORBA interfaces, ASN.1 for GDMO interfaces, and XML. Guidelines for the specification of protocol specific designs are for further study in ITU-T SG4. Joint activities with 3GPP SA5 (Release 8) and other standardization bodies are running, concerning the definition of guidelines for design specifications in XML.

A.2 Integration Reference Points (3GPP)

The 3GPP specification methodology is defined in the following 3GPP technical specifications:

- TS 132 150: Integration Reference Point (IRP) Concept and definitions [i.6].
- TS 132 151: Integration Reference Point (IRP) Information Service (IS) template [i.15].
- TS 132 152: Integration Reference Point (IRP) Information Service (IS) Unified Modelling Language (UML) repertoire [i.16].
- TS 32.153: Integration Reference Point (IRP) technology specific templates [i.17].
- TS 132 154: Backward and Forward Compatibility (BFC); Concept and definitions [i.18].
- TS 32.155: Telecommunication management; Requirements template [i.12].

The core concept of the 3GPP methodology is the Integration Reference Point (IRP). An IRP is an architectural concept that is described by a set of specifications for definition of a certain interface, comprising three levels:

- a Requirements specification,
- an Information Service specification, and
- one or more Solution Set specifications, e.g. for SNMP, XML, CMIP and CORBA.

There are three different categories of IRP specifications in 3GPP:

- Interface IRPs:
  - Related to a set of operations and notifications (verbs) for a specific telecom management domain such as alarm management, configuration management, etc.
  - Interface IRPs also contain definitions of Support IOCs.

- NRM IRPs:
  - Related to a particular NRM (Network Resource Model) as defined in TS 132 101 [i.14].
  - NRM IRPs do not define any operations or notifications, only attributes (nouns).
- Data Definition IRPs:
  - Related to commonly used data definitions that can be imported for use by Interface IRP and/or NRM IRP.

The combination of the 3-level IRP specification approach with the three IRP categories is shown in figure A.1 [i.6].

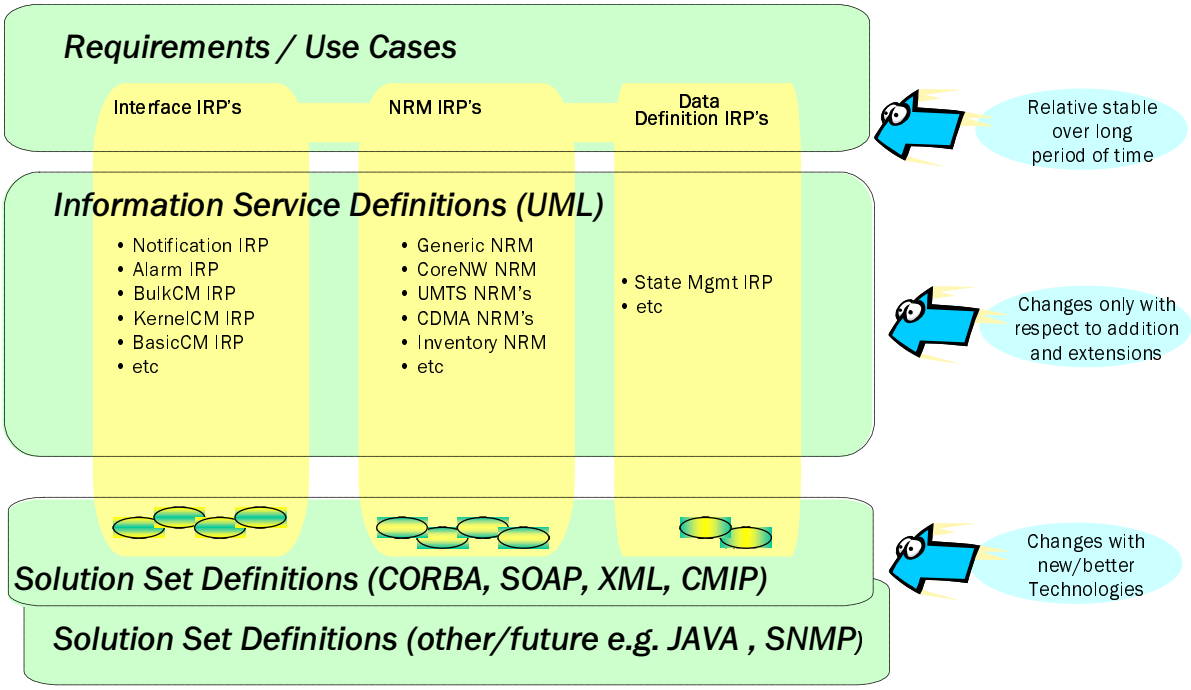

Figure A.1: IRP Specification Approach

The IRP Requirements template is defined in TS 32.155 [i.12], and is taken over from ITU-T Recommendation M.3020 [i.5] (see clause A.1). This joint template will also be used by ETSI TISPAN WG8 for the requirements step 1b (see clause 5.2.1.2).

The IRP Information Service (IS) template in TS 132 151 [i.15] is used for the production of all Integration Reference Point (IRP) Information Service (IS) specifications within 3GPP SA5. It will be used in ITU-T SG4 M.3020, annex B (see clause A.1) for the analysis phase, and will also be used in ETSI TISPAN WG8 for the technology-independent information modelling in step 2b (see clause 5.2.2.2). Minor differences between TS 132 151 [i.15] and ITU-T Recommendation M.3020 [i.5], annex B are going to be harmonized in 3GPP Release 8.

3GPP SA5 has chosen Unified Modelling Language (UML) to capture systems behaviour in the IRP IS context. The UML repertoire defined in TS 132 152 [i.16] selects the UML notations and model elements needed for the existing 3GPP IRP IS specifications. Future IRP IS releases may require the use of additional UML notations or model elements. Before any other UML notation and model elements may be employed in an approved 3GPP IRP specification, the other notation and model elements should be agreed for inclusion first in the repertoire of TS 132 152 [i.16]. The 3GPP UML repertoire is aligned with M.3020, annex D MISM UML Repertoire (see clause A.1). Currently, TS 132 151 [i.15] uses UML version 1.5.

The 3GPP TS 32.153 [i.17] currently provides a very first draft for a template to be used for the production of IRP technology-specific specifications (Solution Sets). Target technologies shown in figure A.1 are CORBA, SOAP, XML, and CMIP. 3GPP Release 8 focuses on guidelines for XML Solution Sets, together with ITU-T SG4, ETSI TISPAN WG8, TMF mTOP/TIP, and ATIS TMOC. These investigations are supported by 3GPP SA5 studies on XML (SOAP/HTTP) IRP solution sets [i.29], and on a harmonization with MTOSI XML specifications [i.30].

Figure A.2 shows the relation of the 3GPP IRP approach with the SOA approach that is used in ETSI TISPAN WG8. 3GPP separates the operations (verbs) and attributes (nouns) from each other in NRM and Interface IRPs (see figure A.1). This is half way to SOA, because here the verbs and nouns have to be integrated, like done in the NOSI definitions in ETSI TISPAN WG8 (see figure A.2).

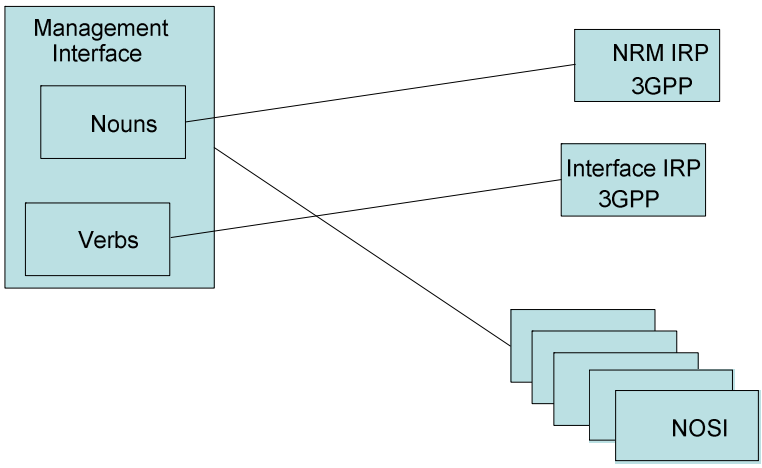

Figure A.2: SOA Approach and 3GPP IRP Approach

A.3 mTOP Specification Guidelines (TMF)

Within TMF's multi-Technology OSS Program (mTOP) an own specification methodology [i.7] has been developed that again follows the three-step-approach:

- Business Agreement (BA):
  - Includes the requirements and use cases.
  - Current work on requirements template (can be automatically generated from a .dot Word template).
- Information Agreement (IA):
  - Includes the information model (UML).
  - Current work on quite detailed modelling guidelines (General UML Guidelines, Data Model DDP Guidelines, Operation Model Guidelines, Notification Guidelines).
- Interface Implementation Specifications (IIS):
  - Includes the XML solution set (WSDL & XML Schema) and the IDL solution set (CORBA).
  - Guidelines for XML Interface Implementation Specifications in supporting documents for MTOSI. Current joint work with other standardization bodies on harmonized XML guidelines.

mTOP aims at a high level of automation in producing the various specifications (BA, IA, IIS). Therefore, a tool-based approach, with a highly automated production of the specifications and transition between the different steps, is currently being developed.

An important concept introduced in mTOP for MTOSI 2.0 is the Document Delivery Package (DDP). A DDP encapsulates all the specifications that relate to a specific eTOM level 2/3 process aspect using the TMF documentation scheme (BA, IA, IIS). This improvement makes it possible to migrate to a Service Oriented Architecture (SOA) in mTOP by separation of data and operations, and classification of operations according to different services. Therefore, the specifications are divided into disjoint parts based on the eTOM level 2/3 processes: Data Model DDPs and Operation Model DDPs.

NOTE: The TMF mTOP program is currently migrating to the TMF Interface Program (TIP). The consequences of this transition concerning methodology are not yet clear.

A.4 NGOSS Lifecycle (TMF)

A.4.1 Background

The ETISI TISPAN NGN OSS Management architecture defined in TS 188 001 [i.1] describes how logical Service Interfaces are positioned in a Service Orientated Architecture (SOA) to deliver Management functionality using the TMF eTOM [i.11] as a framework.

However the architecture is silent on some specific aspects of defining concrete OSS interfaces using for example Web Service Technologies.

This clause provides an overview of the preferred SOA-based approach to defining those concrete interfaces, following the NGOSS Lifecycle of TMF [i.19].

A.4.2 Lifecycle View of Interfaces and Contracts

The model of NGN Management interfaces that is being used by ETIS TISPAN is based on a Contract First Model which is a particular style of SOA approach to defining interfaces.

Contracts are evolved by a lifecycle shown below in figure A.3 from TMF GB 927 [i.19].

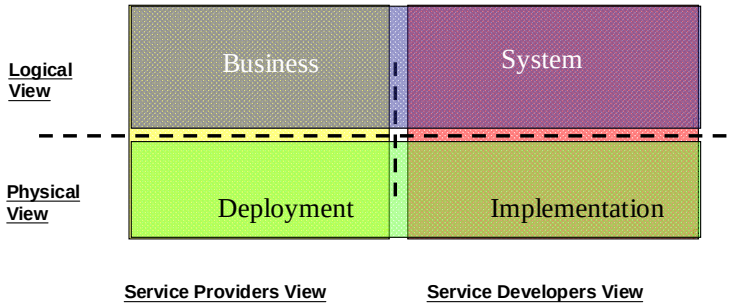

Figure A.3: TMF NGOSS Lifecycle

This lifecycle model was adopted in structuring of TS 188 001 NGN Management Architecture [i.1].

There are essentially two architectural concepts that have to be managed throughout such a lifecycle. These are the:

- **NGN Management Service Interface (NOSI):** also known as a NGOSS Contract within TMF. The specification of this entity evolves as it is progress through the lifecycle. Essentially it becomes more detailed in its specification as one moves from the Systems to Implementation and Deployment views. NOSI is the primary unit of standardization (see clause 4.3).
- **NGN OSS Services and their packaging:** An NGN OSS Service is equivalent to the concept of a component in the NGOSS Logical view. However as NGN OSS Services are realized they are packaged into different groupings as one goes round the lifecycle.

A.4.3 Relation with NOSIs

NOTE: The text in this clause shows a first view on the relation between NGOSS lifecycle and NOSIs, and their mapping to the steps of WG8's specification methodology. Therefore, it is for further study.

The lifecycle model shows that the NOSIs are effectively functionally unchanged as they evolve around the lifecycle. What happens is that they become more specific with respect to technology binding and non functional aspects of such a packaging.

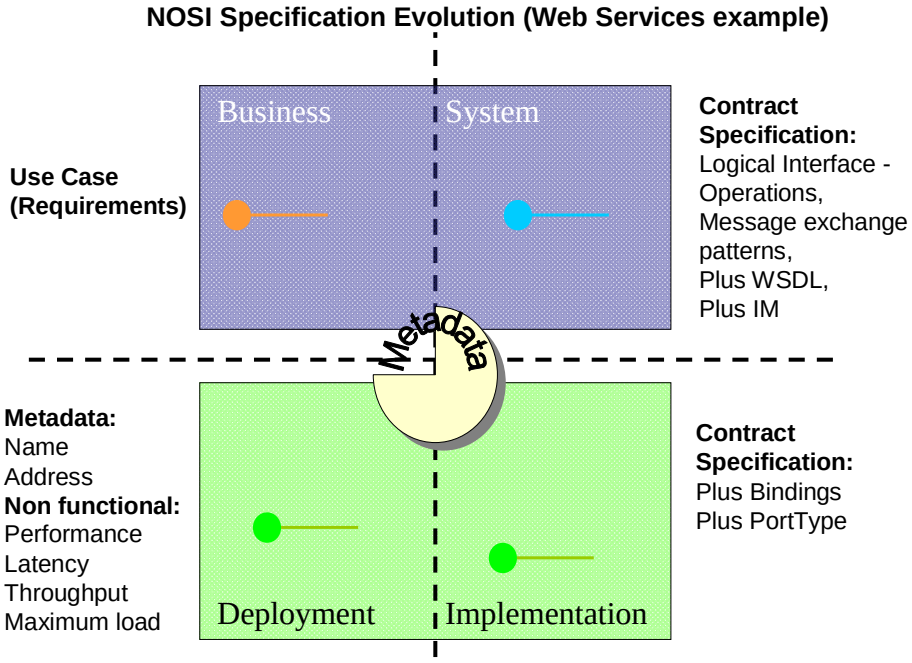

Figure A.4: NOSI Specification Evolution (Web Services example)

In the example shown in figure A.4 the evolution of a NOSI, as it develops through its lifecycle, is identified:

1) The Business view defines the use cases and requirements associated with a NOSI (WG8 step 1b).

2) In the System View the detailed operations and message exchange pattern are identified along with the Web Service Description Language (WSDL) description of all of the messages/documents exchanged. In addition a system's view Information Model is defined that describes the entities represented in the messages and the logical relationships amongst them (WG8 step 2b).

3) In the Implementation View the binding of the NOSI to the Web Services technology is achieved by mapping the WS interface to the Web Environment though SOAP binding and PortTypes (partly WG8 step 3b).

4) In the Deployment View the NOSIs themselves are functionally unchanged. What happens is that the metadata repository has to be populated to hold the name and address for the instance of the deployed NOSI plus non-functional information about performance, latency, average through put and maximum load. This is needed to maintain the Quality of Service offered by the deployed NOSI.

There is another lifecycle perspective which is about packaging and componentization shown in figure A.5. This diagram shows that in the real world the components or packages that are deployed are likely to be groups of NOSIs that work together for some purpose.

- **Business View:** In the example three NOSI definitions are shown in the Business view. One of these is a systems management NOSI.

- **Systems View:** In this view the architectural concept of a NGN OSS Service, described in TS 188 001 [i.1], is used which is an enumerated set of NOSIs. The two example NGN OSS Services, shown above, each use the Systems Management interfaces. Note that the decision about NGN OSS Services and their composition is an architecture decision made in this case by ETSI TISPAN WG8.

- **Implementation View:** In this view the implementer makes a decision about how to package the architectural components - NOSI and NGN OSS Service into Implementation packages. The decisions made include: the bindings of the NOSIs to specific transport protocols and PortTypes, recording and publishing the metadata, and essentially configuration management information, relating the Implementation package to the Systems Architecture components. These Implementation packaging decisions are made by the Implementer, not a standards group such as ETSI.

- **Deployment View:** In this view the operating organization forms the Implementation Package into Deployment packages that are actually the basis of realizing the NOSI Functionality. The deploying organization does two things. Firstly, it groups the implementation packages into deployment packages, and secondly it provides, and publishes, the necessary metadata about the deployed component. This includes the Configuration Management aspects of the Deployment package relating it to Implementation packages name and versions numbers, and also non functional information related to the performance limits of the deployed components such as latency, average throughput, and maximum capacity.

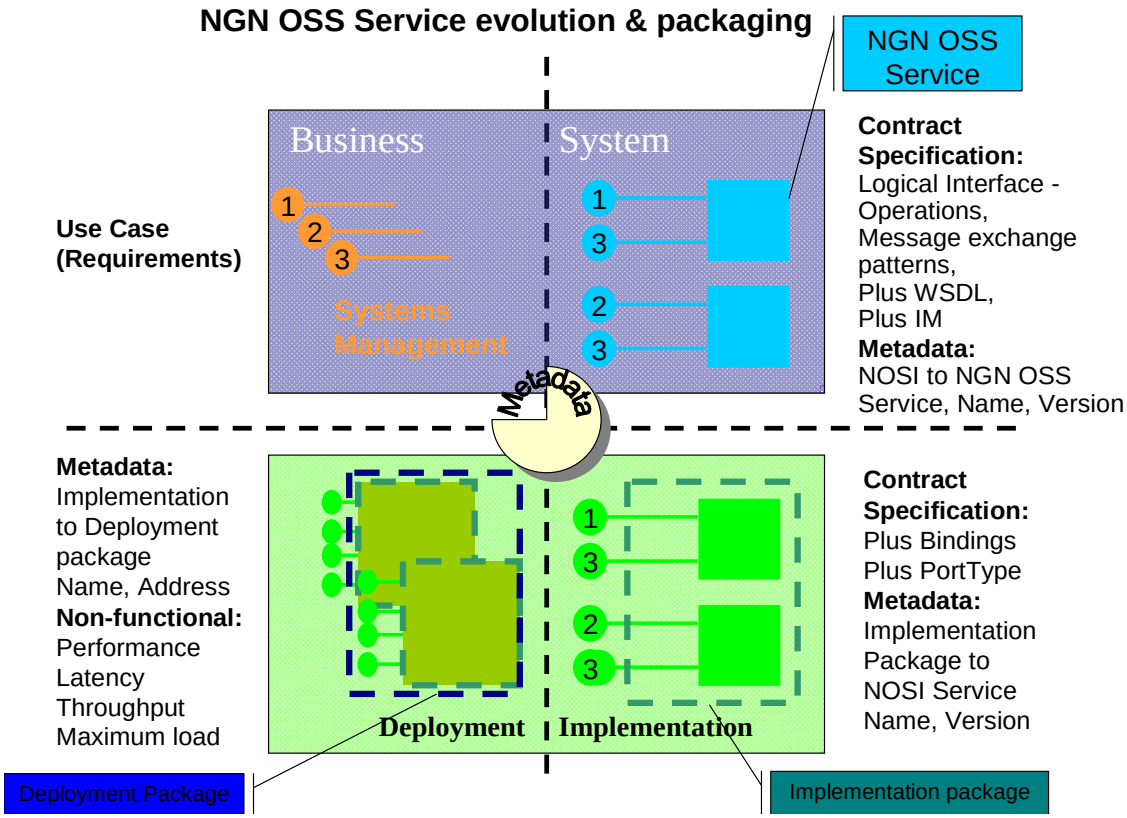

Figure A.5: NGN OSS Service Evolution and Packaging

The idea of packaging by different organizations as one goes round the lifecycle is one of the mechanisms for reducing complexity. Without such groupings the Systems Architecture components would tend to multiply as they are extended and enhanced by implementers. The appropriate level of granularity in the Systems view tends to be driven by logical considerations (usually a fine grain viewpoint) whereas in the Deployment view it is essential to have a simpler and more physical view, if the deploying organization's operations are to be made straightforward and capable of being carried out by less skilled staff than those who create the Systems Architecture.

A.4.4 Documenting the Lifecycle Views

The lifecycle views can be captured using the IRP Methodology of TS 132 150 [i.6] (see clause A.2), and mapped to the corresponding WG8 methodology steps, as follows:

- The Business View of the lifecycle is documented in the Requirements phase of the IRP Methodology (WG8 step 1b).
- The System View is documented in the Information Service (IS) phase of the IRP Methodology (WG8 step 2b).
- Part of the Implementation View is documented in the Solution Set (SS) phase of the IRP Methodology:
  - The protocol specific models of the technology-independent NOSI Information Models will be documented in NOSI Solution Sets (WG8 step 3b).
  - However the final choice of, and packaging of, NOSI Solution Sets into commercial products is a vendor decision.
- The Deployment View is not a matter for standardization.

The 3GPP IRP methodology (see clause A.2) is going to be harmonized with the ITU-T MISM (see clause A.1).

History

Document history		
V2.1.1	November 2008	Publication