

The Embedding of an OSS into a comprehensive NGN Environment

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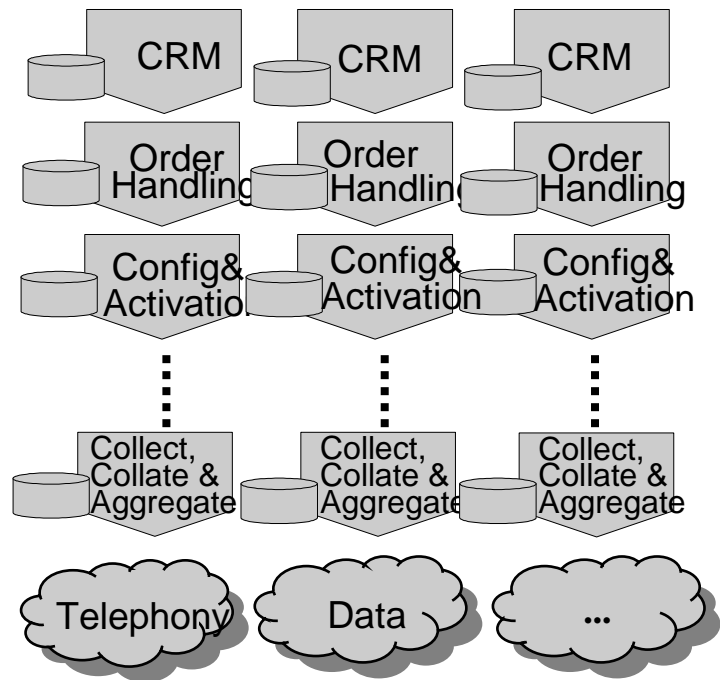
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Introduction and Market Situation

Traditional Telcos were network & service-specific oriented - Stovepipes

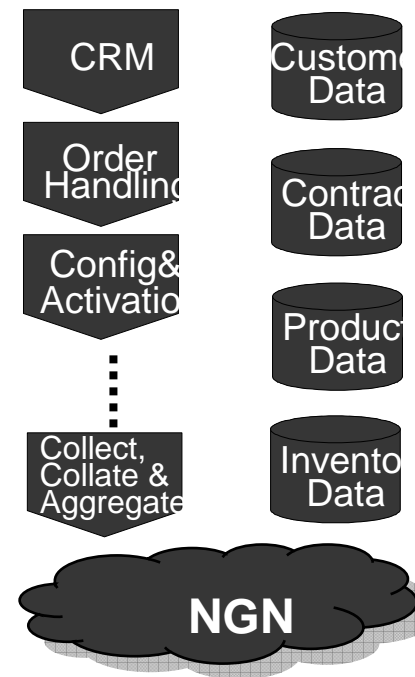


Heterogeneous Process- and IT Support Landscape

The time-to-market required for Provisioning of new Services was not met. Increasing OSS related Development Efforts (Integration Tax)

NGN Architecture and NGOSS oriented OSS/BSS are promising to overcome Stovepipes

Two strategic Steps



The new Approach shall support faster Service Creation and Provisioning

Determination of new OSS Objectives or Features to tap NGN Capabilities. But what kind of ...

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Objectives for a NGN dedicated OSS

OSS ready for NGN has to keep pace with the Quality and Speed of Change in the NGN Arena and h

- support all the eTOM operational Processes for Operation Support & Readiness, Fulfillment, Assurance, and Billing of any Service (including Content) as well as for Strategy, Infrastructure & Product
- contribute Improvement of the overall Process Efficiency and Speed by means of
 - Supporting End to End (E2E) Automation of all the eTOM like Processes, e.g. in a nearly zero touch Provisioning Manner
 - Installing a common Inventory, especially for Resources and Services. This contributes to more Transparency and better Data Quality, e.g. of all the tangible Resources such as Devices or Lines and also non-tangible ones such as Addresses, Capacity or Video Streams
 - Improving/Removing legacy Systems and consolidate legacy Data including Migration (Incumbent's Case)
- interface with Service Creation Capability and Roll out of new Services
- avoid new Stovepipes and to be a more universal OSS for all the NGN Services as far as possible
- guarantee Flexibility and Scalability by means of
 - being usable for various Network Areas, Services, and Environments, e.g. providing an adaptable Set of pre-defined Service Provisioning Templates
 - allowing that Network and IT Resources can be expanded easily in due of Service
- To be completed!
- A Framework for further detailed OSS Requirements Analysis, bus also Design, and Implementation is needed
 - allowing the plug in of new OSS Components
- support Interoperability by means of using SOA like Interfacing at its inner and outer Edges.

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The NGOSS Approach and its Business View

The NGOSS Approach should be used in order to refine and reach these Objectives raised by

- In line with the Industry Standard EAI or the SOA Approach. It contributes to the whole OSS Project Success
- Important Characteristics:
 - Component orientated technology neutral Architecture (TNA)
 - Shared Information Data Model (SID)
 - eTOM Processes
 - Lifecycle Management and Methodology – various Views

NGOSS Business View encompasses but is not limited to following OSS Project Activities

- Identify the OSS Component functional and non-functional Requirements
- Process Analysis and Process Description
- Analysis of all relevant Operator's or Service Provider's legacy Systems including the Determination of Migration Needs
- Data Analysis in the Style of the SID Model
 - Reference or Master Data
 - Interfaces between the OSS Systems (inner Edge), as well as to the BSS, ESS, SCE, and to the NGN Layers (outer Edges). This should be focused on the Determination of:
 - Information Flow between various Systems
 - Objects including Attributes of Data to be exchanged
 - Formatting, Mapping, Validation and Routing Rules
 - Quantity Structure (Time - Amount - Location Figures)
 - Communication Triggers

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Reference- and Integration Points – Overview

Reference Point is a

- Connection between two Functional Domains (e.g. Northbound from OSS to BSS) for Data Exchange
- Reference Points (Ri) will give a first Idea about the OSS Embedding. For further Details the Identification of Integration-Points (In) between various IT Domains (i.e. the OSS's outer Edges to the BSS, ESS, SCE) and also to the Network is necessary.

Integration Point is a

- Part of a Reference Point; Basis for the OSS's outer Edges
- Integration Points (In) consist essentially of Application Programming Interfaces (APIs) or Protocols and Data incl. Formats to be exchanged.
- One decisive Basis for Design and Implementation by means of SOA Technologies

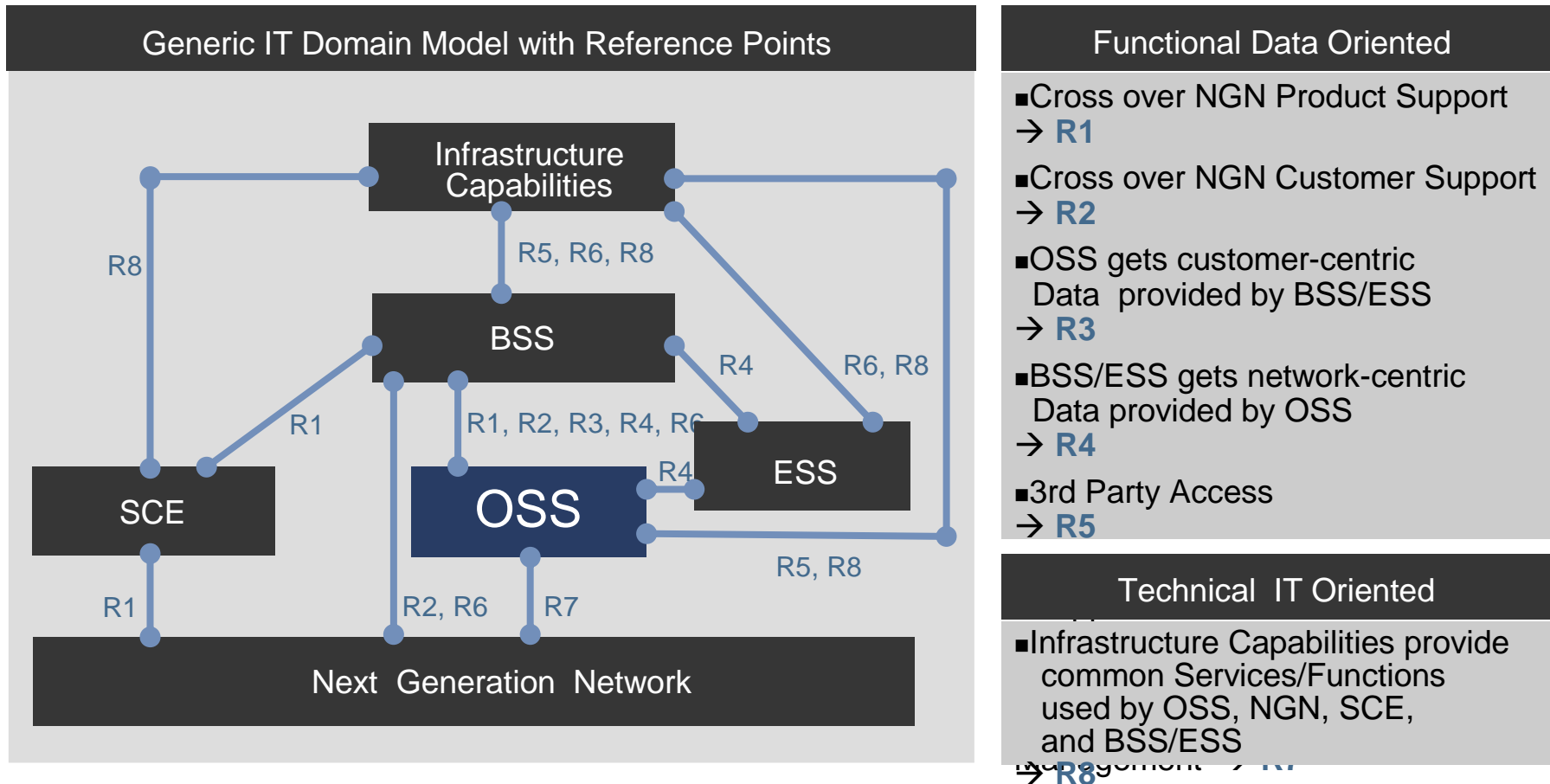
Application Programming Interfaces (API) are characterized by

- Each API is defined mainly by a Name, a Parameter List, the actual Functionality, which is carried out through API Invoking, Input Data, Output Data, Pre-Conditions, Post-Conditions, Exceptions, and Shared Data that is altered by the API's Functionality Processing.
- Depending on the OSS's EAI-/SOA Implementation Technology or Programming Language used APIs can be grouped into more complex Components such as SOA Services based on Web Service Capabilities which can be invoked by other Systems such as ESS or BSS. A detailed API- and Service Definition can not be given by this Paper but would have to be elaborated in a real life OSS Project of course.

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Reference- and Integration Points - Coarse grain Presentation

Besides OSS Features and inner Edges the correct Determination and Description of the OSS's outer Edges or even Reference – and Integration Points play a Key Role in OSS Projects. The outer Edges are a dominant Factor for the proper Embedding of an OSS into its Environment.



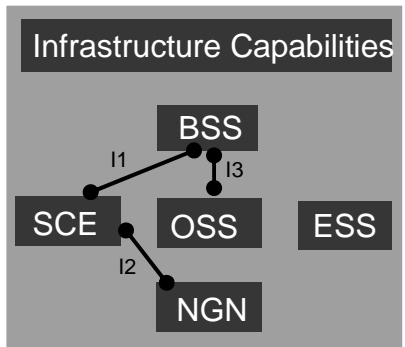
Outer Edges are essentially described by the Reference- or Integration Points stated above and detailed by the following....

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Reference- and Integration Points - R1: Cross Over Product Support

- Product or Service Innovation
- Creation of Products or Services unique Selling Points
- Faster Time to Market for new Products or Services
- New Services shall be created by means of the Service Provider
- Network Abstraction Definitions, i.e. Product Definitions independently on vendor specific Network-Technology

Common IT Domain Model



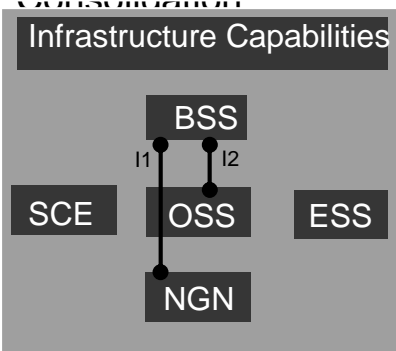
For Identification of an Integration-Point between various OSS - BSS Components . They consist essentially of Interfaces (APIs) and Data to be exchanged.

- ### Motivation
- Save OpEx by means of automated Product DB Up date
- ### Description
- I1: SCE exports Service Feature Data to the BSS (Product Catalogue). Within the BSS the Billing System has to be informed too
 - I2: SCE loads Service Features to the NGN (Application Plane)
 - I3: BSS (Product Catalogue View) and OSS (Service Inventory) needs to be synchronized

- ### System Integration Services
- I1, I2, and I3 Specification, i.e. Determination of
 - Attributes of Data to be exchanged
 - Rules for Formatting, Mapping, Validation and Routing for Data Exchange
 - Quantitative Structure (Time-Amount-Location Figures) for Data Exchange
 - Triggers (Events, Policies,..) for Data Exchange
 - Interface Behaviour (synchrony, asynchrony)
 - APIs incl. Integration Standards & Technologies
 - Data Modelling for I1, I2, and I3
 - Identification of the deepest SCE/NGN/ OSS as well as BSS Component Level for API Use by I1, I2, and I3
 - I1, I2, and I3 Implementation and Testing
 - Service Creation including Capabilities- or Network Abstraction-Definitions

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Reference- and Integration Points - R2: Cross Over Customer Support

Motivation	System Integration Services
<ul style="list-style-type: none"> Convergent NGN Products presume <ul style="list-style-type: none"> an OSS/BSS/ESS overarching View on Customer Data Each Customer shall get lots of Products but One Contract, One Bill NGN shall be access agnostic, Customer 	<ul style="list-style-type: none"> ditto R3 Evaluations <ul style="list-style-type: none"> Standards Vendors Common Customer DB Modelling and Implementation Definition and Implementation of Common Customer DB Propagation and Access Principles Migration of Customer Data of legacy Networks or OSS/BSS to be phased out by the Next Generation Program Activities (Incumbent's Case)
Common IT Domain Model	Description
<p>Infrastructure Capabilities</p> 	<ul style="list-style-type: none"> I1: Common Customer DB replicates Customer Profile Data relevant for HSS I2: Common Customer DB provides Master Data for OSS (e.g. Location for Fault Correlation) <p><small>For Identification of an Integration-Point between various OSS - BSS Components. They consist essentially of Interfaces (APIs) and Data to be exchanged.</small></p>

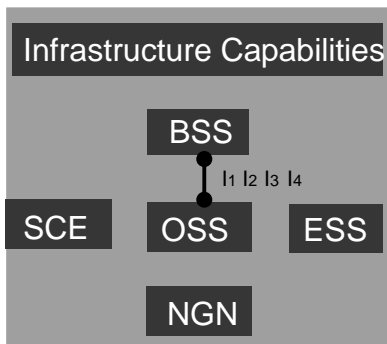
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Reference- and Integration Points - R3: OSS gets Customer Centric Data provided by BSS/ESS

Motivation

- Fulfillment and Assurance Processes are to be accelerated and E2E automated
- Avoidance of Off line (screen- or paper based) Interfaces

Common IT Domain Model



For Identification of an Integration-Point between various OSS - BSS Components . They consist essentially of Interfaces (APIs) and Data to be exchanged.

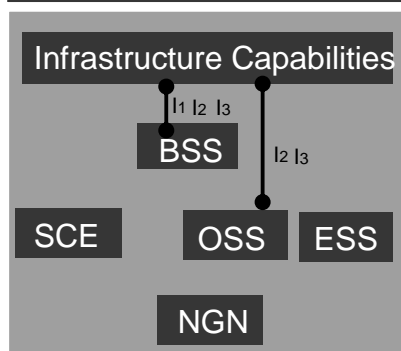
Work Activities Description

- I1: The BSS provides Service Requests to be decomposed and used for Planning Service Options by the OSS
- I2: The BSS provides Service Orders to be processed, decomposed, and checked in regard to Feasibility by the OSS
- I3: The BSS provides Customer Complaints to be processed and solved by the OSS
- I4: The BSS provides Contract-/SLA Data to be monitored by the OSS
 - Process Data (TTD, TTD \

System Integration Services

- I1, I2, I3, and I4 Specification, i.e. Determination of
 - Attributes of Data to be exchanged
 - Rules for Formatting, Mapping, Validation and Routing for Data Exchange
 - Quantitative Structure (Time-Amount-Location Figures) for Data Exchange
 - Triggers (Events, Policies,..) for Data Exchange
 - Interface Behaviour (synchrony, asynchrony)
 - APIs incl. Integration Standards & Technologies
- Data Modelling for I1, I2, I3, and I4
- Identification of the deepest OSS and BSS Component Level for API Use by I1, I2, I3, and I4
- I1, I2, I3, and I4 Implementation and Testing

The Embedding of an OSS into a comprehensive NGN Environment Reference- and Integration Points - R5: 3rd Party Access

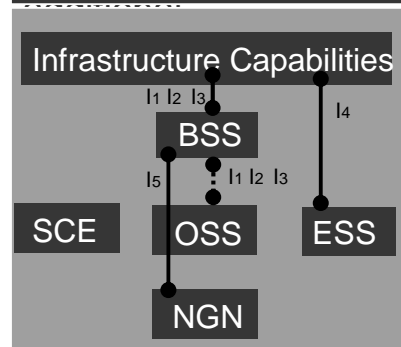
Motivation	System Integration Services
<ul style="list-style-type: none"> ■ Support of new Business Models ■ 3rd Parties act e.g. as Service Providers or Resellers. They both offer and buy an increasing Number of Services (e.g. Line Capacity, L1 Services, L2/L3 Services, Applications or Content) ■ Flexible Access Options for 3rd Party Self Management 	<ul style="list-style-type: none"> ■ I1, I2, and I3 Specification, i.e. Determination of <ul style="list-style-type: none"> ■ Attributes of Data to be exchanged ■ Rules for Formatting, Mapping, Validation and Routing for Data Exchange ■ Quantitative Structure (Time-Amount-Location Figures) for Data Exchange ■ Triggers (Events, Policies,..) for Data Exchange ■ Interface Behaviour (synchrony, asynchrony) <ul style="list-style-type: none"> ■ B2B Interface and Portals ■ Data Modelling for I1, I2, and I3 ■ Identification of the deepest OSS as well as BSS Component Level for B2B Interface/Portal Use by I1, I2, and I3 ■ I1, I2, and I3 Implementation and Testing
Common IT Domain Model	Name to 3rd Party Requests and Description
	<ul style="list-style-type: none"> ■ I1: Provision and Reception of 3rd Party Service Level Information ■ I2: Provision of BSS Billing Data or OSS Usage Mediation Data ■ I3: Access Management, e.g. through Portal to OSS Trouble Ticket Management (e.g. Trouble Ticket Self Creation and Status Look Up Functions)
<p>● — In — ●</p> <p>For Identification of an Integration-Point between various OSS - BSS Components . They consist essentially of Interfaces (APIs) and Data to be exchanged.</p>	

The Embedding of an OSS into a comprehensive NGN Environment Reference- and Integration Points - R6: Customer and Supplier Access

Motivation

- Reduction of the Operator's or Service Provider's Workload by means of Customer Self Service (e.g. Self Ordering, Self Configuration)
- Supplier Integration streamlines Resource or Capacity Ordering and Installation
- Decrease the Load on the Operator's or Service Provider's Purchase

Common IT Domain Model



Description

- I1, I2, and I3 same as in „Customer Centric Data provided by BSS/ESS“ but delivered by the Customer instead of the Operator's or Service provider's User
- I4: The ESS provides Equipment Orders to the Supplier's BSS/ESS. This correlates to the I2a of R4: "The BSS initiates Purchase Data to be handled by the ESS"
- I5: During Call Session: The Customer's Application allows Access to BSS

System Integration Services

- I1, I2, I3, I4, and I5 Specification, i.e. Determination of
 - Attributes of Data to be exchanged
 - Rules for Formatting, Mapping, Validation and Routing for Data Exchange
 - Quantitative Structure (Time-Amount-Location Figures) for Data Exchange
 - Triggers (Events, Policies,..) for Data Exchange
 - Interface Behaviour (synchrony, asynchrony)
 - B2B Gateways and Portals
- Data Modelling for I1, I2, I3, I4, and I5
- Identification of the deepest OSS as well as BSS and ESS Component Level for GW/Portal Use by I1, I2, I3, I4, and I5
- I1, I2, I3, I4, and I5

For Identification of an Integration-Point between various OSS - BSS Components . They consist essentially of Interfaces (APIs) and Data to be exchanged.

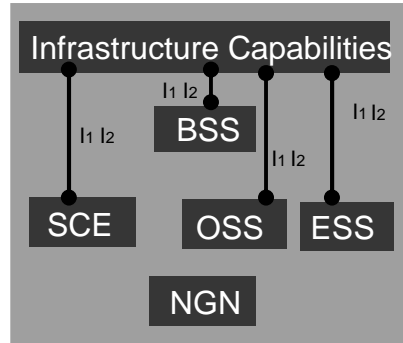
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Reference- and Integration Points - R8: Infrastructure Capabilities

Motivation

- Infrastructure Capabilities provide Features or Functions as well as Devices once (or centrally) but used multiple (or de-centrally) by BSS&OSS &ESS&SCE
- Reduction of CapEx (e.g. Licenses) and OpEx

Common IT Domain Model



●—●
In

For Identification of an Integration-Point between various OSS - BSS Components . They consist essentially of Interfaces (APIs) and Data to be exchanged.

& BSS&ESS Quality, Availability, and Description

- I1: Infrastructure Capabilities provide
 - Central Identity Management (unique Identifier for all the BSS&OSS&ESS&SCE Users)
 - Uniform User (mostly Employees) A³ Administration
 - Single Sign On
- I2: Infrastructure Capabilities provide IT Devices such as Printers used by the BSS& OSS& SCE&ESS

System Integration Services

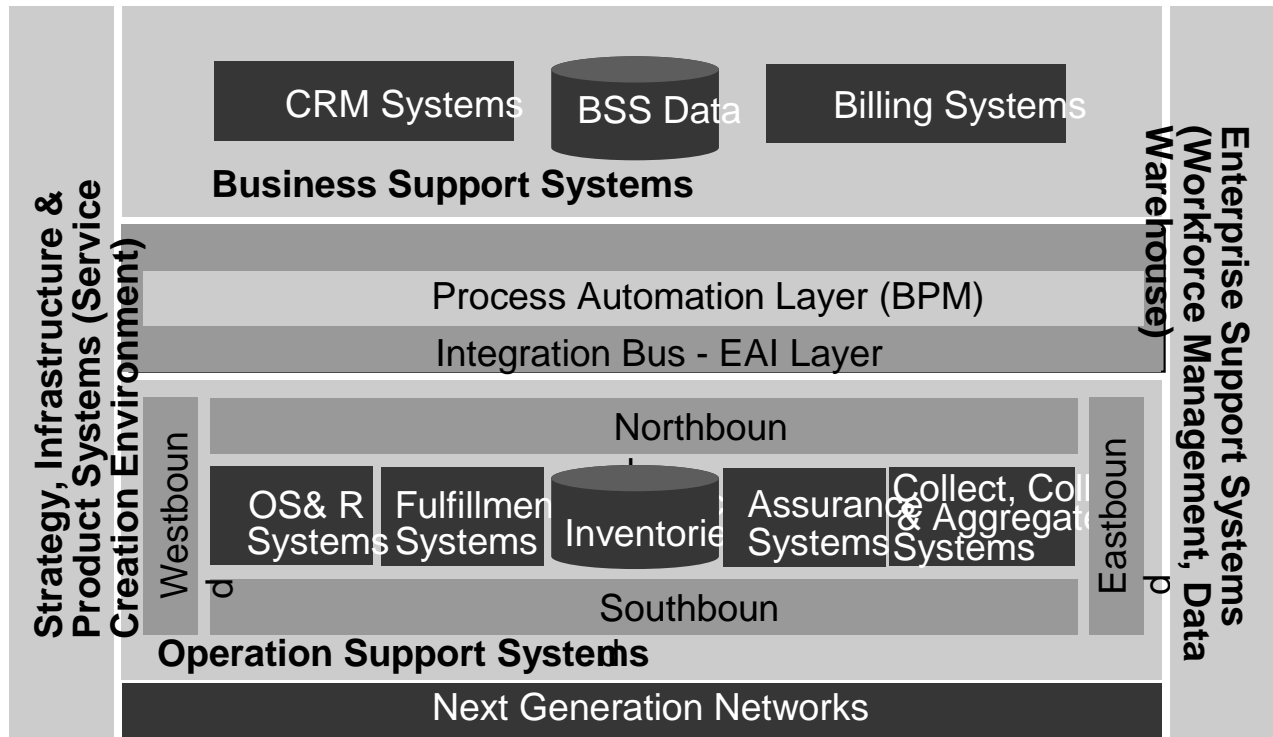
- I1 and I2 Specification, i.e. Determination of
 - Attributes of Data to be exchanged
 - Rules for Formatting, Mapping, Validation and Routing for Data Exchange
 - Quantitative Structure (Time-Amount-Location Figures) for Data Exchange
 - Triggers (Events, Policies,..) for Data Exchange
 - Interface Behaviour (synchrony, asynchrony)
 - Integration Standards and Technologies
- Data Modelling for I1 and I2
- Identification of the deepest SCE, OSS, ESS as well as BSS Component Level for API Use by I1 and I2
- I1 and I2 Implementation and Testing

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NGOSS System View - OSS Design and Application Map

OSS – How it should TO BE

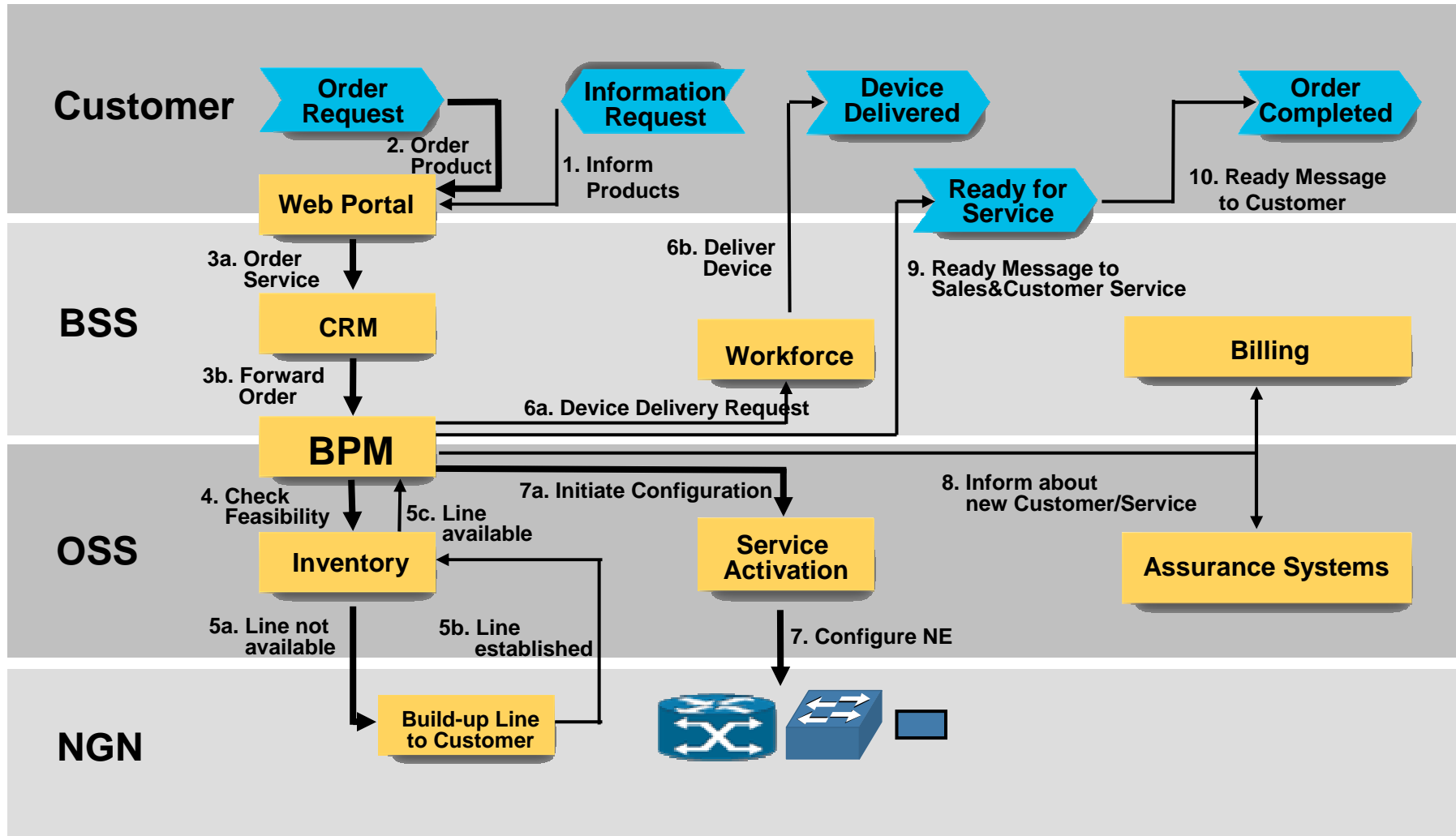
After the Business View including Requirement Analysis and outer Edges Determination is completed, the NGOSS System View follows. This will result in an Application Map which will present an Overview regarding the OSS Functional Domains and its Embedding into the Network- and IT Environment:



- Design/Determination of the best of breed (COTS) OSS Components incl. their Services
- Preparation of OSS Component Installation, Configuration, and Customization
- Reference or Master Data Modeling, e.g.
 - Customer Facing Services
 - Resource Facing Services
- Interfaces Design
 - Specification of the Interfaces Behavior (e.g. synchrony, asynchrony)
 - Determination of the EAI Layer
- Definition of a Migration Strategy with respect to the legacy

October 1st, 2008

The Embedding of an OSS into a comprehensive NGN Environment Process Design including Fulfilment Example Order of Service

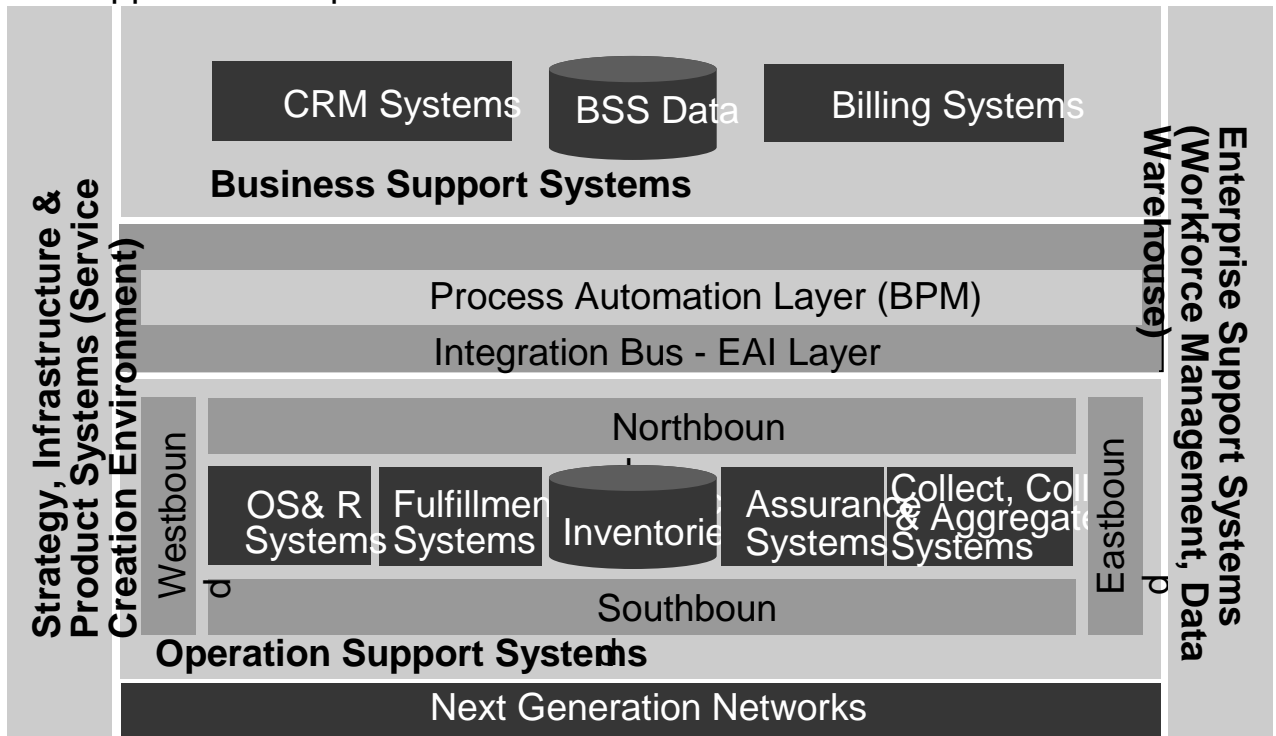


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NGOSS Implementation View – OSS Build

OSS – How it will be built

After Business and System View including all the Process Designs the actual Implementation of the OSS and its Embedding into the Network- and IT Environment will start. This Implementation represents a further Stage within an OSS Project. The NGOSS Lifecycle Management Phase “Implementation View” will give the respective Framework for Realization the Application Map defined:



- OSS COTS Component Installation, Configuration, and Customization
- Installation of the Process Automation and EAI Layer Platform
- Process- or Workflow Programming – Use of BPM Build Time- and Deployment Capabilities
- Migration Tools Installation and Configuration and/or Development from the scratch
- Reference or Master Data Implementation by means of DBMS or COTS
- SOA based Interfaces Programming, i.e. Automation of all the Interfaces at the outer Edges and between particular OSS Applications (inner Edges). E.g. in the Style of mTOP, MTOSI, MTNM

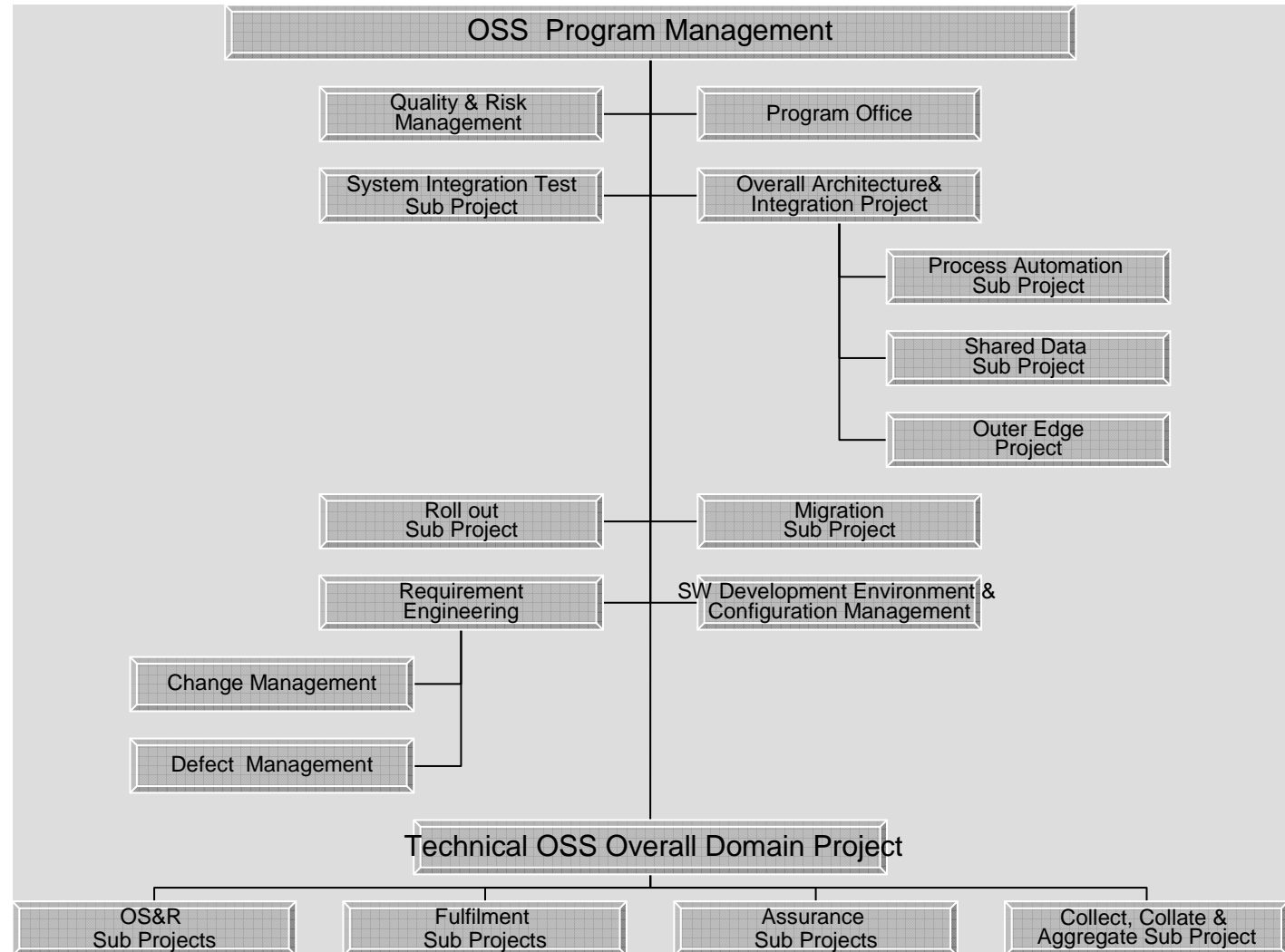
- Testing over several Stages and Objectives
- Preparation for OSS Deployment and Rollout

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PMI Principles and Project Organization for OSS

PMI Principles for OSS

- Are open for the NGOSS Lifecycle Management Phases
- Program Management: A Group of Projects managed in a coordinated Way to obtain Benefits not available from Managing them individually
- Integration Management incl. OSS Program Plan Development, Execution and Integrated Change Control
- Communication Mgmt
- Risk Response Planning
- OSS Testing – Quality Assurance



The Embedding of an OSS into a comprehensive NGN Environment Challenges

IT Architecture specific

- Transaction Security across the whole System (NGN + OSS + BSS + ESS + SCE)
 - Begin and End Point
 - Roll Back Scenarios
 - Bad Cases or Rainy Day Scenarios/Exception Handling in the E2E Process Chains automated
- Use of SOA in such a comprehensive overall System (NGN + OSS + BSS + ESS + SCE)
 - ESB versus Performance for DB Access
 - ESB versus Bulk Data Processing
 - All the Reference-/Integration Points described before were determined empirically. Therefore a Harmonization with real Systems will have still to be done Telco Company specific

Process and Organization specific

- The OSS, BSS and ESS have to be Department overarching in a Telco Organization. Determination of that one which is the Owner/Master of a certain Service/Product or its automated Provisioning and Operation
- Process Complexity - Which Department is the responsible E2E Process Owner (and Designer)
- Determination of Process- as well as System overarching KPIs (e.g. TTD)
- All the Processes described by Standards, have to be detailed by Telco Company specific operational –or Business Process Flows
- New Business Models (e.g. Wholesaler or Retailer specific, Subscriber Management)

Potential System Integrator Services in this Field

- Support for the Solution Elaborations of all the IT Architecture specific Challenges

- Consultancy for all the Process and Organization specific Challenges

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Wrap up

Challenges

- The Proliferation of NGN including its Services and Environment increases the Complexity required from OSS
- Installing an OSS that provides Cost Benefits while allowing for the easy Addition and Expansion of Services.

A sound Strategy for Network Operators or Service Providers

- Determine Objectives and Requirements for an OSS fit for NGN by means of
 - Following the NGOSS Business View
 - Process Definitions E2E
 - OSS's Reference –and Integration Point Considerations
- Apply of NGOSS Features for OSS Design and Implementation such as
 - Component oriented
 - Integration Bus – EAI Layer
 - Business Process Layer
 - Shared Information Data
- Take Advantage of Commercial Off The Shelf and Best of Breed OSS Capabilities that can enable the 'plugging in'

of COTS Products for new OSS Features, requiring the minimum Effort of Integration - less 'All the Fuss'.

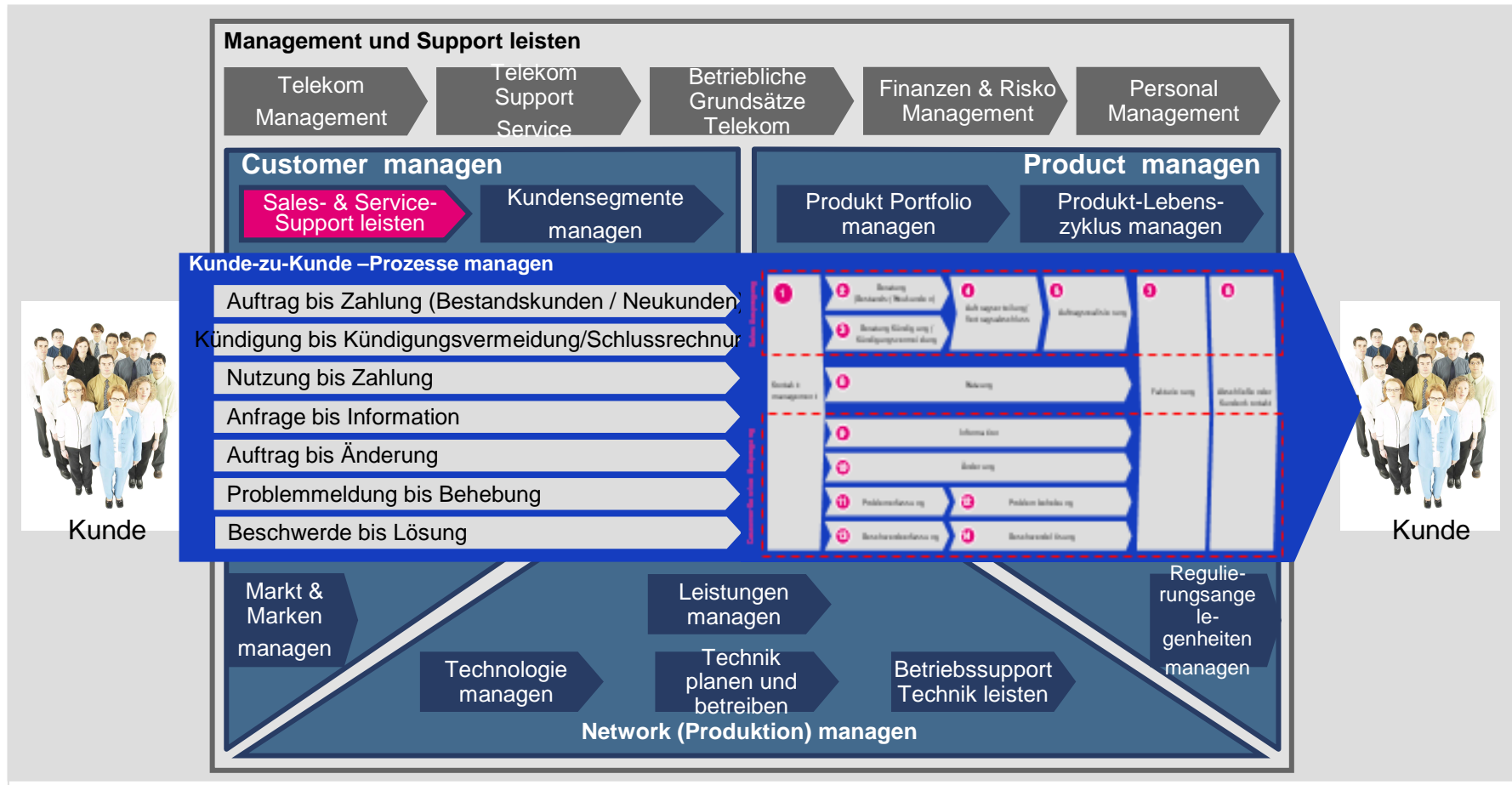
The Planning of an OSS Project in a real Operator's or Service Provider's Environment should follow both the technical NGOSS Recommendations and the PMI's Project Management Guidelines This combined Approach will form the Basics for a successful Development and Deployment of an OSS ready for NGN.

Back up.

Proud 2010

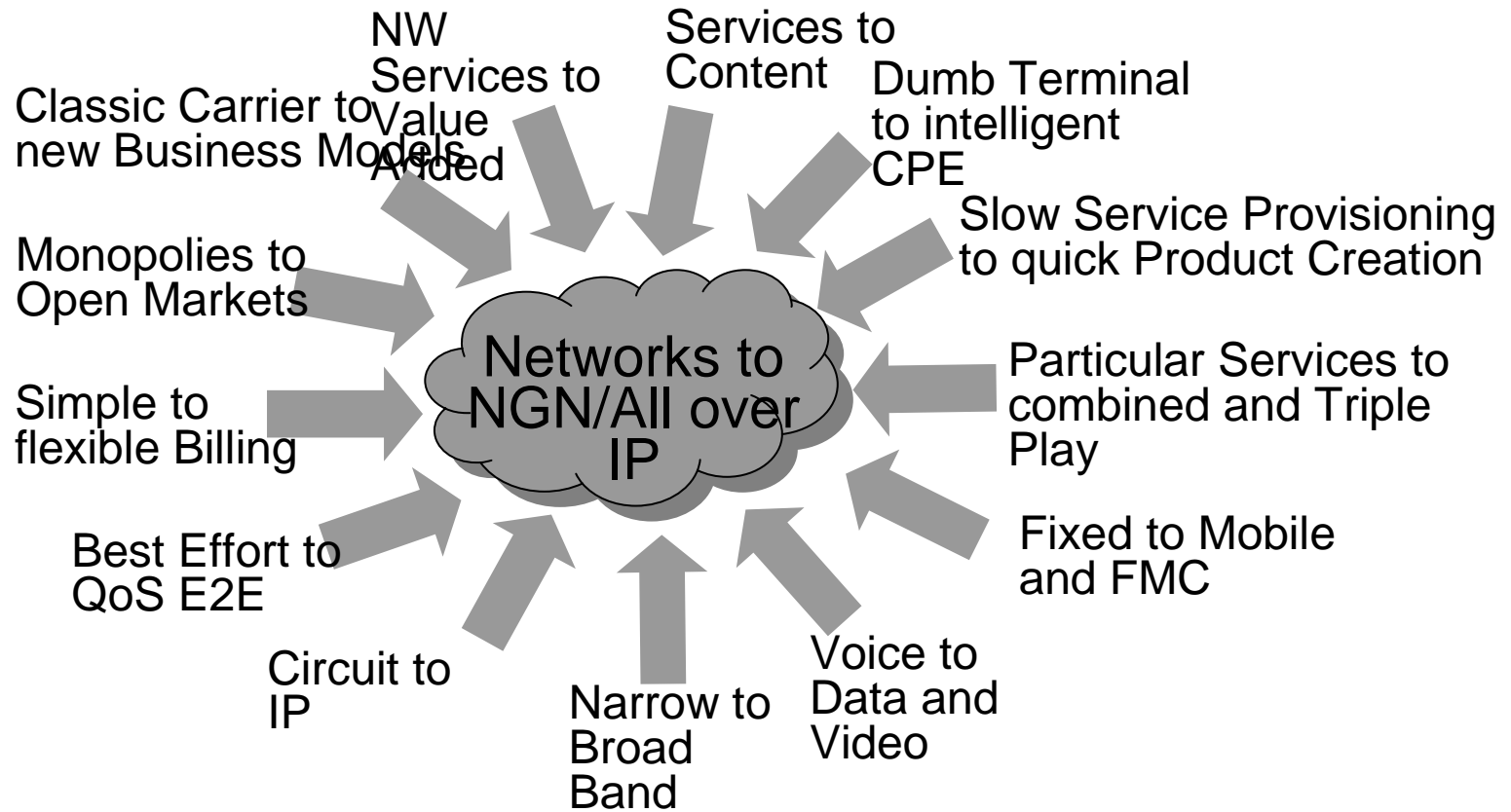
Prozessmodell Telekom 2010

➤ Im Rahmen der Projektarbeit Proud 2010, wurde das bestehende Referenz-Prozessmodell (KOPRA) überarbeitet



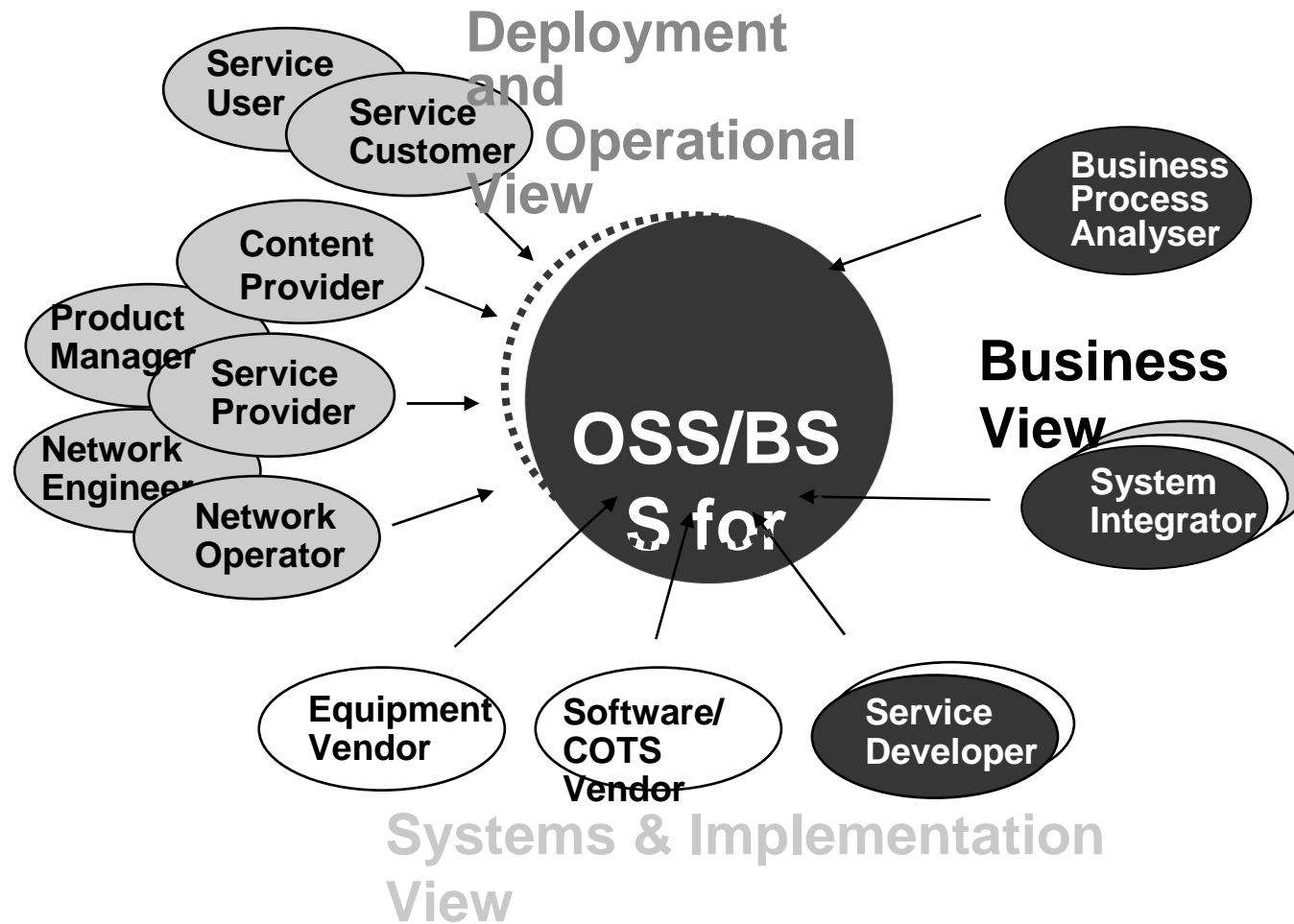
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The multiple Event in Telecommunications

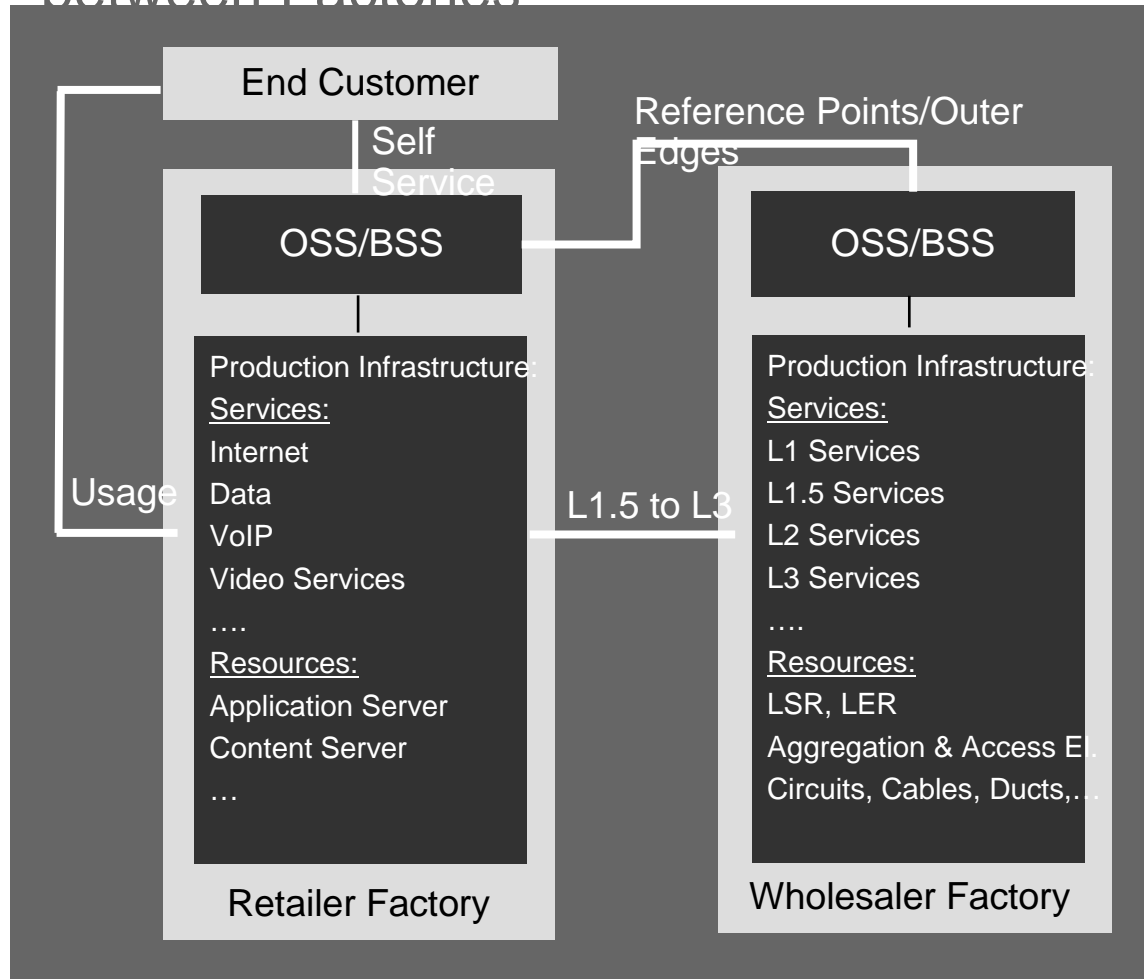


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The Market Place – Stakeholder Views



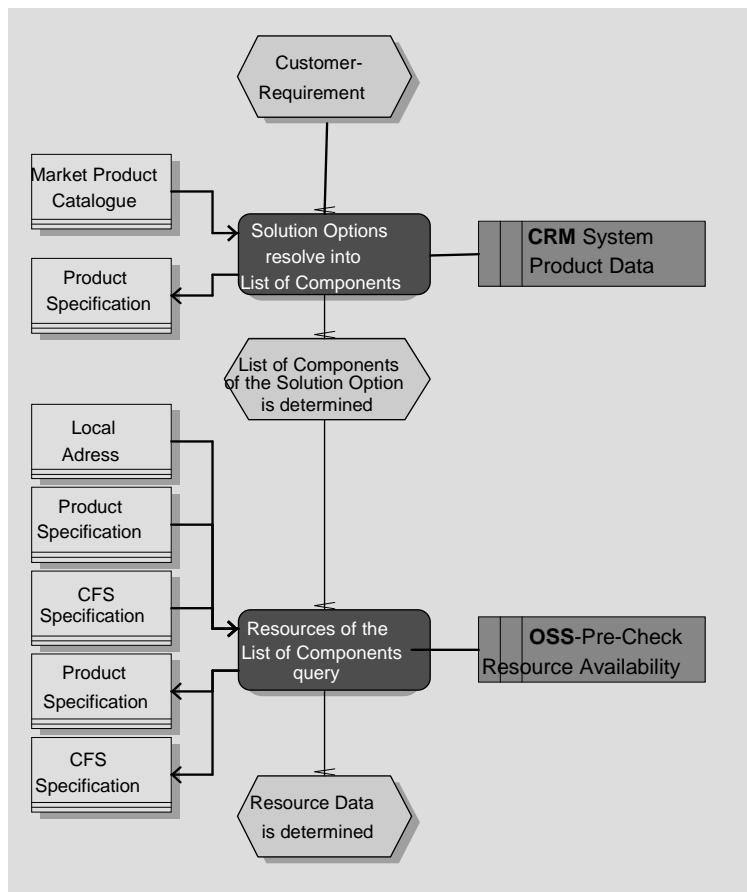
The Embedding of an OSS into a comprehensive NGN Environment Reference- and Integration Points - Example between Factories



System Integration Services

- Reference Points comes from outside of the Provider's own OSS/BSS
- If a Wholesaler provides network oriented Services (e.g. up to the Layer 3 from an IP Perspective) then a Retail Service Provider can build and offer its end-customer oriented Services. This has to be reflected by an adequate OSS/BSS interworking as well and can be modelled by means of two Factories
- For Provision of Products to the End Customer the Factories collaborate on the Production Infrastructure Level (in accordance to Standards L1, L2 or L3) and also on the OSS/BSS level
 - Retailer Factory forwards a Service Fulfillment Requests, e.g. for Bandwidth and Connectivity, to the Wholesaler Factory
 - Creation and Exchange of Incident Tickets for Production Infrastructure raised Troubles from the Wholesaler Factory to the Retailer Factory and end customer reported Problems from the Retailer Factory to the Wholesaler Factory

The Embedding of an OSS into a comprehensive NGN Environment Process Definition including Process Chain Model Example



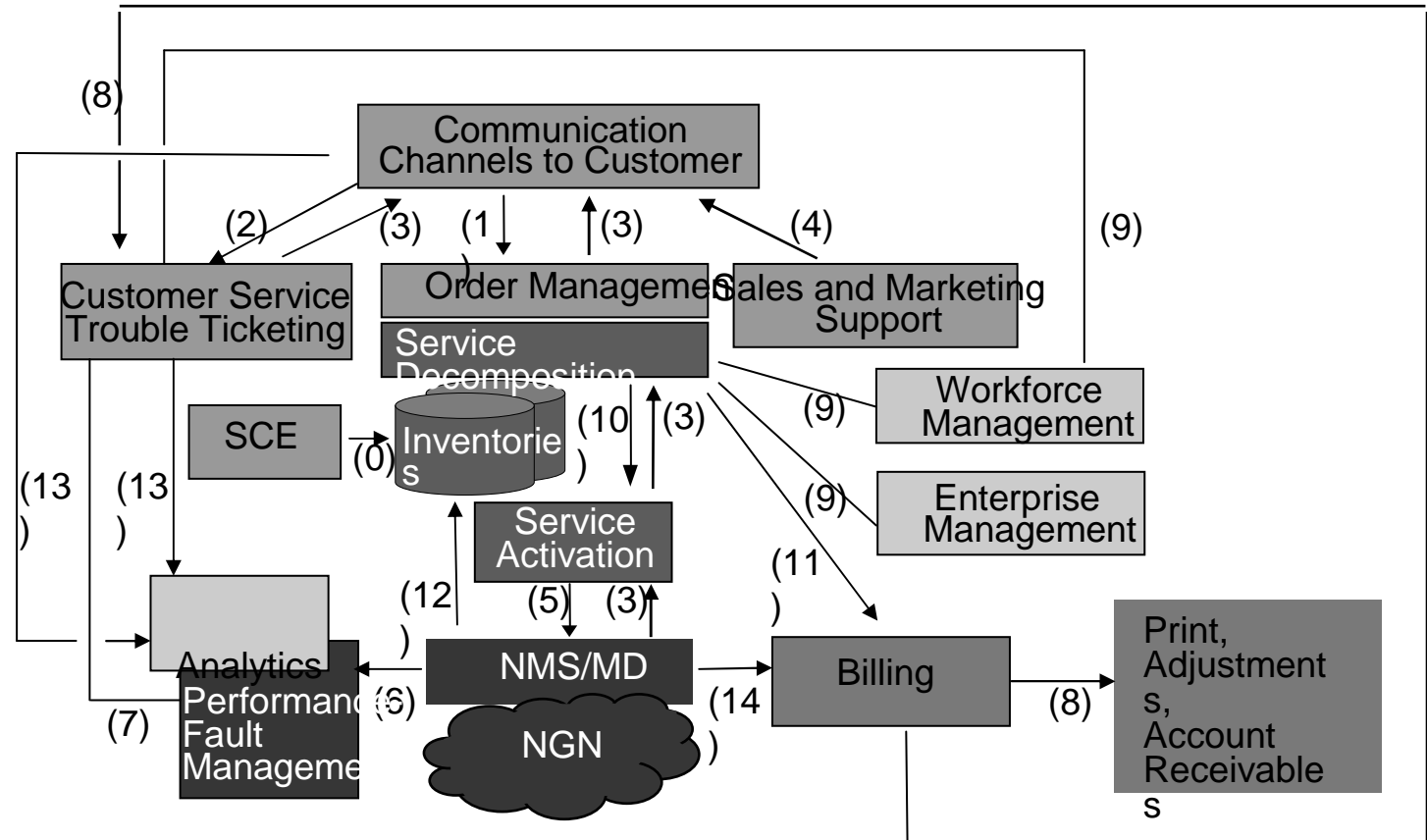
In Addition to the Ri and In Definitions:

- All the Processes are to be determined. They form the Basis for further Automation. This requires a deeper Analysis and Design regarding all the Processes of the full eTOM Spectrum. This is usually done in terms of Unified Modeling Language (UML) oriented Use Cases, Activity- or Sequence Diagrams or so-called event controlled Process Chains.
- In addition to the eTOM, the Processes are to be modeled with respect to the Operator's or Service Provider's Peculiarities and give an Impression how the OSS Requirements can be fulfilled from a process flow oriented point of view, to provide a homogenous complete OSS.
- Derived from the Modeling Language Notation as depicted on the left hand site here, Processes will usually be implemented by means of Build Time Capabilities provided by the Process Engine using mostly the Business Process Execution Language (BPEL).
- A so-called Workflow- or Process Engine can monitor and control the Processing effectively, i.e. a Process Automation Layer (see next Slide) takes care for the Workflow Control among the particular (COTS) Systems at the inner and outer Edges of the OSS.

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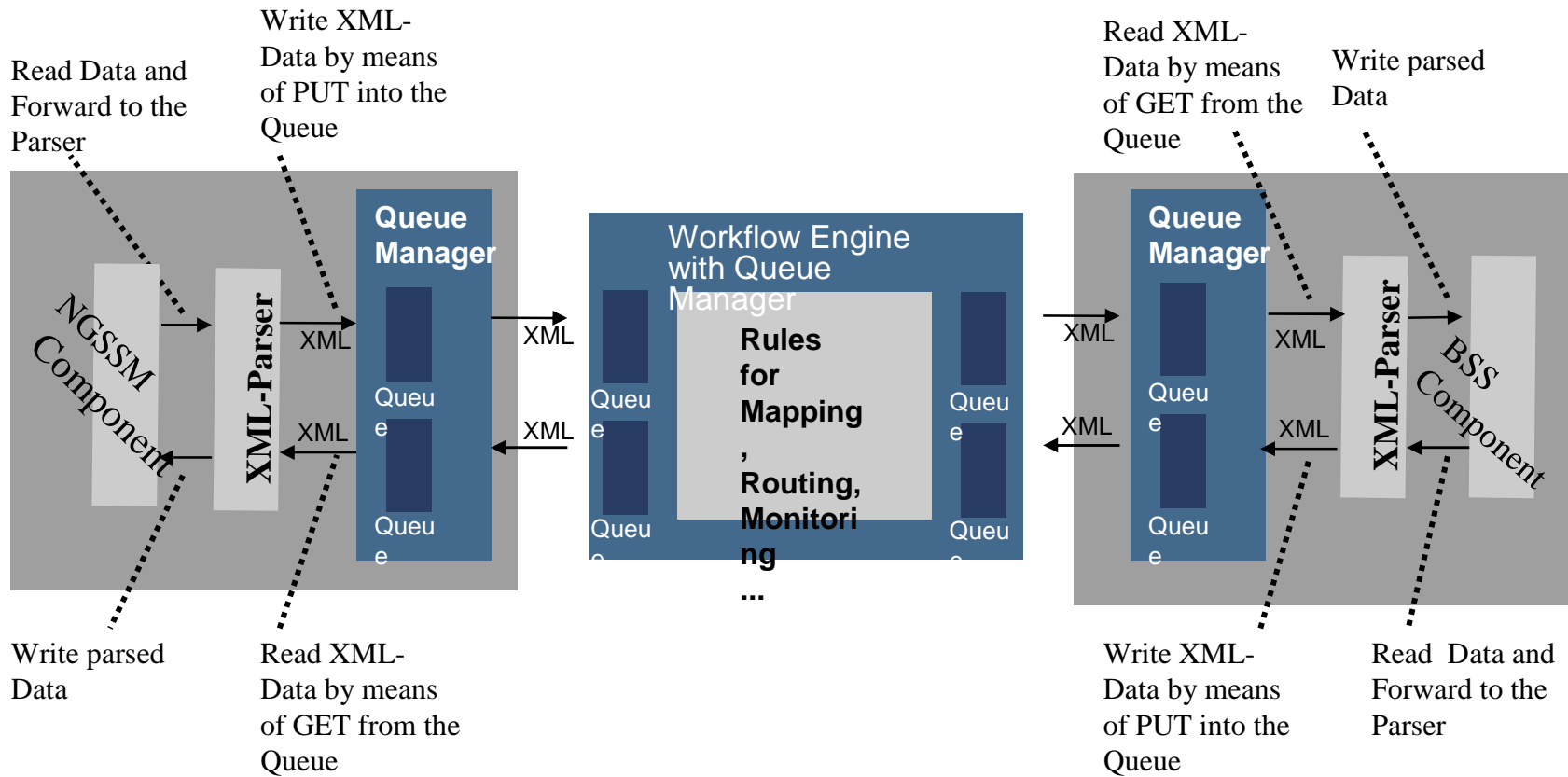
Main Use Cases and Information Flow

- (0) New Service Data
- (1) Service Order Request
- (2) Inquiries, Complaints
- (3) Status Responses, Confirmations
- (4) Marketing and Sales Activities
- (5) Activation, Deactivation, Change Commands
- (6) Events, Polled Data
- (7) Fault, Performance Data
- (8) Bills, Account Data, Bill Information incl. historical Information
- (9) Commercial Data, Work Instructions
- (10) Order Details
- (11) Order Details for Billing & Customer Data, SLA
- (12) Status Network Services, Sync Data
- (13) Process Data, Shared Data
- (14) Usage Data (CDRs, IPDRs,...)



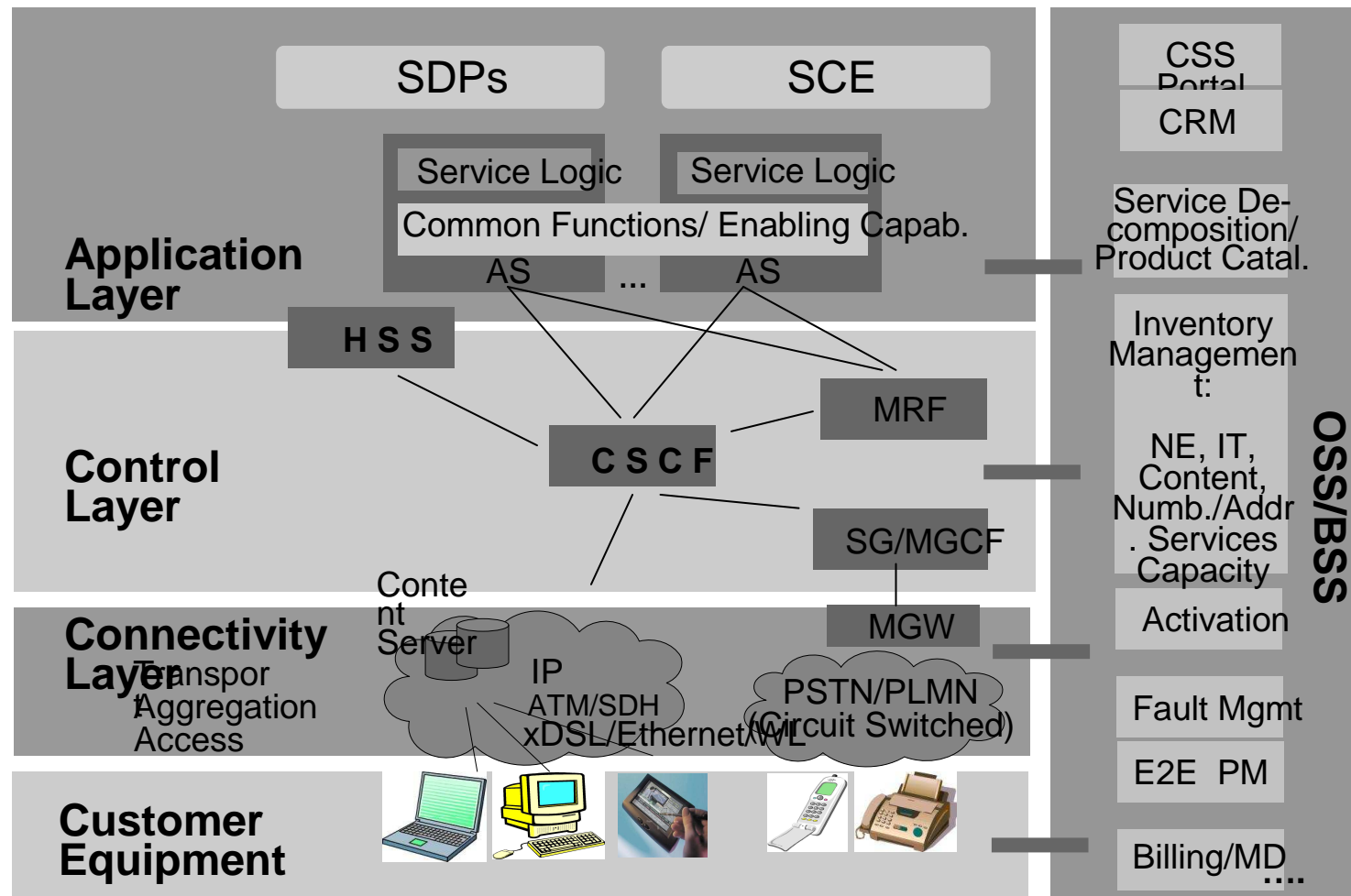
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Business Process- or Workflow Engine



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IMS Architecture



The Embedding of an OSS into a comprehensive NGN Environment

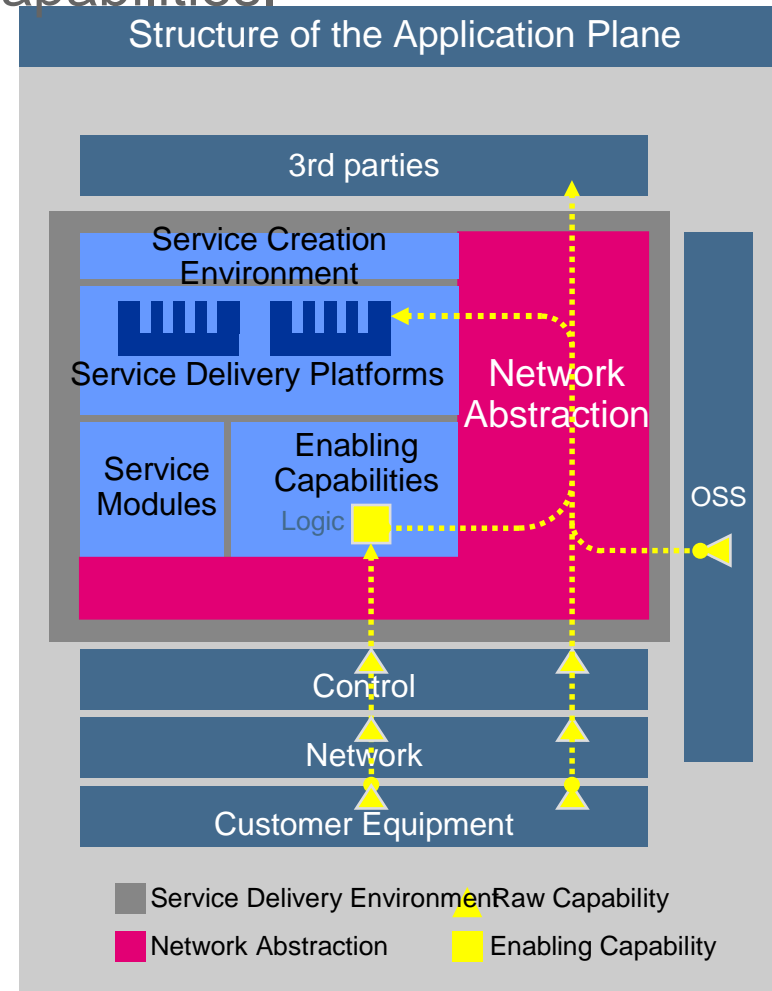
Network Abstraction & Enabling Capabilities.

Definition

- Network Abstraction provides a simple, open, flexible, efficient and controlled way to enable/support the need for Time to Market by considerably improve exploitation of DT's network-anchored capabilities

Role and Purpose

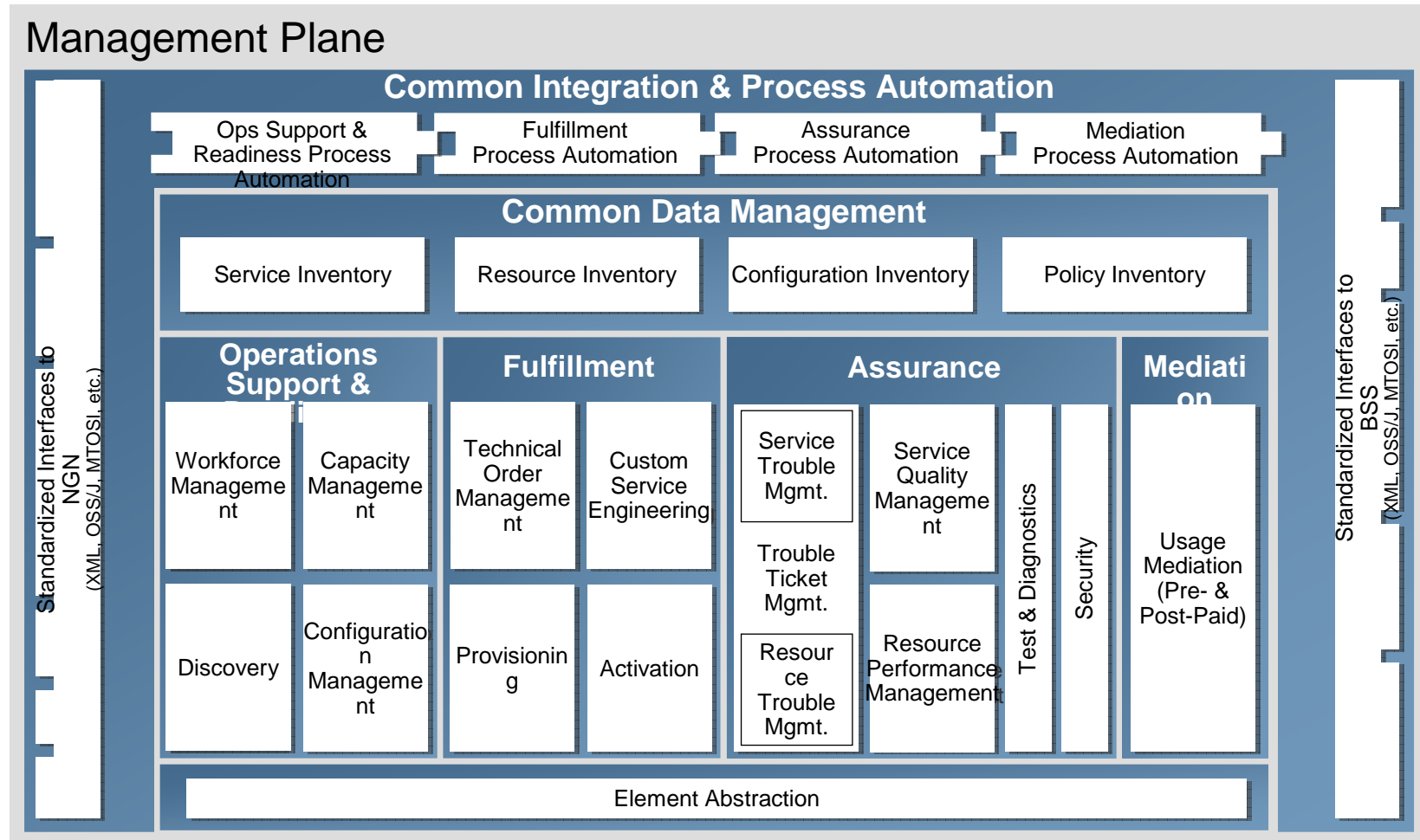
- Fosters enhancements of DT VAS with network-anchored capabilities for differentiation
- Hides networks' complexity and heterogeneity from the application plane
- Account for different length of innovation cycles
- Ensures operational integrity of networks
- Supports new business models based on partnering with 3rd parties for service delivery
- Supports enabling capability concept
- Simplifies convergence by providing cross-BU



Network abstraction should be a natural and integral architectural element within a NGN's application plane and will be consistent with the NG Factory target architecture.

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NGSSM Functional Architecture – Level 1 Overview.



Source „NGSSM General Presentation...“
V 1.2. vom 8.4.2007, Dr. Andre Zehl