



vdvl Provisioning Framework - Solution Description



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1. Introduction

1.1. Goal of this document

The goal of this document is to introduce the principles and main functionalities of the vdv provisioning framework of vdv consultants telecom | internet. This introduction handles the following topics:

-  Service provisioning processes within the eTOM
-  Requirements for service provisioning
-  Solution Description
-  Generic Order Registration
-  Multi Tier Order Management




1.2. vdv consultants telecom | internet

vdv consultants telecom | internet is a small but leading Dutch IT consulting firm, realising sustainable business improvements and revenue generating innovations together with our clients, partners and fellows.

With a strong focus on the telecom industry we deliver our services to operators and service providers in the areas fixed, mobile and cable. We help our clients realising converged technologies to deliver bundled broadband, voice and video services to residential, office and mobile users.

1.3. vdv provisioning framework

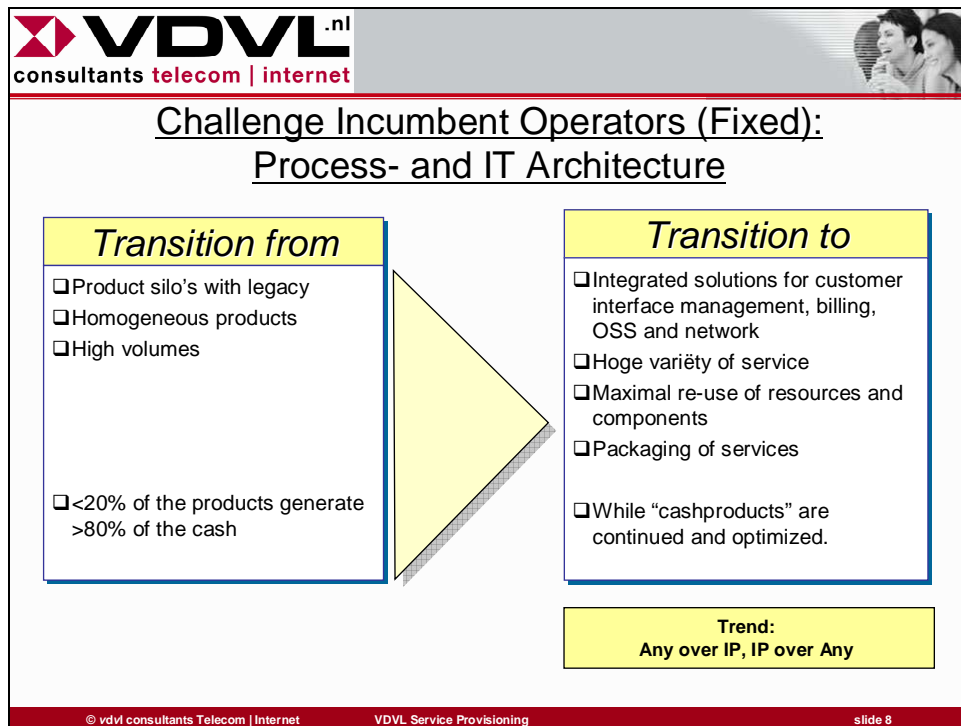
Vdv delivers independent and high level consulting services to the leading telecom operators and service providers in the Netherlands. Among our customers are:

-  KPN
-  Tele2 Versatel
-  XS4ALL
-  T Mobile NL, Orange, Wanadoo
-  Ziggo
-  The COIN association

Vdv has performed many complex migrations and has a leading role in solution design and demand management for many workflow and system integration projects in the area of service provisioning. The experiences and best practices of those projects are used to design and develop the vdv provisioning framework.

1.4. Goal of the vdvI provisioning framework

Incumbent operators are making the transition from product silo's supported by legacy IT ("stovepipes") to more open and integrated solutions that are needed for a high variety of (often stacked) services. Maximal re-use of resources and components is needed to decrease time to market and total cost of ownership.

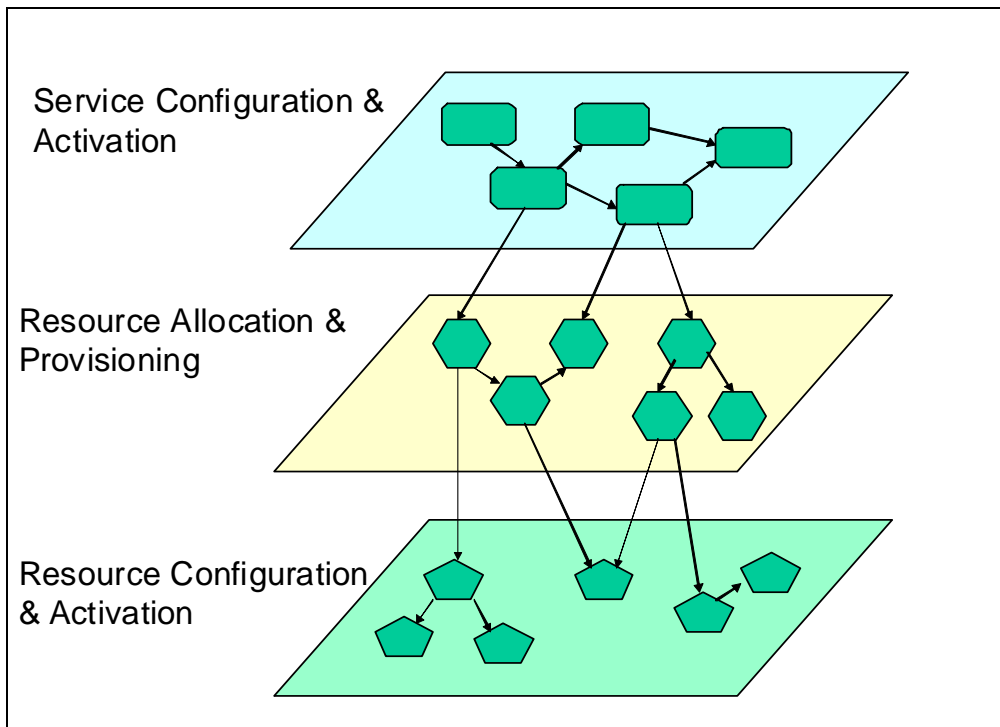


The goal of the vdvI provisioning framework is to provide seamless and zero touch service provisioning in multiple technology networks and, at the same time, ensure time to market and low cost.

The vdvI provisioning framework is therefore based on the following principles:

- ✚ The order registration capabilities offer a generic and configurable (by end users!) product model and northbound interface. The flexible order registration of multi-tier and complex services is supported by a template data model. This template order data model has proved to be very flexible and has been applied for the following services:
 - ISDN30 (over E1 Fiber. (Extended) E1, E1 leased Lines)
 - IP VPN (over ADSL/SDSL, E1 Fiber, (Extended) Ethernet)
 - Multi-tier access services
 - VoIP services (like IP Centrex)
 - Value added services like domain name registration, email, webhosting, PIN and Alarm over IP etc.

- The multi tier order management approach offers the capability to develop re-usable processes and services (workflow components). This enables a fast time to market: Once a workflow component is designed, developed, tested and taken to production, it can be re-used in workflows in another tier. The next picture shows how this principle can be used to implement end-to-end process flows for service configuration & activation:



- Many IT technologies and interface types are used for service activation systems, network activation systems and B2B systems. The vdvI provisioning framework uses Business Process Management and Integration technology of world's leading suppliers like TIBCO and webMethods. This enables zero touch provisioning because the framework is able to integrate with CRM systems (like Siebel and Clarify), network inventory systems, systems for service installed base registration, (service/network/element) management systems for service- and resource activation and B2B interfaces. The vdvI provisioning framework is therefore capable of integrating with many technologies like webservices, middleware, ftp, email etc. etc.

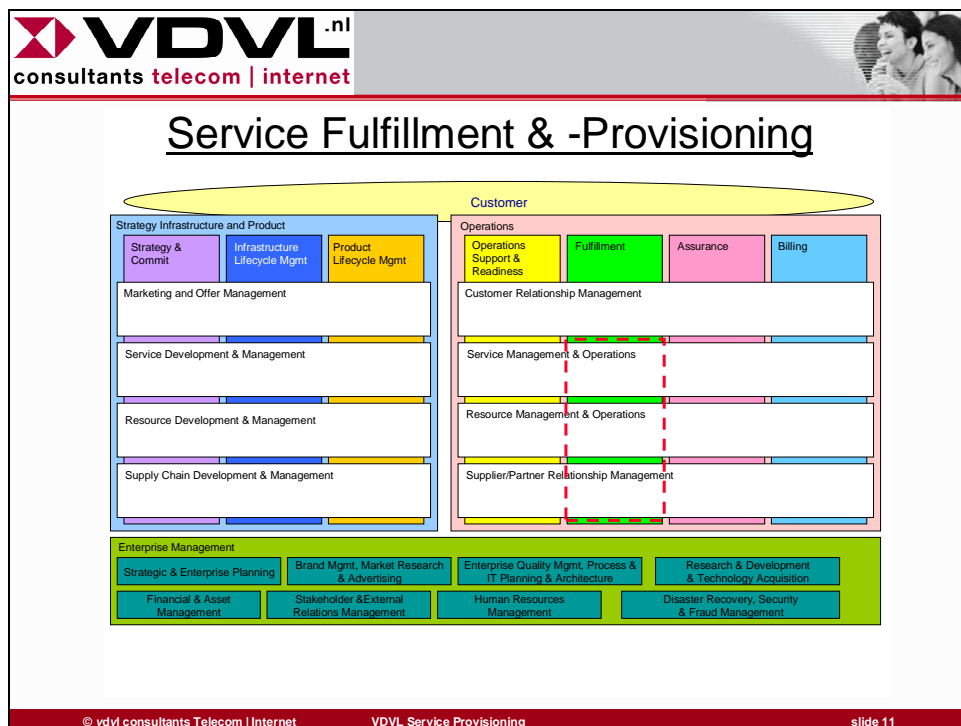
2. Service Provisioning

2.1. Service Provisioning Processes

eTom defines the service fulfillment process as follows:

"The service fulfillment process is responsible for providing customers with their requested products in a timely and correct manner. It translates the customer's business or personal need into a solution, which can be delivered using the specific products in the enterprise's portfolio. This process informs the customers of the status of their purchase order, ensures completion on time, as well as a delighted customer."

The following picture delimits the area of service provisioning. The service provisioning starts when the customer order is decomposed into one or more service provisioning orders. The CRM processes (like "Selling" and "Order Handling") and the billing processes are out of the scope of service provisioning.



The vdv provisioning framework supports the SM&O-F, RM&O-F and S/PRM-F processes.

S&MO-F (Service Management & Operations – Fulfilment) processes are

- ✚ Service Configuration & Activation

R&MO-F (Resource Management & Operations – Fulfilment) processes are:

- ✚ Resource (Network, Computing & Application) Provisioning & Allocation to Service Instance

S/PRM-F (Supplier/Partner Relationship Management – Fulfilment) processes are:

- ✚ S/P Buying
- ✚ S/P Purchase Order Management
- ✚ S/P Interface Management

2.2. High Level Requirements

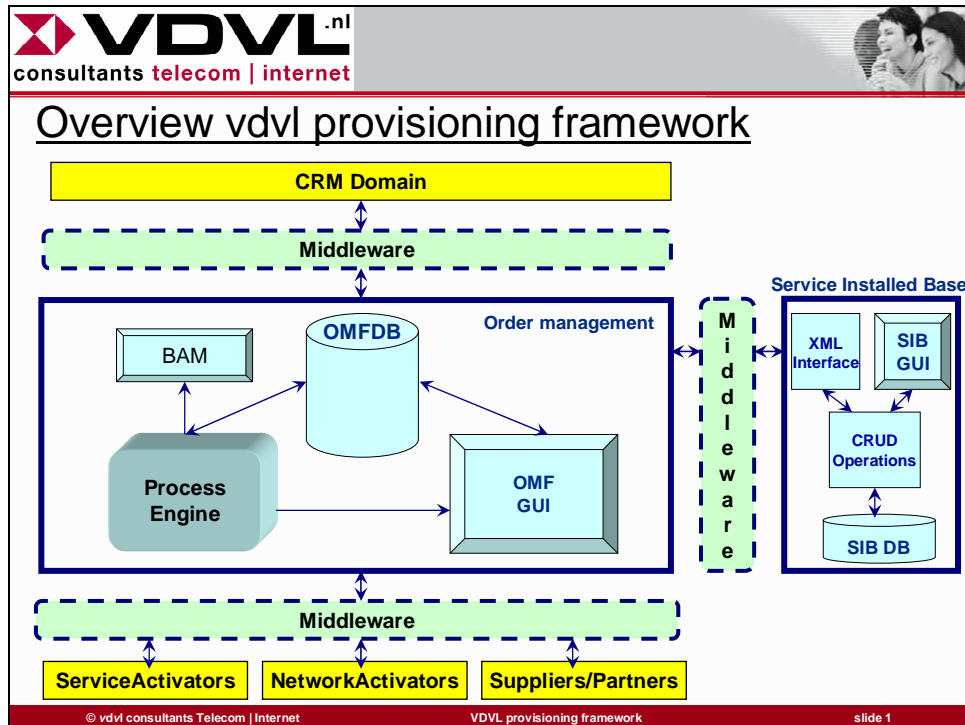
Customers ask vdvI to implement service provisioning solutions that meet extensive requirements. VdvI has many years of service provisioning design and implementation experience. These experiences have been put down into our provisioning framework.

The capabilities of the vdvI provisioning framework are best explained by some examples of the high level requirements of our customers:

- ✚ "Enable migration of new and existing productlines to the service provisioning framework (faster time to market)"
- ✚ "Zero-touch provisioning"
- ✚ "Completely automated order workflow"
- ✚ "Seamless integration with existing platforms for CRM, Network Inventory & Billing"
- ✚ "Clear & userfriendly ordermanagement application to track order workflow"
- ✚ "Turnaround & service provisioning time reduction"
- ✚ "Standardized workflows with high reusability "
- ✚ "Improved data quality in network administration and provisioning process"
- ✚ "Clear distinction between network processes and business processes"
- ✚ "Improved productivity, higher throughput"
- ✚ "Ability of high speed of product innovation / introduction"
- ✚ "Performance reporting on delivery times, SLAs and throughput"
- ✚ "Improved system maintainability"

3. The Solution

3.1. Overview



The vdvL provisioning framework consists of the order management framework and the service installed base.

The order management framework captures orders coming from the CRM domain in the OrderManagementFramework Database. The Process Engine orchestrates all manual and automatic process steps to complete the order. The OrderManagementFramework GUI enables end-users to manage orders and perform their manual tasks or handle incidents when they occur in the process.

The service installed base captures all the service instances ("assets"), parameters and their so-called "master-slave" relations to ensure the integrity of the (often stacked) services.

The order management framework and service installed base can be deployed independently and can be integrated using any common middleware technology.

3.2. Order Management Framework

3.2.1. Introduction

The main functions of the order management framework are:

- ✚ Capture and maintain data about orders coming from from the CRM domain in the Order Management FrameWork Database (OMFDB).
- ✚ Validate the order data with respect to completeness and syntax.
- ✚ Provide information about order details, order progress and the order status via the Order Management FrameWork GraphicalUserInterface (OMF GUI).
- ✚ Expose the order data to the workflow which is in the "Process Engine". Each process instance in the process engine will request the data that is needed from the OMFDB.
- ✚ Support end-users with the management of incidents and manual tasks.

Starting point of the architecture is that the order data will not be put into a so called "pipeline" but that the work flow management application will request the order data needed in a certain process step from the order management application. This architecture has the following advantages:

- ✚ It provides a generic and reusable (weak-typed) interface to the CRM domain.
- ✚ The business rules to validate clean order information will be configured in the database (not in xml/xsd definitions and in program code which needs to be changed when new services are introduced or existing services are changed).
- ✚ It provides a generic view on order and task data and therefore it will prevent the need to develop GUI screens per process step.
- ✚ It ensures high performance and maintainability of the workflow process models in the process engine because they only contain the order data on the lowest process levels.

The Order Management FrameWork publishes its CRUD operations to an XML interface and to a Graphical User Interface. The Graphical User Interface enables the users to perform the following tasks:

End-users

- ✚ View order information, order progress and the order status.
- ✚ Support end users with the management of incidents and manual tasks.

System administrators:

- ✚ Maintenance of business rules for the validation of incoming orders in the configuration tables.
- ✚ Maintenance of the data about task types for incidents and manual tasks.
- ✚ Maintenance of the data for queue and functionality permissions.

The next paragraphs show screenshots of the main functionalities of the order management framework for end users.

3.2.2. Overview

The overview screen shows orders and tasks that have the highest (relative) overdue%, and therefore need attention.

The screenshot displays the 'OVERVIEW' section of the SNI-ZM Order Management Framework. It is viewed through a Windows Internet Explorer browser window. The interface includes a navigation menu on the left with categories like DATA, ORDERS, TASKS, ADMIN, PROCESSES, COMPONENTS, TASKS, QUEUES, REQUESTERS, REQUEST TYPES, QUEUE REPORT, AUTHORIZATION, USERS, GROUPS, CHANGE PASSWORD, and LOGOUT.

The main content area is divided into two sections:

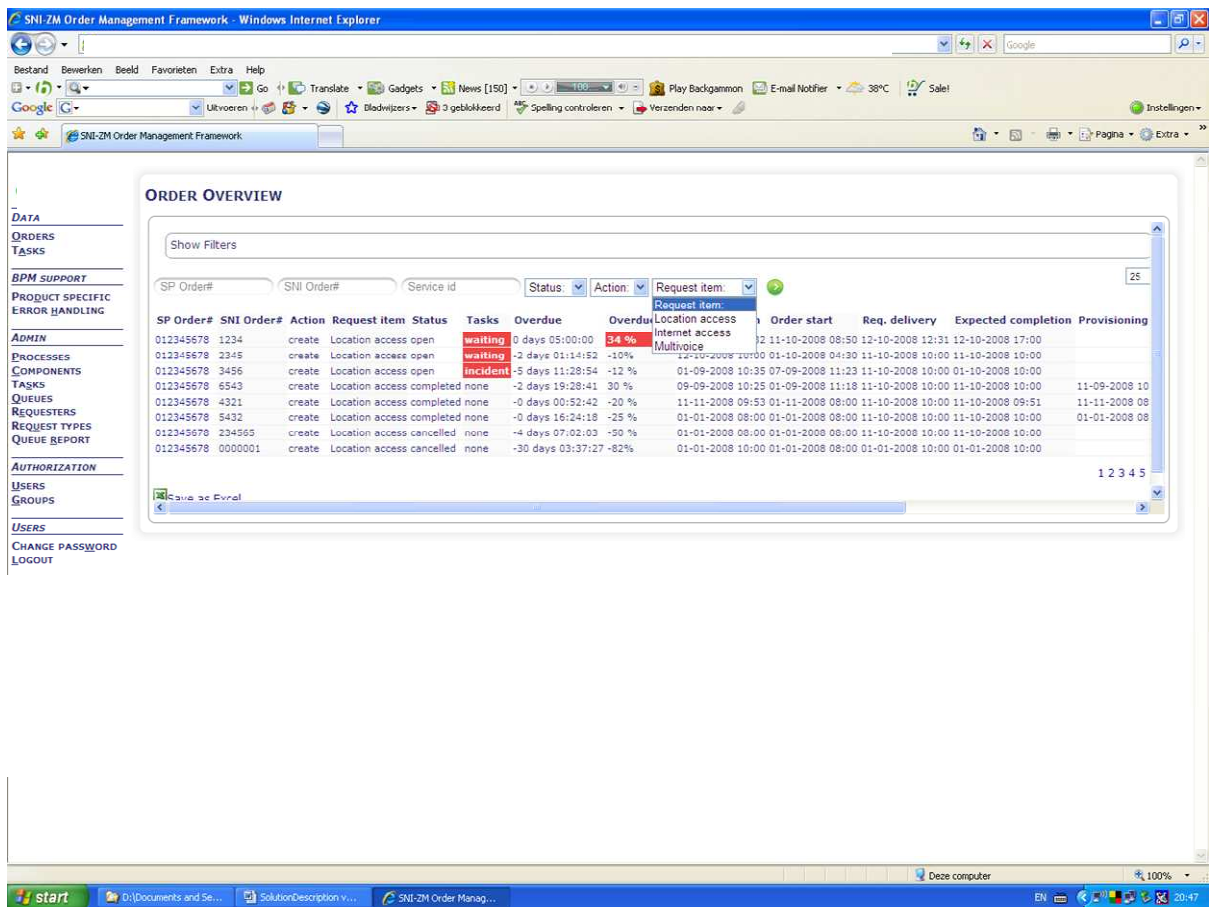
- OVERDUE AND UNCOMPLETED ORDERS**: A table listing orders with columns for SP order#, SNI order#, Action, Request item, Status, Tasks, Overdue, Overdue %, Req. delivery, Order creation, Order start, Expected completion, and Comm. Three rows are highlighted in red, indicating high overdue percentages: 300%, 253%, and 80%.
- OVERDUE AND UNCOMPLETED TASKS**: A table listing tasks with columns for Task, SP Order#, SNI Order#, Action, Request item, Category, Assignee, Overdue, Overdue %, Task start, and Planned completion. Three rows are highlighted in red, indicating high overdue percentages: 245%, 187%, and 7%.

3.2.3. Order Overview

The order overview shows an order list. The end user can select orders on various criteria like OrderId, ServiceInstanceId, Status, Action (e.g. create, update, delete) and RequestItem (the servicetype that was requested). Advanced filters can be made on any order field and can be stored (user based) for future use.

The order list can be sorted on every column that is shown on the screen.

Any selection can be exported to excel to print and analyze the order data.

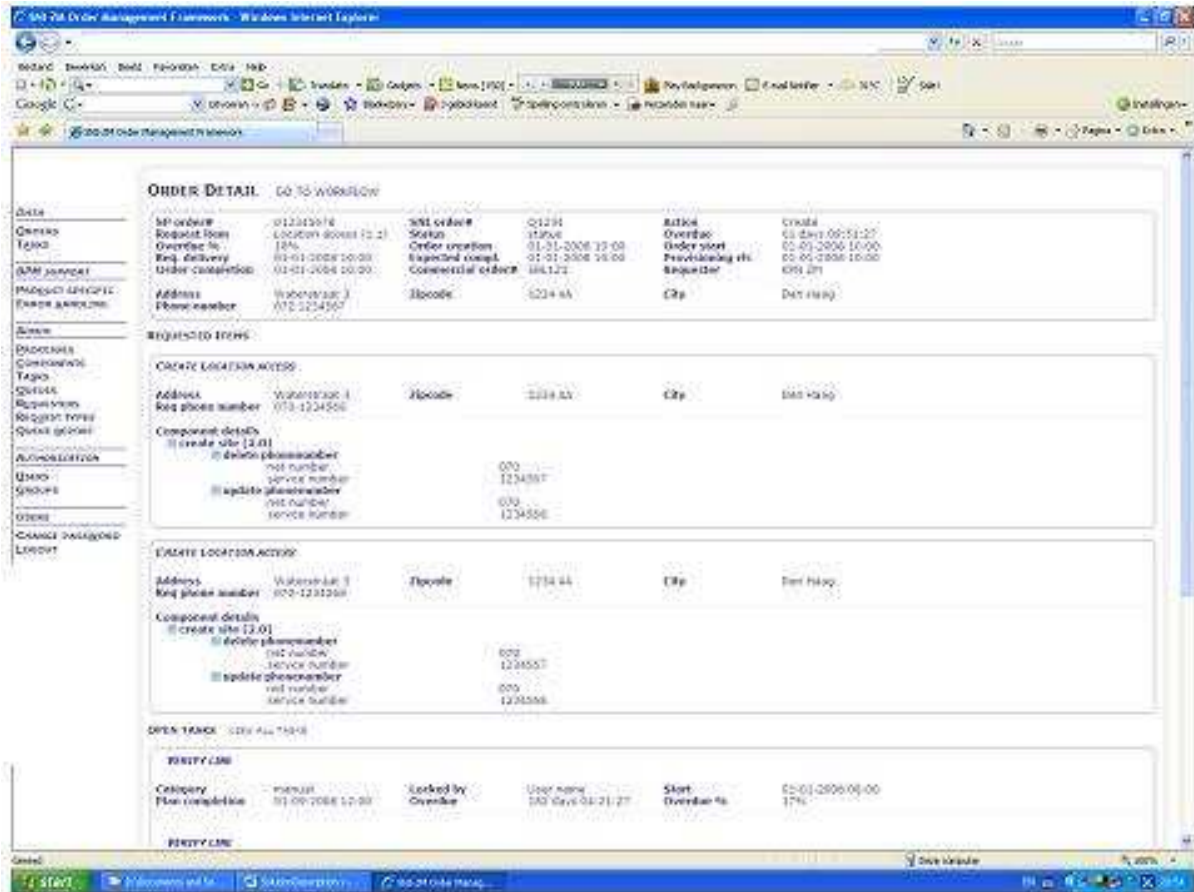


The screenshot displays the 'ORDER OVERVIEW' section of the SNI-ZM Order Management Framework. The interface includes a navigation menu on the left with categories like DATA, ORDERS, TASKS, and AUTHORIZATION. The main content area features a table with the following data:

SP Order#	SNI Order#	Action	Request item	Status	Tasks	Overdue	Overdu	Request item	Order start	Req. delivery	Expected completion	Provisioning
012345678	1234	create	Location access open	waiting	0 days 05:00:00	34 %		Location access Internet access Multivoice	12-11-2008 08:50	12-10-2008 12:31	12-10-2008 17:00	
012345678	2345	create	Location access open	waiting	-2 days 01:14:52	-10 %			12-09-2008 20:00	01-10-2008 04:30	11-10-2008 10:00	11-10-2008 10:00
012345678	3456	create	Location access open	incident	-5 days 11:28:54	-12 %			01-09-2008 10:35	07-09-2008 11:23	11-10-2008 10:00	01-10-2008 10:00
012345678	6543	create	Location access completed	none	-2 days 19:28:41	30 %			09-09-2008 10:25	01-09-2008 11:18	11-10-2008 10:00	11-10-2008 10:00
012345678	4321	create	Location access completed	none	-0 days 00:52:42	-20 %			11-11-2008 09:53	01-11-2008 08:00	11-10-2008 10:00	11-10-2008 09:51
012345678	5432	create	Location access completed	none	-0 days 16:24:18	-25 %			01-01-2008 08:00	01-01-2008 08:00	11-10-2008 10:00	11-10-2008 10:00
012345678	234565	create	Location access cancelled	none	-4 days 07:02:03	50 %			01-01-2008 08:00	01-01-2008 08:00	11-10-2008 10:00	11-10-2008 10:00
012345678	0000001	create	Location access cancelled	none	-30 days 03:37:27	-82 %			01-01-2008 10:00	01-01-2008 08:00	01-01-2008 10:00	01-01-2008 10:00

3.2.4. Order Detail

The order detail screen shows all order details and the tasks that are related to the order. Pressing the "GO TO WORKFLOW" link will show the graphical view of the related workflow instance in the process engine.



3.2.5. Task Overview

The task overview shows a task list. "My queues" will show the tasks that a particular user (belonging to a user group) has execute rights on.

The end user can select tasks on various criteria like OrderId, TaskCategory (incident, manual), TaskType, Status (open, completed), Action (e.g. create, update, delete) and RequestItem (the servicetype that was requested). Advanced filters can be made on any task field and can be stored (user based) for future use.

The task list can be sorted on every column that is shown on the screen.

Any selection can be exported to excel to print and analyze the task data.

The screenshot displays the 'TASK OVERVIEW' section of the SNI-ZM Order Management Framework. It features a navigation menu on the left with categories like DATA, ORDERS, TASKS, RPM SUPPORT, and ADMIN. The main content area shows a task list with the following data:

Task	SP Order#	SNI Order#	Action	Request item	Status	Category	Assignee	Overdue	Overdue %	Task start	Planned completion
<input type="checkbox"/> Choose linetype	826352	73915704	Create	Location access	open	Manual		3 days 10:23:19	245%	23-09-2008 12:01	24-09-2008 12:01
<input type="checkbox"/> Check attenuation	92836	82749603	Create	Location access	open	Incident	Sjonnie Dolittle	2 days 01:18:37	187%	24-09-2008 13:35	26-09-2008 10:35
<input type="checkbox"/> Confirm address	92836	82749603	Create	Internet access	open	Manual	Tjalling van den Bosch	0 days 00:10:46	7%	25-09-2008 16:35	25-09-2008 16:45
<input type="checkbox"/> Check address	763482	82816340	Create	Internet access	open	Complex automatic		0 days 00:10:19	7%	25-09-2008 16:35	25-09-2008 16:45
<input type="checkbox"/> Confirm deletion	AL82643	62849562	Delete	Alarm over IP	completed	Manual	Gerard Opoeruid	-0 days 06:22:29	-19%	23-09-2008 12:01	24-09-2008 16:01

Below the table, there is a 'complete all' button and a 'Save as Excel' option. The interface also includes filter controls for SP Order#, SNI Order#, category, task, status, action, and request item.

3.2.6. Task Detail

The task detail screen shows the general task information (task start, planned completion, actual completion, overdue and overdue%) and the task input data. Task input data is any data coming from the process engine that the user needs to complete the task. It can include order data, but also data coming from other systems like the service installed base, network inventory system or any other system the provisioning framework has an interface with. The user can assign him/herself to the task, put in values for task attributes (which contain branching values for the workflow) and execute the task.

TASK DETAIL ASSIGN TO ME

TASK: CHOOSE LINETYPE

Action	Create	Request item	Location access	Category	Manual
Assignee	-	Overdue	3 days 10:23:17	Overdue %	245%
Task start	01-01-2008 12:22:00	Planned completion	01-01-2008 13:00:00	Actual completion	01-01-2008 11:23:24

ORDER OVERVIEW

SP order#	012345678	SNI order#	Q1234	Status	open
Action	create	Request item	Location access	Overdue	-0 days 05:03:27
Overdue %	34%	Order creation	12-10-2008 12:32:00	Order start	11-10-2008 08:50:00
Reg. delivery	12-10-2008 12:31:00	Expected completion	12-10-2008 17:00:00	Provisioning RFS	-
Order completion	-	Commercial order#	SBL123	Requester	KPN-ZM (COM)

TASK INPUT

Field with long name Lorem ipsum dolor sit amet, consectetur adipiscing elit. Mauris at sapien et felis ornare euismod. Phasellus fermentum elit eget odio. Mauris ultrices aliquet nulla. Long value: Lorem ipsum dolor sit amet, consectetur adipiscing elit. Mauris at sapien et felis ornare euismod. Phasellus fermentum elit eget odio. Mauris ultrices aliquet nulla.

ISRA location

connectionPointNumber	01
connectionPointNumberExt	K1
connectionPointEndPlace	KEL
connectionPointEndPlaceDesc	KELDER
ISRA stift	1

Customer type

Customer name	ABC B.V.
Customer address type	Visiting address
Street	Merkwede
Housenumber	68
Customer zipcode	8444AH
Customer phoneno	Aldskout

Linetype

length from MDF	ASL
length unit	value
resistance A to earth	19
resistance B to earth	82
resistance A B	23
resistance B A	20
resistance unit	ohm
capacity A to earth	18
capacity B to earth	82
capacity A B	23
capacity B A	30
capacity unit	uF

TASK ATTRIBUTES

Tested

Comment

Comment

Comment




Comment

save

3.2.7. Three tier application architecture

The data in the order management framework database can be maintained via the CRUD operations that define the interface to the process engine and the OMF GUI. The CRUD operations ensure the integrity of the data in the order management framework database. The order management framework therefore offers a robust and highly maintainable solution by separating data, business logic and presentation logic (three tier application architecture).

The following table describes which operations may be used by the following components in the architecture:

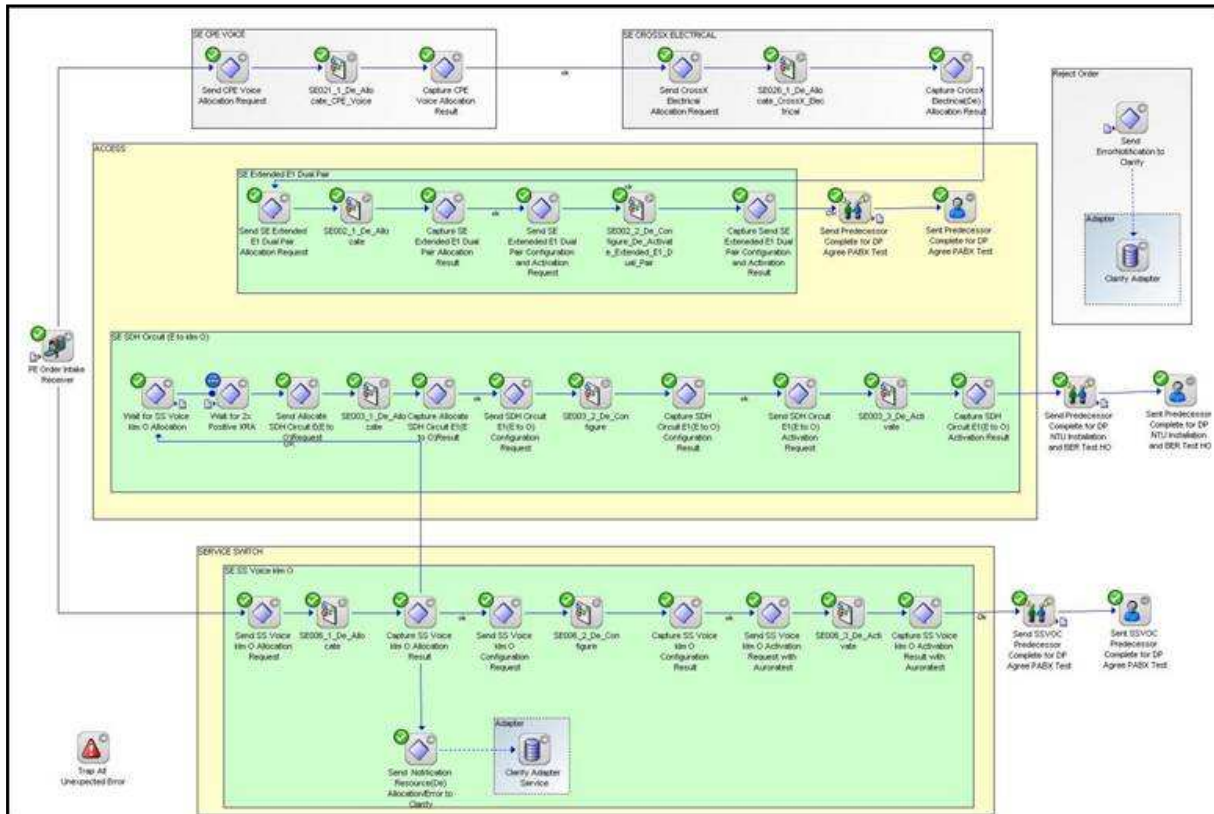
-  OMF GUI – administrator interface
-  OMF GUI – regular user interface
-  Process Engine

Operation	OMF GUI		Process Engine
	Admin	Regular User	
customerOrderRequestConfigurationTables	X		
customerOrderRequest			
CUSTOMER_ORDER_CREATE			X
CUSTOMER_ORDER_READ	X	X	X
CUSTOMER_ORDER_READ_M	X	X	
CUSTOMER_ORDER_REQUEST_STATUS_UPDATE			X
CO_REQUEST_ITEM_CREATE			X
CO_REQUEST_ITEM_UPDATE			X
CO_REQUEST_ITEM_PARAMETER_VALUE_UPDATE			X
taskConfigurationTables	X		
tasks			
REMARK_CREATE	X	X	
REMARK_UPDATE	X	X	
REMARK_DELETE	X	X	
REMARK_READ_M	X	X	
TASK_CREATE			X
TASK_UPDATE	X	X	
TASK_OUTPUT_ATTRIBUTE_UPDATE	X	X	
TASK_INPUT_FIELD_CREATE_M			X
TASK_READ	X	X	X
TASK_READ_M	X	X	
permissionMaintenance	X		
guiFunctionality	X	X	

3.3. Process Engine

The vdvI provisioning framework uses Business Process Management and Integration technology of world's leading suppliers like TIBCO and webMethods.

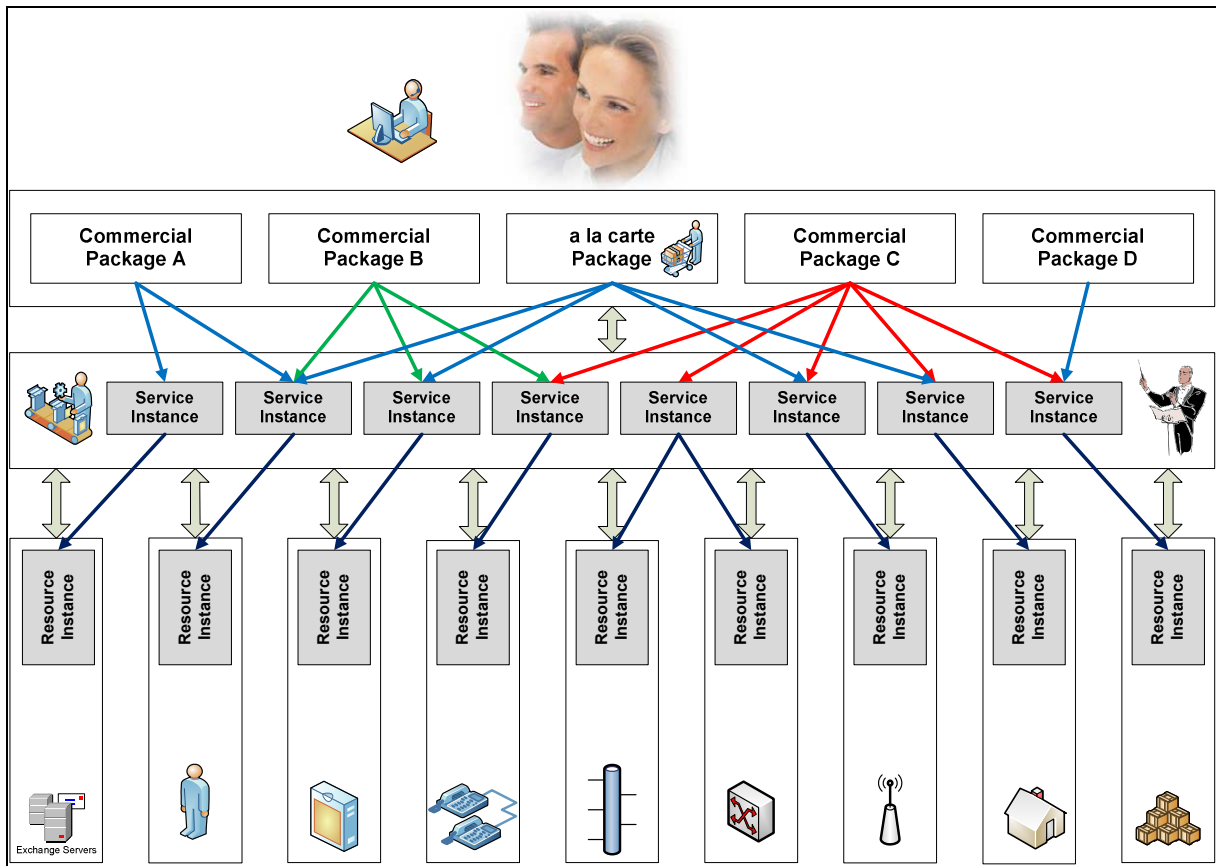
The following screenshot shows a webMethods implementation.



3.4. Service Installed Base

3.4.1. Introduction

The CRM domain will sell commercial packages which consist of service instances that are delivered by the SM&O domain. Service instances (types) can occur within several commercial packages (types). Service Instances (types) are decomposed into one or more resource instances (types) that are delivered by the RM&O domain.



The Service Installed Base has to support the registration of service and resource instances. Thus it is possible to relate the Commercial Installed Base data to the Service Installed Base data, and the Service Installed Base Data to the Resource Installed Base Data. Top-down and Bottom-up tracking of the relations is needed for Service Assurance.

The main functions of the service installed base are:

- ✚ Maintenance of the data about service and resource instances and their parameters (Create, Update & Delete functions);
- ✚ Expose the data to the workflow;
- ✚ Expose the data to the service assurance processes.

The Service Installed Base publishes its CRUD operations to an XML interface and to a Graphical User Interface. The main functions of the Graphical User Interface are:

- ✚ Maintain the business rules in the configuration tables;
- ✚ Retrieve data about service and resource product instances.

The next paragraphs show screenshots of the main functionalities of the service installed base for end users.

The Service Installed Base application offers a robust and highly maintainable solution by separating data, business logic and presentation logic (three tier application architecture).

3.4.2. Product Instances

The product instance screen shows service and resource instances.

The end user can select orders on various criteria like ServiceInstancelid, ResourceInstancelid and the organization the Services are delivered to (or Resources are supplied by).

Advanced filters can be made on any instance field and can be stored (user based) for future use.

The product instance list can be sorted on every column that is shown on the screen.

Any selection can be exported to excel to print and analyze the product instance data.

The screenshot shows a web browser window titled "SNI-ZM Functional Installed Base - Windows Internet Explorer". The main content area displays a "PRODUCT INSTANCES" table. The table has the following columns: Product type, Cat., Service inst. id, Int. resrc inst. id, Ext. resrc inst. id, Status, Organization, Brand, Start date, Change date, and End date. The table contains several rows of data, including entries for "Alarm over IP", "Location access", and "Alarm over IP service". The interface also includes a sidebar with navigation options like INSTANCES, CONFIGURATION, and ORGANIZATION, and a top navigation bar with various utility icons.

Product type	Cat.	Service inst. id	Int. resrc inst. id	Ext. resrc inst. id	Status	Organization	Brand	Start date	Change date	End date
Alarm over IP	F	Q1234567890			Pending create	Org.1	XS4All	23-07-2008	26-08-2008	
Alarm over IP	F	Q123567898			Active	Org.1	XS4All	13-02-2007	20-07-2008	
Location access	F	Q9274528392			Pending update	Org.2	Planet	03-09-2008	03-09-2008	
Location access	F	Q9174619374			Void	Org.3	HetNet	03-09-2008	04-09-2008	04-09-2008
Location access	F	Q9174619351			Inactive	Org.3	HetNet	15-04-2008	16-06-2008	05-08-2008
Alarm over IP service	T		Q9174619351	SID14363	Pending delete	Org.4		23-11-2007	20-08-2008	
Location access service	T		Q9274628492	02894632	Active	Org.5		23-11-2008	26-08-2008	05-08-2008

3.4.3. Product Instance Details

The product instance details screen shows all details of a product instance like parameters and child product instances (see screenshot). Note that it is not allowed to delete parent product instances if child product instances are still active. In this way the service installed base application ensures the service integrity.

The screenshot displays the 'PRODUCT INSTANCES' screen in a web browser. The left-hand navigation menu includes sections for INSTANCES, CONFIGURATION, PRODUCT, CATEGORY, PRODUCT TYPE, PRODUCT TYPE VERSION, PRODUCT STATUS, RELATION TYPE, ORGANIZATION TYPE, BRAND, ORGANIZATION, PARAM DATA TYPE, and ADMIN. The main content area is titled 'PRODUCT INSTANCES' and contains two primary sections:

Product instance details

Product type	Location access	Service instance id	Q1234567890
Category	F	Internal resource instance id	
Version	v.10	External resource instance id	
Prod. type version start date	01-01-2008	Instance create date	31-08-2008
Prod. type version change date	01-01-2008	Instance start date	02-09-2008
Prod. type version end date		Instance change date	02-09-2008
Status	Active	Instance end date	
Organization			
Organization type			

Below the details are three buttons: 'parameters', 'parents', and 'children'. The 'parents' button is currently selected.

Child product instances

Product type	Cat.	Service inst. id	Int. resrc inst. id	Ext. resrc inst. id	Status	Organization	Org. type	Start date	Change date	End date
Alarm over IP monitoring	F	Q9174619351			Inactive			15-04-2008	16-06-2008	05-08-2008
Alarm over IP service	T		Q9174619351	SID14363	Pending delete	Org.2	RO	23-11-2007	20-08-2008	

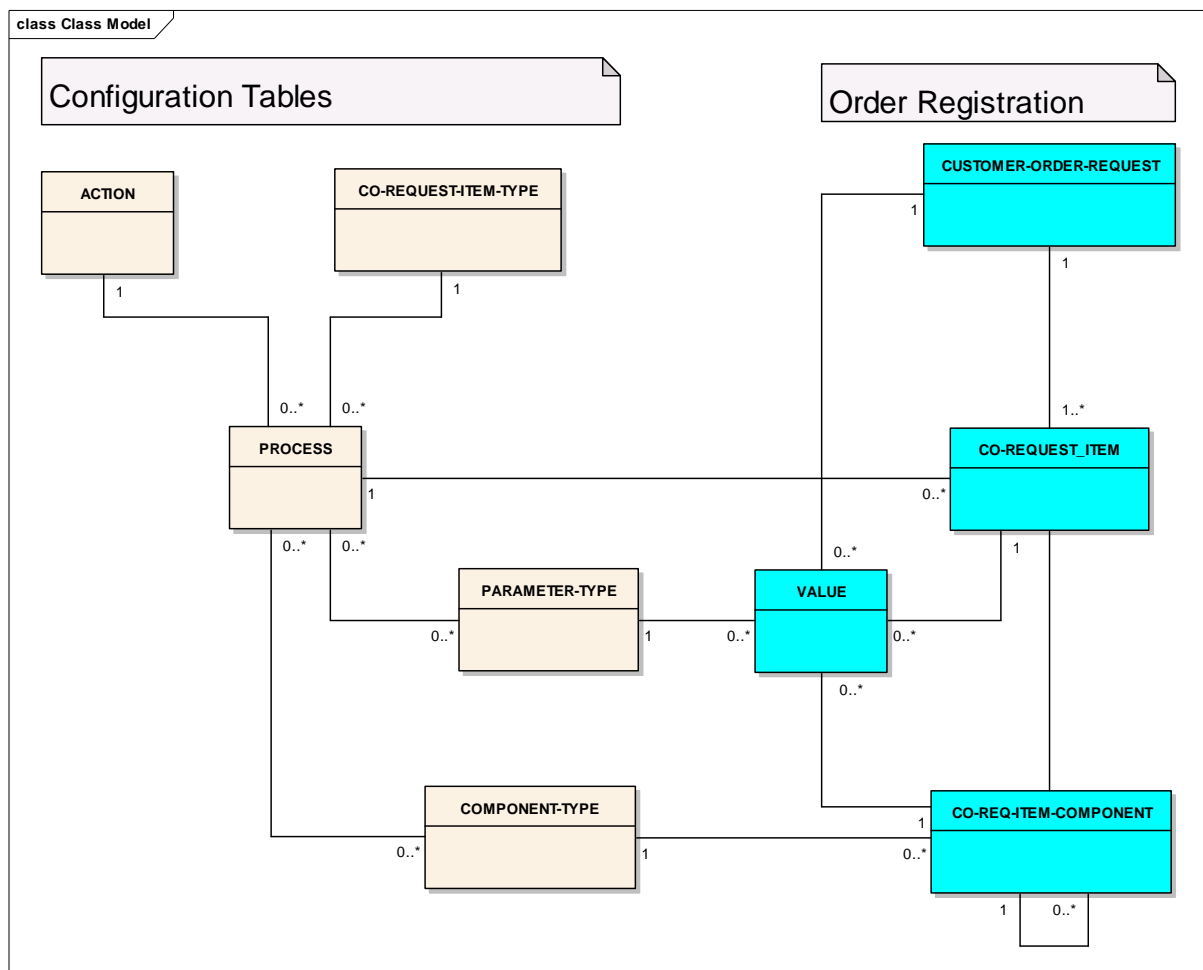
At the bottom of the table, there are pagination controls: '1 2 3 4 5 6 >>'.

4. Distinctive Pillars

4.1. Generic Order Registration

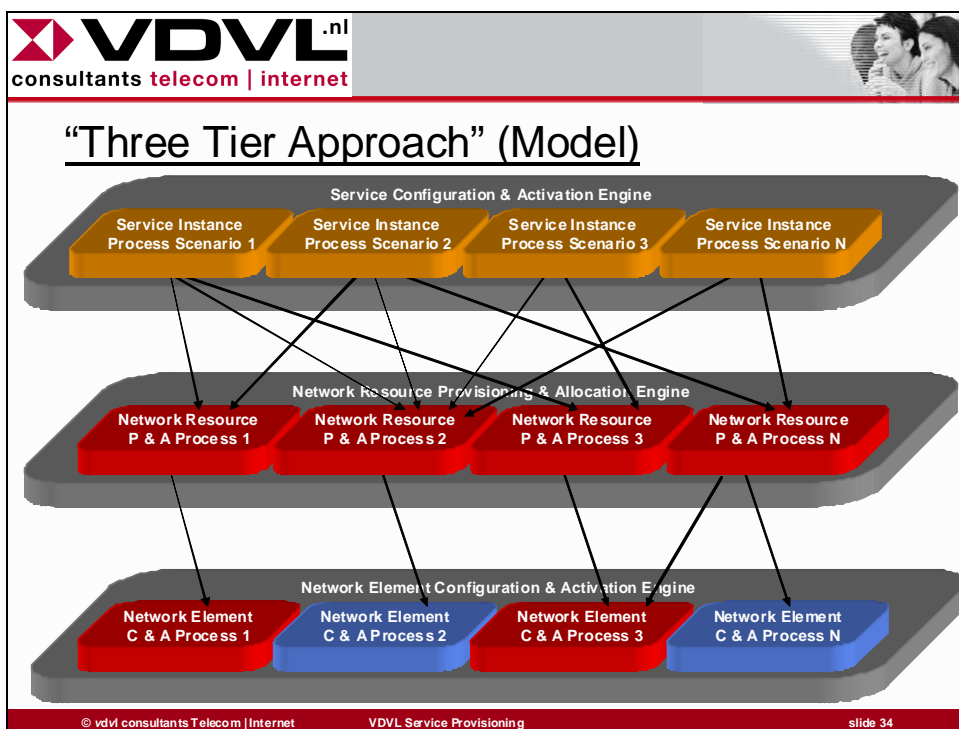
One of the distinctive pillars of the order management framework is the highly configurable template data model. It is the basis for a weak typed generic CRM interface and a generic user interface. New services can be configured without involving the IT development department using the system administrators GUI. Business rules for order validations with respect to completeness and syntax can be implemented just by configuration.

The following picture shows a simplified UML class diagram of the order data model of the order management framework.



4.2. Multi Tier Order Management

The multi tier order management approach offers the capability to develop re-usable processes and services (workflow components). This enables a fast time to market: Once a workflow component is designed, developed, tested and taken to production, it can be re-used in workflows in another tier. The next picture shows how this principle can be used to implement end-to-end process flows for service configuration & activation:



The next picture shows the re-usability ratio for one of the implementations of the order management framework, in this case for ISDN30 services over multi technology access networks. Horizontally the service configuration and activation end-to-end scenario's are shown. The vertical axe shows the decomposition in re-usable workflow components for network resource allocation & provisioning. The matrix shows re-usability ratio of – in this particular case – 77%. If any new access method for ISDN30 services is developed a lot of the workflow components can be re-used. If any new service uses the same access technologies one or more workflows mentioned under "access" can be re-used. Re-use will enable a shorter time to market and will decrease the total cost of ownership.

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Service Configuration & Activation Engine

Re-usability Ratio Network Provisioning & Allocation Processes Add ISDN30

Network Provisioning & Allocation Process	Scenario: Add ISDN30 over Extended E1 Single Pair	Scenario: Add ISDN30 over Extended E1 Dual Pair	Scenario: Add ISDN30 over Fiber	Etc
Service Instance Order Intake & Dispatch				
Service Instance Order Creation	X	X	X	X
Service Instance Order Validation	X	X	X	X
Service Instance PreQualification	X	X	X	X
Publish Service Instance to Network Inventory	X	X	X	X
Service Platform				
SP Voice	X	X	X	X
Access				
Extended E1 Single Pair Access	X			
Extended E1 Dual Pair Access		X		
Fiber E1			X	
KPN ILL E1				X
CPE				
CPE Voice	X	X	X	X
Service Instance Order Integration				
Service Instance Integration Test	X	X	X	X
Publish Service Instance Order Completion to NI	X	X	X	X
Publish Service Instance Order Completion to CRM	X	X	X	X

Re-usability Ratio = 77%

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