SERVICE LEVEL MANAGEMENT OF THE GERMAN AIR TRAFFIC CONTROL AN INTEGRAL PART OF THE ITIL PROCESS LANDSCAPE

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Standard-based approaches to managing the complex IT environment have been rapidly embraced by the IT community. The most popular framework being adopted is the IT Infrastructure Library (ITIL).

Originally developed by the British government in the late 1980s, ITIL is comprised of a growing series of publications that outline a process-based set of best practices for IT service and systems management.

ITIL promotes a quality approach to achieving business efficiency and effectiveness in the use of information systems. ITIL best practices are applicable to all IT organizations, no matter what their size or what technology they use. Today, ITIL is the world's most widely accepted approach to IT service management.

The distinction between business process and IT process needs to be well defined and communicated.

The Service Level Management (SLM) is one of the important and integral parts of the ITIL Standard. The goal of the SLM is to create IT-service modules from the customer point of view. The problem of System Management is that operations are only described from the technical or system point of view. Often the customer view is lost. This problem becomes obvious when dealing with such specific systems as Air Traffic Control (ATC) services. One of the decision-making approaches is discussed in this paper as a case study for DFS Deutsche Flugsicherung GmbH, which is the legal private company for the German ATC and navigation services.

The progressive introduction of the IT-Infrastructure Library (ITIL) process for the IT-System Management, has been planned since 2001.

For the DFS it was important to describe end-to-end services. As example the service chain "Representation of Radar Information". A major point is not only to create the complete chain, but also to define the right criteria and measurement methods. The SLM is responsible for the standardization and controlling of IT-Services. The services have to plan and to fix in a special IT-contract. One-success criteria for Service Provider and Customer are a long-term win-win connection. The SLM has to be arranging the permanent monitoring and reporting for the agreed Service Level.

The tasks and goals are as follows:

- Management of Customer Requirements for IT-Services;
- To create, plan and optimise customer oriented IT-Services;
- To maintain Service Modules and Service Catalogues;
- Standardization of Service Level and Services;
- Contract-Management, monitoring and reporting of Service Level Agreements.

A successful SLM has to equally focus on economical, technical and organizational Customer Requirements. The most important success criterion of SLM is standardization.

Keywords: IT Infrastructure Library – ITIL, Service Management, Service Level Agreements

THE ACTUAL SITUATION OF IT

Often IT and its organization is technical oriented or is focused only on the system point of view. Especially IT-organizations are often structured in such a way that they reflect technical purposes and products.

Due to the fact that Companies today depend on the availability of their IT-Systems, IT has to support all business processes. This means that IT is a critical factor of the company success and its role on the market. IT became a completely new mission for high tech companies and the requirements regarding IT have to be changed.

Business IT has to be more flexible and customer oriented. IT has to move from a technical point of view into a services and customer oriented service organization. This is a complete change of business culture. The customer today is not interested in an IT product. The customer requires an overall measurable IT service, maybe a complete end-to-end service.

SHORT INTRODUCTION INTO THE IT-INFRASTRUCTURE LIBRARY (ITIL)

ITIL is a quasi standard for IT-System Management Processes. The Central Computer and Telecommunications Agency (CCTA) set up ITIL. The British Government set the task to create a new standard for public IT-departments. ITIL is a protected label of the office of Government Commerce (OGC).

What is important is that ITIL is the Best Practice Standard, reflecting the experiences of IT System Management Processes. ITIL is to be understood as an open guideline and a resource to arrange IT service processes, which are tailored for IT Service Management Processes. ITIL is independent of Supplier or other industrial companies. ITIL describes a common frame for all activities of an IT-organization. These activities will be bundled into different processes. Every process is responsible for a special task of the IT-organization. This method for IT-management is independent from the structure of the IT-organization. The main goal of ITL is to describe the IT-Service Processes and to set a standard in a systematic way.

The goals of ITIL are as follows:

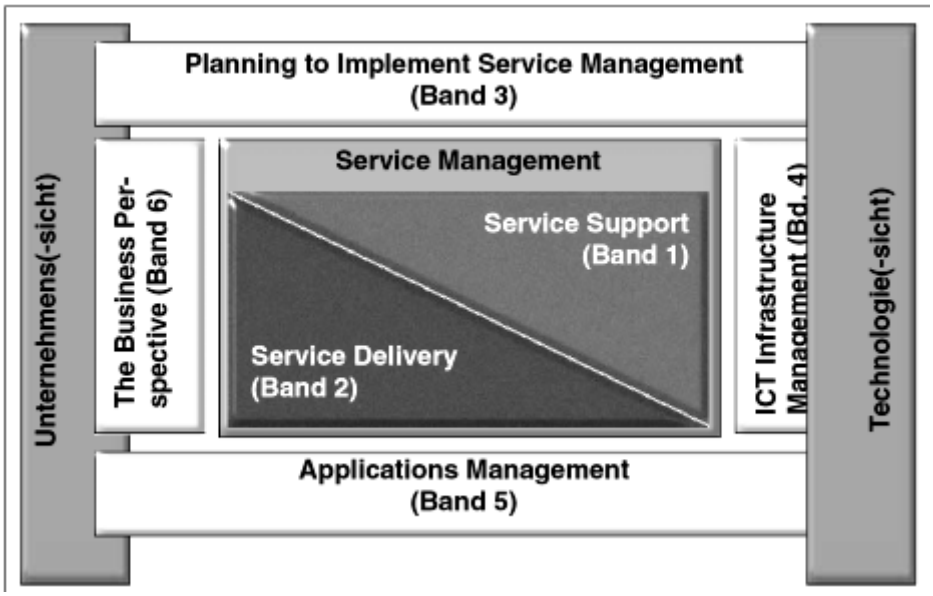
- Provision of a framework of best practices for the management of IT-services.
- Implementation of methods for improvement of quality, performance and economy of IT-organizations.
- To provide a higher degree of professionalism for employee and organization.

The use of the ITIL standard provides the IT-organization with the possibilities of automation and more flexible and customer oriented Services Processes. ITIL is the basis for optimum and cost-efficiency.

"ITIL has the goal to deliver IT-Services in a high quality"[1].

Most IT-organization different ITIL processes can be found. One goal of ITIL is to build a complete and integrated model of IT-processes, which are optimised and perfectly coordinated with each other. All ITIL processes are in line.

The ITIL frame structure is shown in the following picture[2]:



[1] It SMF page 37.
[2] It SMF IT Service Management.

The ITIL Service Management Processes are divided into two core areas:

- Service Support;
- Service Delivery.

The Service Support processes concentrate on the support and realization of system management processes. On this operational level, all processes for system operations are summarized. The term Service Support describes the key practices of system management, like Service Desk, or Incident Management.

On the tactical level the Service Delivery processes describe the long-range planning and improvement processes of IT-Service performance. They ensure that customer oriented service processes are fulfilled in detail and are executed in a structured way.

Service Support	Service Delivery
Service Desk[3]	
Incident Management	Service Level Management
Problem Management	Finance Management
Configuration Management	Capacity Management
Change Management	Continuity Management
Release Management	Availability Management

SERVICE LEVEL MANAGEMENT AS A PART OF SERVICE DELIVERY

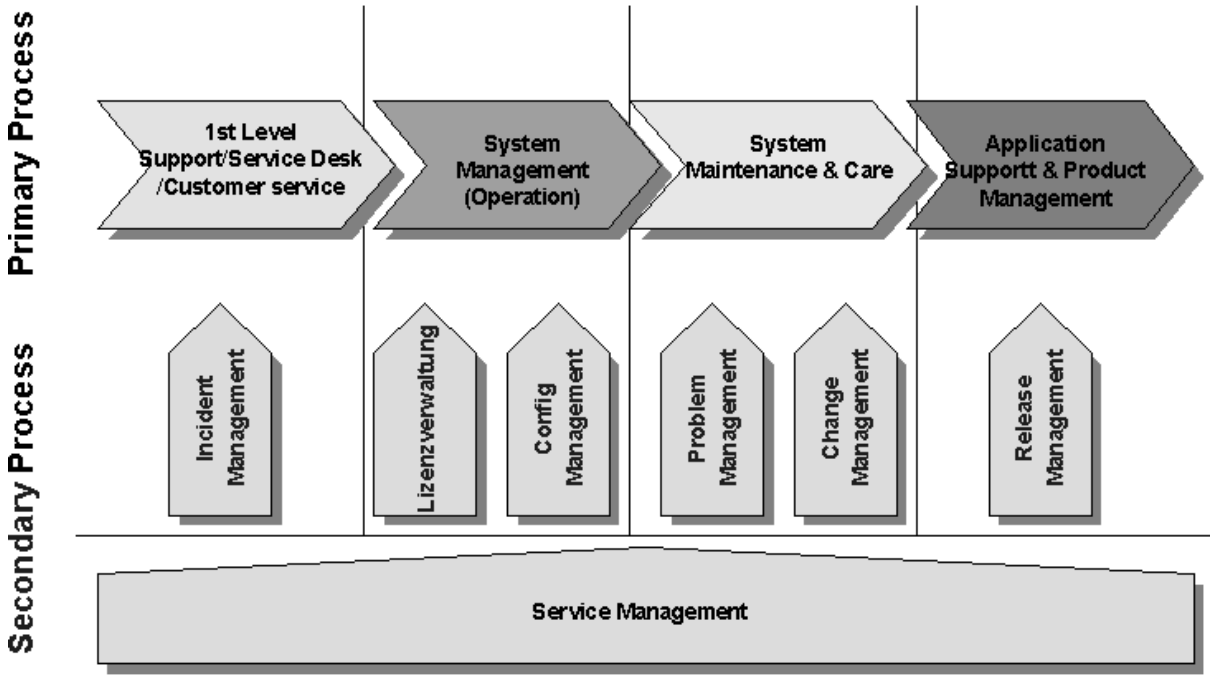
The main goal of Service Level Management (SLM) is to make IT performance measurable. Today it is important that the customer is able to measure the achieved Service Level and to assess the service quality in relation to the customer requirements. Basically the SLM and the customer use agreed metrics for this task. Due to the fact that the IT services have a direct impact on the success of business processes, the IT services have carefully to create, to plan, to operate and to monitor. In this way the SLM is a central and strategic task of IT Management. The SLM as a part of Service Management is the central interface between the customer requirements and the IT Service Operation.

The benefits of Service Level Management are the following:

- The Service Level Management will increase the service quality and economy of service support.
- The services shall fulfil in the customer requirements in a better way and so increase customer satisfaction.
- The Service Level Agreements contain clear requirements from a quantity and quality point of view. Thus there will be a common understanding of the tasks, competence and responsibilities of the customer and the IT-service organization.
- With the help of a permanent service monitor it is possible to react in a timely and cost effective manner to service quality violations.

[3] Service Desk is not a process, but is a special function.

The following picture shows the specific DFS Service Management Processes:



Definition of fundamental basics:

Service Request (SR):

A Service Request contains all customer requirements / wishes. These requirements / wishes shall be described in detail. This is the responsibility of the customer. The task of the IT-organization is to define the resulting technical and financial consequences, so that the Service Request brings all customer requirements into a technical form, which is measurable and necessary for implementation. The Service Request also contains all information about required operational agreements and / or underpinning contracts for the fulfilment of SLAs.

Service Catalogue (SC):

The Service Catalogue is part of a highly sophisticated Service Level Management, because in the Service Catalogue the IT-organization describes the complete service performance, which is normally divided into different service modules. The Service Catalogue contains detailed information on the service modules. The customer can find out which services are standard services and options of the IT-organization and which are only available by special order.

Service Level Agreement (SLA):

The SLA is the formal contract for IT-Services and their quality between the customer and the service provider. The SLA has to be described for the required IT-services in such a manner that not only technical personnel can understand the SLA. The SLA can be structured in a service-oriented or customer-oriented way or as corporate SLAs for a standard service for a lot of different customers.

Operational Level Agreement (OLA):

The OLA is an internal agreement between different internal IT-divisions, for example between the IT-Service provider and the networking provider. The OLA serves to support the IT-organization, which is responsible for the complete service or end-to-end service. Because the OLA is an internal document the OLA is only an agreement, not a contract.

Underpinning Contracts (UC):

The UC is like the same as an OLA. The UC will be closed, if it is necessary to use an external partner for the support of the end-to-end service. The UC has the status of contract.

The following table gives an overview of the Service Level Management activities:

Goal	Confiscation of the agreed and provided IT-service in quantity and quality		
Input	- Costumer requirements - Information about Customer satisfaction - Reports about provided Services - Cost overview - emergency plan	**Source**	- Customer - Service Management Process - Financial Management - Continuity Management
Task	- to take the customer requirements into the Service Request - to ensure the service provided via Operational Level Request or / and Underpinning contract - to work out the service quality - to work out and to maintain the Service Catalogue	**Activity**	- to generate reports - to measure the fulfilment of required services - to plan and to realize the service improvement
Output	- Service Catalogue - SLA, OLA, UP - Service Level Reports - requirements of performance and availability - Service Improvement Programme	**Receiver**	- Customer, IT-organization - internal / external Service provider - Management
Metrics	**Customer advantage**	Fulfilment of Agreements and contracts Economy of services Service satisfaction	
	Quality	Level of covering SLA / OLA / UC Service availability per anno in % Performance parameter / time of processing Reaction time / restoration time Number and time of service interruption	
	Cost	Price / Cost development and trend	
Role	Key Account Manager Service Level Manager		

STRUCTURE OF SERVICE LEVEL AGREEMENTS (SLA)

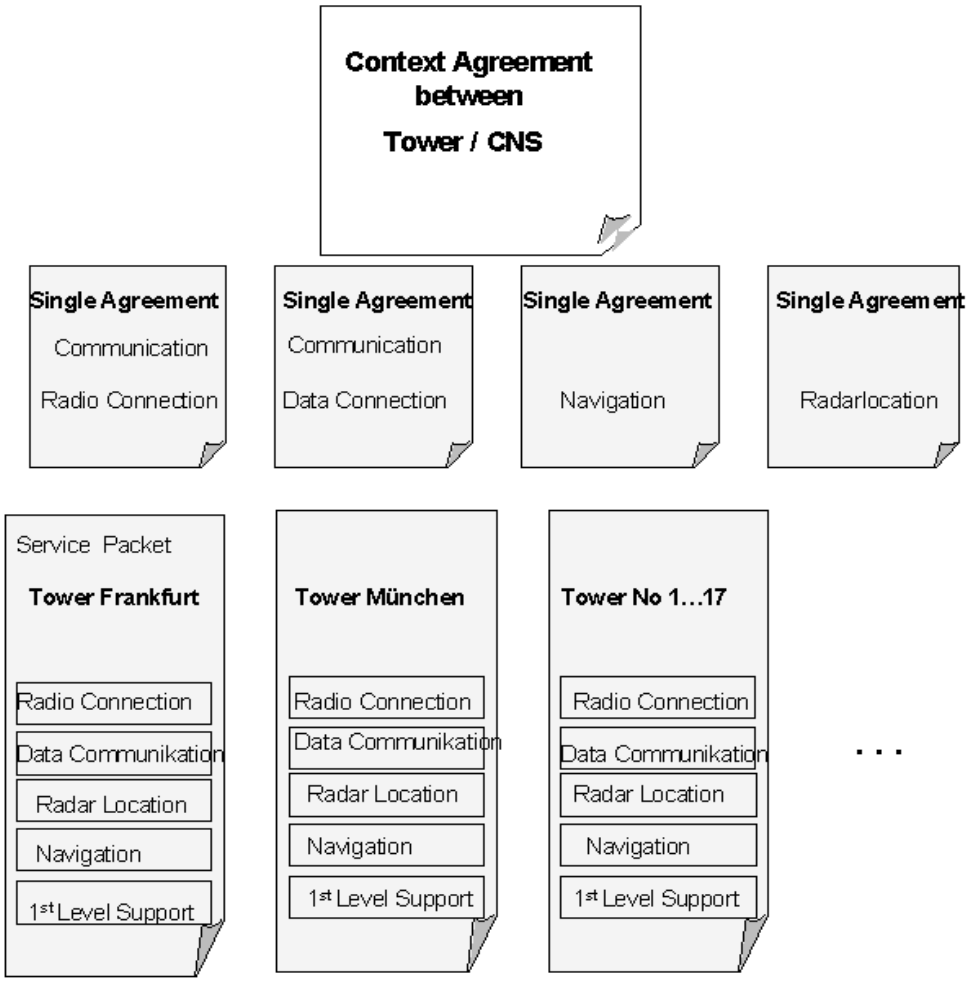
SLAs can be structured by different features. For the formal point of view, SLAs can be divided into the elements Context Agreement / Single Agreement / Performance and service certificate.

The Context Agreement describes the fundamental agreements and regulations, which is important for partnership co-operation between the customer and service provider.

The Single Agreement contains all relevant topics and regulations, which are specific for a defined service or an agreed performance or a specific customer. The Single Agreement can be tailored in such a way that all specific topics can be clarified in the Context Agreement.

Service and Performance Certificates describe all the metrics for the service quality and quantity. This description can be related to a general service or to a service that depends on the location.

The following figure shows the SLA structure between the business units *Tower* and *CNS*:



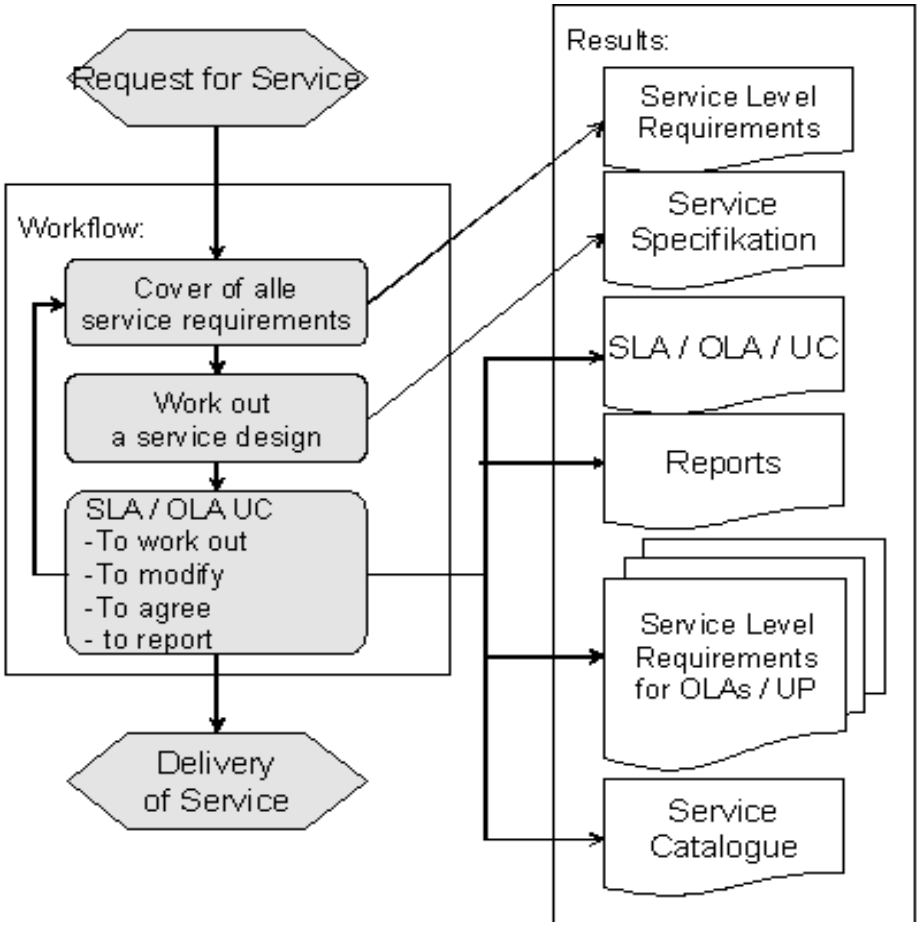
The Service and Performance Certificate shall contain the following aspects:
- Simple description of services and performance criteria;
- The agreed service time period;
- Reaction time period;
- Criteria for availability, Security / Safety and continuity aspects for the Services;
- The tasks of Customer and service provider;
- Critical aspects and exceptions.

The workflow of SLA management has to be included in the referenced documents:
- general description to establish out the process;
- process description;
- Context Agreement;
- appendix to the structure;
- appendix to the organisation and co-operation;
- Single Agreement;
- Service and Performance Certificate;
- Service specification;
- Service Catalogue;
- Lessons Learned.

In DFS the ATC Operation Business Units have established SLAs with the ATC technical Business Units (Service Provider). The DFS technical Business Unit is the central partner for all internal and external technical services. It is the "one face to the customer" and has the complete responsibility for the fulfilment of technical services. Also, all costs for service provision shall be accounted via the internal service calculation.

The steps for establishing SLAs are as follows:
- to record all requirements of the customer;
- to work out the service design;
- to identify the external and internal OLAs / UC;
- to agree all documents for service provision;
- to perform a periodical review and reporting.

The following picture describes the DFS workflow to establish Service Level Agreements:



CREATION OF SERVICE MODULES /CATALOGUE

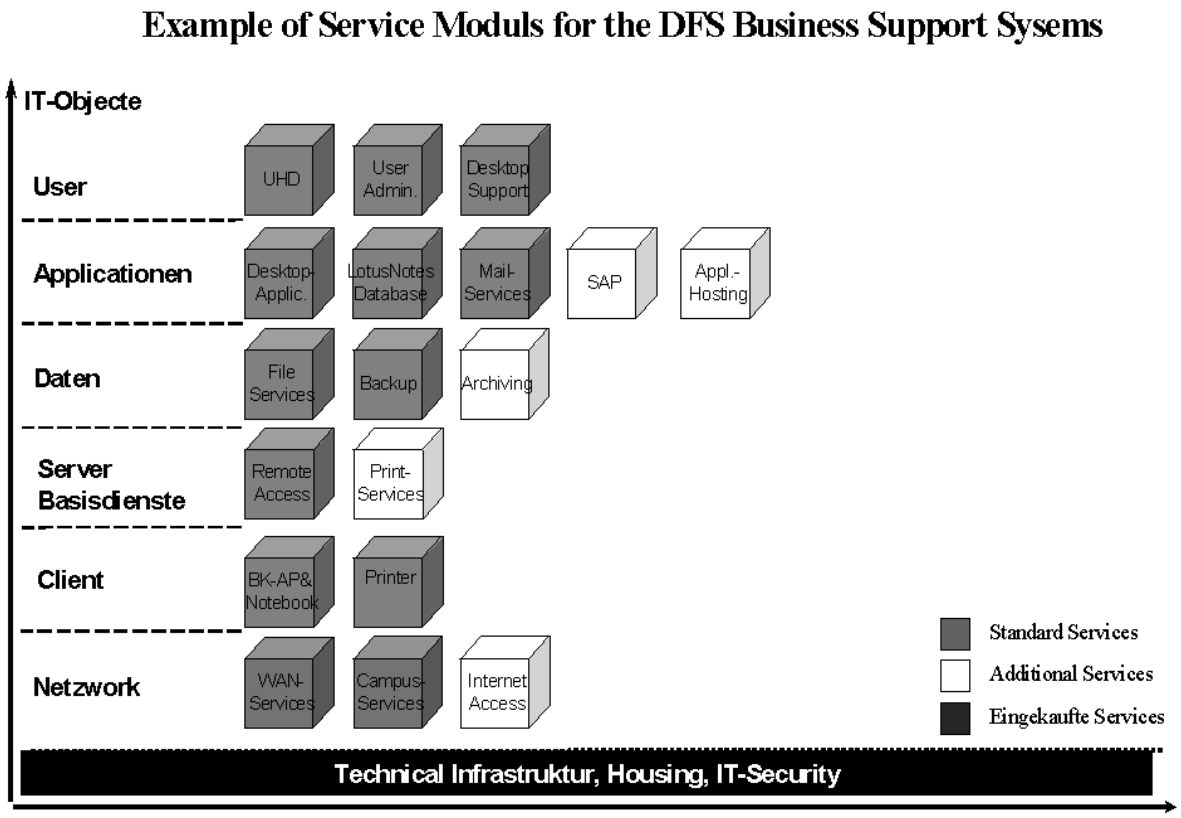
The creation of service modules is one of the important activities to reorganize the IT into a service-oriented organization. It is fundamental, because the definition of service modules required different aspects:
- To work out the services and performance;
- To bundle the services based on different requirements;
- To describe the defined service module in detail;
- To define the interfaces and dependencies between modules;
- To calculate the cost for each service module;
- To decide standards as a basis for the creation of the Service Catalogue.

The service catalogue presents a detailed overview of all services, and describes standard services and options. With the help of the service catalogue the IT-organization can be represented as a service organization with transparent costs or prices.

A service module can be described in the following way.

Service Module:	User Help Desk (Service Desk)
Contents of Service:	The User Help Desk records all hardware and software incidents.
Detail description:	Acceptance and analysis of incidents and calls via telephone and remote administration. Qualification, classification and documentation of all call in the central call management database. Solution and consulting of call for standard services / products. Escalation of call or incidents, which cannot be solved directly to the 2nd level support. Call management for calls escalated to third parties. Customer information management (Call number, status, information about problem solving). In case of systematic or vast number of incidents the UHD has to perform crisis management for the customer.
Hand-over:	Communication between customer and User Help Desk via telephone, number 4500
Service Level:	Service period: Monday-Friday 7:00 am -7:00 pm
Metrics:	80% of calls to be answered within into 30 sec. 95% of calls to be answered within into 45 sec 80% of calls to be solve within 15 min after the first call
Cost:	Price for recording of call: xx € Price for call with direct solution: yy € Price for call with escalation and local support: zz €
Reporting:	Monthly and following metrics: – number of calls by month / day / hour – number of calls solved based on different categories – diagram of accessibility – number of calls taken directly – number of calls not taken – rate of direct solution
Assumption:	Customers are qualified. The Call database is central database for automatic escalation and information. UHD support only for the service modules of the service catalogue.
Running time and dismissal	Duration is 1 year and can be dismissed 3 months before end of duration.

The following picture gives an overview of the service modules for the DFS Business Support Systems:



END-TO-END SERVICES

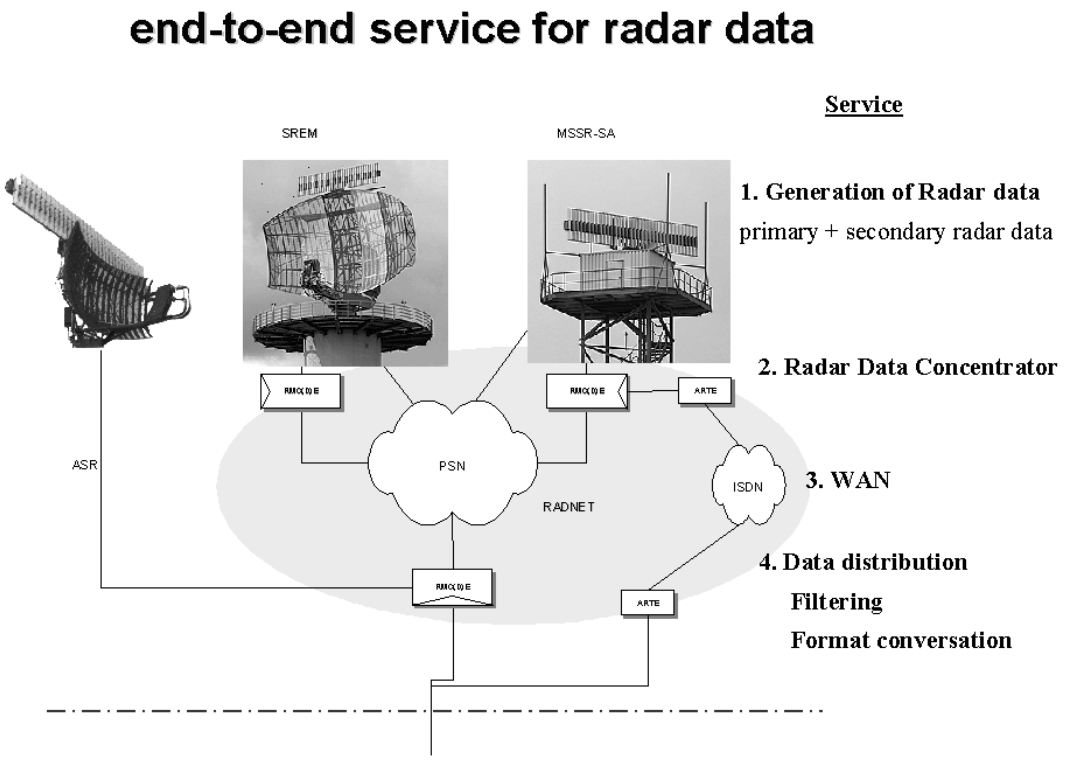
Today in the German ATC we have different service providers, which are responsible for different services. There are a certain of number of SLAs, OLAs and also UC with different external service providers. Additionally, every business unit or division has their own structure and quality of SLAs, with different metrics to measure and to interpret the service quality. They have their own tools and methods.

This cannot be in the interest of the customer and the customer requests an end-to-end service, because the customer requires a certain performance for the complete service chain, and is not interested in managing different services with different units. The requirement is: “One face to the customer”. In this way, only an end-to-end service can satisfy the customer completely.

The different services and systems have their own history. Therefore it is not easy to define and to describe the complete end-to-end service. It is necessary that all service providers establish a working partnership and define a central service provider who is responsible for the end-to-end service.

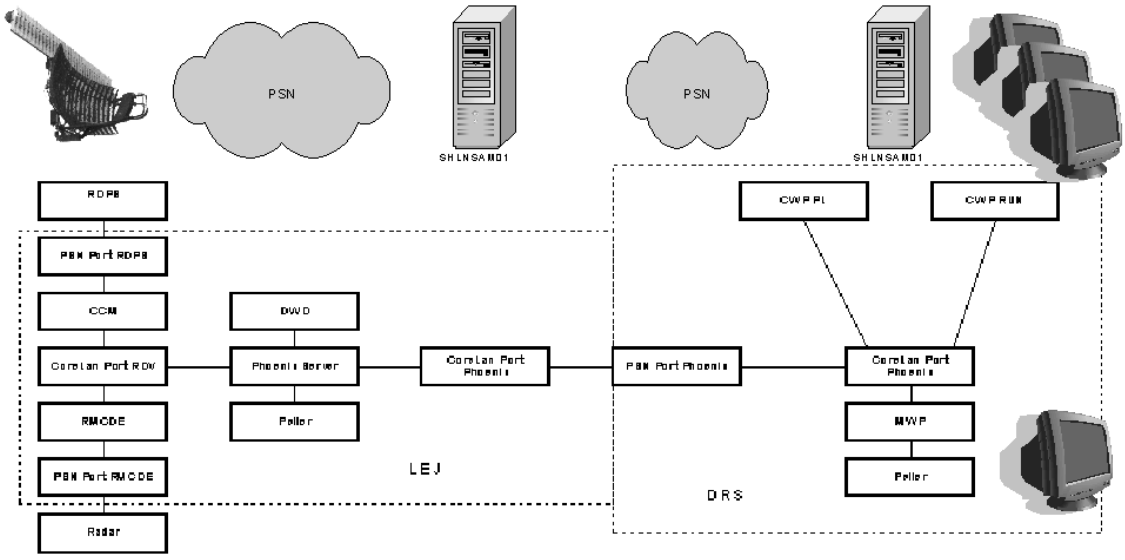
At first DFS has to define which end-to-end services exist, to describe these and to realize the prototyping for these services. Based on this prototyping the end-to-end service becomes transparent and it becomes possible to monitor and to manage. This service responsibility of the service provider including all interfaces shall be clearly defined. Important is that the complete end-to-end service is in one hand and in one place. Incidents and failure must be reported automatically and under real time conditions. For that a sophisticated system management and SLA tool with a uniform database is absolutely necessary.

The following pictures describe the end-to-end services for the radar data distribution Dresden Tower.



The business unit CNS is responsible for the SLA / OLA Radar Data generation. CNS also uses an external service provider like German Telecom for weight area network. The point of hand-over is the input port of the radar data and flight plan processing system.

Radar - Concentrator - WAN- Processing system - LAN - representation system - CWP



This picture shows the complete service chain for the distribution of radar data. Main metrics for this service are:

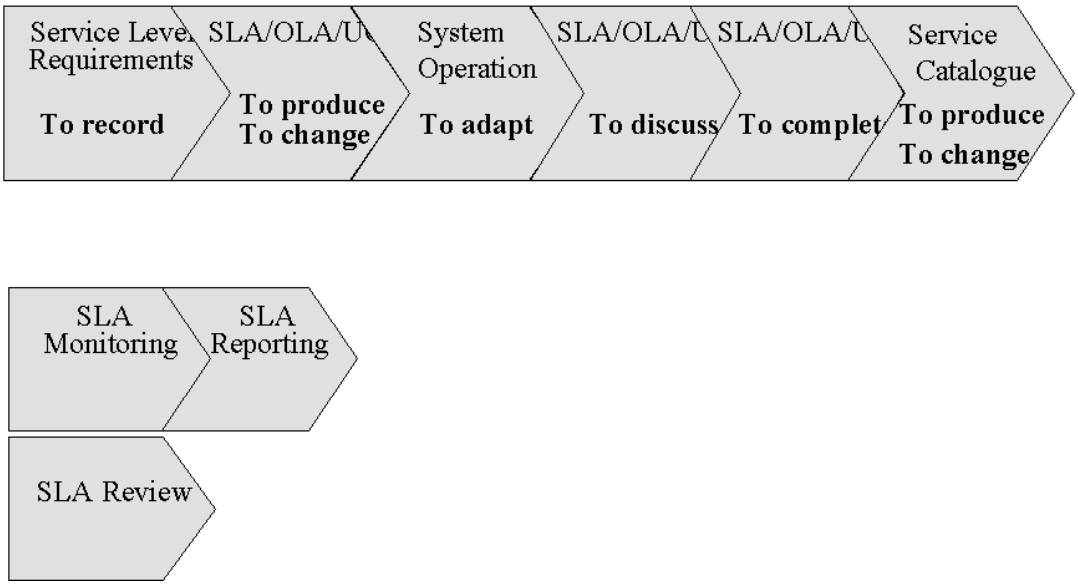
- Servic availability 99,98% p.a.
- Processing time from radar source to reprensentation <2000 msec.

TOOL SUPPORT

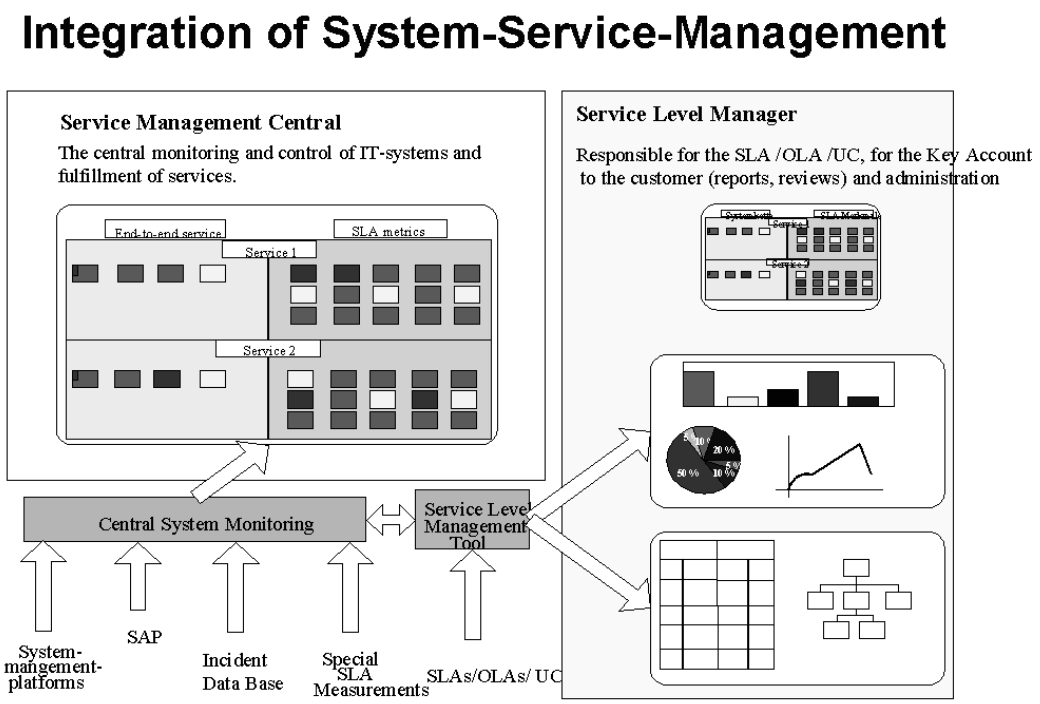
To establish service management processes based on the ITIL standard it is necessary to have tool support. The DFS divides the tool platform in two different kinds of tools. From the technical point of view it is necessary for automation to use a system management tool to report and monitor failures and to perform switch over between cluster systems. The tool resource is for the employee of the system operation (Service Level 1) and System Management (System Level 2). The DFS uses the tool "BMC Partol" for the Business Support System.

The different services and systems have their own system management and monitoring tools and different databases. Therefore it is important to define and to realize special adapters between the system management tool and the service level management tool. The tool platform describes and supports the complete service process. It is necessary that all service providers establish the data and information and define the rules and logic for calculation of the service level metrics. In that way it is possible to integrate the SLA directly in the SLA tool, to combine the different SLA to an end-to-end service. It is necessary to investigate a lot of time and resources to integrate the SLA in the tool and additionally to define the calculation rules, metrics and rules for reporting and alarms. Based on these standards it is simpler to integrate a high number of SLAs in the tool. The SLM tool has to support the following elements.

Tool Support for the complete SLM process



A second important aspect is that the SLM tool and the system management tool have to work together. The databases from the system management tools are the central input for technical information of SLM tool. Based on the integrated Service Level Agreements and calculation rules the SLM tool reports on different levels. Recommend reporting for the High Level Management (Managing Director) via dashboard, for the Service Level Manager and customer via metric reports and for the system operation via detailed technical metric and alarm reports.



CONCLUSION

Today the most critical factor for IT-organization or service provider is the "full-life-support" of the business processes. The ITIL standard is best practice method for reorganization into a customer oriented service provider. It is recommend realizing the ITIL processes via organization project. There for it is necessary to work out a detail project plan. The implementation time for the ITIL processes dependents on the complexity of IT-organization and on the ITIL process it self. The experience for complex companies shows the following time periods.

Incident Management	6-18 months,
Configuration Management	3-9 months,
Problem Management	5-8 months,
Change Management	3-4 months,
Release Management	2-3 months,
Availability Management	4-8 months,
Financial Management	6-12 months,
Service Level Management	6-9 months.

After the implementation of ITIL it is necessary to define the services and service modules of the IT-organization; to describe them in detail and to calculate the costs and prices for every service as well as to provide the service via Service Level Agreements.

The DFS is now gaining its first experience with the definition of service chains and service management and monitoring of end-to-end services. The first prototype will be completed by end of this year. However, it has become apparent that a complete service orientation and customer satisfaction can only be achieved through end-to-end management of services and via complete transparency of cost and service quality. A high level of automation is required based on standard system management and SLM tools. From an organizational point of view it is very important to provide visible results for the management (dash board) and practical acceptance from the system management organization.

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