Modeling Service Level Monitoring Processes for QoS Guarantee of Managed Services

Todor Georgiev [1] and Aleksandar Tsenov [2]

Abstract – **Nowadays the Service Level Management became very important as a part of the relationships between the Managed Service Providers and their customers. The Service Level Management (SLM) process includes approaches, tools and rules for monitoring of the network Quality of Service (QoS) parameters. The overall process includes things such Service Level Requirements (SLR), Service Management Objectives (SMO) and Service Level Agreements (SLA). In this work a method for modelling the processes of Service Level Monitoring is introduced as a part of the whole Service Support Framework, according to the ITIL (Information Technologies Infrastructure Library) requirements.**

Keywords – **Service Level Management (SLM), Quality of Services (QoS), Information Technology Infrastructure Library (ITIL)**

I. INTRODUCTION AND PROBLEM STATEMENT

Increasingly, the relationship between IT departments and their internal customers is that of client–supplier, based on the mechanisms of marketing and competition. IT departments are losing their internal company monopoly and have to compete with services offered on external markets. In this scenario a consistent customer focus of the IT management is of pivotal significance [1; 4; 10]. IT departments are facing the challenge of emerging from a technology-oriented applications developer and infrastructure operator to a client-oriented IT service provider.

Reference models help to reduce the costs and risks inherent in the transformation of organizational processes [2; 3]. This explains IT management's increasing interest in reference models for service oriented IT processes. Within the framework of change mentioned above they ensure systematic structuring of customer focused IT management processes at reduced cost and risk [11]. Within the last few years the IT Infrastructure Library (ITIL) has developed into a de facto standard for IT service management [14]. This is corroborated by the rapid increase in membership of the IT Service Management Forum, which is an interest group enhancing and propagating the ITIL principles [9]. Also the large number of practice-oriented ITIL conferences, publications and training opportunities [7; 8; 9; 14] indicate the growing relevance of ITIL. Recent studies substantiate that the ITIL holds a position of high relevance as well as being utilized extensively in the everyday running of German companies [12]. In spite of

its relevance, its wide distribution and a large number of publications, a critical analysis of the ITIL reference model from a formal point of view is lacking. On the one hand existing literature is content to simply describe the areas of IT management as documented in the ITIL [3; 6; 8; 9; 11] and on the other it makes suppositions about the general usefulness of the ITIL in practice [7; 13]. The authors know of only a few publications on ITIL in scientific journals [11; 14]. This results in uncertainty in the execution of ITIL projects and misunderstandings regarding the attainable advantages of adapting ITIL.

The principles for orderly modeling provide criteria with which the construction of models can be evaluated and which permit the identification of deficits and advantages. Regarding this last point, it is especially the principle of economy which would imply a benefit analysis. The model of principles for orderly modeling was chosen from among a large number of model assessment approaches [1; 5] on the basis of its particular suitability for reference information models. The evaluation is based on a detailed analysis of four case studies conducted for this purpose.

The paper is structured as follows: Chapter two contains a brief introduction into the basics of the ITIL reference model. Subsequently, Chapters three and four describes the approach and the evaluated model of the Service Level Monitoring process. Following that, selected trends are described and a conclusion is arrived at in chapter five.

II. ITIL AS A COMMON-PRACTICE REFERENCE MODEL

The ITIL is an English language set of documents consisting of several volumes of IT management concepts, processes and methods. Originally it was developed by the IT service provider of the British government but currently it is being continuously developed and disseminated by the internationally active IT Service Management Forum [2]. The core of the model consists of IT service management, which deals with the control and monitoring of IT services, based on aspects and principles of classical service provision [4]. Within the ITIL there are two areas of IT service management: service support [14] and service delivery [14].

Apart from IT service management the ITIL also addresses the areas of application management, infrastructure management, business perspective, IT software asset management and security management. Because of their minor practical relevance these areas are not investigated further in this paper. Thus, when the ITIL is mentioned below, what is said refers exclusively to the areas of service support and service delivery, i.e. IT service management. ITIL subdivides service support into the areas of incident management, problem manage-

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ment, change management, release management and configuration management. Service delivery is subdivided into the areas of service level management, financial management, IT service continuity management, capacity management and availability management. In view of the available literature on the subject [1; 14] a detailed description of these areas is not included here. Within the area of reference modeling, models of common practice and best practice can be distinguished [3]. In view of this, the ITIL can be classified as a common-practice model. The modeling object is IT service management and the language of description is a natural language. The nature of recommendation, which by definition has to exist for reference models [2], originates in the description of a branch standard in the area of IT service management. Innovative insights based on a well-founded theory, a requirement for best-practice models, are not emphasized by ITIL. Therefore it is not a best practice model. Rather, the ITIL is a common practice model possessing the character of a branch standard. This standard is valid for internal as well as external IT service providers. Furthermore, the ITIL's validity excludes neither specific branches, nor certain sizes of companies.

III. MODELS OF SERVICE LEVEL MANAGEMENT AS A PART OF THE ITIL – SERVICE DELIVERY PROCESS

A. Service Delivery Process

The Service Delivery Process an it's components is shown on Figure.1. In this provider view all the elements are of equal worth, while the customer view represents another types of relationships and hierarchy - Figure 2.

B. Purpose of Service Level Agreement

- A communication tool
- A living document
- A conflict-prevention tool
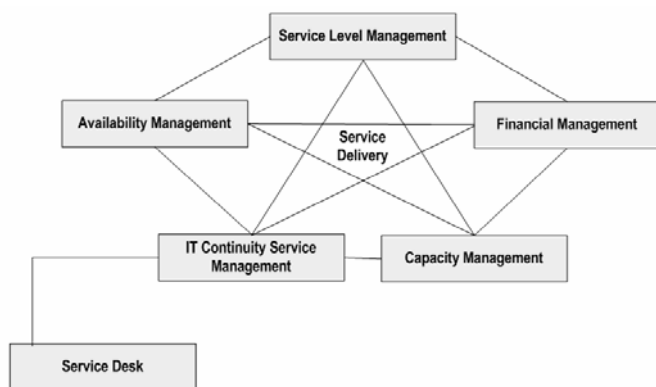- A way towards a service culture
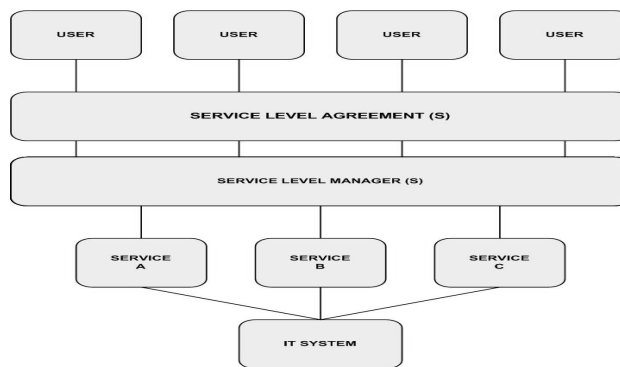

Fig. 1. The Service Delivery Process

Fig. 2. The Service Level Management Items

- An objective basis for measuring service effectiveness – an SLA ensures that both parties use the same criteria to evaluate service quality (Figure 3).
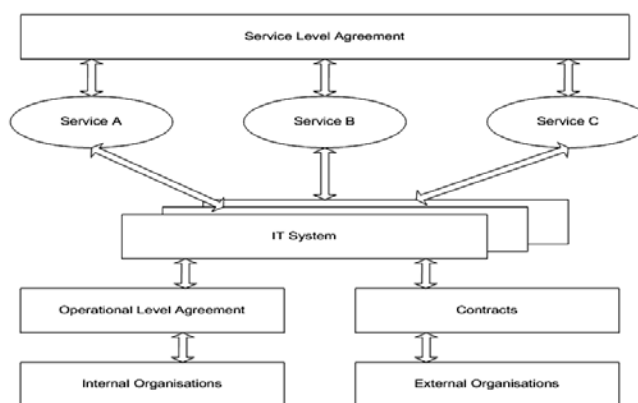

Fig. 3. The SLA Support Structure

C. Modelling the Service Level Management Process

Service Level Management (SLM) should be familiar territory for MSPs. Often, an MSP's contract with the customer is elaborated upon with a number of Service Level Agreements (SLAs). At the very heart of the MSP's relationship with its customer is the setting of expectations or service levels and then meeting them – Figure 4.
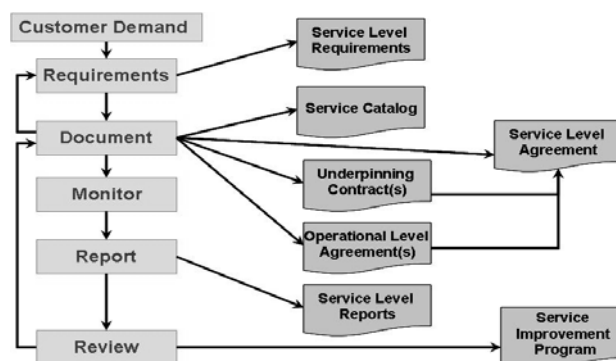

Fig. 4. The Overall Service Level Management Process

In practice, SLAs are negotiated at the beginning of the relationship in the mistaken belief that SLAs are SLM. This is not the case. ITIL indicates that SLM begins with gathering Service Level Requirements from the customer. For an MSP, this typically occurs through the Request For Proposal and Due Diligence processes. Next, a Service Catalogue is developed to identify the services available from IT. Then, internal Operational Level Agreements (OLAs) are identified and negotiated with other IT departments and external Underpinning Contracts (UCs) are established with third party vendors. Finally, an SLA is negotiated with the customer based on the services detailed in the Service Catalogue and the fees the customer is willing to pay. ITIL's SLM approach allows both parties to recognize the customer needs, the provider's capabilities, and the subsequent costs involved. It is this clear definition that moves the MSP onto the right path for supporting agreements and SLAs.

The overall SLM process covers the requirements and characteristics listed below.

Main Requirements
- To check of SLA targets are met
- To react if they are not
- To provide measures
  o For reporting purposes
  o For further review of the service
- Monitor services and customer satisfaction

Measure
- Measure from the customers' viewpoint
- Agree measurement time frames
- Ensure consistency
- Allocate responsibility for measurement

SLM – Report
- Reporting procedures and report must be defined during SLA negotiation
- Reports must be produced as described in the SLA
- Exception reporting for SLA breaches
- Cleary show performance versus targets
- Create impact by using a SLAM (SLA Monitoring) chart…

SLM Review
- Procedures must be defined during initial SLA negotiations
- Regular and Ad-Hoc
- Review achievements versus targets
- Identify corrective actions and improvements
- Review meeting should be held as agreed in SLA

SLM –Renewal/Renegotiation
- Procedures must be defined during initial SLA negotiation
- Fixed date or notice period for renewal
- Renegotiation triggered by
  o Breaches
  o Changes in requirements, technology, volumes

SLM – Service Catalogue
- Provide an accurate picture of the services provided to customers
  o Simplest form is a matrix of services/customers
- Usually includes
  o Customers/users of the services
  o Characteristics of the services
  o Maintainers of the services
- A documentation CI in the CMDB

SLM – Service Improvement Programme
- A key aspect of ITIL is 'continuous improvement'
  o Improve services
  o Decrease cost
- The SIP is the formal approach to improving the Quality of delivered services
  o Planned approach – not driven by failure only
  o Start with existing services and introduce an SIP
- The responsibility for IT Service Quality lies with the Service Level Manager

SLM – SIP – Examples
- Technical improvements
- Process and procedures
- 'Quick wins'
- Training
- Dialogue with customers

SLM – One of 11 disciplines
- SLM define and control the service level targets (the 'what')
- To achieve these targets in an efficient and cost-effective way, SLM must be supported by other ITIL disciplines
- The Service Quality Plan defines 'how' the organization will deliver the agreed service level though Service Management processes

SLM – Content of the SQP
- Management information needed to ensure the services are delivered at the agreed quality level
- Performance targets
  o For the Service Management processes
  o For internal operational teams
  o For external providers
- Monitoring and reporting details

SLM Responsibilities
- Implement SLAs
- Manage SLAs
- Manage UCs and OLAs
- Manage quality of services
Manage customer relationships

IV. THE PROPOSED SLM CONCEPT

An important advantage of the proposed SLM concept is that it provides tight integration across all solutions, permitting them to work together to benefit from - and build upon - the specific capabilities of each (Figure 5).
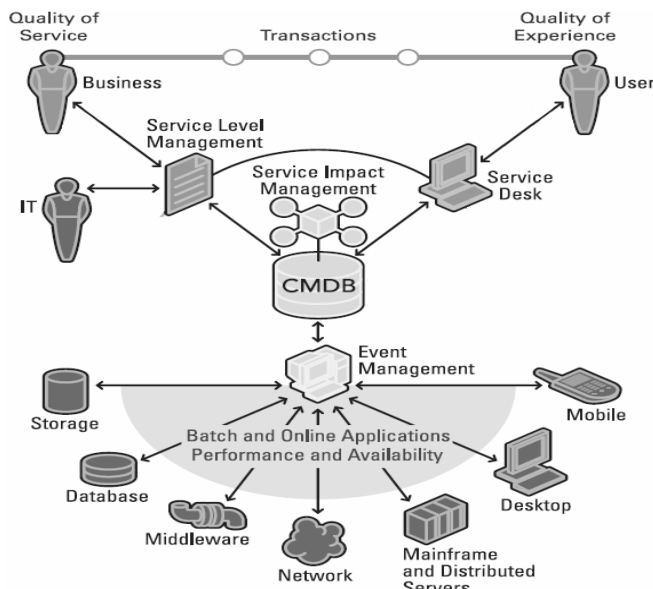
Fig. 5. The proposed Service Level Management concept

In the table below the synergies between the standard Management elements and the functions of the proposed SLM concept are shown.

Standard Management Elements	Proposed SLM Functions
Incident and Problem Management	▪ Tracks help desk response and resolution times and compares them with SLA commitments. ▪ Generates alerts and notifications to the support staff when support SLAs are in danger of being missed. ▪ Provides the help desk with service impact information to assist in determining incident priorities and to facilitate root cause analysis.
Change and Configuration Management	▪ Tracks SLA availability targets to ensure that change tasks and requests are performed in order and on time.
Service Impact and Event Management	▪ Delivers business – aware infor-mation about the real-time state of services.
Capacity Management and Provisioning	▪ Enables the analysis and predic-tive modeling of potential IT configu-ration changes and their effect on ser-vice levels.
Asset Management and Discovery	▪ Measures availability tar-gets for specific assets and ser-vices, and shows the latest cal-culated availability metrics for the specified items in the CMDB to help ensure that cri-tical business assets or ser-vices maintain committed le-vels of availability.
Infrastructure and Appli-cation Management	▪ Uses infrastructure and applica-tion data for service level measuring of both infrastructure and applications.

V. CONCLUSION

The proposed Service Level Management conceptual model is based on the possibility to provide a direct path to Business Service Management by enabling IT to manage the services it delivers from the perspective of the business. It strengthens IT's ability to meet business and user demands and to improve the Quality of Service and the Quality of Experience. The Service Level Management process, introduced in this work, delivers measurable benefits and value as the organization progresses from managing service level agreements from the technical perspective (inside out) to managing service level agreements from the business and the end-user perspective (outside in).

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