

SLAME: a Service Level Agreements Method Elicitation

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Abstract

IT service management (ITSM) is a set of processes aimed to support the design, operation and improvement of IT services. In ITSM context, service level management (SLM) is the process that specifically addresses the definition of IT services quality attributes (e.g. availability, performance, security), which are part of the service level agreements (SLAs) contracts signed between customers and providers. Nowadays, current approaches for SLAs specification, in ITSM context, are mostly based in best practices, supported by check-lists and templates. However, the utilisation of those artefacts is subjective in nature, and heavily dependent on practitioner's experience, which makes SLAs elicitation procedures, difficult of being generalized and replicated in other organizations. To tackle this issue, we propose SLAME (SLA Method Elicitation), a blend of semiformal and formal approaches for IT services quality attributes set up in SLA contracts. SLAME is underpinned by a process modeling notation (BPMN), a metamodeling language (OCL), and a goal-oriented requirements engineering approach (KAOS). SLAME is also intended to bridge the gap between business and IT communities, by ensuring the traceability among business metrics (e.g. number of issued documents or clients assisted), IT services metrics (e.g. service availability, end-to-end response time) and IT infrastructure metrics (e.g. servers' capacity, network performance).

Key words: ITSM, ITIL, SLM, Service level agreements, SLA, BPMN, OCL, KAOS

1. Introduction

Almost every organization depends upon Information Technology (IT) services to provide business services to its clients. IT services rely on the technical infrastructure (servers and network devices) as well as on systems and application software. Some examples of IT services are, for instance, an online order entry or a self-service terminal (a.k.a. ATM) made available to clients of financial institutions.

Nowadays, IT services likewise business services, are customer-focused. IT services providers and customers, set target levels for quality attributes, through contracts known as service level agreements (SLAs). In IT departments the process that addresses SLAs definition and monitoring is the service level management (SLM) (Sturm, Morris et al. 2000). SLM is usually part of a broader framework for IT Service Management (ITSM), such as in today's standard the facto ITIL v3 (ITIL3Sm 2007).

However, a recent report (Coyle and Brittain 2009) noticed that SLA definition and monitoring are still open issues within the ITSM domain. The reason is mostly due, in our opinion, to three main reasons:

- (1) informal specification of SLAs;
- (2) the models of IT services do not address quality attributes;
- (3) SLAs monitoring is performed mainly using IT infrastructure metrics (e.g. dropped packets, or page faults), instead of metrics, regarding IT services, that customers are more acquainted (e.g. service availability, end-to-end response time, or service affordability). Furthermore there is also a lack of traceability among the mentioned indicators, and metrics concerning business services pursuing (e.g. number of issued orders or number of clients assisted).

To tackle the abovementioned issues we are developing SLAME (SLA Method Elicitation), a method for elicitation of IT services quality attributes (e.g. availability, performance, and security), which will be part of SLA contracts clauses. By applying SLAME method in an organization, a series of outcomes are expected, namely:

- (1) IT services functional and non-functional (a.k.a. quality attributes or *subgoals*) requirements, collected and interrelated as directed acyclic graphs, by using a goal-oriented approach (e.g. KAOS). (Darimont, Delor et al. 1997). The top-most strategic goals (business goals) are refined as a collection of IT services and IT infrastructure subgoals. Business goals are expressed in terms of business vocabulary, whereas subgoals are expressed using technical terms in order to reduce the semantic gap among stakeholders. Since some goals conflict with each other (e.g. performance vs. security), dealing with those conflicts will contribute for a more integrated and complete SLAs specification;
- (2) Representation of IT services functional characteristics, using business process modeling notation (BPMN 2009) artefacts (*activity, event, flow object, swimlane, and data object*). The representation is enhanced, with constraints regarding quality attributes, by adding BPMN constructs called *documentation (groups and text annotations)*. In text annotations beside constraints statements in plain english, an equivalent statement in OCL statements (OCL 2006) is also provided, in order to be machine interpreted for model simulation as well as verification and validation purposes.
- (3) SLA contract clauses for providers and customers, with relevant metrics and thresholds of IT services quality attributes, which providers should agree to accomplish, and the customers acquiesce to accept.

SLAME also includes the usage of more formal approaches in the analysis of IT services process models, namely:

- (1) *Model checking of properties*: it consists in performing verifications and automatically proving whether a property is satisfied. Some common properties of IT service models, for verification using model checking are: *reachability* (whether some particular situation regarding quality attributes can be reached), *safety* (whether under certain conditions, an event will never occurs), *liveness* (whether under certain conditions, some event will ultimately occur), *fairness* (whether under certain conditions, an event will occur - or will fail to occur - infinitely often), *deadlock-freeness* (whether the model can never be in a situation in which no progress is possible) (Berard, Bidoit et al. 2001).
- (2) *Checking SLA violation* involves the notion of order in time, so temporal logic should be used, since this is the form of logic specifically tailored for reasoning with these statements.
- (3) *SLA compliance checking*: it is possible to analyze the model behaviour simulating different scenarios using Monte Carlo method for sampling generation. Constraints (invariants, pre, post-conditions) can be formally checked against specified thresholds, after model instantiation, in order to discover possible SLAs non compliance.

2 References

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