

**6th PPgSI's Dissertations Workshop
2019**

**Monitoring of Non-functional Requirements of Business Processes based on
Quality of Service Attributes of Web Services**

Author:	Evando Souza Borges			
Advisor:	Marcelo Fantinato, Dr.			
Research lines:	<input checked="" type="checkbox"/> Systems Development and Management		<input type="checkbox"/> Systems Intelligence	
Research areas:	<input type="checkbox"/> Database <input type="checkbox"/> Software engineering <input checked="" type="checkbox"/> Information technology management <input type="checkbox"/> Human-Computer Interaction		<input type="checkbox"/> Artificial intelligence <input type="checkbox"/> Graphics processing <input type="checkbox"/> Pattern recognition <input type="checkbox"/> Optimization	
Application areas:	<input checked="" type="checkbox"/> Enterprise environments / Business processes <input type="checkbox"/> Bioinformatics <input type="checkbox"/> Biometrics <input type="checkbox"/> Mobile devices <input type="checkbox"/> Economy <input type="checkbox"/> Education / Distance learning <input type="checkbox"/> E-government <input type="checkbox"/> Internet / Social Networks <input type="checkbox"/> Games / Serious games <input type="checkbox"/> Linguistics / Natural Language <input type="checkbox"/> Cheminformatics <input type="checkbox"/> Robotics <input type="checkbox"/> Health <input checked="" type="checkbox"/> Other Which? Business Process <input type="checkbox"/> General*			
Period in the program (at the workshop date):	<input type="checkbox"/> 2 nd semester	<input type="checkbox"/> 3 rd semester	<input type="checkbox"/> 4 th semester	<input checked="" type="checkbox"/> 5 th semester
Qualifying:	<input type="checkbox"/> Qualifying held in: 12/07/2018		<input type="checkbox"/> Plan for qualifying in:	
Defense:	Deadline for deposit: 03/09/2019		Plan for defending in:	
Publications associated with the master's project:	<p>Monitoring of Non-functional Requirements of Business Processes based on Quality of Service Attributes of Web Services, ICEIS 2019 - 21st International Conference on Enterprise Information Systems - ICEIS 2019, Published</p> <p>Monitoring of Non-functional Requirements of Business Processes based on Quality of Service, SBSI 2018 - Brazilian Symposium on Information Systems 2018, Published</p>			

The research project summary

Context:

In the global corporate landscape, with wide competition among organizations, real-time monitoring of Non-Functional Requirements (NFR) of business processes are a competitive edge, complementing the monitoring of functional requirements of business processes. An organization that quickly realizes that a part of its process is not responding as expected, in terms of execution time, for example, can decide before a negative business process outcome. Several types of NFRs can be typically associated with business processes, such as those related to performance, security, availability, parallelism and cost.

To monitor business process NFRs, these requirements need to be specified systematically. From the point of view of systematization, Business Process Management (BPM) shows techniques, methods and tools to handle the entire business process life-cycle, from initial modeling to automation, execution and monitoring. The solution chosen to implement the business processes can cause an impact on how monitoring of business process NFRs can be carried out. Automation and execution of business processes are commonly supported by Service-Oriented Architecture (SOA), using web services technology.

Research problem:

Existent approaches aimed at the monitoring of process NFRs purely work from the technical point of view; i.e., they address the individual monitoring of each of the services that implement a process. This technical point of view is useful for the Information Technology (IT) team, which needs to follow the performance of the services that implement the processes.

Research objective:

StrAli-BAM aims to enable different areas and organizational levels to share a common cockpit or dashboard for real-time monitoring, providing an additional contribution to strategic alignment.

Characteristics of the proposed solution:

Propose a new approach to monitoring non-functional business process requirements (in the BLAs -- Business Level Agreement form) based on quality of service (in the SLAs -- Service Level Agreement form), called: StrAli-BAM - Strategic Alignment with Business Activity Monitoring. StrAli--BAM consists of: an infrastructure to display and processing indicator, an infrastructure for SOA event--based execution and monitoring and reports for presentation of monitoring indicators.

Theoretical foundations:

Non-Functional Requirements

In the software engineering context, Non-Functional Requirements (NFRs) are those that support using the application. NFRs refer to constraints on functional requirements and define how efficient the software should be for the tasks it must perform. Examples of types of NFRs are performance, availability, security, usability, constraints on the development methods and technologies that should be used. NFRs are identified according to the users' needs for the system behavior. Failure to meet certain NFRs may even make the entire application ineffective.

Business Process Monitoring

Monitoring business processes to quickly access information and gain a better understanding of the activities within an organization is of well-known and established importance. Dashboards offer a proper way to view gathered information. Real-time monitoring of business process NFRs is a relevant competitive edge. The term Business Activity Monitoring (BAM) was coined by the Gartner group in 2002. BAM refers to real-time access to critical business performance indicators to improve the viability of business operations. Unlike traditional monitoring, BAM aims to monitor the integration among an organization's applications. BAM accesses events from multiple sources, evaluates conditions, updates metrics, offers output in the form of a dashboard, and issues complex events or warnings.

The StrAli-BPM Framework

The StrAli-BPM (Strategic Alignment with BPM) framework is proposed aiming at contributing to achieving strategic alignment in organizations that rely on business processes. This framework seeks to integrate, at all stages of the BPM life-cycle, both functional requirements and NFRs.

Correlated works:

Metallidis, D., Kritikos, K., Zeginis, C., and Plexousakis, D. (2018). A distributed cross-layer monitoring system based on QoS metrics models. In *Work. Patterns and Pattern Languages for SOCC: Use and Discovery, Performance and Conformance of Workflow Engines (PEACE in PATTWORLD)*, pages 189–200. Springer.

Kintz, M., Kochanowski, M., and Koetter, F. (2017). Creating user-specific business process monitoring dashboards with a model-driven approach. In 5th Int. Conf. on Model-Driven Engineering and Software Development (MODELSWARD), pages 353–361. INSTICC.

Calabro, A., Lonetti, F., Marchetti, E., and Spagnolo, G. O. (2016). Enhancing business process performance analysis through coverage-based monitoring. In 10th Int. Conf. on the Quality of Information and Communications Technology (QUATIC), pages 35–43. IEEE

Validation

Through the indicators obtained in the data collection, it will be evaluated if it is possible to monitor non-functional requirements of business processes and foster strategic alignment between business and IT.

Limitations, risks, and threats:

It was run on the Oracle SOA Suite 12c deployment platform that uses the WS-BPEL specification, no REST executions were observed. For non-functional requirements of BLAs, only the attributes of performance efficiency, reliability and security were considered. For non-functional requirements of SLAs were considered availability, control access, integrity and response time.

Scientific contribution:

Contribute to the advancement of research in monitoring non-functional business process requirements based on quality of service and also adding one more component to the context of the StrAli-BPM research project.

Technical contribution (if pertinent):

It will result in the creation of a prototype tool to monitor non-functional business process requirements and will generate a dashboard for business analysts and IT.

The research method

Genre (choose ONE)	<input type="checkbox"/> Theoretical research	<input type="checkbox"/> Practical research	<input checked="" type="checkbox"/> Empirical research	<input type="checkbox"/> Methodological research
Nature (choose ONE)	<input type="checkbox"/> Basic research		<input checked="" type="checkbox"/> Applied research	
Approach (choose ONE)	<input type="checkbox"/> Quantitative research	<input type="checkbox"/> Qualitative research	<input checked="" type="checkbox"/> Quali-quantitative research	
Literature review* (you can choose more than one)	<input type="checkbox"/> Narrative review	<input type="checkbox"/> Meta-analysis	<input type="checkbox"/> Theoretical review	
	<input type="checkbox"/> Descriptive review	<input checked="" type="checkbox"/> Qualitative systematic review	<input type="checkbox"/> Realistic review	
	<input type="checkbox"/> Scoping review	<input type="checkbox"/> Umbrella review	<input type="checkbox"/> Critical review	
Main technical procedure (choose ONE)	<input type="checkbox"/> Experimental research	<input type="checkbox"/> Survey	<input type="checkbox"/> Ethnographic research	
	<input type="checkbox"/> Bibliographic research	<input type="checkbox"/> Case study	<input type="checkbox"/> Grounded theory	
	<input type="checkbox"/> Documental research	<input type="checkbox"/> Participatory research	<input checked="" type="checkbox"/> Design science	
	<input type="checkbox"/> Ex-post-facto research	<input type="checkbox"/> Research-action	<input type="checkbox"/> Other Which? _____	
Data analysis (you can choose more than one)	<input checked="" type="checkbox"/> Descriptive statistics	<input type="checkbox"/> Statistical test	<input type="checkbox"/> Discourse analysis	
	<input type="checkbox"/> Inferential statistics	<input checked="" type="checkbox"/> Content analysis	<input type="checkbox"/> Others: _____	

* Definition of types of literature reviews established by Paré, G., Trudel M-C., Jaana M., Kitsiou, S. Synthesizing Information systems knowledge: A typology of literature reviews. In: Information & Management 52, p. 183-199, 2015. DOI: 10.1016/j.im.2014.08.008

Next steps:

Plan for defending.