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StrAli-BPM: Tools and evaluation

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Technical Report Series

StrAli-BPM: Tools and evaluation

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***Abstract.** This document presents information regarding the prototype tools developed to support the StrAli-BPM (Strategic Alignemt with BPM) approach. It also provides information regarding an evaluation of the StrAli-BPM approach.*

1. Introduction

The strategic alignment between business areas and Information Technology (IT) is motivated by the needs of large organizations to thoroughly use the potentials of IT to transform business processes and deliver good products and services. In the treatment of processes and services, it is important to attend also to non-functional requirements, minimizing misapplied IT investments due to inefficiency. However, business process modeling languages do not represent these requirements, focusing only on functional requirements. Thus, in order to fill this gap, we proposed the StrAli-BPM (Strategic Alignment with BPM) approach, which is divided in two parts – BLA@BPMN and BLA2SLA: the former to extend the BPMN language aiming to embody non-functional requirements, in the form of BLAs (Business Level Agreements) enriched with KPIs (Key Performance Indicators); and the latter to semi-automatically derive a set of SLAs (Service Level Agreements), associated with web services, from a pre-defined BLA.

This document describes the results related to the evaluation of the StrAli-BPM approach. First, the approach was evaluated by a proof of concept, based on the developed prototype tools, which allowed to verify its technical applicability. Then, a survey experiment was conducted with a panel of experts, members of a real organization. The details of both evaluations are presented as well as some lessons learned.

2. Prototype tools

To support and validate the technical feasibility of the StrAli-BPM approach proposed, in terms of BLA@BPMN as well as in terms of BLA2SLA, two tools were developed. Thus, these tools took into account: *(i)* the inclusion of the BLA attributes in an existing modelling tool of business processes, mapping the proposed artefact with the other existing elements in the BPMN notation; *(ii)* the export of the BLA generated to a readable format by other tools; *(iii)* the reading of this exported file containing the BLA structure to allow the creation of SLAs with the specialists' support; and *(iv)* the export of SLAs generated the WS-Agreement format.

In order to define which BPMN business processes modelling tool would be chosen to use in the tool of the BLA@BPMN part, a comparison between tools was performed considering those ones recommended by the Object Management Group – OMG[1] which were adapted to BPMN version 2.0 and with an interface in English. Considering the requirements needed for the StrAli-BPM approach, searching for a free license tool, with a BPMN notation extension capacity for new artefacts and attributes and with the model's export capacity to XPDL format, the Bizagi[2] tool version 2.4 was regarded as the best option. This tool allows inserting custom artefacts through the 'Custom Artefact' module, which is used to create the extended BLA artefact. Bizagi also allows adding attributes to any BPMN elements – native or extended, already making use of Extension, Extension-Definition, ExtensionAttributeDefinition and ExtensionAttributeValue, which ensure the recording of attributes not only in the Bizagi GUI interface, but also in the computational aspect. Finally, the tool can export the process model to the standard XPDL format.

A limitation of the XPDL language is that it does not export the definitions of the custom artefacts created in the BPD. Given the purpose of the StrAli-BPM approach to export the BLAs settings together with the process models in a structured XML format, BLA@BPMN received a workaround solution to enable validating the approach, in a proof of concept form, with no need to code another structure besides the one already provided by the BizAgi tool in a native form. Thus, the Custom Artefacts elements representing the BLAs were promptly replaced by Data Objects elements. A Data Object is a native artefact of the BPMN notation which can also be associated with a Group and receive extended attributes. Thus, this artefact can be fully exported to a standard XPDL format, including the extended attributes, together with the rest of the business process model. Therefore, the limitation of the XPDL language referred to earlier was avoided and the BLA2SLA derivation tool was able to interpret a single XPDL file with all the functional requirements and business NFRs to create the SLAs.

With this workaround solution, Figure 1 shows an example of the BLA artefact, represented in a credit application business process, preliminarily presented in Section 2. The BLA in question, designated as "6 hours for contracts origination", includes the activities of the business process to be associated with the goal set in the BLA, a goal that is based on the KPI concept. In order to differentiate the Data Objects that represent the BLAs from those used for the traditional BPMN notation purposes, either graphically or exported in XPDL file, the Data Objects used to specifically represent the BLAs must be prefixed with "[BLA]", as in the example of Figure 1.

Specifically for the purpose which the tool was built, this workaround solution meets the expected goal as it can conceptually show the feasibility of the StrAli-BPM approach. Notwithstanding, in order to eventually enhance the BLA@BPMN tool, there is also the possibility of extending the XPDL language scheme to enable exporting the configurations of the extended artefacts. Such adaptation would also require customizing the BPMN modelling tool, which was not part of the initial scope of StrAli-BPM.

The attributes of the proposed BLA structure were inserted into the Bizagi tool through the Element Properties module for the customized BLA artefact as well as for the Data Objects used in the workaround solution. Thus, the BLAs associated with business pro-

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[1]http://www.bpmn.org
[2]http://www.bizagi.com
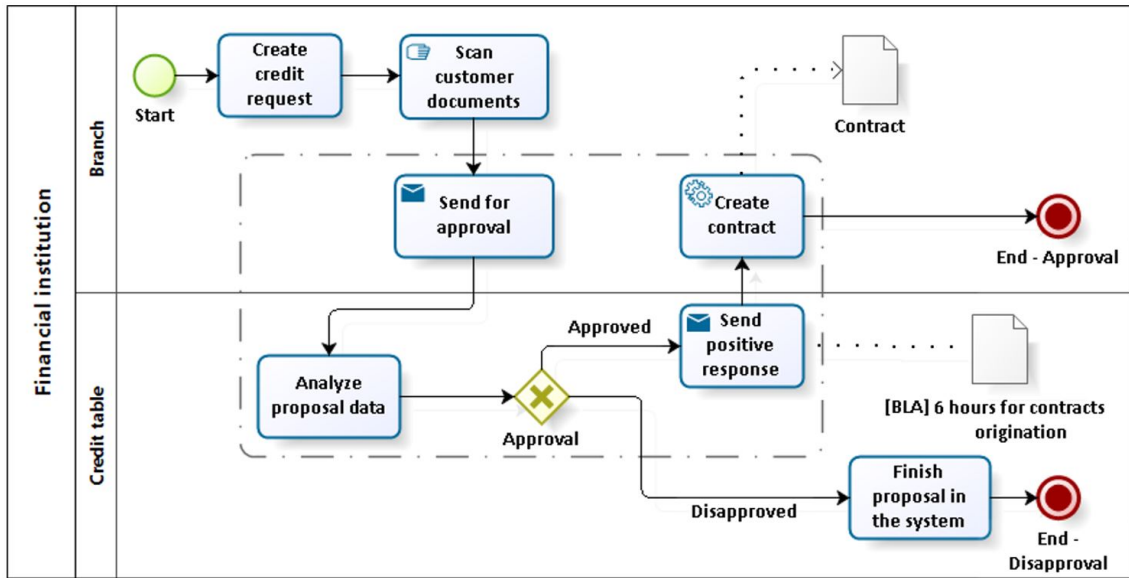
Figure 1. Business process model with a BLA represented by a Data Object

cesses (or sub-processes) modelled in BPMN are represented and persistently stored. Section 3 shows the attributes embedded in the tool.

Finally, to physically record the BLAs outside the Bizagi tool and give continuity to the StrAli-BPM approach (to enter the BLA2SLA) after creating the process model and the required BLAs, the project has to be exported to XPDL format.

The other tool developed regards the semiautomatic derivation of a set of SLAs specified in WS-agreement from a BLA. Based on a BLA, this tool enables to associate the SLAs with web services, which are in turn implemented to execute the planned activities in the business process modelled in BPMN.

The tool BLA2SLA developed consists of a semiautomatic converter, developed in C# language, given its data treatment robustness in XML format. The tool computationally interprets the BLA, exported in XML (XPDL language), and supports the specialist in creating the SLAs specified in WS-Agreement language, also based on XML, respecting its pre-defined structure. The application has a main screen, as shown in Figure 2, divided as follows: *(i)* the upper part contains the list of BLAs imported from the XPDL file, and also the Name, the Context and Service Terms of SLA; and *(ii)* the lower part that contains the list of the SLA's Guarantee Terms and all its constituent parts.

With the tool menu it is possible to: import an XPDL file with the definition of the process model and associated BLAs, to load, save and "save as" a derivation project in the internal and intermediate "b2s" format; and export the SLA created in the tool to the XML format, based on the WS-Agreement language scheme.

The operation tool begins by importing the XPDL file that represents the business process model generated and exported by BLA@BPMN, which includes all possible BLAs linked with such a model. Then, the list of BLAs in the business process model is displayed in the BLA List field. Thus, the specialist can choose any BLA listed so that the SLAs are derived from it.
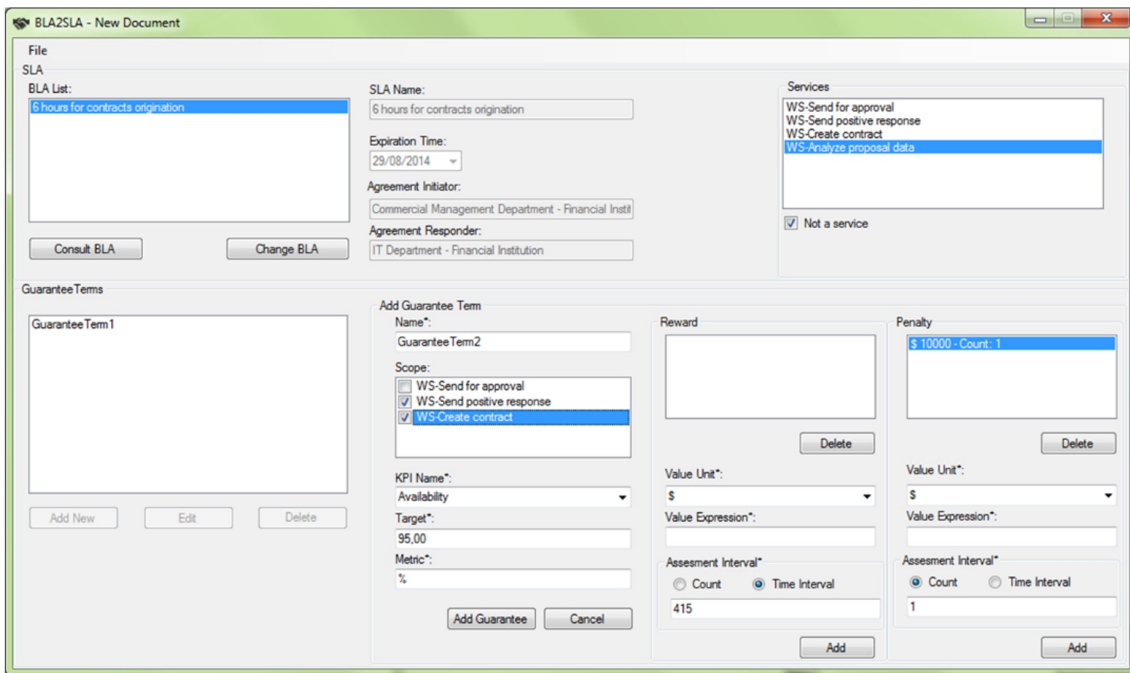
Figure 2. BLA2SLA tool with an imported BLA

In order to present the features of this tool and support its explanation, the XPDL file generated from the model in Figure 1 was imported into the BLA2SLA tool. Figure 2 shows the tool screen with the BLA "6 hours for origination contracts" identified and an example of the SLA in creation.

According to the derivation rules, the fields SLA Name, Expiration Time, Agreement Initiator and Agreement Responder are automatically filled with information from the imported XPDL file, in line with each selected BLA. This information is only read.

The Services list is similarly filled with information from the XPDL file: all activities that have been selected as part of the sub-process under the jurisdiction of a BLA are presented as potential e-services to be implemented as web services. The processing of this type of information in the input file needs to consider details of the language used by the BLA@BPMN tool. The BLAs are linked to activities in the BPMN model using graph coordinates X and Y (XCoordinate and YCoordinate, respectively), as well as the size (Height and Width) of these Groups and Activities. Once incorporated by the BLA2SLA tool, these activities have the "WS-" prefix added to their names.

Given that not all activities in the business process model should be computationally executed via web services, the specialist may disregard such activities marking them as Not a service. This action can be useful, for example, to disregard activities from the business process model that will be manually executed or via script; since in this case this approach does not assume an SLA for them in terms of SOA context. Activities marked as Not a service are not considered by the tool during definition of the Guarantee Terms. For purposes of SLA integrity control, only activities not currently used to create Guarantee Terms may be marked as Not a service.

For each BLA, the specialist should define a set of SLAs (i.e., a set of Guarantee

<u>Terms</u>) according to his or her knowledge about this BLA-SLA mapping and the business-IT context involved. The tool helps the specialist to visually and systematically find the best set of SLAs that together will cover the respective BLA.

The tool presents a list of the <u>Guarantee Terms</u> already created for the selected BLA. The existing ones can be edited or new ones can be created. For both cases, a list of web services is presented in the <u>Scope</u> list to be selected or unselected for the scope of the <u>Guarantee Term</u>, indicating to which web services it applies. Activities marked as <u>Not a service</u> are not presented in the <u>Scope</u> list.

For each <u>Guarantee Term</u>, and all e-services selected as its scope, information related to the Service Level Objective should be defined. Such information includes: <u>Guarantee Term</u> <u>Name</u>, <u>KPI Name</u>, <u>Target</u> and <u>Metric</u>. CustomServiceLevel option is not available in this tool version. None of this information is directly created by the tool, i.e., it needs to be defined by the specialist based on the selected BLA, whose details can be viewed in this tool for reference. For <u>KPI Name</u>, the tool allows the specialist to choose one QoS attribute. These QoS attributes are physically stored in the structure of the Variable class. <u>Target</u> and <u>Metric</u> fields must be defined by the specialist. For purposes of SLA integrity control, once more, the tool does not allow the creation of two <u>Guarantee Terms</u> with the same goal (<u>KPI Name</u>, <u>Target</u> and <u>Metric</u>) associated with the same e-service, since it would cause duplicated goals for an e-service, with different penalties and rewards in each <u>Guarantee Term</u> related to fulfilling the goal.

Also for each <u>Guarantee Term</u>, and the KPI Goal (Service Level Objective), a set of <u>Rewards</u> and a set of <u>Penalties</u> can be defined by the specialist. The tool lists all of the already defined rewards and penalties, which can be viewed or deleted. To add either new rewards or penalties, the specialist must define their <u>Value Unit</u> and their <u>Value Expression</u>. All currency values used in the selected BLA are made available for selecting the <u>Value Unit</u>, although any other currency value can be used. Moreover, the specialist must define the rules for the <u>Assessment Interval</u> in terms of <u>Count</u> or <u>Time Interval</u>. In this case, values are suggested, and can be changed according to the specialist's decision.

In the illustrative example of Figure 2, there is an SLA (or Guarantee Term) called "GuaranteeTerm1". Moreover, a new SLA, called "GuaranteeTerm2" is being added.

- "GuaranteeTerm1" has the following associated data (not presented in Figure 2):
    - Web service(s) in Scope: "WS-Send for approval";
    - Goal: Response time in 30 minutes;
    - Penalty in case of non-accomplishment: $ 5,000.00 [to be charged to each e-service invocation].
- "GuaranteeTerm2", in turn, is now defined with the following data (presented in Figure 2):
    - Web service(s) in Scope: "WS-Send positive response" and "WS-Create contract";
    - Goal: Availability in 95.00%;
    - Penalty in case of non-accomplishment: $ 10,000.00 [to be charged to each e-service invocation].

The tool allows for the defined SLAs to be either saved and loaded again or else exported in the WS-Agreement format. If there is more than one BLA in the process model

imported via XPDL file, the tool creates a WS-Agreement file for each BLA during the export procedure. The following attributes of WS-Agreement language were not incorporated by the BLA2SLA tool: Location (class Variable), Importance (class BusinessValueList), ServiceTermReference and Utility (class Preference). Thus, these attributes are exported to the XML format with the default value "[to be defined]". Therefore, the XML files are created in accordance with the official WS-Agreement scheme, which allows the IT area to subsequently specify this information as needed.

3. BLA attributes added to the BPMN notation

The basic attributes of any element of the BPMN notation, which are Name and Description, are presented in the Basic tab of the Bizagi's Element properties module. Such basic attributes are exported to the XPDL standard, but they were not used in the tool built for the BLA@BPMN part since a new structure was created as presented next.

The whole BLA structure was created using extended attributes, in the Extended tab of the Bizagi's Element properties module – for both the custom artefact as initially planned and for the Data Object artefact used in the workaround solution mentioned in this paper. Figure 3, Figure 4, Figure 5 and Figure 6 present the BLA structure split in four sections: general information; goal; penalties and rewards.

Figure 3. Extended attributes of the BLA artefact – General Information sectio

Figure 4 shows the attributes that comprise the Goal section. Each field is presented in the tool according to the type set for it. As some examples, the Name and Corporative Context attributes are implemented as text type (String) whereas Start Date

and Due Date are date type (Datetime) and Goal – Target Value is numeric type (Double). For the implementation of fields Goal – Comparison Operator and Goal – Check on BLA Due Date, radio buttons were used due to the limited options available for selection in value and in order to make them more visible.
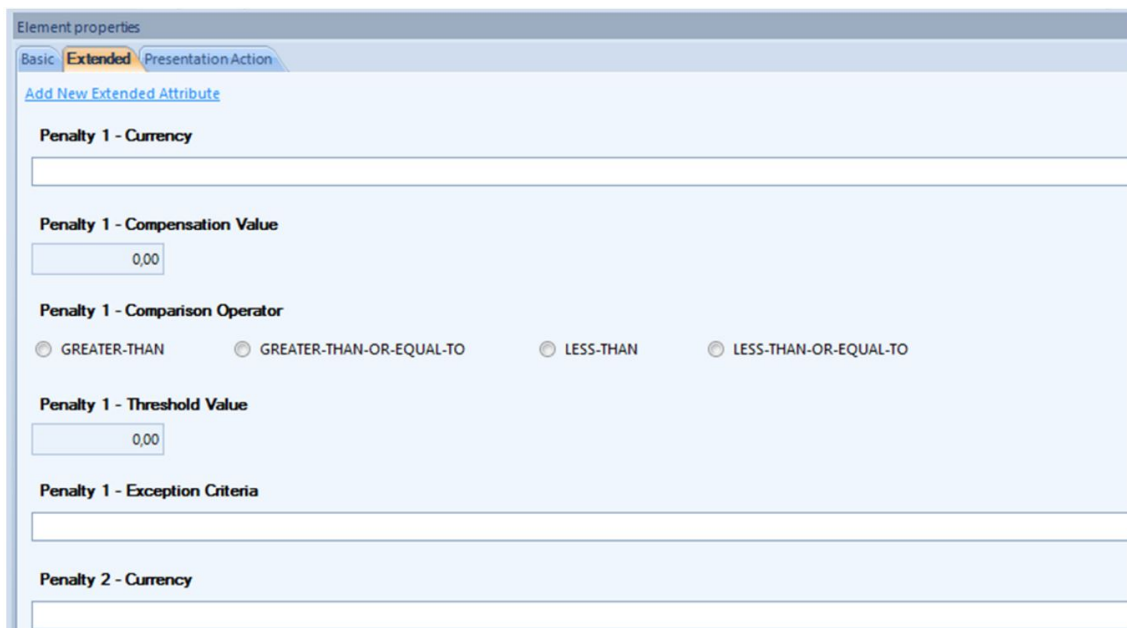
Figure 4. Extended attributes of the BLA artefact – Goal section

Figure 5 and Figure 6 show the attributes that comprise the penalties and rewards of a BLA. Although they could have been created using internal tables in Bizagi, also as extended attributes, to support the many possible occurrences of penalties and rewards in each BLA, this option has not been used since the XPDL export format is not able to register attributes in tables, but only simple attributes.

Figure 5. Extended attributes of the BLA artefact – Penalties section

Figure 6. Extended attributes of the BLA artefact – Rewards section

4. Specification of the BLAs used in the proof of concept

Tables 1 and 2 present the specification of the BLAs used in the proof of concept, respectively, the definition of the BLA "10% increase in market share" and the definition of the BLA "Default index less than 4%".

5. Specification of SLAs used in the proof of concept

Tables 3, 4 and 5 present the specification of the SLAs used in the proof of concept. Tables 3 and 4 present the definition of the SLAs for the BLA "10% increase in market share" (Part I / Part II). Table 5 presents the definition of the SLAs for the BLA "Default index less than 4%".

6. Interview script

Table 6 presents the applied interview script. For the quantitative questions, Mthe Likert scale of 5 points was used.

Table 1. Definition of the BLA "10% increase in market share"

Attribute	Value
General Information	
- Name	[BLA] 10% increase in market share
- Start date	April 01st, 2013
- Due date	March 31st, 2014
- Corporative context	The organization seeks more efficiency in its operations and an increase in the market share with well selected and satisfied customers
- Customer organization	Financial institution
- Customer department	Strategic Planning Department
- Supplier organization	Financial institution
- Supplier department	IT Department
Goal	
- KPI	Market share
- Comparison operator	$\geq$
- Target value	10.00
- Unit	Percent
- Check on BLA due date	True
Penalty 1	
- Currency	$
- Compensation value	30,000,000.00
- Comparison operator	$<$
- Threshold value	5.00
Penalty 2	
- Currency	$
- Compensation value	100,000,000.00
- Comparison operator	$<$
- Threshold value	0.00
Reward 1	
- Currency	$
- Compensation value	10,000,000.00
- Comparison operator	$\geq$
- Threshold value	12.50
Reward 2	
- Currency	$
- Compensation value	30,000,000.00
- Comparison operator	$\geq$
- Threshold value	15.00

Table 2. Definition of the BLA "Default index less than 4%"

Attribute	Value
General Information	
- Name	[BLA] Default index less than 4%
- Start date	February 18th, 2013
- Due date	August 29th, 2014
- Corporative context	The organization seeks more efficiency in its operations and an increase in the market share with well selected and satisfied customers
- Customer organization	Financial institution
- Customer department	Credit Table
- Supplier organization	Insurer
- Supplier department	Risk analysis department
Goal	
- KPI	Default index
- Comparison operator	$<$
- Target value	4.00
- Unit	Percent
- Check on BLA due date	True
Penalty 1	
- Currency	$
- Compensation value	10,000,000.00
- Comparison operator	$>$
- Threshold value	4.50
Penalty 2	
- Currency	$
- Compensation value	25,000,000.00
- Comparison operator	$\geq$
- Threshold value	5.20
Penalty 3	
- Currency	$
- Compensation value	100,000,000.00
- Comparison operator	$>$
- Threshold value	6.00

Table 3. Definition of the SLAs for the BLA "10% increase in market share" (Part I)

Attribute		Value
Name		10% increase in market share
Context	Expiration Time	March 31st, 2014
	Agreement Initiator	Strategic Planning Department – Financial institution
	Agreement Responder	IT Department – Financial institution
Services		WS-Create Credit Application
		WS-Scan customer documents (not a service)
		WS-Send for approval
		WS-Analyse preliminary proposal data
		WS-Send positive response
		WS-Create contract
Guarantee Term 1 (SLA 1)		
Scope		WS-Create Credit Application
		WS-Analyse preliminary proposal data
KPI Target	KPI Name	Capacity
	Target	25
	Metric	Concurrent requests
Penalty	Value Unit / Expression	$ 70,000,000.00
	Assessment Interval	Time Interval: 265
Guarantee Term 2 (SLA 2)		
Scope		WS-Create Credit Application
		WS-Analyse preliminary proposal data
KPI Target	KPI Name	Capacity
	Target	50
	Metric	Concurrent requests
Reward	Value Unit / Expression	$ 1,000,000.00
	Assessment Interval	Time Interval: 265

Table 4. Definition of the SLAs for the BLA "10% increase in market share" (Part II)

Attribute		Value
Guarantee Term 3 (SLA 3)		
Scope		WS-Create Credit Application
		WS-Analyse preliminary proposal data
KPI Target	KPI Name	Capacity
	Target	90
	Metric	Concurrent requests
Reward	Value Unit / Expression	$ 20,000,000.00
	Assessment Interval	Time Interval: 265
Guarantee Term 4 (SLA 4)		
Scope		WS-Analyse preliminary proposal data
		WS-Create contract
KPI Target	KPI Name	Availability
	Target	85
	Metric	%
Penalty	Value Unit / Expression	$ 30,000,000.00
	Assessment Interval	Time Interval: 265
Guarantee Term 5 (SLA 5)		
Scope		WS-Analyse preliminary proposal data
		WS-Create contract
KPI Target	KPI Name	Availability
	Target	98.5
	Metric	%
Reward	Value Unit / Expression	$ 15,000,000.00
	Assessment Interval	Time Interval: 265
Guarantee Term 6 (SLA 6)		
Scope		WS-Send positive response
KPI Target	KPI Name	Scalability
	Target	5
	Metric	%
Reward	Value Unit / Expression	$ 12,000,000.00
	Assessment Interval	Time Interval: 265

Table 5. Definition of the SLAs for the BLA "Default index less than 4%"

Attribute		Value
Name		Default index less than 4%
Context	Expiration Time	August 29th, 2014
	Agreement Initiator	Credit Table – Financial institution
	Agreement Responder	Risk analysis department – Insurer
Services		WS-Send proposal for risk analysis
		WS-Receive proposal
		WS-Perform risk calculations
		WS-Send Evaluation result
		WS-Analyse Evaluation result
Guarantee Term 1 (SLA 1)		
Scope		WS-Send proposal for risk analysis
		WS-Send Evaluation result
KPI Target	KPI Name	Reliability
	Target	2.00
	Metric	Hours
Penalty	Value Unit / Expression	$ 45,000,000.00
	Assessment Interval	Time Interval: 416
Guarantee Term 2 (SLA 2)		
Scope		WS-Send proposal for risk analysis
		WS-Send Evaluation result
KPI Target	KPI Name	Reliability
	Target	5.00
	Metric	Hours
Penalty	Value Unit / Expression	$ 10,000,000.00
	Assessment Interval	Time Interval: 416
Guarantee Term 3 (SLA 3)		
Scope		WS-Perform risk calculations
KPI Target	KPI Name	Accuracy
	Target	8.5
	Metric	%
Penalty	Value Unit / Expression	$ 50,000,000.00
	Assessment Interval	Time Interval: 416
Guarantee Term 4 (SLA 4)		
Scope		WS-Perform risk calculations
KPI Target	KPI Name	Accuracy
	Target	3.0
	Metric	%
Penalty	Value Unit / Expression	$ 10,000,000.00
	Assessment Interval	Time Interval: 416
Guarantee Term 5 (SLA 5)		
Scope		WS-Perform risk calculations
KPI Target	KPI Name	Robustness
	Target	8
	Metric	Incorrect entries
Penalty	Value Unit / Expression	$ 10,000,000.00
	Assessment Interval	Time Interval: 416

Table 6. Interview script

ID	Question	Metric	Related Goals (i)	(ii)	(iii)	(iv)	(v)
Q1	Using a scale of 1 to 5, where 1 means 'would never recommend' and 5 means 'would certainly recommend', how much would you recommend the implementation of the StrAli-BPM approach? Do not limit your response to your area or organization.	Quantitative	x				x
Q2	Using a scale of 1 to 5, where 1 means 'very difficult' and 5 means 'very easy', how easy is to implement the StrAli-BPM approach in your area? Why?	Quantitative		x			x
Q3	Using a scale of 1 to 5, where 1 means 'no advantages' and 5 means 'there are very significant benefits', how much BLA@BPMN actually fosters the alignment between business and IT, fulfilling its purpose? Why?	Quantitative	x	x			x
Q4	Using a scale of 1 to 5, where 1 means 'no advantages' and 5 means 'there are very significant benefits', how much BLA2SLA contributes towards establishing SLAs that meet the goals stated by the business areas? Why?	Quantitative	x		x	x	
Q5	Using a scale of 1 to 5, where 1 means 'very difficult' and 5 means 'very easy', how easy is to created BLAs, associated to business processes, meaningful and with feasible targets for the business? Why?	Quantitative		x	x		x
Q6	Using a scale of 1 to 5, where 1 means 'very difficult' and 5 means 'very easy', how easy is to created SLAs from the goals set by BLAs in the business processes models elaborated? Why?	Quantitative	x			x	x
Q7	According to the standards and methods of your organization, how do you understand that the StrAli-BPM approach can contribute to the strategic alignment between business and IT?	Qualitative	x				
Q8	In your opinion, what are the limitations of the StrAli-BPM approach? How StrAli-BPM could be improved in order to have these limitations addressed?	Qualitative	x				x
Q9	What is your perception (opinion, potential benefits, etc.) regarding the applicability of the StrAli-BPM approach in the corporate environment, not only considering your organization?	Qualitative	x	x			
Q10	Do you know or use another approach similar to StrAli-BPM's purpose? If so, make a comparison between them.	Qualitative					x
	Total number of questions		7	4	2	2	7

7. Results of the interview script – quantitative questions

Table 7 presents the results of the interview script for the quantitative questions.

Table 7. Results of the interview script – quantitative questions

ID	Question	Interviewee						Average
		BU-STR	BU-TAC	BU-OPE	IT-STR	IT-TAC	IT-OPE	
Q1	How much would you recommend the implementation of the StrAli-BPM approach? (1) would never recommend / (5) would certainly recommend	4	3	4	3	4	5	3.8
Q2	How easy is to implement the StrAli-BPM approach in your area? (1) very difficult / (5) very easy	5	5	4	5	5	4	4.7
Q3	How much BLA@BPMN actually fosters the alignment between business and IT, fulfilling its purpose? (1) no advantages / (5) there are very significant benefits	4	3	4	3	3	3	3.3
Q4	How much BLA2SLA contributes towards establishing SLAs that meet the goals stated by the business areas? (1) no advantages / (5) there are very significant benefits	3	3	4	3	4	5	3.7
Q5	How easy is to created BLAs, associated to business processes, meaningful and with feasible targets for the business? (1) very difficult / (5) very easy	4	5	4	3	2	3	3.5
Q6	How easy is to created SLAs from the goals set by BLAs in the business processes models elaborated? (1) very difficult / (5) very easy	5	3	3	4	3	3	3.5

8. Results of the interview script – qualitative questions

1. **Use of the organization's vision**: BU-STR and BU-TAC a pointed out that a feature of great value in StrAli-BPM is its ability to take advantage of the organizational business context when specifying the strategic goals in BLAs. According to these interviewees, from the business areas, it is very significant to raise this information and keep it registered in business processes, both to ensure the commitment of business and IT teams and to feed the organizational process assets.

2. **Usability of the BLA@BPMN tool**: BU-TAC and BU-OPE assigned grades 5 and 4, respectively, for the usability of the BLA@BPMN tool, i.e., for the extension of the Bizagi tool to incorporate BLAs for modelling business processes. BU-TAC's grade 5 is mainly due to the ease of visualization of goals that are associated with business sub-processes through the Group artefact, the Association

connector and the BLA artefact, specifically. On the other hand, BU-OPE noted certain slowness to operate the tool, which actually occurred after the inclusion of the extended artefact BLA with the proposed structure of attributes. Moreover, the interviewee BU-STR suggested that the field Goal – KPI, from the BLA structure of the BLA@BPMN tool, had KPIs preloaded with the indicators most sensitive for each business area of the organization, similar to the already done for the field KPI Name in the BLA2SLA tool.

3. **Need for a structured methodology in the organization**: For interviewees IT-STR, BU-STR and BU-TAC, it is necessary that the organization has processes for software development and IT management very well structured to implement the StrAli-BPM approach. Otherwise, the strategic alignment proposed by the approach may seem meaningless and be broken in the transition from BLA@BPMN to BLA2SLA. Thus, the approach would lose strength in the organization.

4. **Need for knowledge of the organization's strategy**: The interviewees IT-STR and BU-STR highlighted that the approach effectiveness depends directly on how the organization knows and protects its vision and strategic goals. BU-STR also pointed out that, for the definition of strategic goals and hence the BLAs goals, it is essential to know which KPIs and target values are being sought by competing organizations and by the organization's customers and shareholders. The author who was conducting the experiment associated, in agreement with this interviewee, that this analysis is in line with the competitive forces model proposed by Porter, which provides a comprehensive analysis of competitors, new entrants, customers, suppliers and substitute products, which may influence the goals of a particular organization as well as threaten its staying in the market.

5. **Real-time KPIs monitoring**: The interviewees IT-STR, IT-TAC and BU-TAC stated that a real-time evaluation of KPIs would be of great value to enable the improvement of the organization's business processes and also to register goals (in both levels – BLA and SLAs). According to the IT-STR, it is necessary to measure both whether the IT goals defined in SLAs are effectively ensuring that the business wishes be achieved and whether the goals declared by the business areas in BLAs are feasible for IT and have been clearly defined. The result of this monitoring could be displayed even as part of the BLA2SLA tool or else as a specific report submitted to involved areas – customer (business) and supplier (IT).

6. **Internal alignment by business areas**: Although StrAli-BPM propose that KPIs and their target values, as well as their penalties and rewards, are defined by the business areas, all interviewees from IT (IT-STR, IT-TAC and IT-OPE) pointed out the needs for a preliminary alignment between the business areas about the goals they want to set for the BLAs. The aim is to avoid that the IT area be required to ensure an unattainable strategic goal, considering a disproportionate KPI target value, or a potential insufficient time to reach the given value, or even inconsistent values set for the compensating actions.

7. **Internal alignment by IT area**: Similarly and with the same purpose of the previous item 6, the interviewees BU-TAC and BU-OPE consider important to have some meetings of alignment between business and IT, conducted by the IT area, to clarify which goals and compensatory actions should be defined in computational level (i.e., for SLAs).

8. **WS-Agreement language scheme**: The interviewee IT-OPE noted that the attributes Location, Importance, ServiceTermReference and Utility, which are also part of the WS-Agreement language schema, cannot be defined using the BLA2 SLA tool. For him, the tool could also consider these attributes, even if not part of the approach scope, in order to generate an XML file with a complete and operational specification of WS-Agreement language directly through the SLA export function provided by the tool.

9. **Lack of specification of NFRs in the organization**: The interviewees BU-TAC and BU-OPE highlighted that the business areas currently use the Sybase Power Designer tool, used as standard for the organization, to model business processes in BPMN. After modelling, such models are sent to IT that supports each business area in the technical specification. However, this process addresses only the functional requirements of business processes and IT services. For NFRs, organizational objectives or even KPIs, management is performed separately. Thus, for the business requirements, only the business areas manage these indicators in order to conduct their operations in the most efficient possible way, but without computational support. Similarly, in IT level, the SLAs' technical specification is done, without formal involvement of the business areas.

10. **Using business processes specification to create SLAs**: The interviewees IT-TAC and IT-OPE indicated great satisfaction with the BLA2SLA tool, since currently all manner of specifying business processes made by the business areas of the organization are not automatically retrieved to implement SLAs.

11. **Contribution of the BLA2SLA to the strategic alignment**: The interviewee IT-STR stressed that BLA2SLA can bring very significant benefits for the alignment between business and IT since, in general, the SLA goals are defined on the basis of technical understanding, and not arising from definitions of business areas. This scenario of the financial institution commonly occurs in other organizations and makes difficult the strategic alignment between business and IT.

12. **Lack of a derivation tool in the organization**: The interviewee IT-STR remarked that the IT area, although it currently has a dedicated supervision for indicators and strategic alignment, does not have any tool or approach that maps business objectives to QoS. According to him, the methodology of IT systems development could be adapted to consider an approach similar to StrAli-BPM.

13. **Lack of alignment between business goals and IT in the organization**: According to the interviewee IT-STR, KPIs prioritized by the IT are of the financial institution are: availability, cost, systems' incidents, and systems' issues. IT follows these KPIs by Line of Business – LoB, as each system addresses specifically a business area, and periodically reviews the established SLAs. However, as done by many approaches and techniques currently available, this control is conducted unitarily by IT without business involvement. The StrAli-BPM approach not only proposes such alignment, but also suggests that the SLAs goals are defined from the BLAs goals, which, in turn, must be specified by the business areas.

14. **Replacing KPIs by other techniques**: The interviewee IT-OPE reported that knows techniques for measuring and improving QoS, especially for internet services, but that analysis and planning initiatives in this direction are always carried out by TI, and hardly by business areas. IT-TAC, in turn, highlighted the ISO 9000 quality standards, which clearly allow the alignment between business and

IT in order to promote improvements to the organizational business processes. It is possible to establish links between organizational and technical requirements to achieve such gains for the business.