# Towards the Design of a Business Architecture Simulation Technique (Abstract)

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## Abstract

Simulation techniques support the redesign of business processes by analyzing the effect of possible changes on operational performance indicators that focus on the correctness, effectiveness, and efficiency of processes [6, 7]. However, the impact of these process changes on the overall business performance is not explicitly taken into account during this analysis [2]. This can result in operational improvements that are not in line with the organizational strategy, which leads to a suboptimal allocation of resources inside the organization.

The goal of this work is to solve this issue by the development of a business architecture simulation model, which employs the existing Process-Goal Alignment (PGA) modeling technique to provide a coherent view on the impact of process changes on the other business architecture elements [4]. This modeling language is extended by a simulation mechanism to test the effect of operational adaptations on performance indicators that reflect the overall business performance. The new business architecture simulation model, which is built according to the Design Science Methodology, can be applied by the following steps: (i) building the business architecture hierarchy, (ii) executing the operational performance measurement, (iii) determining how performance indicators can be propagated throughout the business architecture hierarchy, (iv) executing the simulation runs, and (v) analyzing how strategic fit can be improved.

1. Building the business architecture hierarchy.

PGA employs eight different modeling constructs to analyze how value is hierarchically created throughout the business architecture: Goals, Financial Structure, Value Proposition, Competence, Process, and Activity [3]. As these constructs are included in an integrative modeling language, a coherent view can be provided of how operational decisions affect the business architecture. Therefore, it explicitly needs to be specified how operational elements (i.e., Activities and Processes) support the value creation of the higher-level elements (i.e., Competence, Value Proposition, Financial Structure, and Goal). This is realized in the PGA modeling language by the identification of valueStream relations, which can be used to connect elements that are on different levels in the business architecture hierarchy.

2. Executing the operational performance measurement.

To execute the performance measurement for the operational business architecture elements (i.e., activities and processes), the following data need to be collected:

- *Measure type*: to account for positive (e.g., profit), negative (e.g., loss) or qualitative indicators (e.g., a satisfied criterion) [4]
- *Measure description*: the textual description of the performance indicator [4]
- *Performance goal*: the desired value that the company wants to achieve [4]
- *Allowed deviation percentage*: to be used in case of uncertainty about the desired value of a quantitative performance goal [4]
- *Stochastical distribution with according parameters*: extension that is needed to support the creation of simulated performance results. Parameters can be estimated based on historical data about the past performance inside or outside the organization.

3. Determine how performance indicators can be propagated throughout the business architecture hierarchy.

The purpose of this step is to determine how the operational performance can be further propagated to the higher-level business architecture elements. Based on the available information, either business formulae (with conversion factors) [1] or the AHP measurement with normalized values [1, 5] can be used.

Business formulae are relevant if there is a clear mathematical relation between the performance indicators of two elements that are directly connected by a valueStream relation in the business architecture hierarchy (see step 1). In some cases, conversion factors (e.g., in monetary terms) can be useful to enable the addition or subtraction of performance indicators that are measured in different units.

If it is impossible to identify a mathematical relation, performance indicators can be propagated by determining the weight of each valueStream relation using the AHP mechanism. In the original PGA technique, this mechanism was already employed for this purpose by executing pairwise comparisons of all elements that are connected to the same higher-level element in the business architecture hierarchy. This enables us to calculate the performance of a higher-level element as a weighted sum of the lower-level elements that support this element in the business architecture. In order to use this mechanism, the performance of a business architecture element first needs to be normalized with respect to their performance goal and allowed deviation percentage (see step 2).

4. Executing the simulation runs.

Once it is clear how the operational performance will affect the other business architecture elements, simulated data can be produced based on the stochastical distribution of these operational indicators (see step 2). Afterwards, these simulated data are propagated throughout the business architecture by using the relevant mechanism (see step 3).

5. Strategic fit improvement analysis

The strategic fit improvement analysis can be applied as originally proposed by the PGA technique. This step includes the identification of a critical path, which combines the weight of the valueStream relations in the business architecture hierarchy (see step 3) with the propagation of the simulated performance (see step 4). This allows the end-user to identify operational adaptations, of which the impact can be simulated by reapplying the different steps of the business architecture simulation model. As such, we explicitly acknowledge the impact of operational changes on the overall business performance during the redesign of business processes.

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