Business-IT Misalignment Symptom Detection based on Enterprise Architecture Analysis

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Abstract. While organisations address business-IT alignment achievement, they are continually suffering from misalignments. The paper deals with the concept of misalignment, with special attention to enterprise architecture (EA)-based analytical potential. In this study an analytical solution is built to approach the topic of strategic alignment from an EA-based perspective. The study aims to accomplish an EA-based, systematic analysis of mismatches between business and information systems. The operation, the correctness as well as the relevance of the framework is validated via a case study. The contribution of the proposed study lies in connecting typical misalignment symptoms to relevant EA analysis types along traditional alignment perspectives. The proposed framework has the potential to extend our understanding on assessing the state of misalignment in a complex EA model structure.

Keywords: Strategic Alignment Perspectives, Misalignment Symptoms, EA Artifacts, Enterprise Architecture Analysis.

1 Introduction

While organisations address alignment achievement, they are continually suffering from misalignments. These difficulties (the misalignments) encumber the achievement of alignment, and lead us to the phenomenon of misalignment. Misalignment analysis (detecting, correcting and preventing misalignment) is an important step in achieving alignment, since it helps to understand the nature and the barriers of alignment. In addition, it supports organisations in proposing certain steps to (re)achieve alignment by understanding the underlying causes of misalignment [3]. Most of traditional alignment studies deal with achieving alignment. On the contrary, misalignment issues are considerably underemphasized in the literature. To assess the presence of misalignment in an organisation, several approaches can be used (such as the approach of [3]). However, the innate ability of the enterprise architecture (EA) concept to support the detection of misalignment signs is scantily addressed in the literature (for exceptions see e.g. [4]). This study deals with the phenomenon of misalignment, with special attention to EA-based misalignment assessment. It

conducts misalignment analysis by proposing an EA-based framework to detect the typical symptoms of misalignment in an organisation.

The rest of the paper is organised as follows: The paper first establishes the theoretical foundation of EA-based misalignment symptom analysis and proposes related work (*Section 2*). After setting theoretical context, a research framework is given (*Section 3*). Empirical validation of the proposed framework is presented briefly by a compact case study description (*Section 4*). At the end of the paper conclusions are drawn and future research directions are determined.

2 Theoretical Background and Related Work

Many attempts have been made in order to classify and analyze alignment evaluation techniques (e.g. [6]). There are a few misalignment models in the literature (e.g. [3, 6]). [3] provides different classification schemes for the indicators of misalignment, e.g. the concept of misalignment symptoms. Misalignment symptom detection deals with the identification of such indicators. Several misalignment symptom collections have been proposed in recent literature on misalignment (e.g. [3]). EA is the construction of an enterprise, described by its entities and their relationships. EA analysis types are methods that are capable of assessing EA models, e.g. evaluating dependencies, isolated objects, complexity or heterogeneity. A number of research efforts have focused on proposing models for EA analysis. [9] proposed potential EA analysis categorizations, [2] and [9] proposed EA analysis collections. There have been many attempts to investigate reciprocal contributions between strategic (mis)alignment assessment and EA analysis. Recently, there has been an increased interest in EA-based alignment assessment, especially in matching EA domains to evaluate the state of alignment in an organisation. Many authors have linked EA to strategic alignment and alignment assessment (e.g. [1, 8]). The problem of EA alignment has also been extensively studied in the literature (e.g. [4, 7]).

3 A Framework for EA-based Misalignment Symptom Detection

This section proposes an overview on the research methodology used in the paper. The proposed research extensively utilises the technique of misalignment detection. It reflects the recent studies of misalignment models and processes and uses a symptom-based method. A misalignment symptom catalog will be generated from recent literature on misalignment symptoms. Based on literature review, existing approaches have slight explicit potential for misalignment symptom detection. Only a few of the proposed techniques can be directly applied to this problem. The contribution of this study extends results on approaching EA-based misalignment symptom detection. The research uses rule testing to reveal the symptoms of malfunctioning alignment areas. The framework has four main parts: *Alignment perspectives* (P.§§), a *misalignment symptom catalog* (S.§§), an *artifact catalog* (AF.§§) and an *EA analysis catalog* (A.§§). In the first step traditional alignment perspectives are provided with typical misalignment symptoms. In the second step relevant artifacts are connected to

the misalignment symptoms, which may contain the symptom in question. In the third step suitable EA analysis types are recommended to the misalignment symptoms. The proposed framework has two constituent parts for detecting misalignment symptoms: Part 1 identifies the applicability of the symptoms for EA-based analysis. Based on this assessment, Part 2 detects the symptoms in the XML exports of the EA models.

The operation of the framework is built on the above-introduced framework components. It first conducts an assessment for identifying symptoms for EA scope analysis. This step concludes with a distinct categorization of misalignment symptoms. Secondly, an analysis tool is proposed for detecting misalignment symptoms in EA scope. Implementation details of operating the proposed framework are summarized briefly in the following. Queries for misalignment symptom detection are written by using the XPath language and the Schematron language. Schematron language is used for making assertions about patterns (i.e. misalignment symptoms) found in the XML exports of the EA models. Queries will use the syntax of XPath for defining the corresponding parts of the XML exports. Schematron-based queries with embedded XPath expressions will be written and later validated in an XML validation tool, namely the Oxygen XML Editor v18.0. The XML editor includes an editor for writing Schematron queries as well as an inbuilt validator engine for validating XML documents against a Schematron rule. Assertions reported by the validation engine will also be displayed by the editor.

4 Case Study

To demonstrate the applicability of the proposed framework as well as to better understand how it works in practice, a case study has been conducted. The case study clarifies the operation of the framework by applying it in the context of a real EA model structure. The empirical investigation focuses on a Hungarian road management authority. The study was carried out in a fragment of the road management authority's EA model structure. It describes a road control initiative, showing the relevant EA models and artifacts to be modified during the progression of the project. Road control initiative is a pilot project for setting up the EA practice in the authority. The initiative is part of an integrated road network development project which aims to transform the internal operation as well as to optimize processes in order to increase operational efficiency and transparency within the road management authority. As part of the integrated road network development project, the road control project is concerned with the implementation of a traveling warrant system. The road control project was set off to outline the process of road control with EA methods over 2 set of changes. The as-is state presents the actual state of road control activities. To be No. 1 and To be No. 2 phases deal with the changes in process execution, supportive applications and underlying technological infrastructure. The case study was concerned with illustrating the applicability of the proposed research framework. To assess the state of misalignment at the road management authority, the proposed framework was used. The detection results confirmed the usefulness of the framework as a misalignment assessment framework.

5 Conclusion and Future Work

The paper dealt with the concept of EA-based misalignment analysis. It presented a research approach for EA-based misalignment assessment. The construction and operation of the framework have been discussed in the previous sections. To illustrate the feasibility of the proposed framework in practice, a case study was performed. Topics reserved for further examination include: framework automation, the dynamic analysis of EA model states and dissolving the tool lock-in by a transformation layer.

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