Current Tool Support for Metrics in Enterprise Architecture Management

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Abstract:

Today's organizations are challenged with constantly changing market requirements and technological innovations. To address these challenges, Enterprise Architecture Management (EAM) emerged as an instrument to increase flexibility and agility. Recently, metrics are gaining attention in practice to support the analysis of an Enterprise Architecture (EA) and their evolution. These metrics intent to measure organization-wide progress of transformations and facilitate the assessment thereof. Basis for these metrics are business processes, applications, infrastructure information, and their interrelations. The sheer amount of this information, the efficient computation of EA metrics, and the communication of respective results requires adequate tool support. In this paper we present findings from an empirical study on the current software for metrics in EAM. We describe prevailing solutions and give pointers to their future functionality spectrum.

Keywords

Enterprise Architecture Management, Tools, Metrics, Survey

1 Introduction

Enterprise Architecture Management (EAM) is a commonly accepted means to cope with the growing complexity of organizations. In line with the ISO Standard 42010 we define an Enterprise Architecture (EA) as the "*fundamental organization of a system [enterprise] embodied in its components, their relationships to each other, and to the environment, and the principles guiding its design and evolution"* [7]. EAM considers an organization from a holistic point of view [1] covering aspects like business capabilities, organization, applications, infrastructure, and data.

EAM shares organizational visions and derives goals that work toward the shared vision. Each individual EAM goal represents an objective contributing to at least one business goal. However, unless the degree of fulfillment of these goals is not made explicit providing hard evidence, proving the discipline's actual benefit and

contribution becomes hard. In consequence, concrete metrics as the calculation rule and Key Performance Indicators (KPIs) as "*an item of information collected at regular intervals to track the performance of a system [enterprise]*" [3] are used to quantify and measure the current/future state as well as the development of an EA [10].

In the past, the prevailing perception in EAM has been a lack of metrics and KPIs [5, 8]. However, increasingly researchers like Matthes et al. [11] turn their focus on this topic while more and more EAM tools offer proper software support [2]. In the light of this development, the support for metrics and KPIs by current EAM tools, i.e. their software-based definition, calculation, and display, is an interesting research area. Against this background, we conclude to the following research questions.

1. *Which EAM tools support the definition, calculation, and display of metrics and KPIs?*

2. *How is this support realized by these tools?*

This article is structured as follows: in the next section, we present the research methodology we applied for answering the research questions. Subsequently, we elicit the different dimensions for an analysis of EA tools focusing on the support of metrics. In Section 4 we present our dataset from a survey on EAM tools comprising 13 solutions in total. In this sense, we give an overview on EAM tools and their capabilities centering in particular on their metrics capabilities. The paper concludes with a brief outlook on further research topics.

2 Methodology

To capture the current state on metric support through current EAM tools we conducted an exploratory online survey across multiple countries and industries. The first aim was to obtain a clearer picture to which extent current EAM software solutions provide facilities to define, calculate, and present metrics. Additionally, the survey captured information about the respective tool vendor. Upon survey design, we performed a pre-test consisting of the completion of the contained questions through three independent and non-related researchers (cf. [4]). The questionnaire was afterwards optimized according to the colleagues' feedback and suggestions. The final version of the questionnaire was accessible to tool vendors for 21 days between July and August 2013.

In parallel to the survey design we identified 43 EAM tool candidates using common Internet search engines and publicly available tool survey material [2, 9, 15, 16]. In July 2013 we contacted the identified vendors by mail and phone inviting them to complete our questionnaire. In total, we sent over 1100 survey invitations via e-mail. The list of mail recipient experts has been compiled during

past EAM projects we performed with industry partners in the course of the last 8 years. One week prior to closing, we sent out an electronic reminder. At the time we closed the survey, 13 tool vendors had fully completed the questionnaire. Subsequent to an analysis of the resulting data, we documented the preliminary results.

3 Analysis dimensions

This section explains the different analysis dimensions we took a closer look on when examining EAM tools in the light of metrics and KPIs. To obtain information on the organization behind a certain EAM tool solution the survey started with several questions regarding the vendor's profile.

In case the tool provides metrics facilities, the vendor was asked to specify if the EAM tool comes with *predefined metrics*. That is, whether the tool offers a set of built-in metrics that a user can directly choose from [9]. Built-in metrics ease the barrier to use KPIs while relying on best-practice knowledge incorporated in the metrics' formula. This way, a variety of ad hoc analyses can be performed in an efficient manner utilizing KPIs that are well-known and frequently applied in industry. As an example, Figure 1 illustrates how the feature *predefined metrics* could look like in the EAM solution of Sparx Systems. As depicted, the metric Use Case Points (UCP) can be configured through the user who is allowed to adjust the predefined formula.

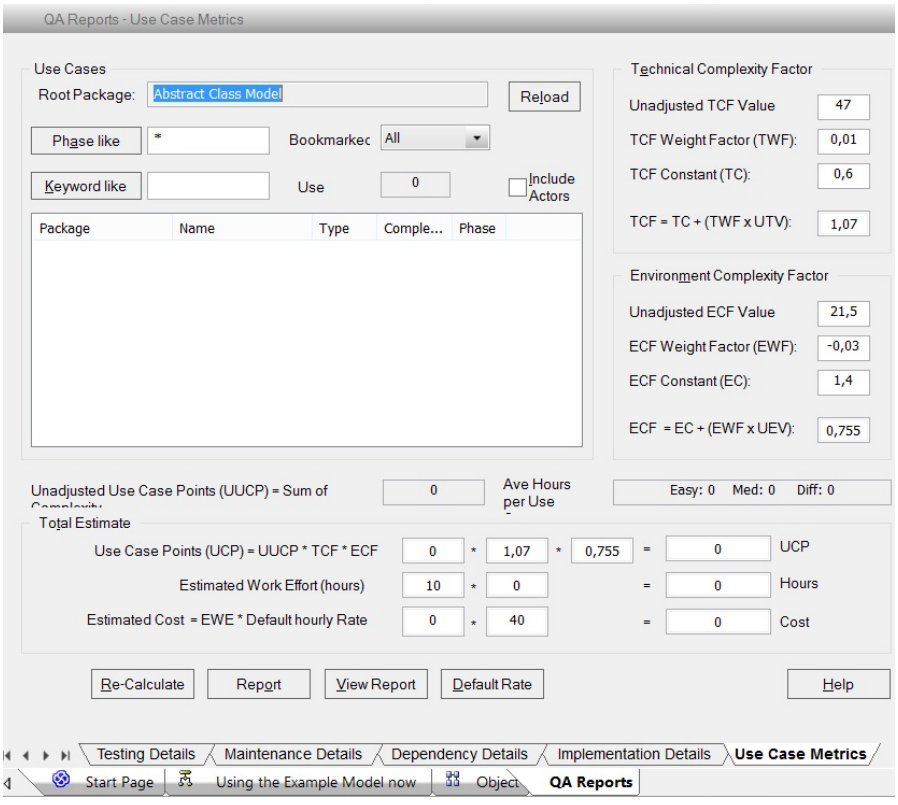

Figure 1: Predefined metric configuration in Sparx's Enterprise Architect

We further wanted to know if the EAM tool provides *user interface support* when it comes to the definition of new metrics. As for predefined metric selection (cf. Figure 1), this support could be realized by means of a wizard or an editor. Any guidance during the definition of metrics contributes to error-avoidance. Especially sophisticated heuristics can be employed to assist the user since a tool-based realization of EA KPIs commonly relies on model-based calculations. An example is shown in Figure 2. For the previously specified metrics "Contract Management Service Availability" a Layer8 user can, among others, define a target value as well as a KPI category.

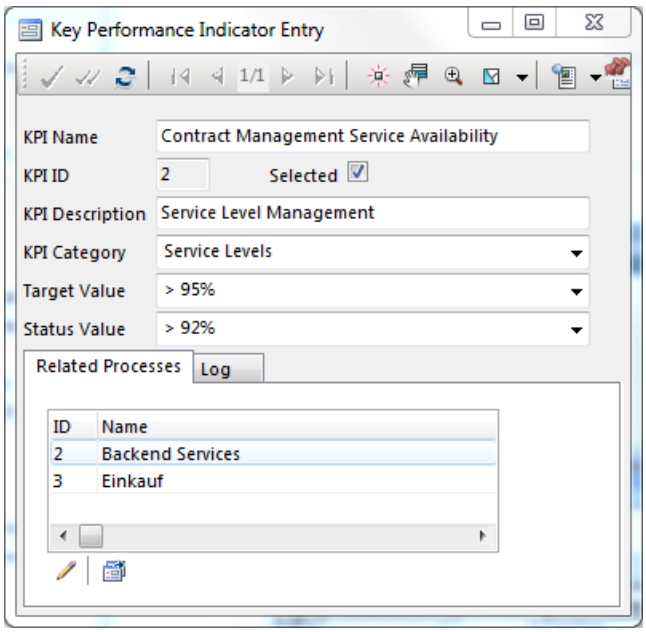

Figure 2: Graphical wizard for the definition of metrics as provided by Layer8-Solutions' Layer8

Targeting at a higher expressive power, the vendors were questioned if their tool features a *domain specific language* (DSL) for customized metrics definition [12]. While predefined metrics and wizards guide the user and help to avoid errors, these mechanisms most certainly limit the solution space. Employing a DSL, users have a much higher degree of freedom. In practice that means users can build complex functions that build on a set of primitive mathematical functions or invocations of other defined functions. For example, Figure 3 depicts a metric definition code snippet as realized in MEGA's tool EA Solutions Powered by HOPEX. Such a DSL editor can be facilitated by code completion, syntax highlighting, and type checking.

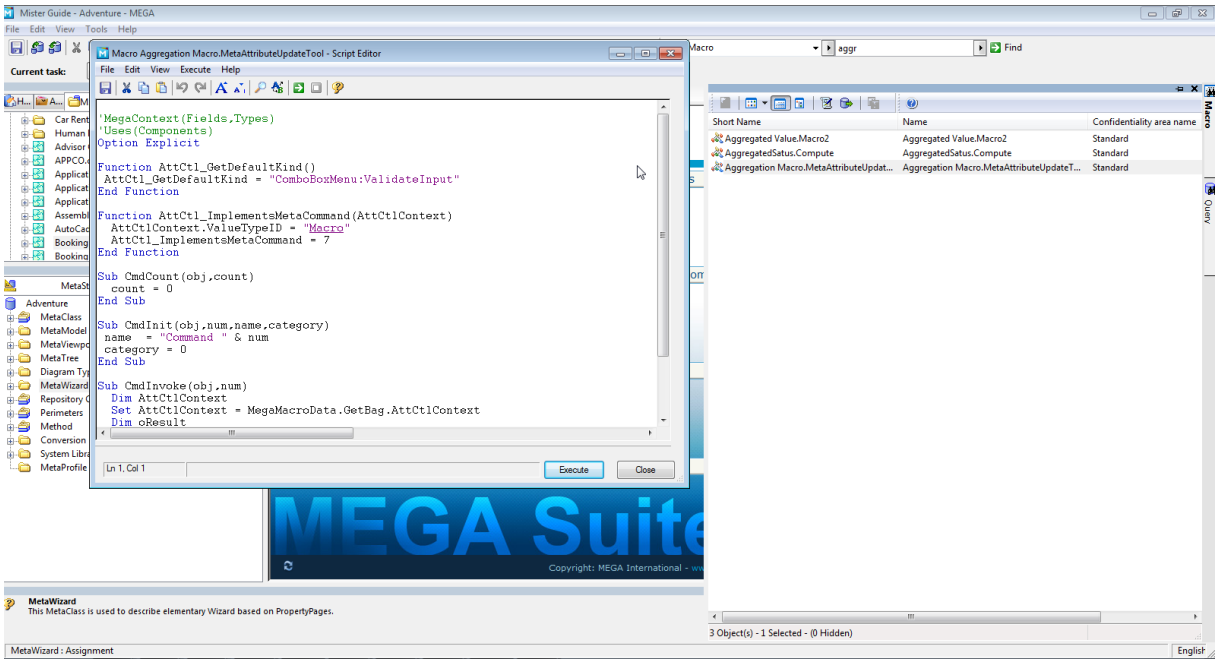

Figure 3: DSL of the MEGA's EA Solutions powered by HOPEX

Besides the definition, an appropriate visualization of quantitative information (cf. [17]) is crucial for an effective management of EAs [6, 10, 14]. Consequently, we posed the question if the EAM tool also offers an *integrated view* or *cockpit* that allows for a user-friendly presentation of (aggregated) KPIs. Figure 4 demonstrates how such a cockpit (including explanations) looks like within alfabet's (Software AG) solution planningIT.

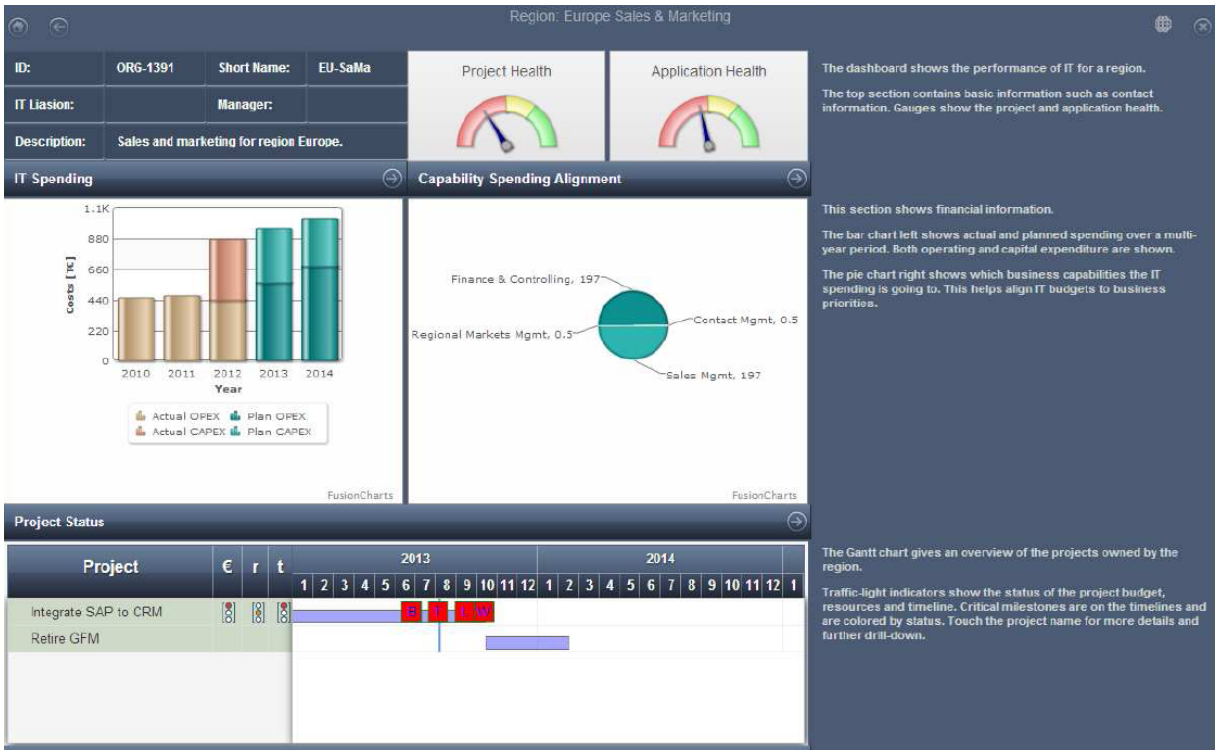

Figure 4: Web-based dashboard as offered through planningIT

4 Current tool support for EAM metrics

Table 1 summarizes the different profiles of the vendors who participated and completed the survey. While the companies' age ranges from 1 to 44 years, the company size varies between start-ups and major software industry player.

Tool name	Company	Founding year	Number of employees	Tool version
ABACUS	Avolution	2001	51-250	4.2
BiZZdesign	BiZZdesign	2000	51-250	4.2
Corporate Modeler Suite	Casewise	1989	51-250	2011.4
EA Solutions	MEGA International	1991	251-500	HOPEX V1R1
Enterprise Architect	Sparx Systems Software	1999	11-50	10
iteraplan	iteratec GmbH	1996	51-250	3.1
Layer8	Layer8-Solutions	2011	11-50	3
leanIX	LeanIX GmbH	2012	1-10	1.5.5
MappIT	Frankitecture	2012	1-10	2.5
planningIT	alfabet (Software AG)	1969	5001-10.000	8.1
process4.biz	process4.biz GmbH	2003	11-50	6.0.0
SAMU Repository	Atoll Technologies Ltd.	2001	11-50	5.42
Txture	QE-LaB Business Services	2011	1-10	1

Table 1: Vendor profile and tool offering

As our survey results in Table 2 reveal, 11 of 13 tools under examination offer a dedicated metrics support. Of this set, 8 even provide a user interface for a

user-friendly definition of metrics and associated KPIs. The same amount of vendors ships their tool with a set of predefined metrics. When it comes to DSLs, as a more sophisticated feature, the current tool support is scarce. Only three of the 13 questioned vendors confirmed the respective capability. Finally, seven tools feature an integrated view or cockpit to display several metrics simultaneously.

Tool	Metric support	User interface	Predefined metrics	Domain specific language	Integrated view or cockpit
ABACUS	✓	✓	✓	✓	✓
BiZZdesign	✓	✓	×	×	×
Corp. Modeler	✓	✓	✓	×	✓
EA Solutions	✓	✓	✓	✓	✓
Enterprise Arch.	✓	✓	✓	×	✓
Iteraplan	✓	✓	✓	✓	✓
Layer8	✓	✓	✓	×	✓
leanIX	✓	×	✓	×	×
MappIT	×	×	×	×	×
planningIT	✓	✓	✓	×	✓
Process4.biz	✓	×	×	×	×
SAMU Repos.	✓	×	×	×	×
Txture	×	×	×	×	×

Table 2: Metrics support of surveyed EA tools

When asked for any additional features their tool provides with regards to metrics and KPIs in EAM vendors stated:

- Simulations using Monte-Carlo, activity-based, discrete-event, equation-based, and structural techniques (e.g., business process simulation)
- Import of metrics from third-party systems (e.g., project management tools)
- Export KPIs to third-party systems (e.g., Microsoft SharePoint, Business Intelligence applications)
- Visualization type to display KPIs (e.g., bar charts, line charts, pie charts)
- Continuous KPI monitoring mechanisms (e.g., time interval, trend reporting)

5 Summary and conclusion

In this paper, we presented findings from an empirical study on the current tool support for metrics in EAM. The article provided an overview on present EAM tools that support the definition, calculation, and display of metrics and KPIs (Section 4). Based on a subset of examined tools, we revealed insights on how metric-related features are actually realized in today's EAM tools (Section 3).

Future work could examine the specific functionalities vendors indicated as additional metric and KPI features. Since the data relies on the information given by the vendor further validation is required. We seek to evaluate the statements during an extensive EAM tool survey we are going to tackle in Q4 of 2013 [13]. This includes software installation, testing using EA scenarios and sample data. Results will be published in a comprehensive study due in Q1 2014.

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