EXPLORING THE RELATIONSHIP BETWEEN BUSINESS AND IT ARCHITECTURE AND TO DEVELOP A MEASUREMENT MODEL FOR BUSINESS CRITICAL SERVICES

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Abstract: This research paper summarises the experiences of a research and development project that was aimed to explore the relationship between business and IT architecture and to develop a measurement model for Business Critical Services. The paper presents the main research milestones and results, while summarising the research experiences and challenges. The document includes not only the research results, but also the used methodology and approach. The research, utilising architecture modelling frameworks, elaborated an architecture based structure for services and measurement in a Hungarian Bank. By combining service, process and infrastructure models the KPIs of different architecture levels have been aligned and a systematic and integrated measurement concept was developed.

1 INTRODUCTION

Researching the relationship between business and IT architectures is a popular, although complex and challenging research area, in which researchers can analyse the relationship between different services, documentation of IT infrastructure or measuring and interpreting architecture elements.

In the complex environment of IT dependent organisations, such as telecom and financial institutions, raises the challenge of defining and controlling IT enabled business services. In these organisations business dependent services mainly rely on virtual internal IT environments that can be changed dynamically, based on the changing requirements. This environment – that can be labelled as *internal cloud* – has serious impact on business performance.

In our research, the practice of a Hungarian Bank was analysed. The research had to face the challenge, that both business and IT services are only weakly defined, and the link between the two areas in just hypothetical.

The research targeted to explore the following questions, based on specific organisational data:

1. How to model the relationship between business process, business operations and IT services (business and IT architecture alignment)
2. What is the required granularity of IT service definition, in order to effectively support business operations.
3. How to model the relationship between the required support of business operation and IT infrastructure items?
4. How to define and interpret business and IT service availability?
5. How to measure business and IT service availability?

In order to answer these questions, the research aims to explore the business and IT architecture of the organisation (business processes, business products and services, IT services), and to model the relationship between architecture items.

2 ARCHITECTURE MODELLING APPROACHES

An architecture is the fundamental organization of something, embodied in its components, their relationships to each other and the environment, and the principles governing its design and evolution.

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Enterprise Architecture is the organizing logic for business processes and IT infrastructure reflecting the integration and standardization requirements of the firm's operating model. EA is conceptual blueprint that defines the structure and operation of an organization. (Spewak, 1993)

An architecture framework is a toolkit which can be used for developing a broad range of different architectures.

Architectural domains are a structuring criterion for a collection of architecture products. Architecture frameworks defines usually 3-4 domains/ areas, that structures the outcomes of architecture planning. Typical results are: Business architecture, Information systems architecture, often subdivided into Data architecture, Application architecture, and Technical architecture.

During the research several architecture frameworks were analysed, in order to find which approach should be selected for service modelling.

The Enterprise Architecture Reference Traditional Model offers clear distinction between the architecture domains (Business, Information/ Data, Application/Integration and Technical/ Infrastructure).

The Zachman Framework is an Enterprise Architecture framework for enterprise architecture, which provides a formal and highly structured way of viewing and defining an enterprise.

Capgemini's Integrated Architecture Framework has evolved based on the real-world experience, and continues to provide strong focus on the need to understand the business needs and drivers, and for all aspects of the architecture and all architectural decisions to be traceable back to these business priorities (Mulholland and Macaulay, 2006).

The GAME architecture approach is strongly based on the general categories of business, application, data and infrastructure, but completes with security and governance architecture.

The Department of Defense Architecture Framework (DoDAF) provides a foundational framework for developing and representing architecture descriptions, it establishes data element definitions, rules, and relationships and a baseline set of products for consistent development of systems, integrated, or federated architectures.

TOGAF (2009) is a high level and holistic framework for assisting in the acceptance, production, use, and maintenance of enterprise information architectures. Practical and proven, it is based on an iterative process model supported by best practices and a re-usable set of existing architectural assets.

The approach of McKinsey for architecture structures (Buckow-Rey, 2010) tends to integrate the Business and IT views of an organisation. This approach focuses on the problem of architecture complexity that became common in big organisations with diversified activities.

Analysing the methodological part of the projects 8 architecture modelling approaches were analysed. The analysis focused on the following issues:

- Modelling structure, layers, categories and relationships
- Service definitions
- Measurement requirements

Based on these main aspects the TOGAF and DoDaF architectures were the most suitable for further investigation, although neither approaches can be used as they are.

During modelling, the project has strongly built on the previously presented architecture modelling approaches, and the project follows the generally accepted main architecture groups, as: business architecture, service architecture, IT architecture (including data, application and technology architecture). As the part of the business architecture the research emphasise the importance of processes, as part of the business architecture. *Services for customers* and even *internal services* are created through processes.

3 MEASUREMENT MODEL

Enterprise Architecture approaches covers both business and IT areas. These frameworks define building components, relationships, that often determined by a specific goal. In order the emphasize the importance of business and IT performance measurement, not only output indicators, but hidden factors should be also explored. Business indicators inherited in business performance (Kellen, 2003), but fails to incorporate IT performance.

The service can be seen as the aggregate of key business functions. In order to be able to manage and improve the value creation ability of the service we have to control the process which provides the service therefore measure the process.

The more sophisticated control we want over a process, the more depth we should measure.

What can we gain from the measurement:

- know the current state of the services, therefore know the service availability,

- notice trends (both in business and it processes) hence predict incidents before the occur, be prepared for changes,
- get better resolution times by finding the root causes earlier,
- know the utilisation of resources therefore optimise capacity.

Although every organisation uses the same or very similar technologies – the system architectures and business processes are different, there is no commonly agreed and fit for all set of measurement points.

The measurement possibilities are infinite – the used technologies and the available tools should define what an organisation should measure. Too many measurement points and too many events would result in dismissing important events. It is an optimisation effort. Monitoring or management tools can provide a pre-set of measurements but they differ from solution to solution.

The important factor is to know what we are currently measuring and to be able to manage the monitoring activities. To provide transparency and assist the management of monitoring it is advised to create measurement packages based on technology and the goal of measurement.

Reactive - health-check type of measurement: The general infrastructure measurement methods are measuring the basic functions and parameters of infrastructure elements e.g. fan speed, processor temperature. The measured values are not stored in any database, only the exceptions are logged in a file or forwarded as an event message therefore there is no way of analysing trends in a the series of data.

Proactive - trend analysis type of measurement: In case of business critical IT services shareholders do not want a single minute of disruption in the value creation because this would mean business losses. In order to foresee possible incidents IT has to analyse the critical IT components measure the operational parameters and analyse trends.

There are many levels of the architecture, where we can measure performance parameters. For example blade chassis and the management of the blade farm dynamically manages the physical blade configurations – there is no need to know the utilisation of each blade. *Performance parameters should be measured, aggregated and stored at the level of management.*

The key performance indicators of business services are the main factors of value creation. These KPIs should be especially important for the customer of the business process analyzed.

The defined KPIs of the business service are:

- Waiting time
- Process cycle times of services (e.g. Account identification time, Customer identification time, Customer data recording time, transaction recording time, etc.)

The above mentioned KPIs tend to measure the performance of business services, but lack the measure the patterns of the real business requirements. Patterns of Business Activities are measured to analyse the workload profile of business activities. These patterns present the changing demand for a specific customer business service, based on a special period of a day, week, month or a year (e.g. tax day, salary day, holiday season, etc.)

The analysis of direct IT services showed that the total business process can be broken down into components, with two distinctive time frame – the data input time and data processing time. Based on interviews with the business representatives the data processing time is low, related with the waiting time. The Direct IT Service KPIs are usually paired with the Support Business Service KPI-s because they are always an action-reaction type of activity. Application level performance indicators are rarely measured. The performance of an application is usually described as the performance of an application server.

Business processes provide Customer Business Services that require Direct IT Services. Direct IT services are functions of application frontends. The business activity defines the demand for Direct IT Services (e.g. the number of queries), which are provided by the applications with a specific performance (e.g. response time). Performance depends on the processing capacity provided for the application by the technology resources (e.g. application server).

Technology resources have utilisation and we assume that the performance of a Direct It Service correlates with it. Therefore application level performance is measured on both business level, and IT infrastructure level. Application levels indicators are the aggregation of health check measures.

The main performance indicators of the IT infrastructure are commonly known and accepted because they are strongly tied with physical hardware components. These five measures are important because they can describe the capacity and performance of the main infrastructure elements: servers, network components and storages. These measurements should be continuous; measurement data should be collected and analyzed. These standard measurements can contribute to all of the potential goals of measurement.

Figure 1 summarises the project results of the measurement structure:

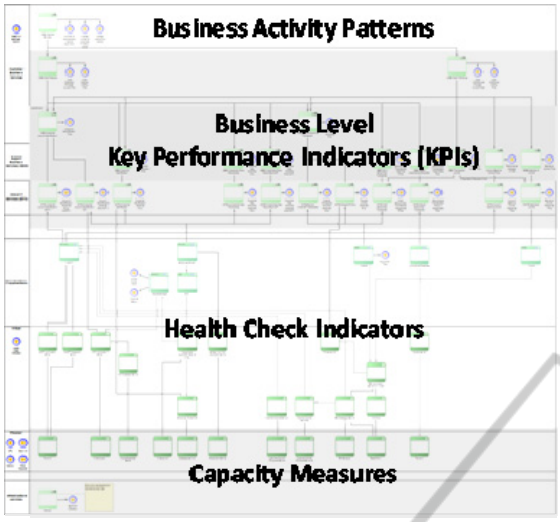

Figure 1: Top level overview of Business and IT architecture, and related measures.

- the top layer consists of the measurement of *business activity patterns* (e.g. no. of transactions, waiting customers, etc.), that represents the demand for IT services.
- The next layer covers customer business services and directly supporting IT services. These service levels can be easily measured with *performance indicators*, practically with response times.
- The next layer consists of the application and virtual technology architecture. In this layer performance indicators are hard to be defined, but *health-check indicators* (even in large number) can be easily measured and visualised.
- At the bottom layer covert the physical technology infrastructure, where *capacity* data can be measured.

4 CONCLUSIONS

In complex organisations, it is rare to see detailed models that describe business and it architectures, or the relationship between these two areas. The description certain architecture components are complex in itself, exploring and recording relationships and dependencies is more complex challenge.

Although business-IT alignment researches have decades long history, the theories are not adequately represented in practice, and only partial results and successful projects exist. Because IT services are the gates to business (and to IT), it is vital to explore adequate information on them. As a challenge, international best practices (ITIL, MOF, eSCM, eTOM, etc.) address these questions in a very high level, and IT services expectations and interpretation possibilities are defined very generally.

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