Model for Management of Business Informatics

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Abstract:

A number of methodologies (e.g. ITIL, COBIT, ISO 20000, etc.) have been developed over the last two decades but their use, in particular in small and medium sized enterprises is still very limited. In this paper we discuss existing IT management approaches and their limitations with a particular focus on Czech and Slovak organizations. We base our discussion on available literature, our surveys of Czech organizations and our experiences gained from practical assignments. The MBI (Management of Business Informatics) model attempts to overcome the limitations of the existing methodologies and models. It can assist IT executives with solving IT management problems. Customization of the model can take into account various factors that influence enterprise IT management in specific organizations. We describe the basic concepts and features of the MBI model and its future development.

Key words:

Management of business informatics, IT management, methodologies and frameworks, measurement of performance.

ACM Computing Classification System:

Management of computing and information systems

Introduction

This paper describes the characteristics and principles of the MBI (Model for Management of Business Informatics) model. The aim of the MBI model is to offer IT professionals who are responsible for the management of information technology in organizations a comprehensive methodological support based on industry best practices. Application of this model has the potential to increase overall IT effectiveness, improve IT governance and efficiency of IT services, and result in better business performance. MBI model considers important relationships and attributes that are relevant to information systems management and provides a suitable methodological basis for university courses on Business Informatics and IT management.

1 Current Issues in Business Informatics

Management of business informatics has been the subject of interest of researchers and IT practitioners for a number of decades. Recent increase in the complexity and heterogeneity of the technological infrastructure and enterprise applications, as well as increased number of informa-

tion services provider options makes the effective management of business informatics challenging. Today, the management of organizations expects improved effectiveness and reduced costs associated with the provision of IT services, forcing IT executives to seek improved methods for the management business informatics. The need to improve the quality of management of business informatics has resulted in numerous approaches; we discuss these approaches and the challenges organizations face in their implementation in the following section.

1.1 Approaches to Management of Business Informatics

Increasing demand on the extent and quality of management of business informatics led to the development of various methodologies, models, frameworks, standards and their application in practice. These methodologies include COBIT [8], CMMI [2], ISO/IEC 20000 [3], [4], ITIL [20] and TOGAF [13]. These mostly process-oriented approaches represent current best practice and include recommendations for addressing various IT management issues encountered in practice. Detail comparison of these approaches is available in the literature [6], [17], [21], [22]. However, application of these methodologies in practice is associated with numerous problems. A recent survey of Czech organizations [16] indicates that the level of adoption of methods for the management of business informatics is still relatively low. For example, ITIL (the most widely used methodology) is used by 53 % of Czech companies, but is fully implemented in only about 6 % of these organizations. In the case of COBIT, 53 % of respondents indicated that it is not used in their organizations at all, and 12 % indicated that this method is only used for strategic management of IT. According to survey respondents, the most important reasons for the low level of utilization of existing methodologies are the complexity of the methodologies, excessive costs associated with their implementation, and considerable demands on the expertize of IT practitioners even in the case of SMEs (Small and Medium-sized Enterprises).

Current trend in business informatics is to strengthen the use strategic applications, i.e., enterprise applications that have the potential to deliver competitive advantage. Such strategic applications include Business Intelligence (BI), Competitive Intelligence (CI), Customer Relationship Management (CRM) (in particular social CRM), and various forms of electronic and mobile business applications. The implementation of these strategic applications is common in multinational corporations, but SMEs face significant problems when attempting to implement such applications caused by limited financial and human resources. According to Molnár [13] "The use of methods and tools of Competitive Intelligence (CI) is still the domain of large multinational enterprises and small and medium-sized enterprises (SMEs) have little knowledge about what CI is, how to implement CI and what benefits can CI bring them. According to research, conducted in the Czech Republic, main problems of SMEs are lack of financial resources for buying sophisticated and expensive software and shortage of CI experts, due to relatively flat and simple organizational structure."

A very topical issue is the application of metrics in relation to the processes used for the management of business informatics and their integration with methods for IT performance management. According to [1], [10], [22], and [24] performance management of business informatics is one of the most important areas of application of the principles of business informatics and performance management. However, we must differentiate between performance management in organizations that provide IT services (i.e. IT service providers) and performance management in organizations that are not service providers (i.e. consumers of IT services) [21], [22]. IT providers tend to focus on effective delivery of a set of IT services that maximize their profit, while IT departments in IT service consumer organizations are focused on ensuring the availability of all IT services needed by the various business units.

Another important research topic concerns the study of the role of IT executives such as Chief Information Officers (CIOs) in ensuring the continuous development and innovation of both IT applications and IT infrastructure, and ensuring harmonization of technology innovations with the business needs of the organization. IT leadership issues, including suitable allocation of re-

sponsibility and authority in relation to IT, effective use of human resources, and monitoring and evaluating the effectiveness of IT is extensively covered in the literature [5], [14], [17], [18], [21].

A key question for the management of business informatics concerns the applicability of a single universal model across a range of different types of organization. Many researchers and practitioners argue that each organization needs to develop its own model for the management of business informatics that meets its specific conditions and requirements. Our surveys (see section 1.2) as well as international studies, e.g. Weill and Ross [23], indicate that IT executives tend to develop specific management models that are adapted to the environment that the organization operates in. The factors that influence this environment include industry sector, size of the organization, corporate culture, employees' skills and knowledge, legislative environment, and the availability of IT services from external providers.

The identification and analysis of the above problems and many other issues in the area of management of business informatics form the basis for the formulation of the objectives and principles of the Model of Business Informatics (MBI). An important source of information for the design of the MBI model was the analysis of the results of surveys of Czech organizations during the period of 2010 – 2012 discussed in the following section.

1.2 Results of survey of IT management in the Czech Republic

Business informatics in Czech enterprises and institutions of public administration has undergone a very dynamic development in recent years, in particular in terms of technological innovation. However, international comparisons show that the performance of business informatics in Czech Republic suffers from a number of unresolved problems and unexploited potential [12] or [21]. According to international statistics, the Czech Republic is still under the average of EU-27 in the application of e-business, e-government, and the use of electronic information resources [25]. While there are many factors influencing this situation the quality of management of information systems plays an important role. To substantiate this assertion we have conducted several major surveys involving 1,400 respondents from Czech commercial enterprises and institutions of public administration during the period of 2007 - 2012. Detailed analysis of the results of these surveys were published in [7], [12], [16], [21]. We summarize the most important conclusions that were used as inputs into the MBI model below:

- respondents confirmed that the main objective of business informatics and its management must be maximum support for business activities, achieving the highest level of alignment of business needs and functions of business informatics (Business/IT alignment)
- approach to management of business informatics must be adapted to all external and internal factors that affect the organization,
- management of business informatics should follow appropriate standards, methodologies and methods and use suitable metrics to determine the performance and quality of the management processes; necessary supporting documentation and expertise should be provided,
- information systems must be developed and operated at a reasonable cost that corresponds to the importance of IT for the enterprise; focusing on minimizing IT costs may not be the best long-term strategy,
- when evaluating existing applications, and planning new projects it is essential to monitor their potential and actual effects with a primary focus on strategic impact that can deliver competitive advantage for the organization,
- in relation to the previous point, it is useful to identify applications that have strategic importance for the company and are critical for improving competitiveness, and give these applications investment priority,
- innovation in business Informatics should follow developments of the IT market and the state of informatics in organizations of business partners and competitors,
- cooperation between user departments, IT departments and external providers should operate on the basis of service contracts and service level agreements (SLAs),

- from the perspective of ensuring necessary resources, it is essential to choose operational models (outsourcing, cloud computing, etc.) that can deliver cost savings at an acceptable level of risk,
- the required qualifications for users and IT practitioners should be systematicaly developed,
- organizations should take into account that there will be shortage of IT specialists over the next few years.

2 Content and principles of MBI model

Based on the findings of the various surveys we defined the objectives and principles of the MBI model.

2.1 Objectives and principles of MBI model

The primary objective of the MBI model is to provide IT executives in organizations where IT is not core business, a consistent and flexible methodological framework based on best practice for the management of business informatics. The model should assist IT practitioners to:

- document and analyze the existing system for the management of business informatics,
- design and implement a new (improved) management system,
- provide advice and best practice solutions for specific problems in IT management. Examples of problems that MBI provides solutions for include: How to develop information strategy? How to prepare IT budget? What is the structure and content of SLA for application services that are delivered in the form of Software as a Service.

The aim of the model is to enable organizations to improve the performance of their IT, in particular to improve the quality, accessibility, effectiveness and efficiency of IT services, and consequently to improve business performance of the entire organization. To address this requirement several *key principles* have been defined for the MBI model:

1. the model must be able to support business strategy of the organization, for example in the area of the definition of strategic applications of business informatics, and in the area of monitoring the success of IT investments [8], [21], [22];
2. the model must allow control of all key features of enterprise information system [17], [21]:
   - cover the required functionality,
   - availability, timeliness, accuracy and trustworthiness of required functions and information,
   - compliance with legislations,
   - reliability,
   - user-friendliness,
   - security,
   - flexibility,
   - openness,
   - integrity,
   - standardization,
   - performance,
   - effectiveness;
3. the model must be able to record the responsibilities and authorities of departments and employees in the context of enterprise informatics [23];
4. IT management must be based on a coherent system of metrics that evaluate all important IT services, IT processes and IT resources [14], [21];
5. the model should provide various levels of detail (granularity) for management tasks and monitored metrics that correspond to the requirements of different types of organizations;
6. the model must be able to rapidly respond to changing needs and conditions of business informatics. Its content and functionality should be easily extendable and upgradable;

7. application of the model in practical situations should offer high flexibility. The implementation of individual components (tasks) of the model should be supported without having to implement the entire model. Given the effort involved in the implementation of a comprehensive system for the management of business informatics it is often more effective to address only areas that have been identified as most problematic, or those areas that have the most significant impact on the performance and success of the enterprise;
8. related to the above principle is the ability to effectively deploy the model in organizations operating in different industry sectors and in organization of different size. Implementation of the model in a organization should respect the specific conditions under which the organization operates, including its financial and staff resources. This will allow the application of the model to SMEs that typically have limited financial and human resources;
9. integral part of the model should be recommendations that summarize important practical experiences.

2.2 Key concepts and content of the MBI model

Any model for management of business informatics must clearly define the types of objects and relationships that the model is based on. Figure 1 shows the metamodel that represents the MBI classes of objects and types of relationships between them. The MBI metamodel is drawn using UML class diagram notation 2.0.

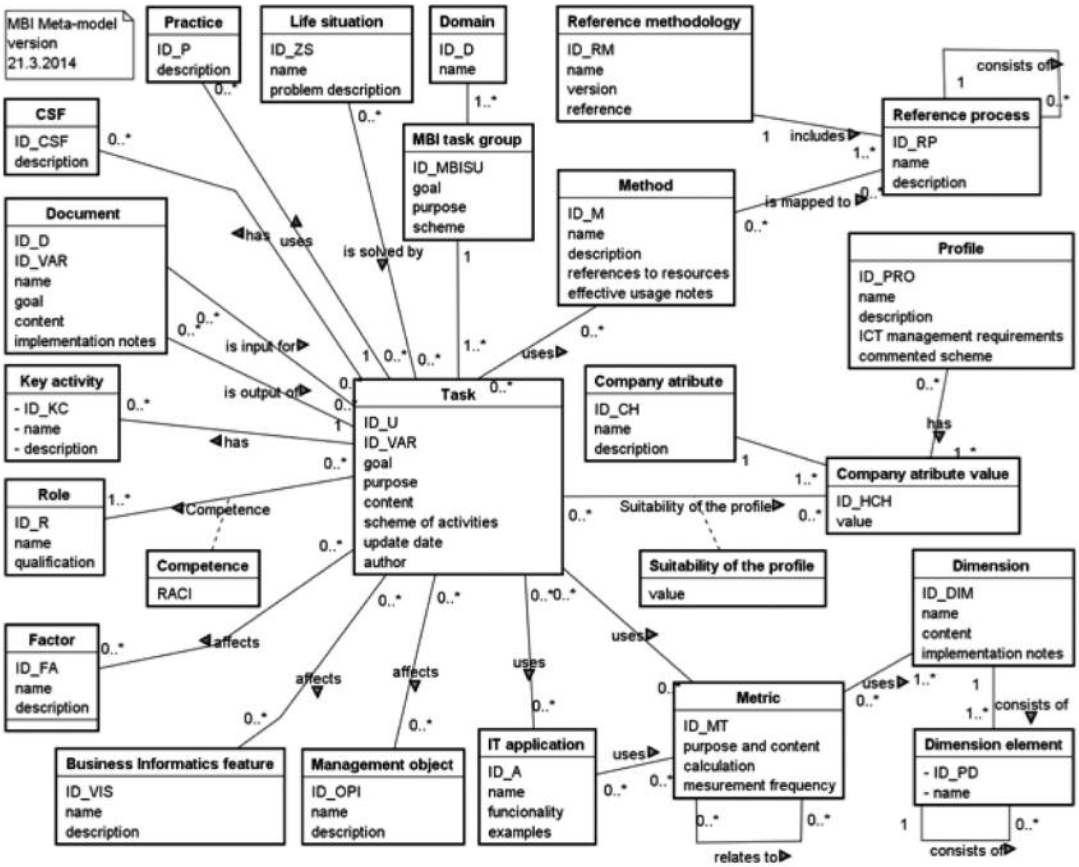


Fig. 1 *MBI object classes and relationships*

Task is a key MBI component that represents a basic enterprise IT management unit. Task describes how to proceed in solving a particular IT management problem, for example proposal for sourcing of enterprise IT system, implementation of an IT service, activation of a IT service, implementation of a security audit, etc. The MBI model defines a large number of tasks found in IT practice and in other IT management frameworks. MBI presents these tasks as a three-level hierarchy that corresponds to domains of IT management as illustrated (Fig. 2).

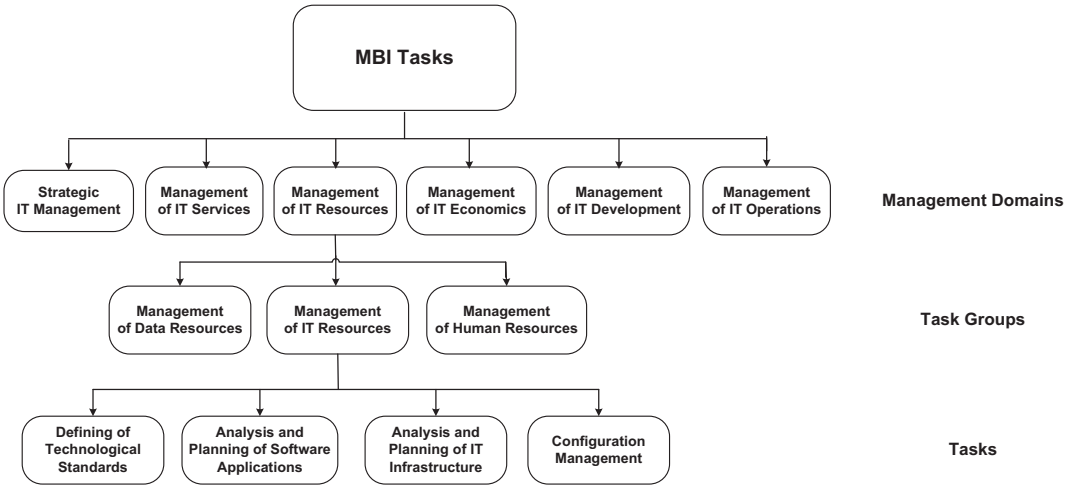


Fig. 2 *Hierarchical Structure of Tasks in the MBI Model*

Task groups are defined within each management domain, for example the domain of Management of IT Resources contains the following tasks: Defining of technological standards, Analysis and planning of software applications, Analysis and planning of IT infrastructure, Configuration management.

Each task is defined by a number of attributes, some of which are directly linked to business performance of the organization and its IT (Fig. 1). A key feature of the MBI model are IT processes - schematically expressed management procedures. Processes consist of activities and can be expressed at varying levels of granularity (i.e. only core activities, high-level process diagram, or detailed process diagram) as required for a particular problem under consideration. This enables precise description of the IT process, or on the other hand, can allow for initiative of IT staff as recommended by Method Knowledge Based Process Reengineering [22]. Process tasks are the basis for the specification of management metrics as described in [15].

Each task is related to many other MBI objects. The most important objects are:

- *Document/Data.* Documents include printed or electronic documents that are used as inputs or outputs of tasks. A document may be related to management of business informatics (e.g. a project plan, project objectives, SLA) or provide a solution to particular problem, (e.g. a test scenario, or a tender document used in the process of selecting of a provider of IT services). Data in the MBI model constitute a set of data records that describe some property of an object, for example a results of measurement of a parameter associated with an IT service, e.g. project status within the portfolio of projects, customer information stored in the CRM database, etc.
- *Role* expresses the responsibilities of an employee for the task and its outcomes. Examples of roles are: CIO, operations manager, project manager, IT architect. Roles are characterized by qualifica-

tion requirements that the employee occupying the role should posses. Linking roles to individual tasks includes the specification of competency requirements of a given role in relation to the task using the RACI matrix format.

- *Applications* – represent the functionality of application software that can be utilized for a given task.
- *Metrics* – are expressed on the basis of the principles of dimensional modeling, i.e. as indicators and their analytical dimensions. Metrics determine the key indicators of performance of tasks – KPI (Key Performance Indicator), or KGI (Key Goal Indicator). For example, "IT operating costs" have the dimension of IT services, IT applications, or individual business units. Metrics can provide information such as "What are the operating costs of the service for individual business units."
- Metrics can be regarded as an application of BI in the management of business informatics. The assignment of metrics to individual business processes in the context of tasks ensures that only metrics that are useful in practice are defined. Another essential requirement is that there are data sources that can be used for the measurement and that such data sources are accessible, so that the cost of obtaining data for the monitored metrics does not exceed the benefits obtained by their use.
- *Methods* – represent the recommended management practices for a particular task.

All defined objects in the MBI model represent "doors" to the model (Fig. 3). This allows the user to access information more directly without navigating the entire model, for example via roles, or some other path that is relevant to the current problem that the user is working on.

Other important components of the MBI model are management factors (Company attributes) that influence the method used to solve a particular task. Management factors include the Size of the organization, Industry sector in which the organization operates, the Type of organization

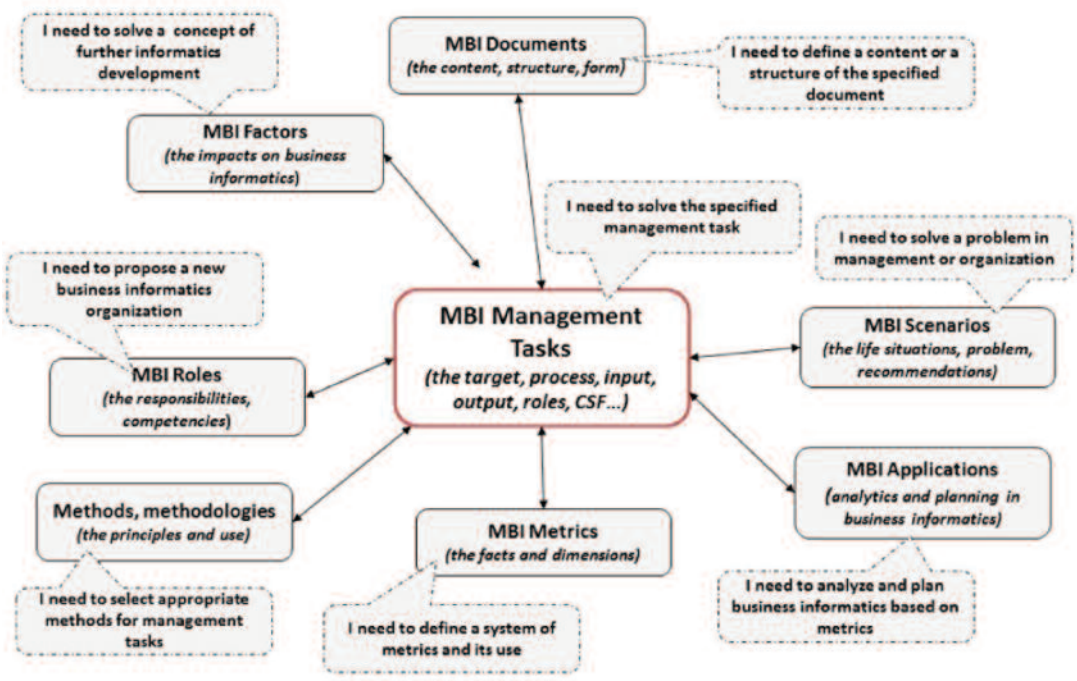


Fig. 3 *"Doors" into the MBI model for a specific problem*

(i.e. private company or public institution) etc. These factors have a significant impact on how a particular task is conducted. For example, consider the task of preparing a Tender for the Supply of IT Services. The approach for solving this task for a public institution has a completely different character than the approach used in the case of a private company, as a publicly funded entity has to follow specific legally mandated tender guidelines. It is therefore apparent that a person responsible for the completion of a given task must identify all the significant factors that impact on the completion of the task and understand how these factors influence the task. The MBI model helps IT managers to identify significant factors that impact on each task, and at the same time provides guidance on how to incorporate attributes into specific tasks.

The content of MBI model is available at the site *mbi.vse.cz* and currently contains data gained from various consulting assignments and derived from literature on this topic.

3 Types of MBI models

As noted in section 1, it is not possible to use a single *optimal* model of the management of business informatics across all organizations. MBI includes several types of models of business informatics that differ in the level adaptation to specific circumstances of a given organization type.

The most basic and most comprehensive model is the *generic reference model*. The generic reference model is intended for all organizations and includes generalized, best practice guidelines for the management of business informatics and their specific variants for different types of organizations and for different management factors. Best management practices and practical experiences are captured in the generic reference model in the form of tasks, documents, methods, metrics and other objects as described in section 2.2.

The second type of the MBI model is a *specific reference model* aimed at organizations that belong to a particular sector of the economy (automotive, banking, public administration, etc.). The content of the specific model is adapted to a particular industry, business, legislative and other conditions that apply to a given sector of the economy. Specific model is created by *profiling*, i.e. the selection of variants of object occurrences from the generic model that are relevant for a specific sector of the economy as shown in Figure 4.

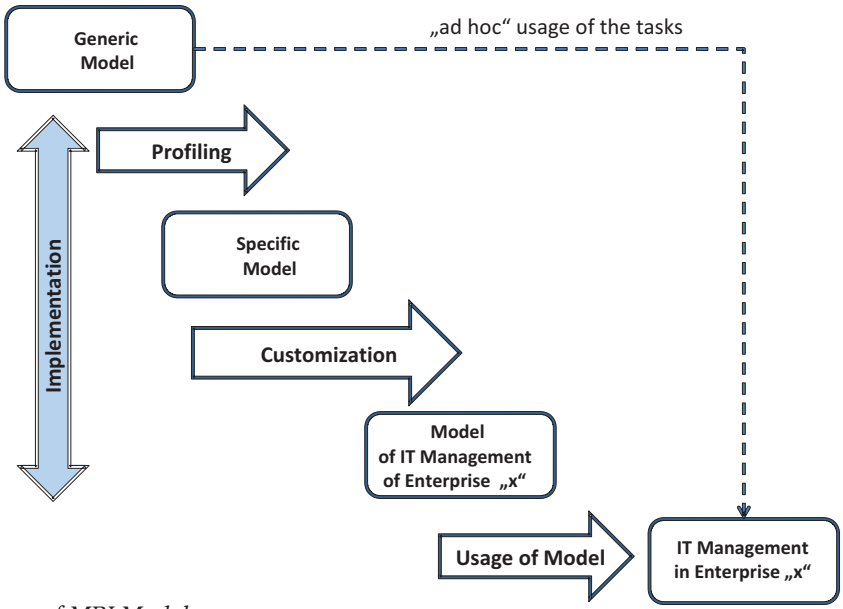


Fig. 4 *Types of MBI Models*

The third type of model is a *model of management of business informatics for a specific organization*. This model is created by customizing the specific reference model by taking into account the particular aspects of the organization. Customization includes:

- selection of object occurrences from the specific reference model (i.e. tasks, documents, metrics, etc.) that are relevant for a specific organization. This means that there is a further reduction in the number of occurrences of each object, eliminating the occurrences from the specific reference model that IT management does not regard as necessary for a particular organization and given situation, i.e. those that are not in line with the implementation goals of MBI;
- modification of objects whose contents does not fully meet the specific conditions of the organization. Specific conditions may arise as a result of various factors affecting the organization and its informatics (section 2.2), but also as a result of management efforts to set a different (to MBI model) level of standardization of business and IT processes and its enforcement;
- completion of additional tasks and related objects required by the company not contained in the specific reference model (i.e. capturing specific know-how of the organization);
- definition of the roles of the IT department. The generic reference model assumes a core set of roles for the organization and its IT department. These roles are then assigned responsibilities for individual MBI tasks using the RACI matrix. The roles can be defined differently in a specific organization;
- assigning roles to individual tasks by modifying the RACI matrix for these tasks (determined by the responsibilities and authorities of individual IT roles in the organization - employees with a given role are assigned tasks that they are fully responsible for, and tasks they cooperate on).

The application of the model in an organization involves the use of individual tasks and their implementation by individual actors. The outputs of tasks can be saved back into the model as templates (variants) of documents.

4 Application of MBI in practice and its future development

IT practitioners have two alternatives for the application of the MBI model. Firstly, IT executives can use the model to create a comprehensive system for the management of business informatics based on the best practices in this area (as illustrated in Figure 4). In this case, MBI is used to describe all tasks that requires business informatics in the organization, all roles and their responsibilities with respect to tasks, and all other objects that IT management decides to include. MBI then becomes a company *regulation* that determines who, when and how should solve various IT problems in the organization.

Alternatively, MBI offers IT executives solutions to problems that occur at the strategic, tactical and operational levels. IT executives can find template solutions to current problems using the MBI navigation mechanism based on “access doors”, or by searching for specific scenarios and use cases.

Example 1: A user needs to create information strategy for the organization. If the user is only interested in the structure of the information strategy document he can locate the relevant document in the MBI system and use it directly. If the user is interested in the entire process of strategic management he needs to use two tasks groups “Strategic Analysis of Business Informatics” and Strategic Proposal for Business Informatics”.

Example 2: The user needs to prepare SLA for newly introduced services. Using the MBI navigation mechanism the user locates the task “Preparation and Approving of SLAs”, follows the recommendations of the task and uses SLA templates stored in the MBI system for inspiration.

Example 3: A user identifies a problem with the performance of enterprise applications - applications have poor availability and slow response time. Using the navigation mechanism the user identifies tasks that impact on performance of enterprise applications, locating the task “Ensuring operational performance and scalability of services”.

The authors expect that the second alternative will be used primarily by IT practitioners in SMEs, and that in large enterprises the combination of both alternatives will be used most frequently.

4.1 Implementation of a comprehensive system for management of business informatics

To ensure that the creation of a comprehensive system for the management of informatics using the MBI model brings the desired effect (i.e. IT/business alignment and increase the competitiveness of the company), the MBI implementation must be well managed. MBI authors recommend the following implementation steps:

1. Senior management of the organization should define the objectives of MBI implementation and determine the metrics by which the objectives will be measured. Definition of the objectives will vary depending on the business situation and on the anticipated role of business informatics over the next two to three years.
2. Establish MBI implementation team. The team should have at least three members. The team leader must be the CIO or another IT executive whose responsibility includes the management of business informatics. This executive must posses the necessary competencies, but must also have a *natural* authority to ensure that the fundamental changes that the implementation of MBI produces can be enforced. The second member of the team should be a business representative that together with the CIO participates in defining IT governance rules and the rules that define the relationship between business and informatics. The third member of the team should be technology oriented, and is responsible for technological aspects of the business model and the definition of technology-oriented tasks. In the case of larger organizations it is appropriate to add a representative of the finance department that will address cost and revenue aspects of MBI implementation.
3. Identify areas (groups of tasks) that business informatics must address including their priorities. The input into this step are the objectives of MBI implementation defined in the first step and its output are the tasks that business informatics must implement including their priority. During this step the implementation team should use the catalog of MBI tasks.
4. MBI implementation plan (stage, schedule, budget).
5. Select MBI tasks and other objects MBI (documents, metrics, etc.) that suit the list of tasks defined in the previous step.
6. Complete or modify the tasks that the previous step did not successfully resolve. When modifying the tasks the practitioners should comply with the rules that are appropriate to the description of the process and process maturity. This creates a proposal for a new system of management of business informatics.
7. Top enterprise executives approve the new system of management of business informatics.
8. Provide training to all employees of the organization that have roles described in the MBI model. Every employee is trained in the tasks that relate his role(s).
9. Start using the new system of management of business informatics.

4.2 Further development of the MBI model

Given that the lack of proven content of the model could lead to erroneous practices and poor decisions by MBI users it is essential for the development of MBI to be conducted according to rules which ensure its high quality. The MBI Steering Committee ensures the quality of the model. The MBI Steering Committee makes decisions about:

- inclusion of new occurrences of individual objects (tasks, documents, etc.) into MBI. To ensure the quality of MBI content the Steering Committee reviews each new object occurrence by two

reviewers. If the reviewers disagree the decisions about acceptance or rejection is made by the steering committee;
- content of the various versions of MBI,
- date of release of a new version of MBI.

The rules governing the creation and modification of a specific model are defined by the CIO and his team and should be part of corporate IT Governance. In general, all tasks and other objects of the generic reference model should be regarded as recommendations that can be modified by the user organization to suit its needs. The authors of the MBI model recommend that when modifying the model, factors affecting the management of business informatics in the organization are taken into account, and that the detail description of the role and maturity of various components and processes are chosen according to the KBPR (Knowledge Based Process Reengineering) method [22].

Conclusions

The development of the MBI model aims to provide a method for the management of business informatics incorporating all relevant international experiences and at the same time respecting the conditions and customs in individual organizations. MBI model is intended primarily for SMEs, as research indicates that in these organizations the application of available large-scale methodologies (e.g. ITIL, COBIT, etc.) is too expensive and time consuming. An indirect benefit of MBI is that it assists in the clarification of concepts, principles and methods used for the management of business informatics. In its present form MBI is an ongoing project and represents a starting point for further development, aiming to provide a comprehensive platform for the management of business informatics based on precise metrics. This trend towards more effective IT management based on measurable outcomes is evident in recent surveys we have conducted in hundreds of Czech organizations. These studies identify the need for effective methods and tools that enable IT executives to make informed decision based on reliable information.

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