MANAGEMENT OF ICT-BASED ENTERPRISES – APPROACH THROUGH FRAMEWORKS FOR BUSINESS ARCHITECTURE, IT GOVERNANCE AND IT MANAGEMENT

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Abstract

Many organisational systems today rely heavily on well-developed information and communication technology featured in more or less complex information systems and their related systems with other specific purposes. Managing those systems requires well-defined methodological frameworks in order to ensure the realisation of strategic goals, planning and organization, delivery and support of their services as well as monitoring and evaluation of their processes.

Frameworks, which are now widely accepted, began as a collection of best practices and "methodological frameworks" and sometimes as ontologies in specific areas of enterprise, to become frameworks which profoundly decompose the dynamics of an enterprise by enabling effective implementation and exploitation of the IT.

This paper presents some of the current (meta)models and methodology frameworks and their suitability for governance and managing business strategy, process and operations, change, IT strategy, information and technology balance sheet, risk conformance and compliance. Frameworks and their models,

methods and tools that are compared include CoBIT, ITIL, TOGAF, ISO 27002 and Deloitte framework.

Keywords: *frameworks, model, ICT governance, ICT management*

JEL Classification: D8, D83, G13

INTRODUCTION

Managers of all kinds of organizational systems are faced with different challenges arising from current issues of functioning and tracing a future of the systems in a way that they ensure survival, by alternating their opportunities for growth, efficiency and flexibility

The functioning and development of any organizational system largely is determined by the strategic objectives, clarity of vision - a purpose and strength of ideas it contains and the mission that determines the key achievements and distinctiveness in relation to other organizational systems. At different levels of governance, they (vision, mission and strategy) will determine the frameworks for providing the answers to the questions:

- Why, When, Who, What, How, Where.

Realization of organizational business processes will be supported by various enablers such as:

- well-defined processes and flows,
- ICT,
- human resources and their competencies,
- motivation and measurement,
- business policies and
- physical infrastructure.

Their combination will determine different organizational (business) architecture, dynamics, processes and project life cycles and other aspects of the functioning and development of the system, in order to achieve outcomes that will meet internal and external demands of their stakeholders.

Many organisational systems today rely heavily on well-developed information and communication technology featured in more or less complex information systems and their related systems of other specific purposes. Therefore,

the development, implementation, operation, maintenance and organization of ICT and is carried out on the ideas of managing complex business architectures.

The emergence of the first methodologies for the implementation of individual stages of development and implementation of information systems dates back to the late sixties. During the following decades, a series of individual concepts and (meta) methodologies were developed. Their main disadvantage was partial approach and view of development of information systems and ICT outside of the context of strategic and often tactical system's goals. Top-level managers, business functions managers and IT managers also contributed to this. Top-level managers did not recognized the importance of ICT for business, middle management concentrating on business functions while IT managers did not understand business, management and control processes and dynamics of enterprise systems (especially not in large business systems). Lack of communication and inability of certain groups to understand all aspects of the complexity of enterprise systems, often resulted in only partial solutions to the identified problems or solutions which were not much better than the existing, nor in terms of productivity and efficiency, nor in terms of the quality of existing processes and services. A large number of poorly utilized solutions, incomplete solutions as well as complete failures pointed to the necessity of co-operative and co-facilitating relationships between top management, middle management and IT management. That was the reason for emergence of numerous integrative frames based on best practices in ICT and enterprise alignment, implementation, governance and management.

A particular problem was the number of public services in which the development happened (not by plan) but as result of the constant demands of the public. No wonder then that the initiative for the development of methodological framework for ICT governance and management often comes with a level of state administration. Globally many positive results were achieved in information services of public and state institutions, whose development was based on conceptual fundamentals underlying the frames which are the subject of these investigations. In Croatia, some solutions introduced so far are beginning to show effects, but a large number is still unsettled. What is typical in such systems is their hierarchical and horizontal structure which is basically repeated and well-placed for the system, can be applied, with minor modifications, to all subsystems.

This paper will present some of the current (meta)models and methodology frameworks and their suitability for the development of business and, specifically, ICT architecture and processes.

The purpose of this paper is to determine how the model and methodological frameworks can help the overall quality of IT solutions in support and execution of complex business processes at different stages, including an analysis of the current situation and readiness (maturity) of the enterprise system for the introduction and implementation of ICT, to the development of system's capacity to govern and manage the implemented solutions in an optimal way.

BRIEF HISTORY AND CONTENT OF (META) MODELS AND FRAMEWORKS FOR GOVERNANCE AND MANAGEMENT OF INFORMATION TECHNOLOGY

Requirements for computer processing on the one hand and the capabilities of computers for more complex processing on the other hand, led to the penetration of IT in all business processes. The problems, which began to emerge in connection with the implementation of IT, in the beginning of mass exploitation, related to setting-up of good sequence of procedures that enabled the enterprise to achieve, in shortest time possible, the desired optimal performance in terms of achieving acceleration of the execution of processes.

These requirements, especially in large enterprises, have caused or discovered, other business issues pertaining to the functional and procedural organization of an enterprise, the organization and manipulation of data, data security, architectural solutions of IT and organization, an embodiment of IT projects, management of technological development due to incredibly rapid development of information and communication technologies, methods and models of management and decision-making and more.

In the context of these changes, requirements began to emerge for clearer methodological frameworks that would enable enterprises to avoid failures and problems of autarchic development, which is why the IT companies began at first to collect cases and categorize them by certain types of problems where the solutions reached to be acceptable and successful.

Conceptual bases, which sometimes cannot be strictly considered as methodologies, began to be built in the conceptual frameworks of governance and management of information technology in the context of management (planning, organization, coordination, controls, supervision, instructing and forecasting) of an enterprise and its development as a whole.

Frameworks, which are now widely accepted, began as a collection of best practices and "methodological frameworks" and sometimes as ontologies in specific areas of enterprise, to become frameworks which profoundly decompose the dynamics of an enterprise by enabling effective implementation and exploitation of the IT. A number of analysis of frameworks considering their mutual resemblance and differences are investigated. To mention a few (Sante, 2013), (ITG, 2008), (Spremić, 207)

Through historical development, a multitude of such frameworks emerged, evolved and disappeared and some of them have become de facto standards. A brief historical overview and basic concepts of some of the currently well accepted framework follows.

COBIT

CoBIT is an acronym of "Control objectives for information and related technology". The first version emerged in 1996. It was published by ISACA (Information Systems Audit and Control Association). ISACA was founded in 1967 as an initiative of enterprise audit and control professionals. They observed deficiencies and shortcomings in ICT solutions for business operations and processes and consequently misinformation in reporting and data analytics. In 1996 a numerous guides and models were proposed which were intended to control, manage and governance of IT in enterprise. Few versions have been developed and the last published in 2012 is referenced as CoBIT5. According to ISACA, "COBIT 5 brings together the five principles that allow the enterprise to build an effective governance and management framework based on a holistic set of seven enablers that optimises information and technology investment and use for the benefit of stakeholders." (ISACA, 2014)

The five COBIT 5 principles:

1. Meeting Stakeholder Needs
2. Covering the Enterprise End-to-end

3. Applying a Single Integrated Framework
4. Enabling a Holistic Approach
5. Separating Governance From Management

COBIT 5 Enablers

1. Processes
2. Organisational structure
3. Culture, Ethic and Behaviour
4. Principles, Policies and Frameworks
5. Information
6. Infrastructure and Application
7. People, Skills and Competencies

Working frame is represented by three dimensions summarising every aspect of each dimension. It is integral space, which connects goals (defined through business requirements) information resources and processes are specified by domains and for each process is defined:

- general description of process in cascades,
- detailed verifications,
- recommendations and guides for measuring,
- maturity model .

ITIL

ITIL (Information Technology Infrastructure Library) was developed in eighties last century, based on set of recommendations of CCTA (Central Computer and Telecommunications Agency) of British government. Its occurrence corresponds with intensive ICT implementation in government institutions and main goal of ITIL was to establish standards and recommendations for ICT implementation, governance and management of ICT in government institutions.

"ITIL v3 presents a lifecycle approach to managing IT services designed to provide the most value possible to the business." (Array, 2013).

"The five stages of the lifecycle can be represented as follows

- Service Strategy. How to transform IT service management into a strategic business asset
- Service Design. How to design IT services, processes and functions to realize the strategy
- Service Transition. How to move new and changed IT services and components into a production environment safely and effectively
- Service Operations. How to efficiently and effectively deliver and support IT services
- Continual Service Improvement. How to monitor and measure IT service management and make adjustments to remain aligned with business and strategy"

TOGAF

TOGAF is acronym of The Open Group Architecture Framework. It started as a framework for technical architecture of enterprise at the beginning of nineteen's. Last version TOGAF 9.1 comes into use in 2011. It is process oriented meta model which describe steps in enterprise architecture development. The architecture represents 'formal description of system and detailed plan on component level for system's implementation. Architecture is also a structure of components, their relationship, principles and guide for governance, design and evolution'. (TOGAF as Enterprise Architecture, 2015). Four types of architecture are recognized in TOGAF: Business architecture, Data architecture, Application architecture and Technological architecture. Key model of TOGAF is Architecture Development Method (ADM). For Each phase the goals, principles, frames, input, steps and output are described.(TOGAF, Components, 2014)

DELOITTE MODEL FRAME

Deloitte model is comprised of four types of services:

- IT strategy and alignment with business strategy
- Assessment of IT state

- Building business architecture
- IT governance.

Models, methods, techniques and tools used in service delivery are (Deloite, 2008, 2014):

- CIO Management Framework Enterprise Value Map
- Value Analytics
- IT Strategy and Assessment Toolkit
- Programme Leadership Diagnostic
- Business Model Innovation.

ISO/IEC 27002 STANDARDS

ISO/IEC 27002 STANDARDS are derived from ISO/IEC 17799:2005 Information Technology—Code of Practice for Information Security Management British Standards Institution (BSI) The ISO IEC 27002 standard consists of recommended information **security** practices. It comprises measures based on legal requirements for security, best practices in standards for information security as well as critical success factors of IT management (The ISO IEC 27002 standard, 2014).

TO WHOM AND WHAT FOR ARE NEEDED FRAMES FOR ICT DEVELOPMENT, GOVERNANCE AND MANAGEMENT

Frames, models and methods described in previous chapter deal with different aspect of enterprise and IT. That is why interest for its use comes from all managerial levels. Frames could be use in:

- Planning and organization
- Acceptance and implementation
- Delivery and support
- Monitoring and evaluation

According to ITGI and OGC (ITGI and OGC, 2008) usage of frames is stimulated by different kinds of factors like:

- claims of managers and boards for better ROI of IT
- regulation issues in data privacy and financial reporting
- selection of service providers
- increasing risks in IT usage
- necessity for IT governance in order to achieve business values and risk reduction
- necessity for costs optimization
- resource management , knowledge and IT optimization
- accelerated maturity of IT and need for better prediction
- performance measurement and IT control.

All framework analysed in previous sections have much in common and all are based on best practices. All strive to be integrative in IT implementing procedures, IT management and IT governance. Managers are faced with dilemma which one to use to achieve best values of IT and its implementation in enterprise. Suitability of particular frame or their combination should be viewed through a number of criteria: (ITGI, 20080)

- Tailoring (in sense of IT governance, request for services, project definition, continual improvement and audit and control)
- Prioritising (effective planning for requirements meeting where and how to use standards)
- Planning (frame setting for goals and responsibilities, aligning of IT and enterprise goals and objectives, risk understanding and definition, setting the priorities, results measurement and control and improvement definition)
- Pitfalls avoidance (poor project definition, neglecting business culture, imprecise goals, unrealistic expectations, top management indifferences for IT projects)
- Best practices adjustment (use those best practices that are best suited to internal procedures and business requirements)

According to our analysis and previous research made about frames usage, appropriateness of models for business area and field of management is presented in Figure 1.

Figure 1. Appropriateness of models for business area and field of management

Area	Business strategy	Processes and operations	Change	IT strategy	Information and Technology Balance Sheet	Risk, Conformance and Compliance
Field of management	Business Model Business Environment Opt. Business Strategies	Business Processes and operations IT Operations IT Asset Mnmt. Security	Readiness, Projects Programmes Methods, Alignments, Benefits	Information Strategy, Business/IT Architecture, IT Principles	Human, Structural and Market Capital, Organizational Data, Applications, Business and IT Processes, Technologies	Governance, Conformance Compliance Enterpr. Risk Mgmnt., Contol Audit
Framas /(Meta)Models	Strategis Plans, Business Plans, Balanced Scorecards	CoBIT ITIL IGOE ISO 27002 PCI DSS TCO/ROI BCM 6Sigma	PMBOK OPM3 PRINCE2 MSP CAPM CMM CoBIT	TOGAF Zachman Framework, Balanced Scorecard, Delloite CIO Framwork	Zachman Framework, ISO38500, Balanced Scorecard, Delloite CIO Framwork	CoBIT, COSO, SOX, UCF, ISO27001, PCI DSS Balanced Scorecards

CONCLUDING REMARKS

Frames and their operating units can be useful meta-models and models that will assist the development and implementation of enterprise information systems. In all the frames, which have a longer or a shorter history, it is pointed out that they are based on the collections of best practices.

In one way or another, they stress the fact that in modern (especially large) business, in which the system can deliver values through information technology, it is important to manage this technology for a variety of IT related risks, to avoid repetition of procedures already learned , to avoid mistakes in IT implementation projects, excessive investment, security problems, frequent system breakdowns or errors that might occur in delivery of IT services from third parties that do not meet the requirements of the users.

As the analysis shows, in terms of process activities some models have advantages and/or disadvantages compared to other frameworks. Thus it can be concluded that CoBIT has a well developed process and control objectives system that can be used effectively especially in the acceptance and implementa-

tion and monitoring of IT related activities. ITIL has proven to be superior in audit of information systems that precede new investment decisions. ISO 27002 is a standard and a framework of best practices suitable for the research and analysis of all security aspects of IT. TOGAF framework seeks to round up key architectural issues of development of the enterprise and a harmonized IT system. Deloitte methodology has a well-defined map through which business system value are generated and together with the CIO framework provides an opportunity for good preliminary analysis of the existing system and analysis of strategic commitments of the enterprise in terms of information and communication technologies. In this context, very often one selected frame is mapped to the other with the intention that all relevant aspects are run through analyses. These analyses, despite their relatively high cost, enable the new system to be planned, implemented, delivered and monitored with lower overall costs than those that could be generated without these analyses.

As can be concluded from their content and processes, frames are complex meta-models and are applicable primarily to large enterprise and government institution. For small business systems and their IT management, simplified versions of presented models are used.

Of what significance are the frames for top management? Analysis showed that well-defined strategic objectives and commitment, clear vision and awareness of the importance of ICT for their realization are the basis for implementation business and IT architecture. In this context, benefits for top management come from gaining insight into the hierarchical architecture of the business system, it's processes, resources and performances.

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