Approaches to the Management of Economics Efficiency in Business Informatics

Milos Maryska

Abstract: **This paper is devoted to issues connected with processes that can be used for management of economic efficiency of business informatics with the support of Business Intelligence. We analyze processes and create Reference management model for management of business informatics for management of business informatics and management of the business informatics economics. This reference model takes into account requirements on management of economic efficiency necessitated by accounting, requirements from consultancy with managers of companies, differences in the method of account of business informatics cost and profits. The model also takes into account requirement imposed by methodologies for management business informatics and methods and processes for evaluating and measuring business informatics. In the paper are described three processes from the reference model - Main process for management of business informatics economics, Analysis of IS/ICT costs and IS/ICT costs planning. The paper provides answers to questions like "What processes can be used for efficient identification of costs and profits?", "Is there main process for management business informatics economics? If this process exists, is it possible to formalize it?", "In which way can be interconnected processes in business informatics economics management with processes in the company?". Finally is answered a questions "Is there any relationship between processes in management business informatics economics and processes in management economics within the company?".**

Index Terms: **Business Informatics, Business Intelligence, Economics, Investment Plan, Process.**

I. INTRODUCTION

In the present economic area and progressing economic crisis management requires exact formulation of company's economic situation. Management requires information not only about the company as a whole, but also details information about each of company's parts. These necessities are closely connected with company's owners' requirements on providing information about company's economic situation.

Significance of processes, measuring and management of business informatics economic is emphasized by the fact that companies don't ask questions, what profits offer and cause the investments into/upgrades of information systems and communication technologies (IS/ICT), but the companies ask, what money they lose when the investments/upgrades aren't implemented.

In the majority of firms is invested considerable sum of money into business informatics. This is just one of many reasons why for company's management is crucial a periodical checking of effects provided by business

Milos Maryska, milos.maryska@vse.cz, 80340119, IACSIT

informatics. With previous facts is connected effort to exactly formulate firm's economic situation. This effort is also connected with determination, description and benchmarking business informatics economic. [7], [26], [27]

An analysis the company's economics situation and the company's management (not only in the business informatics) is current really important trend. This trend is based on application principles of Business Intelligence (BI) and Corporate Performance Management (CPM).[19] BI and CPM principles encourage processing of comprehensive capacity data sources. The aim of this is support the management of business informatics economic, performance and efficiency and processes.

There is lot of information data sources in the area of the economic management that are more or less concentrated on problems connected with the management of business informatics economic. None of this information sources cover this area so complex to be possible to consistently use it. This information data sources are for example: [5], [7], [10], [13]-[15], [20], [21], [25] and others.

In the informatics area is also a lot of information data sources focused only to special point of view measuring in business informatics [2], [10], [12]-[15], [17], [26], [27].

The problems of the processes – their setting and point for management business informatics is solved in higher detail for example in [5], [20].

Another really important information data source for the management of business informatics economic are trends connected with evolution of accounting and accounting standards. We can mention for example: [1], [3], [4], [6].

At premises of a university are this problems solved for example at the Carnegie Mellon Software Engineering Institute [25], at the University of California, Berkeley and at the Cambridge University [15] and also at the Faculty of Informatics and Statistics, University of Economics, Prague [7], [11], [12], [16] and other.

This paper is connected with parts of some above mentioned works.

This problem area is also solved by private companies. These companies are solving especially measuring and management of the business informatics economic and partly also processes. We can mention following companies: Ernst and Young [EY, 1], Gartner [22], IDC [23]. Processes are also solved in [28].

II. PROBLEM FORMULATION

Cost plays in the business economic main role because almost all management decision is based on comparison costs (how much money cost it) with profits (how much money company receive from it). [1] This thesis is valid also in measuring, process optimization and in the

management of business informatics economic.

In the economic routine often come up situation when measured direct cost always don't reflect actual total costs connected with the object of measurement (this objects usually contain also depreciation, part of operation/development charges and other). This problem was solved in pasts by Total Costs of Ownership (TCO). One of the main problems the TCO is that basic calculation principles aren't public – "true" TCO methodology is private methodology

CobiT [20], ITIL [5] methodologies and others feel the lack of principles of multidimensionality and for example link with characteristics of Czech law. On the contrary these methodologies contain procedures, processes and instructions to the management of business informatics economic. Parts of these methodologies (with adjustment) are possible to use to define for processes in the management of business informatics economics. 1

In case the company want to be successful and competition able not only in the present day, but also in the future, then [16] says, that the company management has to accept and suitably react to trends in evolution and maintenance of IS/ICT that are itemized in [16].

Through academic researches the Department of Information Technology (DIT), for example [7], [11] and from another works for example [13], [14], arise, that the management of business informatics economic is really complicated problem that has to be solved. We come to this conclusion through following facts:

- In the companies usually aren't known true costs for each individual activity of business informatics and business informatics processes, which are used for their detection.
- The business informatics doesn't provide expected profits – it doesn't have considerable influence on business results or the results aren't found out correctly.
- Relations between the business processes and their business informatics support aren't respected. The business informatics doesn't contribute to higher process performance and don't contribute to better company's results.
- Decisions about investments are connected with risks and for example the total price of the investment can be a threat for company existence. There isn't possibility to prove clear link the between business results and investments into the business informatics very often.

If we want the management was effective and provides self-contained range for example for measuring and analysing the business informatics situation, it is appropriate to define processes that provides it. We can take the processes of the economic management as higher level that enables cover and consistent solution the problem areas mentioned above.

The above mentioned problem areas determine main thesis and questions we have solved in the project "The Reference Model for Management of the Business Informatics Economic" (RME). Some of selected thesis and questions are solved in this paper:

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[1] Knowledge acquired from these methodologies isn't possible to use entire, but on grounds of synthesis their principles and conclusions are design new procedures,

- Is it possible to describe the relationship of costs to the business informatics by processes? Is the creation of costs describable by attributes we can use for subsequent analysis of their creation?
- What processes we can use for detection/estimation for example costs and profits expended on investment not only presently but also for investments in the future?
- Is there any main process for the management of business informatics economic?
- What way we can link processes of business informatics economic management with processes of economic management whole company? Is there any relationship?

III. METHODOLOGY

The above mentioned questions are solved in the academic research project The Reference Model for Management of the Business Informatics Economic (RME). The RME is not stand-alone reference model, but RME is a self-contained component that is integrated into the IS/ICT Management Reference Model (ITGPM) – the domain Financial Management - Management of business informatics economic". The reference model ITGPM is integrated reference model for managing business informatics. The ITGPM constitute 10 domains ([7], [8], [11]) – see Fig. 1. These domains are mutually interconnected and through these interconnection creates complex model for management of business informatics. ITGPM is concentrated on all basic management areas in business informatics, not only on the management of business informatics economic. [7], [8], [11]

The purpose of the RME model is provide complex view on the management of business informatics economic and view on possible procedures and approaches we can use to definition of this model. [8]
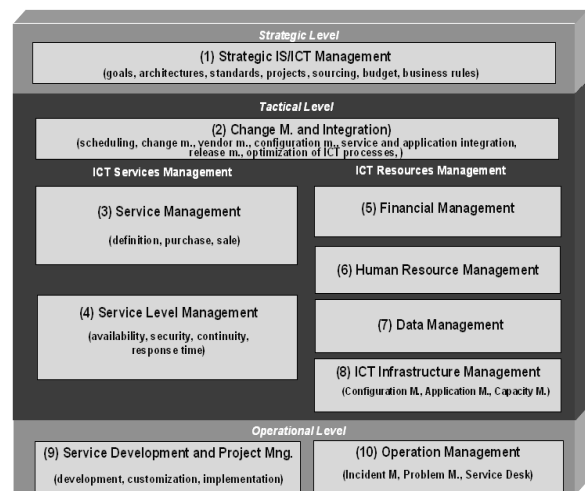

Fig. 1.   The ITGPM reference model

Definitions of aims, procedures, processes and applications of the RME are formulated in following points:

- **Improve the innovation** of IS/ICT in the company.
- **Rationalise application** of current personal, material and technical resources in operation of business informatics.
- Another aim was **early scoring of risks** that are connected with product selection with underestimation of needed projects or operational capacity, services and their providers and others.

On the grounds of aims the RME solution was made interconnection and extension of ITGPM – domain Financial Management and the RME model. Interconnection and extension of both reference models are achieved through processes, metrics and dimensions.

A.   Analysis and synthesis of existing methodologies

The first stage of creation of the costs efficiency model was based on an analysis and synthesis of existing management methodologies and evaluating/measuring methodologies that have been formed for business informatics as ITIL [5], CobiT [20], TCO [21] etc., The Reference Management Model ITGPM ([11], [16]) and other. Other analyzed methodologies whose basics are contained in RME are for example CPM [17], Value-Based Management ([18], [24]). Two of these methodologies – CobiT and ITIL are shortly described in the following paragraphs.

CobiT Framework 4.1 („Control Objectives for Information and Related Technology") is process based oriented methodology. To the processes included in CobiT are added sets of metrics of their efficiency. CobiT provides recommendations across processes in various companies' areas. The most important aim of the CobiT methodology is supporting improvement companies efficiency, providing of instructions what and how control and measure in the context of IT management requirements. The CobiT is characterised by basic components that have defined explicitly bindings among them.

The CobiT distinguish four domains of IT processes that represent framework of the CobiT methodology. Each of domains has defined Control Objectives that should be monitored and managed. This is depended upon aims of each company. There are mentioned all of important domains for management of economics of IT in the following text:

- Plan and Organize – is devoted to the strategic and tactical planning and organizing of ICT. In this domain is included management of added value of ICT for the company. The most important processes are in the domain Plan and Organize:
  o P01 – Define a Strategic IT Plan,
  o P05 - Manage the IT Investment,
  o P10 – Manage Projects.
- Acquire and Implement – we have to identify appropriate architecture and solution of ICT to be achieved of ICT strategy. This domain includes process that lead to the in-house development of this solution or that lead to the acquisition of the solution from other provider/company. In this case these processes also contain procedures that help with its implementation and integration with systems and processes.
- Delivery and Support – in this domain are solved questions connected with management of ICT services (providing of services, security management and ICT services continuity managements, service support, data management and support and management of ICT infrastructure. For the management ICT efficiency is the most important process DS 6 – Identify and Allocate Costs.

- Monitor and Evaluate – Each of companies processes should be monitored and evaluated in defined time period. Processes should be controlled if their results are in required quality and fulfil defined control criteria and standards. In this domain are included all areas of management of efficiency, checking systems, internal checking and ICT management:
  o ME1 - Monitor and Evaluate IT Performance,
  o ME2 - Monitor and Evaluate Internal Control,
  o ME4 - Provide IT governance.

We can use the CobiT methodology in business practice for analysis and evaluation of efficiency of internal checking systems. Results from analysis of ICT afford opportunity to company owners comprehend the importance of internal checking of ICT and identify ineffective internal checking processes or their parts. In the context of the CobiT methodology is important also endeavour to better up efficiency of internal checking systems.

The CobiT contains The Val IT Framework that is the second important information source for design of the RME. The Val IT Framework is not part of CobiT Framework, but is published by the same organization and is closely connected to CobiT Framework. For the model is The Val IT Framework beneficial because contain case studies. The aim of The Val IT Framework is providing information to management about the value that should be produced by the investments into the ICT.

The Val IT Framework provides us three main information areas we can use in the RME:
- Value Governance
- Portfolio Management
- Investment Management

ITIL v3 is in detail described in five books. These books are structured according to the ICT services life-cycle. ITIL is also process based oriented methodology. Successful implementation of processes based on the ITIL methodology that is closely connected with effects from improvement of business informatics. Process improvement and relationship between processes contribute to the continual improvement of ICT services.

We can identify most important effects of the ITIL for business. These effects are following:
- Processes are described in the context of other ITIL processes,
- ITIL is based on unified terminology that is used around the world,
- ITIL take place the importance of continual service improvement and quality of processes.
- ITIL try to cut down costs on development and implementation of new ICT services,
- ITIL try to improve communication flows between ICT specialists and customers of ICT services,
- ITIL try to improve quality of IST services with unchanged costs on this improvement,
- ITIL try to increase competitiveness,
- In the ITIL are transparently defined roles and responsibilities during development, improvement and providing of ICT services
- ITIL also provide basic indicators to evaluate serviceability.

The management of ICT economics according to the ITIL is described in the book Service Strategy in the fifth chapter – Service Economics. The chapter of Service Economics is divided into two parts: 5.1 Financial Management and 5.2 Return on Investment. Although the ITIL v3 is the last version of ITIL, we have to mentioned, that better description of service economics is made in the ITIL v2.

In the ITIL v2 is the ICT economics described in higher detail and contain more knowledge domains:

- Budgeting (chapter 5.2.)
- Developing the IT Accounting System (chapter 5.3) – in this chapter is proposed Accounting system for the evidence of cost on ICT services in required detail
- Developing the Charging System (chapter 5.4) in this chapter are proposed requirements that should be included in the charging system that is used to charging for ICT services provided to the service recipient.
- Planning for IT Accounting and Charging (chapter 5.5) – This chapter describe, how should be prepared company that want to implement accounting system. There are take into account a lot of factors in this chapter. Some of these factors are data sources, the design of indicators, complexity of the company etc.
- The last chapter devoted to the economics in ITIL v2 (chapter 5.6 – Implementation) is devoted questions, how should be management of ICT economics according to the ITIL implemented into the company.

From existing models and processes for economic management were applied into the RME appropriate procedures and best practices. These used principles from other methodologies have been modified to be appropriate for the RME (his processes, dimensions and metrics). The last but not least main activity was adaptation the RME model for specific conditions (for example law and others) in the Czech Republic.

B. Processes in economic management

The second phase of the academic project lies in the design, respectively adaptation/addition existing processes in the management of business informatics economic and further in extension of processes with reference examples of their usage.

Processes in economic management we identified in business informatics are following (see Fig. 2):

- IS/ICT financial management,
- Analysis of IS/ICT costs,
- Analysis of financial requirements,
- Analysis of financial resources for IS/ICT,
- Analysis of planned and executed effects formed by IS/ICT,
- IS/ICT cost planning,
- Preparing of IS/ICT investment plans,
- Preparing of IS/ICT budget,
- Plans of arrangement of financial resources for IS/ICT.

For each of mentioned processes were defined its characteristics, information inputs, procedures how should be solved every activity in the process and also were defined outputs from the process. The definition each of

above mentioned processes were supplemented by metrics and dimensions (see [7], [8]), which allow to make an analysis of the processes from various view in the context of Business Intelligence principles.
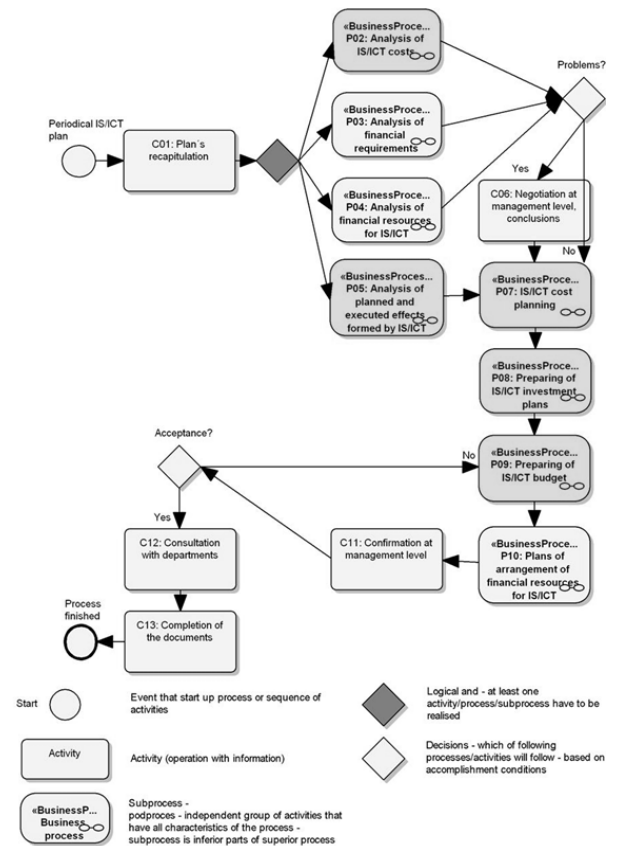

Fig. 2. Financial management process in IS/ICT

1) Analysis of IS/ICT costs

This task is devoted to the costs evidence, costs analysis and cost planning according to the various defined dimensions. All of these have originated in business informatics.

In the Analysis of IS/ICT costs process aren´t included results from another processes (compare with process IS/ICT costs planning). Analysis of IS/ICT costs process is elementary process preparing data-inputs for other processes in the area of Financial management processes in IS/ICT. This process is shown on the Fig. 3.

Important activities in this process are for example Definition/change the dimensions for costs analysis, analysis of data sources and their preparation and analysis of cause of problems in costs. Definition/change the dimensions for costs analysis is closely connected to requirements on consistency of accounting system. There shouldn´t be a lot of changes in the accounting system during longer time period (for example 5 years). In case the changes in accounting systems are needed all of them have to be written down because they influence results comparability in time.

In the Analysis of IS/ICT costs are included for example following functions:

- Cost analysis according to the various dimensions: costs, business processes, organization units, services of business informatics, projects, providers of IS/ICT.

- Analysis of cost evolution in time, that means costs evolution during one year, year to year comparison, indexes.
- Allocation of direct and common infrastructure costs to the organization units, on business processes, services, application.
- Business informatics costs planning in segmentation according to the dimensions: costs types, organization units, services of business informatics, projects,
- Estimates of costs on business informatics on grounds of evolution from previous periods.
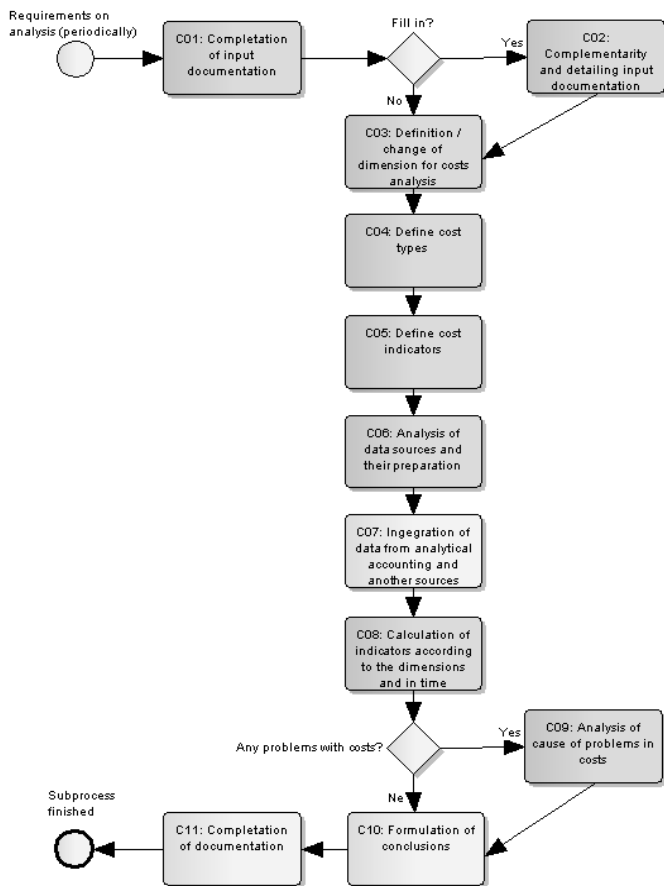- Identification of providers which IS/ICT services and products presenting extreme costs.

Fig. 3.   Analysis of IS/ICT costs

2) IS/ICT costs planning

The process at Fig. 4 is solving tasks connected with IS/ICT cost planning. That means completion of all required documents, completion of results from analysis in other processes, inputs from company's investment plans and situation and prices at the market. Really important part in this process is definition of cost structure and adequate indicators convenient to company.

Definition of cost structure should be for long term not only for one accounting period, because cost structure should meets methodology requirements on consistency of accounting system.

Last parts of this process are aim for definition of prerequisites required to easy analysis based on Business Intelligent principles and validating that all required document to results from the process are available and authorised by company's management.
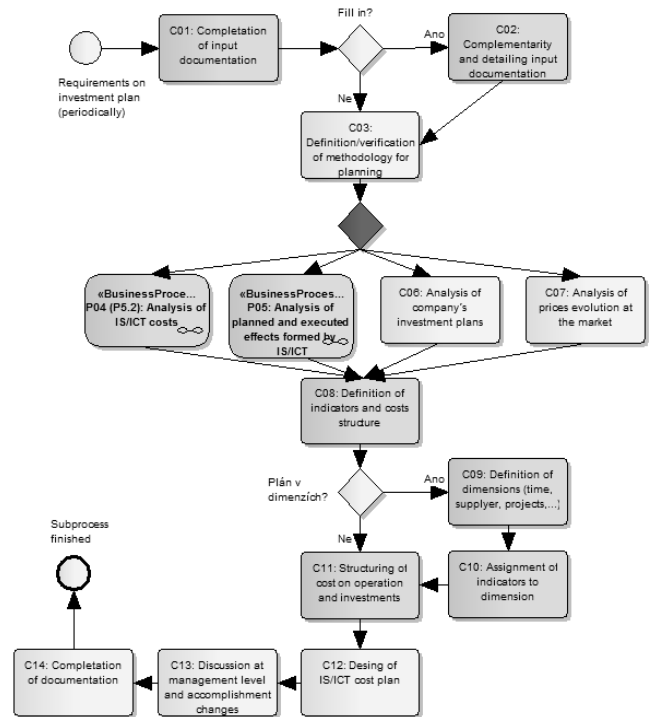
Fig. 4.   IS/ICT costs planning

3) Verification of designed processes

Above mentioned processes were used as the main input for design and creation the RME pilot application. The RME pilot application contains expect processes and also appropriate dimensions indicators and metrics for management and analysis of business informatics economics.

The verification was based on opportunities for processing above mentioned processes into the RME pilot application and possibilities to implement the RME pilot application into the selected company. In this company was the RME pilot application implemented and verified.

4) Analysis and synthesis of existing methodologies

The first stage of creation of the costs efficiency model was based on an analysis and synthesis of existing management methodologies and evaluating/measuring methodologies that have been formed for business informatics as ITIL [5], CobiT [20]., TCO [21] and others), The Reference Management Model ITGPM ([11], [16]) and other. Other analyzed methodologies whose basics are contained in RME are for example Corporate Performance Management ([17]), Value-Based Management ([18], [24]).

From existing models and processes for economic management were applied into the RME appropriate procedures and best practices.

IV.   RESULTS AND DISCUSSION

Position and application the RME is connected with solution specified economic tasks, for example analysis of costs in business informatics. In these types of tasks is possible to use recommended procedures (processes defined by the RME model) or metrics and dimensions and these fill up by own values.

Above mentioned processes are sub processes of the main process Financial Management. It is possible to present this main business informatics economic

management process by the Fig. 2.

The designed process Analysis of IS/ICT costs that was mentioned in the chapter Methodology, is presented on Fig. 3 and process IS/ICT costs planning is presented on Fig. 4.

Other processes that were solved in scope of the academic research projects were:

- Preparing of IS/ICT investment plans.
- Analysis of planned and executed effects form IS/ICT.
- Preparing of IS/ICT budget.

Other processes are now solved within the scope of the research project P403/10/0092.

The devise processes are utilisable also independently without the RME application support because they identify basic logical steps in activities that have to be carry out to be achieved defined target, for example execution of IS/ICT costs analysis, preparing of IS/ICT investment plans, preparing of IS/ICT budget and others. The designed processes take into account the best practices described in methodologies like CobiT [20] and ITIL [5].

Results from Analysis of IC/ICT costs planning and costs planning are really important for management of company. These results in aggregated form can be compared with data from competitive companies.

Analysis of IS/ICT costs provide information about cost structure provided services and is one of important information sources for dictate of prices for IS/ICT services. Results of this process are source to another process like Preparing IS/ICT investment plans, Preparing of IS/ICT budget, IS/ICT Costs planning and other.

Applications of more categorization attributes provide better basis for analysis of company's economic.

With previous are connected questions how design appropriate dimensions and indicators. These questions are solved for example in [7], [8].

Make a remark on that Business Intelligence area and related adjusted processes provide (especially in measuring and management economics) scope for creation:

- Tool supporting automated data transfers from in-house accounting, data transformation and purification and saving transferred and processed data into the data warehouse.
- Defined system of indicators (Key Performance Indicators, Performance Indicators and Key Resource Indicators) by way of is possible to find out actual state and evolution of company's economic situation.
- System of indicator we can analyse economic situation, performance, efficiency of business informatics economic from various views.

In the context of analysed and designed processes, dimensions and metrics were developed and verified the RME pilot application. This application provides tools and support for analysis effectiveness of measuring, efficiency and management processes of business informatics economic.

V. CONCLUSIONS

The domain Financial Management is one of the most important parts the Reference Management Model ITGPM that is designed for management of business informatics.

Importance of management of business informatics economics is still increasing in the context of current economic situation in the world. Companies try to cut down or optimize business informatics costs structures, profits and gains. Companies' management alto try to reveal if the in-house business informatics is cheaper or better than outsourcing or other forms of buying ICT services.

The foundation of designed processes for the management of business informatics economic and with processes closely connected dimensions and metrics is provision of guidelines how can be business informatics managed. Fulfilment of this aims were achieved through developed the RME pilot application.

The RME model is intended to provide self-contained view on management of business informatics economic. Application of the RME in practice provides planning and analytical function for management economic and also non-economic aspects of business informatics. Through mentioned are prepared inputs for strategic decision-making, projects planning, preparing agreements about providing business informatics services and others.

Identified and in detail described processes, dimensions and metrics appropriate for management of business informatics economics are in tune with law in the Czech Republic. Furthermore are supplemented with reference examples.

In comparison the RME model with other existing reference models is the RME model solved with different approaches to the management of business informatics economic. The RME provide recommended procedures, processes, metrics, dimensions, application and examples to solution defined set of tasks in business informatics management. Designed processes are possible to connect to the self-contained the Reference Management Model ITGPM.

Opportunities in integration and also independent application the RME and the ITGPM are arranged through designed processes, dimensions and metrics.

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Milos Maryska was born in Usti nad Labem in the Chzech Republic in year 1981. He has graduated at the Faculty of Informatics and Statistics at the University of Economic, Prague, in Information Technologies in 2006. In year 2010 has graduated in Applied Information Technologies and gained degree Ph.D.

Since 2010 he has been working as a senior lecturer at the Department of Information Technologies at the Faculty of Informatics and Statistics at the University of Economics, Prague, Czech Republic. Within his pedagogic and research work he focuses on management of economics of business informatics, Business Intelligence and ERP systems. He is co-author of 3 books, and author and co-author of several conference papers and in journal articles. In the company Siemens IT Solutions and Services Czech Republic works as a Head of Technical Team and Business Consultant/Project Manager.

Ing. Milos Maryska, Ph.D. is committee member at conferences: IDIMT, ECIME 2011 and ICIME 2011. He placed from 1st to 3rd, in Chart of students at Department of Information technology at University of Economics in Prague among years 2003-2006.