



**HAL**  
open science

# The Reference Model for Cost Allocation Optimization and Planning for Business Informatics Management

Petr Doucek, Milos Maryska, Lea Nedomova

► **To cite this version:**

Petr Doucek, Milos Maryska, Lea Nedomova. The Reference Model for Cost Allocation Optimization and Planning for Business Informatics Management. 10th International Conference on Research and Practical Issues of Enterprise Information Systems (CONFENIS), Dec 2016, Vienna, Austria. pp.253-262, 10.1007/978-3-319-49944-4\_19 . hal-01630529

**HAL Id: hal-01630529**

**<https://inria.hal.science/hal-01630529>**

Submitted on 7 Nov 2017

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution 4.0 International License

# The Reference Model for Cost Allocation Optimization and Planning for Business Informatics Management

Petr Doucek, Milos Maryska, Lea Nedomova

University of Economics, W. Churchill sq. 4, Prague, Faculty of Informatics and Statistics,  
Czech Republic

{doucek, maryskam, nedomova}@vse.cz

**Abstract.** The proposed conceptual model deals with two areas – Cost Allocation and Planning for Management of Business Informatics. This paper shows some limitations of the model, its architecture – the individual layers of the model, key principles of cost allocation on which the proposed model is based, and factors which must be taken into account during the development and subsequent implementation of the model. Practical experience with model's implementation in business are discussed. In conclusion, there are several ideas for the future development of the reference model.

**Keywords:** Performance management – business informatics– cost allocation – profitability- management.

## 1 Introduction

The main target of the company is achieving its targets and especially achieving profits [1, 2]. Management requires exact information about company's economic situation to be able to set paths to these aims [3, 4]. This information is presented by measures [5, 6, 7, 8].

Measuring results and performances have a long tradition [9, 10]. Rapid development in this area is visible especially in last ten years [11] and this development can be split into two groups. The first group is especially about development in the area of norms and processes how the measuring should be realized and the second group is about development of tools for measuring results and performances with the support of information and communication technologies (ICT) [10].

Measuring of results and performance is usually covered with Performance Measurement System (PMS) that helps organizations with a task to achieve their goals and stay competitive by measuring and managing their efficiency and effectiveness of their actions [12] and that covers both of above mentioned groups. Organizations feel that PMS is contributing them to achieve their success but they face problems implementing it University of Economics in Prague, Faculty of Finance and Accounting [13].

This feeling is based on necessity of 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. One of the most important factors that is influencing availability of information is quality of the Business Informatics.

One of the general approaches to creating and defining of PMS is Corporate Performance Management (CPM), which is a management concept that describes processes, methods, metrics and systems that are needed for performance management of a company [14]. The main goal of CPM is allowing of measuring and management of performance of a company or its parts and helps to company to achieve its goals.

Corporate Performance Management is an umbrella term that describes the methodologies, metrics, processes and systems used to monitor and manage the business performance of an enterprise.

Performance management means the process of collection, analysis and/or reporting of information which are relevant to efficiency to individual, group, organization unit, system or their parts [15]. It could contain also the process and strategy investigation or investigation of technological procedures and phenomenon in order to identify if their outputs are in relevance to organization's intentions and goals. The core of performance management is the added value production in chain "Data – Value – Metric – Measurement – Indicator – Information". This chain must function consistent in order not to produce distorted information.

Performance management can be understood as performance management in the complex organization's management system [16]. In this context, is performance management decision and executive making process based on obtained data and information in order to influence achieved outputs and results. For consistent performance management is not sufficient only the performance measurement system [17]. The condition of consistence must be also fulfil between measurement (what and how is measured) and management (how are measurement interpreted, what is the goal and how are results used).

This paper aims to present a conceptual reference model for cost allocation and planning for efficient management of corporate informatics (REMONA). We have found out that these areas of performance management in business informatics should be covered by ICT support but these are not available [3], [16], [18]. During another research we found out that our model should be based on the principles of Corporate Performance Management (CPM) that is general approach to PMS. An inseparable part of the presentation is holding a scholarly discussion about the presented model to obtain feedback and opinions on its design from the academic community and from end users. The REMONA model is proposed as part of an academic project of the Faculty of Informatics and Statistics at the University of Economics in Prague in association with the companies Profinit, s. r. o. and AM-line.

The design of the model follows the Design Science Research approach [19] that is extended for additional scientific approaches:

- Case studies and qualitative research [20, 21] – we realized 7 business projects and consultations with Chief Financial Officer in different companies during year 2010-2014 that help us with formulation of lack of current solution and gaps that are feel by managers.

- Analysis of current state of the art that is proved by cited literature and synthesis and deduction that help us with identification and formulation of the problem and project goals,
- Design and development of the model,
- Final solution was tested by way of two case studies in selected international companies [22].

## 2 The REMONA model

The proposed model identifies key dimensions and indicators and interconnects them within designed analytical cubes. REMONA is designed to be easily integrated into a company and easily configured, which enables it to quickly tailor to the needs of a specific company.

The REMONA model is based on the principles of Corporate Performance Management and Business Intelligence. The aim of the model is to offer a solution to two key corporate tasks, 'cost allocation management' and 'planning'. This solution is inextricably connected with the tasks of analyses and in particular, what-if analyses. For both tasks the model comprises key 'Dimensions', 'Metrics', 'Drivers' and 'Activities', which are addressed as part of corporate informatics. Another requirement for the model is the possibility of its rapid and easy adaptation to a specific company in which it will be implemented. This is achieved in the case of the REMONA model by its logic being implemented as much as possible through appropriate links between data cubes and related dimensions.

To get the full picture we should add that in the case of specific companies or specific allocation rules or analyses of profitability we are ready to make required changes directly in the reference model (solution code) and add new findings to the original model through system feedback.

The proposed model is based on basic requisites, limitations and requirements which must be fulfilled to ensure that REMONA can be easily and quickly implemented in a company. The model design is based on the following:

- The overall design of the model must be a general one so that it can be tailored to the needs of a target organization.
- The proposed model must support easy and quick integration into corporate architecture.
- The model will be created in such a way that modifications can be made primarily through configuration of the system, although it is possible that some functionality may have to be developed to meet specific requirements.
- During the preparation of the model the necessary dimensions and key metrics must be identified for tasks carried out in a given area.

When designing the model and subsequent implementation of the system it is necessary to answer some key questions, which have to be taken into consideration as they affect the preparation of the proposed model:

- What are current and expected main problems in economics and management of development and operation of corporate informatics and what the priorities of the solution?
- Are some of the standard methodologies (ITIL, CobiT) or proprietary methodology or model used in the management of informatics?
- Is the management of corporate informatics based on the management of services and service level agreements?
- What key metrics are required for the management of the economics of the system for corporate informatics? Are any in use at present?
- Is there documentation of the management of corporate informatics and database management from which data can be obtained? Are there data in them that could be used to design and fulfilment of metrics and dimensions?
- Has an analysis been carried out of the level of ripeness of processes of corporate informatics management and what are the results?
- How high a level of detail will be necessary for analytical tasks in the management of economics of corporate informatics?
- How are costs of PI monitored?
- What is the place of cost analysis in corporate informatics management?

The proposed REMONA model is designed to permit easy and quick adaptation (modification) of the solution according to the character of the answers to these questions by parameters without high costs of additional alterations.

## 2.1 General Overview

The REMONA model is solved by the authors in following areas:

- Business tasks (Profitability, Planning and Cost Allocations)
- Dimensions and Metrics
- Application REMONA (software) that is solved from following views:
  - Architecture,
  - Data Model designed for the application and its Business Tasks,
  - Application Layer that contains business logic of the solution defined in Business Tasks (see above),
  - Reporting,
  - Deployment that is describing all mandatory steps that have to be completed if we want to use model in proper way,
  - Initial parameters of services etc.

The Tasks describes issues that are solved with the model and dimensions and metrics support solving of these issues from multidimensional point of view. Business Tasks can be described as predefined processes that are using dimensions and metrics defined for the model and these dimensions and metrics can be used for parameters of the REMONA model.

These three business tasks were selected because cost allocation, planning, and profitability is growing in importance. The market and the economy are undergoing a negative economic development. It is in such periods that managers demand accurate, detailed and up-to-date information not only about the company as a whole but also about its individual parts [23]. Key activities and goals according to [24, 25], [4] include at present:

- Every company tries to get maximum return on each investment and clearly identify, and in many cases calculate, the benefits of investments.
- Companies try to minimize or eliminate activities and processes which do not generate the required value.
- Companies struggle against changing economic conditions.
- Measuring and managing a company as a whole and company informatics as one of its parts is a phenomenon being closely monitored.
- Proving that investments are warranted (for example, in ICT) and proving the achievement of expected or required results.

The application REMONA can be described as a software that is supplemented for analytical and operational manuals. The REMONA model contains the design of data model only but the REMONA model contains developed model with user interface in the form of reporting. The REMONA model is designed in the context of easy improvement. We expect that different companies requires different dimensions and metrics. Our design contains the general dimensions and metrics only and these can be supplemented by other users. From these reasons we selected IBM Cognos Express as a platform that provides the best environment for easy improvement.

## 2.2 Business Architecture

The architecture can be described from several views with different degree of detail and elements describing the model.

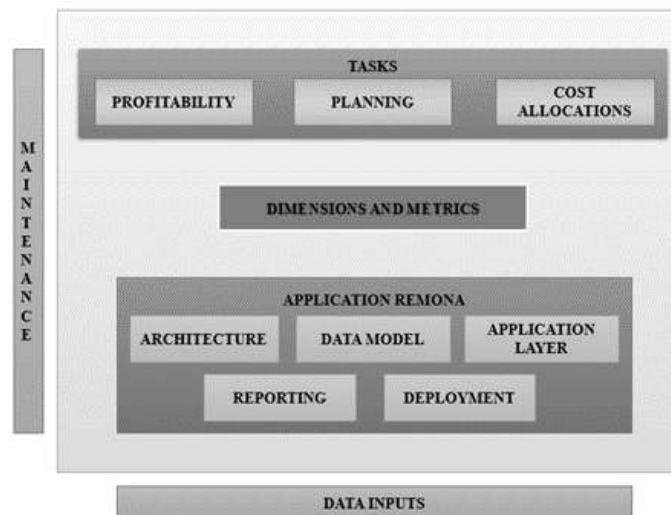
**Fig. 1.** The Remona model concept

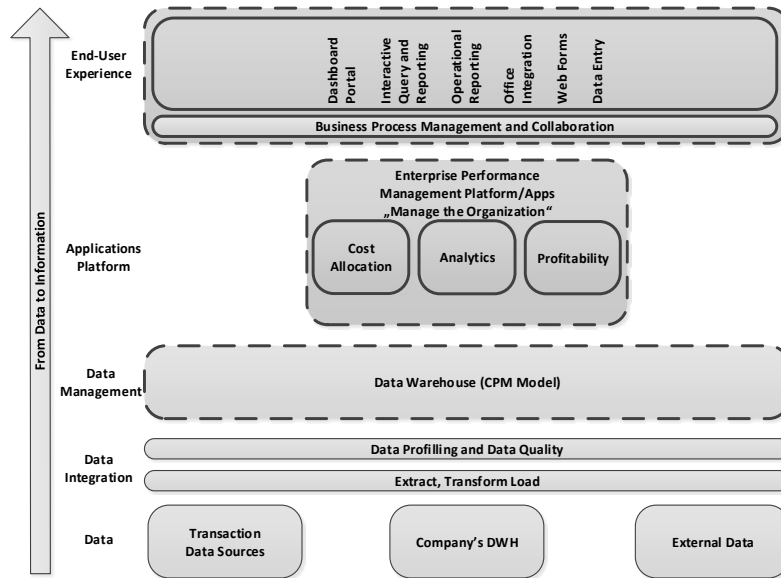
The basic view of the architecture is represented by individual layers integrated in the model. It is a layer of Fig. 1:

- primary data sources,
- data integration – Data Stage (addressing questions of data pumps (ETL) and data quality),
- core of data warehouse and data mart – partly addressed in REMONA,
- application layer and user interface layer (object of REMONA),
- a metadata layer passes through all the layers which is of key importance for end users as it guarantees a standard language and description of all indicators and attributes which are part of REMONA and the other layers of the company information system.

The architecture of the model shown in the following picture Fig. 2 is based on the traditional architecture of a BI solution and modified for the purposes of the model with the aim of allowing its integration into the architecture of an ordinary organization. The picture shows in detail a view of the individual components of the architecture described above as part of data warehouse and application layer.

A layer of application tools ('Application Platform) contains the business logic of the proposed REMONA model which reads in data from a prefabricated data model.





**Fig. 2.** Remona Business Architecture

### 2.2.1 Data Management Layer – Data Warehouse

The data model and the data warehouse developed according to it must cover the needs implied from the analytic tasks to be performed over it.

The conceptual model is divided into four compact sections, which are further detailed up to the level of physical data model, which is implemented in the selected database technology. The conceptual model is divided into the areas “Finance and Management Accounting”, “Production Entity”, “Cost Allocation Entity” and “Other Entity” [26]. Each of these areas covers a specific field.

### 2.2.2 Application Layer

The application is the most important part of the REMONA model. This is the operating part of the whole model. The application layer contains logic of the REMONA model. This logic is based on rules and processes that are processing three defined business tasks – profitability, planning and cost allocations. We have defined several multidimensional cubes for each of these business tasks. Multidimensional cubes allows processing of calculation steps defined in processes defined for each of business tasks.

We have divided cubes into four groups:

- parametric (prefix RF – Rates and Factors),
- calculating (prefix Lu – lookup),
- data cubes (prefix C – Cube),
- data cubes – Historical (prefix CH – Cube History).



Each of multidimensional cubes contains one dimension with metrics and at least one standard dimension that is used for analyzing of data in the cube. We defined relations among cubes that enables to process data in on-line mode. Data are pre-processed during loading in batch mode. This approach makes solution faster.

### **2.2.3 User Interface Layer – Reporting**

In the model design, we expect the use of two main types of presentation and analytic-presentation layers:

- Native tools and the selected environment, i.e., the tool Cognos Express/Cognos TM1.
- The tool Microsoft Excel.
- The first group of tools provides full functionality implied by the fact that these are native tools. As for the tool Microsoft Excel, the functionality of the solution is provided by a plug-in module, which implements in the tool Microsoft Excel full functionality of the systems Cognos Express/Cognos TM1.

## **3 Results and Implementation Experience**

The REMONA model was implemented in two international companies, the first one with headquarter in USA and the second one with headquarter in Germany.

The target of the first implementation (in USA) was verify that model is possible to implement in big company and investigate what is missing in the model and what should be improved or changed – especially in metrics and dimensions.

Model REMONA was adjusted according to the experiences from the first implementation. Adjusted model was implemented in selected international company in Germany.

The first implementation was carried out over the MS SQL Server 2012 database in which the data warehouse of the REMONA model was implemented. The second used system was IBM Cognos Express and Microsoft Excel 2010 as a reporting tool. The solution was prepared over data for 1 year of the company's life.

Implementation was split into 5 phases:

- Identification of the reason for introducing the REMONA Model to the target company, business requirements and setup of the project
- Analysis
- Draft data warehouse and ETL
- Implementation of ETL and the REMONA Model
- Testing and verification of the setup

Based on the results the authors identified that one of the researched projects is currently loss-making. Based on the results authors find out, that:

- high price of the accommodation of employees which are at the site of the solution of the project which is not covered by the customer,
- higher share of time spent at the site as opposed to the agreement, where the plan of the presence of employees at the site was lower (by 40%),
- higher travel expenses and board caused by the same reasons stated in the previous point.

The yield for the services provided is not stated as the cause which corresponds to the agreed rate. The error of low profitability or loss, as the case may be, is caused by badly calculated costs for the project and the inadequate price for the provision of services.

The second implementation provides information about efforts that have to be invested into implementation in small company with DWH that have 85 tables. The efforts were 45 man-days from which 22 man-days was implementation of standard solution (analysis of target environment and processes and customization) and 23 man-days was adjustment of REMONA (development new functionality and new reports)

The savings from the second implementation were defined in areas as follows:

- Monthly financial statements are available from all subsidiaries.
- Real-time reporting over all subsidiaries, for example from point of view (Travel costs, drawing of project budget, employees workload etc.).
- Unified processes for evidence without dependency on human factor.
- Saving of 1.2 FTE (full time equivalent) over all subsidiaries – automatized reporting.

All of these savings proved that the solution provides effects to companies that are using this solutions and pilot implementation in both companies proved that implementation is possible and not so difficult.

## **4 Conclusions**

CPM is very significant activity among business activities and its importance keeps growing. It is especially very important activity from the point of view of company managers.

Business economics management cannot succeed without adequate procedures. If this type of management is not successful, company top management cannot be expected to support it and to consider it one of key departments keeping entire business vital. If it is not possible to prove benefits, company management shall see it as a simple cost item that should be minimized as much as possible.

The model provides effects in several areas.

For business practice the REMONA model and its implementations proved that:

- The REMONA model is adjustable to the requirements of the company – configuration is especially in the area of ETL that are reading data from the source systems (DWH) and loading it into the REMONA, code lists, dimensions, metrics etc.
- The model takes into account current trends in the area of Business Intelligence, Corporate Performance Management, reporting and current best practices.
- Effects for firm's results from implementation of the REMONA model – faster and more accurate reporting, cost reduction etc.

## 5 References

1. Dopson, L. R.: Linking Cost-Volume-Profit Analysis With Goal Analysis in the Curriculum Using Spreadsheet Applications. *The Journal of Hospitality Financial Management*, 11(1), 104–104 (2003)
2. Halkos, G. E., Tzeremes, N. G.: International Competitiveness in the ICT Industry: Evaluating the Performance of the Top 50 Companies. *Global Economic Review*, 36(2), 167–182. (2007)
3. Harindranath, G.: ICT in a Transition Economy: The Case of Hungary. *Journal of Global Information Technology Management*, 11(4), 33–55. (2008)
4. Young, R. C.: Goals and Goal-Setting. *Journal of the American Institute of Planners*, 32(2), 76–85 (1966)
5. Ling, F. Y. Y., Peh, S. Key Performance Indicators for Measuring Contractors' Performance. *Architectural Science Review*, 48(4), 357–365 (2005)
6. Martin, P. R., Patterson, J. W.: On measuring company performance within a supply chain. *International Journal of Production Research*, 47(9), 2449–2460 (2009)
7. Sarker, B. R., Khan, M.: A comparison of existing grouping efficiency measures and a new weighted grouping efficiency measure. *IIE Transactions*, 33(1), 11–27 (2001)
8. Sauka, A.: Measuring the competitiveness of Latvian companies. *Baltic Journal of Economics*, 14(1-2), 140–158 (2014)
9. Chen, Y., Zhu, J.: Measuring Information Technology's Indirect Impact on Firm Performance. *Information Technology and Management*, 5(1-2), 9–22 (2004)
10. Manning, R., White, H.: Measuring results in development: the role of impact evaluation in agency-wide performance measurement systems. *Journal of Development Effectiveness*, 6(4), 337–349 (2014)
11. Thompson, M., Walsham, G.: ICT Research in Africa: Need for a Strategic Developmental Focus. *Information Technology for Development*, 16(2), 112–127 (2010)
12. Neely, A., Gregory, M., Platts, K.: Performance measurement system design: A literature review and research agenda. *International Journal of Operations & Production Management*, 15(4), 80–116 (1995)
13. Petera, P., Wagner, J., Menšík, M.: Strategic Performance Measurement Systems Implemented in the Biggest Czech Companies with Focus on Balanced Scorecard - An Empirical Study. *Journal of Competitiveness*, 4(4), 67–85 (2012)
14. Gartner, Inc.: Corporate Performance Management: BI Collides With ERP. (2001) <https://www.gartner.com/doc/350794/corporate-performance-management-bi-collides>
15. Upadhaya, B., Munir, R., Blount, Y.: Association between performance measurement systems and organisational effectiveness. *International Journal of Operations & Production Management*, 34(7), 853–875 (2014)

16. Berry, A. J., Coad, A. F., Harris, E. P., Otley, D. T., Stringer, C.: Emerging themes in management control: A review of recent literature. *The British Accounting Review*, 41(1), 2–20 (2009)
17. Flapper, S. D. P. Fortuin, L., Stoop, Paul P.M.: Towards consistent performance management systems. *International Journal of Operations & Production Management*, 16(7), 27–37 (1996)
18. Voříšek, J., Pour, J., Buchalceková, A.: Management of business informatics model – principles and practices. *E+M Ekonomie a Management*, 18(3), 160–173 (2015)
19. Hendl, J.: *Kvalitativní výzkum*. Praha: Portal. (2016).
20. Maryska, M.: *Referenční model optimalizace nákladové alokace a plánování pro řízení podnikové informatiky (habilitační práce)*. VSE, Praha (2014)
21. Peffers, K., Tuunanen, T., Rothenberger, M. A., Chatterjee, S.: A design science research methodology for information systems research. *Journal of Management Information Systems*, 24(3), 45–77 (2007)
22. Yin, R. K.: *Case Study Research: Design and Methods*. SAGE (2009)
23. Král, B.: *Manažerské účetnictví*. Management Press (2012)
24. Dimon, R.: *Enterprise Performance Management Done Right: An Operating System for Your Organization*. Wiley (2013)
25. Turban, E., Leidner, D., Mclean, E., Wetherbe, J.: *Information Technology for Management: Transforming Organizations in the Digital Economy*. Wiley Student Edition (2012)
26. Maryska, M., Wagner, J.: Reference model of business informatics economics management. *Journal of Business Economics and Management*, 16(3), 621–637 (2015)