STRUCTURAL AND FUNCTIONAL ORGANIZATION OF BUSINESS ANACLITIC SYSTEMS

Rahimov Nodir[1]

[1]*Tashkent University of Information Technologies, Uzbekistan*

Abstract

The characteristics and functional subsystems of business analytic systems (BAS) are analyzed. They represent a class of information-analytical systems based on Business Analytics intelligent technologies (BA). BA-technologies are a set of interrelated components: data store, on-line analytical processing (OLAP) and data mining (DM). BA-technology is the development of Business Intelligence (BI) technology which has a more complete use of the component based on the concept of knowledge, reasoning and logical conclusions. The functional subsystems of BAS: data entry, electronic information resources (EIR), the analysis and evaluation of information and situations (AIS) are considered. A distinctive feature of EIR and BAS is the integration of database, knowledge and control software. The features and interconnection of data warehouses technology, OLAP and DM in the organization of functioning EIR, OLAP, DM subsystems are described. Control function of EIR is also considered.

Keywords: *Knowledgebase, Database, Data Warehouse, Data Mart, On-Line Analytical Processing, Extraction Transformation Load, Business Analytics, Business Intelligence, Business Analytic Systems, and Electronic Information Resource.*

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1. INTRODUCTION

In large firms a huge amount of data contained in business documents, contracts, spreadsheets, data bases, e-mails, reports, technical journals, mass media, the Web and other documents are generated. In the aggregate they represent the verbal component of corporate knowledge. They should be generalized, classified, organized and structured for the purpose of presenting and storing in electronic information resources (EIR) of corporate information systems (CIS).This information is one of elicitation sources of empirical knowledge which describes the functional and logical interconnection and internal patterns in this data. Non-formalized knowledge of the subject matter experts, formulated in the form of linguistic expressions are elicitation in addition to such knowledge. Thus, formed information and empirical knowledge is preliminarily converted and presented in the form of appropriate data models (file, relational) and knowledge (production rules, frames, semantic networks) and they are recorded to store in a special database (DB) and knowledgebase (KB) of EIR.

Such knowledge represents know how experience of implementation of business processes, as well as the main characteristics analysis of the analyzed situations and decisions made in the monitoring process and analogous process control. To solve functional problems (such as monitoring, analysis, evaluation, forecasting and decision-making) the EIR content allows using by their managers of all departments of large organizations (corporations, institutions and government bodies).The EIR content should be regularly updated, supplemented and actualized. The opportunity of supplying information and knowledge on the request of managers and users of various divisions of corporations should also be provided. Performing these functions is carried out by means of EIR management system (MSEIR). Management of EIR is considered as a systematic searching process, elicitation, selection, presentation, replenishment, updating, organization and dissemination of information and various categories of users' knowledge. Their application increases effectiveness of decision making significantly which is directed to dynamical adjustment of changing environmental conditions and increase corporate competitiveness.

Referred above tasks of intelligent analysis and evaluation of information about the external and internal organization environment from various sources, as well as the assessment and forecasting of the situations described by the subject area are solved by BAS. The results of this analysis are generated in the form of analytical reports with recommendations for managers to make organizational and management decisions.

BAS represent a class of information-analytical systems (IAS) based on Business Analytics intelligent technologies [1-4].The structure of such systems consists of data entry subsystems, electronic information resources (EIR), as well as analysis and evaluation of information and situations (AIS).A distinctive feature of EIR and BAS is the integration of database, knowledge and control software.

The completeness and correctness of the EIR, as well as required adequacy of data display and knowledge of the analyzed situations which is studied by the application domain largely determine the effectiveness of problems solving by BAS means. Besides execution efficiency above mentioned MSEIR functions is determined by the effectiveness of their software and algorithmic tools.

It defines topicality of development, upgrading methods, models, algorithms and software of Business Analytics technology, including knowledge management systems (KMS), which allows automating the building process and updating the database and advanced BAS KB and EIR, as well as interaction of EIR components [3,5].

2. GENERAL CHARACTERISTICS OF BUSINESS - ANALYTICAL SYSTEMS

The purpose of business analytic systems is intelligence, integration, aggregation and data analysis from different sources stored in the EIR, as well as analysis and evaluation of current and predicted situations. In order to solve these problems BAS use intelligent Business Analytics technologies, including mechanisms of logical reasoning and conclusions based on expert knowledge. Such systems help corporation's managers to determine measures according to the results of obtained state estimate of analyzed situations and make organizational and management decision on reengineering of detected inefficient business processes and organization department for the purpose of provision company's strategic objectives and a changing environment adaptation.

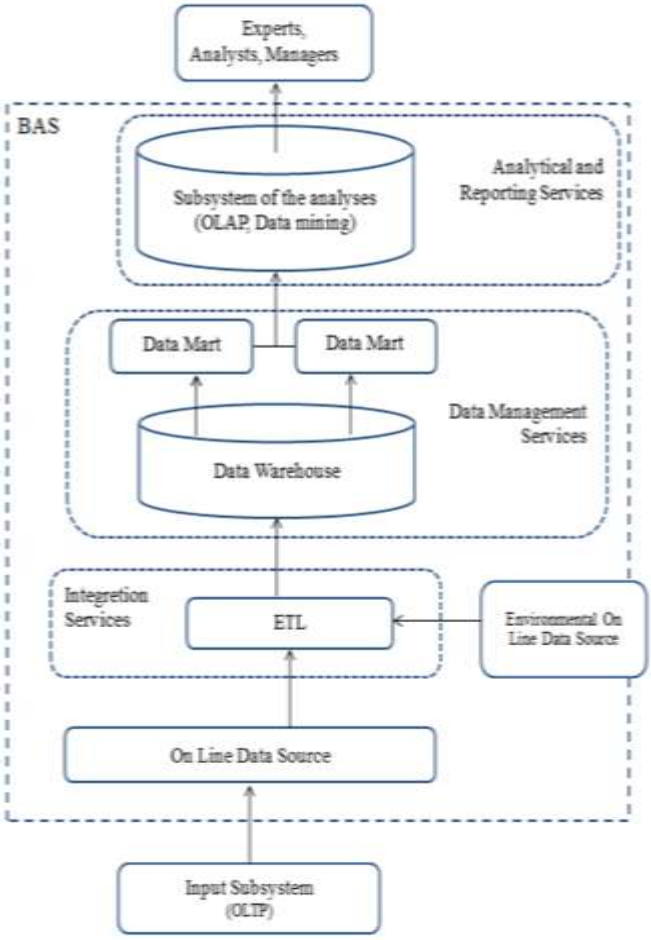

Fig.1. Generalized structure of business – analytical systems

The functional components of BAS are subsystems: data entry, EIR and management them, the analysis and evaluation of information and situations. Input subsystem implements collection, elicitation, purification, pre-processing (systematization, structuring, aggregation) of data from various internal and external sources and inputs them into the EIR (Fig – 1.). Various data which is generated during the execution of business processes and processed by means of OLTP (On-line Transaction Processing) stored in electronic and paper form received from the mass media and the Internet (web documents) is used in this case. An important source for the EIR is the knowledge gained by experts. Input Subsystem realizes its function using the ETL tool (Extraction Transformation Load). The main procedures of ETL are searching, elicitation, collection, pre-processing (cleaning, filtering, transformation), and the primary analysis of the required information and input them into the EIR. The elicitation of raw data, as a rule, introduces in different format and contains surplus useless information. Therefore ETL means implement their preprocessing before entering the collected data into the EIR for the purpose of filtering, transformation into formats in the database of the primary analysis and EIR.

Intelligent Business Analytics (BA) Technology used in BAS is a set of three interrelated components: data warehouses (DW), on-line analytical processing and data mining.BA-technology is the development of Business Intelligence technology (BI) distinguished as a more complete use of the component based on the knowledge conception, inferences and logical reasoning [2,3-6]. This allows carrying out the assessment of the analyzed situations more adequately and generating analytical reports with recommendations of possible solutions alternatives in the conditions of imperfect information (Imperfect Information) in changing environment.

In accordance with this, EIR subsystem is generated on the basis of data warehousing concept in these systems and data marts [4, 6-7], constituting the first base component of BA-technology. They contain components for storing data and knowledge. The distinctive features of DW are: a) the integration, systematization, structuring, negotiation and aggregation of disconnected detailed data contained in the various internal and external sources; b) constant content; c) temporary Chrono logicality; c) multi-dimensional; c) data separation used for operation processing and data used for analytical processing, i.e. to analyze and solve problems. Data Mart are fragments of DW which present a variety of subject database with aggregated information necessary for individual departments of corporations to solve their local problems. Combining DW and Data Mart concepts provides the possibility of building a single integrated EIR as a single data source and knowledge for corporations on the whole and its subdivisions as well.

The second basic component of BA technology, OLAP technology is used for the intelligent processing of incoming data, organizing, structuring and generating them in the form of multi-dimensional models to store in the DW format in the AIS subsystem considered in the BAS. A multidimensional data presentation in the form of cubes or hyper cubes or polycube is based on the OLAP concept.

Their intelligent analysis is performed using the third component of the basic BA-technology in AIS subsystem - Data Mining (DM), in order to identify hidden functional, logical patterns and interconnections between accumulated and stored data in EIR. DM means allow you to identify and explain (with a certain probability) various anomalies and forecast the development of analyzed processes. The methods of classification, clustering, association, sequences and forecasting are used to solve the mentioned problems in DM.

Automation functions of building processes, replenishment and updating of databases and knowledge bases, as well as interaction coordinate of the EIR component is performed by means of EIR control subsystem. This subsystem is interconnected with the input subsystem, performing post-processing of collected data by means of their systematization, coordination, aggregation, structuring and updating. An important function of EIR subsystems management is the procedure of knowledge formation elicitation from the processed data and the experts as well. While performing these procedures, this subsystem also interacts with DM component. Processed and formed in that way data and knowledge are recorded to store in the database and knowledge base and data marts of EIR and BAS.

3. CONCLUSION

Based on Business Analytics intelligent technologies - BAS consist of data input subsystems, EIR, the analysis and evaluation of information and situations as well as EIR control system. The feature of these systems is integration in the EIR data and knowledge bases and control systems. Means of generation, processing and knowledge representation are used to solve the functional problems in BAS. They include machinery of logical reasoning and conclusions based on expert knowledge. It affords the opportunity to solve the analysis and forecasting of the processes problems more effectively as well as the generation of recommendations for decision-making. Processing and analysis results are generated in the form of analytical reports with information and hints intended for their subsequent analysis in expert support system of corporate information systems. Generated variants accordingly of acceptable solutions are available to managers, analysts and experts of analysis, evaluation and final decisions for. Mentioned above the functional capabilities of BAS offer managers an effective means of support to solve the problems of business process analysis and making decisions on their transformation for the purpose of the best adaptation to the changing environment.

REFERENCES

[1] Kenneth C. Laudon, Jane P. Laudon. Management Information Systems. Managing the Digital Firm. 12th Edition (Eng.), ISBN: 9780136078463. Prentice Hall, 2012.

[2] BarseghyanA.A, KupriyanovM.S, CholodI.I, Tess, M.D, ElizarovS.I . Analysis of the data and processes: manual. - 3rd Edition Revised. and ext. - SPb.: BHV-Petersburg, 2009. - 512 p

[3] BekmuratovT.F., Dadabaeva R.A. Concept of strategic support systems. // Scientific journal "Problems of computer science" - Novosibirsk, Institute of Computational Mathematics and Mathematical Geophysics SB RAS, 2016, Issue 1, -p. 2-13[in Russian]

[4] SchavelyovL.V. Methods of analytical data processing to support decision making. DBMS – 1998 - № 4-5. http://infovisor.ivanovo.ru/press/paper04.html#39

[5] BekmuratovT.F., RahimovN.O. Objectives and stages of knowledge base construction of electronic information resources. Perspectives for the development of information technologies ITPA-2015. Transactions of the international scientific conference. 4-5 November. Tashkent. 2015. -p. 142-145.

[6] Inmon W. H. Building the Data Warehouse. Third Edition. - NY: Jhon Wiley &Sons, Inc. 2002.

[7] “Building the Data Mart” Marc Demarest, DBMS. - July 1994, v7, n8. P 44-50.