Application of Olap-Cubes by Monitoring Realization of University Strategy

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Abstract: In the study, advantages of multidimensional cubes use by developing the information systems are described. Application of OLAP-technology in system of monitoring realization of university strategy will allow to conduct successfully monitoring of the operational plan's indicators to make the detailed analysis of data to watch dynamics that promotes successful realization of development strategy of L.N. Gumilyov ENU. It is impossible to make any administrative decision without having information necessary for this purpose, usually quantitative. For this purpose creation of data storages that is process of collecting, elimination and preliminary data processing for the purpose of providing resultant information to users is necessary for the statistical analysis. Systems of support of decision-making usually possess means of providing modular data to the user for various selections of an initial set in a look, convenient for perception and the analysis. As a rule such modular functions form a multidimensional data set which axes contain parameters and cells the modular data depending on them. Along each axis data can be organized in the form of the hierarchy representing various levels of their specification. The technology of the complex multidimensional analysis of data received the name OLAP (On-Line Analytical Processing). The OLAP is a key component of the organization of storages of data. Thanks to such model of data users can state difficult requests, generate reports, receive subsets of data.

Key words: OLAP-technology, multidimensional cube, strategy of university, monitoring of indicators, subsets

INTRODUCTION

Today L.N. Gumilyov Eurasian National University is a higher education institution with the special status provided according to the Decree of the President of the Republic of Kazakhstan and rather high international authority; implementator of innovative technologies of educational process and successor of the best scientific traditions.

In ENU was Strategy of development of ENU for 2011-2020 years is approved. Need of strategy of development is predetermined by intensive social economic changes, new priorities in development of an education system and the country in general; basic changes in system of the higher and postgraduate education of RK, the foundation of which was laid by ratification of the Lisbon convention "About recognition of the qualifications relating to the higher education in the European region in 1997 and is fixed by signing of the Bologna declaration (2010); changes in standard and legal base: The law "About science in 2011, the law "About education in 2011, the state program of education development of RK for 2011-2020, the strategic plan of MES RK for 2011-2015, the plan of measures MES RK for 2011-2015, rules of the organization of educational process for credit technology of training in 2011, etc.

The analysis of a condition of university, mission and vision, the main strategic directions, the purposes of a task and the expected results is presented to strategy. Strategy is intended for use in work of structural divisions of university to workers of the sphere of management of the education which is trained and other interested persons (Sydykov *et al.*, 2012a).

On the basis of strategy the plan of realization of development strategy of ENU for 2012-2015 in which the strategic directions of development, the purposes, tasks and target indicators (Sydykov *et al.*, 2012b) are listed was developed and approved.

On the basis of the plan of realization of development strategy of ENU by each faculty strategy till 2020, plans of realization of strategy of development of faculties till 2015 and operational plans for the current year were developed. Need of storage, collecting planned and actual indicators of faculties, analysis, monitoring of realization of strategy of development, accounting became the basis of development of this system.

MATERIALS AND METHODS

It is impossible to make any administrative decision without having information necessary for this purpose, usually quantitative. For this purpose creation of data

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storages that is process of collecting, elimination and preliminary data processing for the purpose of providing resultant information to users is necessary for the statistical analysis. Kimball (1996) one of the researchers of the concept of data storages, described data storage as "a place where people can get access to the data". He formulated also the main requirements to data storages:

C   Support of high speed of data acquisition from storage
C   Support of internal consistency of data
C   Possibility of receiving and comparison of so-called cuts of data
C   Existence of convenient utilities of viewing of data in storage
C   Completeness and reliability of the stored data
C   Support of high-quality process of replenishment of data

The storage of data differs from a usual relational database. First, usual databases are intended to help users to perform daily work whereas storages of data are intended for decision-making. For example, sale of goods and an invoice of the account are made with use of the database intended for processing of transactions and the analysis of dynamics of sales for some years allowing to plan work with suppliers by means of storage of data.

Secondly, usual databases are subject to continuous changes in process of research of users and storage of data is rather stable: data in it are usually updated according to the schedule. In an ideal process of replenishment represents, simply addition of new data for a certain period of time without change of the former information which is already in storage.

And thirdly, usual databases most often are data source, getting to storage. Besides, the storage can be replenished at the expense of external sources for example, statistical reports.

Systems of support of decision-making usually possess means of providing modular data to the user for various selections of an initial set in a look, convenient for perception and the analysis. As a rule such modular functions form a multidimensional data set which axes contain parameters and cells the modular data depending on them. Along each axis data can be organized in the form of the hierarchy representing various levels of their specification. Thanks to such model of data users can state difficult requests, generate reports, receive subsets of data.

The technology of the complex multidimensional analysis of data received the name OLAP (On-Line Analytical Processing). The OLAP is a key component of the organization of storages of data. The concept of OLAP was described in 1993 by Codd, famous researcher of databases and the researcher of relational model of data (Codd *et al.*, 1993). In 1995 on the basis of the requirements stated by Codd the so-called FASMI test (Fast Analysis of shared multidimensional information the fast analysis of the divided multidimensional information) including the following requirements to appendices for the multidimensional analysis was formulated:

C   Providing the analysis results to the user for the acceptable time (usually no >5 c), even if at the price of less detailed analysis
C   Possibility of implementation of any logical and statistical analysis, characteristic for this appendix and its preservation available to the end user
C   The multiuser access to data with support of the corresponding mechanisms of blocking and means of the authorized access
C   Multidimensional conceptual data presentation including full support for hierarchies and multiple hierarchies (it is the key requirement of OLAP)
C   Opportunity to address to any necessary information irrespective of its volume and a place of storage

OLAP-cubes of the inter systems deep see platform are the cornerstone of this system. The OLAP technology of the Deep See gives an opportunity to analyze multidimensional data via the intuitive clear Web interface. The OLAP-cube of system is shown in Fig. 1.

The indicators in an OLAP-cube are planned and actual indicators of the operational plan, the measurements in an OLAP-cube are the strategic directions, the purposes, indicators names of faculties year. On the basis of an OLAP-cube by means of the analyzer various summary tables one of which is presented in Fig. 2 are created.

A number of interactive tooling panels with various widgets, filters, indicators is developed for granting opportunities of maintaining the analysis of data. Process of setup of the panel is shown in Fig. 3.

Panels ensure functioning with multidimensional data and provide convenient access to information for conducting monitoring.

Description of monitoring system of realization of development strategy of Enu. Administrator's subsystem. The title is presented in Fig. 4.

After an entrance to system under the administrator's profile, the main form of system shown in Fig. 5 will open.
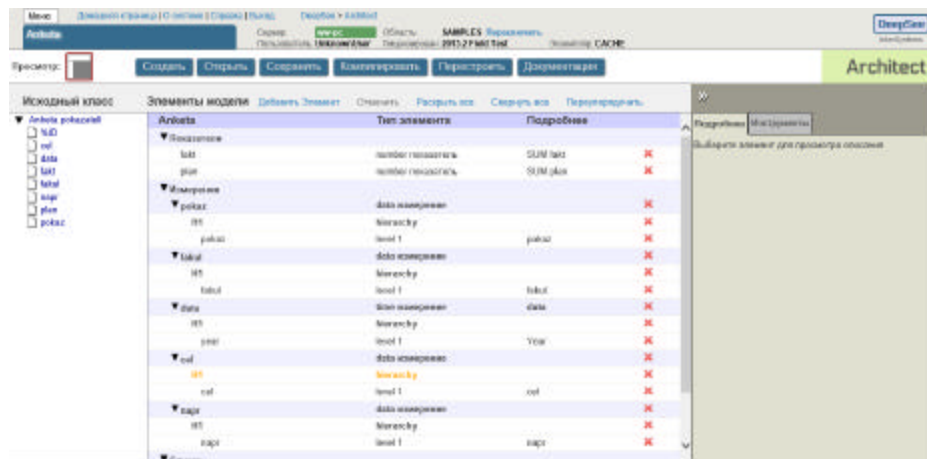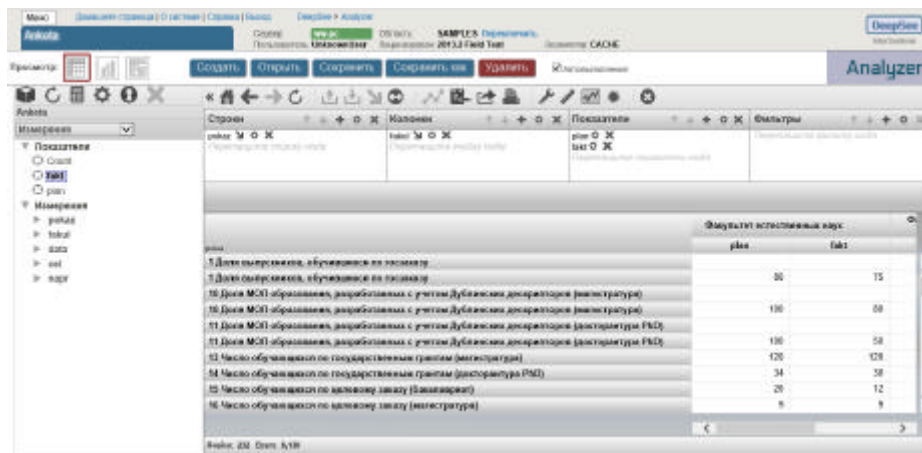
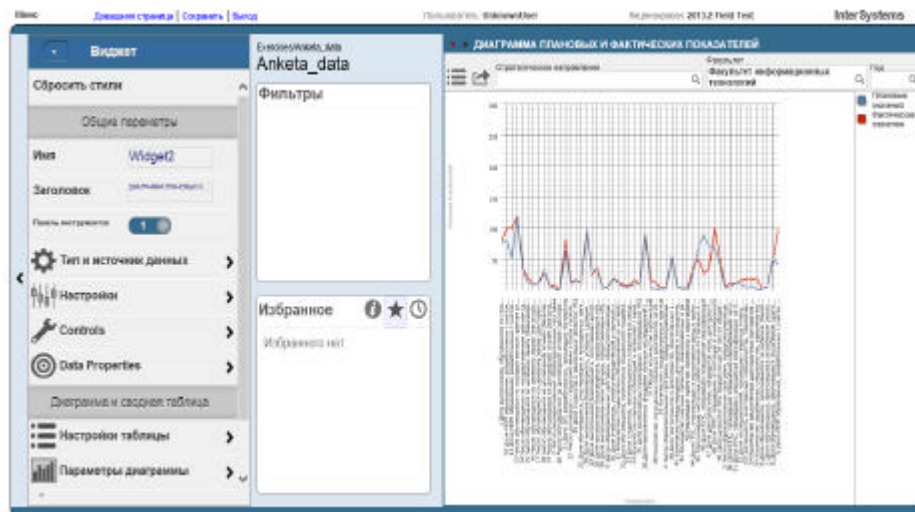Fig. 1: OLAP-cube

Fig. 2: Summary table
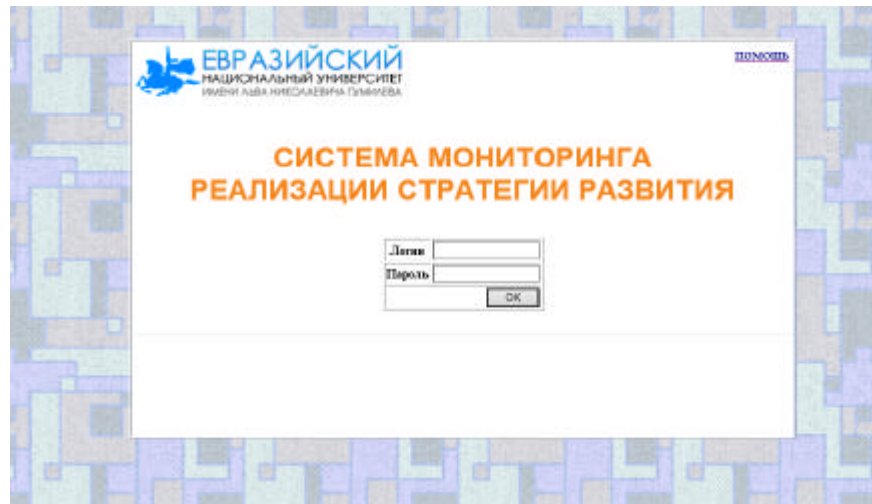

Fig.3: Creation of the tool panel

Fig. 4: Title of system

Fig. 5: Main form of system

The administrator has the rights to look through the development strategy of ENU, the plan of realization of strategy of ENU, the general operational plan, strategy, development plans, operational plans, reports of faculties, indicators and indicators of the plan of realization of strategy the chart.

RESULTS AND DISCUSSION

Viewing the strategy of the plan of realization of strategy of ENU development: For viewing of the accepted strategy of ENU till 2020, the approved plan of realization of strategy development of ENU for 2012-2015 it is necessary to press the corresponding buttons. PDF files with the text will open.

Viewing the operational plan of ENU: For viewing the operational plan of ENU, it is necessary to press the corresponding button. The form reflecting the list of the strategic directions, the purposes, planned and actual indicators will open. Planned indicators are formed of "The plan of realization of strategy", actual total indicators of faculties (Fig. 6).

Viewing the data of faculties: For viewing the data of faculty it is necessary to press the corresponding button. When choosing the Faculty of Information Technologies the form shown in Fig. 7 will open.

This form provides access to viewing the strategy, the plan of realization, the operational plan, Fig. 8 of faculty.
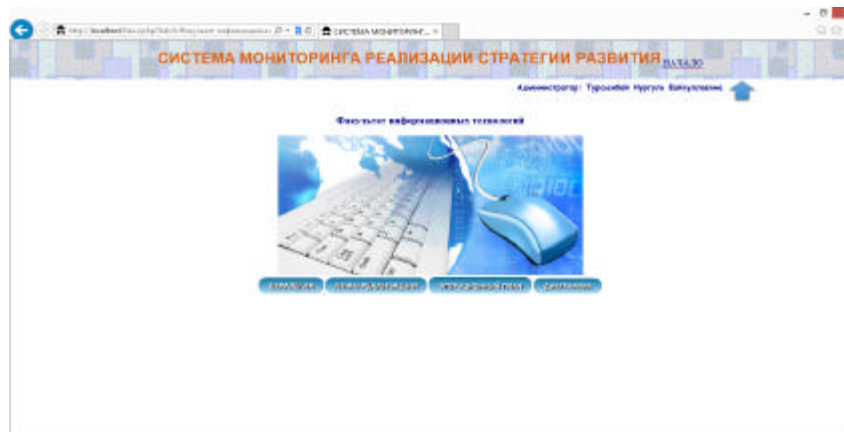
Fig. 6: Operational plan of ENU

Fig. 7: FIT page

Fig. 8: The of faculty indicators

By pressing the operational plan button the form reflecting the list of the strategic directions, the purposes, planned and actual indicators of faculty will open. Editing indicators is accessible only to the dean of the relevant faculty. For viewing Fig. 8 with planned and actual values of indicators it is necessary to press the chart button.
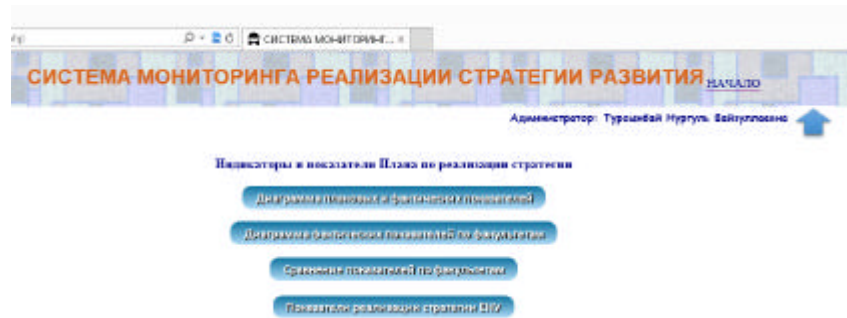
Fig. 9: Indicators and indicators of the plan on strategy realization

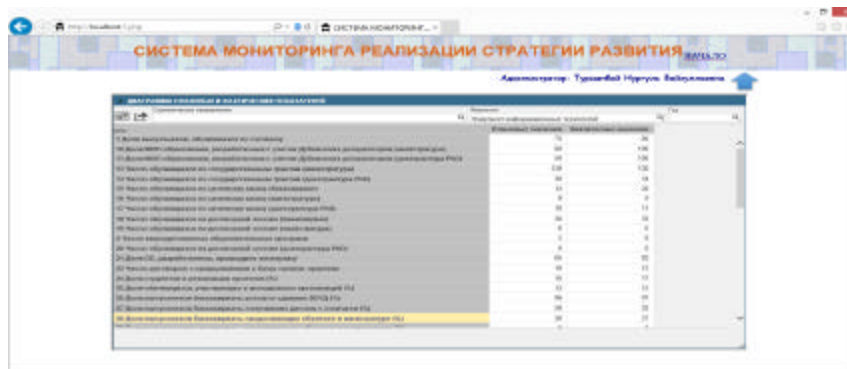Fig. 10: The of planned and actual indicators

Fig. 11: Tabulated

Planned indicators are allocated in the blue color, actual red. There is a possibility of selection according to names of the strategic directions. This chart visually displays success of implementation of the operational plan.

Viewing the indicators and indicators of the plan on strategy realization: For viewing the indicators charts and indicators of the plan it is necessary to press the corresponding button in the main form (Fig. 9).

Chart of planned and actual indicators: When choosing the "Chart of planned and actual indicators" button the form allowing to compare indicators will open. Selection in the direction, faculty and year is provided (Fig. 10).

This Fig. 11 may be presented in the form of tables for this purpose, it is necessary to press the button. For data export to Excel, it is necessary to press the button. The Excel-file with the current indicators will open (Fig. 12).
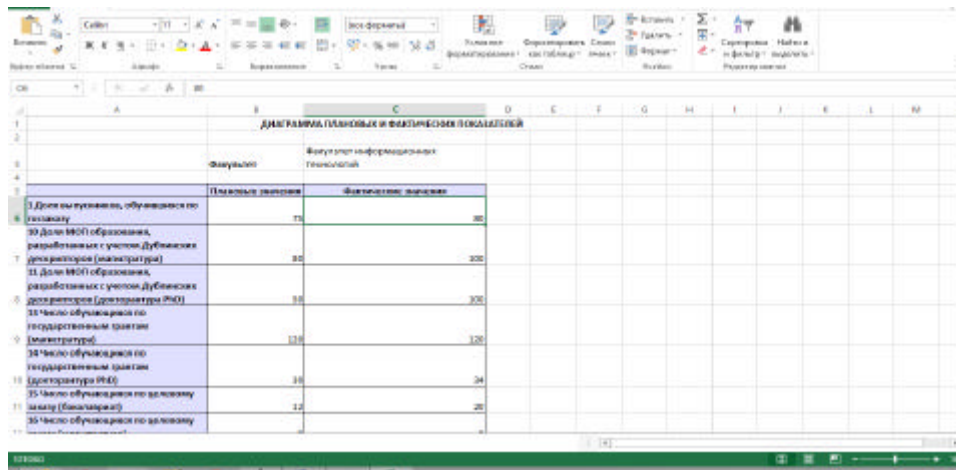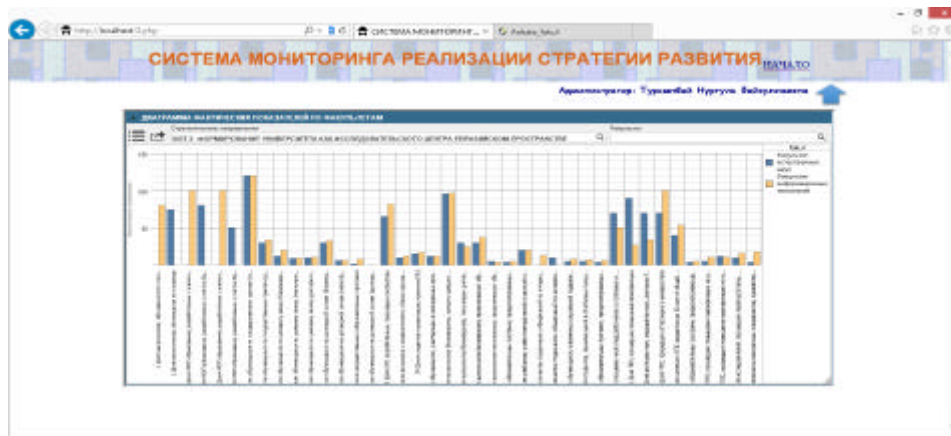
Fig. 12: Data export to the Excel-file

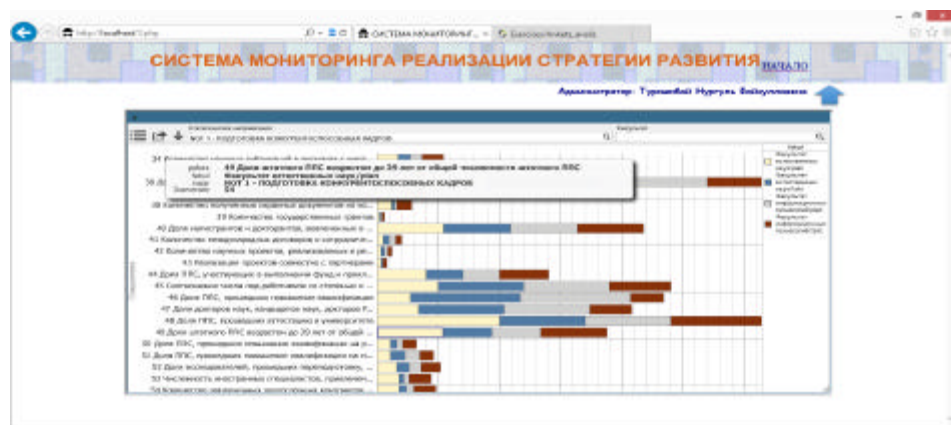Fig. 13: The faculties' of the actual indicators

Fig. 14: The faculties' indicators

The faculties' chart of the actual indicators: For comparison the actual indicators among faculties it is necessary to press the corresponding button (Fig. 13).

The chart of faculties' indicators: For comparison the planned and actual indicators of faculties it is necessary to press the corresponding button. This Fig. 14 allows to compare planned and actual indicators of faculties.
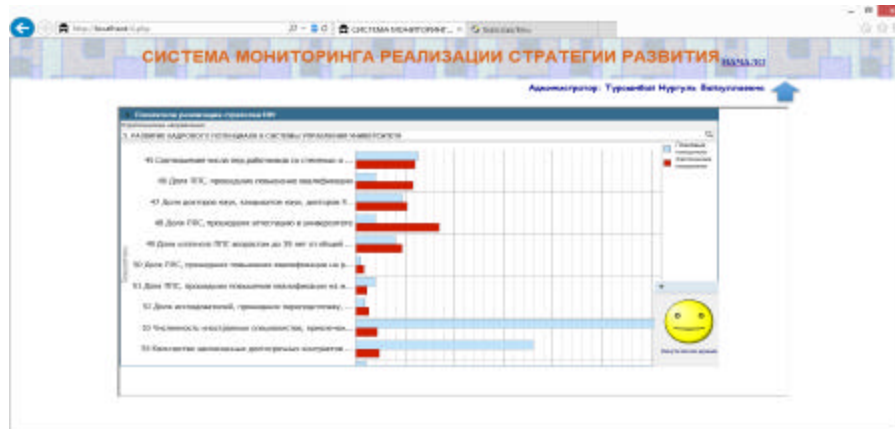
Fig. 15: Indicators on realization the strategy of ENU

Chart of indicators on realization the strategy of ENU:
For comparison the planned and actual indicators of the operational plan of ENU it is necessary to press the corresponding button (Fig. 15).

In the left bottom corner, the indicator which is visually reflecting approach of the actual values to planned values in the current year is located.

CONCLUSION

At development of the monitoring system in information system it is necessary to consider such phenomenon as forms' diversity when the same report can be presented in various form (Soomro and Baharom, 2014). It is connected with that effective monitoring requires more and more detailed reporting. That is in system, it is used more and more various charts, reports as managers want to receive the reporting in all analytical cuts interesting them. Static reports do not suit many modern managers any more. They need dynamics which the multidimensional OLAP-cube can give.

Thus, the OLAP-technology already now became an obligatory element in modern and perspective information systems. And thanks to application of OLAP-cubes the developed system will allow to conduct successfully monitoring of indicators of the operational plan to make the detailed analysis of data to monitor dynamics that will promote successful realization of development strategy of ENU.

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