

# Development of the hybrid information and analytical system for management reporting in the organization

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**Abstract.** There is an increasing emphasis on improving the efficiency of management reporting systems due to the development of information technologies. This paper describes the experience of implementing a hybrid reporting management system. The paper substantiates the choice of system components and presents a model of the proposed solution.

## 1 Introduction

Nowadays, digitalization covers almost all aspects of companies' activities [1]. The ability to manage data efficiently and use it to make strategic decisions is becoming one of the main competitive advantages. The constant growth of information volume, as well as the complexity of its processing, lead to the need to search for new approaches aimed at automating the collection, data storage and analysis [2-3]. Companies that implement such technologies are able not only to increase the speed of information processing, but also to minimize the likelihood of errors. Moreover, they get the opportunity to improve the quality of analytical conclusions significantly.

At present, one of the main tasks in the field of data management is the development of systems that combine disparate sources of information and make it possible to generate reports on its basis quickly [4]. The analysis of the process of implementing the information and analytical system (IAS) for management reporting was conducted on the example of JSC Gubernskie Apteki [5]. While the analysis a decision was made to implement a hybrid IAS for management reporting. The project is aimed at solving problems associated with the disparity of data, the high labor intensity of their processing and the problems in generating reports.

## 2 Description of a hybrid approach to management reporting

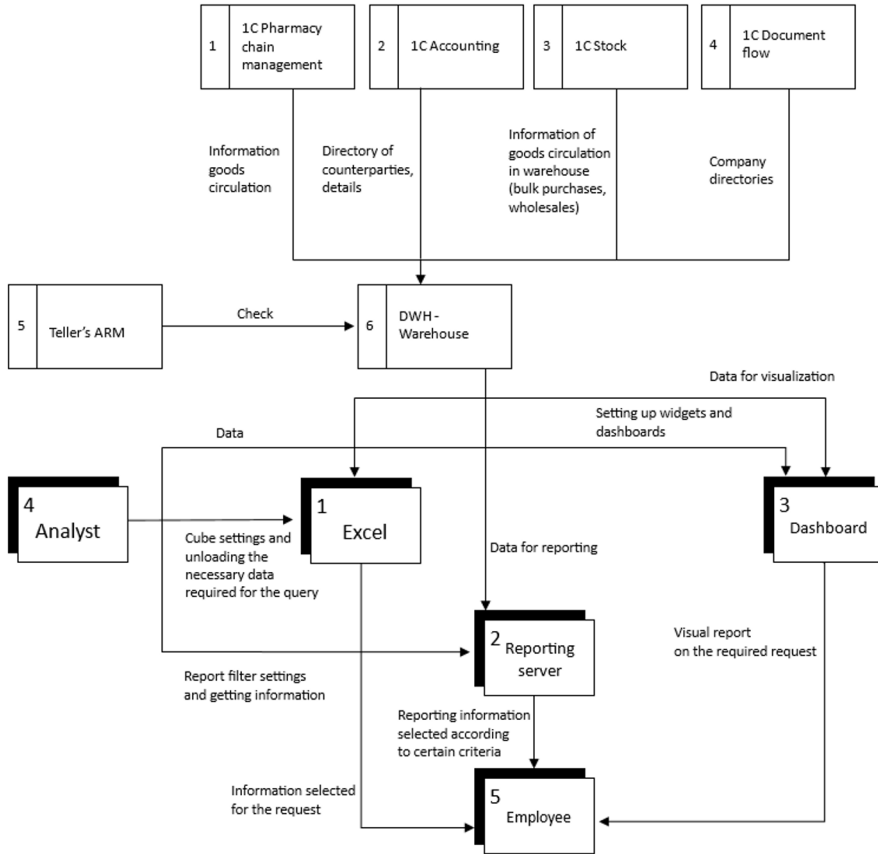
The main purpose of this work is to develop and implement a project that facilitates the automation of data management processes as well as to increase the efficiency of the analysis.

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The object of the study is JSC "Gubernskie Apteki" unites a network of pharmacies, warehouses and prescription and production units (Fig. 1).

The study included an analysis of the company's existing business processes related to reporting management. At this stage, the main problems that hinder efficient data processing were identified, such as fragmentation of information, duplication of operations, and significant time costs for preparing reports.



**Fig. 1.** Process of obtaining periodic reporting data

The following stage included studying the capabilities of modern BI systems and database management systems (DBMS) [6]. Here, the main task was to identify the most suitable tools that would meet the specifics of the company, performance requirements and import substitution conditions. This is especially relevant in the current economic conditions, when the implementation of domestic software is becoming a strategic direction [7].

The system was designed applying modeling methods. User scenarios, interfaces and functional blocks of the system were developed. Mechanisms for automatic data upload, dashboard construction as well as information visualization in a convenient form were thought out to ensure intuitive user interaction with the system.

The main purpose of the project was to develop a single platform for data management capable of automating the processes of collecting, processing and analyzing information [8]. Business processes at JSC Gubernskie Apteki were characterized by data fragmentation before the implementation of the information and analytical system. Information for reports was stored in disparate sources, such as 1C Accounting, 1C Warehouse and other internal

systems. Analysts had to extract data, clean it and reconcile it with each other manually to compile reports. It was time consuming as well as it increased the possibility of errors.

Having analysed the problems of current processes, an optimal set of tools for their automation was selected. The main emphasis was on BI systems that provide data integration, visualization and report generation capabilities. The preference was given to domestic developments such as Visiology, Modus BI, Analytic Workspace and Yandex Datalens among the available solutions. These systems met the requirements of flexibility, scalability and corresponded to the principles of import substitution. Having reviewed these BI systems, studied their characteristics, advantages and disadvantages, it is possible to make a comparative table according to the required criteria where 5 is the best score and 0 is the worst. The scores will be given according to the level of compliance of the system with the specified criteria (Table 1).

**Table 1.** Comparison of BI systems to be integrated into a hybrid system.

<b>Criterion</b>	<b>Analytic Workspace</b>	<b>Visiology</b>	<b>Yandex DataLens</b>	<b>Modus BI</b>
Variety and design of built-in visualizations	5	4	4	5
Development of advanced calculation measures and formulas	5	3	5	4
Connecting to data sources	5	4	4	4
Loading, transforming and storing data	5	3	3	5
Flexibility of the system at working with data	4	3	4	3
Self-service Problems in retraining and possibility of self-service	5	5	5	4
Development of OLAP representstion	5	3	4	4
Ability to create templates for standard reports	4	3	4	4
Presence of machine learning elements	3	3	3	3
Information support for the product	5	4	5	5
Total:	4.6	3.5	4.1	4.1

Based on the results of the table, it can be concluded that the Analytic Workspace system is the most preferred alternative for the company's requests.

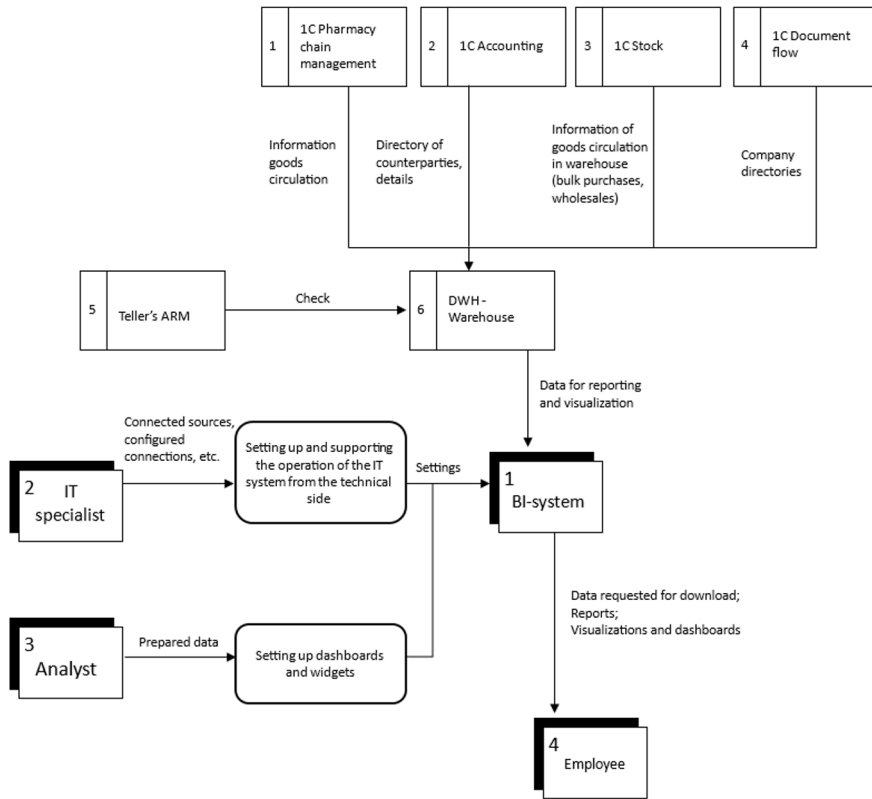
The following key tasks were completed at the project implementation phase:

Creation of a single data warehouse (Data Warehouse), which accumulated information from various sources [9]. This ensured the integration of data and its unification.

The development of a user interface with dashboards for visual display of key performance indicators of the company. Interfaces are adapted for employees without deep knowledge in the field of IT.

Setting up mechanisms for automatic data unloading using filters and parameters. This made it possible to minimize manual labor and reduce the time for preparing reports.

As a result, the following hybrid reporting management system was developed (Fig. 2).



**Fig. 2.** Process for obtaining periodic reporting data after implementation of a hybrid system

The ability to generate reports automatically taking into account the specifics of the company's work was a significant improvement. For example, data on sales, preferential vacations and warehouse balances are now easily combined into a single reporting form. Dashboards developed within the framework of the project allow employees to receive information quickly on the dynamics of indicators and visually evaluate the results for the selected period.

The results of the IAS implementation were impressive. The time spent on preparing reports was reduced from several hours to several minutes. The accuracy of data improved, as automation made it possible to eliminate human errors. Data visualization presented in the form of graphs and charts, made the information more accessible for perception. It simplified management decision-making.

Moreover, the implementation of domestic BI solutions helped the company reduce software costs and abandon foreign platforms. It meets import substitution requirements.

### 3 Conclusion

The conducted research showed that automation of reporting management processes applying modern BI systems is an efficient tool for increasing the company's productivity. The example of JSC "Gubernskie Apteki" demonstrated how the implementation of an information and analytical system makes it possible not only to reduce the time spent on data processing, but also to increase the accuracy and clarity of reporting. This, in turn, contributes to making more informed decisions and increasing the overall efficiency of activities.

The implementation of the system also proved the importance of applying domestic software solutions that meet modern market requirements. This project was not only a successful example of automation, but also demonstrated the possibility of scaling such systems to other business processes of the company.

Prospects for further research include the development of additional analytical tools, integration with external data sources, and expansion of the system's functionality. This will help the company continue to develop its analytical infrastructure and to be competitive in the market.

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