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Concept and Method for Development of Corporate Information System

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Abstract. *The report covers modern method for development of Corporate Information System (CIS). The main system-technical effect of the introduction of CIS lies in the transition from a localized, poorly synchronized, heterogeneous set of autonomous systems to a single, integrated, system architecture, which is built on the basis of a universal set of modern service tools*

Keywords *method for development, enterprise applications, corporate* ***i****information system, distributed oil and gas company, integration technology platform.*

I. Introduction and Problem Statement

The lack of a unified corporate technical policy, insufficiently managed competition between government and business structures in the market of modern software and information systems leads to the fact that many large-scale companies in the fuel and energy complex are characterized by "island" ("patchwork", "mosaic") automation [1].

In this case, for individual units of companies from various developers and suppliers, various information and software systems are purchased and implemented. Therefore, information support for decision-making by managers, especially at the upper levels of the management hierarchy, has significant drawbacks due to the intersystem inconsistency of input and output data, the fragmentation of methods and algorithms for their processing when solving such functional problems.

A very promising and modern approach to solving this problem is the comprehensive "end-to-end" automation of the main business processes of a large-scale company based on the creation and implementation of a corporate (integrated) information system [1], which has a modern multilayer and multi-level client-server architecture.

In this paper, a large-scale geographically distributed oil and gas company (OGC) is considered as an example of an industrial facility for complex automation based on the creation of a corporate information system.

II. Problem Solution and Results

The class of CIS includes integrated information systems designed for the comprehensive automation of all main activities and business processes in a company. The CIS OGC implements the process of integrating independently functioning information systems into a single management system based on a structured and orderly exchange of information between them.

All information systems included in the corporate information system must meet uniform system-wide requirements.

The main systemic effect of the implementation of the CIS OGC is the transition from a localized, poorly synchronized, heterogeneous set of autonomous systems to a single, integrated, system architecture, which is built on the basis of a universal set of modern service tools for supporting integration technologies - a corporate integration technological platform (CIP) [2].

The development and implementation of CIS OGC provides the following main advantages:

- increasing the level of standardization and unification of system elements, which significantly increases its flexibility and adaptability to changes in the external environment;
- creation of a unified information space, which ensures a significant reduction in duplication, inconsistency and inconsistency of data, as well as an increase in the reliability of information provided to end users of the CIS OGC;
- overall reduction in the level of risks and total costs of creating and owning the system;
- in the end, the successful implementation of the CIS has a significant impact on improving the efficiency and reliability of the oil and gas complex as a whole.

At the same time, the development and implementation of CIS OGC is a complex, multi-stage and very time-consuming process, carried out under strict time and resource constraints. More often than not, there is no single detailed plan for the creation of a corporate information system, and a common project is simply a combination of many poorly coordinated local solutions. This approach can be used to build a small-scale control system. In the case of developing a corporate information system for a large strategically important object (company, corporation), it becomes more and more difficult to correctly add new functions to the system. In addition, more and more errors appear in it, which are more and more difficult to correct at the stages of implementation and maintenance. A typical feature of such a system is a prolonged period of testing and preliminary testing, as well as a significant number of errors detected during trial operation.

We define the following as the most promising strategies for the development and implementation of corporate information systems:

- "extensible core";
- "pilot project";
- "parallel strategy";
- "bottleneck";
- "jump".

The first strategy is focused on the primary implementation of information, software and hardware for the basic (nuclear) set of the most significant functions, the second - on the implementation of a full-featured system for a limited set of automation objects in a specific subject area, the third - on the

parallelization of work both within individual projects and between them, the fourth - to choose as priority tasks of such functions, the ineffective implementation of which has the most significant impact on the operation of the system as a whole, the fifth is a significant replacement of outdated information systems with new ones in places with the most unreliable, obsolete and ineffectively working software and technical means.

The paper proposes the priority joint use of these strategies with the possibility of scientifically grounded their application both in individual works and in a group of projects based on the analysis of pre-project survey data, as well as monitoring the state of "inherited" and newly created components of the CIS.

The technological basis for building a unified integrated system architecture to ensure the mutually consistent and reliable functioning of the components of the CIS NGK is the corporate instrumental integration technological platform (CIP).

Instrumentation is a single set of tools combined into a common architecture based on a basic multilayer web technology, as well as technologies for integrating heterogeneous applications based on web services and an additional modern microservice architecture as a basis for the development of newly added non-monolithic software components [3].

Instrumentation provides a reduction in the total cost of ownership of corporate information systems (Total Cost of Ownership, TCO). It also facilitates efficient and mutually consistent sharing of people, information and business processes, overcomes a variety of technology constraints, and integrates applications and information from virtually every source. In addition, instrumentation ensures maximum reliability, safety, scalability and smooth execution of automated business processes.

It was proposed to include the following basic tools in the ITP:

- maintaining a single repository of system-wide metadata;
- support for object-oriented data integration technology;
- support for web integration technologies and the creation of web portals;
- support of technologies of data warehouses and OLAP;
-support for service-oriented architecture and technologies;
- support for messaging technology.

The main purpose of the instrumentation is to combine existing applications with newly created and / or implemented software and information support without stopping or disrupting the operating infrastructure, ensuring the joint functioning of heterogeneous applications, possibly not connected at the technological level, but working in a single business space. Instrumentation is a complex and multifaceted technology that covers all levels of a corporate system - its architecture, information and software, basic business processes. Instrumentation provides the following main types of integration:

- integration of business processes (Business Process Integration - BPI), when a company must define, implement and manage procedures for the exchange of corporate information between different business systems. The use of BPI can simplify business operations, reduce costs and improve responsiveness to customer requests;
- application integration (Application Integration –AI). At this level of integration, the goal is to combine the data and / or functionality of one application with another, thereby providing near real-time integration. AI is used - for B2B (Business to Business System) integration, web integration and building corporate information web portals that support the interaction of corporate users with a variety of business systems;
- data integration (Data Integration). Integration of data and database systems is a guarantee of successful integration of applications and business processes. Before embarking on integration, it is necessary to identify (locate) and catalog the data, build a data model. After completing these three steps, the data can be shared (distributed) across database systems;
- platform integration (Platform Integration).

III. CONCLUSIONS

The report discusses topical problems of automation of business processes of large-scale companies.

A comprehensive "end-to-end" approach to the automation of the main business processes of a large-scale geographically distributed oil and gas company based on the creation of a corporate (integrated) information system is proposed.

The main system-technical effect of the introduction of CIS OGC is the transition from a localized, poorly synchronized, heterogeneous set of autonomous systems to a single, integrated, system architecture, which is built on the basis of a universal set of modern service tools for supporting integration technologies - a corporate integration technological platform.

The most promising strategies for the development and implementation of corporate information systems are considered.

For the development of new non-monolithic software applications as part of the CIS, it is proposed to use modern microservice architectures, as well as supporting tools and frameworks [3].

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