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MODELING OF MANAGEMENT OBJECTS AND PROCESSES

Abstract. The article examines the main issues of modeling objects and management processes, analyzes and improves the methodological apparatus of the research. It has been proven that the majority of researchers study the system as an oriented and in a certain way directed set of elements, between which mutually determined and mediated connections of the studied area are established in a certain way. It was established that the system built in a certain way functions to achieve a defined and set goal, which is determined by the elements that are the components of this system and determined by the components of its theory considered in the study, using all levels of its abstract description. It is noted that at the theoretical-multiple level of its abstract description, with the optimal formation of all its components, the real state and prospects of its development and improvement are determined, which require the further perspective of formation, modernization and implementation of real systems. It is justified that, provided that business processes are correctly modeled, they provide an opportunity to increase efficiency and optimize the activities of the entire company, which is the main function of modeling and its practical utility. It is established that after the modeling process itself, an improvement plan must be developed and changes implemented to successfully increase the efficiency of all processes. The research of the software market made it possible to determine that today there is a sufficiently high level of services and platforms for modeling and designing business processes: from basic graphic editors that allow users to visualize the algorithm, to complex applications with analytical tools, constructors and other functions. Building a business process model is a useful method that allows you to effectively analyze, improve and optimize the company's business processes to achieve strategic goals and increase process automation and competitiveness. It is substantiated that the modeling of business processes is indirectly an organized approach to the construction of a business process, with its gradual analysis and interpretation.

Keywords: system, model, modeling, management processes, analysis, business processes.

Introduction

The company's activities consist of many business processes that are connected to each other into a single mechanism. Work productivity depends on the configuration and competent development of business processes, as well as the orientation of the business towards high results. Therefore, if a result is needed, you should regularly analyze, refine, and sometimes even rebuild systems and some processes within an organization or enterprise. Business process management can be improved and implemented using special techniques such as modeling. Particular attention should be paid to the methodology of business process modeling (BPM).

It will help to clarify why it is important to model business processes, what advantages it provides, what tasks and goals it allows to achieve. Types, stages, and BPM tools deserve detailed analysis. Through the modeling process, companies can identify their weaknesses, identify risks, optimize business processes and improve overall performance. The basic principle is to decompose cumbersome technological processes into small components. A detailed description of the elements and parts of various business processes allows in any situation to more deeply understand their essence, identify the potential for their improvement, and application in other areas of business.

The model is a textual, schematic, graphical representation of the internal processes of a business and the logical interdependence between them. Such adequate models can and should reflect: the current state of processes - how it is happening now; their desired position after making modifications, adjustments - what will happen afterwards, the result.

Analysis of recent research and publications. The problem of analyzing the evolution of the development of artificial intelligence in the direction of multimodality and transformational development in large language models (llm) has always been in the scientific focus of leading foreign and domestic scientists. It was the study of verification and interaction of information systems with the surrounding world that caused, according to scientists, this evolution of views regarding the perception of certain results that are inherently multimodal and multicomponent.

Analysis of the improvement of llm with the help of the ability to process and generate different data modalities in the field of view of a number of foreign scientists.

Poberezhny R., Kramskoi R., Pererva P. research methods of modeling the processes of management of socio-economic systems [1].

Vydrya E., Kobeleva O., Pererva R. focused on the studied structures of the enterprise's strategic innovation project and examine the content and contents of its modules [2].

Famous researchers consider the modeling processes, based on the analysis of the evolution and distribution of multimodal artificial intelligence systems and their influence on the development of the studied issues [3-6].

Others focused on the processes of modeling business processes in individual software applications, where it determines their features, advantages and disadvantages [7].

A number of modern publications are devoted to the study of best practices in the design, development and implementation of business process management systems [8-15].

Main part

Modeling is a way of researching any phenomena, processes or objects by building and analyzing their components. The term "system" has existed for more than two millennia, however, different researchers define it differently. The system can be one computer, and an automatic line or technological process in which the computer is only one of the components, and the entire enterprise or several different enterprises functioning as a single system in one industry. What one researcher defines as a system may be only a component of a more complex system for another[1-3, 5].

Based on the axiomatic statement regarding the relevance of determining that the main issues of modeling objects and management processes, there is a need for a thorough analysis and improvement of the methodological and methodical research apparatus. It should be noted that the majority of researchers study the system as an oriented and in a certain way directed collection of many elements. Note that the system functions under certain conditions, if necessary, its modification and expansion to achieve a defined and set goal, which is determined by the elements that are the components of this system, and determined by the components of its theory, which is considered in the study, using all levels of its abstract description. It is at the theoretical-multiple level of its abstract description, with the optimal formation of all its components, that the real state and prospects for its development and improvement are determined, which require further prospects for the formation, modernization and implementation of real systems.

Many researchers define a system as a purposeful set of interconnected elements of any nature. According to this definition, a system functions to achieve some goal.

This definition is quite correct for sociological and technical systems, but is not suitable for systems of the surrounding nature, the purpose of which is not always known. The definition of the concept of a system is related to an abstract theory systems, within which the following levels of abstract description are used:
– symbolic or linguistic;
– theoretical-multiple;
– abstract-algebraic;
– topological;
– logical and mathematical;
– theoretical and informational;
– dynamic;
– heuristic [4-7].

To define a certain concept, certain symbols (alphabet) are used and rules for operating them are established. A concept expressed in an abstract language means any sentence (formula) built according to the grammatical rules of this language. It is assumed that such a sentence contains selectable variables, so-called constituents, which, having only certain values, make this statement true. All statements are divided into two types: terms which point to objects, and functors that define relations between terms. The use of terms and functors makes it possible show how, based on the linguistic level, other levels can be formed abstract description of the system.

At the set-theoretic level of the abstract description of the system, it is possible to obtain fairly general information about real systems, and for specific purposes, other models are needed, which would provide an opportunity to analyze various properties of real systems in more detail. This requires lower levels of abstract description of systems, which are special cases of description of the set-theoretic level. So, if the connections between the elements of the given sets are established with the help of some single-valued functions that map the elements of the set to the original set itself, then the abstract-algebraic level of system description takes place.

In such cases, it is considered that zero, unary, binary, ternary and other relations are established between the elements of the set. If some multivalued functions are defined on these sets, then there are topological abstract models written in the language of general topology or its branches, which are called algebra topology, homologous topology, etc. p. Choosing the right level of abstract description when studying one or another real system is always the most responsible and the most difficult step in theoretical-system constructions.

This process is almost impossible to formalize and largely depends on the experience and knowledge of the researcher, his professional training, research goals, etc.[12-14].

The theory of relativity, which studies the universal physical laws that apply to the entire universe, and quantum mechanics, which studies the laws of the microcosm, are not easy to understand, and yet they deal with systems that are considered simple from the point of view of modern natural science.

Simple in the sense that they include a small number of variables, and therefore the relationship between them lends itself to mathematical processing and the derivation of universal laws. However, in addition to simple ones, there are complex systems that consist of a large number of variables and, therefore, a large number of different relationships between them.

The larger it is, the more difficult the subject of research is to achieve the final result - to deduce the regularities of the functioning of this object. The difficulties of studying these systems are also related

to the fact that the more complex the system, the more it has so-called emergent properties, that is, properties that are not present in its parts and which are a consequence of the effect of the integrity of the system.

Meteorology studies complex systems in particular, since the processes of weather formation are much less known than gravitational processes, which, at first glance, seems like a paradox.

In general, during the construction of the model, the following requirements must be taken into account:

– independence of the results of problem solving from the specific physical interpretation of the model elements; meaningfulness, that is, the ability of the model to reflect important features and properties of the real process being studied and modeled;

– deductibility;

– inductance.

Since the model is created to solve specific tasks, the model developer must be sure that he will not get absurd results, and that all the obtained results will reflect the characteristics and properties of the modeled system necessary for the researcher. System analysts use the model to make decisions and find the best ways to build or upgrade the modeled system. It is always necessary to remember that the customer is the user of the information obtained with the help of the model.

It is pointless to develop a model if it cannot be used. Moreover, working with the model should be automated for the customer to such an extent that he can work with it within his subject area. Thus, an advanced interface must be implemented between the model and the user, which is usually created using a menu system configured to use the model in a specific area. In order to implement all these methods in practice, you will need a business modeling system [8-11,14-15].

The degree of detail of the model should be chosen taking into account the goals of modeling, the possibility of obtaining the necessary input data for the model and taking into account the available resources for its creation.

The degree of detail of the model should be chosen taking into account the goals of modeling, the possibility of obtaining the necessary input data for the model and taking into account the available resources for its creation.

There are several conventional ways to create, construct and visualize a picture of processes within the framework of system modeling:

– tables,

– diagrams,

– development scenarios,

– description diagrams and so on.

Which method of describing business processes to choose depends on the preferences, objectives of the company and how many objects need to be studied.

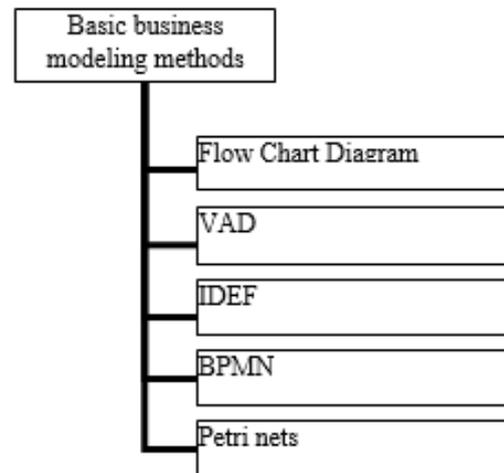Basic business modeling methods looks as shown in Fig. 1.

Fig. 1. Basic business modeling methods

If a correctly model a business process, it can help improve its efficiency and optimize the activities of the entire company. This is the main function of modeling and its practical benefits. If we consider a business not as something single and integral, but decompose its work into its component parts, then you will see a number of problems. At first glance, they may be understandable or even invisible, but in fact they greatly influence the work of the company. After the modeling process itself, it is necessary to develop an improvement plan and implement changes to successfully improve the efficiency of all processes. This means creating a model of existing interacting processes helps companies understand how they actually function. Therefore, under the condition of optimal and verified modeling of business processes, they provide an opportunity to increase the efficiency and optimize the activity of the entire company, which is the main function of modeling and its practical benefit. After passing the propaedeutic level of training, after the modeling process itself, there is a need to define and implement an improvement plan and implement changes to successfully improve the efficiency of all processes. Including finding solutions that help improve the work process. Processes mediated by BPM deserve analysis and more detailed research and looks as shown in Fig. 2.

Functional modeling involves dividing a large business process into functions, tasks and operations. In this approach, each function or task is represented as a separate element that is linked to other parts of the process itself. To interpret and describe this type of modeling, flowcharts are often used to observe exactly how the process works technically and how the process elements are interconnected. Simulation modeling of business processes allows you to focus on creating a model that, in theory, simulates the flow of a process under different conditions. Changes in the functions of the process and its properties are necessarily analyzed in dynamics. In the object-oriented modeling approach, business processes can be considered as a collection of objects that interact with each other to achieve certain goals.
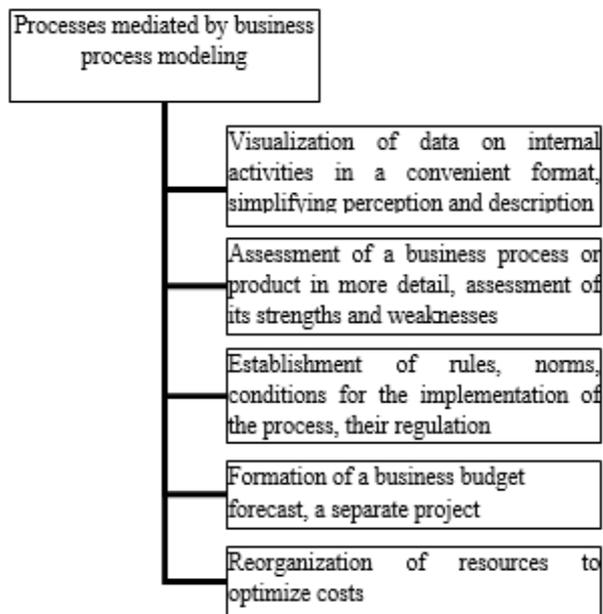
Fig. 2. Processes mediated by BPM

Each business process is a set of objects that has its own attributes and qualities.

They can be related to each other, and object-oriented modeling describes such relationships. All described types must be implemented using one of the three main methods of modeling business processes looks as shown in Fig. 3.
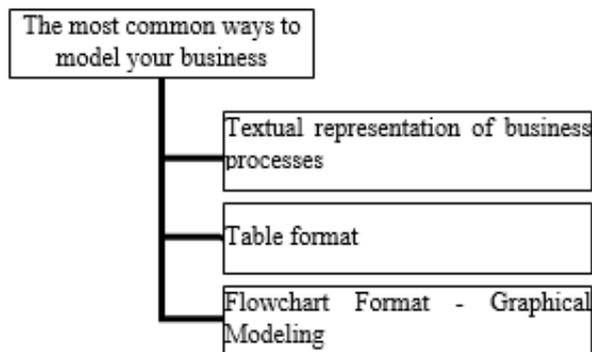

Fig. 3. The most common ways
to model your business processes

The modeling process includes a number of stages, each of which must be performed sequentially, within the framework of a specific algorithm.

To make an effective business process model, you should go through the following stages:
– studying the current state of the process,
– analyzing the information received,
– developing the desired model,
– testing the updated model, finalizing the new model.

At the first stage, an analysis of the current state and stage of execution of the business process is carried out.

The stage includes searching for information: defining the goals and objectives of the process, including the logic of its work, identifying the necessary key resources, means, and boundaries. This is the original or standard business model that will form the basis for a group of future improvements.

The second stage is the analysis of the information received, which involves the disclosure and addition of the process. It is necessary to search and identify restrictions, repetitive operations, and transitions.

Thus, at this moment we clarify, detail the "standard" model, reveal non-obvious details, functions and record the needs for changes. At the stage of developing the desired model, a model of an optimized business process is built. Based on the data obtained earlier, based on the opinions of experts and analysts, a new model is created in which the identified problems are eliminated. At the next stage, the new model is tested in real conditions, performs all functions and is introduced into the company's activities.

After this, if necessary, it should be assessed and the results of business activities identified. If defects or errors appear during actual operation of the model, it is further refined taking into account new data, changes in external conditions, requirements and goals of the company, and a new model is finalized.

As a result of the study and analysis of the software market, it can be confidently stated that today there is a sufficiently high level of services and platforms for modeling and designing business processes: from basic graphic editors that allow users to visualize the algorithm, to complex applications with analytical tools, constructors and others functions. In our opinion, designing, developing and building a business process model is a useful method that allows you to effectively analyze, improve and optimize the company's business processes to achieve strategic goals and increase process automation and competitiveness.

As a result of the conducted analysis, it can be stated that business process modeling is an indirectly organized approach to building a business process with its gradual analysis and interpretation.

Conclusions

Today on the software market you can find dozens of services and platforms for modeling and designing business processes:
− from basic graphic editors that allow you to visualize the algorithm for users,
− to complex applications with analytics tools, designers and other features.

Each tool is focused on certain types and stages of BPM, where the model must fully comply with the goals of the project and be applicable within your business, area of activity and work system.

Building a business process model is a useful method that allows you to effectively analyze, improve and optimize a company's business processes to achieve strategic goals and increase process automation and its competitiveness.

During the modeling process, it is important to consider the organization as a single system in which various structural and organizational processes are interconnected and interdependent. To do this, you need to be able to decompose each process into its components, look for interdependencies in them, build diagrams, highlight symbols and concepts, analyze them and operate with them. Business process modeling can help create an organized approach to building a business process and can also improve the efficiency of a company. But for this it is important to be able to handle models and to build the structure of the model, it is necessary to correctly interpret and analyze it.

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Моделювання об'єктів та процесів управління

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Анотація. У статті розглянуто основні питання моделювання об'єктів та процесів управління, проаналізовано та вдосконалено методологічний апарат дослідження. Доведено, що переважна частина дослідників вивчають систему як орієнтовану та певним чином спрямовану множину елементів, між якими встановлено взаємообумовлені та опосередковані певним чином зв'язки досліджуваної області. Встановлено, що певним чином побудована система функціонує задля досягнення визначеної та поставленої мети, що обумовлено елементами, які є складовими цієї системи та обумовленими розглянутими в дослідженні компонентами її теорії, з використанням всіх рівнів її абстрактного опису. Зазначено, що на теоретико-множинному рівні її абстрактного опису при оптимальному формуванні всіх її складових визначають реальний стан та перспективи її розвитку та вдосконалення, які потребують в подальшій перспективі формування, модернізації та впровадження реальних систем. Обгрунтовано, що за умови, коли правильно змодельовані бізнес-процеси, вони надають можливість підвищити ефективність і оптимізувати діяльність всієї компанії, що є основною функцію моделювання та його практичної користі. Встановлено, що після самого процесу моделювання необхідно розробити план покращення та впровадити зміни для успішного підвищення ефективності всіх процесів. Дослідження ринку програмного забезпечення дозволило визначити, що сьогодні достатньо високий рівень сервісів і платформ для моделювання та проектування бізнес-процесів: від базових графічних редакторів, які дозволяють візуалізувати алгоритм для користувачів, до складних додатків із інструментами аналітики, конструкторами та іншими функціями. Побудова моделі бізнес-процесу є корисним методом, який дозволяє ефективно аналізувати, покращувати та оптимізувати бізнес-процеси компанії для досягнення стратегічних цілей і підвищення автоматизації процесу та його конкурентоспроможності. Обгрунтовано, що моделювання бізнес-процесів опосередковано організованим підходом до побудови бізнес-процесу, з поступовим її аналізом та інтерпретацією.

Ключові слова: система, модель, моделювання, процеси управління, аналіз, бізнес-процеси.