УДК 656.07.6.3
МРНТИ 73.31.43

# METHODOLOGY FOR MODELING HYBRID ADMINISTRATIVE BUSINESS PROCESSES

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***Abstract:*** *The paper deals with methodology of modeling hybrid administrative business processes. Literature review shows that there are many definitions and interpretations of the concept of "business process". However, among researchers there is no clear definition of the hybrid business process approach in modeling of administrative activities. There was given definition to hybrid administrative business process, principles of modeling hybrid administrative business process. Business process modeling describes the logical relationship of all elements of a process from its beginning to its completion within an organization. The proposed methodology is based on the Casewise Framework methodology and ARIS House methodology. According to this methodology it is planned to describe and formalize public administrative processes. It was considered a formalized representation of the enterprise in the form of a matrix, which built on the basis of the model of Professor Zachman. Changes in the processes of a modern enterprise are carried out continuously. The same need makes it necessary to change the processes of functioning of state bodies. Therefore, "business engineering" should be viewed not as a technology for describing and re-engineering business processes during the preparation of a company or government agency for automation, but as a regular management technology based on its electronic business model. Modeling of hybrid administrative business process is explored on the case of licensing of providing scientific and research activities of universities.*

***Keywords:*** *Hybrid business process, administrative business process, business process*

## ГИБРИДТІК ӘКІМШІЛІК БИЗНЕС ҮДЕРІСТЕРІН МОДЕЛЬДЕУГЕ АРНАЛҒАН ӘДІСТЕМЕ

***Аңдатпа:*** *Мақалада гибридті басқару бизнес-процестерін модельдеу әдістемесі қарастырылған. Әдебиеттерге шолу «бизнес-процесс» тұжырымдамасының көптеген анықтамалары мен түсіндірмелерінің бар екенін көрсетеді. Дегенмен, зерттеушілер арасында әкімшілік қызметті модельдеу кезінде гибридтік бизнес үдерісінің тәсілін нақты анықтау мүмкін емес. Мақалада гибридтік әкімшілік бизнес үдерісінің анықтамасы, гибридтік әкімшілік бизнес-үдерістерді модельдеу принциптері келтірілген. Бизнес-процесті модельдеу процестің барлық элементтерінің ұйымнан бастап оның аяқталуына дейінгі логикалық байланыстарын сипаттайды. Ұсынылып отырған әдіснаманың негізі «Casewise Framework» әдістемесі мен ARIS House әдіснамасына негізделген. Осы әдістеме бойынша мемлекеттік басқару процесін сипаттау және ресімдеу жоспарлануда. Профессор Захманның үлгісі негізінде салынған матрица түріндегі кәсіпорын ресми түрде қарастырылған. Қазіргі кәсіпорынның үдерістеріндегі өзгерістер үздіксіз жүзеге асырылады. Сол қажеттілік мемлекеттік органдардың жұмыс істеу процестерін өзгертуді де қажет етеді. Демек, «бизнес-инжиниринг» автоматтандыру үшін компанияны немесе мемлекеттік органды дайындағанда, бизнес-үдерістерді сипаттау және қайта құру технологиясы ретінде ғана емес электрондық бизнес моделіне негізделген тұрақты басқару технологиясы ретінде де қарастырылуы керек. Гибридтік әкімшілік бизнес-үдерістерді модельдеу жоғары оқу орындарының ғылыми-зерттеу қызметін ұсынуды лицензиялау мысалында зерттеледі.*

***Түйінді сөздер:*** *гибридті бизнес үдерісі, әкімшілік бизнес үдерісі, бизнес үдерісі*

# МЕТОДОЛОГИЯ МОДЕЛИРОВАНИЯ ГИБРИДНЫХ АДМИНИСТРАТИВНЫХ БИЗНЕС-ПРОЦЕССОВ

*Аннотация:* В статье рассматривается методология моделирования гибридных управленческих бизнес-процессов. Обзор литературы показывает, что существует множество определений и толкований понятия «бизнес-процесс». Однако среди исследователей нет четкого определения подхода гибридного бизнес-процесса при моделировании административной деятельности. Представлено определение гибридного административного бизнес-процесса и принципы моделирования гибридного административного бизнес-процесса. Моделирование бизнес-процессов описывает логические отношения всех элементов процесса от начала до его завершения в организации. Предлагаемая методология основана на методологии Casewise Framework и методологии ARIS House. Согласно этой методологии планируется описать и формализовать процессы государственного управления. Было рассмотрено формализованное представление предприятия в виде матрицы, которая построена на основе модели профессора Захмана. Изменения в процессах современного предприятия осуществляются непрерывно. Эта же необходимость делает необходимым изменение процессов функционирования государственных органов. Следовательно, «бизнес-инжиниринг» следует рассматривать не как технологию описания и реорганизации бизнес-процессов при подготовке компании или государственного учреждения к автоматизации, а как технологию регулярного управления, основанную на модели электронного бизнеса. Моделирование гибридного административного бизнес-процесса исследуется на примере лицензирования обеспечения научно-исследовательской деятельности вузов.

*Ключевые слова:* гибридный бизнес-процесс, административный бизнес-процесс, бизнес-процесс

## INTRODUCTION

One of the first problems that state digital transformation agencies face is changing their IT infrastructure. In an effort to meet the demands of citizens, they will be forced to learn to exist in a hybrid infrastructure, realizing some services by their IT department, while others will be acquired from outside. The concept of a hybrid business process defines a process where execution mechanisms are not only people, tools, but various IT services and robots. development of an automated system for transforming components of structural modeling language diagrams into class diagrams based on hybrid adaptive technology for designing business processes, including IDEF0, UML, OWL, RDF, XML, XSLT. The process model must meet the requirements of modeling, so that all users of the model (and this can be both government officials and information systems) unambiguously interpret all information from the model.

## PRINCIPLES OF HYBRID BUSINESS-PROCESSES

To meet the requirements of business process modeling, in addition to observing the modeling notation, it is necessary to comply with the following principles that affect the properties of the model [1]:

1. The principle of feasibility. The created model of the business process should ensure the achievement of goals. The boundaries of the modeling area, goals and quantitative indicators of their achievement should be clearly defined;

2. The principle of information sufficiency. Provides the necessary critical level of a priori information about the object, at which the transition from the stage of collecting information to the stage of building a model is carried out.

3. The principle of multiplicity of the model. The model created should reflect the process under consideration from different angles and with different details.

4. The principle of aggregation. The created business process model should provide an opportunity to adapt quite flexibly depending on the changing requirements as the project progresses, to offer various options for building a model, regrouping the subsystems and changing the relationships between them.

5. The principle of separation. The created business process model should ensure the isolation of components whose internal structure is not of direct interest for the purposes of the pro-

cess for which only significant input and output information flows are defined.

## METHODOLOGY

The business process methodology includes a set of rules relating to the creation of a holistic model and includes a description of the levels of abstraction, sources and methods of collecting information for constructing individual diagrams, etc. The notation mostly affects the issues of dis-playing individual diagrams, and not the model as a whole. It is precisely the clarity and clarity of the chosen methodology that largely determines the achievement of the goals set. The most well-known methodology is the Casewise Framework methodology, based on the model of Professor Zachman [4].

The essence of the Zachman model is reduced to a formalized representation of the enterprise in the form of a matrix (Table 1). Designers, together with customers, should form models of the subject (problem) area, reflecting the content side of the system, while designers lay down the technological requirements for the implementation of the system, hidden from the users view.

The rows of the table reflect the levels of representation of the system, these include the levels of modeling, the levels of solving design problems. In more detail these are the following views:

— business environment of the system,
— conceptual model,
— logical model
— technological, "physical model",
— detailed implementation (often block by block),
— user representation (maintenance).

Selected aspects, the columns of the table, actually reflect the sections providing the system:

— information support (data),
— functional support (functions)
— communication support (network)
— organizational support (organization structure), etc.

The described sections of the software and the presentation levels of the Zachman scheme are a classification of the entities of the enterprise and its information system.

The rows of this matrix describe the subject (problem) field models from the perspective of various categories of participants in the design process, which include representatives of future users of the system (customers), designers (consultants) involved in the process of obtaining and developing knowledge about the problem area and formulating IP requirements; developers and operators of IP.

Based on the requirements model, the IS developers carry out the technological detailing of the project and its sub-sequent implementation. On the basis of the developed working documentation and the resulting final product of the system, the operators support the operation of the system in new conditions.

Architectures consider the system in the context of the same aspects, but from different angles of view as shown in the table 1.

The main aspects of building architectures are the following:

- goals, business rules (the motivation for why the system is functioning);
- objects (which is undergoing conversion);
- functions (how the conversion is carried out in the process);
- participants (subjects) of the process (who carries out the process);
- place (where the process is performed);
- time (time requirements for process performance, events).

The first two lines show models related to the point of view of future users of the system, the third line corresponds to the view of the consultant designer, the fourth and fifth lines are from the point of view of the IP developer, and the sixth line is from the points of view of operational services.

The approach based on Zachman's architectures does not define the actual methods for constructing models of the problem domain, however, the developed methodologies for modeling domain domains imply the implementation of the principles of consistent detailing of abstract categories: goals, objects, functions, organizational units, etc. at the levels of determining the requirements for the system, their specifications and implementation.

**Таблица 1 – Matrix of consistent models in architectures**

| | Models | Motivation (Why?) | People (Who?) | Functions (How?) | Data (What?) | Network (Where?) | Time (When?) |
|---|---|---|---|---|---|---|---|
| 1 | Scope Contextual | | | | | | |
| 2 | Business model Conceptual | | | | | | |
| 3 | System model Logical | | | | | | |
| 4 | Technology model Physical | | | | | | |
| 5 | Components | | | | | | |
| 6 | Functioning system | | | | | | |

At that time, the methodology used by ARIS supports four types of models reflecting various aspects of the system under study [5]:

- organizational models representing the structure of the system - a hierarchy of organizational units, positions and specific individuals, a variety of links between them, as well as the territorial linking of structural units;

- functional models containing a hierarchy of goals facing the management apparatus, with a set of trees of functions necessary to achieve the goals;

- information models reflecting the structure of information necessary for the implementation of the entire set of system functions;

- management models representing a comprehensive view of the implementation of business processes within the system.

Within each of the listed types, models of different types are created, reflecting the corresponding sides of the system under study. ARIS supports a large number of modeling methods used to construct these models. Among them are such well-known as Chen diagrams, Unified Modeling Language (UML), Object Modeling Technique (OMT), etc.

The advantage of this approach is that in the process of analysis, each side of the system can be given special attention, without being distracted by its relationship with other parties. And only after a detailed study of all aspects can we start building an integrated model that reflects all the existing links between all aspects of the system.

In addition, ARIS does not impose restrictions on the sequence of development of the above four aspects. The process of analysis and design can begin with any of them, depending on the specific conditions and the goals pursued by the developers. Convenient and effective means of modeling and navigation, as well as support for full-fledged multi-user work allow you to simultaneously work on all aspects.

Another feature of the ARIS methodology, which ensures the integrity of the system being developed, is the use of different levels of description, which supports the theory of the life cycle of the system existing in the field of information technology. The ARIS Toolset uses a three-phase life cycle model, i.e. Each of these aspects has three levels of representation:

1. The level of definition requirements. At this level, models are developed that describe what the system should do - how it is organized, what business processes are present in it, what data is used.

2. The level of design specification. This level corresponds to the concept of an information system that defines the main ways of implementing the requirements presented at the second stage.

3. Level of implementation description. At this stage of the life cycle of creating information systems, the specification is transformed into a physical description of specific software and hardware. This is the final stage of system design, followed by the stage of physical imple-

mentation (programming). The level of implementation description generates documents on the basis of which it is possible to ensure the process of developing program modules (or selecting ready-made software components that meet the requirements), as well as the selection and organization of technical means for implementing the system.

The methodology should provide the availability of clear information about the levels of abstraction used to create the model and their main users.

For each of the levels of abstraction there should be a set of rules defining which processes and organizational units of which should be present at each of the levels of abstraction (and which should not). The methodology should have a clear structure, ensure communication between the layers, since the model being created must be structured, rigorous and complete.

The need to adequately respond to the challenges of a changing environment makes it necessary to change the processes of functioning of state bodies. Therefore, "business engineering" should be viewed not as a technology for describing and reengineering business processes during the preparation of a company or government agency for automation, but as a regular management technology based on its electronic business model.

It is possible to single out the main processes of state administration, in the modeling of which it is advisable to apply business engineering:

procurement for state needs;

issuance of licenses for the implementation of a certain type of activity to legal entities and citizens;

issuance of permits for the implementation of specific actions to legal entities and citizens;

permissive registration of acts, documents, rights, objects;

notification registration of acts, documents, rights, objects;

setting prices and tariffs;

issuance of documents to citizens and legal entities;

granting rights to use natural resources;

determining the right to make payments from the budget and ensuring such payments;

implementation of the powers of the owner in relation to state property;

organizing the provision of budget services.

Technology business engineering can be an integrating environment for all management subsystems in government. The task of managers is to manage the electronic restructuring of structures and processes occurring in organizations.

Models of state bodies, as enterprises for the provision of public services, supported by appropriate tools, should become an integral part of the information system of the "electronic state", giving its managers and citizens-clients the opportunity to observe an accurate and complete picture of the organization of any activity, as well as its restructuring. The ability to have integrated knowledge of the entire system of processes in relation to the knowledge of the goals and strategies of an enterprise or a state institution is achieved by special ways of organizing information and special software.

## USE CASE OF HYBRID BUSINESS PROCESSES IN GOVERNMENT ORGANIZATIONS

As we mentioned in the previous section there are many automated services on the portal of electronic government. However, the service of licensing of providing scientific and research activities of universities is still not automated. Scientific and research activity is the crucial part of the modern university. That is why we decided to consider this service.

The issuance of a license for scientific and research activities can be represented by the following steps:

1. The state service "Licensing of universities to engage in scientific activities" is provided by the Committee for Control in the Field of Education and Science of the Minis-try of Education and Science of the Republic of Kazakhstan and the territorial Departments of the Committee for Control of Education and Science of the Ministry of Education and Science of the Republic of Kazakhstan [2].

Acceptance of the application and issuance of the result of the provision of public services is

carried out through the web portal of "electronic government" www.egov.kz (hereinafter - the portal).

The basis for the commencement of the procedure (action) for the provision of the state service is the receipt by the service provider of the electronic request of the service recipient through the portal with the necessary documents attached.

5. The content of the procedure (actions) that is part of the process of providing a state service for issuing a license:

Process 1 - registration of an electronic document (request of the service recipient) and processing the request on the portal;

process 2 - service provider checking the completeness of the submitted documents

process 3 - the service provider's verification of the service provider's compliance with the qualification requirements and grounds for issuing a license;

Process 4 - generation of a denial message in the requested service, or generation of the result of the service, due to the compliance of the service recipient with the qualification requirements and grounds for issuing a license. An electronic document is generated using an electronic digital signature (hereinafter - EDS) of the authorized person of the service provider.

## CONCLUSION

Before making decisions on modeling the business processes of government agencies, it is advisable to clearly see and evaluate the existing picture of activity. The easiest way to do this is in the format of an organizational-functional model (Zachman methodology). To fix first, "why" (goals) and "what" (functions) to do, and then "how" and "why" process (technology of activity) is written. That is, the process of developing a business model itself reflects the real way of an organization when moving from a function-oriented structure to a process one.

If for business, both customers and employees of the firm must know what it produces, for which the company has price lists, then the government needs a similar document with the status of a state standard ("state service register"). After fixing and fixing the functional behind the organizational units of the state body, the transition to identifying the existing interactions of the processes and identifying them "as is" (ARIS methodology) is possible.

## ACKNOWLEDGMENT

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