

# Scenario modeling as method of staff training in the organization

## Modelado de escenarios como método de capacitación del personal en la organización

Andrei V. SOROKO [1](#); Dmitry S. SHEMONCHUK [2](#); Valery V. BONDALETOV [3](#); Pavel A. BAKLANOV [4](#); Elena A. ZVEZDINA [5](#)

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#### ABSTRACT:

Currently, the comprehension of the fact that the level of personnel's professional competence is the core of competitiveness of the organization does not cause any doubts among the chief executives of both domestic and foreign companies. In this regard, the present traditional forms of staff training technologies are being actively replaced by emergent informal extracurricular learning, among which the greatest interest is caused by technologies based on a wide application of electronic games. Scenario modeling as a form of employee training is becoming increasingly popular in corporate training. The present article concerns problems and peculiarities of the modeling of learning games, as well as presents the experience of the research team of the Moscow Technological University (MIREA) in modeling of simulation business game.

**Keywords:** business games, simulation games, staff training

#### RESUMEN:

Actualmente, la comprensión del hecho de que el nivel de competencia profesional del personal es el núcleo de la competitividad de la organización no genera dudas entre los directores generales de las empresas nacionales y extranjeras. En este sentido, las formas tradicionales actuales de las tecnologías de capacitación del personal están siendo activamente reemplazadas por el aprendizaje extracurricular informal emergente, entre los cuales el mayor interés es causado por tecnologías basadas en una amplia aplicación de juegos electrónicos. El modelado de escenarios como una forma de capacitación de los empleados se está volviendo cada vez más popular en la capacitación corporativa. El presente artículo se refiere a problemas y peculiaridades del modelado de juegos de aprendizaje, así como presenta la experiencia del equipo de investigación de la Universidad Tecnológica de Moscú (MIREA) en el modelado de simulación de juegos de negocios. Palabras clave: juegos de negocios, juegos de simulación, entrenamiento del personal

## 1. Introduction

Currently staff training is one of the most important policies in contemporary organizations

which think about their prospects for the future. The experience of most countries shows that exactly the knowledge, skills, and high level of staff competence are a key to the organization's sustainability and success in the market, since they form the foundation for the further development of the organization (Bondaletov 2009; Vinichenko, Frolova, Maloletko, Bondaletov and Rogach, 2016; Ryabova 2017).

Different models of knowledge transfer have been developed in the modern world over time. Almost all of them in one way or another have found their place in the training system of the organization's staff. At the present time, one of the traditional training models, most successfully used both in Russia and abroad is mentoring and its various forms, such as "shadowing" and "buddying", which complement the mentoring method and increase its effectiveness.

Shadowing method (derived from English word "shadow") is widely used in England and the USA (it is used by approximately 71% of companies). The essence of this method is that the newcomer is attached to his mentor and follows him-literally-as shadow, observing all working processes that are carried out by the mentor. This method is relatively simple, and allows complete immersion of the employee in all real operating conditions that leads to more quick adaptation of a new employee.

The learning method such as buddying (derived from English "friend, buddy") differs from the preceding method by the fact that employees involved in this training method are absolutely equal, and this method does not imply the mentor and mentee or "older" and "younger". The method is characterized by providing objective and honest information while performing tasks that are directly associated with the preparation and development of new skills, and allows a deeper dive into core business processes.

The mentoring method and its most contemporary forms, despite having a number of advantages, are characterized by serious disadvantages. The most significant disadvantage is the reduction of the operating and economic efficiency of highly qualified employees involved as mentors. Another important disadvantage is the unstructured presentation of information (knowledge and skills), the lack of the algorithm and the pedagogical teaching methods. To minimize losses and optimize the learning process, as well as to achieve the same success in training, as that of mentoring, many companies are implementing informal extracurricular leaning technologies. These technologies are based on the extensive use of electronic games. For example, L'Oréal uses "Hair-be 12" training game, which develops key skills in employees of hairdressing salons. In the MITRE Corporation, the employees are involved in "Honorable Work" 3D-game. In Renault the game teaches the service standards in the car-care center. The Hilton Hotel chain uses virtual guest service trainer. The British Gas company is using a training course of effective communications and troubleshooting for service engineers.

Despite the undeniable advantage of simulation gaming techniques compared to other forms of staff training, chief executives of Russian companies and state authorities yet pay little attention to the use of e-learning methods and technologies (Nikolaev, Novikov and Tikhonov 2014). Problems are associated primarily with the complexity in the description of particular business situations and the weakness of the means of their simulation. Therefore, the development of simulation games occurs on a proactive basis and within the frameworks of educational or research institutions. Case in point is board game "Personnel Management", which is developed proactively by research team of the Moscow Technological University (MIREA) under the supervision of Doctor of Economics A.V. Soroko. Analyzing the market of simulation games, we have come to the conclusion that none of games presented on the Russian market is aimed at increasing administrative literacy of personnel. No doubt, there are objective reasons, which are associated with the lack of unified regulations of the administrative activities in business sector organizations. Therefore, our choice fell on government service. In this sector, business games can be used to simulate the following processes: personnel management, interagency coordination of documents, budget planning management, budget execution management, etc. (Golovanova and Soroko 2017).

The purpose of developing this game is to reduce the number of incorrect or erroneous actions undertaken by civil servants when performing official duties.

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## 2. Methods

To achieve the set objectives, we used principles and methods of conducting business games, in which various processes related to the activities of state bodies and officials were imitated. When developing simulation models, the authors used a method of constructing visual graphical models. A method of visual simulation modeling of spatial-temporal relations as applied to the study of the human factor in organizations had been widely used in the publications of Yu. D. Krasovsky (1989).

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## 3. Results

### A preparatory stage

The complexity of modeling such games comes from the fact that:

- simulation studies usually use models constructed based on production rules and semantic modeling diagrams. Simulation models allow simulating activities of employees in real time mode;
- in the simulation the objective reality is replaced by virtual reality: real employees are replaced by the main characters of these employees, real information about the processes is replaced by a pseudo real information obtained through processes simulation, while time scale for decision-making is compressed in the course of the task;
- the main characters (an employee and a citizen of the Russian Federation) should be able to act and possess knowledge in all processes used in the business game, they should have ideas about possible actions in the course of their activities;
- subsidiary characters should be necessarily involved as experts (head of structural unit, and direct supervisor of an employee) for the preparation of documents at the preparatory phase and evaluation of the business game results; the immediate supervisor of the civil servant should carry out an evaluation of the results of his subordinates in the business game.

The above-mentioned difficulties make corresponding impact on requirements regarding the development procedure of simulation games and distribution of roles:

1. The goal of the main characters is improving knowledge about the processes in which they are involved.

The objectives of the main characters include:

- developing educational learning material on processes;
- developing rules, procedures and mechanisms of conducting business games;
- involving in business games and getting maximum result based on the business game evaluation.

2. The goal of the subsidiary characters is the formation of an attractive image of business games.

The objectives of the subsidiary characters include:

- preparing educational learning material on HR processes and procedures;
- preparing business game scenarios;
- managing the business game process;
- providing expert evaluation of business game participants.

3. Processes used in business games should be provided with corresponding written list of regulatory legal acts. List of regulatory legal acts consists of the following parameters:

- type of the regulatory legal act (law, order, or instruction);
- date of publication;
- number of normative legal act;
- title;
- the process;
- execution parameters;
- key points;

- process participants;
- execution evaluation parameters.

The normative legal acts must contain references to sections of the document (or texts of document sections) that refer specifically to the processes used in the business game.

Normative legal acts must be arranged in accordance with the hierarchy to detail and clarify the documents' provisions.

A normative reference base of processes for conducting business games should be formed at the preparatory stage.

When changing normative legal acts, the regulatory reference database must be changed accordingly.

4. Formalization of the formed normative reference database is carried out using a simulation model built on production rules and semantic schemes.

In the course of formalizing normative reference database in accordance with the principles of constructing production rules, it is necessary to create or adjust a set of conditions  $U = \{u_1, u_2, u_3, \dots, u_k\}$  and the set of actions  $D = \{d_1, d_2, d_3, \dots, d_n\}$  for the processes involved in the business game. Upon completion of forming the set of conditions and actions, it is necessary to check independently the consistency and coherence of the sets  $U$  and  $D$ . For this purpose it is necessary to take advantage of developed specialized algorithms or use existing methods of information processing.

Based on the sets  $U$  and  $D$ , the production rules  $P = \{p_1, p_2, \dots, p_l\}$  are generated in the following form:

P1: If  $u_1 \ \& \ u_3$ , then  $d_1$ ;

P1: If  $u_2$ , then  $d_2$ ;

.....

Pl: If  $u_3 \ \vee \ u_3$ , then  $d_3$ ;

Schematically, the production rules are shown as flowcharts.

Production rule reflects the specific atomic recruitment procedure in the recruitment process.

Based on the sequence of production rules we generate scenarios for business game in the form of a set  $S = \{s_1, s_2, s_3, \dots, s_m\}$ . The scenario consists of a certain sequence of production rules  $s_i = \{p_1, p_4, p_{20}, p_8\}$ .

In the course of constructing production rules we must adhere to the principle of credibility of the simulated situation. Description of game activities should be maximally close to real situations.

The likelihood principle in the simulation game is implemented through the

- reaction of the external environment;
- the set of game forms of plan and accounting documents (which should be exactly the same as in reality);
- managerial decisions making procedures, bringing them to the performers;
- interaction of game participants;
- organization of business meetings and sessions by analogy with the real practical situation.

5. After creating business game scenarios based on processes and procedures, we form guidance materials, which consist of the following teaching aids:

- teaching aids for acquaintance with a subject area (process and procedure);
- the scenarios implementation program (the list of scenarios, amount of time needed to progress through the scenarios, and possible solutions);
- materials, which allow carrying out the assessment of scenarios implementation results.

The computer game "Personnel Management" acquaints employees to the compliance with administrative regulations.

The main stage of the proposed game is an active part of the game. In accordance with the training materials developed during the preparatory phase, participants are preparing for conducting business game. The acquisition of theoretical skills is carried out through the

different forms of training, which include:

- lectures;
- seminars;
- practical studies.

In the course of training, participants should be prepared to participate in a business game which is conducted on the basis of the following principles.

1. The principle of the gradual mastering of the learning material by game participants. This involves the following:

- the first stages of a business game should be maximally simplified;
- adjustment and mastering the principles of the business game;
- the study of problems should be based on the experience of trainees in the course of the business game.

The use of above provisions will mobilize trainees to work productively with all course materials.

2. The principle of equal portions of game information. The principle involves organizing simulation games in such a way, where trainee acquires equal portions of new information each gaming day.

Before beginning the business game, participant is given a list of processes and procedures in the form of formalized scenarios, which he must resolve.

In the course of the business game, the conditions of a production rule  $u_j$  of the scenario  $s_i$  are displayed to the participant. The participant must choose the correct actions  $d_z$  with respect to the proposed condition. Correct actions are made by the participant independently or chosen from a given list of possible actions.

The following restrictions can be imposed in the course of implementing the scenario:

- change in the time limit for implementing the scenario.
- implementing additional scenarios in the course of business game;
- operational changes in scenarios' implementation terms;
- change of the gaming parameters.

Analysis and evaluation of results are carried out according to the following criteria:

- comparison of problems and phenomena that took place in the business game;
- determination of compliance of a business game to real life;
- evaluation of the decisions taken during the business game, their effectiveness, moral or value sense;
- identifying the causes of positive and negative behavior of participants in the business game;
- proposals for changes in the business game scenarios, as well as the actions of participants to achieve the best results;
- suggestions for improving the quality of professional activity.

### **An example of using the production model for the business process entitled "Granting Vacation"**

To simulate staffing process of "Granting Vacation" using a production model, it is necessary to determine the following model components:

1. Participants. Process participants involve civil servant, head of the civil servant, human resources employee, and financial services employee.
2. Conditions. We define the set of process conditions  $\{U\}$  comprising of the following elements (Table 1).

**Table 1**  
Elements of the set of conditions

No.	Conditions	Condition Code
1.	Application on granting vacation has been received	u1

2.	Application on granting vacation signed by all heads	u2
3.	Application on granting vacation left without signatures of the heads	u3
4.	Does not coincide with the vacation schedule	u4
5.	Coincides with the vacation schedule	u5
6.	A specified number of vacation days exceeds the number of authorized days	u6
7.	A specified number of vacation days does not exceed the number of authorized days	u7
8.	Order on granting vacation has been issued	u8
9.	Order on granting vacation has been signed	u9

3. Actions. We define the set of process actions  $\{D\}$  comprising of the following elements (Table 2).

**Table 2**  
Elements of the set of actions

No.	Actions	Action Code
1.	Execution of the order on granting vacation	d1
2.	Application on granting vacation has been returned	d2
3.	Notification concerning violation of the limit of the number of vacation days	d3
4.	Notification concerning violation of vacations schedule	d4
5.	The order for granting vacation has been signed	d5
6.	Verification for presence of all heads' signatures	d6
7.	Verification for compliance with vacation schedule	d7
8.	Verification for valid number of vacation days	d8
9.	Notification concerning signing the order on granting vacation	d9

3. Rules. We define multiple process production rules  $\{P\}$  comprising of the following elements (Table 3).

**Table 3**  
Production rules

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No.	Conditions	Correct actions	Incorrect actions	Rule Code
1.	u1 & u2	d1	d2	p1
2.	u1 & u3	d2	d1	p2
3.	u4	d4	d5	p3
4.	u6	d3	d2	p4
5.	u5	d5	d4	p5
6.	u1	d6		p6
7.	u2	d7;d2		p7
8.	u5	d8;d4		p8
9.	u6	d1;d3		p9
10.	u8	d5		p10
11.	u9	d9		p11

4. Scenario. We define the set of scenarios  $\{S\}$  for business game of stuffing process of "Granting vacation", which comprises of the following elements (see Table 4).

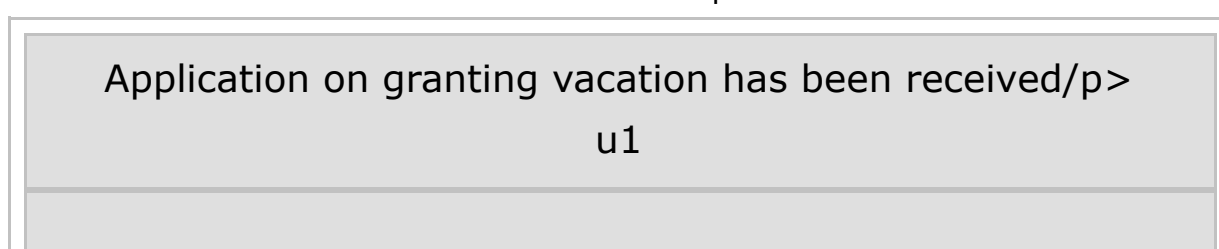
**Table 4**  
Elements of the set of business game scenarios

No	Scenario Title	Scenario Code	Sequence of rules usage
1.	Successful scenario of granting vacation	s1	{p1, p5}
2.	Extremely unsuccessful scenario of granting vacation	s2	{p2, p3, p4}
3.	Successful detailed scenario of granting vacation	s3	{p6 – p11}

Schematic representations of production rules in the form of flowcharts are presented in Figs. 1-6.

Production rule p6 is presented in Fig. 1.

**Figure 1**  
Production rule p6.



Verification for presence of all heads' signatures  
d6

Production rule p7 is presented in Fig. 2.

**Figure 2**  
Production rule p7

Application on granting vacation signed by all heads u2
Application on granting vacation has been returned d2
Verification for compliance with vacations schedule d7

Production rule p8 is presented in Fig. 3.

**Figure 3**  
Production rule p8

Coincides with the vacation schedule u5
Notification concerning violation of vacations schedule d4
Verification for valid number of vacation days d8

Production rule p9 is presented in Fig. 4.

**Figure 4**  
Production rule p9

A specified number of vacation days exceeds the number of authorized days u6
Notification concerning violation of the limit of the number of vacation days d3
Execution of the order on granting vacation d1

Production rule p10 is presented in Fig. 5.



**Figure 5**  
Production rule p10

Order on granting vacation has been issued u8
Order for granting vacation has been signed d5

Production rule p11 is presented in Fig. 6.

**Figure 6**  
Production rule p11

Order on granting vacation has been signed u9
Notification that the order for granting vacation has been signed d5

A well-formed sequence of actions during a business game is built into the results chain consisting of positive productive rules ("Yes") that leads to mastering by the trainees of the actions sequence.

Incorrectly-formed sequence of actions during a business game might look as follows (in fact, there might be many options of erroneous actions) (Fig. 7).

**Figure 7**  
Negative sequences chain

Application on granting vacation has been received u1	
Verification for presence of all heads' signatures d6	
Application on granting vacation signed by all heads u2	
Application on granting vacation has been returned d2	Verification for compliance with vacations schedule d7

## 4. Discussion

Currently, more than 2000 business games are used in the world. For the sake of fairness it is worth noting that the very idea of training personnel through a business game is not new. The first business game was developed and conducted in Russia in 1932 (Bel'chikov and Birshtein 1989), while then since 1938 business games in the USSR were prohibited. Their second birth occurred only in the mid 60's (development and implementation in 1966 of a large-scale game "Reform", and then in 1968 – the business game "Astra"), after emergence

of first business game in the USA (Rand Corporation, 1955; The American Management Association, 1958).

This method has been actively developed both in Russia and abroad by the authors such as A. Kalashnikov, M. Belova, N. Skudnova, N. Titov, S. Sergienko, A. Kazantsev, V. Malyuk, A. Kushevsky, M. Meskon, J. Mosef, M. Lakin, Ch. Abt, K., Grinblat, F. Gray, G. Gram, G., Dupuis, R. Duke, R. Prud, et al.

Great contribution to the development of gaming technology in the system of vocational education was made by contemporary domestic scientists A.A. Verbitsky (1991), V.S. Dudchenko (1987; 1989), Yu.D. Krasovsky (1989), V.Ya. Platov (1991), and E.A. Khrutsky (1991). Among foreign scientists a significant contribution to the establishment and development of gaming technology was made by S. Malcolm (1950), A. Tough (1971), D. Cofer (2006), and J. Cross (2007).

A new round in development of domestic role-playing simulation games occurred in the 80's of the XXth century that was caused by implementation of personal computers into educational process. According to experts, currently in the Russian education system, teaching gaming technologies are focused so far only in the area of economic literacy. Here it is worth mentioning games such as "Cash Flow," "Rat Race", "Monopoly", and "Financial Carousel". Some technologies are also known for increasing the literacy of the population in the field of energy saving, which are implemented in Russian online games "My Energy" and "Smart City" (Maloletko 2017).

The main advantage of gaming techniques is that the proposed scenarios are objective reality rather than the product of certain abstract generalization. Simulating real communication relationships that arise in the organizational environment and getting the output for every scenario, which provides training in the course of the free creative thinking, and searching for solutions to the problem by comparing different scenarios and actions in accordance with a strictly defined algorithm, allow creating new generalized knowledge or mastering important professional competencies.

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## 5. Conclusion

We gave an example of simulation of just one component of the staffing process "Granting Vacation" of the developed computer game "Personnel Management". Full launch of the game still needs a lot to do. It is necessary clarifying new storylines, defining the relationships to be copied from the life, setting rules, defining roles, etc.

However despite the existing difficulties, simulation games represent a very promising pathway. "The development of information technologies (IT) is a socially significant phenomenon in the management of the new world economy creating processes, and therefore their use should be not only effective, but also comfortable and friendly in exploitation" (Zhukov 2015). In fact, we are talking about creating simulators, where employees can train to acquire the necessary skills when solving problem situations, make mistakes and thus learn how to cope with them in real life, develop their abilities and acquire new skills.

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1. Moscow Technological University (MIREA), 119454, Russia, Moscow, Vernadsky Avenue, 78
  2. Moscow Technological University (MIREA), 119454, Russia, Moscow, Vernadsky Avenue, 78
  3. Moscow Technological University (MIREA), 119454, Russia, Moscow, Vernadsky Avenue, 78. Russian State Social University, 129226, Russia, Moscow, Wilhelm Pieck street, 4, build.1. E-mail: [bondaletovvv@mail.ru](mailto:bondaletovvv@mail.ru)
  4. Moscow Technological University (MIREA), 119454, Russia, Moscow, Vernadsky Avenue, 78. Russian State Social University, 129226, Russia, Moscow, Wilhelm Pieck street, 4, build.1
  5. Moscow Technological University (MIREA), 119454, Russia, Moscow, Vernadsky Avenue, 78
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