

# Agent Based Modeling of Integration of Organizational Cultures in Mergers and Acquisitions

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## Abstract

In the article a new approach to the analysis of compatibility of organizational cultures during merges and acquisition using the Agent based simulation model (ABM) is considering. The choice of this method is substantiated. Using ABM makes the considerable economy of time possible. Usually companies spend a lot of time on estimation of possible results of merge. Also ABM allows promptly change the initial parameters of the model. Results of the research experiments are presented in the article. They showed that the Agent based simulation model can be successfully used as a tool of prompt analyzing and prediction of the result of organizational cultures integration. In addition to this it can take into account features of each culture separately.

**Keywords** agent based model, modeling organizational culture, merger and acquisition, culture integration, corporate mutual relations

## 1 Introduction

The number of mergers and acquisitions is growing up every year. Russian companies also are using potential of such transactions for development of their successful businesses. Mergers and acquisitions open opportunities to enter new markets, gain access to promising modern technologies, and transition to the new, more promising economic sectors.

Regular changes of economic environment, together with increase of information flows with fast access to data and acquisition of new knowledge, create preconditions for development of internal sources of economic growth, which allow the company to operate progressively in rapidly changing environment.

Organizational culture of company provides resources designed to support flexible, adaptive and efficient business systems. Organizational culture determines how and in what way created and controlled business processes are.

Organizational culture creates foundation for joint activities of company team and formation of organizational culture, corresponding to the current external environment, and it also provides effective organizational development of the company.

On the other hand, study of organizational culture itself makes it possible to obtain objective assessment of many processes occurring in the company, which becomes especially important in the process of implementing mergers and acquisi-

tions, when merging of companies with already established organizational cultures greatly increase resistance of their personnel to conducted organizational changes.

Influence of organizational culture upon results of merger or acquisition deal is often underestimated. Organizational culture, as a cohesive core of company, can produce significant impact on many aspects of company activities, promoting or delaying its development. It depends primarily on characteristics of the culture itself and its compliance with current situation and goals, in the context of which it manifests. Creating of organizational culture of such type, which will be more consistent with structure and goals of the company formed as the result of merger or acquisition, is one of challenges that must be met at an early stage of planning of the deal.

Large-scale changes in mergers and acquisitions initiate resistance of the personnel of merging companies to these changes, which may result in substantially lower to expected effectiveness of merger or acquisition deal. Solution to this problem can become establishment of informational support of the coming changes, when employees are regularly informed about all events inside the company, which creates a favorable working atmosphere and greatly impedes spread of rumors and thus mitigates negative reaction of team. As far as possible, company employees should be involved in reorganization process, which significantly increase the role of communications.

But if resistance of personnel to changes in the period of integration is a special case of reaction of employees to any organizational changes, and the ways to solution of this problem are indicated, than solution to wide-range problems still is not fully determined. In this way, the potential conflict of organizational cultures should be analyzed at the early stage of merger or company takeover deal. But in practice, to conduct such analysis is very problematic case. The main difficulty is that it is impossible to predict the future culture of a new company after merger deal and to evaluate its effectiveness. Options may vary depending on many factors, like : organizational cultures type prior to merging, their strength and level, similarity and ability to changes. According to consultants any change of organizational culture requires at least three years. In other words, it takes a long time for assessment of the results of integration of organizational cultures. While if in the process of cultural integration were made mistakes, than negative results show up only with time, and to make adjustments and get the desired results would take more time and additional capital inputs.

The purpose of all the mergers and acquisitions transactions, without any exception, is integration carried-out successfully. Integration is understood as element joining-up resulted in forming a single whole. As a rule, the process of merging and acquiring companies, integration, results in creation of a new organizational structure capable to dispose available resources in a way more efficient

and rational, to optimize material, financial, labor and informational flows of the integrated companies. Statistical data show that 70% cases of prospectively advantageous transactions fail because of the low-quality preparation and carrying out integration. So, selection of an organizational form for companies integration in compliance with the purpose and objectives stated is an important step that can facilitate to unify resources and flows efficiently.

Integration is carried out in various directions. Though, whereas corporate strategy integration, product series management systems, product distribution and delivery management systems are predictable and subject to numerical computation on the base of data available, organizational culture integration is often unpredictable.

Integration of united enterprises organizational cultures is a crucial component in forming the corporate interaction efficiently. Resistance exhibited by the personnel to the process in the period of companies mergers and acquisitions is conditioned, first of all, by the difference among various (in the majority of cases) corporate values and organizational cultures. The mergers of *„equals“* finishes frequently with the matter that a stronger group imposes their organizational culture on a unilateral basis.

There is no doubt, mergers and acquisitions propose a lot of advantages for business development. Nevertheless, some erroneous illusion might be created that such transactions are relatively easy, inexpensive and represent the only way to increase business considerably. However, most investigations on mergers and acquisitions efficiency evidence that 60 to 80% companies even armed with potentially advantageous strategy do not accomplish the objectives. It is often concerned with mistakes committed in the course of enterprise integration as well as incorrect organization of the transaction itself. Mistakes and inadvertences can appear in every phase of mergers and acquisitions. Thus, in addition to the incorrectly chosen object for merger and acquisition, low-quality preparation for transactions, and erroneous financial estimation, there could be chosen erroneous ways to implement integration. Particularly, serious mistakes can be made in the course of changing and forming the enterprise organizational culture resulted from mergers or acquisitions. In this phase, the mistakes committed can be conditioned by the lack of detailed integration plan and the lack of appropriate approach. The main cause for most failed mergers is inconsistency and incompatibility of organizational cultures.

The cause for most failed mergers and acquisitions consists in the joining companies inability to overcome organizational culture contradictions. Cultural problems are to be solved even for most successful mergers. In other words, cultural and organizational problem solving acquires the utmost importance for each integration, both successful and failed one. Although this area has not been investigated

properly yet, experts working in this area stated that enterprises which completed integration successfully had paid a lot of attention to the following aspects :

management team forming : how to target the management ranks to the tasks issued by the Director General and the Board ;

organizational structure : how to create a structure that would mostly correspond to the new enterprise strategy ;

highly-efficient culture : how to work-out and develop a culture that would facilitate for efficiency increase and would help the new enterprise to realize their long-term objectives ;

expert employee administration : how to reveal the most various employees in both enterprises and what actions to undertake for involving them into the process of new enterprise creation.

In order to avoid mistakes, it is necessary to elaborate a plan for mergers and acquisition procedure, and, as it has already been noted and never before stated, the question on organizational culture and emerging companies personnel is to be formulated in the phase of choosing the object for mergers and acquisitions. In case the merged enterprises remain existing independently from each other, as a rule, there are no big problems with the personnel. However, if the enterprises start functioning as a single whole, the question on organizational cultures integration becomes exceptionally acute.

The new organizational culture could not be acquired by simply joining two old cultures. In theory, if promoting people, introducing new values, orientations, introducing new behavioral models, remunerating them, forming models to emulate, these behavioral models will be repeated and will be fixed in the personnel minds. This way, a new culture is being created. Though, in practice, organizational culture integration is rather complicated, as far as it is a multiphase complex process that needs comprehensive planning and accurate implementation. Detailed calculations along with competent and thoughtful actions of the managing personnel will guarantee the successfully implemented integration.

Nevertheless, the potential of organizational culture confrontation is rarely analyzed in this phase, preceding the mergers or acquisition transaction. As a result, the culture confrontation creates a serious problem for merger procedure.

From this we can conclude that during the period of mergers and acquisitions the most important is issue of compatibility of organizational cultures of the merging organizations. And at planning stage of the deal, for future development of effective merging strategy, it is very important to be aware of possible results of integration of cultures.

At the moment there is no tool of diagnostics of organizational cultures compatibility, which can during short period of time to play off a large number of possible scenarios for merging organizational cultures and get expected results of

integration, in order to subsequently select among all possible variants the most optimal one.

In this regard, the main objective of study is building of tool that allows during short period of time to study large number of possible scenarios of merging of organizational cultures targeted on getting of expected integrated culture, and then choose from all options the most suitable one. In this way, one of the objectives of study is task of taking into account individual characteristics of micro level individual agents in order to obtain more realistic assessment of impact of organizational changes on production indicators.

As the above mentioned tool, we decided to develop agent-oriented computer simulation model, related to the class of models based on individual behavior of agents. Due to its advantages, namely :

- 1) ability to simulate close to reality system,
- 2) emergency,
- 3) flexibility,
- 4) possibility of specification of model parameters without knowledge of global dependencies within the frameworks of simulating of relevant subject area, we assume that the agent based model will allow us to achieve objectives of study.

## 2 Literature Review

It should be noted that in Russia an agent-oriented models have been developed relatively recently and their development is mainly concentrated in the Central Economics and Mathematics Institute (CEMI RAS) (under leadership of Academician V.L. Makarov), as well as the company's "XJ Technologies" (St. Petersburg). For more details about theoretical aspects of this model class see articles of V.L. Makarov and A.R. Bakhtizin [1].

In the world practice there is some experience in developing agent-oriented models of organizational culture and corporate relations. Examples of the most advanced works are shown below.

A multi-agent simulation platform for modeling perfectly rational and bounded-rational agents in organizations [2].

This paper presents an agent-based simulation framework for the analysis of the equilibria that emerge in a complex structure such as an organization; we can think of some of these equilibria as corporate culture. Authors concentrate on modeling the effort exerted by heterogeneous agents in an organization, and how the interaction between them may lead to a common level of effort (corporate culture). The simple model authors propose is a system in which agents interact in a dynamic, adaptive and evolving way. The model shows how different compositions of the population may lead the system to different common behaviours; the implications of result findings are both descriptive and normative, and shed

light on some core problems of the economics of organization design.

How Groups Can Foster Consensus : The Case of Local Cultures [3].

This work is based on an idea that a local culture denotes a set of rules on business behaviour among firms in a cluster. Similar to social norms or conventions, it is an emergent feature of interaction in an economic network. To model its emergence, authors consider a distributed agent population, representing cluster firms. The model introduces a feedback mechanism of agent behaviour and in-group structure. Studying its consequences by means of agent-based computer simulations, authors find that for narrow-minded agents the feedback mechanism helps find consensus more often, whereas for open-minded agents this does not necessarily hold. Overall, the dynamics of agent interaction in clusters as modelled here, are conducive to consensus among all or a majority of agents.

Computer Mediated Communication and Organizational Culture : An Agent-Based Simulation Model [4].

This paper examines the mutual relationship between the organizational use of Computer Mediated Communication and organizational culture. Computer Mediated Communication supplements communication among members of an organization to maintain the culture, especially when those persons cannot communicate by other means. On the other hand, a strong organizational culture allows a more effective use of Computer Mediated Communication by providing members with some of the necessary common ground to better understand the information exchanged. These relationships are investigated using an agent-based model. This agent-based model incorporates many partial theories into a coherent and fully defined model, which helps formalize and integrate those theories. In this paper, authors present some of the results of the agent-based model that show that organizational culture can influence the effectiveness of Computer Mediated Communication and that Computer Mediated Communication can help maintain and stabilize a culture.

Social construction of organizational culture : an agent-based model [5].

This model, called "OrgNorms", assumes that culture is important to organizations, and companies in particular, on two levels. First, the homogeneity of an organization's culture affects communication and efficiency. Second, the 'cultural fitness' of an organization to local society affects its competitive advantage. OrgNorms is an agent-based model designed to simulate the development of and changes in organizational culture in a culturally changing society, tracking the organization's internal homogeneity and its external fitness to its societal environment. A central assumption is that homogeneity demands that new members adopt the organizational norms, while fitness demands that the organization adopts the views of the new members. That connection breeds similarity, that knowledge is local, and that agents take after those who are similar and the local

majority, are other key assumptions.

These examples of agent-oriented simulation models related to organizational culture show that AOM can be successfully applied in studies and forecasting of various processes of transformation of organizational culture.

### 3 Agent-based Modeling of Organizational Mergers

With regard to experience of our colleagues from Russia and other countries, in 2010 we developed an **agent-based model of organizational mergers**, as is described below.

#### 3.1 Characteristics of agent

**Table 1** The characteristic parameters of agent

n/n	Parameter description	Parameter value
1	Age	from 18 to 60 years
1.1	First age group	20-25 years
1.2	Second age group	25-40 years
1.3	Third age group	40-50 years
1.4	Fourth age group	50-60 years
2	Marital status	0 - agent has no family, 1 - agent has a family
3	Professionalism of agent	
3.1	Education	0 - secondary, 1 - higher
3.2	Experience	from 1 to 40 years
3.3	Work experience in particular organization before merging	from 1 to 10 years
4	Loyalty	from 1 to 10 points, where minimum value of parameter means intolerance to the values of company, and 10 points means his strong commitment
5	Ability to adaptation	from 1 to 10 points
6	Satisfaction with working conditions after integration	1 to 10 points
7	Labor market demand of agent in times of integration	from 1 to 10 points
8	Ability to work	from 1 to 10 points

(1). Age. For these parameters, a distribution among four age groups : 20-25 years ; 25-40 years ; 40-50 years ; 50-60 years was specified.

(2). Marital status. It includes : has no family, has a family.

(3). Professionalism of agent, which consists of concepts such as : Education(C1), Experience(C2), Work experience in particular organization before merging(C3).

These variables during initializing of models have random values with standard deviations enclosed in brackets.

In order to create the model, 8 main parameters were chosen : age, marital status, professionalism of agent, loyalty, ability to adaptation, satisfaction with working conditions after integration, labor market demand of agent in times of integration, ability to work. Input parameter data are given in Table 1.

Professionalism is determined by value within intervals from 0 to 100 points, as function of three components ( $C_1, C_2, C_3$ ) in the following as

$$P = 33.3 \cdot C_1 + 33.3 \cdot \frac{C_2}{40} + 33.3 \cdot \frac{C_3}{10} \quad (1)$$

i.e. in case of maximum values of all components the level of professionalism of agent is also maximum - close to 100 points.

(4). Loyalty. In this case, a loyal employee should share the core beliefs and values of the company (from 1 to 10 points, where minimum value of parameter means intolerance to the values of company, and 10 points means his strong commitment).

(5). Ability to adaptation. It also can be divided from 1 to 10 points. Under adaptation we understand mutual adjustment of employee and company, which is based on gradual involvement of worker into labor activities in new professional, psychophysiological, psychosocial, organizational, administrative, and economic conditions.

(6). Satisfaction with working conditions after integration. It also can be divided from 1 to 10 points.

(7). Labor market demand of agent in times of integration. It also can be divided from 1 to 10 points.

(8). Ability to work. It also can be divided from 1 to 10 points.

### *3.2 Characteristics of Environment for Functioning of Agents and Organizational Cultures*

We come to the description of environment of agent model. The agent functioning medium comprises four organizational culture types - Clan culture, Adhocratic culture, Hierarchical culture and Market culture.

For determination of environment we used a simplified version of methodology for assessing of organizational culture, and below is brief description of four types of organizational cultures, used in probability function, which graph is shown in Fig.5.

Type 1. Clan culture. It means very friendly working place where people have much in common. Companies are like big families. Leaders or chiefs of companies



are perceived as educators, and perhaps even as parents. The company is cemented with loyalty and traditions. There is high responsibility of the company. It is focused on a long-term benefits for improving of individual, pays attention to a high degree of team unity and morale. Success is measured in terms of good relations to consumer and care about people. The company encourages teamwork, participation of people in business and mutual consent.

Type 2. Adhocratic culture. It means a dynamic, entrepreneurial and creative working place. People are willing to offer their own support and stand the risks. The leaders are considered innovators and persons who are ready to stand the risks. Cohesive spirit of this company is devotion to experiments and innovation. Necessity of work on the business forefront is emphasizes as need. The general long term policy of such company is its growth and acquiring of new resources. Success means production and performance of unique and new products and / or services. It is important to be a leader on the products and services markets. Such organization encourages individual initiative and freedom.

Type 3. Hierarchical culture (bureaucratic). It is very formalized and structured place of work. Procedures dominate activities of employees. Leaders are proud of the fact that they are rationally minded coordinators and organizers. It is critical to maintain smooth running of the company. Company is united with formal rules and official policies. Long-term concern of organization is to provide stability and smooth running performance of cost-effective operations. Success is measured in terms of supply, smooth schedules and lower costs. Management is concerned about employment status and long-term predictability of employees.

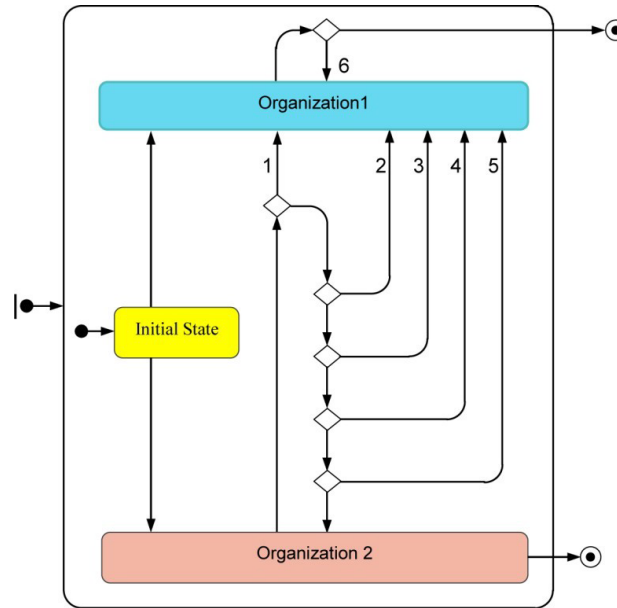
Type 4. Market culture. This kind of company is focused on results, the main concern of which is performance of task. People are ambitious and compete with each other. Chiefs are hard leaders and tough competitors. They are unshaken and demanding. This company is united together with emphasis on the desire to win. Reputation and success are things of common concern. Focus of strategy is targeted to a specific action, achievement of tasks and measurable goals. Success is measured in terms of markets penetration and increase of market share. Important is competitive pricing and leadership on the markets. The working style of this company is hard line targeted on competition.

### *3.3 Agent Behavior*

Behavior of agents is specified by diagram of state (state chart), transitions inside of which depend on the values of probability functions listed below.

Since within the frameworks of model occurs absorption of one company by another, the agent has two options : adapt to the new conditions or leave (for simplicity it is assumed that after reorganization the absorbing company does not change its type, and, on the other hand, the absorbed company takes leading style of absorbing organization). This chart shows process in the following way : agents

of absorbed organization (Fig.1 - “Organization 2”) through conversion pass to the absorbing organization (“Organization 1”) or have to leave (this transition is shown along the arrow directed towards the ring with dot in center). In the process of work this model simulates the process of absorption, and some time after reorganization, when agent may resign (i.e. it is another transition along the arrow directed towards the ring).



**Fig.1** State chart of model agent

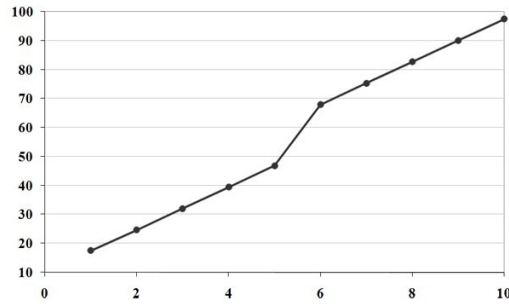
For simplicity, we do not consider optimization of personnel, i.e. possible redundancy of employees by company.

Next, we go to the more detailed description of agent state chart.

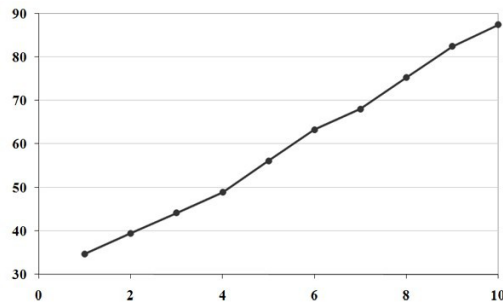
First of all in the state chart of transition may work out transition 1, depending on agent’s loyalty towards values of company (in this case loyalty parameter of all agents is relevant only to absorbing company). If company’s values are alien to the agent, than he can adapt to them, depending on the values of corresponding parameter (i.e. may work out transition 2).

The behavior of agent may be adjusted depending on other parameters. For example, if qualification of agent is in high demand on labor market, than probability of his resignation is high (transition 3). Otherwise “thing, which can change up his mind,” may be his age (transition 4), as well as having a family (transition 5).

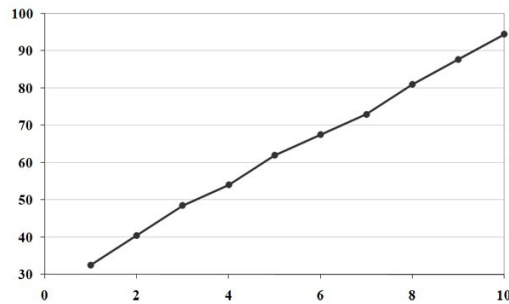
After the process of absorption the agent may stay unsatisfied with new con-



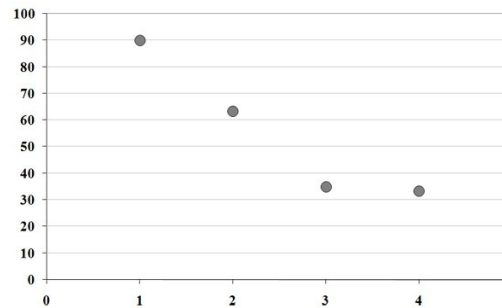
**Fig.2** Probability (y-axis) of transition of agent into absorbing organization based on his level of loyalty (x-axis)



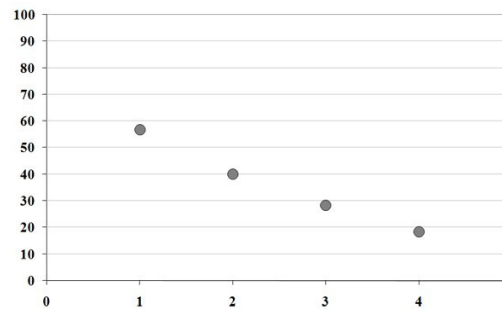
**Fig.3** Probability (y-axis) of transition of agent into absorbing organization based on his adaptation ability (x-axis)



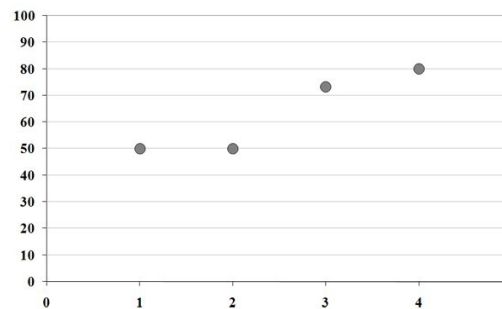
**Fig.4** Probability (y-axis) of transition of agent into absorbing organization based on the level of labor market demand in times of integration (x-axis)



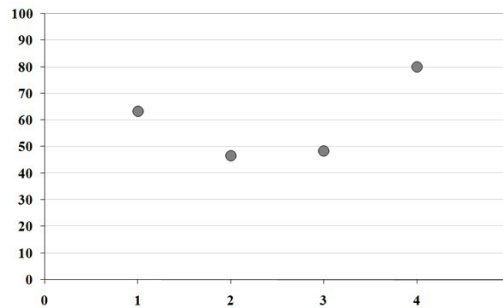
**Fig.5(a)** Probability (y-axis) of transition of agent (working in company with organizational culture of first type) into absorbing company, depending on type of organizational culture (x-axis)



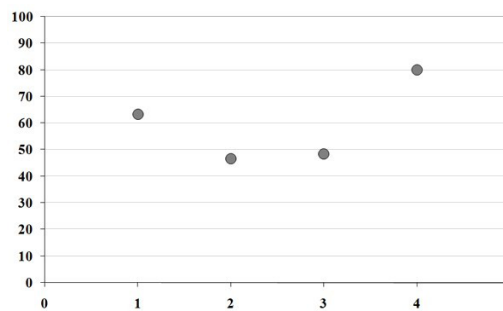
**Fig.5(b)** Probability (y-axis) of transition of agent (working in company with organizational culture of second type) into absorbing organization, depending on type of organizational culture (x-axis)



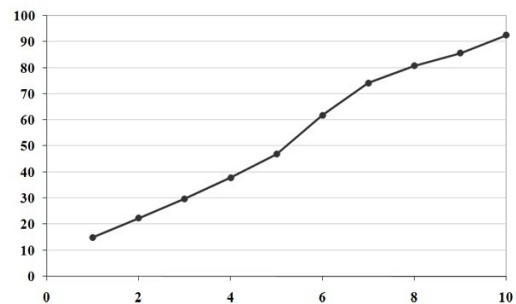
**Fig.5(c)** Probability (y-axis) of transition of agent (working in company with organizational culture of third type) into absorbing company, depending on type of organizational culture (x-axis)



**Fig.5(d)** Probability (y-axis) of transition of agent (working in company with organizational culture of fourth type) into absorbing company, depending on type of organizational culture (x-axis)



**Fig.6** Probability (y-axis) of transition of agent into absorbing company based on age (x-axis)



**Fig.7** Probability (y-axis) of transition of agent into absorbing company based on satisfaction with working conditions after integration (x-axis)

ditions, and in this case he may initiate transition 6 (this applies to employees of

absorbed organization, only).

Transitions in state chart can work out depending on values of probability functions, defined by experts. Fig.2 shows a graph of probability function, where the argument (x-axis) is level of loyalty and value of function (y-axis) - probability of transition 1.

Fig.3 and 6 show graphs with probabilities of working of transitions 2 and 4, depending on capacity for adaptation and age of agent, respectively.

For determination of probability of transition 3 we must calculate average probability on basis of functions, whose graphs are shown in Fig.4 and 5(a)-5(d).

### 3.4 Adequacy of Model

For testing of model adequacy we have conducted three experiments on merging of different types of companies, whose parameters are provided in Tables 2-4.

**Table 2** Parameters of absorbing and absorbed companies for experiment No.1

Parameter	Absorbing company		Absorbed company	
Type of organizational culture	Bureaucratic		Market	
Number of employees	20 000		20 000	
Age of employees	20-25 years	25%	20-25 years	60%
	25-40 years	40%	25-40 years	20%
	40-50 years	20%	40-50 years	10%
	50-60 years	5%	50-60 years	10%

**Table 3** Parameters of absorbing and absorbed companies for experiment No.2

Parameter	Absorbing company		Absorbed company	
Type of organizational culture	Bureaucratic		Market	
Number of employees	300		30	
Age of employees	20-25 years	25%	20-25 years	15%
	25-40 years	50%	25-40 years	50%
	40-50 years	20%	40-50 years	30%
	50-60 years	5%	50-60 years	5%

For experiments, were collected data on transactions of mergers and acquisitions during the period from 2004 to 2009. Companies involved in this experiment represent large retail sector and IT-sphere.

In the first experiment, two organizations having manpower strength of about 20 000 persons each, were represented ; each company had associated companies. The experiment took into account the total number of employees for each enterprise including associate companies and representative offices.

**Table 4** Parameters of absorbing and absorbed companies for experiment No.3

Parameter	Absorbing company		Absorbed company	
Type of organizational culture	Bureaucratic		Market	
Number of employees	50		30	
Age of employees	20-25 years	20%	20-25 years	18%
	25-40 years	60%	25-40 years	70%
	40-50 years	16%	40-50 years	10%
	50-60 years	4%	50-60 years	2%

In the second experiment, the absorbing company before reorganization had 300 people, the merged company had 30 people.

In the third experiment, small enterprises took part; the absorbing company personnel counted 50 persons for when transaction started and the merged company personnel counted 30 persons.

Bellow in Listing 1 adduces a code generated by AnyLogic program which is responsible for agent initialization and model initial state initialization.

All the agent populations (`people.size()`) are distributed by groups (age groups, as well as agent groups pertaining to the first or the second organization) depending on the values preset (initial number of employees working for the first (`AgentFirm1`) and the second organization and, also, four age frames. (`age1`, `age2`, `age3`, `age 4`)).

```

for (int i = 0; i < people.size(); i++)
{
    if (randomTrue(AgentFirm1) == true)
    {
        people.get(i).statechart.fireEvent("Firm1");
        people.get(i).firm = 1;
        people.get(i).oldfirm = 1;
        // for the first age group, age values of 20 to 25 years are assigned
        if (randomTrue(age1) == true)
        {
            if (age == false)
            {
                people.get(i).age = uniform (20, 25);
                age = true;
            }
        }
    }
    // for the second age group, age values of 25 to 40 years are assigned

```

```
if (randomTrue(age2) == true)
{
  if (age == false)
  {
    people.get(i).age = uniform (25, 40);
    age = true;
  }
}
// for the third age group, age values of 40 to 50 years are assigned
if (randomTrue(age3) == true)
{
  if (age == false)
  {
    people.get(i).age = uniform (40, 50);
    age = true;
  }
}
// for the fourth age group, age values of 50 to 60 years are assigned
if (randomTrue(age4) == true)
{
  if (age == false)
  {
    people.get(i).age = uniform (50, 60);
    age = true;
  }
}
age = false;
}
else
{
  people.get(i).statechart.fireEvent("Firm2");
  people.get(i).firm = 2;
  people.get(i).oldfirm = 2;
  // for the first age group, age values of 20 to 25 years are assigned
  if (randomTrue(age1) == true)
  {
    if (age == false)
    {
      people.get(i).age = uniform (20, 25);
      age = true;
    }
  }
}
```



```
    }  
  }  
  // for the fourth age group, age values of 25 to 40 years are assigned  
  if (randomTrue(age2) == true)  
  {  
    if (age == false)  
    {  
      people.get(i).age = uniform (25, 40);  
      age = true;  
    }  
  }  
  // for the fourth age group, age values of 40 to 50 years are assigned  
  if (randomTrue(age3) == true)  
  {  
    if (age == false)  
    {  
      people.get(i).age = uniform (40, 50);  
      age = true;  
    }  
  }  
  // for the fourth age group, age values of 50 to 60 years are assigned  
  if (randomTrue(age4) == true)  
  {  
    if (age == false)  
    {  
      people.get(i).age = uniform (50, 60);  
      age = true;  
    }  
    age = false;  
  }  
}  
}
```

**Listing 1** Piece of code responsible for initial model initialization

It should be noted that the agents in the base model version are defined rather “rigidly”, as referred to the age frames; nevertheless, in the same way, we can define other agent parameters (Loyalty, ability to adaptation, labor market demand of agent, etc). For example, by means of the model, we can simulate a situation when the majority of employees working for a company possess a high-degree loy-

alty or labor market demand.

In the following we describe pieces of codes that determine numbered transitions in Fig.1. Here, two points are important :

1) The functions in use are AnyLogic package functions that operate with Java language.

2) All the program structures adduced define the general class of agent-employee who takes part in the process of two organizations merging. When creating the direct instance of a class, for every agent a unique set of parameters is assigned, each of which is specified by normal distribution using `uniform()` function.

Transition 1 operates on the following condition :  $randomTrue(fnLoyalty(loyalty)/100) == true$  , where *loyalty* variable is specified by normal distribution *uniform(1, 10)*, and *fnLoyalty* function is given as a graph in Fig.2.

Transition 2 operates on condition :  $randomTrue(fnAdaptation(adaptation)/100) == true$ , where *adaptation* variable is specified by normal distribution *uniform(1, 10)*, and *fnAdaptation* function is given as a graph in Fig.3.

Transition 3 operates on condition :  $randomTrue((fnFirm4(get\_Main().firm1Type)/100)) == true$ , where Varied functions *fnFirm1*, *fnFirm2*, *fnFirm3*, *fnFirm4* are given as graphs in Fig.5(a)-5(d), and independent variable *firm1Type*, that determines the type of organization being absorbed (1, 2, 3 or 4) is specified on carrying out experiments.

Transition 4 operates on condition :  $randomTrue(fnAge(age)/100) == true$ , *age* variable is specified on initializing the model, and *fnAge* function is given as a graph in Fig.6.

Transition 5 operates on condition :  $randomTrue(fnFamily(family)) == true$ , variable *family* is randomly specified  $randomTrue(0.6)$ , and *fnFamily* function is specified in an expert way as follows :

```
if (family == true)
{
    return 0.2;
}
else
{
    return 0.2;
}
```

Transition 6 operates on condition :  $randomTrue(fnIntegration(afterintegration)/100) == true$ , *afterintegration* variable is specified by normal distribution *uniform(9, 10)*, and *fnIntegration* function is given as a graph in Fig.7.

Table 5 shows final results.

As you can see, the difference between resulting values is not too large, and

**Table 5** Number of employees, retired after merging, percentage of total number.

	Actual data	Calculated data
Experiment NO.1	20,0%	16,1%
Experiment NO.2	2,12%	3,5%
Experiment NO.3	12,5%	10,24%

therefore we go to other calculations.

#### 4 Results of Computer Experiments

After that using the developed model we evaluated effects of hypothetical merging of companies with different types of organizational culture in order to identify the best and worst variants suitable to both organizational cultures. For experiments we used companies with the same number of employees, as well as with similar values of other parameters. Output data are shown in Table. 6. These data represent relative values of changes in number of employees as percentage from the first scenario, which perform merging of two companies of first type.

As you can see, the biggest number of employees resigned as a result of merging of companies of second type (absorbing company with Adhocratic culture) and fourth type (absorbed company with Market culture).

**Table 6** Relative changes in the number of retired employees of the merged companies of various types, in percentage from the first scenario

	Type 1	Type 2	Type 3	Type 4
Type 1	0	-0.6	-0.9	-0.9
Type 4	-0.7	-1	-1	-1.4
Type 2	-0.9	-0.9	-0.3	-0.4
Type 3	-0.6	-0.8	-0.8	-0.4

We propose a new method for assessing of compatibility of organizational cultures in mergers and acquisitions with help of agent-based model, which has several advantages. First, it allows during relatively short period of time to get preliminary assessment of the results of mergers with different types of organizational cultures, because AOM can consider more variants of possible scenarios. Second, AOM allows you to specify unlimited number of basic parameters, such as number of employees, which can vary from several dozens to several thousands employees.

During development of this AOM with method of expert judgments, we selected eight parameters to describe agent. But it is important to note that in each case the merger or acquisition model can be changed depending on initial conditions of transaction, and there can be defined bigger or smaller number of parameters.

Possibilities of fast changes of operating parameters of the model, and its easy adaptation to specific conditions allow considering agent-based model as universal tool for preliminary assessment of merger or acquisition of companies with different types of organizational cultures.

The other authors work has shown that the agent-oriented models could be successfully used for studying and solving organizational culture problems. The authors of the present article, by-turn, have worked-out such an agent-oriented model that makes it possible to solve several important problems concerning the organizational cultures integration when merging and acquiring companies, that is : on pre-setting selected parameters values for each company, determining the degree of integration success and the number of resigned and remained employees. In case the number of resigned employees does not satisfy the management, they will be able even on the preparatory phase of integration, to work out measures to retain employees and implement these measures in the course of merging.

The number of employees maintained after merging is the direct indicator of transaction success. As far as if after merging, the majority of employees resigned, then in the phase of preparing and carrying out mergers, some outrage mistakes had been committed ; the company had not made the maximal efforts to retain them, had not taken into account employees' interests.

In this case, the efficiency of a transaction carried out depends on the number of employees who decided to link their future to the new company in which every employee feels comfortable and finds it beneficial to work. That is why the results acquired by the using of the agent-oriented model are so significant and representative for predicting the results of organizational culture integration.

The authors of the present work did not have a purpose to investigate all the existing integration types. The scope of their scientific interests covers only one of the integration types, organizational culture integration. The agent-oriented model was developed to study the selected integration type.

In particular, AOM presented in this article shows that, most of all, who will be not be satisfied with new conditions and quit the company as the result of merger are employees of two Adhocratic and Market type organizational cultures. In practice, to obtain such results takes several years, during which companies with these types of organizational cultures would suffer significant loss to resolve inevitable conflicts. But with AOM results can be obtained at the planning stage of potential deal and it allows management to take appropriate measures to prevent massive layoffs of employees or even cancel the deal, which action could help company to save unnecessary expenditure.

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