

Infocommunication Technologies Application for Projects Implementation Support in Distributed Information Area

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Abstract¹

In paper questions of support of performance of projects in the distributed information space are considered. Requirements to functionality of system of support of performance of projects are submitted. Results of the analysis of known means of support of performance of projects, means of support of communicative processes in the distributed information space and methods of representation ontology subject domains are resulted. The technique of subject domain ontology construction is resulted. The description of the developed ontology editor for representation of knowledge on subject domains of projects, including the module of support of communicative processes in the distributed information space is resulted.

1. Introduction

Now, in conditions of toughening of competitive struggle in the market of development custom-made software, many companies transfer a part of process of development to other countries with lower cost of work. Also practice of the organization of work in the distributed space is widely applied. For example, when employees with the purpose of economy of time and

means perform the work being at home or in road. In the given conditions interaction with fellow workers is carried out by means of the distributed information space. It results in difficulty of communications between executors, and also to strengthening of influence of various barriers: language barrier, time shift, cultural differences. Development of the large organizations, such as Microsoft, IBM, Project Management Institute and a plenty of works researchers are devoted to the decision of this problem: Pavlov V.L., Terehov A.A. (patterns of development software in conditions of outsourcing), Sapegin A. (distributed development and support of information systems), Popov E.V., Tarasov V.B., etc. However, areas researched by them not to the full take into account specificity of the distributed space. Therefore development of methods, models and the software directed on increase of an overall performance in these conditions is an actual scientific problem.

The distributed information space is a non-uniform environment on the basis of computer networks in which opportunities of an information exchange between its any users (executors of the project) without dependence from their current remoteness from each other are provided.

As support of performance of projects in the distributed information space we mean the decision of the following tasks:

- Differentiation of the rights of access of participants to system;
- Granting the adaptive interface for a manipulation a database, according to adjusted patterns and filters for representation of the information;
- Maintenance of communicative support of participants.

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Specificity of the distributed information space consists in impossibility of direct ("alive") dialogue between participants of projects.

Owing to what before participants there are following problems:

1. Inadequacy of traditional approaches to management of projects, necessity of support of network organizational structure.
- Developers can and should play in different projects various roles, it will allow them to expand the outlook both to raise qualification and to realize the professional importance.
- With the purpose of increase of an overall performance of the organization as a whole, tasks should be assigned by executors, being based on principles of self-organizing, in view of their competence.
2. Necessity of uniform representation (at a semantic level) for all participants for understanding and interpretation of overall aims and tasks.
- Executors, depending on their roles (for example, see tab. 1), use various software for representation of the information which or it is weak or are not integrated at all with each other. It has a negative effect on understanding of overall aims and tasks of participants of projects.

Table 1

Role	Software
Programmer	The environment of development, electronic documents
Manager	Project management systems
Analyst	CASE - means
Personnel officer, accountant	Systems of electronic document circulation
Management	decision-making systems

3. Compulsion of application of means of the communications

The purpose of work is development mathematical and the software for support of performance of projects in the distributed information space.

Tasks of the given work are:

- The analysis of known means of support of performance of projects, means of support of communicative processes in the distributed information space and methods of representation ontology subject domains.

- Development of a technique subject domain ontology construction.
- Development of the ontology editor for representation of knowledge on subject domains of projects, including the module of support of communicative processes in the distributed information space.

2. The Analysis of Existing Approaches and Technologies

It is offered to carry out the analysis of existing approaches and technologies from a position of their satisfaction to the following requirements to functionality of system of support of performance of projects.

1. Maintenance (is common figurative) ro representations (at a semantic level) information on projects (ontology) for all participants for understanding and interpretation of overall aims and tasks. Granting to participants of "common language" at all levels of performance of the project: for programmers (what function that carries out), managers (what task is responsible for what part of the project, a place of a task), analysts (conformity of specification / model to requirements of the customer), personnel officers (who than is engaged what is necessary qualification), economists (how many it is required to time and resources) and managements (generalized / aggregated information for decision-making).
2. Maintenance of friendliness and presentation of the interface, simplicity of viewing and entering of the information (usability).
3. Information search, aggregation. Construction of the personalized representations ontology (formation of reports) for the programmer, the manager, the economist, the head.
4. Integration local ontology in uniform distributed{allocated} ontology. Maintenance of consistency uniform ontology, its completeness and integrity.
5. Differentiation of the rights of access to ontology.
6. Maintenance of communications (text, audio, video) and support of methods of support of decision-making.
7. Integration with the tool software connected to development software, managements of projects, managements of databases, document circulation, communications.
8. Conducting "magazine" and backuping, support of a historicism and reserve copying.
9. Maintenance and support of processes of self-organizing. Support of network operational structure.

of concept, and relations, the set of statements (items of knowledge), giving components to their terms of

interpretation, accordingly, the subject, a predicate or object is under construction.

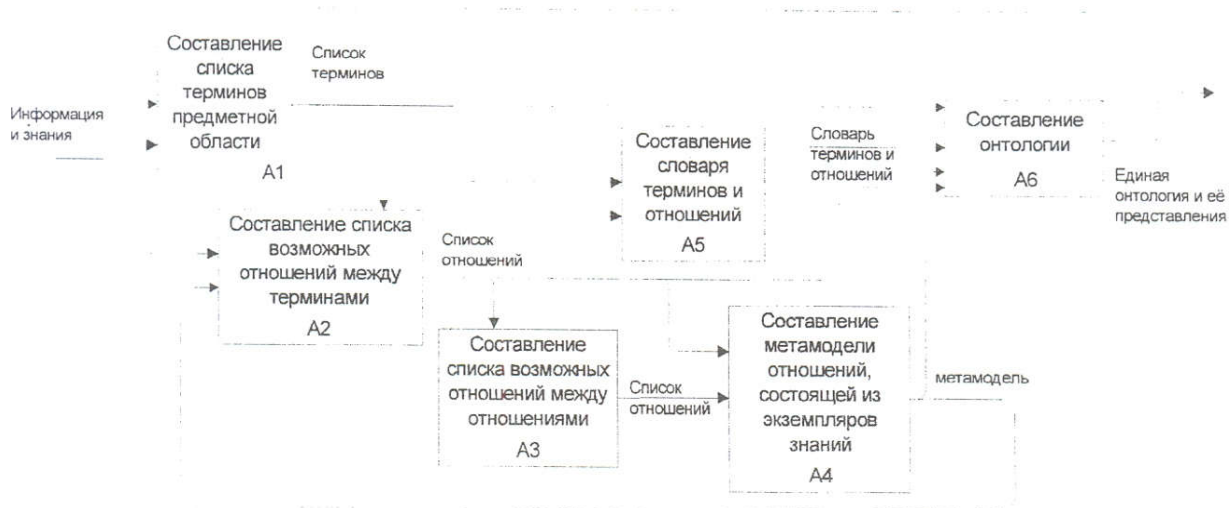


Figure 3. Sequence of Operations of the Expert on Ontology Construction

4. Method of the Organization of Knowledge in Ontology for Management of Projects of Development Software

Let's consider an example of construction ontology for the project on development of the software.

According to the offered sequence of actions of the expert at convergent subject ontology construction, the set of information units in which the terms - concepts participating in representation of a subject domain will originally be worn out is formed. For realization of the given example it is enough to consider some groups of terms.

Group of tasks which should be solved at performance of the project on development software, it: «Drawing up of the specification», "Coding", "Designing", «Management of the project», "Operational testing", «Financial regulation».

The group of agents is a set of participants of projects, to each agent there meets the real person, in the given example it: "Kudryavtsev", "Smith", "Singer", "Switch", "Buinov" and "Rublyov" (all surnames are invented).

During performance of the project, agents should solve the tasks, the relation of the agent to a task is defined by their role. Group of roles (or posts) - "analyst", "programmer", "manager", "tester", "economist".

The project, as well as at its subtasks, should have entrance and target data, in some cases it there can be characteristics, information, program or material products. Group of the data - "Technical project", «

Internal specifications », "Software", "Integrated operational schedule", "Business - plan".

The data are for one tasks entrance, for others target, from here the data are connected among themselves by projects which task to receive from the entrance data - target.

The way of linkage of these terms with the help of the following items of knowledge is offered:

- <agent, role, task>;
- <role, task, entrance data>;
- <task, entrance data, target data>.

Such organization of knowledge in ontology is enough convenient for users as allows to have for a small number of actions access to all basic of the data under the project.

The example of filling ontology under the project of development software is submitted in tab. 2.

5. Software Realization

The program represents the client-server application consisting of base of knowledge, a media - server and the user web – interface (fig. 4).

Functioning of system occurs as follows: authorization of the user in system, editing of the data, mutual coordination of patterns of representation and integration of the data, interpretation of the data.

Each user of system has the a name and the password which to him are necessary for entering at authorization (fig. 5).

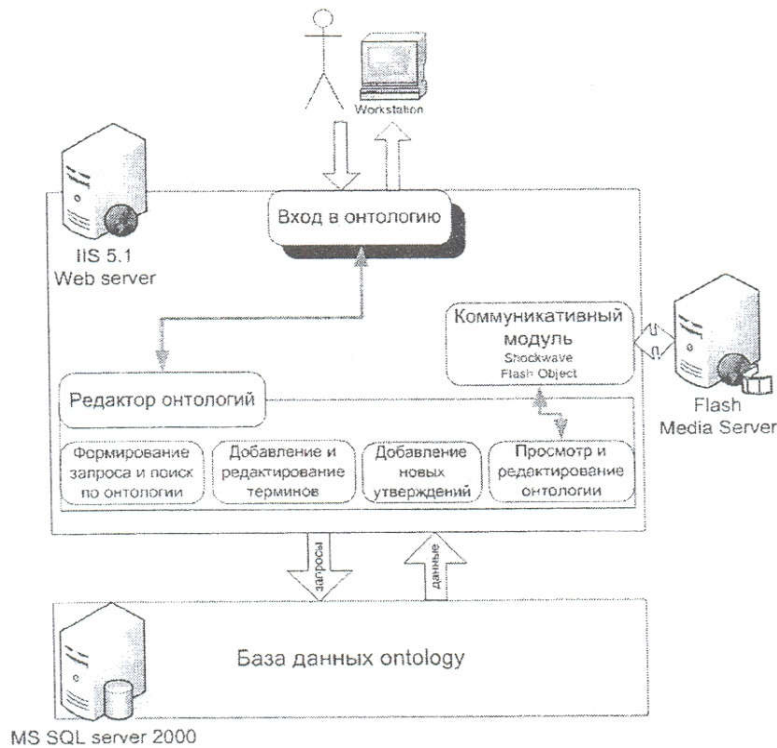


Figure 4. Schema of Module Cooperation

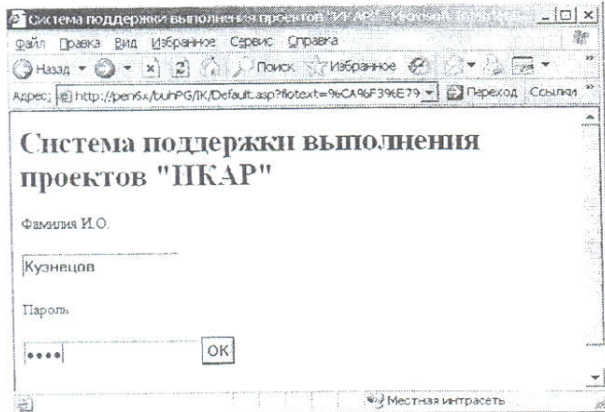


Figure 5. Authorization of the User in System

The name of the user is a part of ontology, it represents the user during his work in system. On fig. 6 the interface reflecting the information, described the user is submitted.

For viewing ontology trellised representation is used. With the web - interface (fig. 7) the opportunity of transition for editing the submitted items of knowledge and creation new in the allocated place ontology is realized.

On fig. 8 the example of a part ontology under the project « Development of the software » is submitted. According to the offered model, for the agent of "Smith" entrance his given task ("coding") that is who is responsible for drawing up of specifications. On offered triplets <Smith, Programmer, Coding>, <Coding, Internal specifications, Software>, <Drawing up of the specification, the

Technical project, Internal specifications>, <Kudryavtsev, Analyst, Drawing up of the specification>, from "Smith" it is possible to turn « Drawing up of the specification » up to the executor of a task, to contact and there and then to see (download) changes which that has made in the data « Internal specifications ».

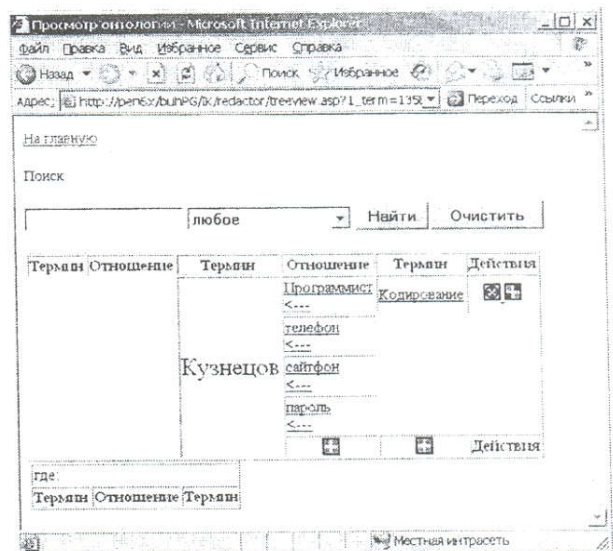


Figure 6. Interface of the System

For the coordination of the contents of patterns of representation for unequivocal interpretation of the projects given by participants, developed communication Flash-module "Sitephone" which allows participants to

exchange text, audio and video by the information under projects (fig. 9) is applied.

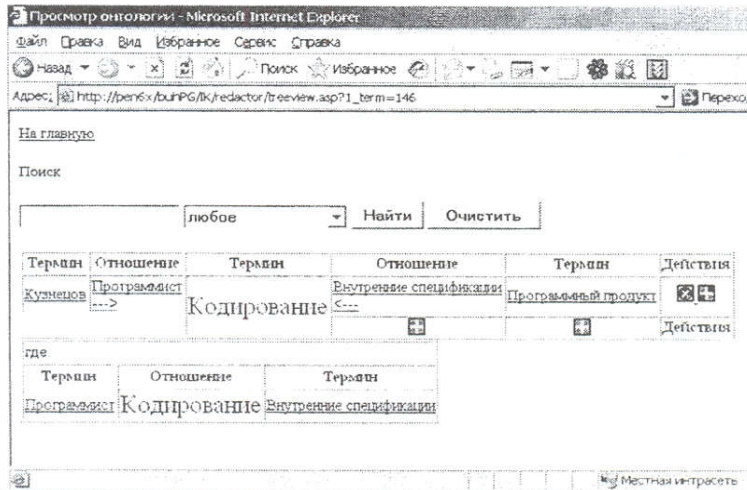


Figure 7. Grid Representation of Ontology

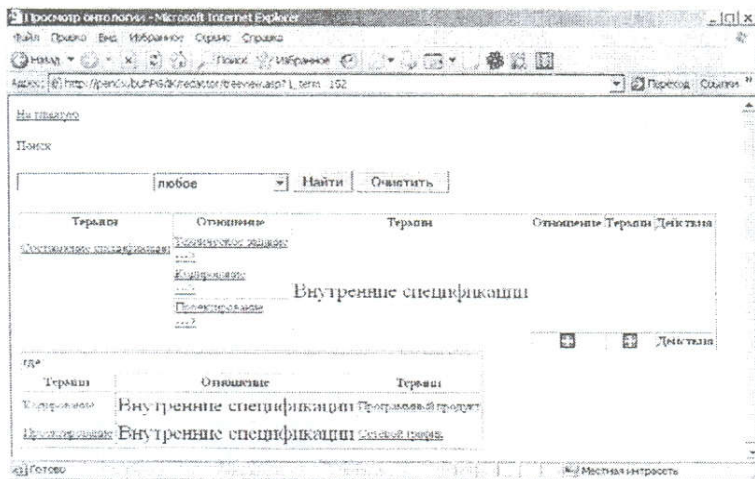


Figure 8. Representation of Project Management of Development Software

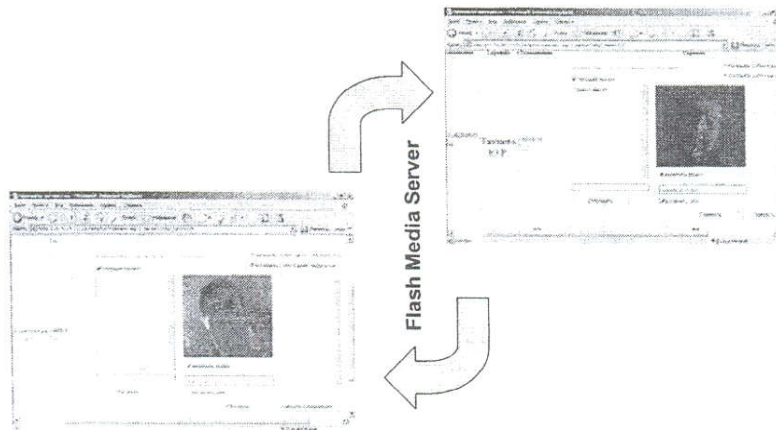


Figure 9. Using "Saitphone" – Communication Flash-Module

Table 2. Example of Ontology for Software Development Projects

№	Agent	Role	Task	Input data	Output data
1			Drawing up of the specification	Technical project	Internal specifications
2		Analyst	Drawing up of the specification	Technical project	
3	Kudryavtsev	Analyst	Drawing up of the specification		
4			Coding	Internal specifications	Software
5		Programmer	Coding	Internal specifications	
6	Smith	Programmer	Coding		
7			Designing	Internal specifications	Integrated operational schedule
8		Manager	Designing	Internal specifications	Integrated operational schedule
9	Singer	Manager	Designing		
10			Project management	Integrated operational schedule	Software
11		Project manager	Project management	Integrated operational schedule	
12	Switch	Project manager	Project management		
13			Operational testing	Software	Technical project
14		Tester	Operational testing	Software	
15	Buinov	Tester	Operational testing		
16			Financial regulation	Business – plan	Technical project
17		Economist	Financial regulation	Business - plan	
18	Rublyov	Economist	Financial regulation		

6. Conclusion

On the basis of the traced analysis is offered the approach to support of performance of the projects, taking into account specificity of the distributed information space. The formal model ontology is offered, the system of support of performance of the projects, including the ontology editor, the communication module is developed.

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