Towards Digitalization of business processes: Building a business domain ontology for project management

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Abstract: The article presents an ontological model of the subject area. It was designed to improve the efficiency of the software development process and reduce development costs. This ontological model is recommended to be used in the formation of the company's software architecture. The article contains data on the process and results of developing an ontological model of the selected subject area. The theoretical justification of the application of the ontological approach is presented. The business domain of relations between IT directors during the implementation of the digitalization project of the company's business process is defined as a subject area. The sources of the metadata of the ontological model were the standards for the organization of collective activity – ISO 21500:2012 and PRINCE2. The ontological model was developed in accordance with the basic characteristics of the modeling process and the mathematical apparatus that established the relationship of concepts and the order of inheritance of attributes. The project topics became layers of the ontological model, the responsibility for the consistent implementation of which is borne by IT directors, as well as the functional tasks and functional roles of IT management distributed among them. The order and direction of interaction of the IT management in the project is shown by the relationships between the entities of the model. The chosen form of visualization - semantic network - allows you to demonstrate the result of the development of an ontological model and can be considered as a ready-made product to support the semantics of end-user requests in the company.

Key-Words: ontology, ontological model, IT directors, digitalization project, semantic network, IT management

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1 Introduction

The application of an ontological approach to the modeling of business processes, automated information systems is a widespread practice. It is enough to point out such subject areas as corporate knowledge management and management of the architecture of the company's business processes [1, 2]. Any database and business process described in any notation become part of the corporate knowledge system [3]. And it, in turn, needs to create meta-keys that provide ordering, linking and quick recall of information. This task is performed by ontology, and the method of its application is called the ontological approach.

Ontology from a theoretical point of view is a well-studied, practically codified field of knowledge [4, 5]. From the standpoint of philosophy, the construction of ontology is the process of conceptualizing the essence of knowledge in the subject area [6]. And in practice, there is no unity of methodology for constructing ontological models [7]. Succinctly and meaningfully defining the concept of ontology, we point out that ontology is a structure describing the meaning of elements of a certain system, with the help of which it is possible to form relationships, classes of both the system itself and its subsystems. In simple words, an ontology is conveniently structured metadata that captures the features and properties of entities that we want to remember, save and have easy access to. Ontology helps to structure the world around us, to describe a specific subject area in the form of concepts, rules and statements about these concepts.

By the subject business domain, we mean a stable relationship between the names, concepts and objects of the selected business area, independent of the information system itself and the circle of its users. By naming the subject area, we, on the one hand, limit, and on the other hand, visualize the information search space. Working with a domain-oriented data warehouse, thanks to the introduced subject area, allows you to perform queries in a finite time, including unregulated ones.

It is difficult to overestimate the importance of ontological models. They underpin all modern management systems and support knowledge-based applications. [8]. Knowledge transfer support systems that combine structured data with business domain ontologies are also based on them. [9]. If we talk about extracting information from heterogeneous

data resources, then ontology-based systems are able to process such information and integrate it into consistent knowledge bases. Then related information from disparate sources, with the exception of duplicate information, can be used to query in an integrated and seamless manner [10].

Specialists who have the skills of designing and developing information systems based on ontological models are in demand specialists. Especially when it comes to the development of intelligent information systems [11, 12].

It is believed that in information systems and related fields, the use of business domain ontology contributes to the general understanding of the subject area, but there is not enough empirical data to support this statement. [13]. We support the position that the use of the subject area at the group level has an advantage. The ontological model is a metadata model. In our opinion, this allows all participants in the process of interaction to operate not so much a single system of concepts as a single system of meanings underlying such concepts and the connections between them.

The necessary quality of verbal and nonverbal interaction is provided, since ontology literally unifies the language that specialists speak and communicate with each other. This happens through the unification of the semantic query, making it more accurate and supporting the optimization of queries based on the axiom [14]. Adaptation of the business domain ontology for personalized search of knowledge and recommendations is carried out on the basis of adaptation models that consider the previous behavior of users [15] and individual cognitive styles for the organization of joint ontology design [16]. As a result, adaptive ontology satisfies the future requirements of users and increases the value of knowledge. Separate efforts should be made to ensure the integrity of the ontology of the subject area, for example, by introducing a mechanism for collecting knowledge based on pre-processing requests [17]. In relation to a separate subject area, the ontological model is limited to its description. At the same time, it has a complete toolkit for reuse [18] and updating of ontologies, which includes enrichment and filling [19].

One of the ways to apply the ontological approach is to develop an ontology for the formal conceptualization of our understanding of various areas of human activity [20]. We have set ourselves the task of formalizing organizational ties between IT directors in the process of their interaction. The field of IT management relations in the process of digitalization of business processes in the company was chosen as the subject area. By formalizing organizational ties, we meant building a relationship model. And the best way to solve this problem is by developing an ontological model. Thus, the purpose of the study was to create an ontological model of the subject area used to increase the efficiency of the software development process and reduce development costs.

As a natural limitation of the subject area, we denote that it describes corporate knowledge management systems classified as "local as view"[14]. While network content management systems [21], classified as "global as view", are not represented in this study.

The key task for the reuse of knowledge about the interaction of IT management in the project is to extract existing examples of interaction in similar functional areas. We have systematized the positive practices of relations between IT directors within the process space of standard corporate systems. The developed ontology for the selected business domain provides a formal representation of reference processes in the field of standard corporate systems. This determines the potential of implementing an ontological model into a corporate system for supporting knowledge-based applications.

The developed model captures and unifies all the significant signs and properties of the relationship between IT directors, which we want to raise to the standard of interaction. By applying the ontological model, we will be able to correlate the standard with the practice of interaction of IT directors. The nature of the ontological model is such that we will have easy access to all the entities of interaction relationships in order to make changes to the search algorithm for the corporate knowledge base.

The task of building an ontological business domain model to support the interaction of IT directors is a non-trivial task. Its complexity is determined, in particular, by the presence of many intersubstitutable and intersubjective connections between IT directors. In addition, the separate functionality and individual goals of the interaction participants should be considered. In solving the problem of building an ontological model of the chosen subject area to support the interaction of IT directors, we will refer to the standards for forms of collective activity - ISO 21500:2012 and PRINCE2. By isolating the entities of interaction relations from these standards and applying them to the practice of interaction of IT directors in the digitalization of business processes, we will develop an ontological model, which is the purpose of the study. This ontological model is recommended to be used in the formation of the company's software architecture.

2 Materials and methods

When launching and implementing a business process digitalization project, it is important that process participants and support units are provided with complete and reliable information, data sets at all stages of the project. The organization of information support is a task that is not solved during the implementation of the project, but should be solved long before its initiation. This approach ensures the viability and effectiveness of the project. It should also be borne in mind that the duration of business process digitalization projects is a very variable category. Therefore, before initiating the project, it is also necessary to solve the problem of choosing a project management methodology.

We believe that it is impractical to use cumbersome methodologies for its implementation, in particular, PMBoK or ISO 21500:2012. Despite their comprehensive and complete approach to project management, they still become redundant, causing the need for preliminary adaptation to the field of application.

It is also unreasonable to give preference to flexible methodologies (Agile, Scrum) when implementing a project to digitalize a business process. They are ideal for software development projects, having advantages such as iterative releases, embedded testing and validation of the working product at all stages of development. However, digital infrastructure projects are characterized by a fixed volume and content of the project, and this limits the possibilities of flexible methodologies and devalues their application.

The golden mean between classical and flexible methodologies, in our opinion, is PRojects IN Controlled Environments 2 (PRINCE2). This methodology has a full-fledged structure of processes and documents, that is, it contains all the necessary subject groups of processes for the implementation of digitalization projects, namely, planning, change management and quality management. Moving from abstract levels to concrete filling of stages, substages and connections (that is, from top to bottom), the methodology focuses not on the result, but on the process. At the same time, it does not contain a description of specific details, does not pretend to universality and detailing of specific cases of project implementation. Unlike classical methodologies (PMBoK or ISO 21500:2012), which are applicable to projects of any subject area, PRINCE2 adapts to the specifics of the organization and scales for projects of various sizes and complexity. This property allows you to reuse the accumulated experience of project implementation. In addition, PRINCE2 can be combined with industry methodologies.

The recursive approach in PRINCE2 most clearly characterizes the possibilities of the methodology we have chosen for the implementation of business process digitalization projects. On the one hand, we use the PBS (Product Breakdown Structure) tool, which splits the target product into non-overlapping sub-products. Accordingly, we get the opportunity to implement each of the sub-products according to a simplified algorithm, which is close to flexible methodologies. On the other hand, the nature of recursion is such that each step of the project is determined by the results of the previous step. Accordingly, the stack of project steps sequentially passes through all stages, and inclusion in the stack of steps of the next stage of the project is possible only after the completion of the previously implemented one. This property is characteristic of classical methodologies.

All of the above can be considered a justification for the application of the PRINCE2 methodology for the implementation of a project to digitalize the company's business process. Next, let's imagine how the PRINCE2 methodology, used among corporate standards for forms of collective activity, can be integrated into an ontological model. Our model is represented by a triad:

$$O = < C, M, R >, \quad (1)$$

where C={ci} – a set of concepts (concepts) forming an ontology O, and, if $i = \overline{1,I}$, then $|C| - I$, where:

$M_i = \{m_{1_i}, m_{2_i}, \dots m_{n_i}\}$ – the set of attributes of the concept i (n – the number of attributes describing this concept);

$R \subseteq C * C$ – the relation of direct inheritance.

The ratio R is given by the matrix I*I. At the same time, dependent (child) concepts (c_k) inherit attributes from the parent concept (c_i) and expand the number of attributes with their own:

$$\exists(c_i, c_k) \in R \rightarrow M_i \subset M_k \quad (2)$$

Recall that our subject area is the support of interaction between IT directors in the implementation of digitalization projects of business processes. Modeling the subject area using an ontological model involves determining the basic characteristics of the modeling process. To them, we attributed the following, respectively:

- the ontological model is universal in terms of linguistic, symbolic or pictographic representation of data;
- the ontological model supports the concept of assigning attributes to entities;

- the ontological model is built according to the object-oriented concept of class inheritance, this ensures the organization of all entities into a logically related structure;
- the ontological model supports n:n relationships (between two objects) and n:m relationships (between an object and a set of objects) using binding relationships; as a result, we have a variety of semantics, we can take into account role, time characteristics;
- the ontological model has an extensible format while preserving the original data model, that is, it allows you to expand the list of entities without losing the quality of the connecting relationships;
- the ontology data model corresponds to such an architectural principle as the difference between objects, object properties and activities in project management. Thus, the connection of the properties of the object with its description will be ensured and the possibility of the properties of the object to have multiple versions or descriptions;
- the ontological model supports multiple inheritance of concepts and does not contain false inheritance relations linking the concept with the ancestor of its parent concept.

The ontological model has a hierarchical structure. The analysis of the subject area of IT management interaction in the implementation of business process digitalization projects makes it possible to divide the concept space into meta-ontology and the actual ontology of the subject area. Through meta-ontology, we obtain a generalization regarding the source of the collected fragments of knowledge and realize the intention to adhere to a structure close to the ontological structure [22].

The set of concepts for the ontological model were selected using the theory of social networks, and the relationships between the concepts were identified by the method of hierarchical clustering. Next, the hierarchy of concepts of the subject area was developed and the properties and relationships between the concepts were determined.

Meta-ontology includes concepts that denote categories in relation to the concepts of the subject area. The structure of the meta-ontology determines the structure of the subject area, therefore, an algorithm for verifying the integrity of the system of concepts of the subject area is based on it.

Visually, the ontological model is the result of combining three levels, each of which contains interrelated entities. The upper level includes meta-ontology entities. This is followed by two levels of entities of the business domain ontology. One of them includes entities combined in accordance with the functional task that the IT director performs in the project. The second level combines entities according to the principle of a functional role for each position of the IT management.

Recall that according to a given architectural principle, we distinguish objects in the data model, properties of objects (properties), as well as types of activities (activities). Accordingly, the upper level of the ontological model, in accordance with the specified architectural principle, includes the activities of the IT management in the project. Then the next two levels of business domain ontology include objects of their interaction and properties of objects. Each object in the data model corresponds to properties such as the name of the concept, the composition of the attributes of the concept and the generic relations of the concept.

Recall that the establishment of an order for determining the entities of the IT management interaction relationships is our first step. This concludes the methodological component of the study – we have summed up the theoretical basis and justified the application of standards of collective activity to build a model of relations. We have also identified the basic characteristics and the mathematical basis according to which the ontological model will be formed. The following is an applied stage of the study, the meaning of which is to establish a list and hierarchy of entities of IT management interaction relationships. The hierarchy is based on the patterns of interaction between IT directors. By characterizing the patterns of interaction, we will be able to identify the attributes of entities in the ontological model being developed. The following are the results of determining the entities of the ontological model sequentially for all its levels.

3 Results and discussion

Definition of Meta-ontology entities

We offer a description of the top level of the ontological model being developed. Its entities expressing the unique, but at the same time related topics of the project are presented in the PRINCE2 methodology. These are 7 topics (aspects) of the project that require constant attention from IT directors (Fig. 1). Each of the entities in accordance with the recursive approach is connected to itself and maintains a binding relationship with other entities.

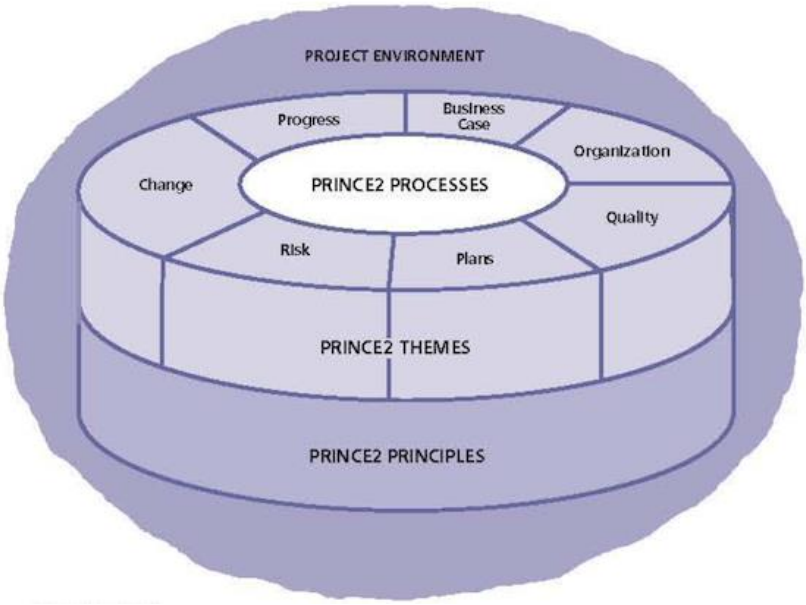

Fig. 1 – 7 topics (aspects) of the PRINCE2 methodology project [23]

Let's present a semantic description of the entities included in the ontological model to the extent that a clear idea of their essence can be obtained, but without the details contained in the PRINCE2 methodology.

The essence of the "Business Case" includes a list of criteria for the viability of the project and tools for monitoring the feasibility of the project at all stages of its implementation. The criteria are based on data on the economic justification of the project (benefits, costs, risks, investments), which are necessary for deciding on its launch and phased implementation.

The entity "Organization" includes data on the functional distribution of the roles of IT management in the project, the structure of responsibility and responsibilities for each role. But it should be borne in mind that the digitalization project is integrated into the general outline of the company's business processes and is only part of the overall scale of activity. Therefore, the range of entity roles includes data on all stakeholders (groups of people), both those who can influence the project and those who are affected by the project.

The essence of "Quality" contains a classification of means of validation and verification of project results (at any stage) to the expected needs, requirements and specifications. It is assumed that any created product must have a set of properties that characterize its specified consumer qualities.

The "Plans" entity contains data on planning levels, types of plans and properties of their structures, as well as planning benchmarks. The PRINCE2 methodology contains indications of the following types of project implementation plans – the project initiation stage plan, the project plan itself, product creation stage plans, exception plans, team plans.

The essence of "Risk" includes risk identifiers indicating risk situations, risk assessment indices, ranks and control indicators of project risks at all stages of design (from the initiation of the project and during its implementation). Risk analysis and management at the time of its occurrence in accordance with the PRINCE2 methodology is considered as a factor in increasing the success of the project.

The "Change" entity contains indicators for managing potential (spontaneous) and planned changes to the final product and its intermediate stages. The management of any content changes presupposes their preliminary determination and evaluation based on previous experience. Approval of changes takes place on the basis of a request for change and is evaluated in terms of the impact on the economic justification of the project (the essence of the "Business Case").

The essence of "Progress" includes benchmarks for monitoring results and forecasting project goals. The data necessary for making further decisions based on the results of monitoring are formed by comparing the values of the actual indicators of the project with the planned ones. All these actions are carried out in accordance with the approved monitoring and forecasting mechanisms.

Summarizing the list of entities corresponding to the project topics in the PRINCE2 methodology, we indicate that they constitute the upper level - meta-ontology. Having described it, we can proceed to the description of the ontology of the subject area itself. Recall that it includes entities of two levels. One of them includes entities combined in accordance with

the functional task that the IT director performs in the project. The second level combines entities according to the principle of a functional role for each position of the IT management.

Definition of the entities of the ontological model by the type of functional task

For the subject area of IT management interaction, the data model is primarily represented by communication relationships. Taking this into account, it was necessary to determine the composition of entities describing the functional tasks performed by IT management in the project through communication between IT directors.

The PRINCE2 methodology provides such a tool as a communications management strategy. The document of the same name describes the meaning and frequency of communications between project participants. There is a clear limitation of methodology here. It is obvious that only an interaction management plan is not enough to organize interaction between project participants. Tools are needed that will ensure such processes as the distribution of input, output data and communication management. To solve this problem, additional entities of IT management interaction relationships were included in the ontological model. To ensure continuity between classes of entities, the standard for forms of collective activity – ISO 21500:2012 "Guidance on project management" was used. Thus, in addition to the entity "Communication Management Strategy", the entities "Communication Plan", "Distributed information", "Communication Management" with their corresponding child entities were taken from the ISO 21500:2012 Standard into the structure of the ontological model level (Table 1).

Table 1 - Composition of entities combined by type of functional task

Entity	Child entity
Communication plan	Project plans Register of project stakeholders Description of roles and responsibilities Approved changes
Common information	Communication plan Reports on the performance of work Unplanned requests for information
Communications management	Communication plan Common information Reliable and timely information Corrective actions
Communications management strategy	Standards, communication methods Register of project stakeholders Description of roles and responsibilities Storing communication records Frequency of communications Communication format Reporting

The entities presented in Table 1 are inherited from the corporate communications policy, project initiation documentation (in terms of the project management team structure, risk management strategy, quality management strategy, change management strategy). If necessary, the reporting of communications is also formalized, for example, meetings and informal discussions with stakeholders.

Since the ontological model is large enough, the concept of inheritance of concepts provides an effective way to organize all entities into a logically connected structure.

Definition of entities of the ontological model by the type of functional role

Having described the entities combined in accordance with the functional task performed by the IT management of the project, we proceed to the description of the last level of the ontological model. Recall that this level unites entities according to the principle of the functional role of the IT director in the project.

In order to include a level with the positions of IT directors in the ontological model, it was necessary to make a description of their functional roles. To do this, we have identified the features of each functional role that determine the essence of the interaction of IT management in the implementation of business process digitalization projects. In the classification, the names of IT management positions adopted in the business environment and which have already become traditional were used. Figure 2 shows the functional roles of project participants with reference to the positions held by IT directors in the company – CEO, CDO, CDTO, CTO, CIO, CA.

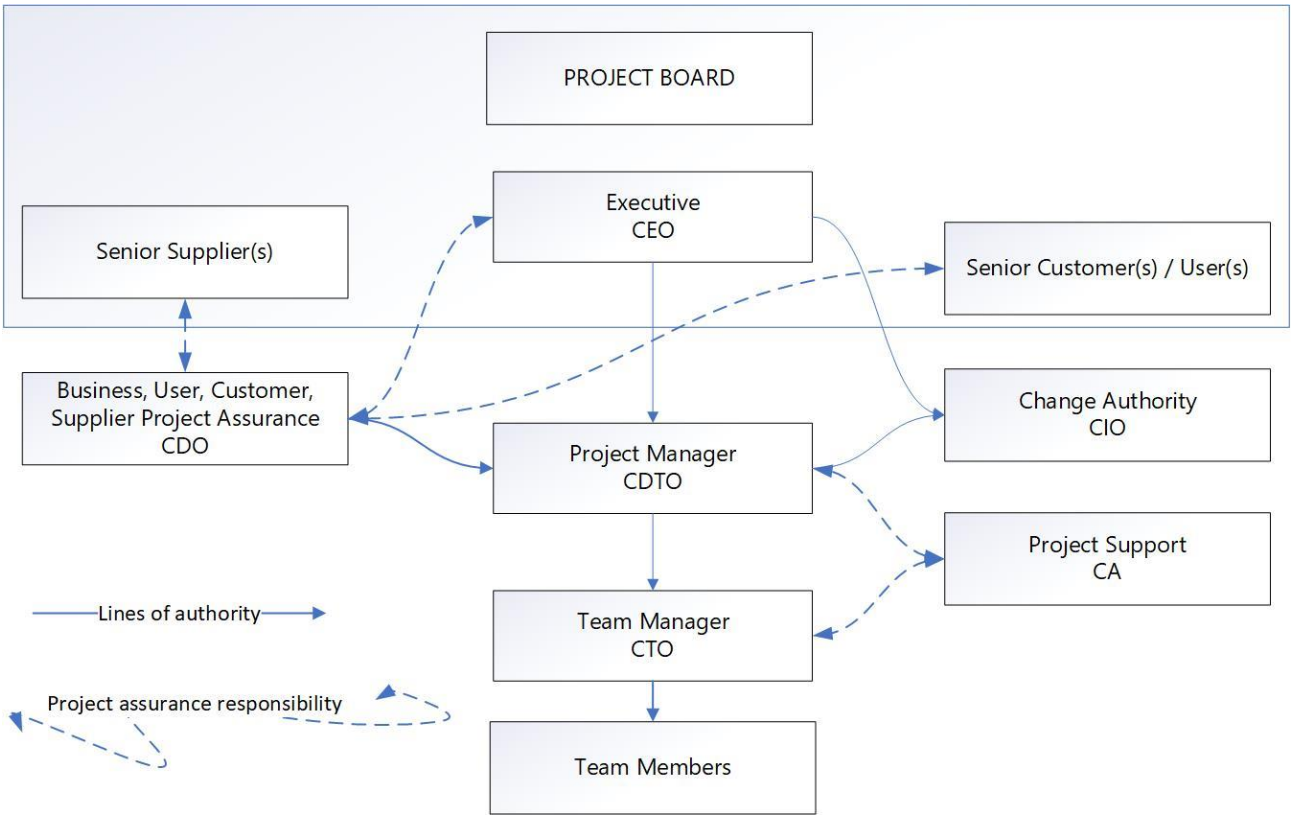

Fig. 2 - Functional roles of IT management in project implementation

Correlating the positions of CIOs with the functional roles of project participants, we also gave them a characteristic. The meaning of the verbal description of each position of the IT management is that structured metadata for the construction of the second level brings all the significant features of the functional role into the ontological model.

Below are the characteristics of all positions of the IT management involved in the digitalization project of the company's business process.

The Chief Information Officer (CIO) provides leadership in the development, delivery and implementation of technologies as auxiliary tools for the implementation of business processes. In the strategic aspect of its activities in the company, the CIO is responsible for the implementation of the Strategic Plan of Information Systems - ISSP [24]. Its day-to-day activities include end-to-end processes of designing IT architecture and providing information and technologies to ensure the efficiency of business processes.

Chief Architect (CA) is responsible for software design and making key decisions on the organization and change of IT architecture in the company. His daily activities are focused on the technical implementation of various projects. Traditionally, the CA is subordinate to the CIO and performs functions based on its technical or functional specialization.

Chief Digital Transformation Officer (CDTO) also has a variant name – Chief Digital Officer (CDO). CD TO coordinates the development and implementation of the Digital Transformation Strategy of the company's business processes [25]. Under his leadership, the digitalization of the existing IT architecture and the architecture of business processes is carried out. Realizing its expertise, CDTO develops new solutions, changes business models based on digital technologies, the introduction of which will ensure an increase in the efficiency of business processes. His subject area is the introduction of digital technologies and the adaptation of the company to changes in the digital infrastructure.

Chief Transformation Officer (CTO) provides technical support for changes initiated by CDTO. CTO's activities are aimed at ensuring flexible and conflict-free integration of digital technologies into the daily activities of the company's employees. Interacting with CDTO, he monitors the processes of acceptance of changes and is an adept of the concept of continuous transformation. His area of responsibility also includes the organization of transformations of external business processes aimed at the development of business infrastructure and service quality.

Chief Data Officer (CDO) ensures the operation of data management systems and controls the interaction between data owners and product managers in all areas of the company's activities. Being responsible for the implementation of the Data Management Strategy, the CDO implements a set of tools for working with data [26]. The scope of its activities includes operational issues on statistics of data quality incidents, and strategic issues of developing metrics for the effectiveness of data management systems. The CDO implements most aspects of its activities in cooperation with other IT directors, while single-handedly managing projects in the field of data management. The CDO, as a data custodian, is the owner of business processes related to compliance with requirements and industry standards, and is also a partner of the CIO in the implementation of any technical initiatives.

The types of functional roles of IT management in the project shown in Figure 2 will be used in the ontological model as second-order entities. In our opinion, they fully reflect the project management procedure and directly indicate the content and results of the joint activities of IT directors.

To build an ontological model, the semantics of the data on the entities included in it is important. For this purpose, a special semantic level is formed, which contains a description of the possible roles of project participants and possible grounds for interaction between them. All the presented characteristics of IT management positions are fixed in a specially created semantic layer and are an integral part of the ontological model being developed.

Description of the process of constructing an ontological model of the subject area

Next, we will present a data model of the ontological model being developed, which shows how it is possible to combine entities of the meta-ontology level and the ontology level of the subject area. In the data model, the entities of the ontological model are perceived as objects. This meets the requirements of the methodology [27]. To build a data model, we use the entities of the described objects corresponding to the topics of the PRINCE2 methodology (Figure 1) and objects combined by the type of functional task performed (Table 1), by the type of functional role (Figure 2).

The data model considers the subject of communications and the frequency of interaction between CIOs involved in the project. A controlled cyclic flow of information is the basis of their interaction, that is, receiving feedback is a reaction to the initiative of interaction expressed by one of the parties.

Relationships between entities are shown in the ontological model by means of connections, which, as is known, is one of the advantages of the ontological representation of data [6]. Connections are formed according to a single scheme, connecting two objects. The scheme is simple – links inherit properties and attributes from parent objects. Accordingly, all possible relationships between entities of the ontological model are set using links. Figure 3 shows how entities (by the type of functional task in the project) are related to entities (by the type of functional role of each IT director). The nature of the interaction between entities is fixed in the semantic layer, where all possible roles of project participants are embedded.

To visualize the ontological model, we chose the type of semantic network [28] for the following reasons. Firstly, the semantic web is an effective means of data visualization, allowing interactive navigation methods to search for hidden or redundant relationships between objects. Using a semantic network, we use such an analysis method as VAD (Visual Analysis Data). Accordingly, we operate not with graphical primitives (as in the graphical diagram), but with semantic constructions extracted from the semantic layer, which contains descriptions of personalities, functionality, events, relationships, connections, and so on. Secondly, the semantic network offers a rich choice of tools for managing its content, starting from filtering and grouping data about network instances and ending with the output of data on an analytical slice in different layers and the construction of complex chains of relationships between objects.

Figure 3 shows the final version of the combination of layers on the ontological model.

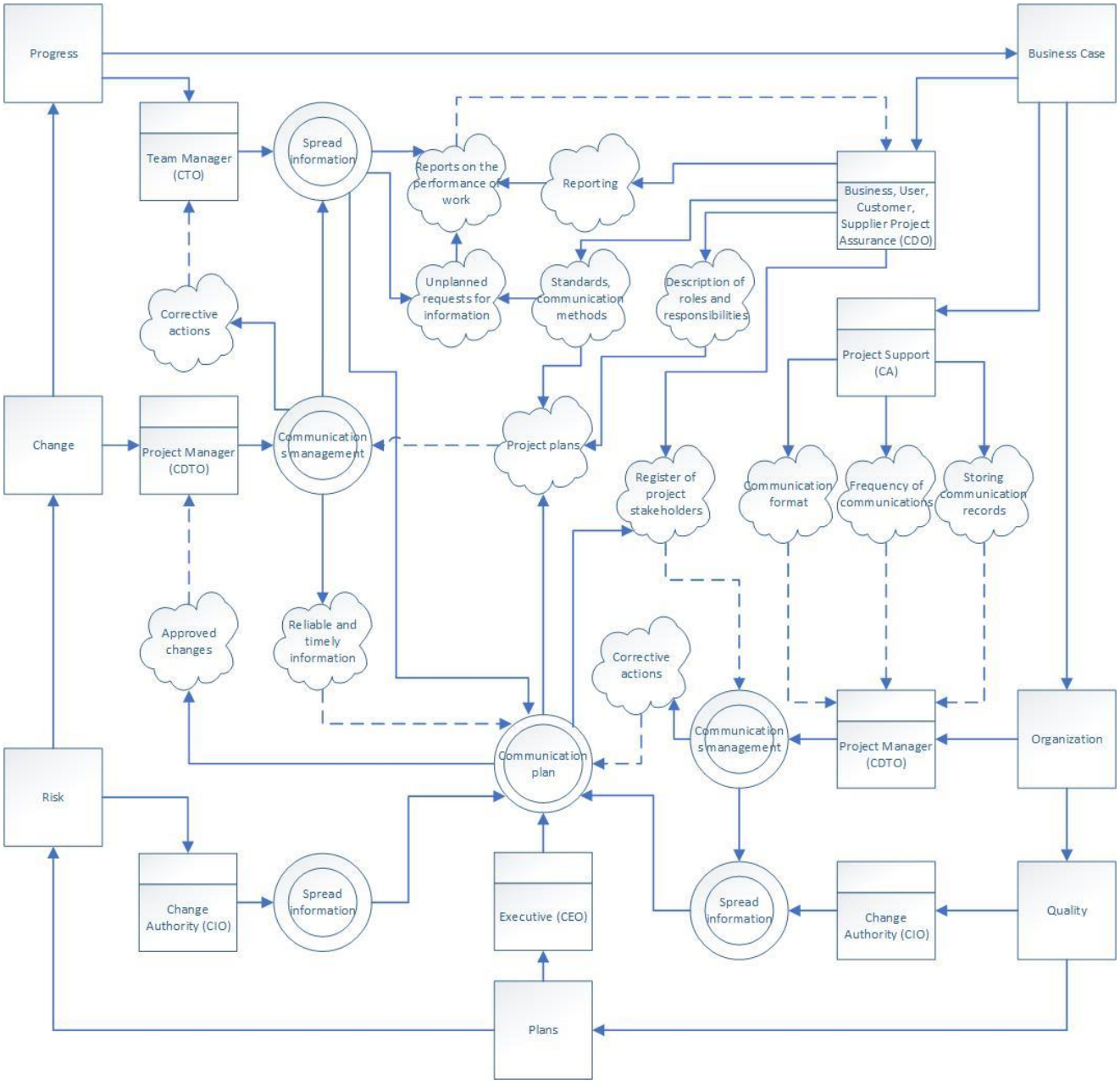

Fig. 3. Visual representation of the ontological model of the business domain in the form of a semantic network

The project topics provided by the PRINCE2 methodology are presented in the form of the first layer of the ontological model. A layer has also been added containing the role of IT management in the implementation of the business process digitalization project. The content of the functional task performed by each IT director according to ISO 21500:2012, and the transfer of the result further along the chain of interconnection for the implementation of the project, is also represented by one of the layers of the model. The relationships between the model objects show the direction and nature of the relationship between the project participants.

Further development of the developed ontological model is associated with the development of an information decision-making system. The domain of knowledge represented by the business domain ontology will be implemented into the information architecture of the company's knowledge base as an add-on of the project management information system. This add-in will be responsible for automating the process of interaction of IT management in the project. The selected basic characteristics of the ontological model will help to avoid the problem of semantic heterogeneity arising from differences between ontologies [20]. Thanks to the ontology alignment process, it is planned to ensure the compatibility of entities (including

relationships and instances of objects). The ontology machine model is proposed to be formalized by means of a relational database (Fig. 4).

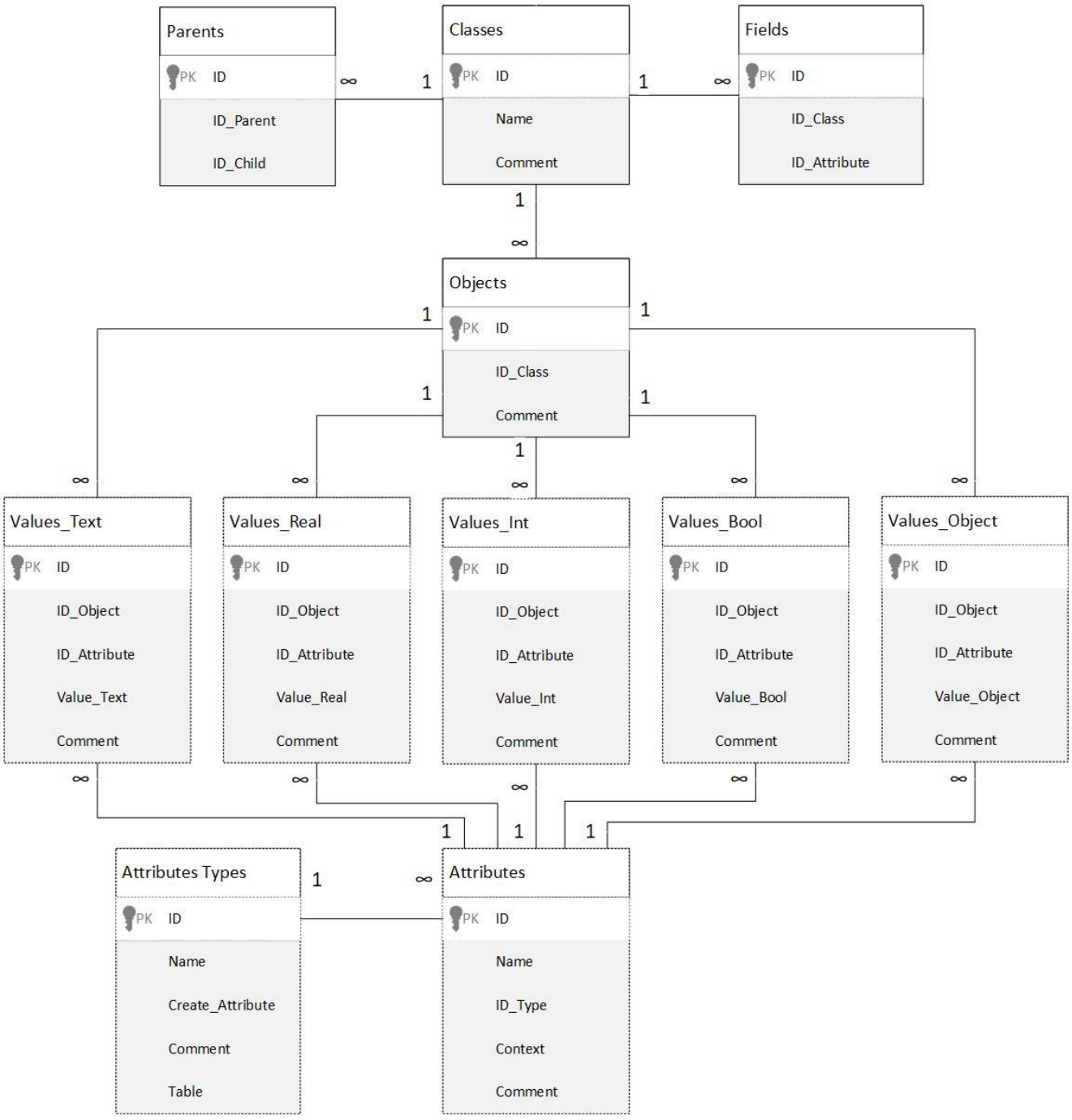

Fig. 4 - Structure of the business domain ontology database

Each entity in a relational database is represented by a table, and relationships between entities are implemented through foreign keys [29]. This approach gives a formal character to the intuitive representation of the objects of the domain under consideration and the connections between them, which is the ontology of the domain.

The relational database includes a number of interconnected tables, which greatly simplifies the visualization of objects and relationships between them in comparison with a conventional schema. The Attributes table includes attributes of a set of registered concepts classified by attribute type, the sets of which make up the Attributes Types table. The collection of ontology objects is distributed in tables depending on the data type Values – text, logical, real, integer, as well as the type of object reference. The composition of the attributes of each concept in the Fields table, as well as the identifiers and descriptions of concepts in the Classes table form the

core of the database structure. The Parents table defines inheritance relationships between concepts. Upon completion of modeling classes, attributes, relationships, and hierarchy, it is necessary to fill the ontology with instances.

Thus, we will prepare the basis for the application of the Protégé 4.2 ontology editor, which requires a frame model of knowledge representation. The machine model of the concept of ontology includes fields containing the name of the concept, the composition of attributes and generic relations of the concept. The attribute of the concept, in turn, is characterized by a name, type and value.

The order of construction of a relational database described by us, of course, does not provide data manipulation functions, but uses the capabilities of a relational database instead of an internal interface. In the future, it will be necessary to determine how the connection to the database is established. And the extended task will have to determine how authentication takes place and how to integrate data from multiple databases at the same time.

The developed ontological model has been tested in Domain Ontology Ranking System (DoORS)[30] for two semiotic layers – semantic and social. Satisfactory results were obtained in terms of the quality of the definition of values and social content. The machine model of ontology is focused on the step-by-step formation and editing of the structure to reflect possible future changes in the entities of the ontological model and the relationships between them.

3 Conclusions

The developed ontological model fulfills the task of specifying the subject area by expressing the model of relations between IT directors within the framework of the initiated project on digitalization of the company's business process. The scientific contribution of the obtained result consists in solving, using an ontological approach, the task of formalizing organizational ties between IT directors in the process of implementing a project to digitalize the business process in the company.

As a result (the finished product in the form of a semantic network), the ontological model provides the user with a number of possibilities. Instead of a declarative description of knowledge, the user gets the advantage of categorizing and structuring the area of knowledge. By developing this advantage and applying the system of business domain concepts at the conceptual, logical and graphical levels, the user manages information flows and implements information search and categorization functions.

If we talk about the direction of development of the ontological model, then its application gives the user the opportunity to identify patterns in associative relationships and analyze the subject area from the position of expertise. Thanks to the form of visualization, such properties of the knowledge system as connectivity and interpretability are realized. The constructed semantic network also allows the use of associative links for visual data analysis in the process of solving optimization problems for project management.

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