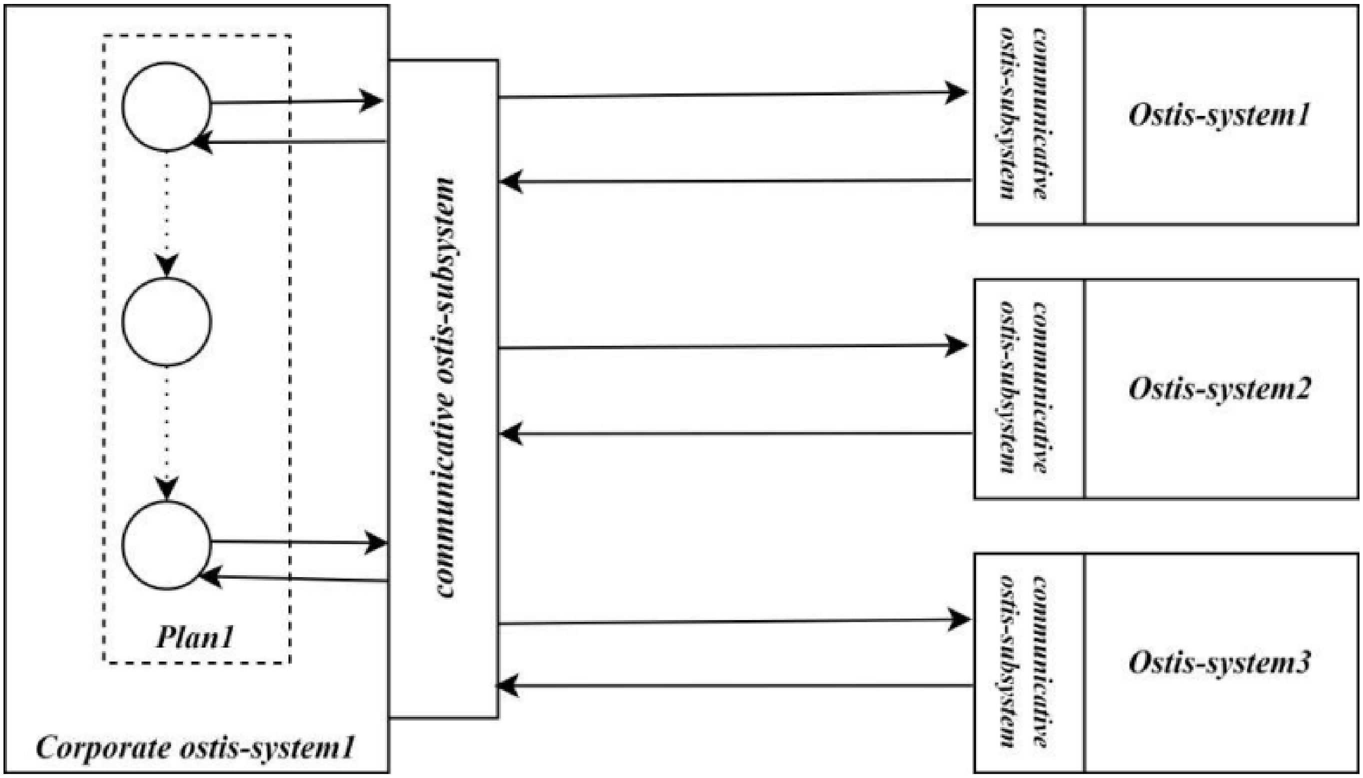

Рис. 3: Example of method interpretation by the ostis-systems collective

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ПРИНЦИПЫ ДЕЦЕНТРАЛИЗОВАННОГО РЕШЕНИЯ ЗАДАЧ В РАМКАХ ЭКОСИСТЕМЫ ИНТЕЛЛЕКТУАЛЬНЫХ КОМПЬЮТЕРНЫХ СИСТЕМ НОВОГО ПОКОЛЕНИЯ

Шункевич Д.В.

В работе рассмотрены принципы децентрализованного решения задач в рамках экосистемы интеллектуальных компьютерных систем нового поколения, в частности рассмотрена архитектура такой экосистемы с точки зрения организации процесса решения задач, выделены роли систем, участвующих в процессе решения задач. Уточнены принципы формирования коллектива систем, участвующих в решении задач, этапы решения конкретной задачи полученным коллективом.

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Towards the Theory of Semantic Space

Valerian Ivashenko
Department of Intelligent Information Technologies
Belarusion State University of Informatics and Radioelectronics
Minsk, Republic of Belarus
ivashenko@bsuir.by

***Abstract*—The paper considers models for investigating the structure, topology and metric features of a semantic space using unified knowledge representation.**
The classes of finite structures corresponding to ontological structures and sets of classical and non-classical kinds are considered, and the enumerability properties of these classes are investigated.
The notion of operational-information space as a model for investigating the interrelation of operational semantics of ontological structures of large and small step is proposed.
Quantitative features and invariants of ontological structures oriented to the solution of knowledge management problems are considered.
***Keywords*—Semantic Space, Neg-entropy, Operationa-linformation space, Enumerable sets, Natural numbers, Ackermann coding, Generalized formal language, Enumerable self-founded Hereditarily finite sets, Countable nonidentically-equal Hereditarily finite sets, Multigraph, Hypergraph, Metagraph, Orgraph, Unoriented graph, Quasimetric, Orgraph invariant, Homomorphism, Isomorphism, Homeomorhpism, Oriented sets, Graph wave-front, Dynamic graph system, Receptor, Effector, Transmitter, Resonator, Graph dimension, Fully-connected orgraph period, Rado graph, Universal model, Stable structure, Operational semantics, Denotational Semantics, Infinite structures, Generalized Kleene closure**

I. Introduction

There are different approaches to the study of topological, metrical and other properties of signs in texts leading to the consideration of corresponding semantic (or meaning (sense)) spaces [56].
Space is convenient because it is connected with some ordinal or metric scale which allows to reduce the cost of solving such cognitive tasks as searching (synthesis) or checking (analysis) the presence of an element (including for the purpose of eliminating redundancy) in a set organized as a space.
Knowledge integration based on unification is necessary both to eliminate redundancy and to compute semantic metrics. For this purpose, the developed model of unified knowledge representation [1], [5] can be adopted.

*I*I. Approaches to the construction of a meaning space

The history of the development of the concept of "meaning space" and the corresponding models are described in the works [2], [11], [32], [56].As stated in [56], the main approaches to the construction and research of the organization of meaning space include:

- exterior studying the physical nature [30], [33], [48] of processes including thinking processes [29],
- (quantitative) interior using quantitative and soft models, including probabilistic description of processes [11], [34], [35], [42], based on the practice of using words of language [20], [53],
- (qualitative) interior investigating the structure of represented knowledge and its dynamics [12], using formal semiotic models [51].

In some cases, it is possible to combine these elements of these approaches.

The following models and methods are used to construct and investigate the semantic space:

- mathematical models of spaces [37]–[41], [43], [44],
- formal and generalized formal languages [45], [56],
- methods of probability theory [11], [36], [54],
- methods of formal concepts analysis [58], [59],
- other models [3], [4], [45], [46], [49].

Further in the paper we consider the main classes of structures, their attributes and corresponding types of subspaces of the semantic space using unified knowledge representation [5], [12].

*I*II. Unified representation and classification of fully representable finite knowledge structures

At the level of syntax, using syntactic links, it is possible to represent only finite knowledge structures in a unified (explicit) way.

Let us consider the principles of unified representation of knowledge [5], [12] with a structure that is one of finite structures of different kinds. Let us compare a certain class of structures to each kind of finite knowledge structures.

Note that finite structures can be divided into two main types: oriented finite structures and unoriented finite structures [21].

The simplest unoriented finite structures are hereditarily finite sets [63]. The class of hereditarily finite sets can be expressed as follows:

$$\emptyset^{(+\overset{*}{1})} = H_{\aleph_0}$$