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ONTOLOGY BASED DECISION SUPPORT SYSTEMS DEVELOPMENT

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Decision support systems constitute a class of computer-based information systems including knowledge-based systems that support decision-making activities. One of the fundamental components of a DSS is a problem situation management knowledge base and a database of relevant definitions. These include:

– Semantic metadata used in a domain ontology;

– Formal knowledge represented by procedures (base of rules) enabling logical finding of a decision in a problem situation;

– Knowledge on former problem situations and correspondent management decisions (precedents) taken;

– Factual data as complex dynamic system monitoring results.

The integration of the aforementioned knowledge representation models is based on a unique information space of problem situations cognitive elements. It is formed as a result of object-cognitive analysis and complex systems management modeling in problem situations. This method includes the use of an object-oriented and ontologic analysis as well as the development of a semantic web representing the acquired knowledge.

Object-oriented analysis uses the domain field thesaurus to state the requirements to the system by defining system classes and objects, identifying significant relations between them, sorting out critical object interactions and finally modeling the system processes.

Ontologic analysis is used to create a domain-oriented ontology. It is based on the domain field description in terms of entities, relations and procedures. Relevant infologic and functional system characteristics should be defined and united in the content of a domain-oriented ontology. Ontoanalysis is aimed at surveying and interpreting system relations in complex domain fields using methods and means of computer modeling.

Ontologies are also used to create a domain semantic web which is used to refine the generalized representation of the problem situation. It makes possible to create logical, casual and synonymy relations which characterize the compatibility of events and facts in the problem situation, coincidence and sequence of the system development. This helps to create cause-and-effect relations, knowledge integrity and consistency verification procedures and etc. thus enabling to use logical deduction as a core-method for the system reasoner.

A DSS should also provide a user interface imparting intuitive access to the system decision search module driven by the reasoner.