

**GORBACHEV N.N. SUSTAINABLE DEVELOPMENT OF INNOVATION  
CLUSTERS EDUCATIONAL CONTENT USING UNIVERSITY KNOWLEDGE  
DOMAIN ONTOLOGY**

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*Проанализирован опыт использования модели предметной области к управлению учебно-методическим контентом. Приведен пример архитектуры системы управления знаниями ВУЗа на основе актуализируемой модели предметной области.*

**Introduction.** Development of innovation clusters in universities depends on implementation of contemporary research and practice results into educational process. Since 2000, volume of scientific knowledge doubles every two years period; in 2012 volumes of technical information in some segments of the economy will double every 18 months (Appiah, 2007).

Big amount of incoming information requires improvement of corresponding knowledge management toolsets. Such tools shall allow for classification, systematization of new data, information and knowledge and utilization of them for updating the university knowledge resources. Expenses for technical supporting, development and updating the existing educational content reach 85% of total university knowledge management system (KMS) maintenance costs. However, investments into new content and knowledge tools take only 15% (Garrot, 2009). Thus, the problem of knowledge management for sustainable development of university knowledge clusters divides into organizational (process models), technical (KMS toolsets) and economics (cluster knowledge updating costs) groups of aspects.

**Conception of obligatory knowledge sharing.** Conception of obligatory knowledge sharing is suggested as theoretical basis for innovation cluster knowledge management. Obligatory knowledge sharing is a variant of transfer of personalized individual or collective intellectual property objects into university KMS for updating and/or development of educational content. Applying the conception to suggested organizational approaches allows for the following classification of obligatory knowledge sharing:

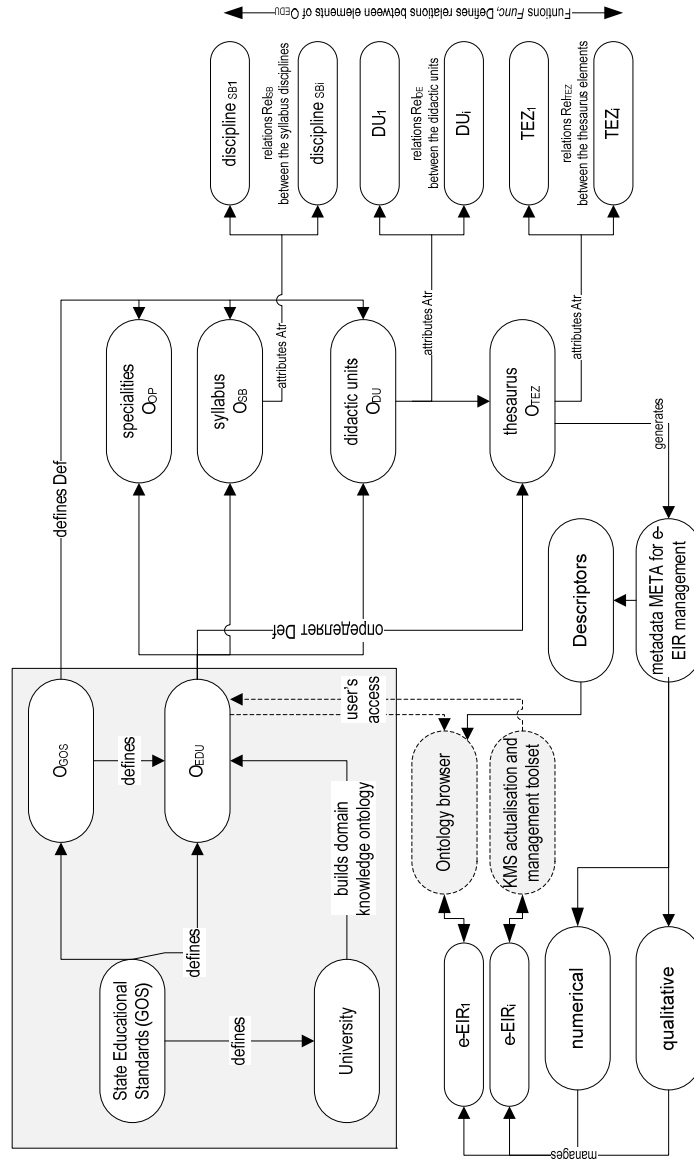
- Individual (knowledge sharing between the individuals inside the innovation cluster);
- Collaborational (knowledge sharing in course of group work or between the projects);
- Corporative (knowledge sharing applying corporative regulations and stimuli);
- State (knowledge sharing applying corporative regulations and stimuli).

Information resources (IRs) of the university include traditional and electronic educational IRs. Electronic IRs are real-time updatable. KMS users (lecturers, students) working with external knowledge sources and defining correspondence between university IRs and current research and practice results. In case of discrepancy they attract the new information to university prospective information sources repository. Knowledge domain in a form of ontology guides the KMS users in course of studying the external knowledge sources and allows for classification, verification and systematization of knowledge incoming to university prospective information sources repository.

Knowledge domain model developed in a form of ontology provides superstructure for knowledge updating and development acts as university organizational impact to innovation cluster knowledge systematization and development (DeLone W.H. and McLean E.R., 1992). Construction of innovation cluster ontology consists of two stages:

- Mathematical modeling of university knowledge domain using methods of graph theory
- Implementation of mathematic model to ontology building using modeling software.

**Conclusions.** This paper has outlined the advantages provided by application of domain knowledge ontology to knowledge management within the university innovation cluster. The article also has illustrated the economic benefits that can be gained by organizing the knowledge incoming to innovation cluster basing on the project and the distributed resources approaches consolidated using methods of dual management. Suggested organizational approach using mechanisms of obligatory knowledge sharing inside the innovation cluster was approbated in Minsk Branch of MESI for instant development and updating of educational content.



**Figure 1.** Suggested architecture of university domain knowledge ontology

Classification, attestation and implementation of contemporary research and practice results using expandable university knowledge domain ontology allowed for effective publication of new content into innovation cluster knowledge management system. Methods and approaches to collaborative work management were used for development of knowledge management system toolsets for improving the content updating effectiveness. Application of conception of obligatory knowledge sharing inside the innovation cluster using domain knowledge ontology has confirmed its effectiveness in course of approbation.

On the platform of knowledge domain ontology various economic-mathematical models may be developed for increasing the functioning effectiveness of innovation cluster knowledge management system. Currently, the authors has developed: economic-mathematical model of content updating periodicity (based on Bellman function); economic-mathematical model of optimal updates publication (based on Dice coefficient applied to ontologies comparing and Floyd-Warshall algorithm) and economic-mathematical model of KMS content updating technological process (using IDEF3 notations (Whitman and Huff, 1997) for technological modeling PERT methodology (Kelley, 1961) for optimization).

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