

# Information Portal MilUNI for Military Universities Cooperation

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## Abstract

The paper describes the Knowledge Management System (KMS) about military universities (MilUNI), mostly in the NATO environment, but it also includes all European countries. The goal of the MilUNI is to support the cooperation among universities in education, research, and the staff and students exchange. The system is based on the Topic Maps theory using the AToM software. Special attention is paid to the ontology design, Knowledge Base (KB) development, and application processing when using the KMS. The KMS includes the KB with interface for administrator, architect, and editor and the Knowledge Portal with user interface. Related work is analyzed. The search procedures in the KMS are mentioned. The paper concludes with suggestions for the further development of the system.

*Key words:* Knowledge-based systems, architectures, co-operation, education, information

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## 1. Introduction

The objective of the MilUNI (Military Universities) Knowledge Management System (KMS) is to provide a well-arranged platform for collaboration among military universities in teaching, research and exchanges of teachers and students.

The system contains information about universities, their structure and focus of study. The university staff members are connected with recorded activities, such as positions held, authorship of publications in conference proceedings and journals, and their participation in projects.

There are in the system the full-text conference papers, which enables the partners to study or quote them. It includes information about the study and research activities and it is publicly available at <http://miluni.eu>. In order to fulfill the KMS objectives, the contents of it have to respect the following:

- Universities and research organizations have to be related to NATO countries, next to European Union (EU) countries (non-NATO), and European countries (non-EU).
- Domains of interest include many fields of interest, such as Military Science, Engineering, ICT, Logistics, Medicine, Social Science, etc.
- Universities are linked to the countries and cities.
- NATO Centers of Excellence, Network Enabled Capability (NEC), events and institutions that are related to research and education in the field of interest.

The structure of the system is given by ontology classes of which are described in Chapter 4. The ontology consists of these main classes: university, organization, person, conference, collection, and article.

The MilUNI also includes information from the CIA World Factbook [5], a free source of information on countries of the world which is linked to other stored information. In this case it is the information about continents, countries, cities, and organizations.

The system was developed within the research program of the Ministry of Defence [4]. After the introduction, the paper states the theoretical basis, and a tool used for creating the KMS. Then follow an analysis of similar solutions, description of the ontology classes, the results of solution, and considerations on the further development of the system.

## 2. The Theoretical Background and Tool Used

The KMS is based on the Topic Maps (TM) principle [3]. The main reason is that the knowledge representation in the TM is intuitive; it keeps information in context, and conforms to human thinking more than other knowledge organization principles. The TM model consists of three basic elements: topic, association between topics, and occurrences of the topics. The TM is standardized in ISO/IEC 13250:2003.

**The topic** contains a denominated subject of interest. It stands for a subject we want to discuss; it is its substitute in the computer. Each topic (class) represents just one subject. It is a place in TM where all known information on the given subject is available by means of relations and occurrences. Each subject is represented by one topic in a Topic Map and it can be anything: a person, thing, entity, process, etc.

**Associations** represent relationships between topics, are bidirectional, and express relationship between subjects.

**Occurrences** are formed by the information relevant to a given topic; they can refer to information or they might just contain it. There are internal or external occurrences.

**AToM** (Aion Topic Maps Engine) software tool [1] implements the TM idea. Its main goal is to support the implementation of projects of KMS, especially effective development of powerful web applications. This has necessitated some extensions or specification of the TM standard. The following data types have been further complemented:

- Code and Ident – for the unique identification.
- Group Tree – a simple built-in taxonomy.
- Selection – forms a one-level code list.
- Text – the text content using the built-in editor.
- Picture, File – internal storage of images and files.

The AToM has been designed to build knowledge based applications. Such applications require a precise application layer and work with users. The authorization of users shall be under control, i.e. the settings of the activity in the SW which the user can perform in the KMS. It is necessary to monitor the user's activities, i.e. what object the user created, modified or even opened.

### 3. The Related Sources about Military Universities

A similar example of the MilUNI KMS is the free encyclopedia "Wikipedia". On this website, we can find a heading named "Military Academy" [6]. The choice done by the system is to sort military universities by country. Although this classification is easy to be executed, it does not permit users to find a university by the domain of study or by training. The greatest advantage of Wikipedia is the fact that this encyclopedia is free, and that many people can add some information to its entries. It clearly increases the number of inputs into the information source. There is a great risk to have erroneous information, and thus to harm the credibility of the information source because of the lack of hierarchy and user role.

Another example of portals on military universities is American Military University [2], which provides a comprehensive overview of the possibilities of studying at military schools in the USA. It offers a detailed overview of the areas of study by study programs (bachelors, masters), by specialization (arts, science), and by certification (shorter educational programs). All aspects associated with the study, including finance, accommodation, security, and study support are explained.

Generally, it is not difficult to obtain information resources on universities on the web. You insert the word "university" in a search engine, you will get a number of results; however, they are not organized, and, moreover, it is not certain that the result is complete. Another possibility is to find a link to a university in a national search engine, or to search the site of the Ministry of Education with an overview of universities, or to find a website with a list of universities, e.g., <http://www.vysokeskoly.com>, where you can search for universities and colleges in the Czech Republic by type, focus of study and geographic location.

However, all of these links, contrary to MilUNI, provide only a basic overview of a university, mostly in regard to the needs of prospective students who need to find a university for their further study. It does not provide complex information for promoting cooperation; moreover, it is meant only for the national environment.

## 4. Ontology

The contents of a KMS is defined in the KB ontology which includes classes with attributes, relationships among classes, and a set of occurrences meaning specific contents of the KB. The ontology definition is an important procedure that follows a analysis of the domain of interest.

The most important part of the ontology consists of classes that formulate term structure of the domain. The MilUNI ontology contains the following set of classes:

UNIVERSITY (structure of hierarchy)

- Universities in NATO and Europe countries

ORGANIZATION (other organizations than university)

- Research organizations focusing on the military
- International cooperation (such as ERASMUS)
- Organizations listed in the CIA World Factbook.

PERSON (university or organization member, author of a conference paper ...)

CONFERENCE (specialized/scientific conference)

COLLECTION (collection of articles or book)

- For example Proceedings of MCC-2012

ARTICLE (document from the collection)

PRODUCT (the result of an activity)

- For example, IS for Command and Control (C2IS)

VENUE (place, e.g. conference centre)

WEB ARTICLE (actuality for the portal), includes:

- Homepage articles
- Homepage boxes

ACTIVITY PROFILE (group tree of the activities, and profiles of education)

GEO TREE (group tree that includes continent, country and city from the CIA World Factbook)

DOMAIN TREE (hierarchy of areas of interest in the document or its part)

## 5. Knowledge Base

The Knowledge Base (KB) is prepared in a simple shape; see the user interface in editing mode in Fig. 1 (universities hierarchy). The main feature is a user friendly access to the information about the structure of the system, its main educational areas, the program of the faculties' education, list of departments, research and conference activities, etc.

The MilUNI includes data from public sources on about 100 universities and their 300 organizational parts (faculties, departments). They are situated in 40 countries, 130 cities. Almost 60% of the universities are from NATO member countries, 15% from the EU (non-NATO countries) and 25% are universities of other countries of Europe, such as Russia, Ukraine and Kazakhstan.

The most common way to obtain the required information is by browsing the knowledge base of a selected class, such as UNIVERSITY; see an example of the print-out in Fig. 2. The filter can be used, let us assume, for the ENSTA university. Required data about the university can be obtained, then its field of study, the list of its academic staff and students, and perhaps even their publications at conferences.

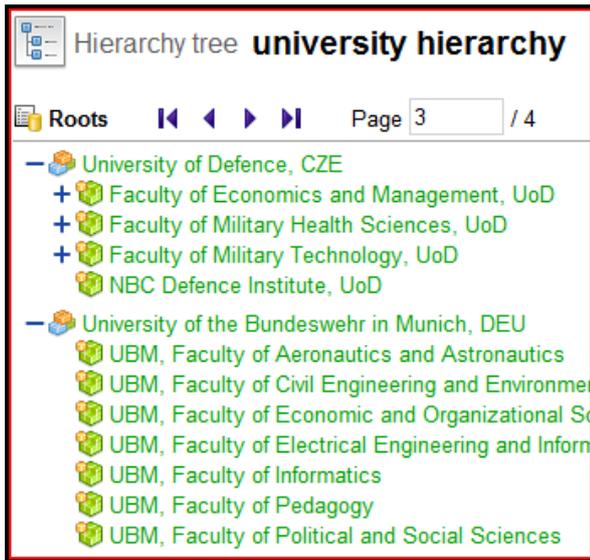


Fig. 1. MilUNI – universities hierarchy

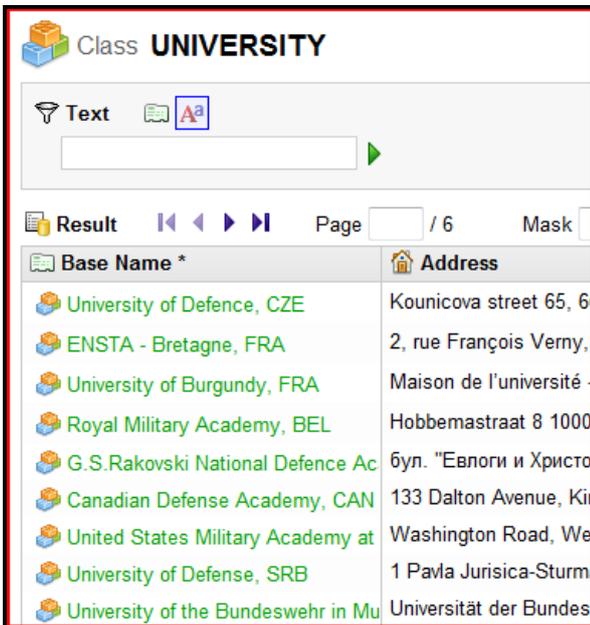


Fig. 2. MilUNI – set of universities

Another way is based on the global hierarchy search procedure using the field present at the top of the page. For a better understanding of these methods, Fig. 3 shows the result of the information retrieval about Network Enabled Capability (NEC). This procedure searches the full text of the entire KMS, passing through all classes and attributes, and regardless of the ontological structure it displays an overview of occurrences.

The knowledge-based system has, according to the rights set for users, two forms. As a portal for a common user to get the information needed and as an AToM SW interface for a qualified user for entering and editing data, or as a system administrator for editing ontology and managing users.

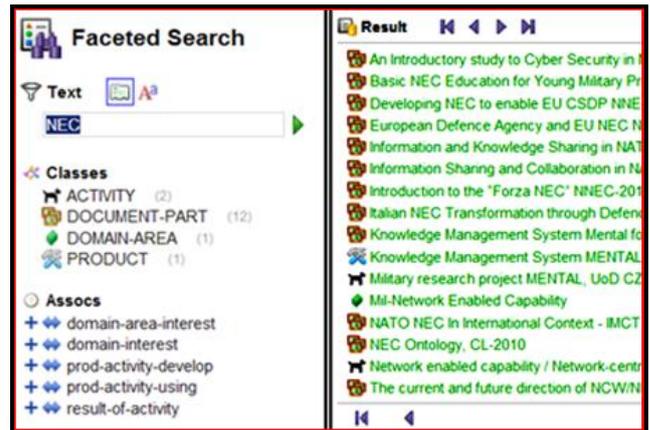


Fig. 3. Search procedure for NEC in the KB

## 6. Knowledge Portal

The Knowledge Portal (KP) covers the KB in the KMS to shield users from details of implementation. The KP is prepared as a typical portal template that is designed for any similar type of KMS. The portal structure and functions are designed with respect to the KB content, but it does not fit in the first version.

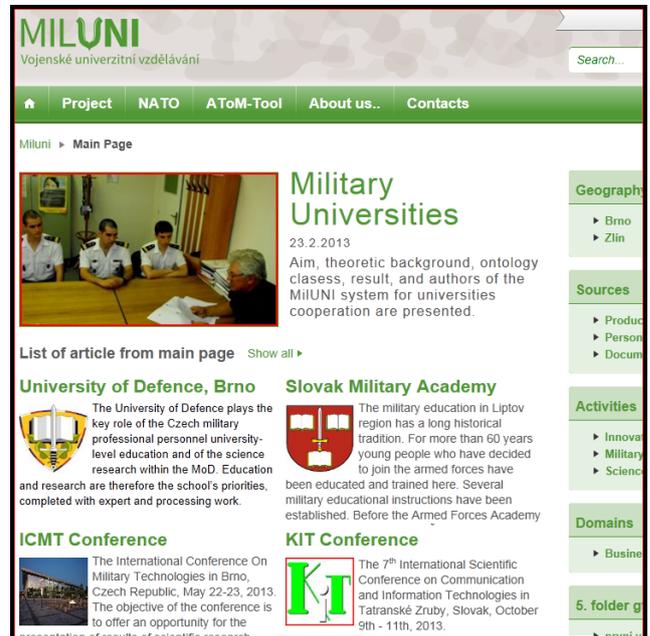


Fig. 4. Knowledge Portal – title page

The KP structure is designed with respect to KB and is connected with the KB, so that could be simple edited and personalized. Both parts of KMS (KB and KP) are mutually adapted and adjusted, so as to achieve the best practices resulting effect on the user. While the proposal KB leads to patient editing of the ontology, the design of the KP generates a number of changes in the data.

The title page of the KP consists of the registration box, main menu, actualities (search result area), full text search box, and results boxes (see Fig. 4). The result list of the Slovak universities search is shown in the Fig. 5 and the

detail about Military University of Technology in Warsaw (Poland) is shown at the Fig. 6.

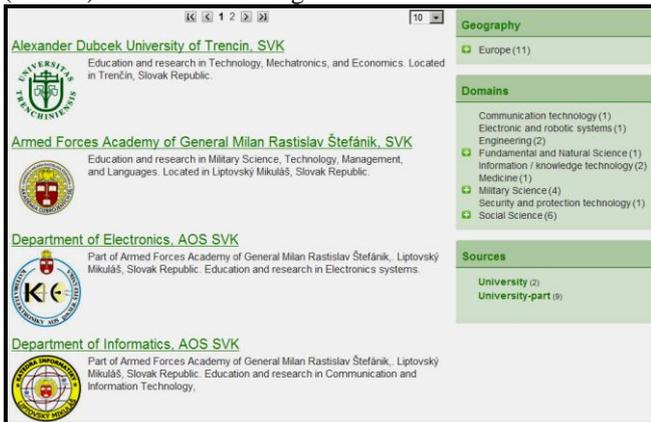


Fig. 5. Knowledge Portal – result list (search result)

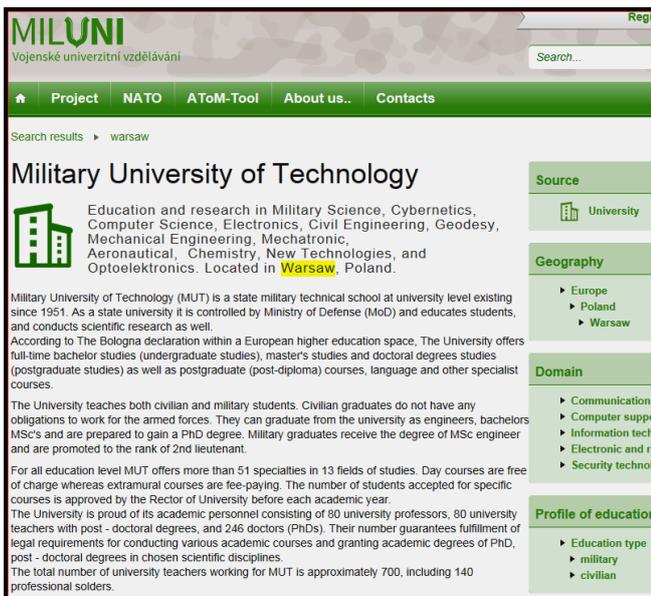


Fig. 6. Military University of Technology – detail page

## 7. Further Development

The existing state of the MilUNI system development is only a starting point for its further improvement. The primary requirement of such a system is its acceptance and utilization by users. The author assumes that this process will take one to two years. At first, it is necessary to address colleagues from military universities who have already shown their interest in mutual collaboration, and to encourage them to use the system.

Supposedly, these colleagues will inform their colleagues, and thus the awareness of the MilUNI platform for cooperation within military universities will raise. Naturally, an interest group will form which will secure the verification and editing of the existing data about each university, and then, step by step, they will add further information to meet the objectives of the knowledge system. It primarily includes research activities, publications in scientific journals and at conferences.

This community will gradually make suggestions on the improvement of the ontology, and it will also put forward the requirements for adding other vital relations.

## 8. Conclusion

The article presents the MilUNI KMS designed for the collaboration among military universities. It collects publicly available information on the structure, people, instruction and research at the universities, the participation in conferences, and other related information. The creation of the system constitutes only a starting point for its use; its further development depends on its acceptance by users. This poses a great challenge for the future.

## References

- [1] AION CS company and software Aion Topic Maps Engine (AToM), AION CS, Zlín, Czech Republic 2013, <<http://www.aion.cz/>>.
- [2] American Military University, USA, 2012 <<http://www.amu.apus.edu/academic/programs/list>>
- [3] PEPPER Steve. *The TAO of Topic Maps*, 2012, <<http://www.ontopia.net/topicmaps/materials/tao.html>>.
- [4] Research Program for Development of Organization CIS Department, MoD, Prague, Czech Republic, 2011-2015.
- [5] The World Factbook, CIA, USA 2013, <<https://www.cia.gov/library/publications/the-world-factbook>>.
- [6] Wikipedia's information source about Military Academy, 2012, <[http://en.wikipedia.org/wiki/Military\\_Academy](http://en.wikipedia.org/wiki/Military_Academy)>.