

Information Platform for Military Universities Cooperation

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Abstract. The paper describes the information platform MilUNI for military universities cooperation. 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. The three layer architecture of the system is described: ontology, data, and portal. Special attention is paid to the ontology design that forms the structure of the knowledge. The data layer allows enter and update data and portal is designed for the user access to knowledge base. The implementation tasks and goals with the dissemination of the system are mentioned.

Keywords: Knowledge base, Military university, Cooperation, Topic Maps, AToM, Ontology-, Data-, and Portal Layer.

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 staff members that are connected with recorded activities, such as positions held, authorship of publications in conference proceedings and journals, and their participation in projects.

The university members include 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://www.atom.miluni.eu> (respective <http://www.miluni.eu> from July 2013). In order to fulfill the KMS objectives, the contents of it have to respect the following:

- Universities and organizations related to NATO and European countries.
- Domains of interest include fields of education, such as Military Science, Engineering, ICT, Logistics, Medicine, Social Science, etc.
- Universities and organizations are linked to the countries and cities.

The structure of the system is given by ontology classes such as: university, university-part, person, product, conference, article, etc. MilUNI also includes information from the CIA World Factbook [1], 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 and cities, formed in so called geo-tree.

The MilUNI system was developed within the research program of the Ministry of Defence [2]. After the introduction, the paper states the theoretical basis, and a tool ATOM used for creating the KMS. Then follow an analysis of similar solutions, description of the ontology, the results of solution, and considerations on the further development and dissemination of the system.

2 The Theoretical Background and ATOM Tool Architecture

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 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. A subject is a part of the real world, which is described in TM. 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; they are not oriented and may have an arbitrary form (Unary, Binary or N-nary). **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 [4] 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. A simple set of basic features for the TM Internal Occurrences has been changed to the following data types:

- Code and Ident – for the unique identification of the entity.
- Group tree – a simple built-in taxonomy.
- Selection – forms a one-level code list, applied cardinality 1: N and M: N.
- Text – text content, using the built-in editor.
- Picture, File – internal storage of images and files.

In the definition of associations the following features were finalized:

- Order – each association can provide a structure of embedded occurrences.
- Hierarchy – a special type of association for parent-child relations.

The ATOM software architecture includes 3 platforms:

1. ATOM Studio for ontology definition and update, users administration, batch data access, portal formation, ...
2. Data Editor for data input and update.
3. Knowledge Portal for user access.

The set of ATOM Studio functions is at the Fig. 1, user interface of the Schema Editor is at the Fig. 2, and user interface of the Data Editor is at the Fig. 3.

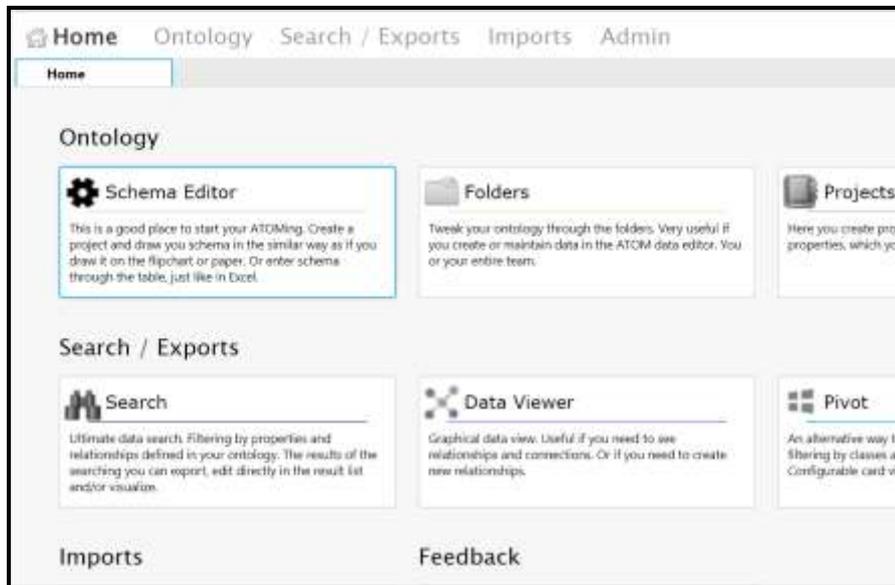


Fig. 1. Functions of the ATOM Studio (source author)

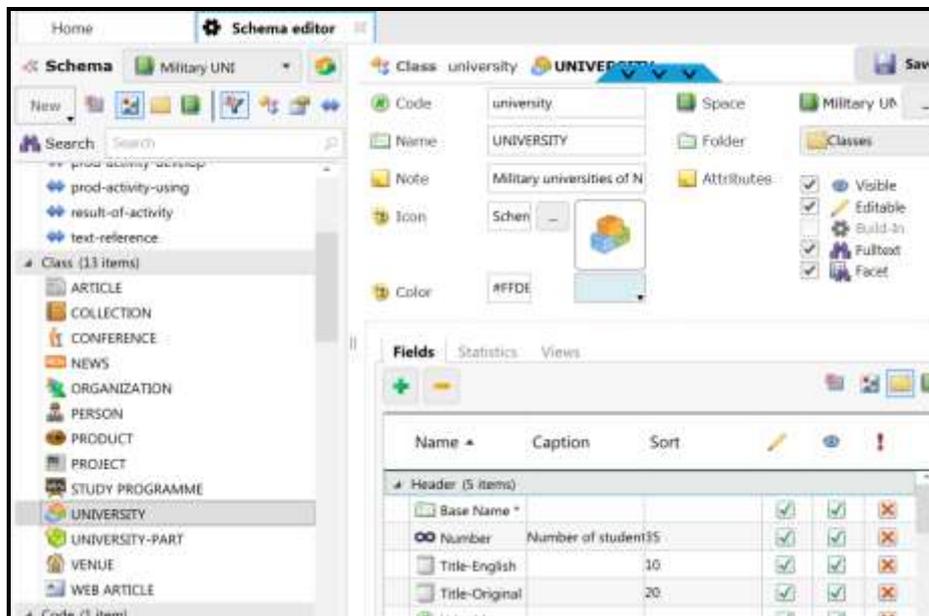


Fig. 2. User interface of the Schema Editor (source author)

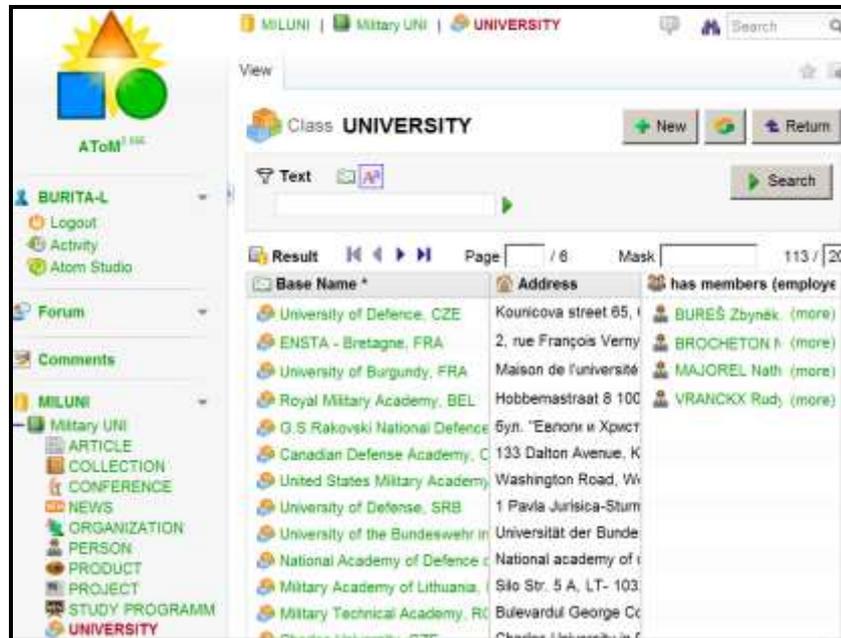


Fig. 3. User interface of the Data Editor (source author)

The Knowledge Portal (KP) covers the knowledge base (KB) in the KMS to shield users from details of implementation. The KP consists of 3 types of pages: Title (see Fig. 4), List (see Fig. 5), and Detail page (see Fig. 6).

The KP includes some menus and boxes for access and search of information. Almost all parts are under administration in MilUNI ontology.



Fig. 4. Title page of the KP (source author)

United States Military Academy at West Point
The United States Military Academy is a college that educates, trains and inspires the Corps of Cadets. West Point graduates earn Bachelor of Science degrees and are commissioned as second lieutenants in the United States Army.

United States Naval Academy
United States Naval Academy is the undergraduate college of naval service. Students attend the Academy for four years, graduating with Bachelor of Science degrees and commissions as ensigns in the Navy or second lieutenants in the Marine Corps.

University of Burgundy
Education and research in Computer Sciences, Robotics, Automotive and Transport Engineering, Mechanics and Energetics, Government Administration, and Social Sciences. Located in Dijon, France.

University of Defence, Czech Republic
Education in Military Science, Technology, Economics, Management, Languages and Medicine. Located in Brno, Vyškov and Hradec Králové, Czech Republic.

University of Defense, Serbia

Source
 Technology, production (35)
 Transport (1)

Geography
 Europe (84)
 Asia (19)
 North America (4)

Sources
 Articles (154)
 Proceedings & Books (33)
 Conferences (34)
 Organizations (40)
 Persons (133)
 Products (4)
 Projects (5)
 Universities (113)
 University parts (248)

Fig. 5. Page with result list of the KP (source author)

Search results > Universities > Liptovský Mikuláš

Armed Forces Academy of General Milan Rastislav Štefánik

 Education and research in Military Science, Technology, Management, and Languages. Located in Liptovský Mikuláš, Slovak Republic.

The military education in Liptov region has a long historical tradition.
For more than 60 years young people who have decided to join the armed forces have been educated and trained here. Several military educational institutions have been established.

In the former Czechoslovakia:

- Military College (1945 – 1950)
- Military High School (1950 – 1973)
- Military Technical University (1973 – 1993)

In the Slovak Republic (after January 1, 1993):

- Military Academy (1993 – 2004)
- National Academy of Defence of Marshal Andrej Hradík (2004 – 2006)
- Armed Forces Academy of General Milan Rastislav Štefánik (2004 onwards)

Source
 University

Geography
 Europe
 Slovakia
 Liptovský Mikuláš

Fig. 6. Detail page of the KP (source author)

3 The Related Sources to MilUNI

A similar example of the MilUNI KMS is the free encyclopedia “Wikipedia”. On this website, we can find a heading named “Military Academy” [5]. 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 and is not useful for cooperation.

Another example of portals on military universities is American Military University [6], 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. All aspects associated with the study, including finance, security, accommodation, and study support are explained. The system is useful only for applicant at the US military schools.

Generally, it is not difficult to obtain information resources on universities on the web; if 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.

5 Ontology

The structure of the KMS is defined in ontology which includes classes with attributes, relationships among classes, and set of occurrences meaning the content of the KB. The MilUNI ontology contains the following set of classes:

UNIVERSITY

UNIVERSITY-PART (part of a university - faculties and departments)

ORGANIZATION (other organizations outside the university)

- Research organizations focusing on the military
- Organizations for Network Enabled Capability (NEC)
- International cooperation (such as ERASMUS and SOKRATES)

PRODUCT (the result of activities of an organization and a person)

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

CONFERENCE (specialized/scientific conference)

COLLECTION (conference proceeding, book, journal, ...)

ARTICLE (part of the COLLECTION)

PROGRAM (educational, research, development, innovation)

PROJECT (a single activity)

Besides classes is in the ontology an essential built-in taxonomy (group tree):

DOMAIN TREE (areas of interest of a person, organization, conference, activity)

EDUCATIONAL TYPE TREE (forms of study)

GEO TREE (continents, countries, cities)

TIME TREE (time intervals)

5 The MilUNI Development and Use

The MilUni KMS is designed in a complex shape; the main feature is a user friendly access to information and their associations in many areas as is the program of the education, list of departments, research and conference activities, etc.

MilUNI includes data from the public sources on 113 universities and their 249 organizational parts (faculties, departments). They are situated in 38 countries, and most then 100 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 KMS is prepared by CIS Department University of Defence (UoD) and the initial data input was realized by French students at the internship in summer 2012. The history, present, and future of the project is at the Tab. 1.

Table 1. The project schedule (source author)

Analysis and Design ^α	04-06/2012 ^α
The initial data entry ^α	06-08/2012 ^α
Add and update data ^α	09-12/2012 ^α
Portal creating, editing data and change ontology ^α	01-04/2013 ^α
Completion of the portal and its presentation ^α	06/2013 ^α
Addressing selected universities, communication ^α	06-11/2013 ^α
General expansion ^α	2014 ^α



Fig. 7. The initial set of menu (source author)

Composition of the initial menu options of the portal was teamwork of substantial supplier. Structure of the initial menu options for knowledge base access corresponds to the basic needs of users, see Fig. 7. A sample of the portal features follows.

The first example shows linking universities to geo tree (see Fig. 8) that makes easy to find a university in the selected country (city).

The large experience for the research team was design and development of a portal for users to access information. The portal structure is described in Chapter 2, Fig. 4 to 6. It was necessary to handle the reverse affect the structure and content of the portal to knowledge base. Only when you acceded data through the portal, then appeared a number of irregularities in the inserted information. For example, the field annotation in the universities was understood by editors in different way, from lengthy characteristics to unfilled. All this had to be corrected.

The significantly mnemonics helped to determine the names of Universities (name followed by the abbreviation of the state) and their components (name followed by the abbreviation of the university). In hundreds occurrences facilitated only the unified naming algorithm to the associations of the university structure.

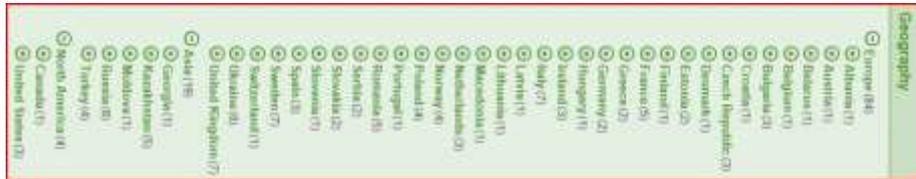


Fig. 8. Universities within geo tree (geography), rotated (source author)

The next example shows linking all including information to the ontology classes (see Fig. 9) that makes possible to simple find any object in knowledge base.



Fig. 9. Selected information in connection to ontology classes (source author)

The last example shows result of full text search, see Fig. 10 that makes possible to find any text in knowledge base.



Fig. 10. The full text search (source author)

6 Further Expansion of the System

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. We address first the selected university with the following letter:

“Let us brief you about the MilUNI (Military Universities) information portal which has been created at the University of Defence in Brno (Czech Republic). The portal is based on the knowledge system and provides information on military academies and universities of NATO member countries and other European countries (except for NATO countries). The portal is available at <http://www.atom.miluni.eu/>. The sources for the information portal are publicly accessible websites of universities, academies and schools. According to our research, nothing like this has been created so far. The aim of the MilUNI portal is to promote cooperation among military schools in teaching, research and exchanges of teachers and students (especially within the ERASMUS programme). We are aware of the fact that the portal will be beneficial only if as many schools as possible contribute to its development so that the data on the portal were relevant. Our objective is to constantly update the information, for example, on academic conferences and published articles, so that they can be studied and cited. Therefore, we would like to invite you to collaboration on the MilUNI portal. In the first phase of the portal development it is necessary to update information about your university and complete information on selected conferences and articles published by the university staff. Those interested in collaboration will be granted access rights and will obtain instructions on working with the system.”

Subsequently, these colleagues will inform their colleagues, and thus the awareness of the MilUNI platform for cooperation within military universities will rise. 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.

7 Conclusion

The article presents the MilUNI system, designed for the collaboration among military universities. It collects publicly available information on the structure, people, education 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 universities cooperation not only at the MilUNI.

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