12th International Conference
″Research and Development in Mechanical Industry″
RaDMI 2012
14 - 17. September 2012, Vrnjačka Banja, Serbia

TOWARDS A MINING EQUIPMENT ONTOLOGY

Ranka M. Stanković, Ivan Obradović, Olivera Kitanović, Ljiljana Kolonja
University of Belgrade, Faculty of Mining and Geology, {ranka|ivano|olja|lily}@rgf.bg.ac.rs

Summary: *Comprehensive, consistent and standardized definition of terms in a specific area are crucial for ensuring interoperability among IT applications related to this area. This goal can be achieved in developing central terminological resources in the form of thesauruses or ontologies, which can then be used for deriving terminology in specific sub-fields. In this paper we describe how RudOnto, a terminological resource for mining engineering developed at the University of Belgrade Faculty of Mining and Geology, can be used for generating a mining equipment ontology. RudOnto is an integral part of a specialized mining engineering information system, which features functionalities for management and maintaining of RudOnto, as well as a wizard for exporting subsets of its concepts to several specific formats, including the web ontology language OWL.*

Keywords: *mining equipment, terminological resources, onotologies, OWL, mining thesaurus*

1. INTRODUCTION

The use of information technology (IT) is today indispensable in almost all mining engineering areas, including mining equipment management and maintenance. Basically, IT is introduced through computer-aided information systems, with the aim of securing reliable information for management and decision making in mining engineering systems [2]. Various IT maintenance support systems and tools have been developed and implemented, ranging from CMMSs, diagnostic support systems, prognostic system, resource management systems as (ERP) and other. However, these systems are often based on different models, which are sometimes incoherent. Thus, there is a need to provide the means to ensure interoperability and cooperation of different applications within the same environment [4].

In order to ensure interoperability among different IT applications, comprehensive, consistent and standardized definition of terms used in a specific area is needed. This goal can be achieved by developing relevant terminological resources in electronic format, preferably including relations of a semantic nature between terms. The simplest semantic relations are those between general and specific terms, such as coal mine, and open pit, as a specific type of coal mines. Such semantic relations result in hierarchies among terms, represented by a hierarchical tree. Terminological resources with a hierarchy among terms are called taxonomies, and they can be related to a specific area or a specific corporation. Examples of such resources are the WAND Mining Taxonomy, which contains over 900 terms and 200 synonyms covering major mining engineering areas including exploration, extraction, extractive metallurgy, geology, equipment, safety, and more,[1] or the Corporate Equipment Taxonomy developed by Meridium Asset Performance Management Software[2]. Terminological resources with

[1] http://blog.wandinc.com/2011/10/wand-mining-taxonomy-released.html
[2] http://www.meridium.com/news_events/pdfs/Corporate%20Equipment%20Taxonomy%20for%20MRC%20Meeting%20Jan%202003.pdf

more complex semantic relations also exist in the form of ontologies, such as the equipment ontology developed within the Brazilian Oil Company [9].

The basic aim of an ontology, as the most complex terminological resource, is to offer a comprehensive, consistent and standardized definition of terms used to describe concepts within a domain, as well as semantic relations that exist among them. A domain is, most generally, any subject area, such as tool manufacturing, automobile repair or mining equipment. Ontologies can thus be viewed as formal representations of knowledge within a specific domain based on vocabularies consisting of concepts, semantic relationships between those concepts and simple reasoning about the domain. Hence, ontologies are basically a type of terminological resources, albeit on top of the terminological resource development hierarchy. They enable sharing of domain information among people, databases, and information technology (IT) applications [3]. Due to their growing usability they are being developed in many engineering disciplines, such as mechanical engineering [10], or petroleum geology [6].

Development of terminological resources for Serbian, both monolingual and multilingual (with Serbian as one of the languages) in the area of mining engineering was initiated several years ago. One of the first taxonomies in this field was developed at the University of Belgrade Faculty of Mining and Geology (FMG), for bucket wheel excavators, within a project aimed at assessment of excavator condition in the process of revitalization [8]. Taxonomies for other types of equipment were subsequently developed within the scope of the Technological coal mine information system [5]. A slightly more complex terminological resource in the form of a thesaurus was developed for geological terms, with more than 3000 terms and their English equivalents, within the GeolISS project[3].

Development of various terminological resources at FMG covering specialized areas has ultimately led to the idea of a general terminological resource for mining engineering. Hence RudOnto was conceived, as a complex terminological resource, aimed at covering the larger area of mining engineering and becoming the reference resource for mining terminology in Serbian. RudOnto is presently implemented within SUKU, a mining engineering information system, also developed at FMG. The structure of this resource places RudOnto between a taxonomy and a thesaurus on the semantic scale, with the final goal of upgrading it into an ontology. One of the intended uses of the RudOnto is for production of appropriate terminological resources in sub-fields of mining engineering, such as, planning and management of exploitation, mine safety or mining equipment management. Such terminological resource have successfully been generated for the FMG e-learning platform Moodle [11]. A RudOnto ontology could thus ultimately serve as a tool for generating a mining equipment ontology. In this paper we explain the initial steps towards such an ontology.

In the next section we give a brief outline of terminological resources in general and RudOnto in particular. Section 3 offers an overview of the software implementation of this resource, whereas in Section 4 we describe the mechanisms by which RudOnto, as a central resource, can be used for transformation of subsets of its concepts to ontologies for specific areas of mining engineering using OWL (Web Ontology Language). The final section features some concluding remarks.

2. TERMINOLOGICAL RESOURCES

2.1 Semantic scale of terminological resources

In general, terminological resources in e-format can be organized in different ways and serve different purposes. Depending on their content, structure, and organization, terminological resources can be classified as indexes, glossaries, taxonomies, thesauruses and ontologies. Basically, each of these types (except the simplest, indexes) is a more complex extension of the preceding one, as illustrated by the semantic scale in Figure 1, which is based on the ontological spectrum as defined by [1] and [7].

The simplest form of terminological resources is an index, which is basically a list of terms usually arranged in alphabetical order. A glossary is slightly more complex, as definitions are added to the terms within the index. Glossaries can be monolingual, bilingual or multilingual, and in the case of bilingual or multilingual glossaries, corresponding terms in different languages are often linked by lists of paired terms. On the next level of semantic scale of terminological resources, relationships

[3] http://geoliss.ekoplan.gov.rs/term

between terms are introduced, or more precisely, between concepts represented by specific terms. The basic relationship between concepts is the hypernym/hyponym relation, which provides for a hierarchy among concepts as a hypernym is a more general term than its hyponym(s) and hence on a higher hierarchical level. As we have already mentioned, such hierarchical classification of concepts are taxonomies, usually represented by a tree structure. However, many other semantic relationships that might exist between concepts, such as holonymy/merony (parto of), antonymy, derived form, etc. cannot be represented by taxonomies, but require even more complex structures, such as thesauruses and ontologies.

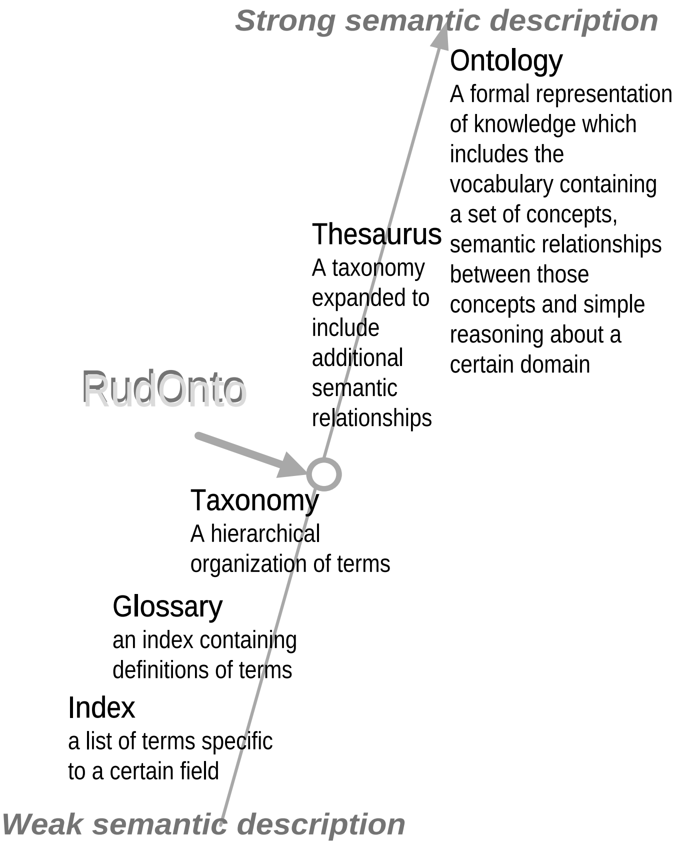

Figure 1. Semantic scale of terminological resources

The boundary between a thesaurus and an ontology is somewhat blurred, and some authors even consider ontologies and thesauruses as the same type of resources, with the difference resulting only from their respective purposes. However, for the majority of authors, there is a distinctive feature of ontologies, namely, that they allow derivation of new knowledge from the existing knowledge.

To summarize, an ontology defines the terms and concepts used for describing a specific domain of knowledge, and are used by people and IT applications to share information from this domain. The basic elements of an ontology are:

- Classes (general templates of objects or entities)
- Instances (individual entities)
- Relations between entities
- Properties of entities and their values
- Functions and processes entities are involved in
- Constraints and rules pertaining to entities

Based on these elements an ontology offers a formal representation of knowledge, through a vocabulary containing a set of concepts, semantic relationships between them and simple reasoning about the domain. At the same time an ontology is a data model of the domain and it can be used for drawing inferences on the basis of the information stored in the objects within that domain and the interconnections existing between them.

2.2. Model of the RudOnto terminological resource

RudOnto, the mining engineering terminology resource currently contains close to 7000 terms representing concepts that are most frequently used in mining engineering practice. There are also English equivalents for approximately 1600 terms, and a few terms in other languages (French, German, Russian...). As illustrated in Figure 1, RudOnto can be placed on the semantic scale somewhere between taxonomies and thesauruses. Namely, in the current version of this resource, the implemented semantic relations between concepts are mainly those of hypernymy/hyponymy, relating more general concepts to a more specific ones. In addition to that, the synonymy relation is also implemented, relating terms that describe the same concept. However, RudOnto allows for implementation of other semantic relations, such as "has/is constructive characteristic (of)" or "has/is technological parameter (of)". This qualifies RudOnto for a thesaurus, but the ultimate goal is to promote this resource to the status of an ontology.

As RudOnto is a multilingual resource, relations between equivalent terms in different languages, or translational equivalents, can also be established. In RudOnto, one term is always selected as the basic term, and hence there is always one basic translational equivalent, whereas all other equivalents, if they exist, are represented as synonyms.

As a general terminological resource for mining engineering RudOnto can be used, among other things, for production of terminological resource in corresponding sub-fields, often in the form of controlled dictionaries, which are consistent collections of terms selected for a specific purpose. For example, controlled dictionaries can be derived from RudOnto for the area of Geostatistics, Mine safety, Mineral resource exploitation, Petroleum exploitation or Mining equipment.

The structure of RudOnto can be described by an UML (Unified Modeling Language) model, as depicted in Figure 2. A brief description of this model follows. The lexicographic superclass within the model is the class *Rečnik*, implemented as an abstract class. Concepts, which can be either general, common to all subfields, or specific, related to a specific filed, are represented by the class *Koncept*. The hypernym/hyponym relation in the model is implemented by involution, which means that a hyponym can appear only once in the resource hierarchy, with only one hypernym above it. Other semantic relations between concepts are enabled by the *RelacijeTermina* class, whereas the *MultijezičkiLeks* class in the UML model is used for translational equivalents. The *Bibliografija* class is used for representing the sources of a concept or a term, and the *Metapodatak* class for the corresponding author of the entry. There is also a *Multimedija* class for implementing multimedia content such as pictures, formulas in the form pictures, and the like. It should be noted that the multimedia documents are represented by metadata, such as their location on the sever (URIs), but are not entered into the resource database.

The class *Koncept* is inherited through specialization by several classes, which provide for more specific terminological resources, for example, for planning and management of exploitation, mine safety or mining equipment management. Within this paper we will go into further detail only for the part of the model pertaining to mining equipment, i.e. to the class *RečnikOpreme*. The class *RečnikOpreme* describes concepts related to types of equipment, different parameters, equipment parts and the like. The class *ParametarZaTipOpreme* is henceforth used for modeling relations such as "has technical characteristic", "has constructive characteristic", i.e. "is an equipment characteristic", etc. Examples of technical characteristic for bucket wheel excavators are, for example, the number of buckets, the length of boom, whereas examples of their technological characteristics are excavation speed and slewing speed.

The class *Oprema* is used for modeling all types of specific equipment (excavation machinery, conveying and auxiliary machinery, pumps etc.). Data on exploitation areas, open pit or work bench are modeled by the class *Područje*. The open pit, that is, the area where the equipment is operating is modeled by the class *OpremaUPodrucju*. Values of predefined parameters for specific items of equipment are registered in the table *VrednostParametraOpreme*. The table *StatusOpreme* is used for registering the current status, but also the history of statuses (equipment in operation, under overhaul, written-off equipment...). Registering of various documentation, such as projects, catalogues, operating or maintenance instructions is achieved by the class *EksterniDokument*. Registering of notes, messages and comments is implemented by the class *Komentar*, whereas the class *Slika* covers various graphical appendices, scanned pictures and schemes, photographs, and the like. All aforementioned types of documentation are related by means of the *DirektneRelacije* class to specific equipment items or the area to which they pertain.

Besides data on the equipment the class *Oprema* is used for modeling data on production systems, e.g. Excavator-Conveyer-Spreader (ECS) systems or transport systems. The relation between a specific system and the equipment that belongs to it is modeled by the class *OpremaUSistemu***.** The model also supports a history of changes, which means that if a new distribution of equipment is made, data on the old distribution are stored and saved.

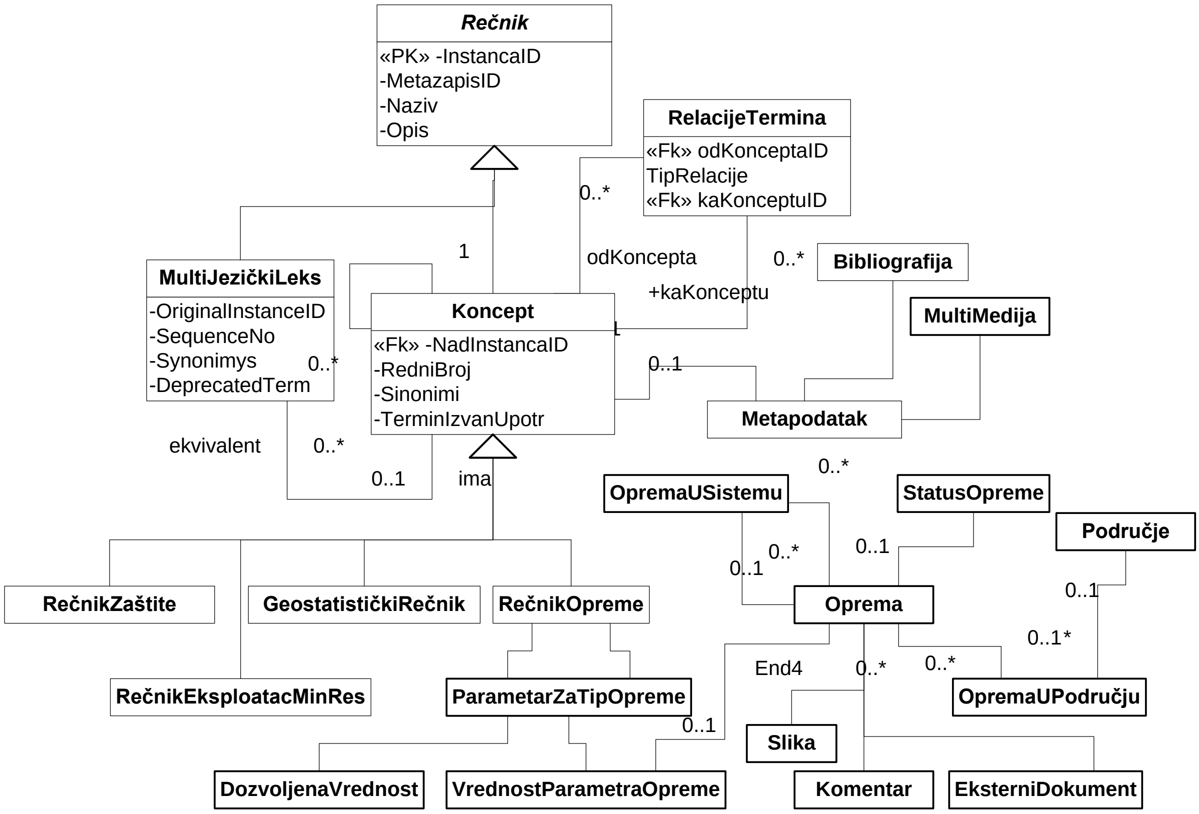

Figure 2: UML model of RudOnto structure

3. THE SOFTWARE ENVIRONMENT

The software supporting RudOnto has been integrated in the SUKU information system, as this system strongly relies on this resource. Namely, in order to control the feature values within an information system it is necessary to create sets of terms that represent the acceptable values for specific features. This can be achieved by creating appropriate domains. Domains are represented by terms, which can be in the form of simple lists of terms or hierarchical trees of terms. However, in both cases these terms can only be the ones that are present in the relevant terminological resource.

The SUKU information system itself is a result of several phases of software development during the long-term research of the problem of coal quality management. The first versions of the software related to the problem of coal homogenization was developed in 1998, whereas the essence of the SUKU system as it is now was realized in the period 2008-2010. The system is in everyday operational use at FMG and is constantly being improved. The current software environment of the system is Microsoft .Net, the programming languages used are C# and C++, and the central data repository is MS SQL Server 2008. The basic components of the SUKU system are depicted in Figure 3, where the left hand side of the figure shows components used for implementing the application interface (user level), the middle shows the business logic, and the right hand side the data layer.

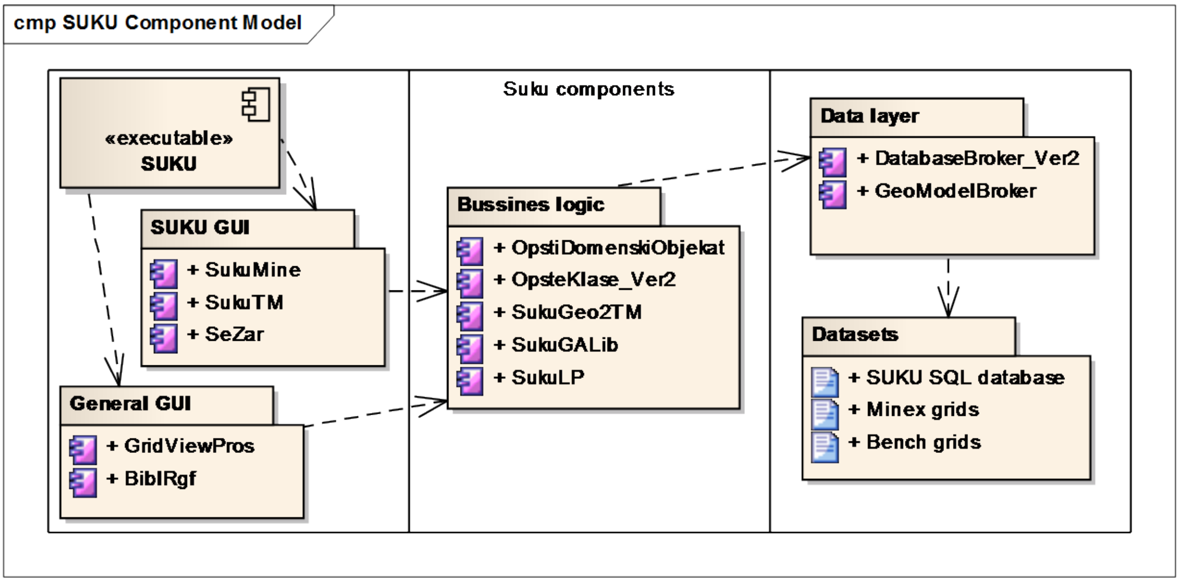

Figure 3. Component UML diagram of SUKU

Three components form the basis of the user layer, namely, the basic component Suku.exe and two packages, Suku interface with libraries developed for SUKU, and the General interface, with libraries used in other software packages. Suku.exe is the shell with the basic interface, used for invoking all functionalities implemented within the system. The interface for managing system data pertaining to user profiles, users, open pits, excavation machinery and conveying mechanization and technological systems is realized within the SukuMine library. The SukuTM library contains classes for exploitation planning, whereas classes pertaining to work force and work safety can be found in the SukuSezar library. As for RudOnto, the interface to this resource is provided by the BiblRgf library within the General GUI.

The package General Interface with its GridViewPros and BiblRgf libraries contains a template of the classes used for different types of data search, domain control, selection of domain elements, and implementation of hierarchical data structures in the form of trees. The business logic of the system is implemented in four libraries, two of which are of a general type, and are used in other packages as well. One of them, OpsteKlase_Ver2 provides the business logic for handling RudOnto. Within the data layer, RudOnto is supported by the DatabaseBroker_Ver2 library, which is also used for manipulation of connection parameters, and for linking to the SUKU relational database, as well as for query realization, invoking store procedure and the like.

Figure 4 illustrates the module for management of RudOnto within the SUKU information system. The hypernym/hyponym hierarchy tree is displayed at the left hand side of the larger panel. When a concept within this hierarchy is selected, a complete entry is displayed, as illustrated by the right hand side of the panel, which shows the basic term used, its synonyms (none in this case), and its definition. For each term, available translational equivalents in other languages can be displayed, as illustrated by the smaller panel in Figure 3,which shows the translations of the term Rudnik (Coal Mine) in French, Russian and English. Definition in another language can also be obtained by selecting one of the translational equivalents (in this case English).

The software solution developed enables the management of mechanization identification and classification, general maintenance data, structure (components) and technical characteristics. The goal is to create a database of available equipment, which will organize, in a unique way, data on construction characteristics, behavior during exploitation, and the like, for different purposes, such as production planning and management, work safety (registering of injuries), maintenance, etc.

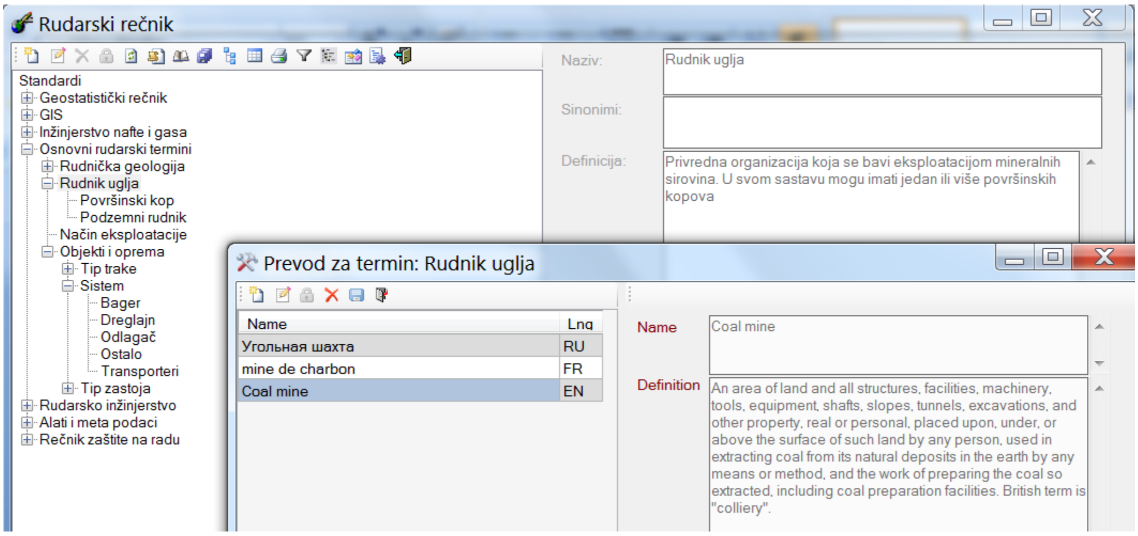

Figure 4: Panel for management of mining engineering terminology

In Figure 5, the left hand side of the panel depicts the predefined classification of equipment types and their groupings, while the right hand size depicts parameters assigned to a specific type of equipment, or its group component. For each parameter assigned to the type of equipment, a data type is defined (numerical or textual), the parameter measuring unit (m, kW, m/min,...), and the parameter type. Thus the right hand side of the Figure depicts technological parameters for the calculation of technological elements of bucket wheel excavator SchRs 630 25/6, which has been selected in the tree on the left hand side. Namely, the data type, the measurement unit, the way in which data are created (by reading, entry, entry for each sub-bench , or reading for each bench, etc.), as well as the maximal range of the data, number of decimals, and its rank for presentation in the analysis.

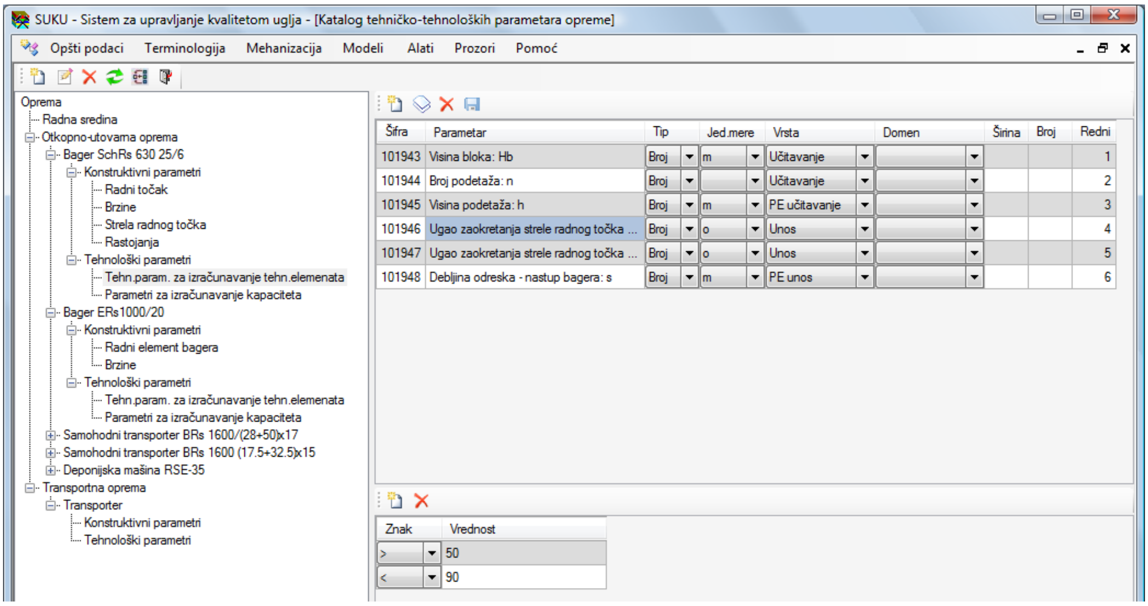

Figure 5: Panel for defining constructive and technological equipment parameters

Figure 5 depicts a panel used for overview and entry of data in technological systems and equipment assigned to them. The left hand side of the panel illustrates systems and equipment, and by positioning on a specific "node" of the hierarchical tree, detailed corresponding data on the right hand side are obtained (in this case a bucket wheel excavator). A unique identification number is assigned to each excavator, then one of the existing types of excavators is selected, followed by detailed data such as the label, manufacturer, operational number, year of commissioning, etc. Technical characteristics of the selected excavator are entered on the panel depicted in Figure 6.

The software solution realized in this way enables linking with other related components, which enable the registering of realized an planned production for each day, month and year, as well as for each type of material (coal or overburden) the excavator worked with. The data on the mechanization operation are used for creating reports that show the realized and planned production for a specific period, the realized working hour capacity, as well as the use in terms of time periods and capacity. In the same way, monitoring and analysis of downtime are planned, for various categories, years and working environments. The possibility of analyzing the downtime is also enabled, by selecting downtime that was longer, shorter or equal to a given time period.

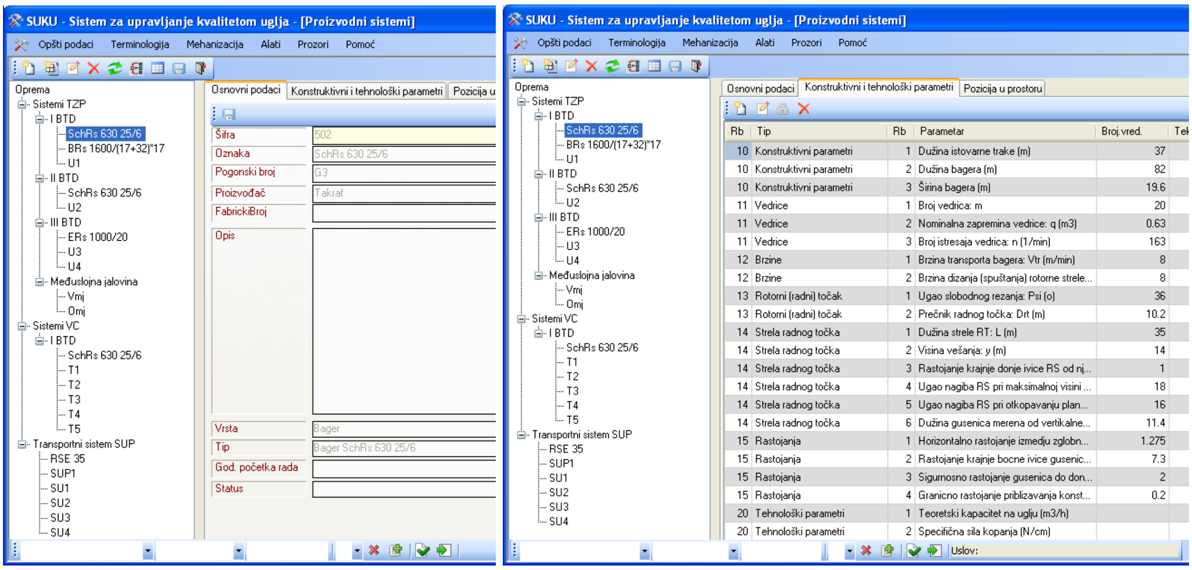

Figure 6: Panel with basic and constructive characteristics of a bucket-wheel excavator

4. RUDONTO TO OWL

RudOnto, as the central terminological resource can be used for transformation of subsets of its concepts to several specific formats, namely OWL, Moodle, TBX, RDF and LMF, thus generating specialized terminological resources. As we have already mentioned it has been used in practice for generating terminology for the FMG e-learning platform Moodle, and we will describe here how it can be used for production of OWL ontologies. The transformation is performed by a wizard, which is an integral part of the information system.

Figure 7 depicts a panel from this wizard. The subset of concepts that are exported from RudOnto belong to the sub-tree of the selected node (concept) in the hierarchical tree depicted in Figure 4. Namely, as hypernymy/hyponymy relations between concepts form a hierarchical tree, subsets form sub-trees of this tree. The selected node is thus the root of the sub-tree to be exported. At that, the user can define the scope of this subset/sub-tree in several ways. One option is to export only immediate hyponyms at the first level beyond the root (its "children"), and the other to export all subordinate concepts at all lower levels (its "descendants"). The selected root node can in both cases be included or omitted, depending on the user's preferences.

For specific terminological resources, derived from RudOnto, such as the resource pertaining to mining equipment terminology, the user can chose between building a resource with or without constructive or technological parameters, with or without components, etc. The class identifier (*rdf:about*) is generated from the basic term in Serbian together with a unique numerical identifier (marked as *InstancaID* in the model). The additional element within the class identifier is necessary as otherwise an unacceptable situation would arise in the case of homonyms, with two different classes having the same identifier. Using a number only would not be intuitive, hence the solution that combines the two elements within the class identifier.

Within the export of a specific concept subset form RudOnto to OWL, the basic Serbian term is exported into *<rdfs:label>*, its hypernym into *<rdfs:subClassOf>*, the Serbian definition into *<rdfs:comment xml:lang="sr">*, the English translational equivalent of the basic term into *<rdfs:label xml:lang="en">*, and the definition in English into *<rdfs:comment xml:lang="en">*.

The annotation property *<owl:AnnotationProperty rdf:ID="synonym">* has been introduced for synonyms. This, in the case of classes with synonyms, synonyms are annotated accordingly, as for example, *<synonym xml:lang="en">machine for excavating</synonym>*.

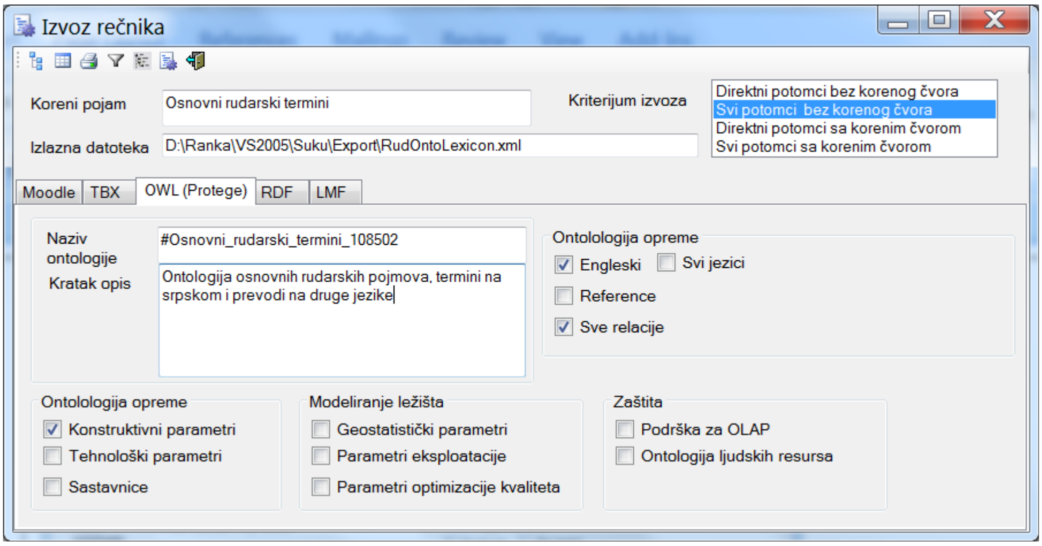

Figure 7: Panel for data export from RudOnto

A part of the OWL code resulting from the export is given below:

```
- <owl:Class rdf:about="#Dreglajn_108829">
     <rdfs:label>Dreglajn</rdfs:label>
     <rdfs:subClassOf rdf:resource="#Sistem_101350"/>
     <rdfs:comment xml:lang="sr">Velika mašina koji se koristi za otkopavanja u površinskim kopovima za
        uklanjanje otkrivke (slojeva stena i tla) koje pokrivaju ugalj. Dreglajn baca žičanom užadi vezanu
        specijalnu kašiku na značajnu udaljeost, prikuplja iskopani materijal povlačenjem kašike prema
        sebi po zemlji sa drugim žičanim užetom (ili lancem), podiže kašiku i deponije materijal na
        deponiju ili drugo mesto.</rdfs:comment>
     <rdfs:label xml:lang="en">Dragline</rdfs:label>
     <rdfs:comment xml:lang="en">A large excavation machine used in surface mining to remove
        overburden (layers of rock and soil) covering a coal seam. The dragline casts a wire rope-hung
        bucket a considerable distance, collects the dug material by pulling the bucket toward itself on
        the ground with a second wire rope (or chain), elevates the bucket, and dumps the material on a
        spoil bank, in a hopper, or on a pile. </rdfs:comment>
     <synonym xml:lang="en" xmlns="">machine for excavating</synonym>
  </owl:Class>
```

The exported OWL code can be viewed and verified through the free, open source ontology editor and knowledge-base framework Protégé (http://protege.stanford.edu). Figure 8 illustrates the exported terminological resource in Protégé 4.2.0, which supports OWL 2.0 (http://www.w3.org/TR/owl2-overview/).

5. CONCLUSION

This paper emphasizes one of the important issues in IT applications in mining engineering and other engineering disciplines whose importance is not always fully understood. Namely IT applications need proper and consistent use of terminology in order to build interoperable information systems. To that end engineering disciplines need terminological resources, preferably in the form of thesauruses and ontologies. Building such resources is a complex task and requires close cooperation between IT specialists and domain experts. A central reference mining terminology resource, RudOnto, is being built at the University of Belgrade Faculty of Mining and Geology with the aim of becoming the reference resource in this field. It is conceived as a multipurpose resource, ultimately to become an ontology, and to serve as the source for deriving appropriate terminological resources in specialized areas of mining engineering. In this paper we have demonstrated that such a goal is feasible, and described the state of the art in development of RudOnto, as well as the main features of the underlining software solution.

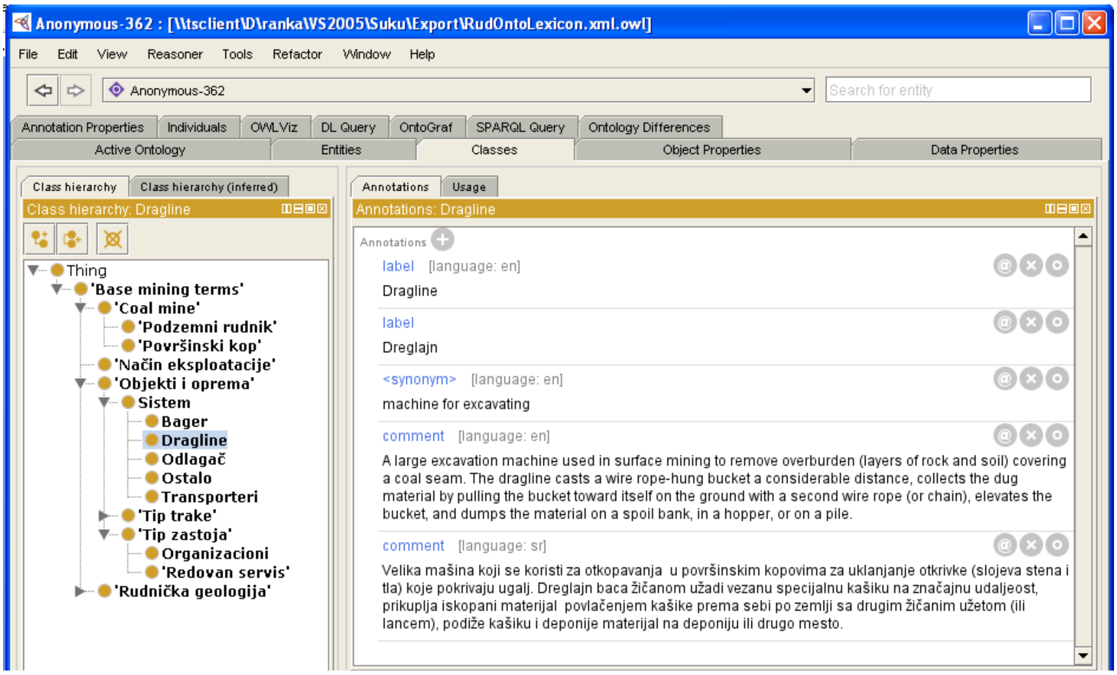

Figure 8: The exported OWL code in Protégé 4.2.0

ACKNOWLEDGMENTS

The research outlined in this paper was supported by the Serbian Ministry of Education and Science grant # TR 33039.

REFERENCES

[1] Daconta, M. C., Obrst, L. J., Smith, K.T.: *The Semantic Web: A guide to the Future of XML, Web Services, and Knowledge Management*. Indianapolis, Indiana: Wiley Publishing, Inc., Web Services, and Knowledge Management, John Wiley & Sons, 2000.

[2] Dašić, P., Šerifi, V., Ječmenica R.: *Metodologija izgradnje EDSS sistema*. IMK-14 - Istraživanje i razvoj vol. 14, br. 1-2, str. 107-118, 2008.

[3] Heflin, J.: *OWL Web Ontology Use Cases and Requirements*, http://www.w3.org/TR/webont-req, 2009.

[4] Karray M.H., Chebel-Morello, B., Zerhouni, N.: *A Formal Ontology for Industrial Maintenance*. In: Terminology & Ontology: Theories and applications, TOTh Conference 2011., Annecy: France, http://hal.archives-ouvertes.fr/docs/00/60/21/82/PDF/TOTH2011.pdf, 2011.

[5] Kolonja, B., Stanković, R., Vuković, F., Obradović, I.: *An Approach to Management Decision Support: The Coal Mine Pljevlja Management Information System*. In: Proceedings of the Fifteenth International Symposium on Mine Planning and Equipment Selection, Torino, Italy, Vol. 1, pp. 436-441, 2006.

[6] Liadey D. M.: *Spatial Ontology For The Production Domain Of Petroleum Geology*, MSc Thesis, Georgia State University, Department of Geosciences, Digital Archive @ GSU, http://digitalarchive.gsu.edu/cgi/viewcontent.cgi?article=1042&context=geosciences_theses, 2012.

[7] McGuinness, D.: *Ontologies Come of Age*. Spinning the Semantic Web: Bringing the World Wide Web to Its Full Potential, Dieter Fensel, J im Hendler, Henry Lieberman, and Wolfgang Wahlster, editors. MIT Press, 2003.

[8] Obradović, I., Ignjatović, D., Stanković, R., Ivković, Lj.: *Ocena stanja bagera i njihovo višetratibutno rangiranje u cilju revitalizacije*. In: Proceedings of the MAREN 2006, Međunarodni simpozijum Mehanizacija i automatizacija u rudarstvu i energetika, zbornik radova, Beograd, Srbija, pp. 358-363, 2006.

[9] Oliveira, J., Krejci, D. & Moreira de Souza, J.: *Equipment Centered Vision – How To Create Equipment Ontologies And Why*. In: Proceedings of the IADIS International Conference on Web Based Communities 2006, San Sebastian, Spain, pp. 289-293, 2006.

[10] Stahovich, T. F., Davis R., Shrobe, H.: *An Ontology of Mechanical Devices*, Working notes of AAAI-93 Workshop on Reasoning About Function, Washington, D.C. pp. 137 - 140, 1993.

[11] Stanković, R., Obradović, I., Kitanović, O., Prodanović, J., Ilić, V.: *An aproach to implementation of blended learning in a university setting*. In Proceedings of the Second International Conference on e-Learning, eLearning 2011, Belgrade, Serbia, D. Milošević (ed.), Metropolitan University, pp.61-66, 2011.