Use of information bases for the application of operational aviation regulations

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ABSTRACT

Text of the article describes the application of information bases as a tool for safety in air transport. By converting these rules into the base allows easier and quicker orientation in regulatory requirements. The following paragraphs provide information about the whole concept and demonstrate key concepts needed to understand the software.

KEYWORDS: 3D objects modelling and description from a traffic flow, electronic regulations, information basis

1. Introduction

Information Basis of Operating Regulations in Civil Aviation (IBORCA) is a grant research project of Ministry of Transport of Czech Republic.

This projects primary goal is to develop specialised software - IBORCA, which is going to contain possibly the most complex database of regulations, directives, conventions etc. Secondary goal is to create methodology for developing and operating such software.

Due to large number of regulations and other normative acts in civil aviation exists a demand for a software tool which allows its users to search and find relevant information above all possible documents. This software shall be quick, easy-to-use and reliable source of information about current (up-to-date) regulatory framework in civil aviation.

It is believed that this software is going to find its users among institutions such as CAA CR, Civil Aviation Department of Ministry of Transport CR etc. Other possible users are universities focused on civil aviation. Further development of this software promises opening this software to public use.

Ministry of Transport recognise the potential of this software as a tool to improve quality of education of aviation personnel.

Project IBORCA has 3 partial goals:
- system analysis and creating system architecture
- creating methodology for developing and operating a software such as IBORCA
- coding and testing IBORCA and deploying final version

Solving team is created by 3 subjects:
- Faculty of Transport Czech Technical University Prague
- Faculty of Mechanical Engineering Brno University of Technology
- Sting Academy – Private university Brno

It is necessary to define term "operating regulations". There is no official definition of this concept. For the purpose of project IBORCA this definition will be used: "Operating regulation is any regulation which has direct application on subjects participating in every-day operation of civil aviation". This broad definition allows authors to integrate specific documents according to presumed needs of users. It also allows to extend the database by new regulations.

2. Division of regulations

In respect of large number of regulatory documents in civil aviation it is considered to be necessary to divide all documents into categories which will be representing interests of potential users. Due to their different needs authors have chosen three ways of division of operating regulations in civil aviation:

- according to Area of Operation
- according to Act on Civil Aviation
- according to Series of Regulations

These three ways create representative division which respects the structure of civil aviation and also allows easy orientation for users.

Division according to Area of Operation

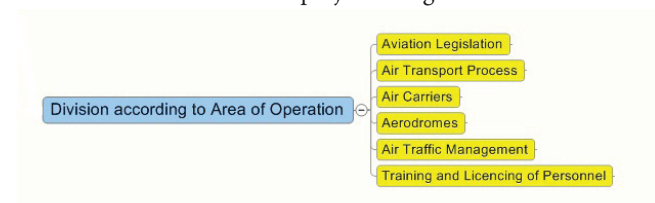This division is based on projects assignment.

Fig. 1. Division according to Area of Operation

Division according to Act on Civil Aviation

Act on Civil Aviation is a basis of second division which is supplemented by Europian Community Law and small number of other topics.

Fig.2. Division according to Act of Civil Aviation

Division according to Series of Regulations

This division is based on existing database systems (e.g. lis.rlp.cz). It is probably the easiest and most comfortable (well-known) division.
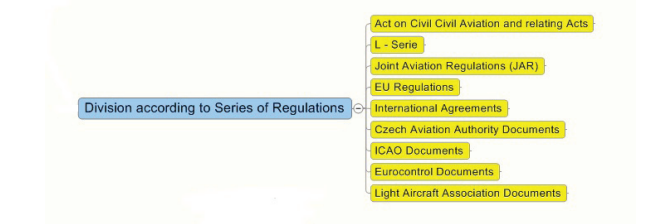

Fig.3. Division according to Series of Regulations

Division according to Series of Regulations is considered to be basic division in IBORCA. However user will have the opportunity to switch among them. Divisions overlap - every document in IBORCA shall belong in every division in at least one category. For example document L 4444:

Table 1. Categorization of L 4444 document

Division	Category
Area of Operation	Air Traffic Management
Act on Civil Aviation	Utilization of Czech Airspace and Air Services
Series of Regulations	L - Serie

These 3 divisions will be the only divisions in IBORCA, however it is possible to change categories (add, rename, delete) in every division.

Due to IBORCAs primary goal as a research project we are unable to include paid documents and documents with restricted access. This leaves IBORCA as a database of open public documents (free documents). These documents we are able to maintain up-to-date without additional payments.

Based on described limitations authors decided to include documents from these sources:

- AIS CR
- Ministry of Transport CR
- Czech Aviation Authority
- EASA
- EUR-Lex – Official Journal

In respect of development of IBORCA it was decided to include only the most representative documents in each category. The system will be then supplemented with new documents according to feedback from its users.

3. Description of a system

Basic requirements were specified in the assignment of project IBORCA:

- search for a word (combination of words) with the possibility of a search with further criteria
- search above a group of documents
- search with lemmatization
- automatic search of a term in Czech and English language
- library of favourite documents for every user
- implementation of further documents

These basic ideas were (in analytic phase of project) transformed into document of requirements which specifies exactly what a system shall do.

IBORCA is considered to be a free access database. It is being designed as an information system with central data storage with internet access and web graphical user interface.

This creates a set of requirements on system itself which is being designed as a Document Management System (DMS).

Analysis of similar projects

A lot of states allows access to their legal documents through web interface, however search functions are limited. Typically it is not possible to search above all documents in a database. Also published documents correspond to area of responsibility of its operator (e.g. AIS CR or Ministry of Transport CR). So it is up to its users to find other relevant documents on its own.

More advanced is EUR-Lex system which contains legal documents of EU. It allows search above selected group of documents, but is not user-friendly. There is also experimental system N-Lex which contains national legal documents of EU members. Due to its experimental status it is still under development and does not contain all relevant documents.

Commercial products are representing another solution. Well-known software is ASA Flight Library. It contains a large amount of publications, pictures and videos. Distribution is on a DVD with on-line updates. It contains only American legislation, but as a part of it are other studying materials. This is very good product in respect of user-friendly environment and its containt.

User interface

User interface allows users to find a specific document and list it through. Division of regulations discussed in previous chapter is a key to enable this function to users.

Other function of user interface is to enable search above documents and work with the results. There are few pictures showing user interface of this system:
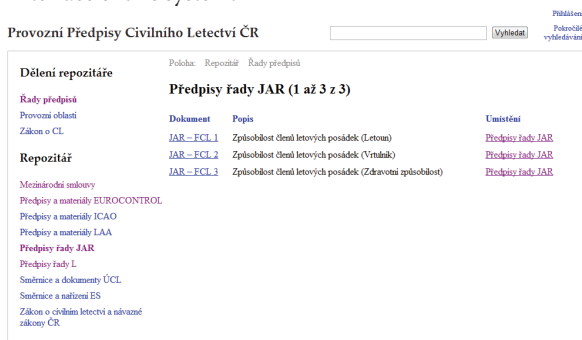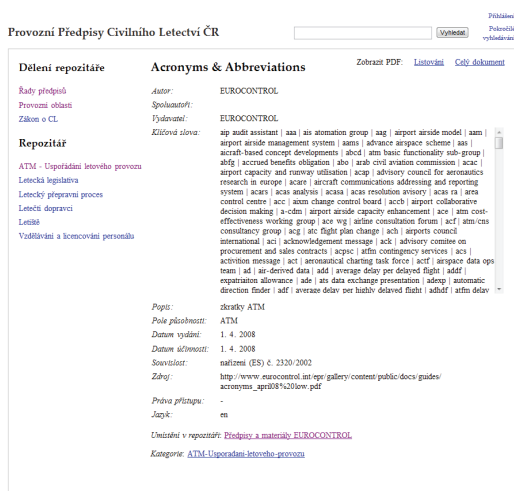

Fig.4. Selection of specific document

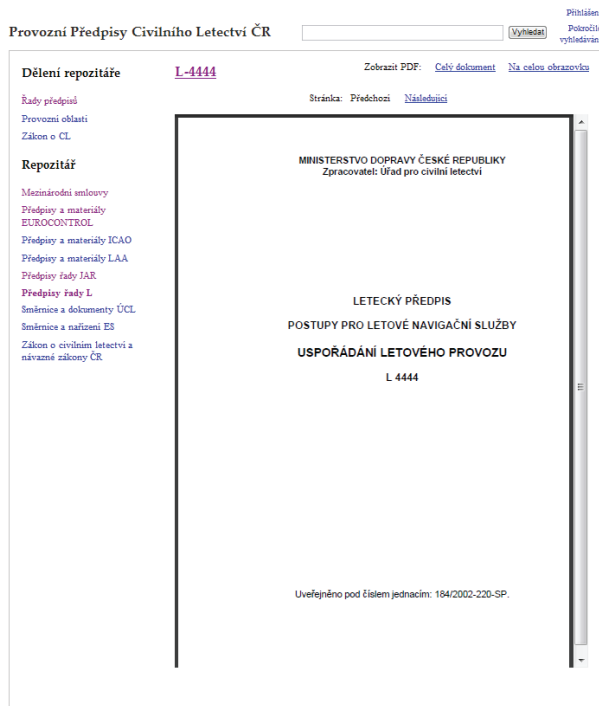**Fig.5. Information about specific document**

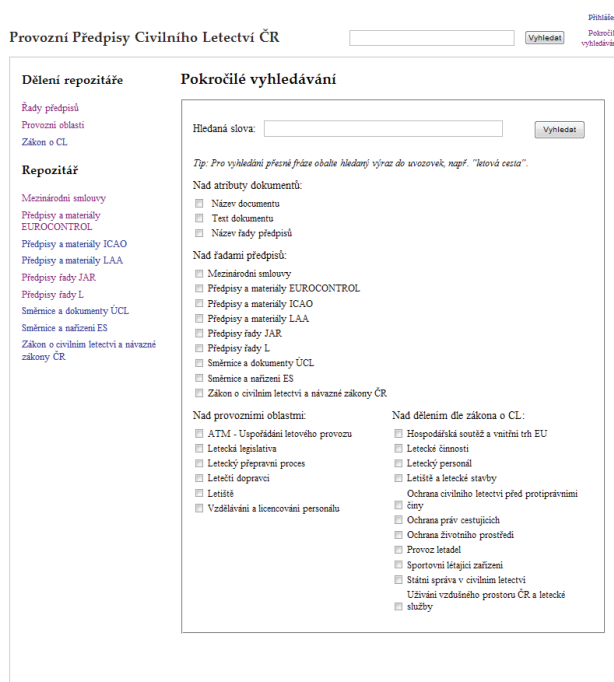**Fig.6. Listing through specific document**

Fig.7. Advanced search

Data format and search engine

Authors chose PDF file as a form of document in IBORCA. These files can be easily full-text searched. It is also easily displayed in web-browser. Most of the legal documents are distributed in pdf files, so they can be easily inserted into database without any additional conversion.

Very important role of IBORCA is to find specific word or combination of words in given regulations. For this purpose

IBORCA is going to use full text search engine Sphinx. Other key part of this process is lemmatisation. This requires a creation of a lexicon of words from dictionary of common Czech words.

Metadata and key words

Metadata are used for increasing acurancy of searching process. For every document in IBORCA was created its own set of metadata. These are derived from Dublin Core Standard.

Every document has also its own set of key words and they are derived into 4 groups – Czech key words, English key words, Czech abbreviations and English abbreviations. Key words are also increasing accurancy of search process.

Key words were chosen from every documents set of definitions. Other possibility is to read every document and based on that choose adequate key words. This was not done due to limited timetable of this project.

4. Conclusion

The full article informs the reader about a joint project between CTU and UNIZA in the creation of an information base operating regulations in civil aviation. Emphasis was placed on key aspects of the project and their possible use in aviation.

The information base is now fully functional, but still in test mode and is not available for public use.

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