# INSPIRE METADATA EDITORS

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**Abstract: INSPIRE metadata editors** INSPIRE is the European Spatial Data Infrastructure (ESDI) standard based on the ISO 19100 geodata standards. INSPIRE was published 2007 and expected to be implemented till 2019. An important part of the standard is related to the metadata record which contains the characteristic parameters of a geodata set in standardized XML form. Several editor programs were developed to support metadata editing. We investigated three software packages representing different category of metadata editors, namely the stand alone CatMDEdit, MetaD and the server based GeoNetwork programs. The programs were qualified according to their versatility, the ease of their setup process, configuration and use, the knowledge what they demanded from the user, the help what they provide to the user. The editors were applied to the same hydrologic data set to prepare the metadata file corresponding to the INSPIRE profile in the investigation. The CatMDEdit was found the best almost from every respect except the versatility in which the GeoNetwork package was the first with its multi-user, Internet related searching and disseminating capabilities. Therefore the CatMDEdit is proposed for small or medium size institutions and the GeoNetwork for large organizations.

**Keywords:** INSPIRE, ISO 19100 standard, metadata editors

## I. INTRODUCTION

Spatial information data relating to local, regional or global size are the basis of geosciences. Due to recent developments in space technology and the Internet they are available for everybody in great abundance. It generated a need for a unified and standardized Spatial Data Structure (SDI) with the following aims 1) sharing data evaluation and eliminating duplicated efforts; 2) rendering geographic data worldwide easily accessible; 3) supporting the seamless integration of geographic data from different sources.

Following several national and regional initiatives (Masser 2007) a successful proposal for SDI has been elaborated in Europe by the E-ESDI expert group, the European Environmental Agency and the Member's States

environmental and national mapping agencies, under the name of European Spatial Data Infrastructure (ESDI). The proposal has been accepted as a directive on establishing an infrastructure for *Spatial Information in the European Community* (INSPIRE) by the European Commission in July 2007 (Directive INSPIRE 2007).

Five drafting teams have been nominated to develop implement rules in the following 5 components of INSPIRE: 1) Interoperability of Spatial Data Sets and Services; 2) Metadata; 3) Network Services 4) Data Sharing; 5) Coordination and Complementary Measures. According to the work program the overall implementation may take more than 10 years, thus INSPIRE can be expected to be fully accomplished by 2019. The first implementation time frame 2010, was given for the provision of metadata, which is the ground pillar of the INSPIRE concept.

A metadata record contains the important parameters of a spatial dataset in a standardized form. The records are open source index files on the accessible spatial data sets of data providers. The standardized form provides an easy access and interoperability. The European spatial data providers are expected to accomplish and disseminate their metadata records by 2013.

## II. INSPIRE METADATA AND METADATA EDITORS

The ISO 19100 international standard series (see Appendix I.) has been elaborated by ISO Technical Committee 211 (ISO TC 211) as a Geographic information/Geomatics standard based on the proposals of Open Geospatial Consortium (OGC) , World Wide Web Consortium (W3C), Object Management Group (OMG), Organization for the Advancement of Structured Information Standards (OASIS) (ISO/TC 211 Advisory Group on Outreach 2012). The standardization started in 2001 and is still in process.

INSPIRE adapted the ISO 19100 as a technical ground for the directive. The adaptation covers 34 themes. The themes are subdivided into three groups and included into the INSPIRE directive in three appendices (see Appendix II.).

The elements of the metadata records are defined by ISO 19115 international standards (DRAFTING TEAM METADATA EUROPEAN COMISSION JOINT RESEARCH CENTRE 2012). The INSPIRE included a large part of them, partly as mandatory, partly as optional and conditional elements (see Appendix III.). This standard is completed by three others, namely ISO 19118, 19119 and 19139, which relate to the metadata encoding and service. ISO 19118 describes the requirements for creating encoding rules based on Unified Modeling Language (UML) schemas, while ISO/Technical Specification 19139 defines Extensible Markup Language (XML) as selected encoding language for geographic metadata. ISO 19119 defines the rules for network services.

Several freeware and commercial metadata editor and validator programs have been developed to support establishing metadata sources based on the above standards. There are stand alone and server based, simple and multipurpose complex programs. Some packages are capable of generating automatically metadata records from some data file formats (e.g. Shapefile, DGN, ECW, FICC, GeoTiff, GIF/GFW, JPG/JGW, and PNG/PGW). A good overview is provided by FGDC Metadata Working Group (FGDC METADATA WORKING GROUP 2012)

We selected 3 freeware programs to test their ease of usage and versatility. Their parameters are included in the Table 1.

Table no. 1. Metadata Editors selected for testing

|  | CatMDEdit 4.6.5 | GeoNetwork 2.6.1 | MetaD 3.0.5 |
|---|---|---|---|
| **Supported Standards** | | | |
| INSPIRE profile | ■ | | |
| ISO 19115 | ■ | ■ | ■ |
| ISO 19110 | ■ | | ■ |
| ISO 19119 | | ■ | |
| **Supported Data Format** | | | |
| XML | ■ | ■ | ■ |
| EXCEL | ■ | | |
| HTML | ■ | ■ | |
| PDF | | ■ | |
| ASCI | | ■ | |
| **Supported Platform** | | | |
| Windows | ■ | ■ | ■ |
| Unix | ■ | ■ | |
| Mac | ■ | ■ | |
| **Operating Mode** | | | |
| Stand alone | ■ | | ■ |
| Server Based | | ■ | |
| **Source Code** | | | |
| JAVA | ■ | ■ | |
| Visual Basic | | | ■ |
| **Extras** | | | |
| Multilanguage | ■ | ■ | ■ |
| Validation | ■ | ■ | ■ |
| Search/Delete | ■ | ■ | ■ |
| Find/Replace | | ■ | |
| Thesaurus | ■ | | |
| Graphic tools | ■ | ■ | |
| Automatic generation | ■ | | |

## III. TEST OF EDITORS

The GEODATA project of University of Miskolc (BAROSS - *EM_ITN1_06-GEO_DATA* - 2006/2009) completed the North Hungarian geodata catalogue by files of hydrologic data sources. They were prepared in Excel format and placed on the GEODATA website (GEODATA 2012). One of them is shown on Fig.1. The selected editors have been used to produce INSPIRE profile metadata record from this dataset in testing process.



**Fig.. 1.** Hydrologic data files of surface water samples in North Hungary

**CatMDEdit 4.6.5** is a complex, versatile, stand alone metadata editor developed by IGN and the Advanced Information Systems Group (IAAA) of the University of Zaragoza University with the technical support of GeoSpatiumLab in Java for Windows and Unix platform. The program can be downloaded from the website http://catmdedit.sourceforge.net, and a detailed presentation can be found at http://catmdedit.sourceforge.net/CatMDEdit.pdf.

The editor is multilingual (Spanish, English, French, German, Polish, Portuguese and Czech), and supports several metadata profiles among them the INSPIRE profile. Beside the standard XML format, the user can present the metadata files in Excel and HTML. Automatic metadata file generation is also available for some earlier mentioned data file formats. It is equipped with several extra tools to facilitate metadata editing like reusing tool for several times repeated contact information, the thesaurus tool to use thesauri in order to fill in some metadata elements, the on-line help describing metadata elements, the real-time validation. Beside these, some graphic tools such as visualisation of data files and graphical geographical selection are also helpful to the user.

The program setup is easy and straight forward without bugs or obstacles. The interface is user friendly but the user should have some knowledge of the

structure of ISO 19115 and the data files subjected to the process. The interactive questioner is shown on Fig.2. The enumerated tools offer the user a substantial help to complete the questioner. Afterwards, the program generates the metadata record in the appointed file format.
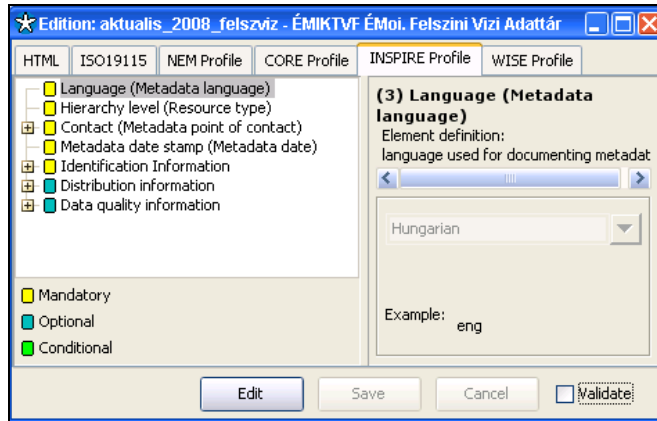


**Fig. 2.** CatMDEdit metadata editor user interface

**GeoNetwork 2.6.1** is a very complex Java servlet program developed by Open Source Geospatial Foundation as Spatial Data Catalogue System for the Food and Agriculture Organization of the United Nations, the United Nations World Food Programme and the United Nations Environmental Programme. It can be downloaded from the website http://geonetwork-opensource.org. The metadata editor and validator is only a part of the package. It has a search tool to access local and distributed geospatial metadata files, an up- and down- loading tool for data, graphics, documents, pdf files, and an interactive Web Map Viewer. The package works in intra or Internet network. The server administrator configures the access of the users for different functionality of the program and maintains the operation. Depending on the workload, the administration processes may require a full time applicant.

The editor itself has multilingual facilities (English, Spanish, Portugase, German, French, Holland, and Chinese), thesaurus, find/replace capability and some graphic tools. It supports several standards. Although the INSPIRE profile is not included in the default, a template can be edited and stored for it.

The program setup is straight forward. However, the GeoNetwork servlet did not work in our case with the enclosed Jetty server. When it had been replaced by the Tomcat 6.0.32, the operation started.

The system configuration is a complex and long process. The graphical administration tool (available from the opening page see Fig.3) is helpful, but only in the hands of a trained hostmaster.

The editor is working with questioners determined by the applied template of metadata standard. A separated form belongs to each category of parameters like identification, maintenance, constraints etc. The full category list and one questioner form is shown on Fig. 4. The user has several tools to complete the questioners (thesaurus, on-line help, graphic tools, real time-validation, search/find/replace facility etc.).
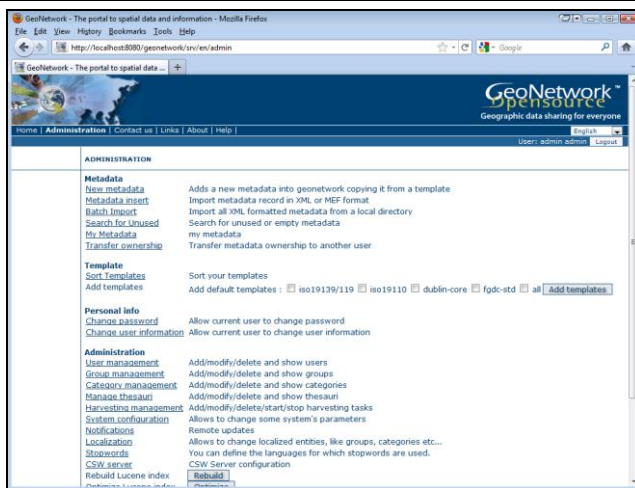


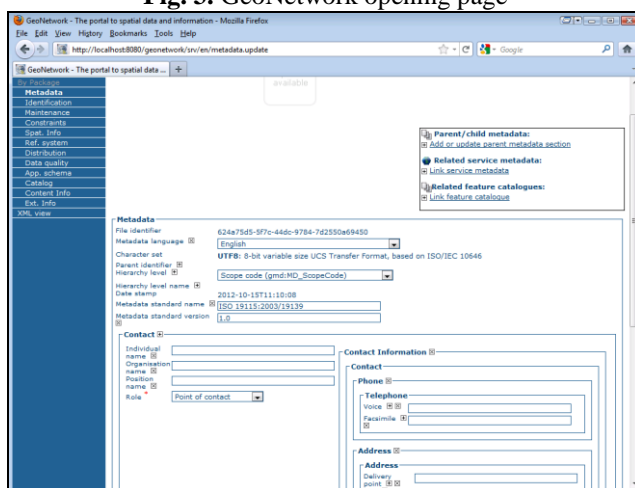**Fig. 3.** GeoNetwork opening page



**Fig. 4.** GeoNetwork metadata editor page

**MetaD 3.0.5**    MetaD is a simple, stand alone metadata editor created by Infraestructura de Dades Espacials de Catalunya in Spain. The program can be downloaded from http://www.geoportal-idec.cat/geoportal/eng/meta-d/. There is only one metadata profile, ISO 19115 core. However, from the elements of this standard the user can select according to his/her needs to shape his/her own profile. The program is multilingual in a constrained way (English, German, Spanish,

Catalan, Galician, Euskra). It has a graphical user interface, editable thesaurus and validation, but there are no graphical tools, and only XML form is supported.

The setup is straight forward, without obstacles. The use of the program is simple; however, the user needs specific knowledge of his/her data files and the elements of the metadata standard. It uses questioners and several rolling menus, which support the completion of the forms (see Fig.5).
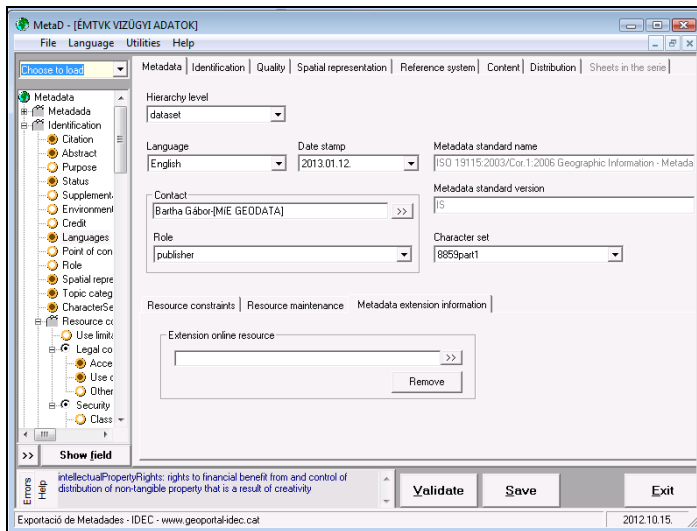


Fig. 5.  MetaD editor page

## IV. CONCLUSIONS

The investigated freeware metadata editors can be used for different purposes. The CatMDEdit stand alone editor has a straightforward setup and there is no need for any configuration. The INSPIRE profile is built in and several tools help the user to create metadata files. However, the user should have certain knowledge of the structure of INSPIRE profile and information about his/her data files. It is the best choice for small or medium size geo-institutions. They can use it after setup without any extra measures (training, new hardware, extra applicant etc.).

The GeoNetwork a complex, server based multipurpose package that has searching and disseminating capabilities besides metadata editing. Trained information expert is proposed to setup and configure the server and the different access right for the connected workstations.  The expert should pay special attention to security measures when the local network is hooked on the internet.

GeoNetwork needs a full time network administrator to maintain the smooth operation and training for users. This package can be proposed for larger organizations that are empowered with the necessary hardware and personals and they need data searching and disseminating capabilities.

The MetaD editor is a rather simple stand alone editor. The setup is easy without special configuration. However, the user needs rather extensive knowledge of the INSPIRE profile to use it and the help is limited. It can be proposed for places having only one type of datasets and the program parameters are accordingly adjusted.

## References

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## Appendix I.   ISO 19100 series of standards

6709 - Standard representation of latitude, longitude and altitude for geographic point locations

19101 - Reference model

19101-2 - Reference model - Part 2: Imagery

19103 - Conceptual schema language

19104 - Terminology Introduction

19105 - Conformance and testing

19106 - Profiles

19107 - Spatial schema

19108 - Temporal schema

19109 - Rules for applicaiton schema

19110 - Methodology for feature cataloguing

19111 - Spatial referencing by coordinates

19112 - Spatial referencing by geographic identifiers

19113 - Quality principles

19114 - Quality evaluation procedures

19115 - Metadata

19115-2 - Metadata - Part 2: Extensions for imagery and gridded data

19116 - Positioning services

19117 - Portrayal

19118 - Encoding

19119 - Services

19120 - Functional standards

19121 – Imagery and gridded data

19122 - Qualifications and Certification of personnel

19123 - Schema for coverage geometry and functions

19124 - Imagery and gridded data components

19125-1 - Simple feature access - Part 1: Common architecture

19125-2 - Simple feature access - Part 2: SQL option

19126 - Profile - FACC Data Dictionary

19127 - Geodetic codes and parameters

19128 - Web Map server interface

19129 - Imagery, gridded and coverage data framework

19130 - Sensor and data models for imagery and gridded data

19131 - Data product specifications

19132 - Location based services possible standards

19133 - Location based services tracking and navigation

19134 - Multimodal location based services for routing and navigation

19135 - Procedures for registration of geographical information items

19136 - Geography Markup Language

19137 - Generally used profiles of the spatial schema and of similar important other schemas

19138 - Data quality measures

19139 - Metadata - Implementation specification

19140 - Technical amendment to the ISO 191** Geographic information series of standards for harmonization and enhancements

**Appendix II.   34 themes in INSPIRE Directive**

Appendix I
1. Reference systems using coordinates
2. Geographical grid system
3. Geographical names
4. Administrative units
5. Addresses
6. Land Registry plots
7. Transport networks
8. Hydrography
9. Protected areas

Appendix II
1. Height
2. Soil use
3. Ortho-image production
4. Geology

Appendix III
1. Statistical units
2. Buildings
3. Soil
4. Land use
5. Human health and safety
6. Utilities and public sector services
7. Environmental protection services
8. Facilities for manufacture and industry
9. Facilities agriculture and aquaculture
10. Population distribution — demography
11. Area management, areas where limitations apply, regulated areas and reporting units
12. Areas with risks to the natural environment
13. Atmospheric conditions
14. Meteorological and geographic characteristics
15. Oceanographic, geographic characteristics
16. Maritime regions
17. Bio-geographic areas
18. Habitats and biotopes
19. Distribution of species
20. Energy sources
21. Mineral sources

**Appendix III. ISO19115 core and INSPIRE profile elements**

| ISO 19115 core elements | Class | INSPIRE elements | Class |
|---|---|---|---|
| Dataset title | M | Resource Title | M |
| Dataset responsible party | O | Responsible organization | M |
| Geographic location of the dataset | C | Geographic Bounding Box | M |
| Dataset language | M | Resource Language | M |
| Dataset character set | C | - | - |
| Dataset topic category | M | Topic Category | M |
| Spatial resolution of the dataset | O | Spatial Resolution | C |
| Abstract describing the dataset | M | Abstract | M |
| Distribution format | O | . | - |
| Additional extent information | O | Temporal extent | C |
| Spatial representation type | O | - | - |
| Reference system | O | - | - |
| Lineage | O | Lineage | C |
| On-line resource | O | Resource Locator | O |
| Metadata file identifier | O | - | - |
| Metadata standard name | O | - | - |
| Metadata standard version | O | - | - |
| Metadata language | C | Metadata language | M |
| Metadata character set | C | - | - |
| Metadata point of contact | M | Metadata point of contact | M |
| Metadata date stamp | M | Metadata Date | M |

"M" indicates that the element is mandatory.
"O" indicates that the element is optional.
"C" indicates that the element is mandatory under certain conditions.