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Place names as a part of global, regional and national spatial data infrastructure

Submitted by Željko Hećimović*

* Prepared by Željko Hećimović, State Geodetic Administration, Croatia.

PLACE NAMES AS A PART OF GLOBAL, REGIONAL AND NATIONAL SPATIAL DATA INFRASTRUCTURE

1. INTRODUCTION

The importance of geographical names is recognized by United Nations (UN) short after UN is formed. For the purpose of standardization of geographical names on maps, UN founded *United Nations Group of Experts on Geographical Names (UNGEGN)* as a permanent expert body for standardization of the geographical names.
European Union (EU) developed EuroGeoNames (EGN) as system of European geographical names infrastructure. It is a part of the European spatial data infrastructure (INSPIRE) and regional process of standardization geographical names. It is defining geographical names in the interrelations with other basic sets of data.

2. DOCUMENTS THAT ARE DEFINING PLACE NAMES AS PART OF GLOBAL, REGIONAL AND NATIONAL SPATIAL DATA INFRASTRUCTURE

The main documents of UNGEGN, INSPIRE and documents on the national levels that are defining geographic names as part of spatial infrastructure are:

- UN resolutions,
- Infrastructure for Spatial Information in Europe (INSPIRE) Directive,
- National documents. In Croatia it is Law on State Survey and the Real Property Cadastre and Law about changes of the Law of State Survey and the Real Property Cadastre (Official Gazette, NN 16/07, 124/2010).

UNGEGN as global and INSPIRE as regional European body are influencing standardization of geographical names on global, regional, national and local level. UNGEGN made tree resolutions on geographical names as part of spatial data infrastructures:

RESOLUTION (2002): VIII/16 Geographical Names Integration into the national and regional spatial data infrastructures.
THE CONFERENCE,
- Recognizes that the standardized geographical names are a component of the successful development of national economies in all countries,
- Notes that the geographical names serve the common approach to geo-information and the spatial data infrastructure,
- Recommends that the standardized geographical names are considered during the establishment of the national and regional spatial data infrastructure and to be included in its development and implementation.

RESOLUTION (2002): VIII/8 Support to the UN Working Group for Geo-Information
THE CONFERENCE,

- Notes that the UN Working Group for Geo-Information works on the establishment of the UN spatial data infrastructure,
- Also notes that the UN Working Group for Geo-Information has recognized geographical names as the main component of this infrastructure,
- Recommends that UNGEGN cooperates with the UN Working Group in developing the toponyms as a part of the UN Spatial Data Infrastructure,
- Also recommends that UNGEGN experts actively support this UN Working Group.

RESOLUTION (2007): IX/10 Support to education and publication
THE CONFERENCE,
- Grateful to the United Nations Statistics Division for its support in organizing educational courses in the area of geographical names standardization,
- Underlines the importance of education, especially for the participants from the developing countries, as the main element of the national spatial data infrastructure and preservation of the cultural heritage,
- Recognizes the importance of electronic and printed form of documents available in all official UN languages.

INSPIRE and EuroGeoNames are treating geographical names in formalized, well defined and structured way. It is treating geographical names as separate data set in context of other INSPIRE data sets. Geographical names are part of INSPIRE annex I data together with coordinate referential system, geographical network, administrative units, addresses, cadastral parcels, transport networks, hydrography and protected areas. Document INSPIRE Data Specification on Geographical Names is defining geographical names as unique data set using UML schema as object oriented semantics in description of the place name model (EGN 2009).

3. DIFFERENCES IN UNGEGN AND INSPIRE PLACE NAMES APPROACH

UNGEGN is global organization for standardization of geographical names, and INSPIRE and EuroGeoNames is European regional organization. UNGEGN exists since late 50's and INSPIRE since the beginning of this sanctuary. EuroGeoNames is developed in accordance with UNGEGN principles. But, there are small differences that could lead to different interpretations of fundamental terns and relations.
Place name or toponym is defined by the UNGEGN as proper noun applied to a portion of the surface of the Earth (Kadmon 2002, 2007). INSPIRE is defining geographical name as proper noun applied to real world entities (INSPIRE 2009). The fundamental difference is that UNGEGN is defining named place as the portion of the surface of Earth that has recognizable identity, and INSPIRE is defining named place as real world entity. INSPIRE is applying proper noun to entity that represent real world and UNGEGN to surface of the Earth. These differences can cause different interpretations of formal representation of named places in a universe of discourse.

There are UNGEGN/INSPIRE differences in definitions of fundamental terms:

UNGEGN (Kadmon 2002, 2007):
- **gazetteer** as list of toponyms arranged in alphabetic or other sequential order, with an indication of their location and preferably including variant names, type of topographic feature and other defining or descriptive information.
- **endonym** as name of a geographical feature in an official or well-established language occurring in that area where the feature is situated.
- **exonym** as name used in a specific language for a geographical feature situated outside the area where that language is widely spoken, and differing in its form from the respective endonym(s) in the area where the geographical feature is situated.

INSPIRE (INSPIRE 2011):
- **gazetteer** as directory of instances of a class or classes of features containing some information regarding position [ISO 19112:2005]. A gazetteer can be considered as a geographical index or dictionary.
- **endonym** as name of a spatial object in one of the languages occurring in that area where the object is situated. It is modification of UNGEGN terminology.
- **exonym** as name used in a specific language for a spatial object situated outside the area where that language is spoken, and differing in its form from the name used in an official or well-established language of that area where the spatial object is located. It is modification of UNGEGN terminology.

6. PLACE NAMES ONTOLOGY

Ontological approach is used to compare UNGEGN and INSPIRE place names models. Semantics as the study of meanings is establishing relationship between real world and data. Semantics is connecting phenomena (features/objects) and signs (on the maps and visualizations) using the concepts, and concepts are defining knowledge base or ontology. Ontology constitutes knowledge base of the semantic.
The place name conceptual ontology is the human readable ontology and Web Ontology Language (OWL) is used to make human readable ontology in to the machine readable. There are more different OWL languages for representation and modeling ontology (W3C Semantic Web 2009, W3C OWL 2009). They are compatible with XML as existing web standards. The OWL is used to formalize the description of ontology on the Web in a format that machines and applications can read.
The International Standardization Organization (ISO) geographic information standards and INSPIRE are using object oriented UML conceptual schema language to describe conceptual model. UML model implicitly contain ontology. But, ISO recognized big potential of ontological approach, and ISO is developing several standards on the topics ontology.

To define conceptual place names domain ontology objects and relationships among them should be defined. Features are used as domain elements. To define place name ontology, relationships between objects should be defined. There are many relationships that can be defined among place name objects. Here are defined some of them:

- functional relationship is defined if object A has the same relationship to two objects, than these two objects must be the same,
- inverse Functional relationship is defined if object A has relationship to a object B, and object C has this relationship to the object B, than object A and object C must be the same thing,
- transitive relationship is defined if relationship term has the ability to pass on other relationships and characteristics of other objects,
- symmetrical relationship is defined if for a relationship, the object and the subject may be exchanged without changing of the meaning,
- antisymmetric relationship defined if object A has a relationship to object B, than object B can never have this relationships to object A,
- reflexive relationship is defined if object A has relationship to itself,
- irreflexive relationship is defined if object A can never have this relationship to itself.

On the global, regional and national levels exists public place names Internet services that are practical solutions of standardization of geographical names. UNGEGN has World Geographical Names Database as public service, INSPIRE has EuroGeoNames as public service and on national levels there are developed public services as well.

UNGEGN World Geographical Names database contains basic geographic names for each UN member country. It is multilingual, multiscriptual geo-referenced geographical names database. It contains the names of the countries in the short and formal form, names of the main and major cities (population over 100 000) in the national and six official UN languages. It also contains language and sound files with pronunciation of major cities.

EuroGeoNames (EGN) is a system of European geographical names infrastructure. It is part of bigger INSPIRE spatial data system. In the EGN system is operatively connected thirteen countries, in the moment.

Here are presented ontological hierarchical relations between UNGEGN, EGN and Croatian feature domain ontological approach (see figures 1, 2 and 3).
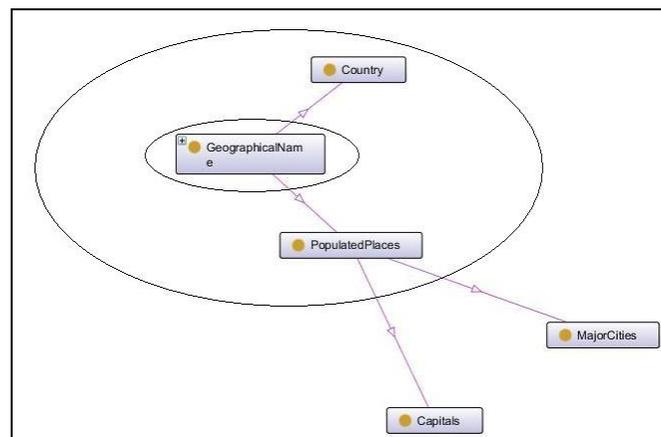

Figure 1. Hierarchy of the UNGEGN World Geographical Names Database features.
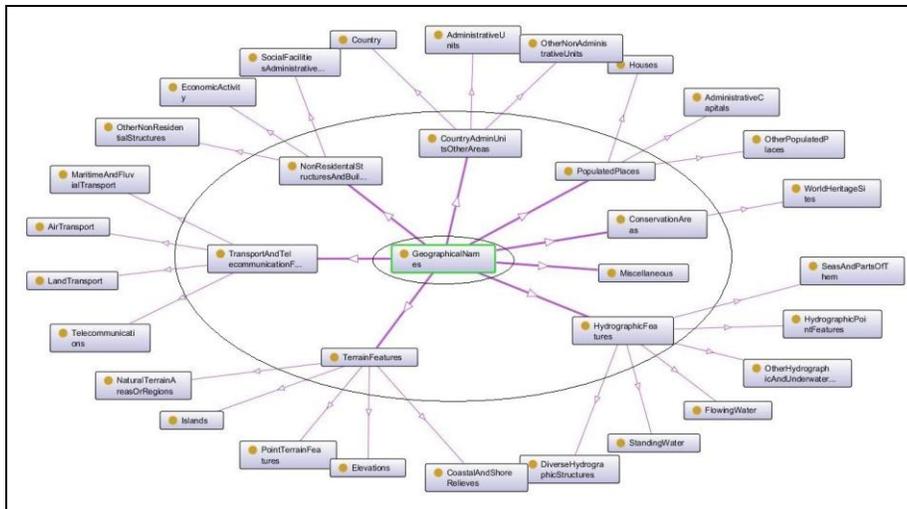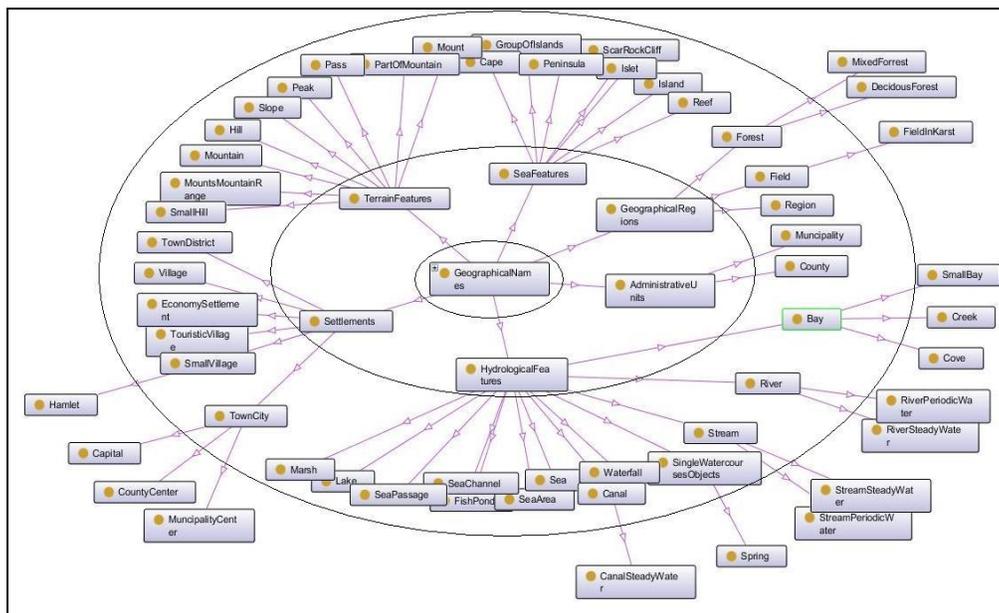
Figure 2. Hierarchy of the EGN features.

Figure 3. Hierarchy of the Croatian place names features.

An ontological hierarchical relation between topographic features for each of the system is only one of relations among ontology domain elements. It is giving elemental relations between domain objects. More complicated connections between features and database models could be developed.

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