Chapter 5.4

Enhancing the Efficiency of ICT by Spatial Data Interoperability

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ABSTRACT

In the present world of information and communication technologies (ICT) "Green ICT" represents a topic of immense interest. The meaning, sense and scope of Green ICT are quite varied and very wide. Hardware technologies, for example (virtualization of hardware) and corresponding methods are considered initiatives towards environment protection and sustainable growth. At the same time, however, improved development and implementation of existing tools influencing environment by implication (for example due to reducing travel costs or energy savings) are very important in terms of Green ICT. ICT solutions could also work as a device or medium of implementation of new environmentally friendly methods, for instance in agriculture or industry. Spatial data or data with a direct or indirect reference to a specific location or geographic area (INSPIRE Registry, 2009), like digital maps, data in navigation tools, are a significant means of correlating otherwise disparate sources of information. This chapter tries to show the relationship of spatial data and how it can benefit Green ICT. This relationship is vital, as spatial data plays a very important role in system and application (e.g. Geographic Information Systems) with the potential for making direct impact on environmental protection. Spatial data continues to be an integral part of common equipment like mobile phones, car navigation systems and computers. The numbers of these gadgets are constantly growing and so is the corresponding

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volume of spatial data sets. Within the context of this rapid growth, the costs of data capture, management, updating, processing and distribution are increasing. For example the operation of servers containing the same spatial data sets is energy-consuming and results in burdening the influence on environment. Spatial data sharing, re-use and possibilities of interconnection of existing spatial data sources pose a solution. Therefore, the spatial data interoperability assurance (e.g. by private spatial data providers, state administration etc.) is required. The spatial data interoperability enables more efficient management and use of spatial data sets and achieving of desired savings. The principles of spatial data interoperability are described in the first part of this document. Emphasis is put on spatial data heterogeneities as the main problem of spatial data interoperability. Moreover, technologies focused on elimination of spatial data heterogeneities are discussed here. Subsequent paragraphs introduce selected instruments (metadata, schema languages, ontologies) which are based on data description and support data interoperability. The last section of this document is composed of examples of several international projects focused on spatial data description and processing of well-described spatial data through web services.

INTRODUCTION

The contemporary world is frequently confronted with many pressing questions dealing with environment, security, sustainability and fair growth. Experts from all branches of human activity (e.g. geography, demography, risk management, security, policy, agriculture, industry, transport etc.) look into these questions and search for solutions and answers. During this search process, the information and knowledge based on data sets which represent the corner stone of information and communication technologies (ICT) is the most important instrument. The information, knowledge and data facilitate the effective targeting of relevant precautions or decisions. At present, the main problem does not lie in the quantity of information and knowledge. More to the contrary, the volume of data, information and knowledge grows practically uncontrollably. Therefore, the quality is more important, resulting in better or worse data, information and knowledge accessibility, usability and efficient management and decision making. In our view the data quality means above all interoperability support, including data sharing, possibility of combination with other data sets and implementation of software and hardware products regardless of platforms, operation systems, providers or licenses. High-quality data must fulfill the above-mentioned conditions without reference to data sources, data providers, state borders, scales, used technologies and platforms, data models, organization structures, legislative rules, end-user requirements, data types, data formats etc. The need for interoperable data is due to the necessity of cooperation among data providers, data processors and end-users on all levels, in all countries, economic sectors or types of economics. Therefore, just the use of such data sets leads to savings in the domains of finance, energy, personal and time sources and cost reduction. Obviously, such achievements implicitly mean environment protection and support of sustainable growth. Thus, for instance, implementation of following recommendations of more efficient data use could lead to elimination of physical traveling. There is no need to adjust, modify or customize spatial data sets or software at the customer. Thereby the amount of greenhouse gasses would be reduced.

There are two very important documents of European Union proving importance of questions of cooperation on the field of efficient data use and re-use including spatial data.

1. Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing an Infrastructure

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