

# **Ontologies and Spatial Data Infrastructure: Semantic Interoperability Issues**



**Sumit Sen**

**Applied Technology Group**

**Tata Infotech Limited, SEEPZ, Andheri, Mumbai –96**

**[www.tatainfotech.com](http://www.tatainfotech.com)**

**email: [Sumit.sen@tatainfotech.com](mailto:Sumit.sen@tatainfotech.com)**

**Table of Contents**

**1. ONTOLOGIES AND SPATIAL DATA INFRASTRUCTURE: SEMANTIC INTEROPERABILITY ISSUES..... 3**

1.1. ABSTRACT ..... 3

1.2. REFERENCES: ..... 4

# 1. Ontologies and spatial data Infrastructure: Semantic interoperability Issues

---

## 1.1. Abstract

Geo-spatial data which forms the basic component of a spatial data Infrastructure is viewed and used by many users in variety of views[1]. There have been many approaches to capture the essence of such views and difference there in. Cognitive approaches[2] most popular among these. These differences in the concepts of different users as above are captured in the different Ontologies and hence ontologies stand out as the best way to resolve semantic interoperability issues rising out of multiple data source contexts or multiple user contexts. Integration of heterogeneous data sources and heterogeneous user platforms which is the most important task of Spatial Data Infrastructures (SDI)

While inspecting the practical role of present day geo-spatial ontologies in the form of meta-data descriptions and also the present day standards of specifying ontologies like DAML+OIL and OWL, it is observed[3] that considerable ground has to be made. Significant theoretical work however exists in the field of grounding of spatial ontologies to basic conceptual structures rooted in the human perceptual system[4]. This approach not only helps to base the ontologies on semantically meaningful theory but also make it possible to produce matchmaking capabilities in relation to user ontologies.

Feature based GI can form a viable data model for sharing spatial data based on the concept of a virtual global database using pluralistic world views[5]. Real world Objects however have to undergo a process of categorisation or classification which is usually based on the ontology or concepts of the primary users of the database and also the generator of the database. The traditional generator of data of SDI being the cartographers, it is required to provide translation of the semantics to users like planners and tourists. Thus the traditional skill of map reading has now become a GI problem with the flourish of GIS and GIS applications.

The entry levels for semantic understanding in GI has often created a barrier for users of GI and with the focus of GIS shifting to diverse and not so traditional areas

it becomes imperative for the SDI to be able to envisage the path for access and usage of the data based on ontological work discussed above[6]. It also makes practical sense to understand the work done by SDI's world-wide in this regard and also use learning from such work in the present SDI initiatives. Research Initiatives in this regard should also be followed to understand the possibilities of integrating Ontologies and hence semantic reference systems closely to the SDI and data supplied there in.

## 1.2. References:

1. Harding, J (2003) From real world views to geographical information. workshop on Fundamental Issues in Spatial and Geographic Ontologies held in conjunction with COSIT 03 , Ittingen.
2. Kuhn, W (2002) Modelling the Semantics of Geographic Categories through Conceptual Integration, In M. J. Egenhofer and D. M. Mark(Eds) GIScience 2002 LNCS 2478 pp `08-118, 2002. Springer-Verlag, Berlin 2003.
3. Sen S (2003) Semantic Interoperability: Experiences of extending Semantic Reference Systems to DAML-S. Submitted to the AAG annual conference Philadelphia, PA
4. Mark, D.M.(1989) Cognitive Image-Schemata for Geographic Information Relations to User views and GIS Interfaces. In Proceedings of GIS/LIS'89 Orlando, Florida.
5. Hart, G & Greenwood J. (2003) A component based approach to geontologies and geodata modelling to enable data sharing In: Proceedings of 6th AGILE conference, Lyon France.
6. Burrough, P & Masser, I. (1998) International aspects of spatial data exchange. In P. Burrough and I. Masser (Eds) GISDATA 5 European Geographic Information Infrastructures opportunities and pitfalls., Taylor and Francis, London.