

Interoperability of Conceptual Geographical Data Schemas using UML Infrastructure

Thiago Bicalho Ferreira,
Sérgio Murilo Stempluc,
Jugurta Lisboa Filho
<http://www.dpi.ufv.br/projetos/geoprofile/>

Introduction

- According to Pinet (2012) several proposals have been presented to solve problems involving:
 - The lack of spatial/temporal constructs ;
 - The lack of CASE tools to aid in conceptual modeling of spatial/temporal data.
- The large number of alternative extensions led to the lack of a standard model for the area of conceptual GDB modeling

Problems

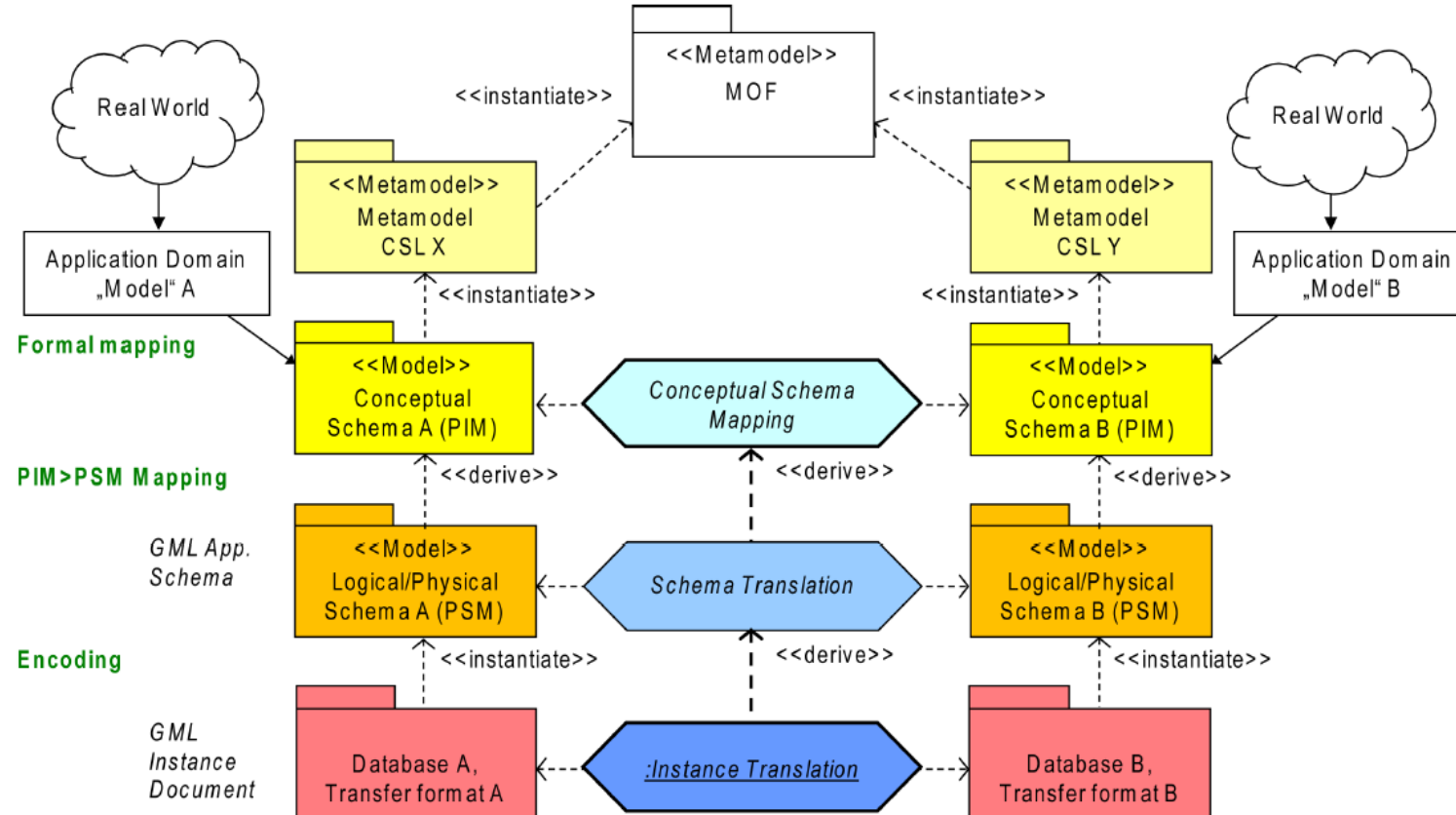
- For Sampaio et al. (2010) the lack of a standard conceptual model causes problems to GDB designers and their teams:
 - The difficulty in integrating different conceptual schemas;
 - The difficulty in reusing projects already validated in previous systems.
- For Staub (2007) the problems caused by the lack of a standard conceptual model can be classified as horizontal interoperability problems.

UML Infrastructure

- UML needs to be extended for geographic data modeling
- OMG defines two ways for the UML extension:
 - The first uses MetaObject Facility (MOF), modifying the UML metamodel to create a new language;
 - The second is by defining a profile;
- GeoProfile:
 - According to Sampaio et al. (2010), GeoProfile is a UML profile that combines the main characteristics of several specific conceptual models for GDB modeling;

Interoperability

- According to Staub (2007), the interoperability of data schemas may occur in two axes, vertical and horizontal (Figure 1).



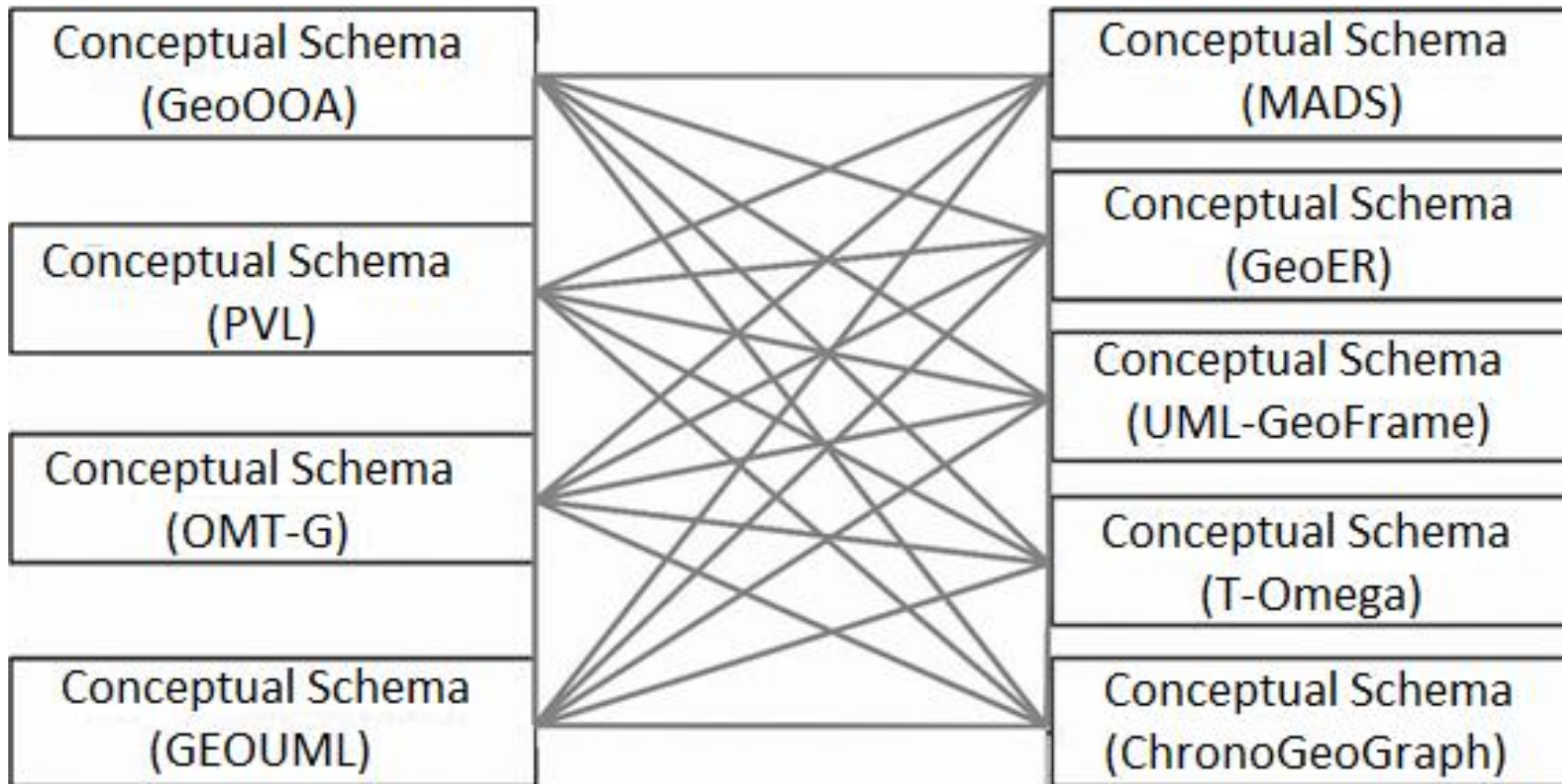
Enterprise Architect

- Commercial tool licensed by Sparx Systems;
- It provides functionality for:
 - Specification of UML profiles;
 - Development of MDA and horizontal transformations;
 - Specifying constraints in OCL;
 - Specification MDG Technologies;
- The method was tested using the Enterprise Architect (EA) CASE tool (EA, 2016).



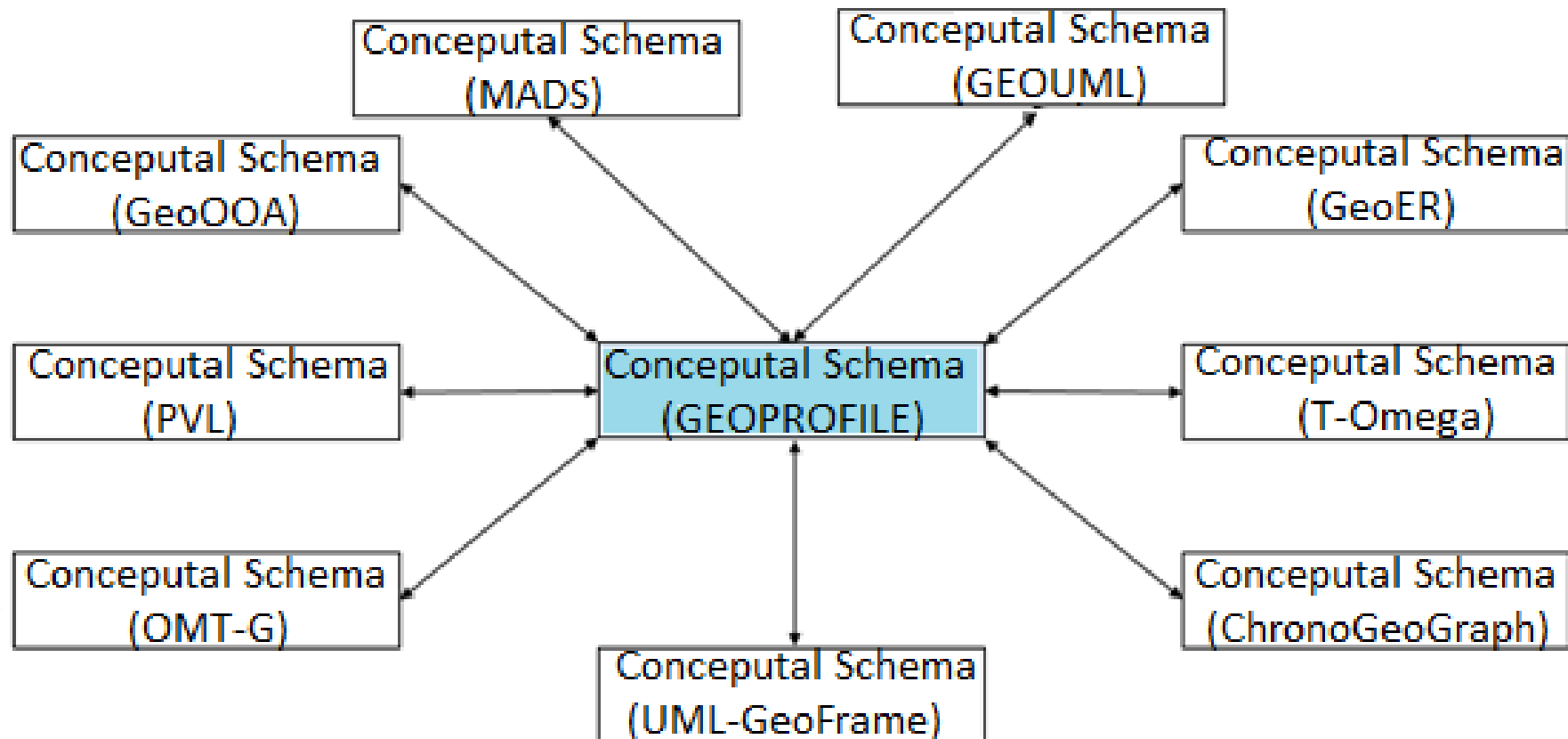
Method for the Interoperability of Geographical Data Schemas

- Step 1: Choosing the Interoperability Base Model



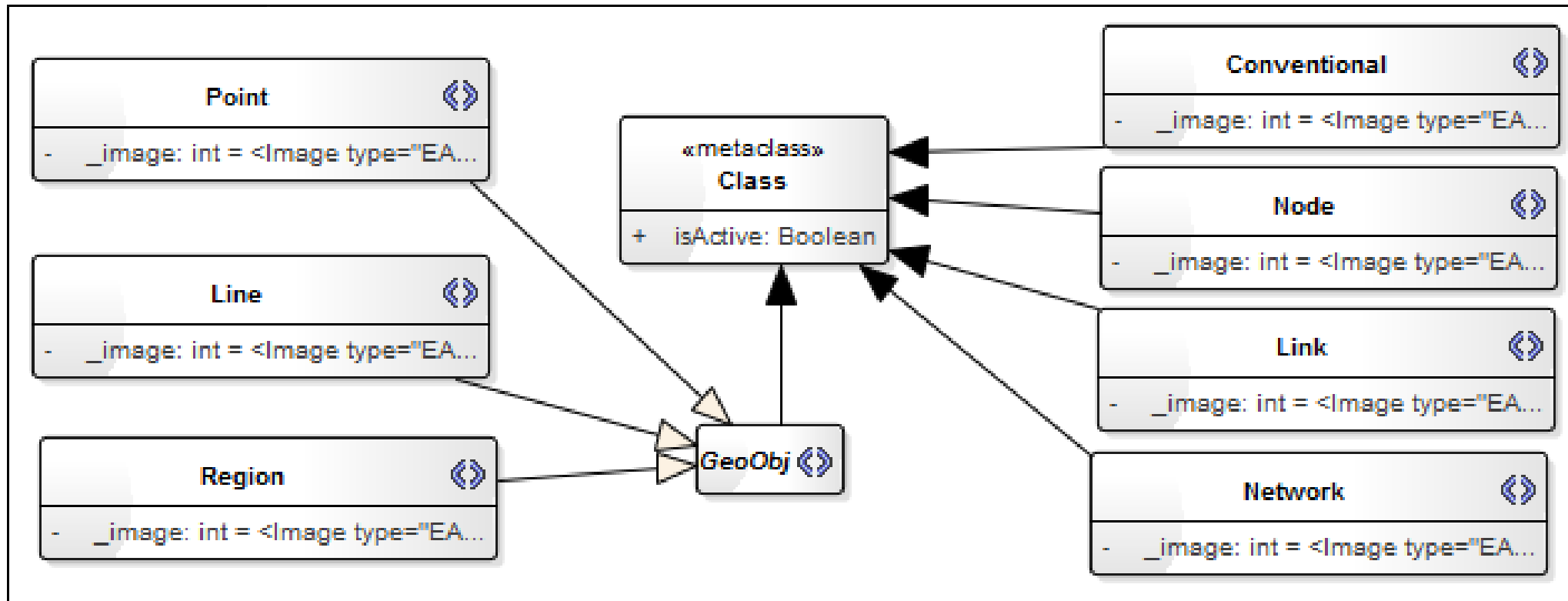
Method for the Interoperability of Geographical Data Schemas

- Step 1: Choosing the Interoperability Base Model



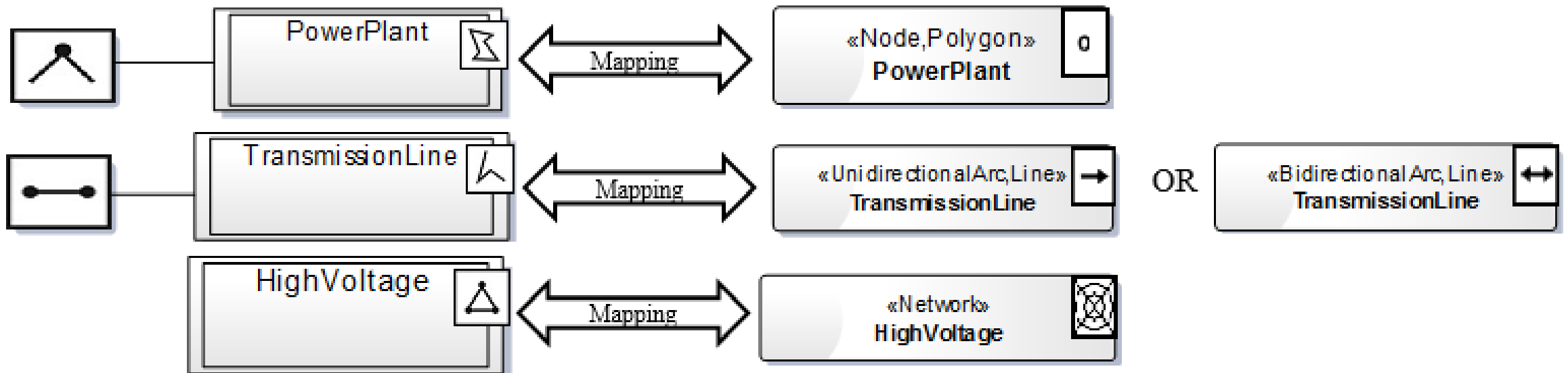
Method for the Interoperability of Geographical Data Schemas

- Step 2: Specifying Metamodels for the Models Selected in Step 1
- Step 3: Defining UML Profile and OCL Constraints



Method for the Interoperability of Geographical Data Schemas

- Step 4: Application and Configuration of the MDG for UML Profiles
- Step 5: List of Horizontal Transformation Rules



Conclusions

- This paper showed that horizontal interoperability can be achieved among different conceptual geographic database schemas using GeoProfile as base.
- The Enterprise Architect CASE tool was used to implement the method proposed with the horizontal interoperability exemplified at the PIM level of the MDA approach.



QUESTIONS?

Thiago Bicalho Ferreira

<http://www.dpi.ufv.br/projetos/geoprofile/>

