

Recent years have been marked by the emergence of spatial decision support systems, or geo-decisional systems, based on Space Data Warehouses (SDW). SDW are generally used to analyze complex phenomena that are often perceived differently depending on the type of user, which implies that a geographic datum of the studied space has Multiple Geometric Representations (MGR). It seems obvious that support for spatial data with MGR in SDW context is of crucial interest. However, managing MGR of spatial data in SDW systems is a major issue.

In this thesis, we propose a Spatio-Multidimensional Model supporting MGR called "SMM-MGR" which redefines the existing concepts of the spatio-multidimensional model to take into account the multiple representation. In addition, new operators have been proposed that allow navigation in the different representations. We have developed a prototype (GéOLAP) conforming to the "SMM-MGR" model, and allowing the different decision-makers a spatio-multidimensional analysis of spatial data with MGR related to industrial risks in Algeria

We proposed a framework for the distribution of ETL spatial activities related to the population of the SDW with MGR in a grid computing environment and thus allowing its deployment in a big-data context. In addition, to improve the performance of our grid-based solution, we adopted the MapReduce model. In addition, we have proposed a solution based on multi-agent systems to plan and balance transformation activities while allowing the joint use of real-time data and archive data.