The increasing amount of data received from experiments and observations on Earth and on space which together with the availability of fast digital network access create a demand for processing, querying, accessing, and retrieving data. The research is in the area of "scientists’ smart lab environment" – methods on scientific data management and visualisation in distributed and heterogeneous environment. The service-oriented architecture (SOA)-based approach enables data description, sharing, analysis and visualization. Our design policy is to understand the metadata, the quality of the data, where and how it was produced. Recording the details of the process by which data sets were derived helps to solve the problem with the distribution and heterogeneity of data. The power of databases is used to allow effective interactions with data, and an interface which can be exploited by the toolkits available, for proposes such as visualization and plotting.

Our system is addressing this scientific process and provides functionality to scientists, who access it over the web. Scientists upload the data they generate into the system and describe it with metadata. There are services that help to create a XML description using a specific XML-based language, convert this description into canonical XML form and map it into relational database. A further development of this work will be to generate services to allow scientists to query and access data of interest, to analyze and visualize data.

The advantages in data management, analysis, knowledge discovery and visualisation empower the scientists to achieve new scientific breakthroughs.