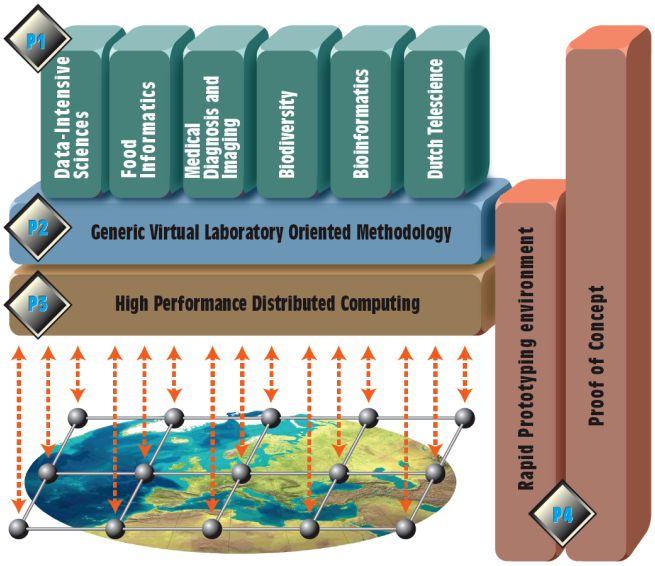
vl·e virtual laboratory for e·science

information

VL-e enables new approaches to traditional sciences

Information has become the fuel of our knowledge society, and our ability to digest, understand and share it will determine our scientific, economic and social progress.

The exceptional increase in computing power, storage capacity and network bandwidth over the past decades forms the basis of a digital revolution which has only just started. Also the changing scale and scope of experimental sciences require a new research paradigm: (digitally) enhanced science or e-Science. The aim of the 'Virtual Laboratory for e-Science' (VL-e) project is to bridge the gap between the technology push of the high performance networking plus the Grid and the application pull of a wide range of scientific experimental application domains. A typical example of this is the life sciences, where VL-e offers solutions for combining laboratory research with computational experiments and simulations, making use of the knowledge and experience gained from dealing with large data sets in high energy physics. At the same time, however, it is recognised that data sets in the life sciences are far more complex than in high energy physics.



More specifically, VL-e is developing a Proof-of-Concept (PoC) infrastructure (both hard- and software) to enhance location-independent access to scientific information and stimulate global and multidisciplinary collaboration, thereby enabling new approaches to traditional sciences. The VL-e software (both for rapid prototyping and in the PoC) provides generic functionalities that support a wide range of e-Science applications. This PoC infrastructure will boost the knowledge economy of the Netherlands.

Currently, six application domains are involved: Data-Intensive Sciences, Food Informatics, Medical Diagnosis & Imaging, Biodiversity, Bioinformatics and Telescience. Several Dutch universities, academic hospitals and industries in the life sciences and ICT domain participate in this project. There is also strong collaboration with NBIC (Netherlands Bioinformatics Centre). The recently started Dutch BIG GRID project will build a nationwide production grid, making use of methodology still being developed within VL-e.

Data Visualization and Virtual Reality

The purpose of scientific visualization is to enhance existing scientific methods by increasing the scientist's ability to see data and understand the results of computations, to interrogate and navigate through datasets, and to communicate these insights with others.

The importance of visualization techniques and virtual environments for computational science is undisputed. Nevertheless, the great potential of interactive visualization has not yet been fully realized. It has been hampered by several factors, such as the lack of comprehensive software tools and environments, the limited scalability of visualization techniques, the limited usability of 3D interaction, and the limited bandwidth of networks. Therefore, the need for more advanced visualization tools and environments has become increasingly urgent. The infrastructure provided by VL-e enables the development of such tools.

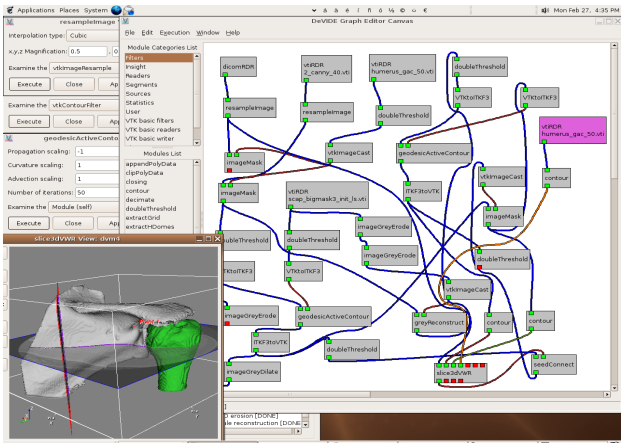


Fig 1. The graphical interface of DeVIDE .

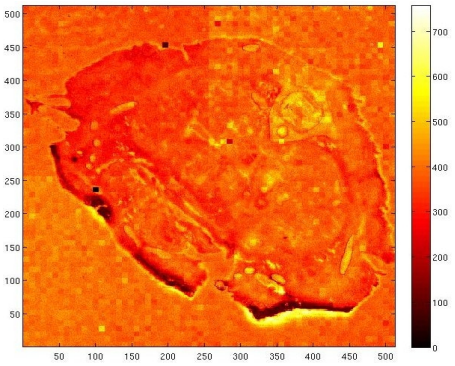


Fig 2. High resolution imaging mass spectrometry with MSVis.

For example, traditional visualization methods cannot cope with huge data sets in a satisfactory way and data reduction strategies must be employed for extracting useful information before visualization is possible. In addition, there is large demand for collaborative environments, especially for multidisciplinary projects, where researchers with different backgrounds interact.

DeVIDE (see Figure 1), or the Delft Visualization and Image processing Development Environment, is a cross-platform (Windows, Linux, OS-X) interactive software package for the rapid prototyping of medical visualization and image processing algorithms. The primary graphical interface allows users to build complex functional networks by connecting blocks together.

In collaboration with SP 1.6 **MSVis**, or Mass Spectrometry Visualization, has been developed. The primary goal of MSVis is to develop extended data analysis strategies for high resolution imaging mass spectrometry. An example of MSVis is shown in figure 2.

VL-e Program line: Generic Virtual Laboratory Methodology

Subprogram: SP2.3 User Interface and Virtual Reality Based Visualization

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vl-e facts

budget 40 M, period 2004-2008
more than 20 consortium partners from industry and academia
director: prof. dr. L.O. Hertzberger
website: http://www.vl-e.nl

consortiumpartners

A&F Wageningen, AMC, CWI, DSM, Friesland Foods, FEI, FOM AMOLF, NBIC, Nikhef, IBM, LogicaCMG, Philips Research, Philips Medical, SARA, Top Institute Food and Nutrition, TNO Kwaliteit van Leven, TU Delft, Unilever, UvA-IBED, UvA-IvI, UvA-SILS, VU, VUmc, WTCW