vl·e virtual laboratory for e·science

Virtual Laboratory for e-Science

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VL-e Mission & Strategy

Background

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

Mission

To boost e(nhanced)-Science by creating an e-Science infrastructure, while carrying out research on methodologies.

Strategy

To carry out concerted research along the complete e-Science technology chain, ranging from applications to networking, focusing on new methodologies and re-usable components. The essential components of the total e-Science technology chain are:

- e-Science development areas
- a Virtual Laboratory development area,
- a Large-Scale Distributed computing development area, consisting of high performance networking and grid parts.

VL-e research programme lines

P1 e-Science in applications

Creates several research prototypes of advanced e–Science application specific Problem Solving Environments (PSEs) in the areas of data intensive computing, food science, medical science, biodiversity, bioinformatics and telescience.

P2 Generic Virtual Laboratory methodology

Develops the fundamental knowledge for the Virtual Laboratory. It focuses on generic methodologies for e-Science such as problem solving, adaptive information disclosure, visualization and user interfaces.

P3 Large-scale distributed systems

Develops fundamental knowledge development in the area of large-scale distributed computer systems based on high performance networking and Grid technology.

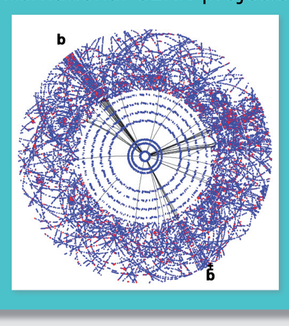
P4 Scaling up & validating in 'real-life applications'

Carries out field tests for evaluation and scaling up of the proof-of-concept environments under well-chosen real-life conditions.

P1 e-Science in applications

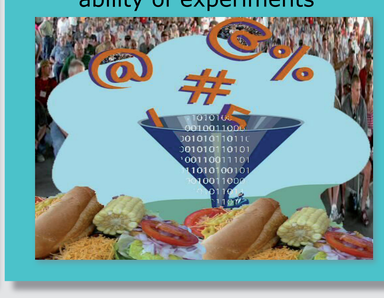
SP1.1 Data intensive Sciences

- Develop a PSE for high-energy physics
- Distributed storage and access of huge amounts of data (PB)
- Uniform & secure access of geographically distributed data for analysis on the grid
- Participation in several international CERN projects



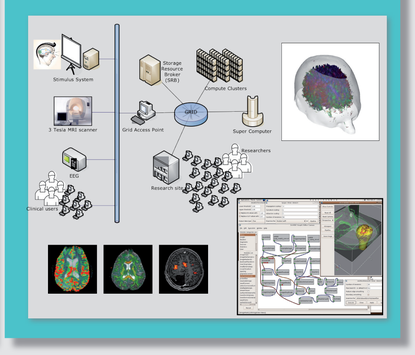
SP1.2: Food Informatics

- Develop a PSE for Dutch food research institutes & industry
- Prediction of food properties out of physicochemical data of molecules
- Development of a Research Management System; focus on
  - cross-project availability and context of data (reuse)
  - reproducability and traceability of experiments



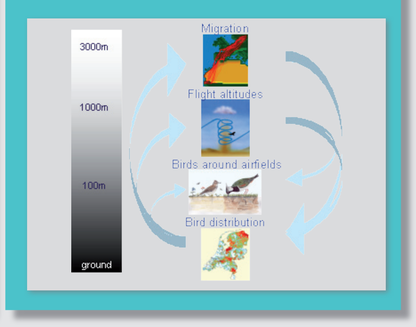
SP1.3: Medical Diagnosis and Imaging

- Develop a PSE for medical imaging applications
- Enable sharing of data and infra structure among institutions
- Applications include functional MRI, MR DTI, CTA and MEG for diagnosis, treatment planning and clinical research



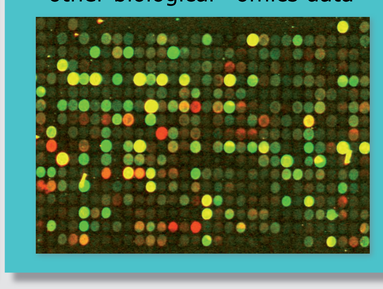
SP1.4: Biodiversity

- Develop a PSE for integrated analysis of field observations to derive spatial models of bird distributions
- EcoGrid, a national database for biodiversity information
- The Netherlands Bird Avoidance Model (NL-BAM) ***http://ecogrid.sara.nl/bambas***



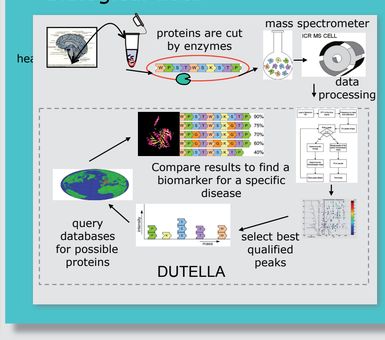
SP1.5: Bioinformatics

- Develop a PSE for integrative bioinformatics
- Biological data integration with Semantic Web tools
- Creation of physical e-BioLab for domain interaction
- Application: bioinformatics for microarray data analysis
- Application: integration with other biological –omics data



SP1.6: DUtch TELescience LAboratory

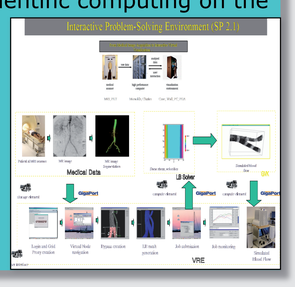
- Develop a PSE for collaborative and remote scientific (computational) experimentation
- Applications include biomarker discovery, electron tomography and molecular imaging
- Combining and disclosing various types of chemical and biological data



P2 Generic Virtual Laboratory Methodology

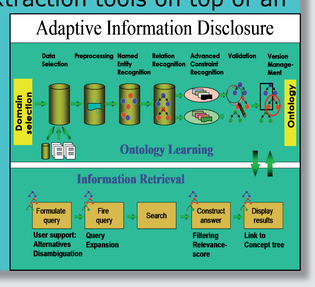
SP2.1: Interactive PSE

- Design domain-specific interactive Problem Solving Environments (PSEs) that support scientific computing on the Grid
- Support of the HPC and HTC modes of computing on a dynamically changing Grid.



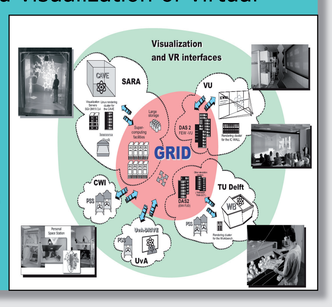
SP2.2: Adaptive Information Disclosure

- Dynamic, model-driven information and knowledge extraction tools on top of an architecture for Grid-based distributed data analysis
- Development of domain-specific semantic models



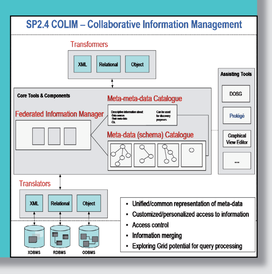
SP2.3: User Interfaces And Virtual Reality

- Grid-enabled visualization of virtual reality (VR) environments
- Novel visualization techniques for Grid applications



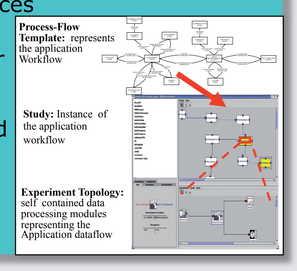
SP2.4: Collaborative Information Management

- Design of a generic collaborative information management architecture
- Exploring Grid technology for federated query processing
- automatic generation of database schema definitions based on ontology



SP2.5: VL & System Integration

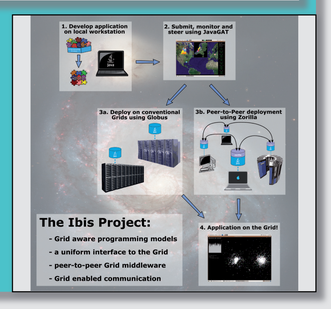
- Provide a generic framework for executing scientific experiments on grid enabled resources
- Defines the architecture for integrating generic software developed within VL-e
- Application workflow management

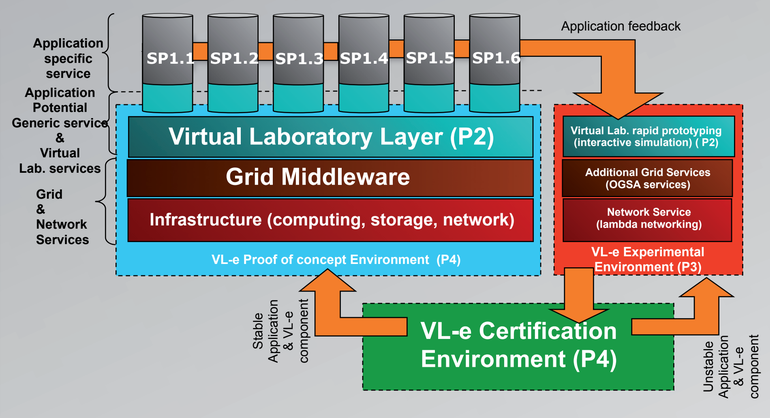


P3 Large-scale distributed systems

SP3.1: High Performance distributed Computing

- Develops for large-scale Grid:
  - a Java-centric grid programming environment (Ibis) for high performance applications ***http://www.cs.vu.nl/ibis/***
  - easy to use, highly portable and robust scheduling infra-structure (KOALA) for coallocating multiple resources ***http://www.st.ewi.tudelft.nl/koala/***





P4 Scaling up & validating in 'real-life applications'

SP4.1: Scaling up & validating in 'real-life apps'

- VL-e Certification Environment
- Development of a Proof-of-Concept (PoC):
  - Basic software for VL-e e-Science applications (SOA approach)
  - Both grid middleware and VL generic software
  - Runs on desktops and local clusters/ storage elements
  - Central Facilities: computing, storage and hosting resources

Virtual Laboratory for e-Science

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