The European GEMSS Project

Grid-enabled Medical Simulation Services

Abstract: As the Internet revolutionised access to information, the Grid will revolutionise accessibility to applications. *GEMSS* is a 2.5 year project funded by the European Commission which commenced in September 2002. It will demonstrate how Grid technologies can be used to transform healthcare and enable Europe to lead that transformation. The *GEMSS* test-bed will render accessible a multitude of medical computing and resource services in a clinical environment. It will provide access to new tools for improved diagnosis, operative planning and surgical procedures in order to create a new way for improved health care.
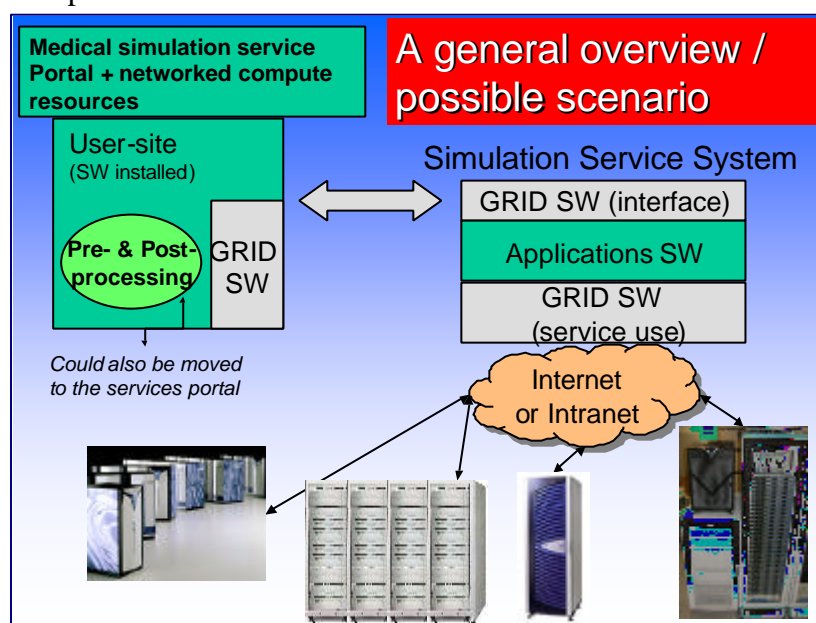

Figure 1: General Scenario for the GEMSS medical Grid test bed.

1. Main Objectives

GEMSS will create an innovative Grid middleware that can be used to provide medical practitioners and researchers with access to advanced simulation and image processing services for improved pre-operative planning and near real-time surgical support. *GEMSS* will build on top of existing Grid and Web technologies, maintaining compliance with standards thereby ensuring future extensibility and interoperability. The project will create a test-bed to evaluate & validate the *GEMSS* environment, including its integration into the end-users working environments. The test bed will provide support for sophisticated authorisation, workflow, security, error detection and recovery. Furthermore, *GEMSS* aims to anticipate privacy, security and other legal concerns by examining and incorporating into its Grid services the latest laws and EU regulations related to providing medical services over the Internet. In summary, *GEMSS* will:

- Install an extendible, interoperable and collaborative test bed for GRID-enabled medical application services.
- Demonstrate the medical significance of the GEMSS models.
- Demonstrate the functionality of the GRID-infrastructure.
- Open a business model for future commercial exploitation.

1.1   GEMSS Test Bed Applications

The *GEMSS* test-bed will include medical service applications, with varying performance and Quality of Service requirements targeting different medical sectors:
- Maxillo-facial surgery simulation: a virtual pre-operative planning space.
- Neuro-surgery support: prediction of the brain-shift during neuro-surgery.
- Radio-surgery simulation: improved treatment planning for cancer destruction.
- Inhaled drug delivery simulation: virtual drug delivery to the lung.
- Cardio-vascular system simulation: simulation of the entire cardio-vascular system for improved treatment plans and surgical procedures.
- Advanced Medical Image Reconstruction.

2.   Key Milestones

The *GEMSS* test-bed will include medical service applications, with varying performance and Quality of Service requirements, and a Grid services infrastructure. Medical science professionals will evaluate the different stages of the system:
- Initial System Design
- Prototype Grid test bed
- Final GEMSS test bed

3.   Major Innovations

GEMSS will develop an interoperable, innovative Grid middleware for medical services applications building on common Grid standards. The focus is on innovative extensions that support medical applications including security models compliant with European legal issues, fail-over and recovery from errors as well as workflow and service orchestration techniques for time-critical processes.

4.   Participants

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