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Cancer Sentinel project: a grid network for distributed medical data management on Cancer.

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The Sentinel project involves several medical actors related to cancer: screening structures, medical laboratories and both regional and national public health authorities.
The project builds upon grid technologies to create a federation of medical data sources related to cancer. The main purpose of the project is to enable secured medical data exchanges between cancer screening structures and cancer analysis (pathology) laboratories. The architecture and tools used to deploy such a network are also relevant to distributed medical images diagnosis, global health and epidemiology.

Detailed analysis

The French national programs for early cancer diagnosis (breast, colorectal, cervical) is carried by associations which are in charge of inviting a targeted population to be screened. In case of positive result, a detailed medical report is created and registered in a local database.
In principle, these reports should be transferred to the screening structure. However, due to data ownership issues, there are no electronic exchanges. The grid technology is particularly well fitted to address this issue as a grid can federate data sources and provide a secured framework where patient data are stored in the laboratory and made available in a secured way to authenticated external users.
The grid security mechanisms allow fine-grained management of rights: a data holder can allow a customer to access and query his databases. Of course, users must beforehand be registered and trusted by the virtual organization. Therefore, providers keep the complete control of their data as nothing is massively extracted from the medical structure. Moreover, the data sources are always up to date, offering new opportunities for (near) real-time data analysis.

Conclusions and Future Work

This project aims at proving the feasibility and the reliability of a grid-based surveillance network for cancer screening using grid technology developed within the EGEE and AuverGrid projects. The network infrastructure will be enlarged in a near future to host a large panel of laboratories, medical structures and public health institutes in order to perform epidemiological statistics on cancer.
The deployment of the grid network started in June 2009 and the first prototype was released in December 2009. The extension to medical images (mammography) is scheduled for 2010.

Impact

The development started in mid-2009 in collaboration with Maat-Gknowledge and a prototype was released in December. The grid network is currently deployed with a dedicated Virtual Organization and its own specific grid services. the first objective was to offer an access to electronic pathology reports for cancer screening associations.
In a second step, the national public health could access to the medical data in order to produce epidemiological statistics on cancer incidence in Auvergne and potentially nationwide if the grid is extended beyond

Auvergne.
The grid security framework has been modified to accept health-professional smartcard certificates to authenticate users on the grid.
Confidentiality and patient protection are critical to fulfill legal requirements on data privacy. The central issue consists in correctly mapping a patient identity through the network, avoiding false identification and offering a good quality of data linkage. For this purpose, a new distributed way to identify a patient using pseudonymisation techniques and data mining mechanisms is currently being tested over the network.

Keywords

Surveillance network, cancer, database federation, epidemiology, data linkage, security, smartcard

URL for further information

www.e-sentinelle.org

Justification for delivering demo and/or technical requirements (for demos)

The grid infrastructure is now operational between three main actors of cancer screening in the French Auvergne region. No special requirements: (Internet access)

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