

“Advancing Clinico-Genomic Clinical Trials on Cancer: Open Grid Services for improving Medical Knowledge Discovery”



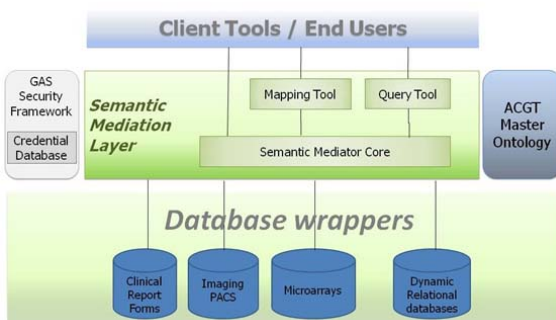
Information arising from post-genomics research, and combined genetic and clinical trials on one hand, and advances from high-performance computing and Informatics on the other is rapidly providing the medical and scientific community with new insights, answers and capabilities. The breadth and depth of information already available in the research community at large, present an enormous opportunity for improving our ability to reduce mortality from cancer, improve therapies and meet the demanding individualization of care needs. A critical set of challenges, however, currently inhibit our capacity to harvest these opportunities.

ACGT has been an Integrated Project (IP) funded in the 6th Framework Program of the European Commission under the Action Line “Integrated biomedical information for better health”.

Its high level objective has been the development of methods and systems for improved medical knowledge discovery and understanding through integration of biomedical information (e.g. using modeling, visualization, data mining and grid technologies). The over-arching objective of the ACGT project has been the provision of a unified technological infrastructure which facilitates the seamless and secure access and analysis of multi-level clinico-genomic data enriched with high-performing knowledge discovery operations and

tested and validated a range of novel technologies, including:

- a domain-specific Master Ontology (MO) on Cancer, built on established theoretical foundations and taking into account current initiatives, existing standard data representation models, and reference ontologies. The ACGT MO is meant to constitute a reference ontology for the cancer domain, and its objective is to enable semantic data integration. The ACGT Master Ontology (ACGT-MO) is implemented in OWL DL, and can be freely downloaded from <http://www.ifomis.org/acgt>.
- a biomedical grid infrastructure offering seamless mediation services for sharing data and data-processing methods and tools; a key element of this infrastructure is a Semantic Mediation (SM) layer and services providing clients with a seamless interface for integrated querying of heterogeneous data sources and standards for exposing the properties of local sources in a federated environment.
- an open source, ontology based Trial Builder and Management System (ObTiMA), supporting efficient design and execution of multicentric post-genomic clinical trials, and enabling researchers in performing cross trial analysis. In supporting the whole life cycle of a clinical trial, ObTiMA utilizes the features provided by the ACGT-MO and the ACGT-SM.
- advanced security tools including anonymisation and pseudonymisation of personal data in accordance to European legal and ethical regulations; In doing so, the project has established the Center for Data Protection (CDP) – an non-profit organization under Belgian law (<https://cdp.custodix.com/>). The CDP is a fully operational entity providing services to 3rd parties. Further exploitation of the CDP at a European level will be achieved through a follow-up project whose objective is to provide legal, ethical and security related “services” to all EU cancer related funded projects.
- a large number of bioinformatics data analysis and literature mining services in order to support

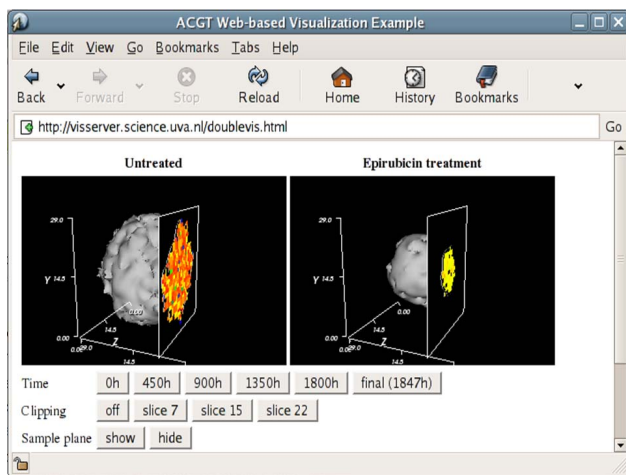


the ACGT ontology-based semantic mediation layer and its services

During the course of its life, the project has defined a detailed architectural blueprint and has developed,

and improve complex knowledge discovery processes; Service discovery and orchestration is made available via an easy to use, web-enabled workflow editor enabling efficient design and controlled sharing of discovery driven eScience workflows.

- an "Oncosimulator", a technologically advanced and user friendly system able to spatiotemporally simulate within well defined reliability limits tumour growth and tumour and normal tissue response to chemotherapy for the cases of breast cancer and nephroblastoma in the patient's individualized context and the definition of the framework for its future clinical evaluation. It may be claimed that the ACGT Oncosimulator development and initial testing has proved both a successful and a globally pioneering endeavour driving multiscale cancer modelling and *in silico* oncology towards clinical reality and practice.



The ACGT Oncosimulator, a technologically advanced environment for modeling tumor growth and response to treatment.

The technological infrastructure has been validated in a concrete setting of advanced clinical trials on cancer, specifically breast cancer (BRCA) and paediatric nephroblastoma (PN).

Although the ACGT project is officially complete, the excellent research partnerships developed during the project will continue. The vision of becoming a pan-European voluntary network connecting individuals and institutions while enabling the sharing of data and tools and thus creating a European-wide web of cancer clinical research has been well advanced. The project has developed long lasting partnerships with some of the major stakeholders in the European Cancer Research arena, including ECCO, SIOPE Europe and ECRIN.

In parallel to these developments, the primary instruments for ACGT's collaborative exploitation are well developed. The CDP has been established and is

already actively engaged in service provision. Also the STaRC Initiative has grown into maturity. STaRC is intended to be a 'Study, Trial and Research Centre' that will exploit clinically relevant aspects of ACGT. The concept behind STaRC has received significant support from patient organizations, patient support groups and some regional governments. Funding for STaRC has started with an initial grant from the local government of the Saarland, Germany. The activities for its official initiation are nearly completed, but are now scheduled to take place as part of a follow-up project.

In conclusion, the ACGT consortium has pursued a long term vision to develop open-source, semantic and grid-based technologies in support of post genomic clinical trials in cancer research. Significant progress has been achieved during the lifetime of the project, important lessons have been learned and good results were obtained. Building upon the technologies, procedures and knowledge generated by the project, several ACGT partners - jointly with important end user groups - are about to enter the second phase of implementation. This has been made possible through additional funding from the EU research programmes (both HEALTH and ICT).

The site of the ACGT Center for Data Protection

Timetable:	from 02/2006 – to 01/2010
Total cost:	16 747 206 €
EC funding:	11 800 000 €
Instrument:	Integrated Project
Project Identifier:	FP6-IST-026996

Important Links:

Project website: <http://eu-acgt.org/>

Video presentation of the project: <http://www.youtube.com/watch?v=2S9GuXbpsQM>

ICT for Health website: http://ec.europa.eu/information_society/ehealth

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