ACGT:
Open Grid Services for Improving Medical Knowledge Discovery

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http://www.eu-acgt.org

Credit slides: M. Tsiknakis, FORTH
The ultimate objective of the ACGT project is the provision of a **unified technological infrastructure** which will facilitate

- integrated access to multi-level biomedical data
- development or re-use of open source analytical tools, accompanied with the appropriate meta-data allowing their discovery and orchestration into complex workflows.

ACGT will deliver a European Biomedical GRID infrastructure offering seamless mediation services for sharing data and data-processing methods and tools, and advanced security;

ACGT

- focuses on clinical trials on Cancer (Wilms tumor, Breast) and
- is based on the principles of
  - Open access (among trusted partners)
  - Open source
- is not a standards generating exercise but a standards adopting one.
Enabling dynamic Virtual Organizations

User Applications and services layer in support of Clinical Trials

The ACGT Integration Layer, the ACGT Tools and Services

- Simulation and Visualization Tools
- Knowledge Discovery Tools
- Ontologies and mediation tools
- Basic GRID technology and security

User Data and Public Databases Layer

Distributed multilevel Biomedical Data
The ACGT Virtual Organizations

Virtual Organizations

Grid Services Infrastructure
(VO Manag., Metadata, Registry, Publishing, Query, Invocation, Security, etc.)

Analytical Services

Clinical data
Research Center

Grid-Enabled Client

Research Center

Genome Database

Protein Database

Grid Data Services

Image

Tool 1

Tool 2

Tool 3

Tool 4

Research Center

Grid Data Services

Grid Data Service

Grid Portal

Public data & tools

Tool n

Research Center

Analytical Services

Grid Data Service

Microarray

Grid Data Service
Discovery and Orchestration of Services

ACGT experiment topology

2D/3D visualization for in silico models

Microarray data processing for molecular classification of disease


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Main challenges in ACGT

- **Grid middleware** services, enabling large-scale (semantic, structural, and syntactic) interoperability among biomedical resources and services;
- Master **ontology** (on Cancer) through semantic modelling of biomedical concepts using existing ontologies and ontologies developed for the needs of the project;
- Open source bioinformatics tools and other **analytical services**;
- Semantic **annotation** and **advertisement** of biomedical resources, to allow **metadata-based discovery** and query of tools, and services;
- Orchestration of data access and analytical services into complex eScience workflows for post genomic clinical research and trials on cancer;
- **Meta-data descriptions of clinical trials** to provide adequate provenance information for future re-use, comparison, and integration of results;
The ACGT clinical trials

- Multicentric TOP trial - Breast Cancer
- SIOP 2002 - paediatric nephroblastoma
- In Silico modeling and simulation of tumor growth & response to treatment
In silico modeling and simulation

- Seeks to extract information related to tumor growth & response to treatment
- Requires
  - access to multi-level clinico-genomic data.
  - implementation of a variety of processing tools and
  - specification of complex analytical workflows
The ACGT master ontology

**Priority:** Ontology of entities involved in two carcinomas
- Nephroblastoma and Breast Carcinoma

Terms from different terminologies & ontologies are integrated together

Hierarchy and Relations of terminologies & ontologies NOT incorporated (except FMA)

Sources used as a dictionary

Deficiencies present in each source in classification and relations: improved
End user tools

An integrated visual environment

Clinical Trial Templates
- Augmented by the ACGT Master Ontology
- Graphical representation of data elements and processing steps in a clinical trial

Data mining and analytical tools
- A variety of tools and applications

Clinical trial workflows
- Graphical representation of workflows
- Processing modules attached to each other in a workflow
Tools for clinical trials life cycle management

- Administrative and Regulatory Management
- Clinical Research Management
- Financial Management
- Study Parameters Development
- Data mining and De-Identification
- Patient Enrollment
Collaborations

ACGT is planning to develop strong links with other projects/initiatives for collaboration - harmonization, in areas such as

- Grid middleware
- HealthGrid
- Biomedical data analysis
- In Silico modelling and simulation
- Biomedical Ontologies
- SOA and metadata for biomedical applications
- eScience workflows
- Translational research on cancer
The ACGT Consortium

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Thank you for your attention!

4th HealthGrid conference
6th - 9th June Valencia (Spain)

http://valencia2006.healthgrid.org