IT Future of Medicine

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FFG Lounge
FET Flagship Initiatives

Rationale

Data-rich, individualised medicine poses unprecedented challenges for ICT, in hardware, software solutions.

We propose a data-driven, individualised medicine of the future, based on molecular/physiological/anatomical/environment data from individual patients.

We shall make general models of human pathways, tissues, diseases and ultimately of the human as a whole.

Individualised versions of the models, produced for each patient, will then be used to identify personalised prevention/therapy schedules and side effects of drugs.

Needs

- World wide ~12 million new cancer cases/year
- Cure rates for most common forms of cancer have hardly changed over the last decades
- Even the most advanced targeted therapies are typically only effective for a small fraction of the patients
- Pharma development costs have dramatically increased, while the number of new drugs keeps dropping

Market

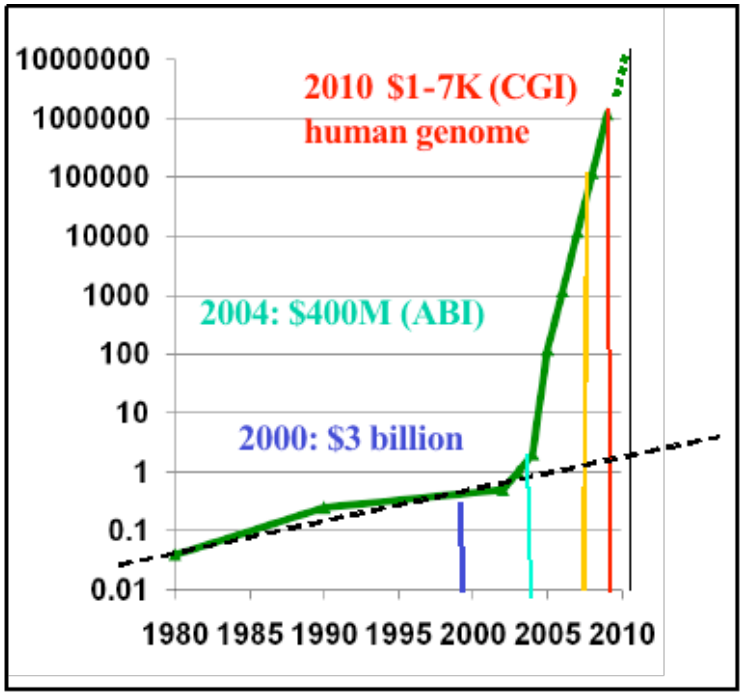
Press Release Source: PwC On Wednesday December 8, 2010, 3:06 pm EST

"NEW YORK, Dec. 8, 2010 /PRNewswire/ -- **Spending on healthcare** among the **OECD** (i) countries and **BRIC** nations of Brazil, Russia, India and China will grow by 51 percent **between 2010 and 2020**, amounting to a **cumulative total of more than $71 trillion**, according to estimates from PwC's Health Research Institute. Health spending in these areas is rising faster than gross domestic product, magnifying gaps in budget deficits and spurring governments to look to the private sector for ways to get a better value for taxpayers' money."

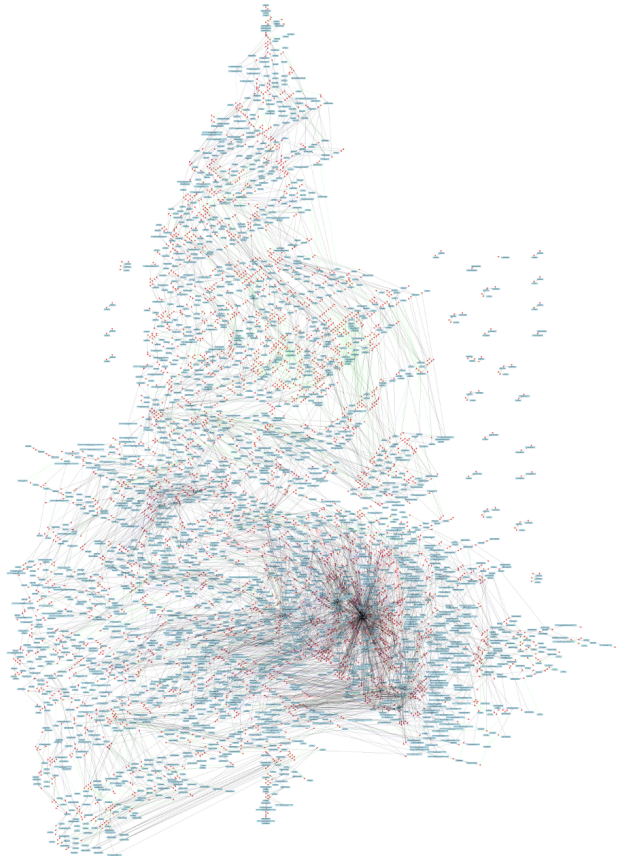
The Future of Genomic Data

Factors of 10 since 2005 for genomics

Moore's law 1.5x/yr for electronics



Make out of Data Models



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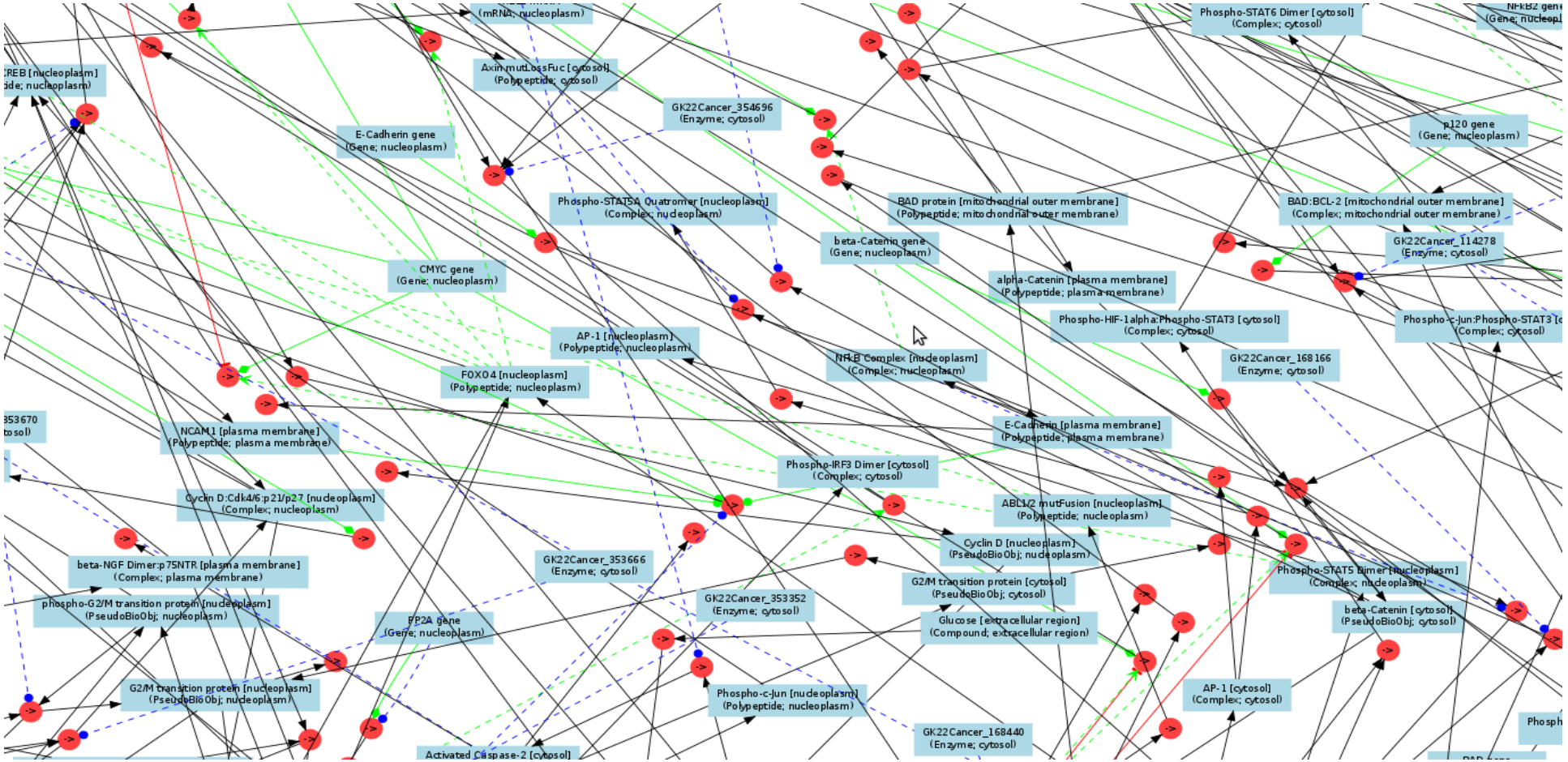

Flagship Goals

Years 1-5

Establishment of integrated molecular/anatomical prototype models of man, development of IT techniques to individualise these models based on high throughput data sources

Years 5-10

Development of infrastructure for model-based individualized medicine.

Interaction with relevant stakeholders/governments/ healthcare and insurance systems to implement this approach throughout the healthcare system

24 Partners

- Max Plank Institut for Molecular Genetics
- Medical University Graz
- University College London
- Free University of Amsterdam
- University of Manchester
- Maastricht University
- EMBL
- Wellcome Trust Sanger Institute
- Kungliga Tekniska högskolan
- Imperial College London
- CIRMMP
- International Prevention Research Institute
- Uppsala University
- University of Luxembourg
- University of Leicester
- HARVARD Medical School
- University of Auckland
- Universite de Geneve
- Centro Nacional De Análisis Genómico
- Siemens
- Alacris Theranostics GmbH
- Charite Universitätsmedizin Berlin
- Illumina
- Commissariat a l'energie atomique et aux energies alternatives

Structure

4 (Super) Workpackes

- Medical Platform
- Analytical Platform
- Information Technology platform
- Integration Platform

Objectives

To perform the planning for a flagship by addressing the following key issues:

- Identify lacking information components (examples of information components are: transcriptome, metabolome)
- For each information component determine the interface with the central system (web services)
- Categorize the various types of ontologies, data models and systems biology models, define their data types and make them congruent with the experimental information components to achieve semantic interoperability
- Define IT infrastructure requirements, build and test demonstrators based on the existing infrastructures
- Find modalities for the highly important ethical and public health ramifications
- Formulate the follow-up project where the IT will be brought into place

ICT Industry Involvement

Microsoft Research COSBI (Prof. Priami)
Computational tools for large scale Systems Biology

Xerox (Machine Learning Research Group Dr. Cedric Archambeau)
New machine learning and mechanism

IBM Research Zurich (Dr. Alessandro Curioni)
Integration of large scale legacy systems with novel system architectures

Intel Germany (Andrea Cato)
Future generation processor architectures - beyond vectorised GPU

Amazon.com
Multi-Peta Scale Data Storage and retrieval

Siemens
Biomedical Solutions and Bioinformatics

Oracle
Future Databases

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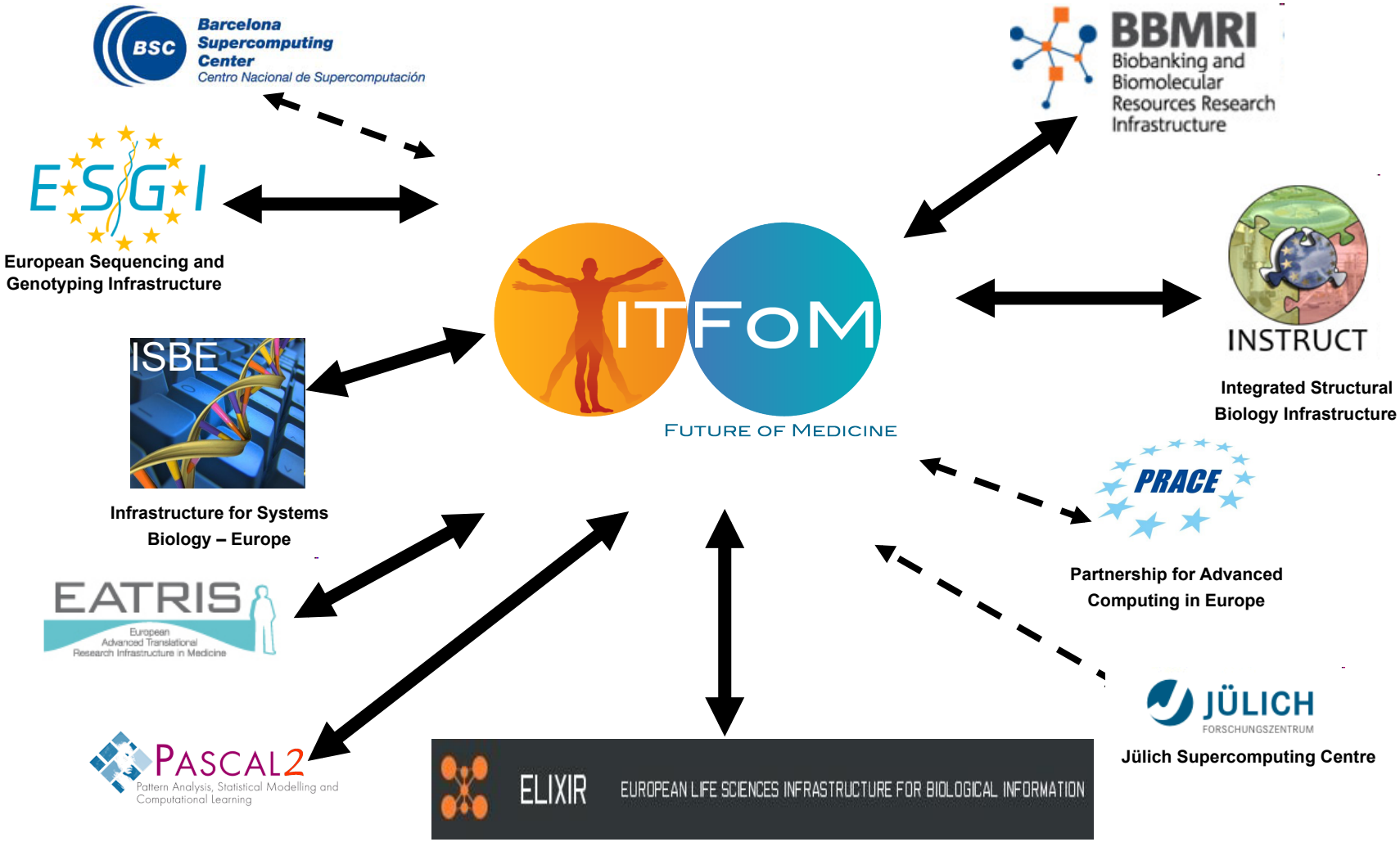
Relations to Infrastructures



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IT-FoM will transform the future of medicine from a *guess & pray* mind-set to *predict & test* strategies.

http://www.itfom.eu/

Danke für Ihre Aufmerksamkeit

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