The economic and business cases for HealthGrid solutions

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Introduction

- **A study on business cases and sustainability of HealthGrid projects**

- **A satellite study to the *MediGRID* project**

- **Commissioned by Telematikplattform für Medizinische Forschungsnetze (TMF), Berlin, Germany**

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Economic and business models

- **An economic perspective includes:**
  - **all stakeholders**
  - **tangible and intangible cost and benefits**
  - **financial and non-financial items**
- **A business case is concerned with:**
  - **one, or a small number of organisations**
  - **<u>financial impact</u> <u>for that organisation</u>**
  - **strategic behaviour – the competition game**
  - **legal issues**

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Defining "Grids"

- **"A <u>Computational Grid</u> is a hardware and software infrastructure that provides dependable, consistent, pervasive, and inexpensive access to high-end computational capabilities"**
  (Foster und Kesselman 1998, in: "The Grid: Blueprint for a New Computing Infrastructure").

- **<u>Data Grids</u> enable control, management, and seamless access to disparate data sources.**

- **Computational Grids and Data Grids can be put under the umbrella of <u>Resource Grids</u>.**

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Defining "HealthGrids"

- **"A HealthGrid should be an environment where <u>data of medical interest can be stored, processed and made easily available</u>."**

- **The following application fields are most likely to benefit form using grids:**
  - **"medical imaging and image processing;**
  - **modelling the human body for therapy planning;**
  - **pharmaceutical research and development;**
  - **epidemiological studies; and**
  - **genomic research and treatment development."**

(http://eu-share.org/fileadmin/templates/Document/SHARE-D3.1_Final-1.pdf)

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The HealthGrid vision

Computing Grid
For data crunching applications

An environment, created through the sharing of resources,
in which *heterogeneous and dispersed health data* :

– molecular data (ex. genomics, proteomics)
– cellular data (ex. pathways)
– tissue data (ex. cancer types, wound healing)
– personal data (ex. EHR)
– population (ex. epidemiology)

as well as applications, can be accessed by all users as an tailored
information providing system according to their authorisation

Data Grid
**Distributed and optimized storage
of large amounts of accessible
data**

Knowledge Grid
**Intelligent use of Data Grid for
knowledge creation and tools
provisions to all users**

Development status of HealthGrids

- **Most applications are using Grids for computing**

- **Very few *Data Grid* applications**

- **No *Knowledge Grid* operational yet**

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Case study: WISDOM

- **Wide In Silico Docking On Malaria (WISDOM)**

- **An initiative for using computing grids for drug discovery**

  - **Targeting neglected and emerging diseases**

- **No business intentions at the start in 2005**

- **Initial success paved the way to sustainability**

- **Current plans for commercialising a service based on HealthGrids**

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WISDOM's Data Challenges

Data Challenge 1

- **Wide in silico docking on <u>Malaria</u>**
- **2005**
- **1 Target – a protein responsible for malaria**
- **500,000 molecules tested**
- **best 25 identified for in vitro tests**
- **1 molecule currently in the next stage of drug development**

Data Challenge 2

- **High throughput virtual screening against <u>Avian Flu</u>**
- **2006 / 2007**
- **8 Targets – H5 N1**
- **300,000 molecules tested**
- **best 123 in-vitro tested**
- **7 active inhibitors found**

Data Challenge 3

- **Second wide in silico docking on <u>Malaria</u>**
- **2006 / 2007**
- **4 Targets – proteins responsible for malaria**
- **4,000,000 molecules tested**
- **analysis ongoing**

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The economic case for WISDOM: estimated costs and benefits
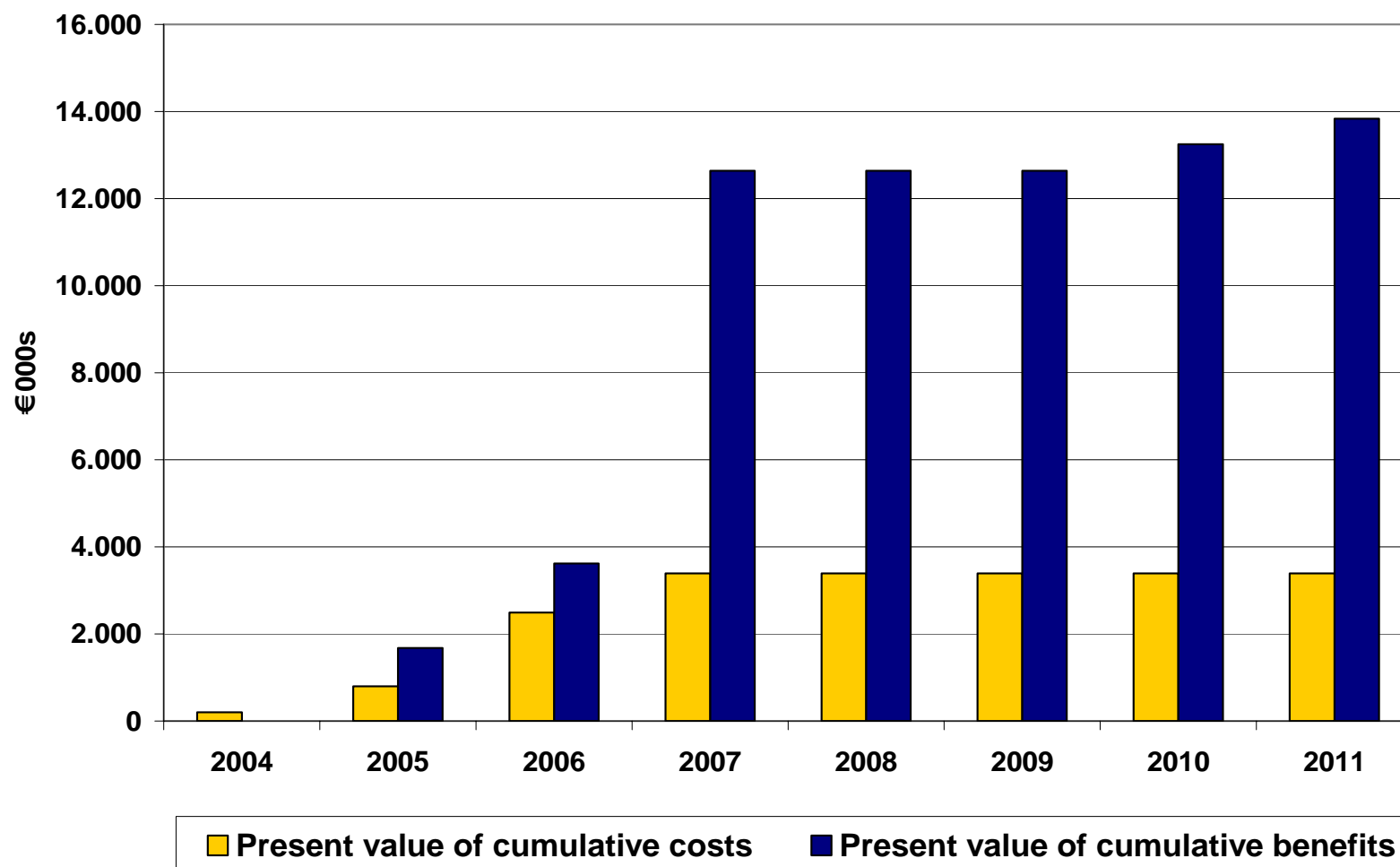
Preliminary data

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In search of a business case: benefits

- **Reducing time for testing** the impact of chemical compounds on a target protein vital to a disease

- **Using existing resources instead of carrying significant set-up costs for computing power**

- **Enabling focused in-vitro testing, with a higher probability of success (rate of active molecules)**

- **The cost of achieving the same stage of drug discovery with the same rate of active molecules without computing is prohibitive**

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In search of a business case: structure

- **Service:**
  - **preparing "targets" – proteins vital to a disease**
  - **testing the impact of a large number of chemical compounds on the target**
  - **providing a small number of promising compounds for further testing**

- **Customers:**
  - **academic labs**
  - **SMEs researching targets**
  - **Pharma industry (?)**

Problems with deploying HealthGrids

- **Data security**

- **Intellectual property rights and patents**

- **Sensitivity of data**

- **Interoperability – technical and semantic**

- **Ontologies**

- **Sustainability**

  - **Economic versus business cases**

  - **R&D versus routine use – what does it mean for the users**

  - **Management – culture, attitude, priorities…**

Thank you for your attention

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