Health Informatics
Research and Development in Europe

Sofie Nørager

European Commission
Information Society Technologies Program
Systems and Services for the Citizen: Applications relating to health
HEALTH TELER MATICS R&D ACTIVITIES

PAST 10 years (1991-2002)
“INFORMATION Technology for HealthCare”


FP2
Computers for Doctors
Budget 20M €
Projects 30
Results Feasibility Study

FP3
Networks for HealthCare Professionals
Budget 100M €
Projects 63
Results

FP4
User Needs Approach
Budget 140M €
Projects 158
Results AIM Community

FP5
Societal Demands
Budget 200M €
Projects 125
Results 1st batch of Products

EU Health Telematics Industry

FUTURE 10 years (2003-2014)
“KNOWLEDGE Technology for Health”


Regional - National Plans

DG SANCO supports: Public Health Policy

DG REGIO, RELEX, EMP, ENT... supports

Others

IMPLEMENTATION

1. E-Molecule: Bioinformatics
2. E-cell/tissue: neuroinformatics
3. E-Individual: Medical Informatics

RESEARCH

DG RTD
Towards wider implementation of EHCR systems

1. Organizational, cultural
2. National / regional strategies
3. Industrial issues
4. Legal - confidentiality and security of data
5. Technology and standards
6. User acceptance
Vision: Person-Centered Health systems

- Hospital
- Doctor
- Pharmacy
- Dietetics
- Archives
- Medical documentation
- Patient admission
- Laboratories
Examples of Ambient Intelligence

For citizens:

• Intelligent diagnosis and communications with telemedicine center
• Monitor citizens at risk: ex. diabetes, asthma, etc.

For Patients:

• Portable communication system for patients at home.
  – Integrated intelligent diagnosis (auto learning /auto adaptation)
  – Wireless communication with GP and hospital

For Health Professionals:

• Interactive computer assisted environment for decision support, prevention, diagnosis, therapy, research
6th Framework Programme 2002-2006

• Integrating Research
  (thematic priorities and international cooperation)

• Structuring the ERA

• Strengthening the foundations of the ERA

• Research and training in the nuclear field
## 6th Framework Programme 2002-2006

### INTEGRATING EUROPEAN RESEARCH

#### Priority thematic areas

<table>
<thead>
<tr>
<th>Area</th>
<th>Million Euros</th>
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<tbody>
<tr>
<td>Genomics and biotechnology for health</td>
<td>2 200</td>
</tr>
<tr>
<td>Information society technologies</td>
<td>3 600</td>
</tr>
<tr>
<td>Nanotechnologies, nanosciences, etc.</td>
<td>1 300</td>
</tr>
<tr>
<td>Aeronautics and space</td>
<td>1 075</td>
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<tr>
<td>Food quality and safety</td>
<td>685</td>
</tr>
<tr>
<td>Sustainable development, global change and ecosystems</td>
<td>2 120</td>
</tr>
<tr>
<td>Citizens and governance</td>
<td>225</td>
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</tbody>
</table>

#### Specific activities covering a wider field of research

<table>
<thead>
<tr>
<th>Activities</th>
<th>Million Euros</th>
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<tbody>
<tr>
<td>Direct activities of the Joint Research Centre</td>
<td>760</td>
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6th Framework Programme 2002-2006

→ NEW INSTRUMENTS

• **Networks of excellence**

  Networking of centres of excellence located in different countries with the aim of federating and integrating research on well defined subjects in the medium and long term.

• **Integrated projects**

  Involving an critical mass of scientific and industrial partners with the focus on significant applications in terms of products, processes or services.

• **EU participation in jointly implemented national programmes**

  (Treaty, Article 169)
6th Framework Programme 2002-2006

THE INTERNATIONAL DIMENSION

• Participation of “third countries” in priority areas
• Specific actions (support of external relations and development aid)

THE REGIONAL DIMENSION

• General activities
  – Support of technological dynamics at regional level
  – Less developed regions: possible support from Structural Funds
• Via “research and innovation”
  – Encouragement of trans-regional cooperation
• Via networks of excellence
  – Integration of research capacities of European regions
• Via “human resources and mobility”
  – Financial participation in regional programmes supporting mobility
6th FP - Ambient Intelligence Technologies for Individualized Health care

• Technical and Semantic interoperability - easy navigation in the health infostructure through multidisciplinary databases of data on molecular, cell, human and population levels.

• Intelligent tools - knowledge representation and management, modeling, simulation, visualization

• Intelligent and communicating biosensors - including microsystems, nanotechnologies, Biochips
Example 1 - Biomedical informatics

1. Medical Informatics
   - Electronic Health Records
   - Medical Imaging
   - Clinical Decision Support
   - Telemedicine

2. Bio Informatics
   - Functional Genomics
   - Proteomics
   - Techniques
   - Computational Biology

3. Neuro Informatics
   - Neuro Algorithms
   - Human Computer Interfaces
   - Machine Learning
   - Knowledge Discovery

"Health Knowledge Science"
Molecular Medicine & Individualised Healthcare

Pharmacogenetics, DNA arrays, proteomics, SNPs, genetic diag.

- **MOLECULAR MEDICINE**
  
  Effort in explaining life and disease in terms of the presence and regulation of molecular entities

- **INDIVIDUALISED HEALTHCARE**
  
  Application of genomics to identify individual predispositions to disease and to design therapies adapted to the genetic profiles of patients and that could be prescribed with guarantee of security and efficiency

*Dr. Fernando Martin-Sanchez*
Example 2 - Wearable systems for Healthcare

- Continuity of care
- Health conscious citizen
- Needs of patient for better care
- Managed care, limited healthcare budgets
- Healthcare quality control and improvement
- Societal changes e.g. lifestyle, ageing, chronic diseases
- Current shift paradigms
  - From portable to wearable
  - From monitoring and treating to preventing
  - From low-cost to ultra-low-cost
Main future activities

- **Requirements**
  - Sensor
  - electronic
  - Power source

- **Design**
  - Sensor (bioelectrodes, piezoelectric, piezoresistive, thermoelectric)
  - Electronic
  - Power source

- **Materials**
  - realization of sensing fabrics with electroactive polymers
  - electronic
  - electrode and track
  - power source

- **Device fabrication, evaluation, integration, operation, evaluation.**
Example 3 - Health-Grid

- Application of the existing GRID technology from other areas to Health for both computing intensive applications and knowledge discovery.

- Development of new middleware and new applications required to meet specific request from the Health domain. (Ex. Security, heterogeneity of data …) .

- Development of and/or agreement on standards
Possible Health-Grid Applications

• E-molecule
  Molecular biology databases - knowledge discovery
  Molecular Medicine (e-Pharmacology)

• E-cell
  Pathway simulations, virtual cell - computing power

• E-individual
  Medical imaging
  Combination of genetic and clinical data

• E-population
  Environmental Influences
INDIVIDUALISED HEALTHCARE
MOLECULAR MEDICINE

Public Health
Patient
Tissue, organ
Cell
Molecule

Patient related data

HEALTH-GRID

Association
Modelling
Computation

Databases

Public Health
Patient
Tissue, organ
Cell
Molecule

Computational recommandation
Information

• General information
  http://europa.eu.int

• General information on research
  http://europa.eu.int/comm/research

• Information about research programmes
  http://www.cordis.lu

• Information requests
  research@cec.eu.int

• Specific Sites:
  www.cordis.lu/ka1/health/home.html