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The future of eHealth research

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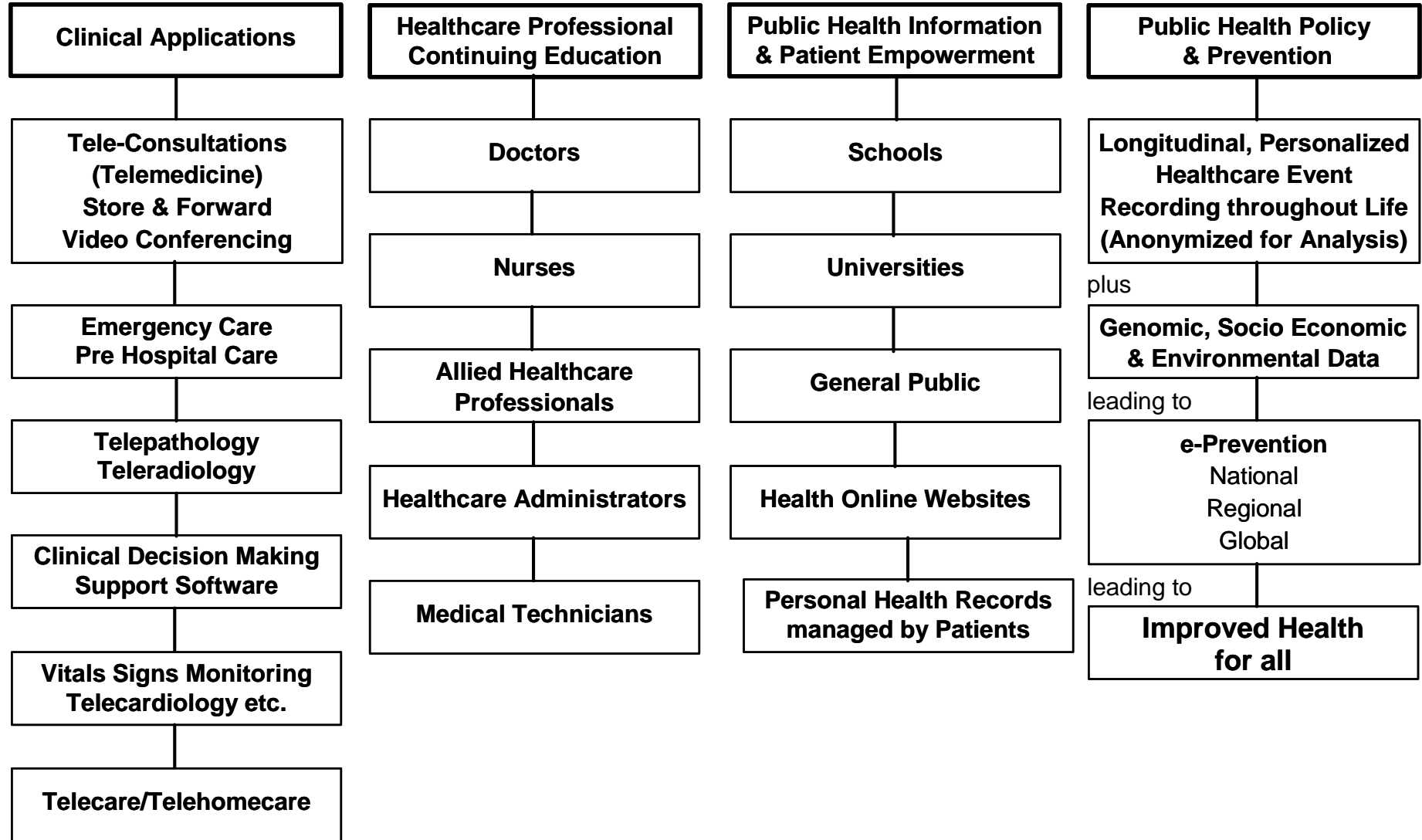European Commission

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Outline

- **Setting the context**
  - A few important facts
  - EU policy and EU Research objectives
  - Illustrated objectives
- **Foresight on eHealth in an ageing society**
  - A global SWOT
  - Dynamics of innovation in eHealth
  - Research challenges
- **A few open questions in the NMS context**

eHealth encompasses (or has an effect on)

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Clinical Applications	Healthcare Professional Continuing Education	Public Health Information & Patient Empowerment	Public Health Policy & Prevention
Tele-Consultations (Telemedicine) Store & Forward Video Conferencing	Doctors	Schools	Longitudinal, Personalized Healthcare Event Recording throughout Life (Anonymized for Analysis)
Emergency Care Pre Hospital Care	Nurses	Universities	*plus* Genomic, Socio Economic & Environmental Data
Telepathology Teleradiology	Allied Healthcare Professionals	General Public	*leading to* e-Prevention National Regional Global
Clinical Decision Making Support Software	Healthcare Administrators	Health Online Websites	*leading to* Improved Health for all
Vitals Signs Monitoring Telecardiology etc.	Medical Technicians	Personal Health Records managed by Patients	
Telecare/Telehomecare			

(**Source: EHTEL, position paper**)

A few facts about eHealth

- Becoming **3rd industrial pillar** of health sector in EU (**€11 bn in 2004 → €50 bn in 2010)**

- Up to **5%** of the total health budget (~2010 in EU25)

- Sector **regulated, fragmented,** little competition and conservative tendencies, many **SMEs**

- eHealth → networked, citizen-centred health → needs strong policy and technology base + regulatory supporting actions

- User communities/lobbies (vs. unorganised number of suppliers)

- Main drivers: **efficiency,** potential **saving** and **improvement** in patient health (e.g. by reducing **medical errors**)

- Huge **external impact** of the **infrastructure**

  Additional dimensions are: Nature of the health area, geographical (**regionalised** HCS), **public/private** delivery and financing, Member States organise healthcare systems (no EU's role in Article152)
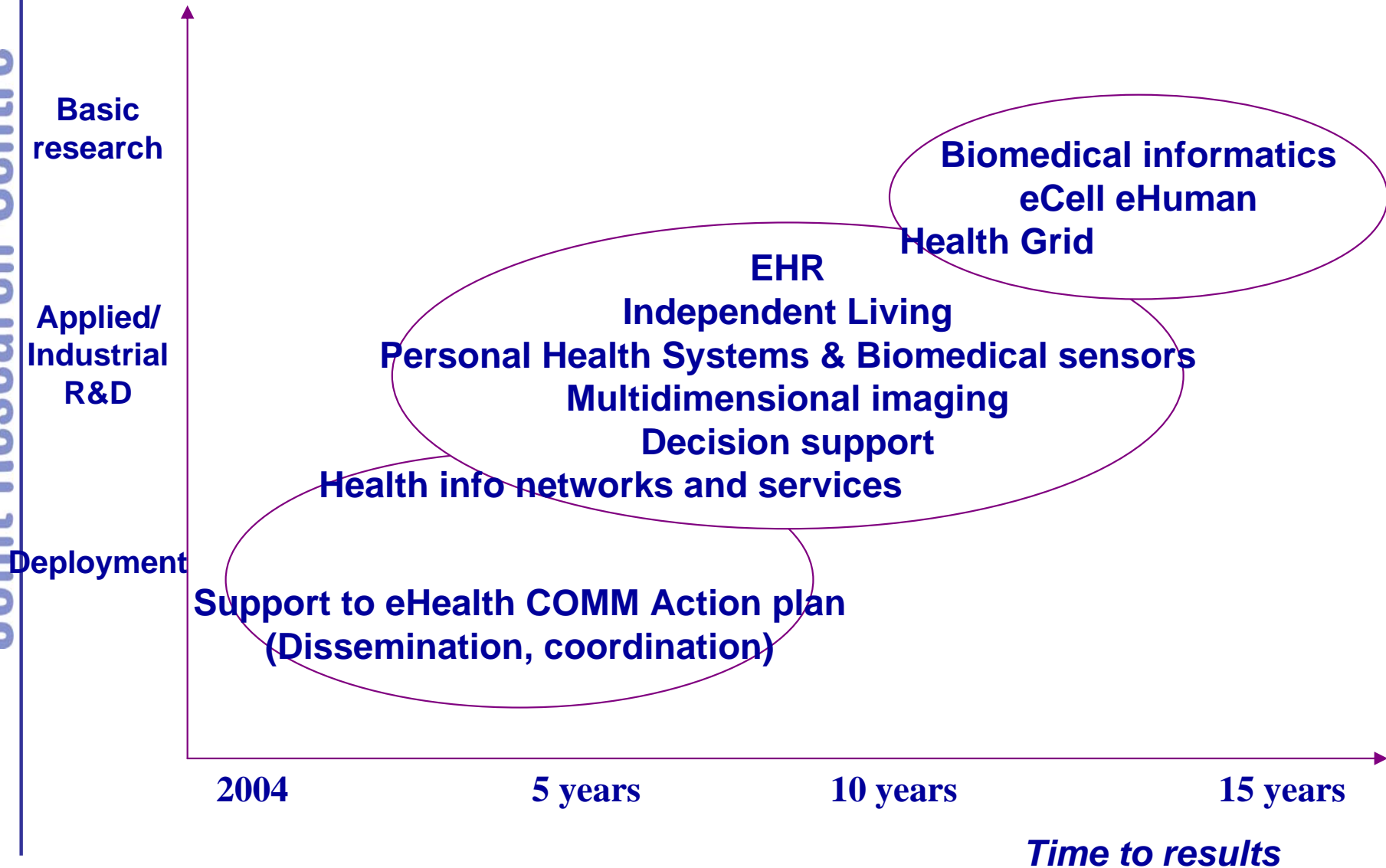
(Source: Deloitte & Touche study, commissioned by the EC)

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EU Policy in eHealth

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- **3 key EU policy objectives: European eHealth area**, **free patient mobility** and **empowerment of citizens**

- Many policy reflections and activities at the European level:

  - Health Telematics Working Group of the High Level Committee on Health
  - Follow-up to the high level reflection process on patient mobility
  - **Action Plan for a European eHealth Area**
  - Update of the eEurope Action Plan (**i2010**)
  - **Public Health** Action Programme
  - High Level Group on health services and medical care to facilitate Member States' cooperation between health systems
  - Implementation and deployment plans or roadmaps (incl. EHR, communication infrastructures, standardisation, security and privacy, research, national and international collaboration) in other Member States

- IST EC policy: **Research, Regulation and Benchmarking**
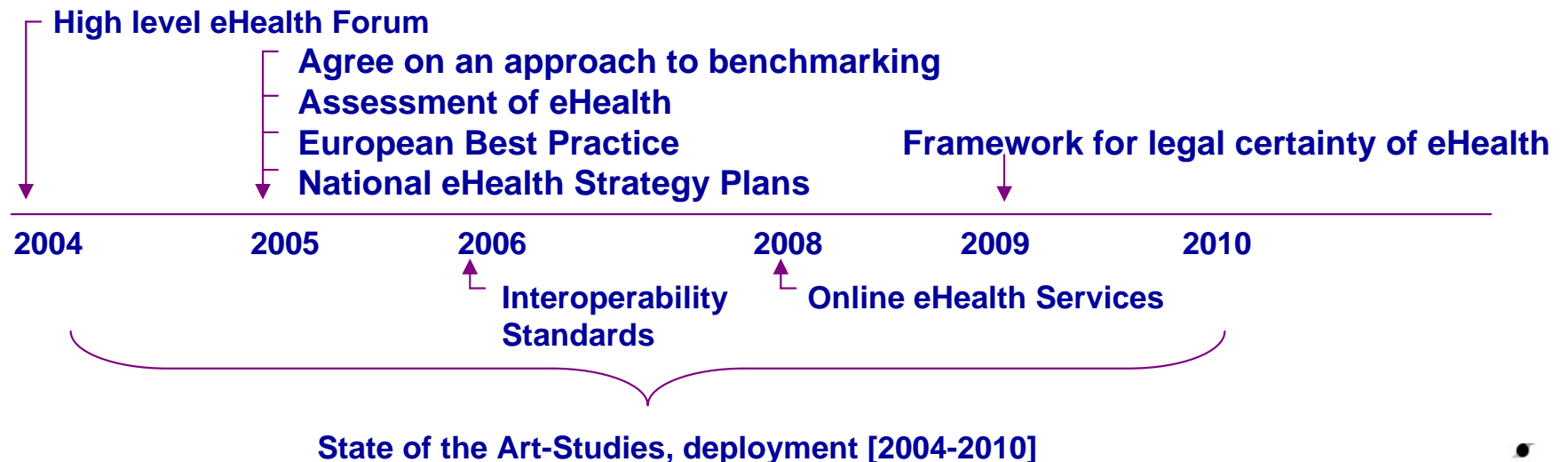
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European eHealth research objectives

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Basic research

Applied/ Industrial R&D

Deployment

**Biomedical informatics
eCell eHuman
Health Grid**

**EHR
Independent Living
Personal Health Systems & Biomedical sensors
Multidimensional imaging
Decision support
Health info networks and services**

**Support to eHealth COMM Action plan
(Dissemination, coordination)**

2004   5 years   10 years   15 years

Time to results

European eHealth Area – An Action Plan
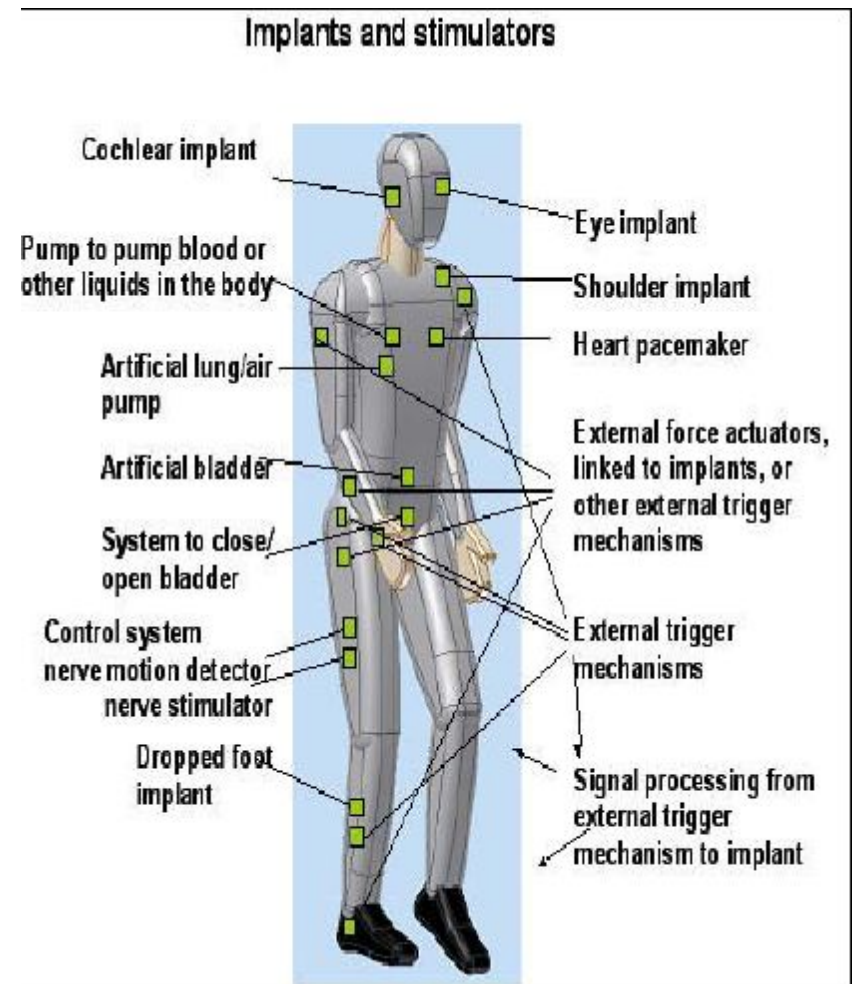## (Communication COM (2004) 356)

- **Approved by Commission, 30 April, 2004, led by DG INFSO**

- **Enabling a move towards a European eHealth Area:**

  - **Addressing common challenges**
  - **Pilots actions: Accelerating beneficial implementation**
  - **Working together and monitoring practices**

- **Timeline**

High level eHealth Forum

Agree on an approach to benchmarking
Assessment of eHealth
European Best Practice   Framework for legal certainty of eHealth
National eHealth Strategy Plans

| 2004 | 2005 | 2006 | 2008 | 2009 | 2010 |

Interoperability
Standards

Online eHealth Services

State of the Art-Studies, deployment [2004-2010]

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Independent Living Services & Telecare

- ## Smart homes
  - iDTV (acceptance), Internet on many novel home developments. LAN wireless technologies. Autoreminders. Modularity.

- ## Location services
  - All European citizens carrying some kind of personal device. Assistive technology can be embedded (e.g. track whereabouts Alzheimer, vital personal data). Problem: mobile devices getting smaller and smaller

- ## Monitoring technologies
  - Investments in research. Promising pattern/gesture/voice AI-based technologies. Evident ethical problems (big brother effects).
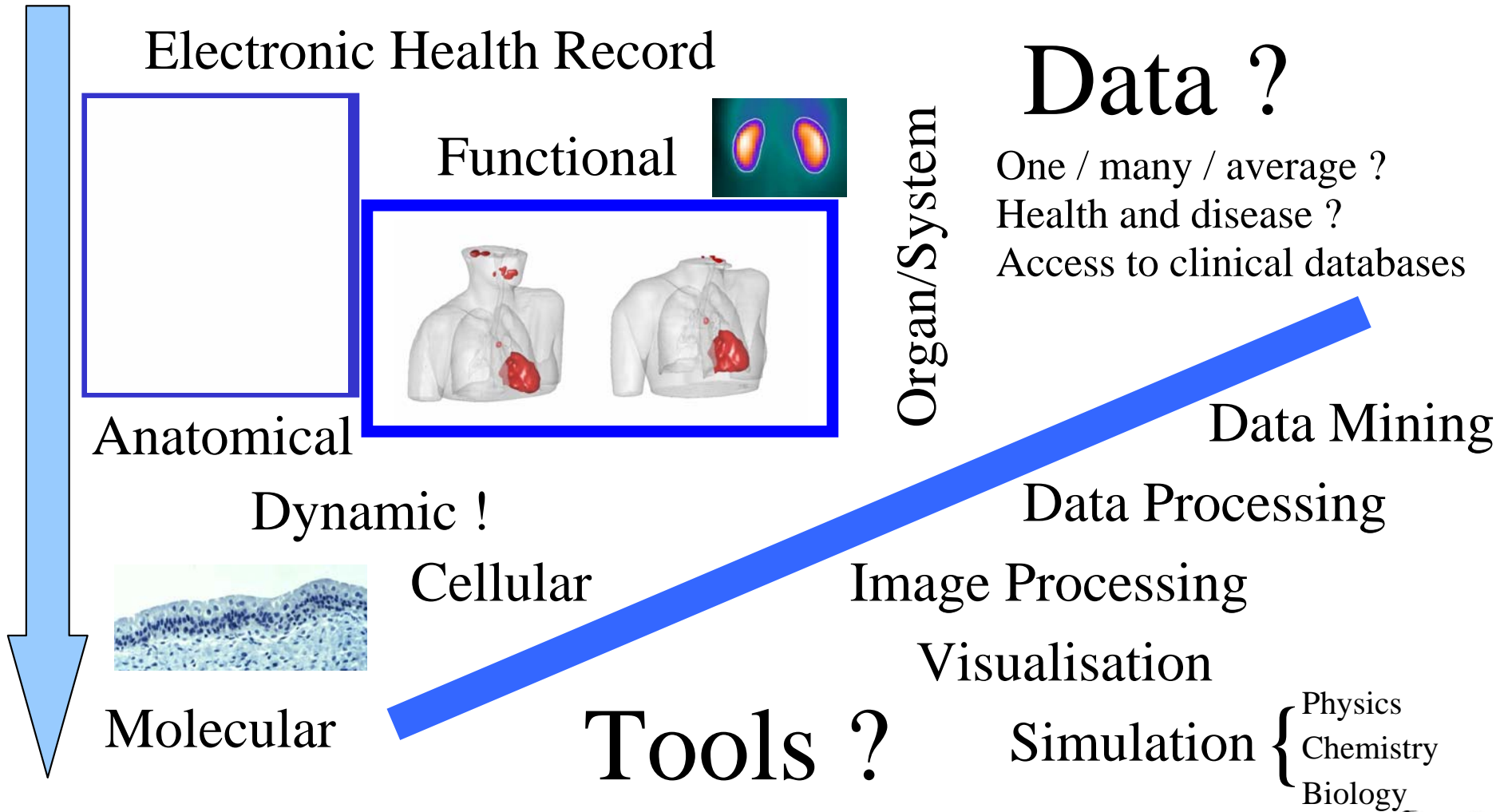

Implants and stimulators

Cochlear implant
Eye implant
Shoulder implant
Pump to pump blood or other liquids in the body
Heart pacemaker
Artificial lung/air pump
Artificial bladder
External force actuators, linked to implants, or other external trigger mechanisms
System to close/ open bladder
Control system nerve motion detector nerve stimulator
External trigger mechanisms
Dropped foot implant
Signal processing from external trigger mechanism to implant

A new generation of wearables and implants

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The '*Virtual Physiological Human*': To be European … or not to be

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Electronic Health Record

Functional

Anatomical

Organ/System

Data ?

One / many / average ?
Health and disease ?
Access to clinical databases

Data Mining

Dynamic !

Cellular

Data Processing

Image Processing

Visualisation

Molecular

Tools ?

Simulation $\left\{ \begin{array}{l} \text{Physics} \\ \text{Chemistry} \\ \text{Biology} \end{array} \right.$

EC workshop 'Towards the *Virtual Physiological Human*' Barcelona, June 2005, Dr. Hose

Not surprisingly, eHealth is a foresighted priority in the Ageing Society

- Where big changes in the present health care model expected, due to:

  - Systemic ICT introduction and emerging technological paradigms (**AmI**, Ubicomp…)

  - 'Endemic' **pressures** (budget, increasing costs of medical technologies…) and new challenges (**ageing**)

  - **Paradigm shifts** (towards prevention, health mgt, multi-casual thinking of human health, Evidence Based Medicine (EBM), …)

  - Increasing citizens' expectations (longer life expectancy, better quality of life by **safer independent living**, self-empowerment in the IS, …)

Deserving many SWOT analysis…

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TECHNOLOGICAL **S**trengths and **power**	eHealth as a **disruptive** innovation
SYSTEMIC **W**eaknesses and **barriers**	eHealth requires **coordinated European healthcare**. Systems change
SOCIO-ECONOMIC **O**pportunities **and options**	eHealth as fundamental engine of economic and social progress towards the Lisbon goals
ORGANISATIONAL **T**hreats and **challenges**	Differences in equal diffusion and use of eHealth

➔ **Policies are not 'one size fits all'** ➔ **Platform thinking is required**

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… with a particular dynamics of innovation …

**Service orientation: holistic approach**
Stressing the **service / public good / wellbeing /humanistic / time** dimensions
Training of different stakeholders
Rebound effects of improved health
From cost-increasing to **cost-benefit thinking**
New business models needed / **reimbursement** as a bottleneck

Tech / Systemic

Knowledge Based *'Health-fare'*

Non Tech / Holistic

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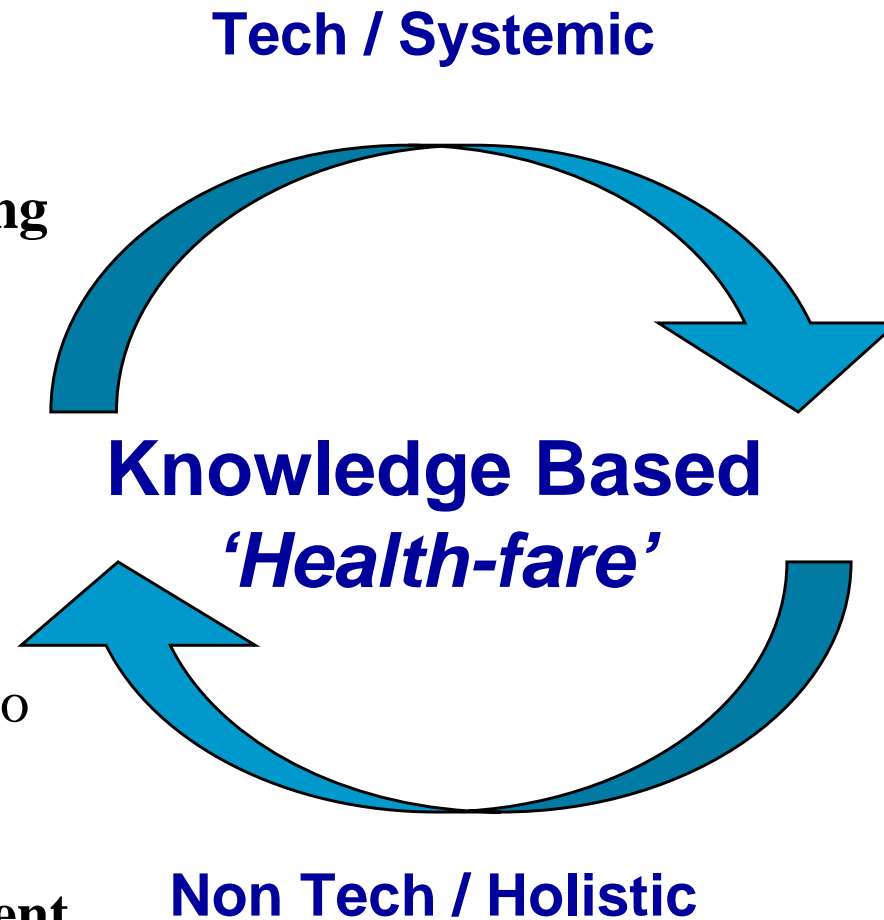
… and presenting a huge range of research challenges

Non Technological

➔ **For the Healthcare systems Paradigm Shifts**, Changing Role of **Professionals**, **Assess**ment, **Eval**uation, **Benchmark**ing and **Accredit**ation, Involvement of the **citizen, ownership** of the Electronic Healthcare Records

➔ **Political Different levels of decision making**. The European EHR → Synchronisation of European healthcare systems (mobility of patients and professionals). **Precautionary Principle** for novel eHealth applications

➔ **Economic** Integrating **'benefit'** aspects difficult (e.g. rebound effects)

➔ **Social** Promoting **Behaviour Changes** and **Prevention**, respect of **Privacy**, **Informed consent.**

Technological

➔ **Bio-Medicals Implants Bioinformatics, DNA / protein sensors, self-powered micro and nano-systems**

➔ **Standards and Interoperability** (e.g. **semantic**) but particular needs (e.g. transmission of uncompressed large sized images in Telemedicine)

➔ **Trust & Security, Interfaces IMS, PETs, models** to exploit **research potential** while respecting privacy. **Multimodal, Context awareness, Vocal**

➔ **Knowledge Management, Modelling & Simulation of Complex Systems Knowledge lost. Medical errors** *('primum non nocere')*. **Data entry**. The **Virtual Patient.**

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eHealth in NMS:
A few open questions

- Although progressing, few countries have a strategic policy. Low priority? Potential benefits well perceived?

- How crucial for development is to (over)invest in eHealth infrastructure?
    - (e.g. Broadband between hospitals, EHR)

- eHealth Market opportunities: some trans-border e-services, unbalanced number of clinicians EU15-NMS. How sustainable is this?

- Ageing phenomenon driving EU15 eHealth developments (e.g. i2010, *Ambient Assisted Living…*), but delayed in the NMS. Major priority in old EU15 leading to telecare and telemedicine services development. But telecare and telemedicine is not for older people only!

Thanks!

Reports at http://fiste.jrc.es/ehealth

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