

**ICT WP 2009-10**  
**Challenge 5**  
-  
**Strategic Objectives 5.3:**  
**“Virtual Physiological Human”**

**Joël Bacquet**

**ICT for Health**  
**DG Information Society & Media**  
**European Commission**



# Strategic Research directions in Challenge 5

**Overall € 340 M over 4 years (2007-2010)**

**– Personalisation of Healthcare**

- Personal Health Systems (PHS)

€ 72 M in 2007 - € 63 M in 2009

**– Patient safety (PS) - avoiding medical errors**

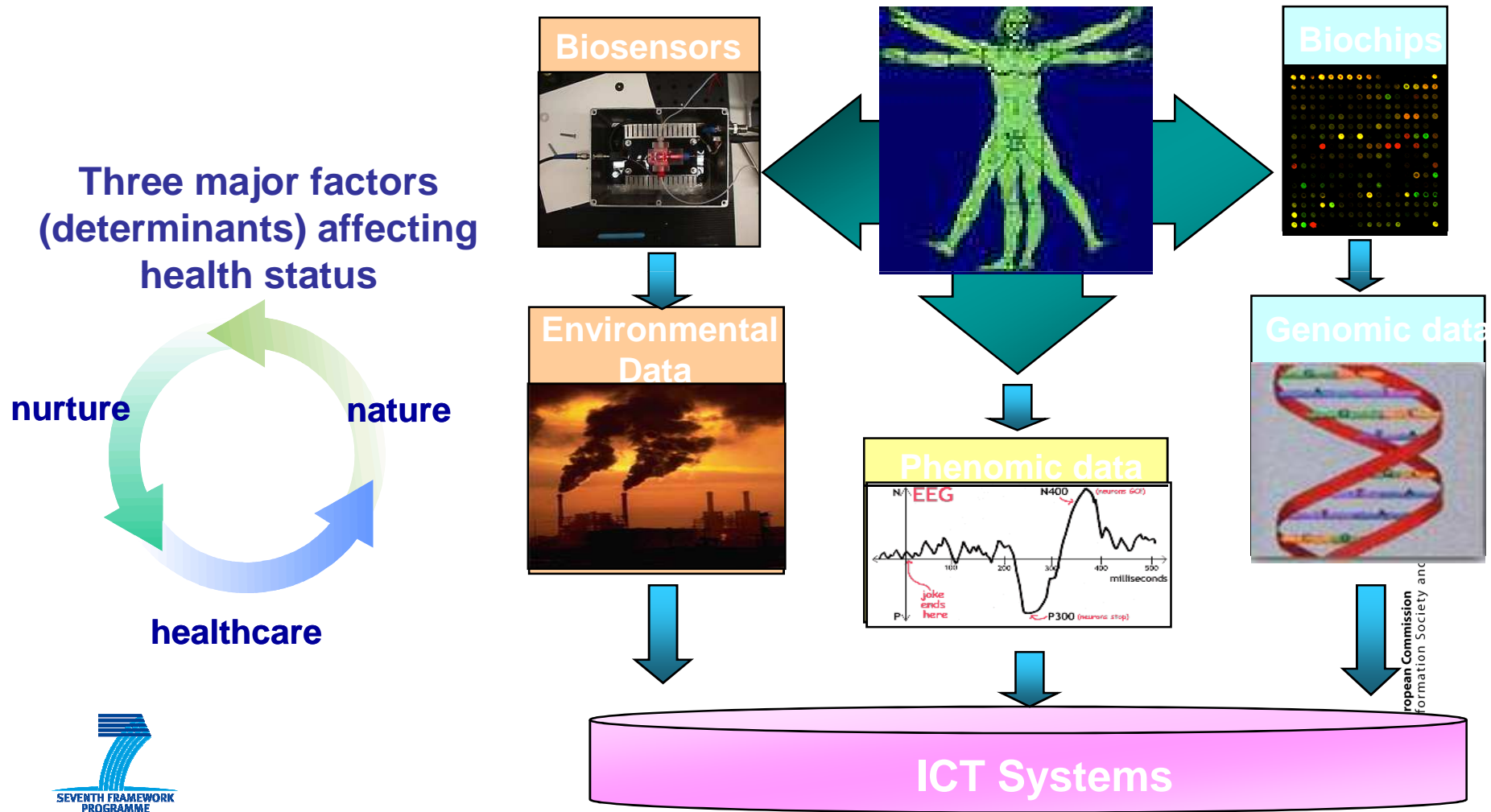
€ 30 M in 2007 - € 30 M in 2009

**– Predictive Medicine – Virtual Physiological Human (VPH)**

- Modelling/simulation of human physiology and disease

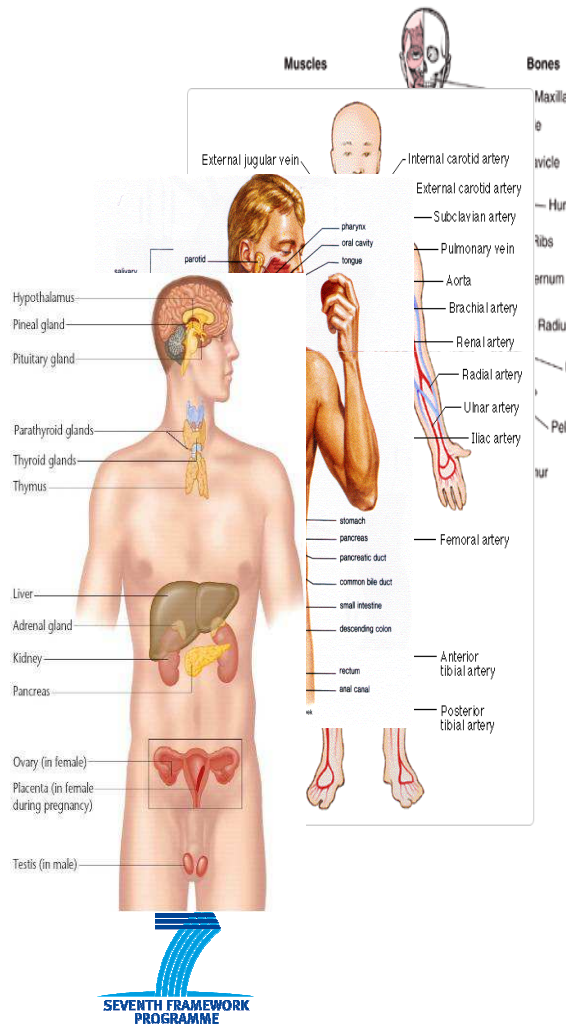
€ 72 M in 2007 - € 5 M in 2009 - € 63 M in 2010

# VPH: Towards full picture of individual's health status



# The Virtual Physiological Human (VPH) concept

## Based on the ideas of the International Physiome project



**The Virtual Physiological Human is a methodological and technological framework that once established will enable the investigation of the human body as a single complex system.**

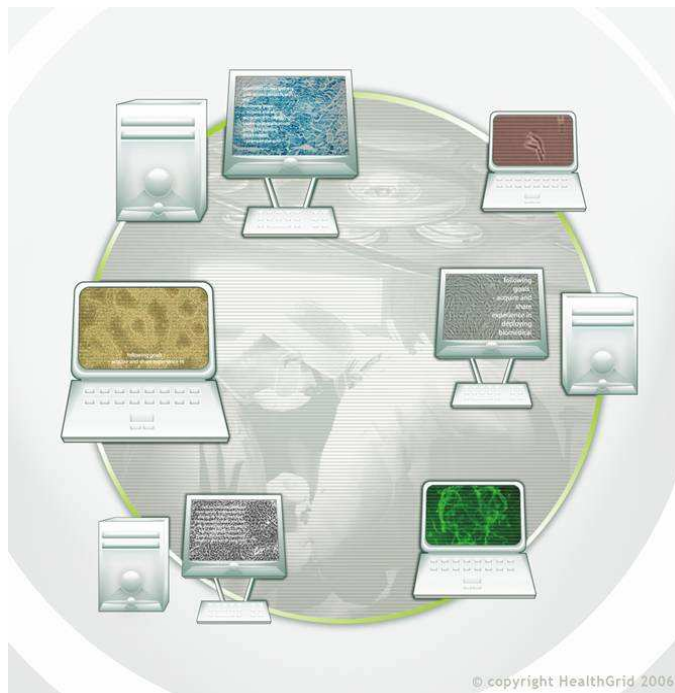
**One of the 12 pioneer projects in FP6, The VPH research roadmap developed by project STEP in 2007:**

**[www.europysiome.org](http://www.europysiome.org)**

- Personalised (patient-specific) healthcare solutions**
- Early diagnostics & predictive medicine**
- Understanding diseases for the first time across several biological levels**



# VPH from an ICT perspective

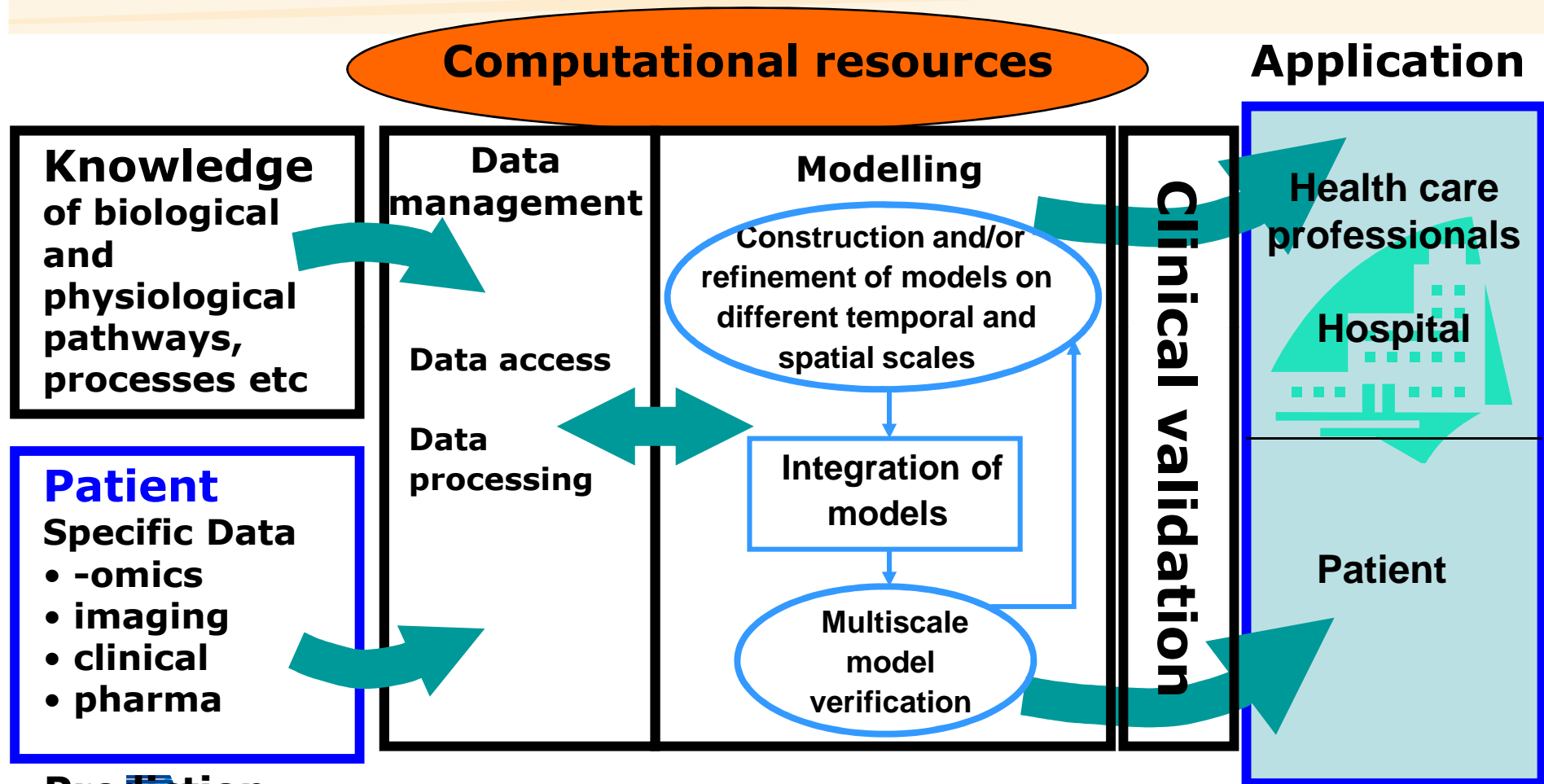


**Computational framework for multi-scale in-silico model(s) of the human physiology and a toolbox for simulation and visualisation.**

**Patient specific model using data such as bio-signals and (multimodal) images including molecular images**

**Technologies involved:  
biomedical modelling, simulation and visualisation techniques, imaging, data mining, knowledge discovery tool, semantic integration, databanks, HealthGrid (infrastructure and tools)**

# Virtual Physiological Human: a schematic picture

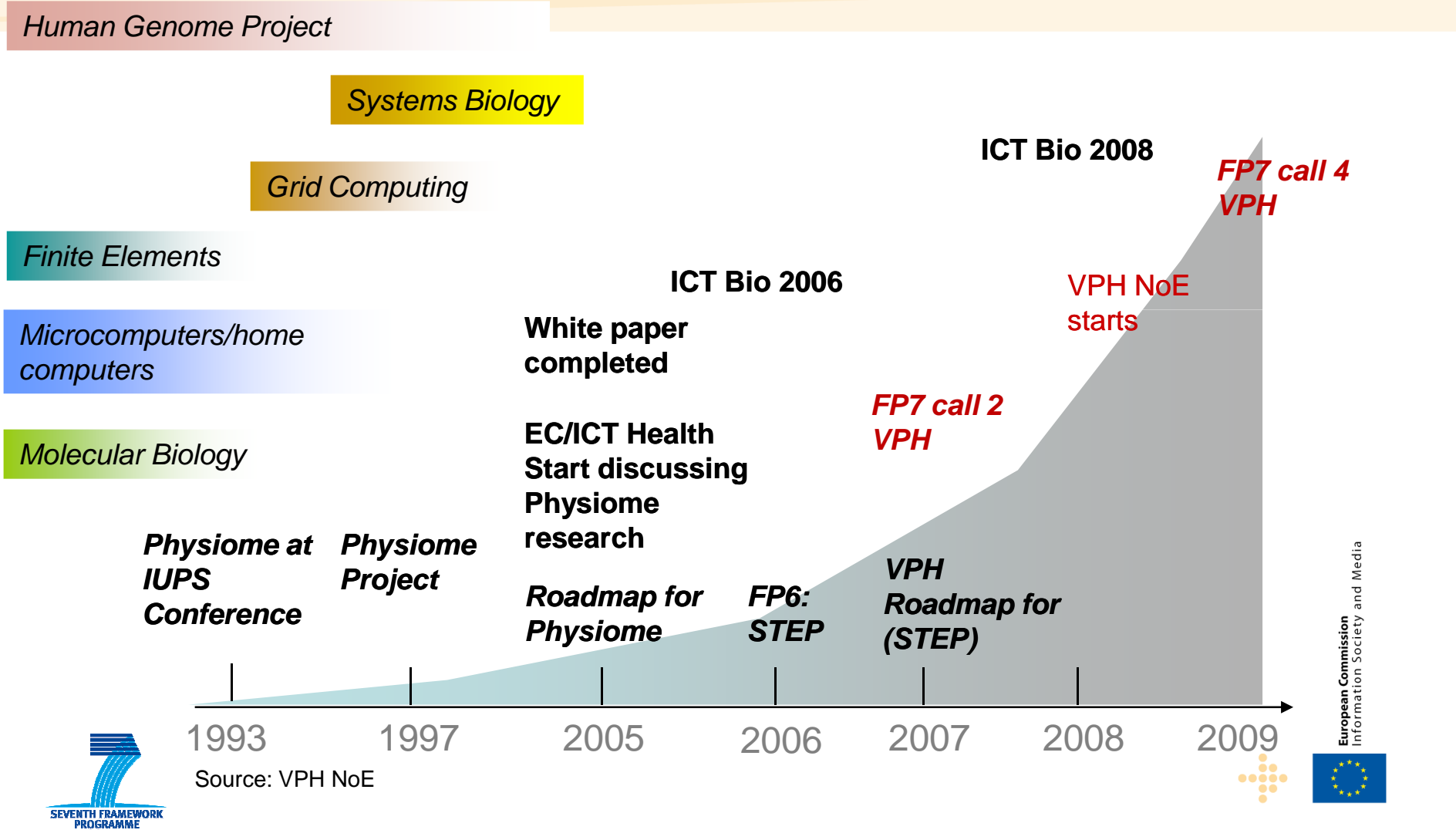


**Prediction,  
Early Diagnosis,  
Treatment**

SEVENTH FRAMEWORK PROGRAMME



# VPH/Physiome History



# First VPH Call: FP7 call 2

## Technical focus:

- Patient-specific computational modelling and simulation of organs targeting specific clinical needs.
- Data integration and new knowledge extraction.

## Clinical focus:

- Simulation environments for surgery training, planning and intervention.
- Prediction of disease or early diagnosis.
- Simulation and assessment of the efficacy and safety of specific drugs.

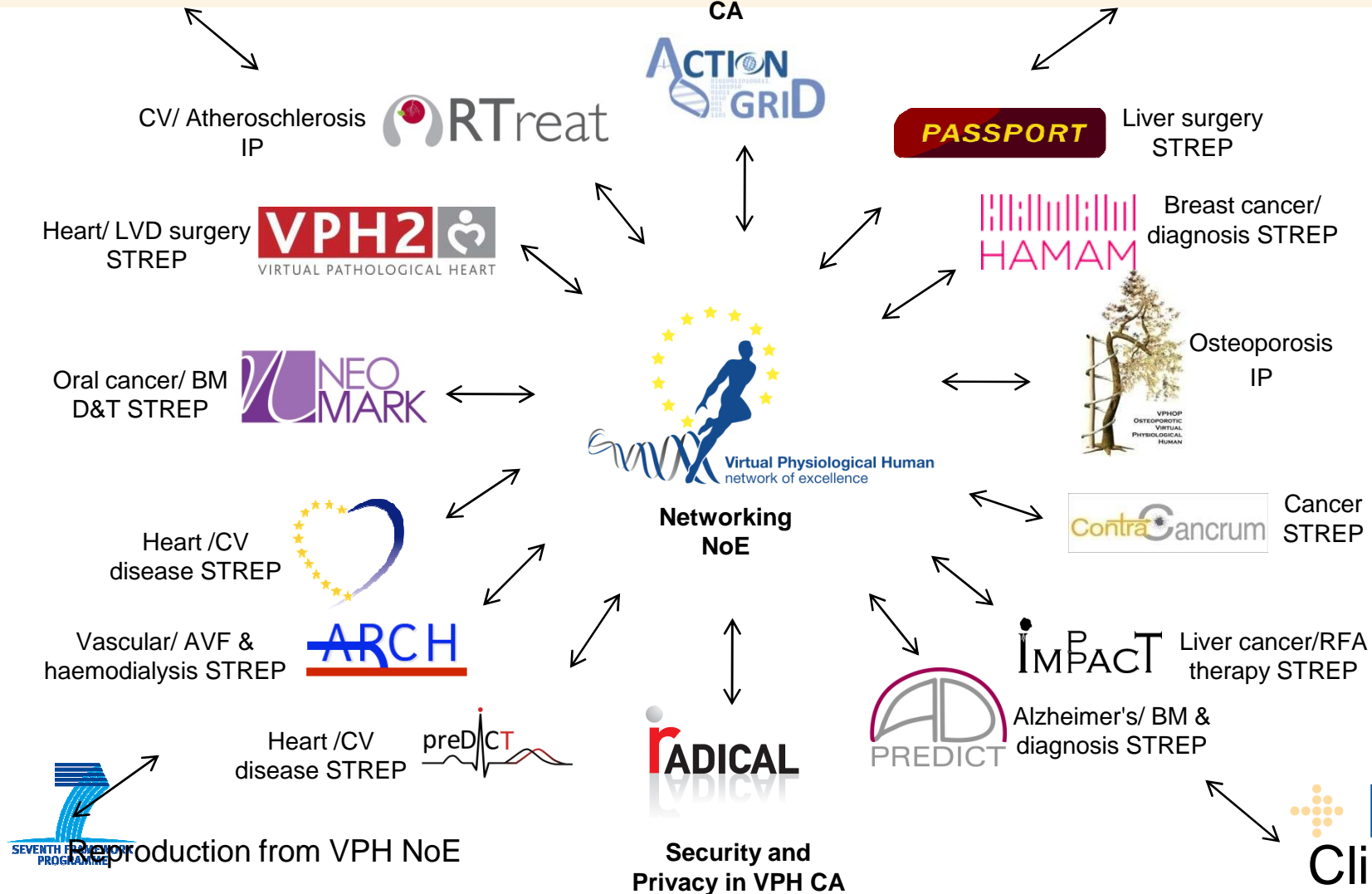
# Results of the 1st VPH call: 15 FP7 projects



Industry

Grid access  
CA

Parallel VPH projects

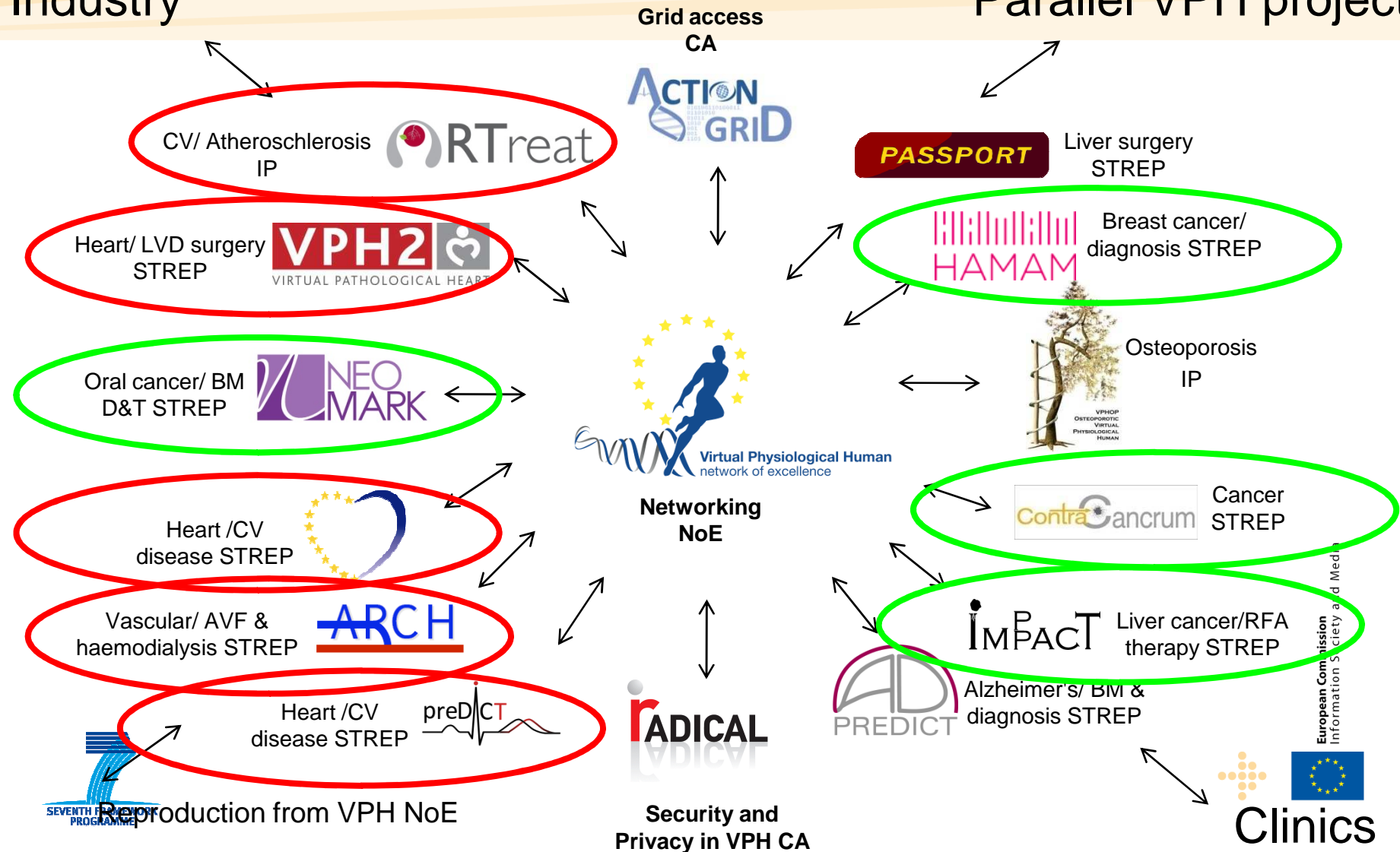


# Results of the 1st VPH call: 15 FP7 projects



## Industry

## Parallel VPH projects



SEVENTH FRAMEWORK PROGRAM  
 Reproduction from VPH NoE

# Virtual Physiological Human Network of Excellence (VPH NoE)



**NoE: team of organisations working in **key focus areas** to support and enable VPH research, within and beyond the VPH Initiative**

- Identification of user needs, standards, ontologies, applications and development of VPH ToolKit
- VPH training activities and materials - MSc, interdisciplinary study groups, focused journal issues, textbook
- Research/news dissemination and international networking

**Project coord.: Miriam Mendes (UCL)**

**Scientific coord.: Peter Coveney (UCL) & Peter Kohl (Oxford)**

**13 partners (12 universities, 1 company)**

**19 General Members**

**9 Associate Projects**

**3 Associate Members (organisations)**

**5 Associate Members (industry)**

**Budget ~9.7M€ (~8M€ EU funding)**



European Commission  
Information Society and Media





## **ICT BIO 2008**

- **Theme: Computer modelling and simulation for improving human health**
- **2<sup>nd</sup> edition (1<sup>st</sup> was in 2006)**
- **450 participants**
- **Strong international component (participants and session speakers)**
- **1st transatlantic workshop on Multiscale Cancer Modelling**
- **Adjacent concertation event for 27 EU VPH related projects.**
- **More info on:**  
[http://ec.europa.eu/information\\_society/events/ict\\_bio/2008/index\\_en.htm](http://ec.europa.eu/information_society/events/ict_bio/2008/index_en.htm)

# Second VPH call: FP7 call 4

## International Cooperation on VPH

### Focus of Call 4:

- Interoperability (interfaces databases, web services, mark-up languages, meta-data, ontologies)
- Tools and services for global cooperation (for modelling/simulation, curated models, interconnected libraries)
- International validation environment (joint verification of clinical relevance of models)

**Budget:** 5M€

**Results:** 5 proposals selected, all of which include international partners.



# Virtual Physiological Human next Call (Call6)

## Keep the overall long-term VPH goals/vision:

- Early diagnostics & Predictive medicine
- Personalised (Patient-specific) healthcare solution

## By means of:

- Modelling & simulation of human physiology and disease-related processes
- Add emphasis on tools/infrastructure for the Bio-Med researchers

## VPH in 2010

- Call 6 expected to open November 2009 and to close in April 2010
- Budget 63M€

## Objective 5.3 VPH Call 6

### Target outcomes overview:

- a) Patient-specific computer based models and simulation
- b) ICT tools, services and infrastructures for bio-medical researchers
- c) Evaluation and assessment of VPH Projects w.r.t.
- d) Observatory on achievements and evolution of the broader BMI field (e.g. bioinformatics, Medical informatics, neuro-informatics)

a) and b) IP/STREP 61M€

c) SA 1M€

d) CSA 1M€

# VPH Call 6

Focus a):

## **Patient-specific computer based models and simulation**

- Multiscale models & simulation of organs/systems targeting specific clinical needs.
- Better understanding of the functioning of the organs and their pathologies aiming at prediction/early diagnosis.

Emphasis on:

- Integration of existing models
- Clinical benefits demonstrated
- Data acquisition, medical, clinical, bio research (if needed) < 25%
- Access to external computing facilities supported

### **Not in scope:**

- proposals which cover only one biological scale.
- improvement of current medical image processing techniques (image based models)
- Modelisation of clinical processes
- Full development of simulator based on medical images only
- Geometrical model of the anatomy

# VPH call 6

Focus b):

**ICT tools, services and infrastructures for bio-medical researchers** to support at least 2 of the 3 activities:

1. Share data and knowledge
  2. Jointly develop and share models/simulators
  3. Create collaborative environments
- 
- Interface to access to resources like Grid/HPC infrastructures
  - Ability to interface with existing medical research infrastructure
  - Complement/compatible with existing methods/standards to be suggested by VPH-NoE

# VPH call 6

Focus a) and b)

## Instrument/budget:

- STREP/IP
- Budget: 61M€
- Minimum 30% to STREP; more than 50% to IPs including at least one in (a) and one in (b)
- For a) Considering the coverage of the projects already funded in this field, the selection of proposals targeting clinical applications other than cancer and cardiovascular diseases will be given preference in case of proposals with tied scores at the evaluation stage.

# VPH Call 6

Focus c)

## **Evaluation and assessment of VPH Projects w.r.t. optimal use and contribution of**

- Shared tools/infrastructure
- Clinical achievements
- Market potential/ penetration

## **Instrument/budget:**

- SA max funding of 1M€

# VPH Call 6

Focus d)

## **Observatory on achievements and evolution of the broader BMI field (e.g. bioinformatics, Medical informatics, neuro-informatics):**

- Facilitate communication between projects
- Dissemination and training

Aim at:

- Sustaining cross collaboration among different fields
- Build on related NoEs

## **Instrument/budget:**

- CSA max funding of 1M€

# Objective 5.3 – Virtual Physiological Human

## Expected impacts:

- Predictive, individualised safer Healthcare
- Accelerate medical knowledge discovery and management and the use of computer based environments
- Improve interoperability of BioMedical information and knowledge
- Acceptance and use of realistic and validated models
- Re-enforce leadership of EU industry and strengthen multidisciplinary research in supporting innovative medical care.

# Contact persons

- **DG Information Society and Media  
Unit "ICT for Health"**

[http://ec.europa.eu/information\\_society/ehealth](http://ec.europa.eu/information_society/ehealth)

- **Virtual Physiological Human team:**

Joël Bacquet (joel.bacquet@ec.europa.eu)

Karin Johansson (karin.johansson1@ec.europa.eu)

Amalia Vlad (amalia-irina.vlad@ec.europa.eu)