Virtual Physiological Human Network of Excellence

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Outline

• A conundrum
• …and a way forward: What is the Physiome?
• The Roadmap to the Europhysiome
• The VPH Initiative
• The VPH NoE
  • Project structure
  • WP descriptions
• The future for VPH
"A conundrum"

"The predictive paradigm in the treatment of disease"

The key to successful computational physiology is the capture of structure-function relationships in a computationally efficient manner. [Crampin et al., 2003]

“We need adaptable tools able to cope with multi-physics and multi-scale problems ranging from molecular to physiological levels. In-house tools must be developed, maintained and updated, or the scientists must rely on available software, adapting it to their specific needs”

In order to obtain patient-specific simulations, simulations must be performed on a routine basis in the clinical setting. … high performance computing required for transient CFD simulation must be accessible, possibly using Grid technology

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What is the Physiome?

The Physiome is the quantitative and integrated description of the functional behaviour of the physiological state of an individual or species.
The VPH Initiative (VPH – I)

- Collaborative projects within the call meet objectives associated with specific challenges
- VPH NoE connects all of these projects, and must focus on addressing issues of common concern that affect VPH-I projects collectively
  - research infrastructure
  - training
  - dissemination

Funding available: 72 M€
12 Collaborative projects (3 IPs/9 STREPs)
2 co-ordination and support actions
1 NoE to bring these together
VPH/Physiome History

1993: Human Genome Project
1997: Microcomputers/home computers
2005: Systems Biology
2006: Grid Computing
2007: Finite Elements
2008: Molecular Biology
2009: White paper completed

Physiome at IUPS Conference
Physiome Project
EC/ICT Health Start discussing Physiome research
Roadmap for Physiome
FP6: STEP
VPH Roadmap for (STEP)

FP7 call 2
Objective ICT-2007.5.3: Virtual Physiological Human

1st meeting standards working group

ICT Bio: need for standards working group

VPH NoE starts

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Attempts to predict accurately the performance of a product or procedure. The entire design process is based upon predicted outcomes. Very often a number of criteria must be satisfied simultaneously and sophisticated computer and analysis technologies are employed.

In contrast, due to the complexity and inherent variability of the biological behaviour, medicine has tended to adopt a semi-empirical approach with observations from clinical studies interpreted in combination with detailed in vitro analysis of individual components of the system.

ICT: at the Heart of the Patient-Specific concept
## VPH call projects

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Topic</th>
<th>Project type</th>
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<tbody>
<tr>
<td>VPH NoE</td>
<td>Networking</td>
<td>NoE</td>
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<tr>
<td>VPHOP</td>
<td>Osteoporosis</td>
<td>IP</td>
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<td>euHeart</td>
<td>Heart/CV disease</td>
<td>IP</td>
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<td>ARTreat</td>
<td>CV/Atherosclerosis</td>
<td>IP</td>
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<td>preDiC T</td>
<td>Heart/CV disease</td>
<td>STREP</td>
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<td>Cancer</td>
<td>STREP</td>
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<tr>
<td>ARCH</td>
<td>Vascular/AVF &amp; haemodialysis</td>
<td>STREP</td>
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<tr>
<td>PASSPORT</td>
<td>Liver/surgery</td>
<td>STREP</td>
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<td>PredictAD</td>
<td>Alzheimers/BM &amp; diagnosis</td>
<td>STREP</td>
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<tr>
<td>NeoMARK</td>
<td>Oral cancer/BM, D &amp; T</td>
<td>STREP</td>
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<tr>
<td>VPH2</td>
<td>Heart/LVD surgery</td>
<td>STREP</td>
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<tr>
<td>IMPPACT</td>
<td>Liver cancer/RFA therapy</td>
<td>STREP</td>
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<tr>
<td>HAMAM</td>
<td>Breast cancer/diagnosis</td>
<td>STREP</td>
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<tr>
<td>Action-Grid</td>
<td>Grid access EU – LA &amp; Balkans</td>
<td>CA</td>
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<td>RADICAL</td>
<td>Security and privacy in VPH</td>
<td>CA</td>
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- **1 NoE**
- **3 IPs**
- **9 STREPs**
- **2 CAs**
VPH NoE

- VPH NoE - Virtual Physiological Human Network of Excellence
- Primary purpose to strengthen the VPH community and provide tools and services for researchers in the field
- Support VPH-I projects directly

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<tr>
<td><strong>Start Date</strong></td>
<td>2008-06-01</td>
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<tr>
<td><strong>End Date</strong></td>
<td>2012-11-30</td>
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<tr>
<td><strong>Project Funding</strong></td>
<td>~9.65M€ (~7.99M€ EU funding)</td>
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Specifically, the VPH NoE will:

- Identify user needs, define standards, ontologies and applications, and develop VPH ToolKit
- Develop VPH training activities and materials: Joint advanced degree programme, interdisciplinary study groups, focused journal issues, textbook
- Provide research/news dissemination services and international EU/international networking

Project Coordinator: Vanessa Díaz-Zuccarini / Miriam Mendes (UCL)
Scientific Coordinators: Peter Coveney (UCL), Peter Kohl (Oxford)

http://www.vph-noe.eu
Consortium Overview

• 13 Core Partners
  4 UK (UCL, UOXF, UNOTT, USFD)
  3 France (CNRS, INRIA, ERCIM)
  2 Spain (UPF, IMIM)
  1 Germany (EMBL [EBI])
  1 Sweden (KI)
  1 Belgium (ULB)
  1 New Zealand (UOA)

• Associate / General Members
  19 Candidate General Members
  3 Candidate Associate Members (organisations)
  5 Candidate Associate Members (industry)
  9 Associate Projects
  … and growing
Project Structure

WP1 - Management

WP2 - Exemplar Projects

WP3 - VPH ToolKit

WP4: INTEGRATION AND TRAINING ACTIVIES

WP5: SPREADING EXCELLENCE

Horizontal integration

Vertical integration
Project Structure

WP1 - Management

WP2 – Exemplar Projects

WP3 – VPH Toolkit

WP4 – Integration & Training activities

WP5 - Networking/Communication and Spreading Excellence within the VPH NoE/VPH-I
International VPH Community

VPH NoE General Assembly - Key Legislative Body

(Includes all membership types)

Annual Meetings (coinciding with Project Meetings)
Delegates Executive Powers to Steering Committee

Steering Committee:

Key Executive Body
Includes Consortium Agreement Signatories
Quarterly meetings to lead implementation of NoE WPs
Takes advice from Advisory Boards
May set up Task Forces on Policy Issues (such as on IP, Ethics, Gender)

Delegates day-to-day project management to WP1 PI & co-PI

Project Office
PIs and Core NoE Staff
Liaises with UCL ERDO

Conducts contract management and project implementation

Clinical Advisory Board
Industry Advisory Board
Scientific Advisory Board
EC Project Officer

WP1

Other VPH Projects

Other VPH Projects

Other VPH Projects

Other VPH Projects

Other VPH Projects

WP2

WP3

WP4

WP5
WP2: Exemplar Projects

EPs work towards integration amongst VPH researchers, in order to address specific research problems or challenges.

- Provide solid examples of horizontal and vertical model/data integration
- Two-way symbiosis with the development of VPH ToolKit (WP3), guiding ToolKit development
- WP2 will pinpoint research areas where calls will be focused
WP3: VPH Toolkit

The VPH ToolKit aims to become the technical and methodological framework to support and enable VPH research.

- The toolkit will be a shared and mutually accessible source of research equipment, managerial and research infrastructures, facilities and services.

- Other VPH projects, including the Exemplar Projects (EPs), will add to and draw capacity from it.

- *Can only be achieved through the integration of disparate knowledge and research infrastructure.*
WP5: Networking/Communication

Development of an International VPH Gateway to facilitate interaction and co-operation between VPH initiative projects

• Development of the VPH NoE website (public and private faces)
• Publish annual scientific roadmaps which will chart Network progress/assist in ongoing planning of activities
• Publish VPH special issues in world-class journals
• Design, prepare and produce a wide array of VPH dissemination materials and events, including quarterly VPH-I newsletter
WP3

• Activities include:
  • Creation of mark up languages for model and data encapsulation
  • VPH software tools and GUIs
  • Model and data repositories
  • Grid access VPH ToolKit
  • Workflow environments & middleware
WP4: Integration & Training

Development of a portfolio of interdisciplinary training activities including a formal consultation on, and assessment of, VPH careers

- Training initiatives in integrative and systems biology, both event-based (Study Groups) and allowing rotation between labs within the VPH NoE (early- and in-career)
- Development of distance learning/training resources for VPH and associated virtual/interactive communication methods, possible joint (inter-university) degree programme
- Development of VPH publishing (textbook and journal special issues)
Future calls?

• EC currently preparing the calls for proposals for 2010
  – VPH will be called in 2010

• Separate call focussed on international cooperation in 2009
  – European partners will be encouraged to form joint projects with partners of ongoing non-EU projects to share and extend international knowledge

• VPH International Symposium Sep 2010 - Brussels
  – Formal opportunity for all VPH projects to meet and discuss issues of common interest
  – VPH NoE will repeat a meeting of this format in 2012, to support continued development and integration of the VPH-I
Acknowledgements

- VPH NoE Community
- ERCIM
- ETSI

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