

# Health

## Project of the Month

# Health-e-Child

March, 2007

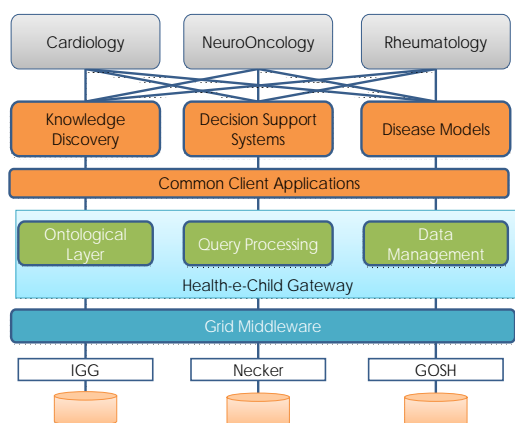
## Universality of information relating to paediatric heart diseases, inflammatory diseases and brain tumours



### Health-e-Child: an integrated e-healthcare platform for European paediatrics

Healthcare processes and models will progressively require coordinated European e-health solutions in order to cope with demographic changes, current demands, future crises and growth in expectations. The **goal of Health-e-Child** is **to become the universal biomedical knowledge repository and communication conduit for the future**, a common vehicle by which all clinicians will access, analyse, evaluate, enhance and exchange biomedical data of all forms. It will be an indispensable tool in their daily clinical practice, decision making and research. It will be **accessible at any time and from anywhere**, and will offer a friendly, multi-modal, efficient and **effective interaction** and exploration environment. Pivotal to this outlook are Health-e-Child's breakthroughs in personalised medicine through integrated disease modelling, knowledge discovery and decision support.

Health-e-Child at a glimpse



Fashioned around three paediatric diseases with at least partly unknown causes, classification and/or treatment outcomes - heart diseases (right ventricular overload [RVO], cardiomyopathies),

inflammatory diseases (juvenile idiopathic arthritis [JIA]), and brain tumours (gliomas), Health-e-Child is **building the enabling tools and services** that **improve the quality of care** and **reduce its cost** by **increasing efficiency**, through:

- ◆ *Integrated disease models,*
- ◆ Database-guided *decision support systems,*
- ◆ Cross modality information fusion and data mining for *knowledge discovery.*

Key to the Health-e-Child system is the establishment of *multi-site, vertical, and longitudinal integration* of biomedical data, information and knowledge delivered via a Grid-based platform, supported by robust tools for search, optimisation and matching processes.

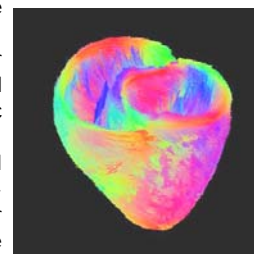
The core of Health-e-Child revolves around its efforts dedicated to meeting the challenges entailed in *biomedical information* analysis for the advancement of personalised medicine.

The following are a few examples of Health-e-Child's ongoing research activity.

#### Disease Modelling in Cardiology

Health-e-Child is currently addressing the main tasks of developing I3D+t segmentations of the right ventricle, and electromechanical and physiological models of RVO + CM. The project's research goals are:

- ◆ identifying significant parameters for subtypes of cardiomyopathies that could lead to indications for additional genetic tests,
- ◆ adapting generic models to clinical data to extract patient-specific high-level discriminative features for decision support and knowledge discovery, and
- ◆ validating new measurements for diagnosis.



#### Decision Support in Cardiology

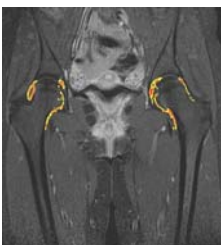
The project is currently developing tools that will enable:

- ◆ The monitoring of right ventricular overload and decision support based on similar cases (similarity search based on specified features and association rules extraction for the given case).
- ◆ The prediction of whether atrial septal defect (ASD) will close by itself or will become larger, thereby precluding trans-catheterisation.

### Knowledge Discovery In Rheumatology

Applied to juvenile idiopathic arthritis (JIA), Health-e-Child focuses on the specific research goals of

- ◆ identifying gene variant combinations (haplotypes) correlated with particular diseases (bones/joints erosion)
- ◆ comparing the presence of different proteins in fluid at different stages of the disease to discover behaviour of cells close to fluid
- ◆ improving the current classification of JIA subtypes, and



- ◆ identifying homogeneous groups of clinical features
- ◆ elaborating explicit criteria for the early prediction of disease outcome/evolution
- ◆ developing image-based methods which rapidly indicate the capacity of

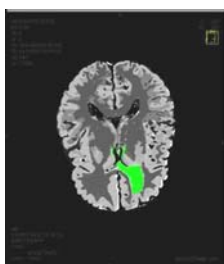
drugs to stop/slow down disease evolution (automatic suggestion of drug prescriptions)

- ◆ analysing the correlation between genomic, proteomic, clinical and image data, with images mapped to (few) quantitative parameters and establishing a candidate gene set (responsible for bone remodelling) for study.

### Knowledge Discovery in Brain Tumours

Priority research goals of Health-e-Child in this area address actions to develop applications to

- ◆ verify the diagnosis/categorization of low-grade gliomas
- ◆ correlate clinical, imaging, and genomic data



- ◆ correlate prognosis with tumour origin site
- ◆ define prognosis (e.g., correlations with spectroscopy)
- ◆ suggest treatment strategies
- ◆ predict outcome
- ◆ provide more precise classification of diseases
- ◆ detect correlations between age and outcome and between genetics and outcome
- ◆ elaborate meta-analyses of published findings.

Like most activities in society today, medical practice as well as research is intimately dependent on information technology. From DNA sequencing to laboratory testing and epidemiological analysis, clinicians and researchers produce as well as search for information, as part of their daily routine and decision making.

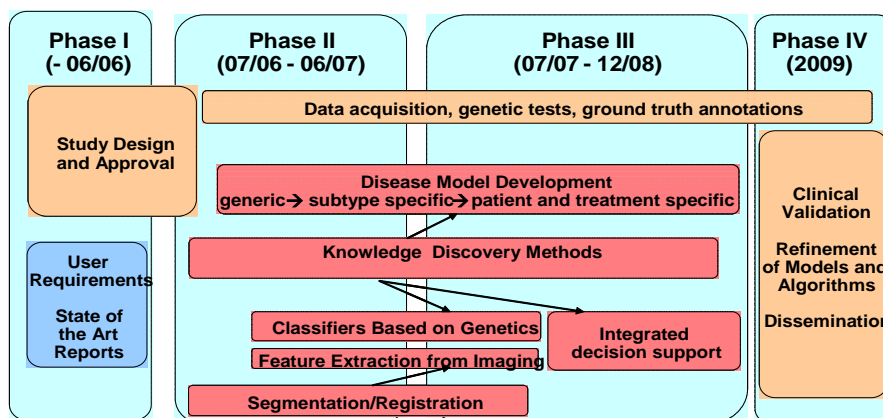
**Health-e-Child's goal is to overcome constraints of today's systems and empower clinicians to further advance their profession**

Taking advantage of technology has improved dramatically the quality of these activities' results, facilitating better health-care provision and more advanced biomedical

research. Nevertheless, the current state of affairs is still severely restricted with respect to the kind of information that is available to clinicians. None of the current long-term targets of the field, e.g., personalised medical care, distributed medical teams, multidisciplinary biomedical research, etc. can be realised given the present level of technology support.

Health-e-Child aims at **filling the gap** between what is **current practice** and the **needs of modern health provision** and research. Ultimately, with the **Health-e-Child system**, **information** will have **no** conceptual, logical, physical, temporal, or personal borders or **barriers**, but **will be available to all professionals** with the appropriate level of clearance.

## Clinical and Application Roadmap



### Links:

Project website: Health-e-Child [www.health-e-child.org](http://www.health-e-child.org)

Project overview: [http://ec.europa.eu/information\\_society/activities/health/docs/projects/fp6book/health-e-child.pdf](http://ec.europa.eu/information_society/activities/health/docs/projects/fp6book/health-e-child.pdf)

Project newsletter: [http://www.health-e-child.org/newsletter\\_files/ploneexfile.2007-01-04.9627125660](http://www.health-e-child.org/newsletter_files/ploneexfile.2007-01-04.9627125660)

Health Policy Relevance: [http://europa.eu.int/information\\_society/activities/policy\\_link/policy\\_cases/index\\_en.htm#Health](http://europa.eu.int/information_society/activities/policy_link/policy_cases/index_en.htm#Health)

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