INBIOMEDvision: Bridging gaps between Bioinformatics and Medical Informatics

The INBIOMEDvision Consortium 1

Abstract. INBIOMEDvision aims to become a European-wide initiative intended to monitor the evolution of the Biomedical Informatics field and address its scientific challenges by means of collaborative efforts performed by a broad group of experts with complementary perspectives on the field. These efforts will certainly contribute to the strength and expansion of the Biomedical Informatics scientific community, particularly in Europe. INBIOMEDvision will develop a series of services and activities to serve the aforementioned purposes (inventory of resources and initiatives, state of the art reviews, prospective analyses, community-building actions and dissemination and training activities).

Keywords: Biomedical informatics, translational bioinformatics, virtual physiological human personalised medicine, scientific monitoring, state-of-the-art analysis, scientific prospective analyses.

The INBIOMEDvision project is funded by the European Commission under the Seventh Framework Programme (FP7/2007-2013) and has as its main goal to promote the Biomedical Informatics in Europe by means of the permanent monitoring of the scientific state-of-the-art and existing activities in the theme. The Project Consortium is coordinated by the Dr. Ferran Sanz, of the Research Programme on Biomedical Informatics at IMIM-University Pompeu Fabra (UPF), the project manager is the Fundació IMIM (FIMIM), and the rest of the partners are the Center for Biological Sequence Analysis (CBS) at the Technical University of Denmark, the Medical Informatics Department (EMC), at Erasmus University Medical Center, the Biomedical Informatics Group (GIB) at the UPM School of Computer Science, the Center for Computational Science at University College London (UCL) and the Bioinformatics Unit of the Instituto de Salud Carlos III (ISCIII).

Biomedical Informatics deals with the integrative management and synergic exploitation of the wide ranging and inter-related scope of information that is generated and needed in healthcare settings, biomedical research institutions and health-related industry.

The Biomedical Informatics concept has, from both the scientific and applied points of view, several challenges to be addressed, such as:

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The synergic integration between the computational methods and technologies used in life sciences research (Bioinformatics) and the computer sciences and applications supporting healthcare and clinical research (Medical Informatics). This integration requires a more intense interaction between the Bioinformatics and the Medical Informatics scientific communities.

- The development of effective translational knowledge management approaches that will facilitate a better and quicker application of (a) knowledge resulting from the basic biomedical research in the disease prevention, diagnosis and treatment, and (b) experience accumulated in the clinical practice in the biomedical research. This bidirectional information translation includes the extension of the electronic healthcare record (EHR) concept in order to incorporate and exploit new information types, i.e. from the “omics” and “nano” technologies, as well as a greater and automated incorporation of phenotypic information generated in the healthcare settings into the “omics” and molecular research.

The integration and exploitation of heterogeneous information stored in widespread repositories and diverse formats, which requires further progress in systems interoperability, as well as the development of more effective techniques for knowledge extraction, especially from documents in free-text and multilingual format. This aspect implies a focus on all the aspects related to the development, adoption and dissemination of appropriate standards and ontologies. Biomedical ontologies provide essential domain knowledge to drive data integration, information retrieval, data annotation, natural-language processing and decision support.

- The development of innovative methods for the simulation and modelling of complex biological phenomena, as well as the corresponding computational applications, able to operate on a wide range of data types, as well as diverse length dimensions and time scales. These computational methods and tools have to show reliable predictive capabilities that make them useful for the biomedical scientists and the healthcare professionals.

- The inter-disciplinary domain between neuroscience and informatics (Neuroinformatics), since a critical challenge in neuroscience is organizing, managing, and accessing the explosion in neuroscientific knowledge, particularly anatomic and neurophysiological knowledge.

- A strong and active involvement of the industrial actors (from both the IT and biomedical perspectives, as well as from both large international companies and small-medium size enterprises).

- The dissemination of concepts and challenges related to Biomedical Informatics, as well as of the scientific advances in the field, not only among the scientific community but also among the relevant stakeholders and the general population.
The need for training activities filling the gaps that traditional disciplines and academic degrees show in order to face the multi-disciplinary scientific challenges of Biomedical Informatics.

The operational objectives of INBIOMEDvision are:

1. To compile the existing knowledge on genotype and phenotype data resources and to provide an overview of the state-of-the-art methods and models that connect biological systems described at the molecular level with the clinical physiopathology.
2. To consolidate a Biomedical Informatics community of researchers by congregating and promoting the interaction between scientists from a wide range of related fields.
3. To develop and facilitate training activities able to engender new generations of scientists and professionals having the Biomedical Informatics perspective, as well as the skills for using the computational methods and tools of this field.
4. To widely disseminate the Biomedical Informatics knowledge and resources.
5. To devise sustainability measures that ensures the long-term maintenance of the INBIOMEDvision activities and services after the termination of the EU-funded project.