

Virtual BioInformatics Lab
Bioinformatics infrastructures and computational approaches
supporting bio-medical-molecular research

- Scenario:

In order to understand complex patho-physiological phenomena, modern bio-molecular research requires high-throughput experiments; these generate vast amounts of data that need to be structurally collected, analysed, and enriched with consolidated information and knowledge, available worldwide, in order to translate new findings into a better understanding of the underlying biological mechanisms involved.

These objectives can be achieved by instrumenting every bio-molecular research laboratory with a Virtual BioInformatics Lab, an infrastructure supporting nanotechnology biomedical research from the collection of experimental data to their computational analysis and integration with externally supported knowledge bases, to the linking with personalized clinical data, and the comprehensive biomedical interpretation of the highlighted most relevant integrated information.

- Aim:

Design and implement the software platform of a generic Virtual BioInformatics Lab, developed by taking into account the requirements common to every bio-molecular laboratory, and easy to customize by including those data and analyses required by a specific research group or laboratory, allowing scientists to select and evaluate efficiently and dynamically the most relevant functional and phenotypic information supporting biomedical knowledge discoveries.

- Envisaged Virtual BioInformatics Lab:

The Virtual BioInformatics Lab is going to be composed of data, analysis, and presentation infrastructures, all developed by taking into account available standards and major state-of-the-art efforts and open source software.

The *data infrastructure* is going to include a Biomolecular Data Warehouse that integrates several genomic, transcriptomic and proteomic information available from distributed biomolecular databanks through the Internet. It is also going to include a specific database for storing user experimental data. Subsequent development will include the integration of relevant data from clinical repositories. The data infrastructure is going to efficiently provide data access to the exploration and analysis units implemented in the *analysis infrastructure*. The *presentation infrastructure* is going to allow intuitive access to the integrated data and analysis units through advanced Web interfaces.

