




ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA

BIG DATA AND OMICS MEDICINE

*Transforming Big Data into Better Health:
exploitation of the advancements in
omics technologies and the potential of
big data analytics to innovate diagnostics,
therapeutics and healthcare.*



The University of Bologna has a long-lasting expertise in the **integration of omics data** with genomic characterisation and with higher levels of complexity, including lifestyle and environmental data, in order to obtain a better understanding of clinical phenotypes.

In particular, integrative or systematic approaches along with the development of supporting ICT tools and platforms are a strong academic asset, in order to leverage on the large availability of patient cohorts and big biological data owned by multiple research groups across different departments.

The research of the University of Bologna is based on extensive expertise on the utilisation of **Big Data software** (Cloudera, Hadoop, Talend and Tableau, among others), the development of big data integration methods based on complex networks, convolutional neural networks and machine learning methods.

Furthermore, other relevant research activities encompass the mapping of the available clinical and biological information **into networks of a priori biological knowledge** (Protein-protein interaction networks, Human metabolic networks, KEGG networks, transcription networks, disease databases, drug databases), and the creation of **network propagation algorithms** for the identification of the so called “Diseases Modules”.

HIGHLIGHTS

Big data analytics and training: the researchers of the University of Bologna have strong and internationally renowned expertise in the field of big data analytics, reflected in the participation in a number of EU-funded projects both in the field of research and innovation (e.g. IMI-2 [HARMONY](#) and [HARMONY PLUS](#); H2020 [GenoMed4All](#) and [ORCHESTRA](#)) and training (e.g. H2020 [IMforFuture](#) - Innovative training in methods for future data).

Medical textual diagnosis classification: the University of Bologna has a long experience on text analytics, driving to the development of [ICD-9-CM](#) search engine, which is a remote service able to provide the most relevant ICD codes while the medical record is being typed.

Cognitive impairment: ongoing studies cover the development of web-based application for early screening assessment of cognitive impairment, such as [COGITAB](#), which is an easy and highly sensitive web-based test that can detect critical cognitive profiles. It is conceived to carry out mass screening of people over 50 years old.