

PROFILE

HUMAN TECHNOPOLE FOUNDATION

Human Technopole (HT) is the **research institute for life sciences**, located in the heart of Milan's new district dedicated to innovation, known as MIND -Milano Innovation District. The area is known for hosting the Universal Exhibition in 2015, and **the iconic Palazzo Italia** is now the headquarters for Human Technopole.

The Human Technopole Foundation, established by the 2017 Budget Law and **overseen by three founding ministries**, the Ministry of Economy and Finance, the Ministry of University and Research and the Ministry of Health, started its activities in January 2019.

As of today, Human Technopole has a staff of around 500, **including 370 researchers and technical-scientific support staff**, professionals of **39 different nationalities**, with an average age of 30. **40% of the research staff come from abroad**, including **some 100 Italians**, among them Foundation Director Prof. Marino Zerial, most of whom are working for the first time in their home country.

To date, Human Technopole has received **EUR 26 million in external funding** awarded to the institute's researchers through grants and scholarships from European and international bodies.

After intense refunctionalisation work, the Human Technopole headquarters and laboratories now occupy an area of more than **20,000 square metres**, consisting of three pre-existing buildings (**Palazzo Italia, North Pavilion, South Pavilion**), the **Incubator labs** and a newly constructed building (**South Building**) scheduled for completion in 2028.



The Human Technopole campus with Palazzo Italia and incubator labs (Sept. 2020)

Human Technopole researchers have published **488 articles** and reviews in international *peer-reviewed* journals, including the prestigious scientific journals *Nature*, *Cell* and *Science*, and have appeared five times on the covers of these journals. **444** publications are the result of **collaborations with other institutes** and **131** describe **new experimental methods, instruments, software and protocols** developed by the institute's researchers.

THE MISSION

The main mission of Human Technopole is to **promote and contribute to the improvement of people's health and well-being**, by studying the fundamental mechanisms of biological systems relevant to human diseases, using a multidisciplinary approach in the areas of medicine, genomics, nutrition and data science. To this end, it:

- promotes **research focused on the fundamental mechanisms of human biology** with relevance to people's health and well-being;
- supports research by providing **technologies** to the Italian scientific community through **shared research infrastructures**: the National Facilities;
- offers **advanced scientific training** to the next generation of Italian scientists and researchers;
- promotes the results of research and technological innovation through **technology transfer**.

Through a synergistic combination of **innovative research and shared research infrastructures**, HT aims to:

- promote an institutional culture based **on excellence and scientific integrity**, together with fundamental values such as transparency, inclusion, openness and collaboration among HT staff and in synergy with the wider research community;
- exert influence and contribute to the **definition of health policies**, exploiting the wealth of knowledge generated by cutting-edge research to inform and shape public health agendas;
- support **the importance of basic research among citizens**, enabling them to actively engage in the public discussion of science.

ENHANCING THE NATIONAL SYSTEM

As a **centre of research excellence** and **large-scale research infrastructure**, Human Technopole plays an important role in building scientific capacity and expertise in the life sciences. By combining its missions, Human Technopole enriches the national system, contributing to its advancement and acting as a point of reference for the Italian academic community engaged in life sciences. Its high standards make HT an ideal partner for other excellent European and international institutes, favouring collaborative initiatives.

Thanks to the creation of new scientific connections with international partners and networks, HT will give even greater visibility to Italian biomedical research, helping to raise its profile.

With its vocation for research in the biological field, the development of technologies for biomedical research and the provision of services through the National Facilities, **HT can be considered a driving force for the advancement of science and the Italian economy**.

SCIENTIFIC COLLABORATIONS AND PARTNERSHIPS

From the start of its activities, Human Technopole has been in dialogue with universities, research hospitals and other scientific organisations to explore synergies and promote joint collaboration initiatives. The institute adopts an **open innovation model** based on scientific partnerships and

collaborations and integrates with other private public law institutions in Italy. By supporting its partners and the Italian research community, this exchange of ideas and resources will enable HT to grow and become a leading institution in the life sciences sector.

In addition to being a partner in international projects such as LifeTime, the pan-European research initiative that aims to revolutionise healthcare through the understanding and monitoring of human diseases at single-cell resolution, HT has signed *Memorandum of Understanding* with important Italian organisations over the years: Scuola Internazionale Superiore di Studi Avanzati (SISSA), Eurac, Università Statale di Milano and the Consiglio Nazionale delle Ricerche.

RESEARCH AREAS AND NATIONAL FACILITIES

Research at Human Technopole takes a global and interdisciplinary **approach to the study of human biology**, aimed at understanding the basic mechanisms that regulate physiology and disease. HT pursues a unique **mix of experimental and computational research**, ranging from fundamental to translational research with a more direct application to human health.

Research activity is initially concentrated in the following **five research areas, which are complementary and of great importance** for biomedical and health research.

Genomics

This research aims to discover the complex mechanisms that govern gene expression and how inheritable genetic information translates into phenotypic traits. It is composed of two research programmes in medical and population genomics and functional genomics.

Neurogenomics

This area exploits and integrates genetics, multi-omics, disease modelling and advanced imaging approaches, combining different systems to study the structure of the nervous system and neuronal development, with particular attention to the molecular mechanisms underlying neuropsychiatric and neurological disorders.

Computational Biology

Working closely with other research areas, it integrates their research activities, using statistical, computational and bioinformatics approaches to develop solutions for large-scale data analysis, management and integration.

Structural Biology

It aims to acquire precise knowledge of the structure of macromolecules and macromolecular complexes involved in a variety of human diseases. This field of study is fundamental for understanding the mechanisms through which different diseases originate in the human body and may find application in the development of new drugs.

Health Data Science

A joint project with the Politecnico in Milan, it uses advanced data science methods to analyse and integrate large-scale data from different sources on the effectiveness of therapeutic treatments on economic and social behaviour, mainly in the fields of precision medicine, healthcare and health economics.

With the approval of the 2024-2028 Strategic Plan, two further research areas have been added that will be developed in the coming years:

Molecular Cell Biology

The aim is to explore the molecular basis of biological processes using a variety of methods and perspectives, from standard molecular techniques to biochemical reconstitution and biophysical manipulation, at various levels – from molecules to cells and tissues, with the cell at the centre.

Biophysical modelling and simulation

The biophysical modelling and simulation of complex biological systems involves experimental design, the use of computational methods to derive biological information from complex data sets, the validation of experiments with predictive models and the use of biophysical modelling to predict the influence of biological and physical factors on complex systems.

In May 2023, the Supervisory Board of the Human Technopole Foundation approved the creation of **five National Facilities**, intended as high-tech infrastructural facilities available to the national research community. The five National Facilities have therefore replaced HT's pre-existing core facilities. In June 2024, Human Technopole officially opened the National Facilities to the national scientific community.

National Facility for Genomics

Its main mission is to develop experimental and analytical workflows to study all the main domains of genomic exploration, including, but not limited to, the analysis of DNA, RNA, chromatin and other markers of epigenetic and regulatory activity. These techniques can be applied to different areas of biology, with a resolution that extends to entire organisms, tissues or single cells.

National Facility for Genome Editing and Disease Modelling

It provides a broad portfolio of genome editing services. Genome editing methodologies are integrated into a series of technological workflows that allow the editing process to be built in a modular way. The services offered will be expanded over time to include subsequent validation of the edited model through the cultivation of cell cultures in two or three dimensions.

National Facility for Structural Biology

This provides a complete platform for structural characterisation on different scales, from tissues to amino acid side chains. It is managed by highly qualified personnel with expertise in all aspects of sample preparation and characterisation and imaging. The facility aims to support the national scientific community in successfully investigating biological actors of interest, both isolated and in their cellular compartments. It is also equipped with electron microscopes, among the most advanced in the world, which allow the study of biological molecules down to the atomic scale.

National Facility for Light Microscopy

It offers access to state-of-the-art optical microscopes, such as wide-field, confocal, spinning-disk, super-resolution and light-sheet microscopes. The National Facility staff supervises external users, taking care to perform image acquisition under optimal conditions. Once fully operational, additional services may be offered, such as basic and advanced training, microscopy courses, sample preparation and design of customised opto-mechanical hardware.

National Facility for Data Handling and Analysis

It supports the national research community by providing a cutting-edge initial analysis of the data generated by the other National Facilities and delivers the data to external users. The main objective of this Facilities is to provide bioinformatics and bio-image analysis expertise for the evaluation of complex and large-scale biomedical data sets.

GOVERNANCE

The Ministry of Economy and Finance (MEF), the Ministry of Health and the Ministry of Education, University and Research (MIUR) are the founders of the Foundation. The Foundation has a dual structure that guarantees the operational autonomy of its bodies: the Supervisory Board performs the function of policy-making and control, while the Management Committee deals with scientific and administrative management.

President

The **president** of the Foundation legally represents the Foundation, chairs the Supervisory Board, has strategic policy-making powers, handles the Foundation's institutional and public relations and promotes training and dissemination activities on the economic and social impact of the scientific research carried out by the Foundation. The chairman of the Human Technopole Foundation is **Gianmario Verona**.

Supervisory Board

The **Supervisory Board** ensures the excellence of the Foundation and compliance with the rules on the appointment of the Foundation's bodies and verifies the use of resources. It performs general guidance and control activities over the Foundation. The **members** of the Supervisory Board include the President and are appointed by the Italian Government by decree of the President of the Council of Ministers.

Paola Bovolenta, Director Centro de Biología Molecular Severo Ochoa, Autonomous University of Madrid;

Maura Francese, Deputy Head of Economic Structure Service, Department of Economics and Statistics, Bank of Italy;

Giovanna Iannantuoni, Rector Milan Bicocca University;

Giuseppe Ippolito, Professor of Infectious Diseases, Unicammillus International University of Health Sciences;

Biagio Mazzotta, President Fincantieri;

Luisa Minghetti, Director Service Coordination and Research Support, Istituto Superiore Sanità;

Marcella Panucci, Head of Cabinet Minister for Universities and Research;

Francesca Pasinelli, Board Member, Telethon Foundation;

Maria Sibilia, Professor of Cellular and Molecular Tumour Biology, Head of the Center for Cancer Research, Medical University of Vienna;

Serena Sileoni, Associate Professor in Constitutional Law at the Suor Orsola Benincasa University in Naples;

Gianluca Vago, President CNAO Foundation;

Alessandro Vespignani, Professor of Physics at Northeastern University and founding director of the Northeastern Network Science Institute in Boston.

Director

The **Director** of Human Technopole is responsible for implementing the multi-year strategic plan and chairs the Management Committee. The Director-designate of Human Technopole is **Marino Zerial**.

Management Committee

It manages all scientific and administrative activities necessary to achieve the Foundation's objectives and implements the strategic plan. The **members** of the Management Committee include the Director and are professionals with proven management skills in leading national institutions. They are appointed by the Supervisory Board:

Irene Bozzoni, full professor of molecular biology and director of the 'School of Advanced Studies' at La Sapienza University in Rome;

Nando Minnella, Director General of the Italian Institute of Nuclear Physics, former head of the technical secretariat of the Minister of Education, University and Research (MIUR);

Stefano Piccolo, professor of molecular biology at the University of Padua;

Fabio Terragni, Partner and Director Alchemia

Scientific Committee

The Scientific Committee is the advisory body of the Human Technopole Foundation. The Committee members, appointed by the Supervisory Board from among eminent scientists outside the Institute, are given an important advisory role by the Foundation's statutes: they are responsible for assessing the protocols of the scientific activities in terms of both quality and consistency with Human Technopole's multi-year plans. The current members, chosen from among top scientists in the field of life sciences, are:

Walter Ricciardi, Chairman of the Scientific Committee of the Human Technopole Foundation. Professor of Hygiene and Public Health, Università Cattolica del Sacro Cuore, Italy;

Geneviève Almouzni, Research Director, *Centre National de la Recherche Scientifique, Institut Curie*, France;

Andrea Ballabio, Director, Telethon Institute of Genetics and Medicine (TIGEM), Italy;

Pietro De Camilli, Director, *Program in Cellular Neuroscience, Neurodegeneration and Repair (CNNR), Yale School of Medicine, USA*;

Kristian Helin, CEO and President, *Institute of Cancer Research*, UK;

Alberto Mantovani, Scientific Director, Humanitas Clinical Institute, Italy;

Margaret McMahon, *Global Head Data Science, Roche Information Solutions Data & Analytics*, Switzerland;

Gennaro Melino, Professor of Biochemistry, Director *Torvergata Oncoscience Research (TOR) Centre*, University of Rome Tor Vergata, Italy;

Andrea Musacchio, Director of the Max-Planck Institute for Molecular Physiology, Department of Cellular Mechanics Biology, Germany.

Luca Pani, professor of clinical psychiatry, University of Miami and professor of pharmacology and clinical pharmacology, University of Modena and Reggio Emilia, Italy;

Alfio Quarteroni, Professor at the Milan Polytechnic and Professor Emeritus at EPFL Lausanne, Italy and Switzerland;

Nadia Rosenthal, Scientific Director, The Jackson Laboratory, USA;

Michael Snyder, Director, *Center for Genomics and Personalised Medicine, Stanford University School of Medicine*, USA;

Giulio Superti-Furga, Scientific Director, CeMM Research Centre for Molecular Medicine, Austria;

Fiona Watt, Director, *European Molecular Biology Organisation*, Germany.

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