Human Technopole

Italy 2040

The New Italian Research Center
in the EXPO Area in Milan

Human Technopole Coordinating Committee

Milan, 6th February 2017

Agenda

1. Main trends and motivations
2. The investment in research
3. The Human Technopole project: general goals
4. Relevant comparative case-studies for Human Technopole
5. The Human Technopole project: the scientific structure
6. The Human Technopole project: the start-up phase
7. Appendices

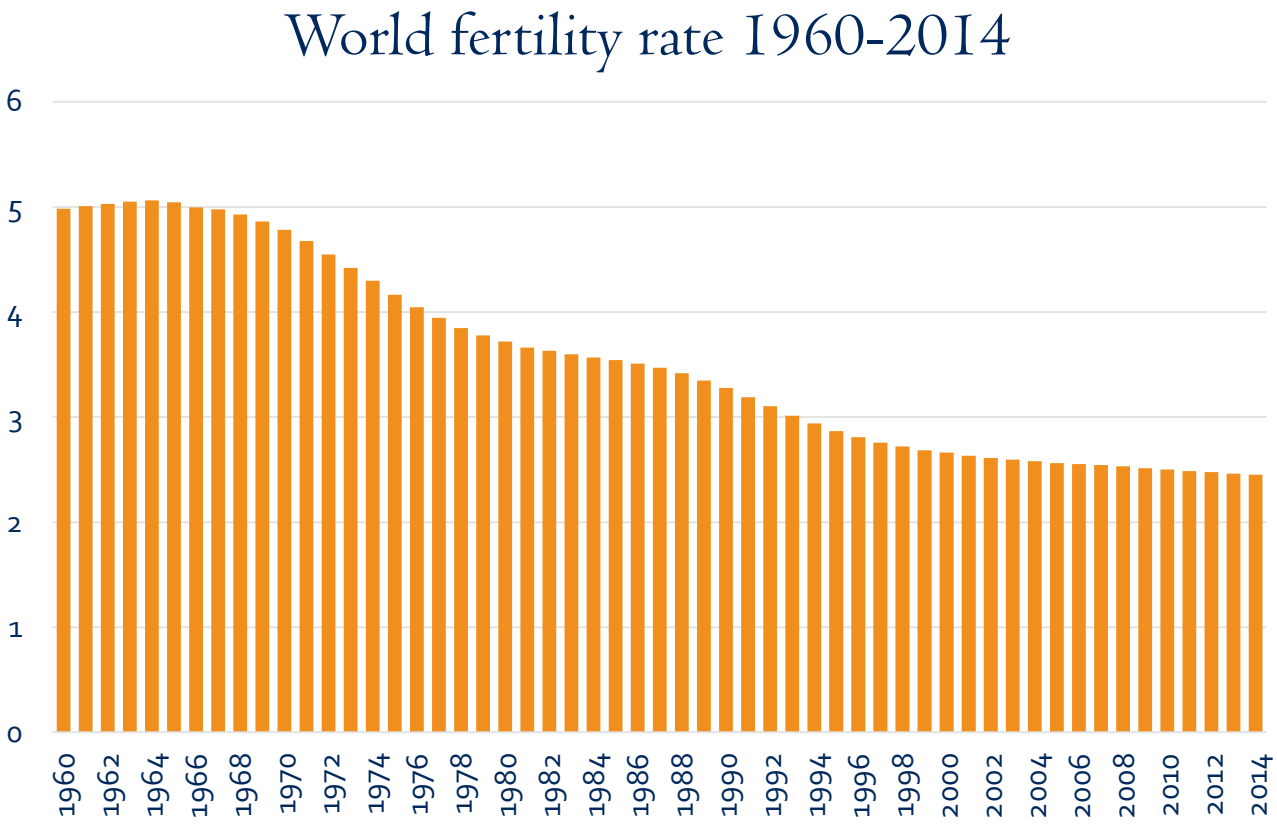
1. Main trends and motivations

- 2040 trends: demography, engines of development, comparison and competition among people
- Cultural and governmental challenges
- Science between method, the pleasure of discovery and the related implications
- A «new enterprise» in the healthcare sectors
- The life science sector in Italy

2040 trends: demography, engines of development, comparison and competition among people

- Engines of development: fertility rate, aging and population
- Innovation as the «only» engine
- Long-term protection of active population
- Support arising from scientific developments
- The future beyond «Guns, germs and steel». There is still competition in science as a state of peace to defeat diseases
- Emerging scientific areas

Engines of development: fertility rate, aging and population



Source: The World Bank data, last update 30th June 2016

Emerging scientific areas

Transport

Nutrition

Life sciences

Energy

Sustainability

New industries (industry 4.0)

Source: Horizon 2020

Cultural and governmental challenges

- Scientific development has always been associated with great cultural and governmental challenges
- Scientific progress cannot be only for few people
  - The most important aspect of scientific discoveries is the extension of their benefits to everybody, thus becoming social achievements
- We need to turn such discoveries into new «rights», hence making public budgets more sustainable
- «Good» behaviors are not prohibitions or impositions. They are rather a natural consequence of good education

Science between method, the pleasure of discovery and the related implications

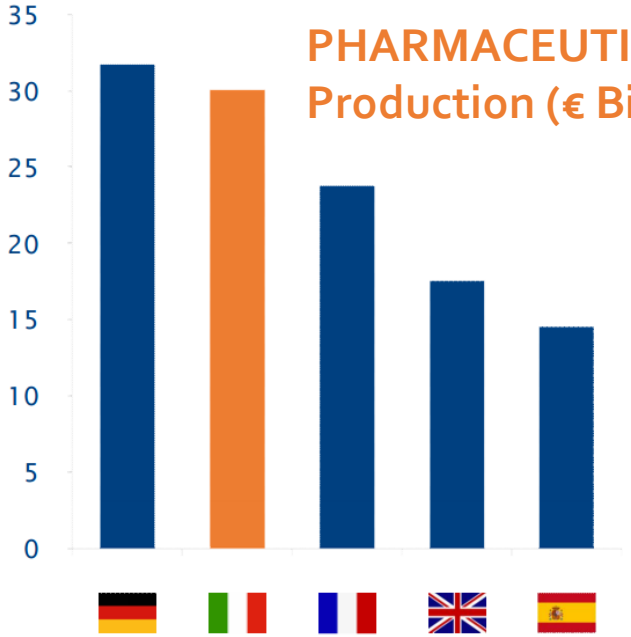
- The value of science is connected to method, uprightness and merit, but also to:
  - Altruism
  - Hope
- Altruism and hope prevent new forms of *scientism* which, although mitigated by history, hide egoism and egocentrism

A «new enterprise» in the healthcare sectors

- It is crucial to combine a research institute with the strengthening of the industry in health technologies
- If excellence in research is not supported by industry, it risks being an «orphan»: it produces knowledge that benefits other Countries
- Italy needs a new industry to be a leader in the field of quality of life. It also needs a large amount of cross-fertilization

The life sciences sector in Italy

Italy is among the leaders in the life-science industries. The Human Technopole project will help the growth in a very competitive sector



PHARMACEUTICAL SECTOR
Production (€ Billion)

Source: Biocat, report 2015 https://goo.gl/f7Ovso

MEDICAL TECHNOLOGIES SECTOR Sales (€ Billion)

Source: Farmindustria, report 2016. Estimation 2015 https://goo.gl/SEdPz4

2. The investment in research

- Global trends
  - Knowledge-driven economy and Lego innovation

- The European goals
  - Lisbon 2000
  - The relaunch towards 2020

Global trends – Knowledge-driven economy and Lego innovation

- In the XXI° century, a significant part of the world economic growth will be driven by a small number of "Knowledge Economy Regions"
- Regions with the right value chain *(ingredients)*, the right culture *(forma mentis)* and "*forti individui*" will perform best
- Lego innovation: recombining knowledges, facing the wind by making the mills work and not by building walls

The European goals – Lisbon 2000 and the relaunch towards 2020

- According to the Treaty of Lisbon (2000), by 2020 3% of GDP should be spent on research and development (vs. 1.9% in Europe and 1.3% in Italy in 2015)

- In 2020, 75% of the active population should work (vs. 72.5% in Europe and 57% in Italy in 2015)

Source: Eurostat

3. The Human Technopole project

- Human Technopole is a national cross-disciplinary research project in Milan's EXPO site.
- Goals
  - Between training, research and industry
  - Key elements
- A 'Boston area' for Italy
- *Infrastructure* and *Facilities*
  - Human Technopole as a *hub*
  - *Cluster*

Human Technopole - Goals

- The project aims to lead Italy towards the co-leadership in the field of quality of life and to ensure better living conditions to all
- The contribution to the existing initiatives is not only scientific and technological, but also:
  - Educational in relation to prevention
  - Organizational in relation to diagnosis and care
  - Political in relation to its implications for social cohesion
  - Industrial in relation to technology transfer processes and the creation of a new industry in healthcare

Human Technopole: between training, research and industry (1/2)

- Human Technopole with regards to the field of research combines with Industry 4.0 projects and with the National Research Program
- Research is a manifold activity and the related technologies are pervasive
- Understanding problems, and finding solutions, require a curiosity-driven, often multidisciplinary, approach. Hence, various skills are needed.

Human Technopole: between training, research and industry (2/2)

- It is possible to «catch up» with a 10-year long industrial production. With this regard, the most innovative sectors – *e.g.* those linked to ageing – can support our work
- Human Technopole should also be the occasion for a cultural growth connected to debates on ethic implications of new discoveries (the human centrality and the need for a humanities/social sciences approach)

Human Technopole and its key elements

- Human Technopole will work with universities and the existing research centers in order not to replicate but to strengthen the network of research infrastructures
- Special focus also on
  - Governance and scientific dissemination
  - Nutrition and sustainability
  - The so-called «third sector» and sociality
  - Ethical questions

Human Technopole: a “Boston area” for Italy

- The project aims to persuade the whole research system
- Wealth tends to concentrate in some geographical areas, however the idea of a balanced and widespread development cannot be overlooked
- The «bell tower» should be seen in terms of development for all communities and of ceaseless dialogue

Human Technopole: infrastructure and facilities

- *Infrastructure* indicates a crucial shared, long-term good which is for common use
- *Facilities* are tools whose aim is to facilitate the work of those who already deal with the topics mentioned above

Human Technopole: a hub

- The Center should systematically act as a «last mile» and as a hub
- The hub increases the value of universities and existing research centers
- The hub should be based on interdisciplinarity as the starting point for connecting and creating new knowledges. This is similar to the concept of intermodality of transport systems
- The hub should support the networking among research centers at global level, thus helping and strengthening connections that already exist among them at local level

4. Relevant comparative case studies for Human Technopole (1/2)

	Starting year	Type of Organization	Country	Staff	Sponsor	Annual Budget (mln €)	m^2
Human Technopole**	2016/17	Foundation	Italy, Milan	1,500	Government	140	30,000
Istituto Italiano di Tecnologia (IIT)	2005/06	Foundation	Italy, Genoa	1,470	Government	96	40,000
Weizmann Institute	1934	Research center***	Israel, Rehovot	3,500	Government	338*	207,600
The Francis Crick Institute	2007	Consortium	UK, London	1,500	46% Government	775	92,900

*Data 2013 **Targets of the project *** 29 km far from Tel Aviv
Data for Istituto Italiano di Tecnologia (IIT): https://www.iit.it/it/institute/facts-and-figures
Data for Weizmann Institute: https://www.weizmann.ac.il/Organic_Chemistry/Rafal/FF.pdf
Data for the Francis Crick Institute: https://www.crick.ac.uk/media/310327/crick_institute_annual_review_2015-2016.pdf

4. Relevant comparative case studies for Human Technopole (2/2)

	Starting year	Type of Organization	Country	Staff	Sponsor	Annual Budget (mln €)	m^2
Wellcome Trust Sanger Institute	1993	Research center	UK, Cambridge	2,000	Mainly Private	588	220,000
DZNE (Neurodeg deseases)	2009	Research center	Germany, Bonn	900	90% Federal 10% State*	66**	38,000

Data for Wellcome Trust Sanger Institute: https://goo.gl/vmyWrT
Data for DZNE: https://goo.gl/Y5W3VH and https://www.dzne.de/en/research-institute-for-neurodegenerative-diseases.html
*90% from Federal Ministry of Education and Research and 10% from the respective federal states containing DZNE sites
** 5 years to go full speed

5. The Human Technopole project: the scientific structure

The initial and approved scientific project will be composed of:

- 7 centers
- 3 facilities

The 7 centers

- C1: Onco Genomics Center
- C2: Neuro Genomics Center
- C3: Agri Food and Nutrition Genomics Center
- C4: Data Science Center
- C5: Computational Life Sciences Center
- C6: Center for Analysis, Decisions, and Society
- C7: Center for Smart Materials and Devices

C1: Onco Genomics Center

- *Mission*: To create a National Reference Center in Onco Genomics that will lay the foundations to extend medical genomics' current benefits to all Italian cancer patients
- Areas of main development
  - *RL1 Clinical Onco Genomics:*
    - ✓ To improve disease prevention and treatment strategies by promoting screening programs, innovative clinical trials and analytical computational tools
  - *RL2 Fundamental Research in Onco Genomics:*
    - ✓ To support continuous knowledge generation and innovation
  - *RL3 Technological Platforms:*
    - ✓ To ensure the ongoing acquisition of the latest state-of-the-art genomics technologies

C2: Neuro Genomics Center

- *Mission:* To apply Precision Medicine to neurodegenerative diseases (Alzheimer's disease, Parkinson's disease and Amyotrophic Lateral Sclerosis)
- Areas of main development
  - *RL1 Neuro Genomics:*
    - ✓ To establish a genomics-based stratification of patients with neurodegenerative diseases
  - *RL2 Models & Mechanisms:*
    - ✓ To identify selected classes of patients with a specific repertory of genomic mutations
  - *RL3 Translational Neuro Genomics:*
    - ✓ To combine genomics-based diagnostics with new pharmacological treatments for neurodegenerative diseases

C3: Agri-Food and Nutrition Genomics Center

- *Mission*: Better nutrition appears to be the main effective, cost-efficient prevention strategy, particularly for chronic non-communicable diseases (NCDs)
- Areas of main development
  - *RL1 Crop Genomics and Biotechnology:* To exploit new traits of potential agricultural and nutritional interest
  - *RL2:Functional and Systems Metagenomics and Metabolomics:* To improve human and plant health via directed intervention in the human microbiome
  - *RL3 Food, Host, and Microbiota Interactions:* To conduct functional studies on immune modulation and nervous system activity
  - *RL4 Personalized Nutrition:* To investigate the human-genome-encoded determinants of immune function, diet, and the metagenome to achieve the self-sustainability of health

C4: Data Science Center

- *Mission:* To develop a scientific framework to efficiently extract information from large sets of heterogeneous data with the aim of generating structured knowledge
- Areas of main development
  - *RL1 Basic Issues in Data Science*: Data managing, information modeling and retrieval, artificial intelligence, machine learning, topological data analysis, data predictions, uncertainty modeling
  - *RL2 Data-driven Genomics*: To understand genome variations in relation to clinical data and how they can be used in Personalized Medicine for cancer and neurodegenerative diseases
  - *RL3 Data-driven Neuroscience*: Topological data-handling methods for analyzing brain structure
  - *RL4 Digital Epidemiology*: Dynamics of health and disease distribution
  - *RL5 Ethical Issues in Data Science:* Privacy, security, data anonymization

C5: Computational Life Sciences Center

- *Mission:* To study disease-associated biological processes in order to discover innovative and personalized therapies for cancer and neurodegenerative diseases
- Areas of main development
  - *RL1 Multiscale Modeling:* To design nanoparticles and medical devices on the nanoscale, and for modeling RNA
  - *RL2 Bioinformatics*: To handle, store, and categorize the huge amounts of data generated by experimental groups
  - *RL3 Software Development and HPC Optimization:* To produce innovative software to handle the large volumes of omics data
  - *RL4 Computational Drug Discovery and Network Pharmacology*: To decipher and characterize new physio-pathological pathways using chemical biology approaches

C6: Center for Analysis, Decisions, and Society

- *Mission*: To develop original research at the intersection of computer science, mathematics, statistics, artificial intelligence, and socioeconomic sciences, endowing the HT with advanced data-handling tools and solutions

- Areas of main development
  - *RL1 HW&SW Conceptual Design*: Hardware and software infrastructure research; machine learning embryonic technologies
  - *RL2 Information Processing:* Data management, integration, and fusion; statistical methods for complex and high dimensional data and data visualization
  - *RL3 Modelling and Managing Socioeconomic Systems*: Developing novel models for the big data analysis of activities
  - *RL4 Decisions and Policies:* Sustaining the production of robust identifying assumptions for causal analysis

C7: Center for Smart Materials and Devices

- *Mission:* To develop material science and nanotechnologies for applications in food, nutrition, health, and medicine

- Areas of main development
  - *RL1 Nanotechnology for Food and Human Health:* to develop low-cost, high-sensitivity assays for the rapid on-field testing of food and biological specimens
  - *RL2 Smart Packaging:* new smart packaging technologies for food
  - *RL3 Valorization of Natural Polymers, Food Residues, and Agricultural Residues:* to valorize food waste, agro-waste, pure natural fibers and polymers to develop easily scalable methods for producing fully biocompatible and sustainable biomaterials and plastics
  - *RL4 Water Cycle; RL5 Human Sensing:* to develop novel nanotechnologies for water analysis and purification

The 3 facilities

- F1: Central Genomics Facility
- F2: Imaging Facility
- F3: Data Storage and High-Performance Computing Facility

F1: Central Genomics Facility

- The Central -Genomics Facility will gather the *Common Technology-Development Platforms* common to OGN, NGC, and AFNGC and the high-throughput *Next-Generation Sequencing infrastructure* for large population screenings
- The F1 Facility will comprise specialized technological platforms run by dedicated technologists (highly specialized technicians), and coordinated by teams of Principal Investigators from the 3 centers. This structure will allow each technological platform to be developed and adapted to meet the scientific needs of the OGC, NGC, and AFNG

F2: Imaging Facility

- To place the Human Technopole at the forefront of innovation in biomedical research, a state-of-the-art cryo-EM infrastructure is needed. This infrastructure should be available to a large group of structural biologists, who are already proficient in the biochemistry relevant to sample preparation. At steady state, this Facility will comprise labs for Electron Diffraction Tomography and Electron Cryo-Tomography

F3: Data Storage and High-Performance Computing Facility

- This Facility will undertake joint endeavors in HPC and big data to create the basis for a national infrastructure. These endeavors include i) designing an integrated common sharing technology, ii) developing domain-oriented problem-solving solutions intended to become benchmarks and standards, iii) facilitating efficient access to databases of large volumes of structured and unstructured data, and iv) creating workflow strategies to close the dramatic gap between the next-generation informatics and computational tools and the ultimate goal of Personalized Medicine

- This aim will be achieved by creating mirror sites of publicly available genomic data and by enabling the electronic management of health records

6. The Human Technopole project: the start-up phase

- The start-up phase
- Key facts after the Milan Universal Exposition in 2015
- The Coordinating Committee's composition and tasks
- The project structure of the Italian Institute of Technology (IIT)
- The working groups of the Coordinating Committee
- Calendar for 2017 (6th February 2017)

The start-up phase

- The project will have a start-up phase lasting up to 2 years (from September 2016) with the aim of:
  1. Starting the set-up of the main infrastructure
  2. Starting the collaboration network
  3. Starting the recruitment of senior scientific staff, exclusively through international calls
  4. Organizing the core HT administration offices

Key facts after the Milan Universal Exposition in 2015

1. Origin at governmental level (November 2015, after the Milan Universal Exposition)
2. Preparation of the scientific proposal by the IIT and University (from January to May 2016)
3. Project approval by international scientific referees (July 2016)
4. Government decree establishing the project structure within the IIT and the composition of the Coordinating committee under the Government supervision (September 2016)
5. Formal appointment and first meeting of the Coordinating Committee (29 November 2016)
6. 'Stability law' (December 2016): final long term funding of the project, request to the Coordinating Committee to write the Statute of the forthcoming HT legal entity (HT Foundation) initially composed of the Ministry of Health, the Ministry of Education, University and Research (MIUR) and the Ministry of Economy and Finance (MEF)

The Coordinating Committee - Composition

Role	Name
Chair and member appointed by MIUR*	Prof. Stefano Paleari
Member appointed by MEF**	Prof. Marco Simoni
IIT Director	Prof. Roberto Cingolani
IIT Chairman	Prof. Gabriele Galateri
Rector of Università di Milano Bicocca	Prof. Cristina Messa
Rector of Politecnico di Milano	Prof. Ferruccio Resta
Rector of Università Statale di Milano	Prof. Gianluca Vago
Chairman of Italian National Research Council (CNR)	Prof. Massimo Inguscio
Chairman of National Institute of Health (ISS)	Prof. Walter Ricciardi
International scientist	Prof. Alessandro Vispignini (Northeastern University)
International scientist	Prof. Munther A. Dalheh (MIT)
International scientist	Prof. Martina C. Cornel (VU University Medical Center)

* Ministero dell'Istruzione, dell'Universita e della Ricerca

** Ministero dell'Economia e delle Finanze

The Coordinating Committee - Tasks

- Preparation of the Statute, which aims to:
  - Propose the name of the Foundation (it might be Human Technopole again)
  - Propose the governance of the Foundation
- Supervision of the start-up phase and coordination with the project structure of IIT

The project structure of IIT

IIT will make available a Project Structure Team to support the start up phase

Administrative Project Structure (up to 16,5 FTE *)
Coordinator: **Francesca Cagnoni**

- HUMAN RESOURCES
- ADMINISTRATION
- MANAGEMENT & CONTROL
- ICT
- LEGAL
- SECRETARIAT

Scientific Project Structure
Coordinator: **Fabio Pammolli**

- SELECTION OF HT DIRECTOR
- START UP OF THE CENTRAL FACILITIES
- JOINT LAB WITH POLIMI

* FTE = Full Time Equivalent

The working groups of the Coordinating Committee

Activity	Coordinator	Members	
Statute of the Foundation	Marco Simoni	Gabriele Galateri Gianluca Vago	
Masterplan	Ferruccio Resta	Cristina Messa Gianluca Vago	
Performance indicators	Massimo Inguscio	Walter Ricciardi Martina C. Cornel Alessandro Vispignini Munther A. Dalheh	
Selection criteria and recruitment rules	Walter Ricciardi	Cristina Messa Ferruccio Resta Massimo Inguscio Martina C. Cornel Alessandro Vispignini Munther A. Dalheh	

Calendar for 2017 (6th February 2017)

- February 2017: Call for selection of the HT Director General
- March 2017: Committee Meeting
- June 2017: Committee Meeting
- September 2017: Start selection of the HT Scientific Director
- January 2018: HT Foundation

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Appendices

Agenda

- Appendix 1: the international comparison
- Appendix 2: the Italian situation in the research sector by number

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Appendix I
The international comparison

International comparison: the context and some benchmarks

- Cluster
- Identifying the most active regions in the world:

- United States
  - Silicon Valley and Boston area

- Asia and Middle East
  - Singapore, Hong Kong, Seoul and Tel Aviv

- Europe
  - London, Cambridge, Heidelberg, Leuven, Amsterdam, Bonn

Cluster – The value chain

Knowledge centers

Entrepreneurs and behavior patterns

Liquidity

Financial markets

Infrastructures

Cluster policies

Presence of international companies

Networks
Governments

Quality of life

Source: Gibbon, Sexian e Hinoul

The importance of international comparison

- The search for uniqueness is necessary. Uniqueness can be achieved only through international comparison. The latter acts as a «compass»
- International comparison is fundamental. However, it should not be conducted by adopting a «subaltern» approach and attention should be paid to some elements revealing our country specificity

Most active regions in the world: United States

	Italy	California	USA
Km² (k)	301.3	423.9	9,834
Inhabitants (mln)	60.6	39.5	321.8
GDP per capita (k€)[a]	25.6	51	46
GERD per capita (€)	360[b]	2,168[a]	1,165
R&D FTE (% of total employment)[e]	1.1	n.a.	0.8
Patents (k)[c]	4.2	39.1[e]	36.9
	Lombardy	**Silicon valley**	**Massachusetts**
Km² (k)	23.8	4.8	27.3
Inhabitants (mln)	10	3	6.5
Inhabitants (%)	16.5[a]	7.6*[c]	2[a]
R&D FTE (% of total employment)	1.2[e]	n.a.	n.a.
Patents (%)	21[d]	43[e]	19[c]
	Milan	**San Francisco**	**Boston**
Km²	182	121	232
Inhabitants (mln)	1.3	0.8	0.6

Data 2016 [a] Data 2011 [b] Data 2015 [c] Data 2014 [d] Data 2012 [e] Data 2013

*San Jose metropolitan region

Source: Eurostat, Us Patent and Trademark, Bureau of Economic Analysis and National Center for Science and Engineering Statistics and Office

Most active regions in the world: Asia and the Middle East

	Lombardy	Singapore	Hong Kong	Israel	South Korea
Km² (k)	23.8	0.7	1.1	20.8	100.2
Inhabitants (mln)	10	5.5	7.3	8.5	50.6
GDP per capita (k€)[a]	33.9	49.7	32.8	31.5	22.6
GERD per capita (€)	464[b]	1,657[c]	366[c]	1,322[c]	904
R&D FTE (% of total employment)	1.2[e]	1.0[c]	0.7[c]	2.2[c]	1.6[e]
Patents (k)	0.9[d]	0.3[c]	0.1[c]	1.3[c]	6.4
	Milan			**Tel Aviv**	**Seoul**
Km²	182			52	605
Inhabitants (mln)	1.3			0.4[b]	10.3

Data 2016

[a] Data 2011 [c] Data 2014

[b] Data 2015 [d] Data 2012 [e] Data 2013

Source: Eurostat, World Bank and Unesco

Most active regions in the world: Europe

	Italy		UK	Belgium	Germany	Netherlands
Km² (k)	301.3		242.5	30.5	357.0	41.5
Inhabitants (mln)	60.6		53.0	11.2	82.2	16.9
GDP per capita[a] (k€)	25.6		29.6	34.5	33.3	35.9
GERD per capita (€)[b]	360		676	895	1,074	806
R&D FTE (% of total employment)[e]	1.1		1.3	1.5	1.5	1.5
Patents (k)[c]	4.2		5.4	1.5	20.7	3.5
	Lombardy		**Cambridge shire**	**Flanders**	**Baden-Württemberg**	**North Holland**
Km² (k)	23.8		3.4	13.5	35.7	4.1
Inhabitants (mln)	10		0.7	6.5	10.8	2.8
Inhabitants (%)	16.5		1.4	57.6	13.1	16.3
R&D FTE (% of total employment)[e]	1.2		1.9	1.7	2.5	1.6
Patents (%)[d]	21		4	12	20	6
	Milan	**London**	**Cambridge**	**Leuven**	**Heidelberg**	**Amsterdam**
Km²	182	1.572	41	57	109	219
Inhabitants (mln)	1.3	8.7	0.1	0.1	0.2	0.8

Data 2016
*NUTS 1 (North East)

[a] Data 2011 [b] Data 2015 [c] Data 2014 [d] Data 2012 [e] Data 2013

Source: Eurostat

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Appendix 2
The Italian situation in the research sector by number

The Italian situation in the research sector by numbers – The need to buck the trend

Italy	2008	2009	2010	2011	2012	2013	2014	2015	2016*	Δ (2008-2016)	Δ %
Tenured academic staff	**62,768**	**60,882**	**57,748**	**56,449**	**54,929**	**53,446**	**51,839**	**50,336**	**48,966**	**-13,802**	**-22.0%**
Full Professors	18,929	17,880	15,854	15,242	14,522	13,890	13,263	12,867	12,689	-6,240	-33.0%
Associate Professors	18,256	17,567	16,955	16,611	16,143	15,810	17,541	20,037	19,814	1,558	8.5%
Assistant Professors	25,583	25,435	24,939	24,596	24,264	23,746	21,035	17,432	16,463	-9,120	-35.6%
Non-tenured academic staff	**460**	**635**	**1,152**	**1,588**	**2,395**	**3,034**	**3,564**	**4,118**	**4,754**	**4,294**	
Art. 24 comma 3-a L. 240/10			3	148	1,118	1,972	2,611	2,971	3,234	3,234	
Art. 24 comma 3-b L. 240/10				3	16	114	296	696	1,276	1,276	
Art.1 comma 14 L. 230/05	460	635	1,149	1,437	1,261	948	657	451	244	-216	-47.0%
Total academic staff	**63,238**	**61,534**	**58,937**	**58,080**	**57,384**	**56,604**	**55,602**	**54,750**	**54,007**	**-8,488**	**-13.4%**
Research fellows	**na**	**na**	**na**	**na**	**na**	**16,002**	**15,511**	**13,940**	**13,606**	**-2,396**	**-15.0%**

Data at 31st December of each year. * Academic staff 2016 at 4th November

* Research fellows: var. 2015-2013

Source: Elaboration of MIUR and CINECA data

The Italian situation in the research sector by numbers – The number of researchers in a comparative perspective

	Total number of researchers*	Total number of HE researchers	Total number of researchers per 1000 employed
UK	466,689	330,382	8.91
Germany	549,283	261,657	8.37
Spain	208,767	117,925	6.92
France	366,299	113,058	9.79
Italy	163,925	77,737**	4.77

*A researcher is a professional engaged in the conception or creation of new knowledge, products, processes, methods and systems, as well as in the management of the projects concerned (definition by Eurostat)
** Universities and research centers

Source: Eurostat and OECD data, year 2013

The Italian situation in the research sector by numbers – R&D expenditure

	Total R&D expenditure (€ per inhabitant)		R&D expenditure in the HE sector (% GDP)	
	2008	2014	2008	2014
UK	523	590	0.43	0.43
Germany	809	1,045	0.43	0.51
Spain	322	276	0.35	0.35
France	642	727	0.41	0.46
Italy	324	367	0.35	0.39

Source: Eurostat