



# Il sistema della ricerca pubblica in Italia: proposte per una riforma costruttiva in vista di una nuova politica economica

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Carrozza  
Scuola Superiore Sant'Anna**

**Pavia, 26/6/2014**



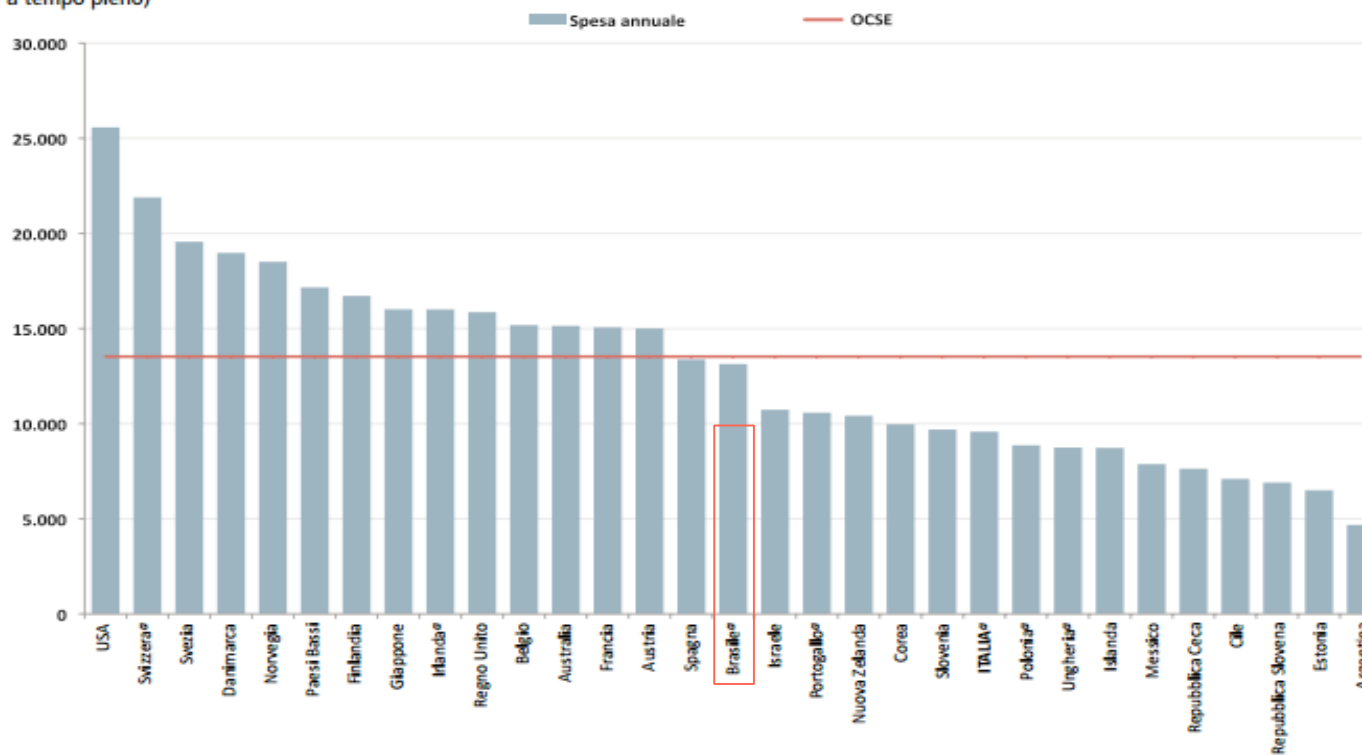
# Ricerca & Sviluppo & Innovazione in ITALIA



## IL CONFRONTO INTERNAZIONALE

I dati OCSE annualmente pubblicati nel rapporto *Education at a Glance* indicano come la spesa in istruzione terziaria in rapporto al numero degli studenti sia in Italia inferiore a quella media dei paesi OCSE (-30%) (figura 34), mentre è sostanzialmente allineata alla media per i gradi inferiori dell'istruzione. Anche se il confronto basato sul numero degli studenti pone problemi di comparabilità legati alla difficoltà di misurare in maniera omogenea il numero degli studenti tenendo conto di coloro che abbandonano o terminano gli studi oltre la durata legale, tale indicazione trova conferma dal rapporto tra spesa in istruzione universitaria e Prodotto interno lordo, anch'esso sensibilmente inferiore alla media (-37%).

Fig. 34 – Spesa annuale in istruzione terziaria per studente. Anno 2010 (dollari americani a parità di potere d'acquisto, per studente equivalente a tempo pieno)

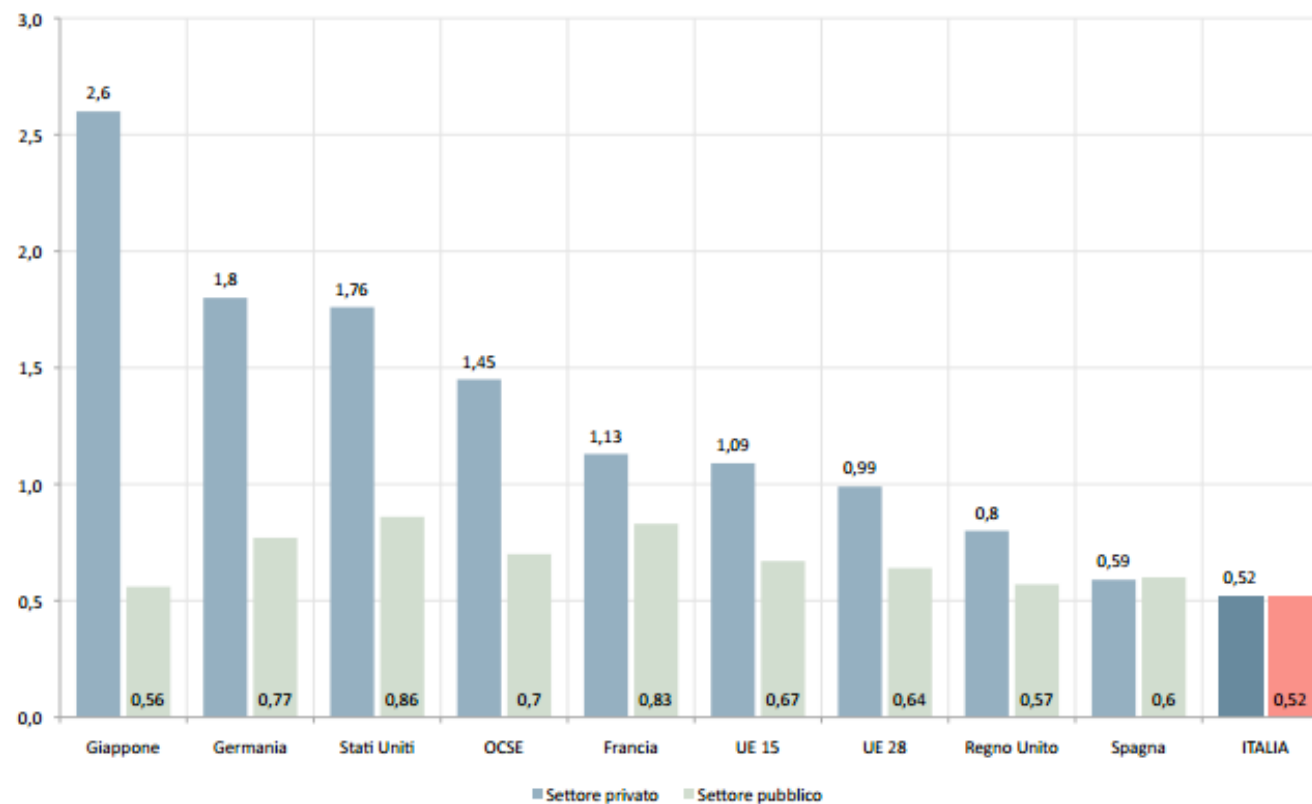


<sup>a</sup> Solo istituzioni pubbliche.

(Fonte: OCSE – *Education at a Glance* 2013)



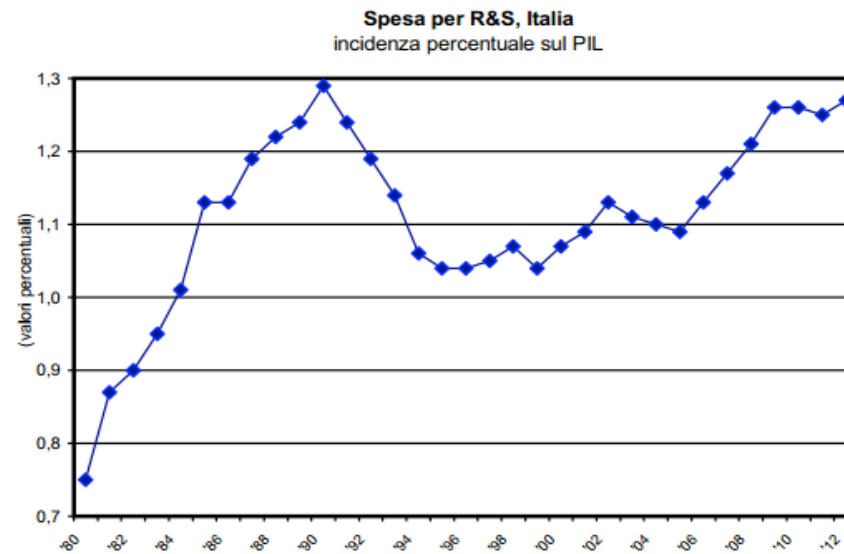
Fig. 58 – Spesa in R&S su Prodotto interno lordo per fonte di finanziamento. Media 2006-2010



(Fonte: OCSE - Main Science and Technology Indicators 2013)



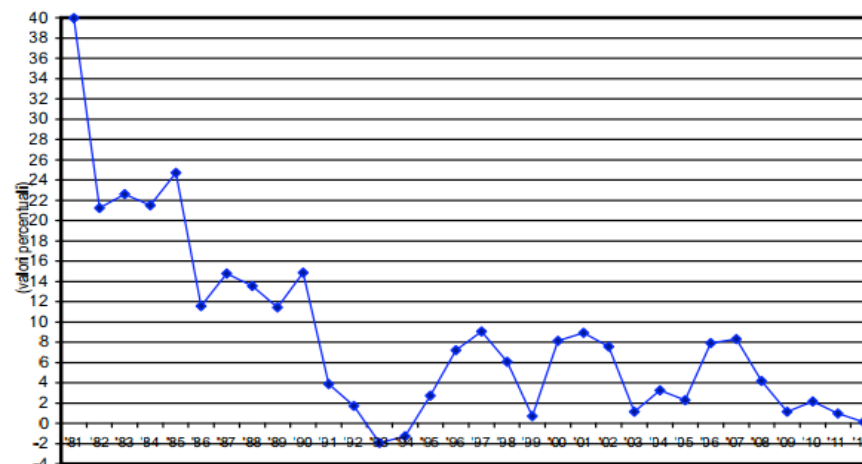
# Spesa in R&S su PIL: andamento



Fonti: ISTAT

ultimo aggiornamento: gennaio 2014

**Fig. 1.1b**  
**Spesa per R&S, Italia**  
variazione percentuale su anno precedente  
(a prezzi correnti)



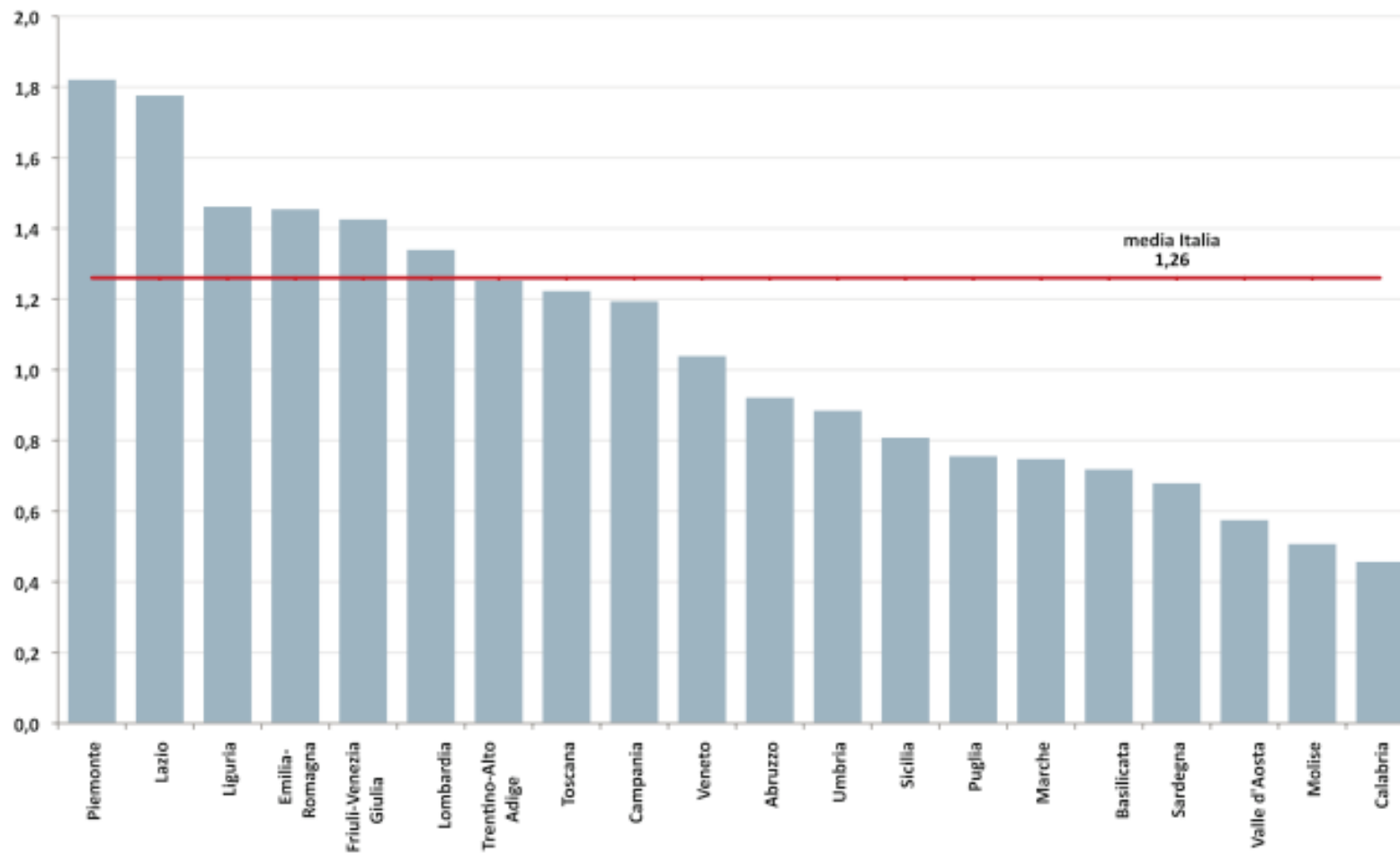
Fonti: ISTAT

ultimo aggiornamento: gennaio 2014



# Spesa in R&S su PIL per regione

Fig. 57 – Spesa in R&S su Prodotto interno lordo regionale. Anno 2010



(Fonte: Istat - Rilevazione statistica sulla R&S)

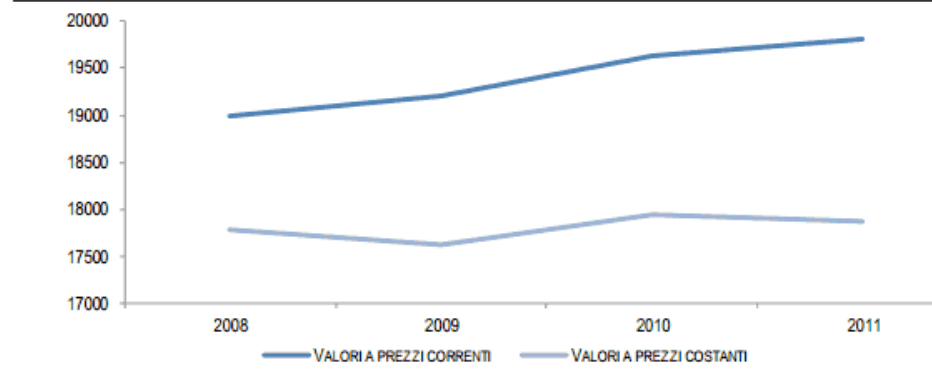


# R&S spesa del settore privato

## Aumenta il contributo del settore privato alla R&S *intra-muros*

Nel 2011, l'aumento della spesa in termini nominali per l'insieme dei settori istituzionali è dello 0,9% e appare in linea con la tendenza di moderata crescita degli anni recenti. In termini reali, invece, si assiste a un decremento della spesa (-0,4%). Se si considera il periodo 2008-2011, l'incremento della spesa al tasso medio annuo è stato dell'1,1% in termini nominali e dello 0,1% in termini reali (Figura 1).

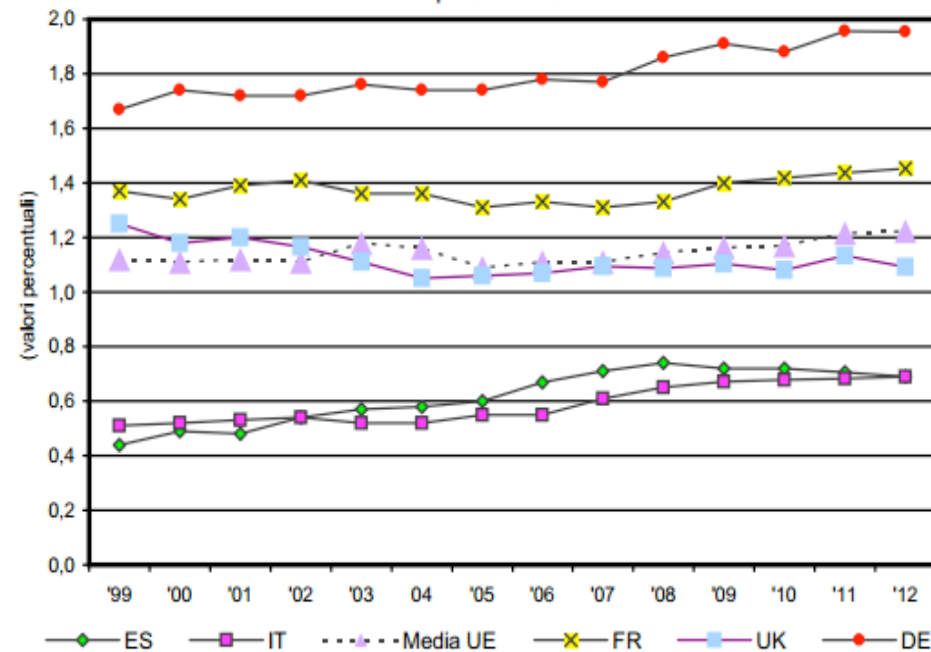
FIGURA 1. SPESA PER R&S *INTRA-MUROS* Anni 2008-2011, milioni di euro



■ L'unico settore a mostrare una crescita della spesa per R&S è quello delle imprese (+2,3%); nelle università la spesa registra una variazione nulla, mentre diminuisce nelle istituzioni private non profit (-6,8%) e nelle istituzioni pubbliche (-1,3%).

■ Il peso della spesa privata su quella totale passa dal 57,5% al 58%, per l'aumento della spesa delle imprese private e il parallelo calo di quella registrata nelle istituzioni pubbliche.

## Spesa per R&S, imprese, nei principali Paesi europei incidenza percentuale sul PIL

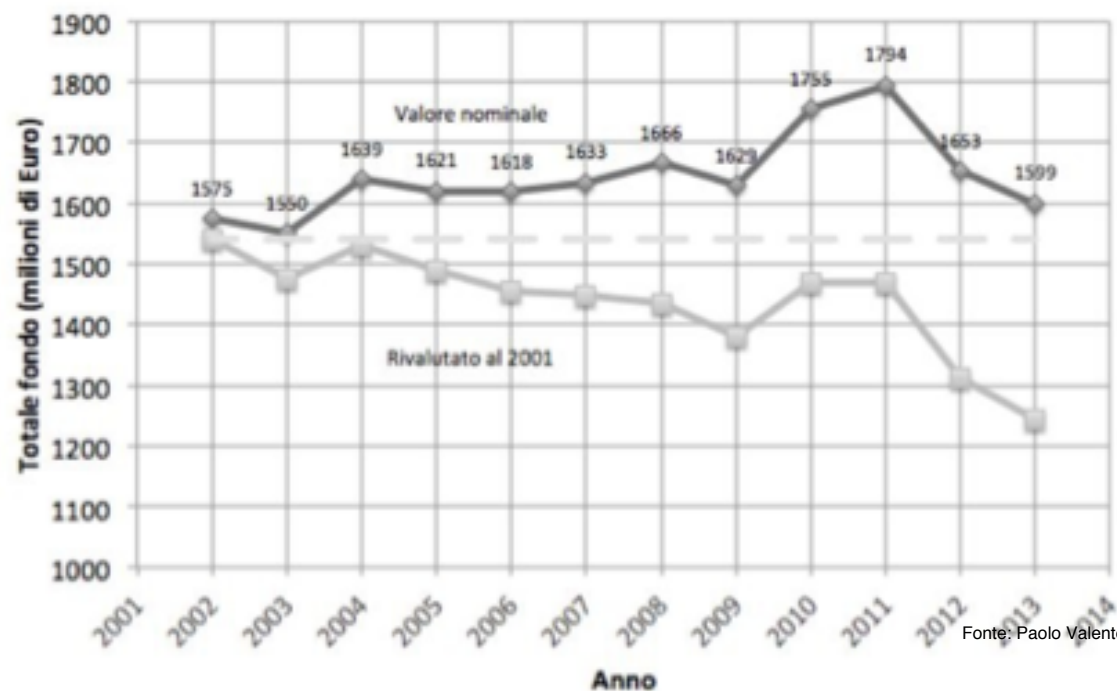




Voci	2008	2009	2010	2011	2012	2013	Variazione 2008/2013
Finanziamenti al sistema universitario	8.456,9	8.430,5	7.978,9	7.378,6	7.293,3	6.876,0	-18,7
Finanziamenti sostegno studenti e diritto allo studio	506,2	748,0	457,9	390,9	475,1	426,5	-15,8
<b>Totale</b>	<b>8.963,1</b>	<b>9.178,5</b>	<b>8.436,8</b>	<b>7.769,5</b>	<b>7.768,4</b>	<b>7.302,4</b>	<b>-18,5</b>

(Fonte: Ragioneria dello Stato – Rendiconto generale dello Stato e Bilancio assestato 2013)

## Fondo Ordinario Enti di ricerca

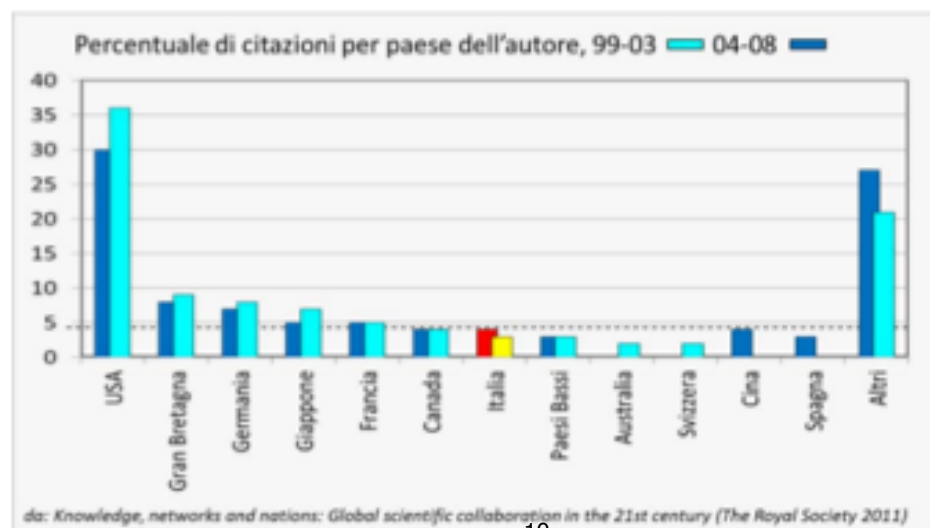
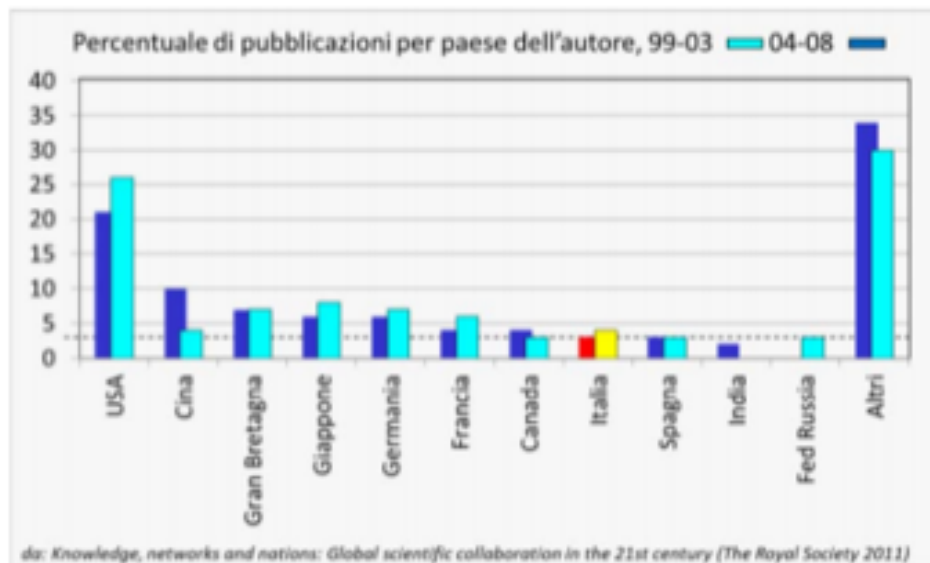


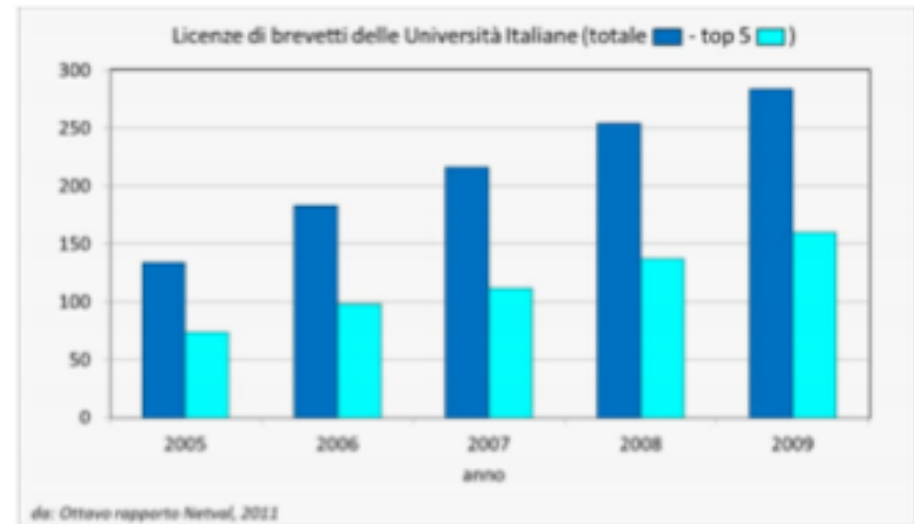
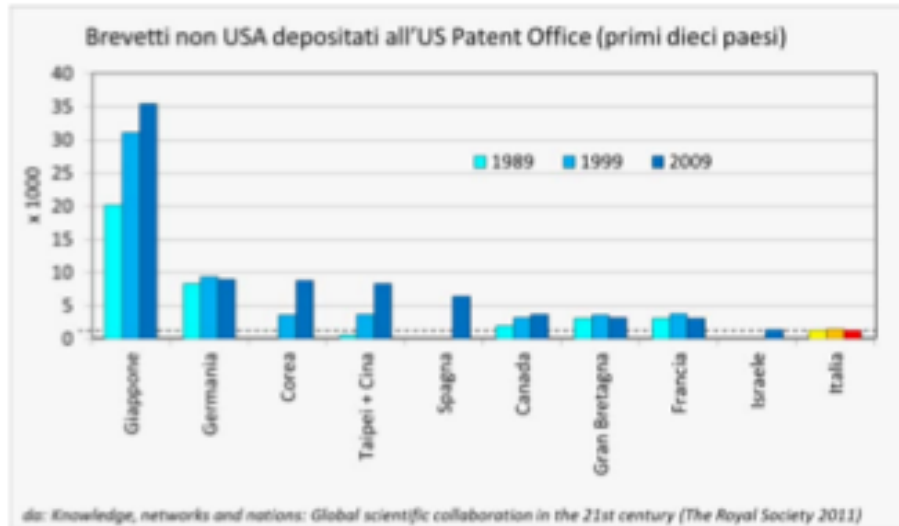
Fonte: Paolo Valente





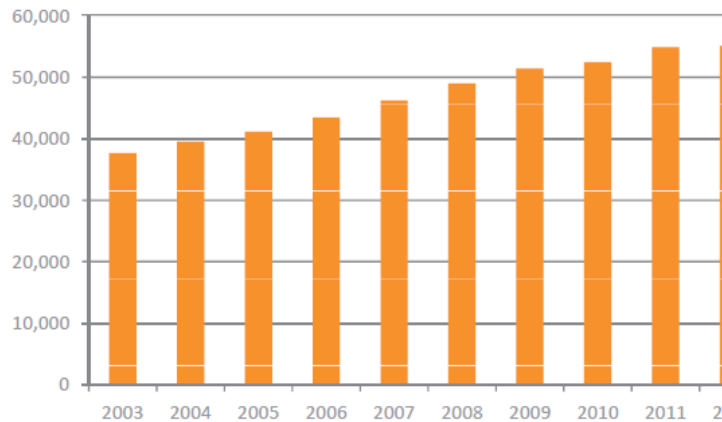
# LA VALUTAZIONE DELLA NOSTRA RICERCA



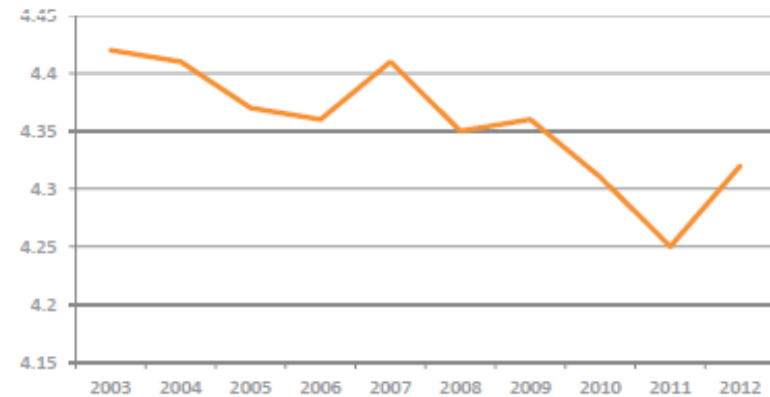




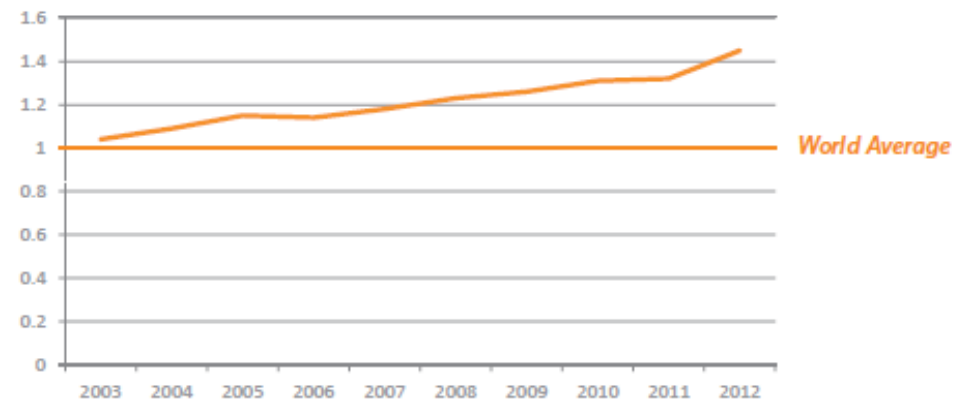
Output of Papers Indexed in Web of Science (2003 - 2012)



Percent World Share of Papers in Web of Science (2003 - 2012)



Relative Citation Impact of Papers Indexed in Web of Science (2003 - 2012)



Population: 59.7 million (census 2012, Istituto Nazionale di Statistica)

GDP (PPP): 1,833 billion \$ (est. 2012, International Monetary Fund)

GERD (billion current PPP\$): 24.8 (2011, MSTI, OECD)

GERD as % of GDP: 1.25 (2011, MSTI, OECD) BERD as % of GDP: .56 (2010, MSTI, OECD)

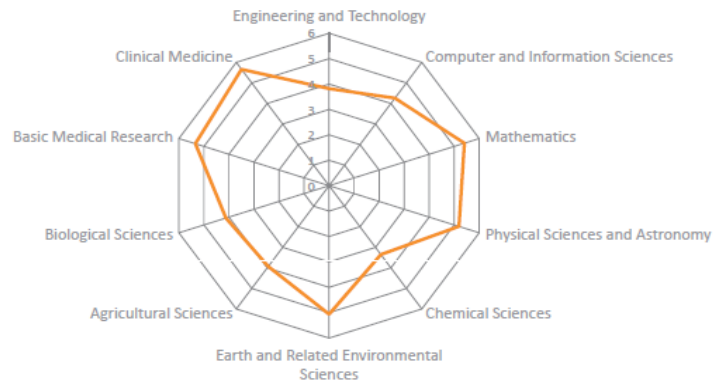
Researchers (FTE) thousands: 106.8 (2011, MSTI, OECD)

R&D personnel per thousand labor force: 9.25 (2011, MSTI, OECD)

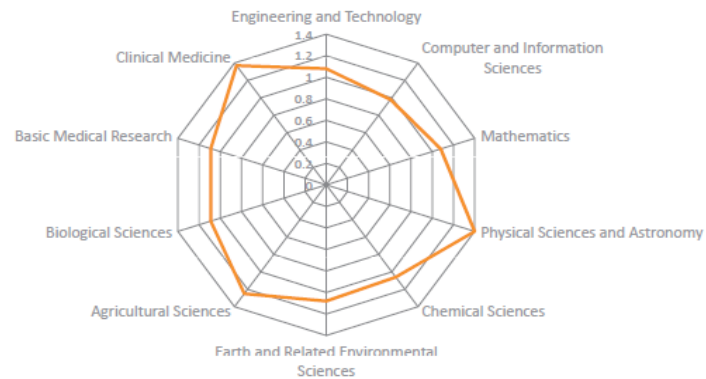


# Citation Impact

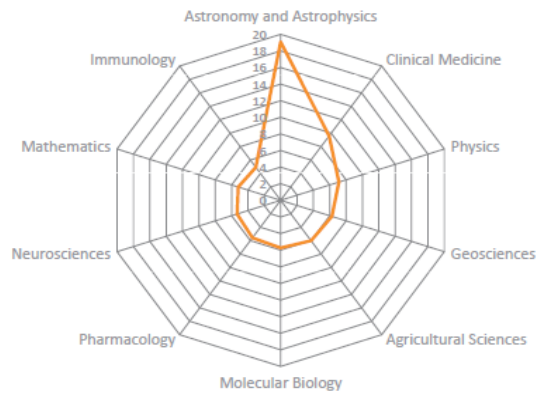
**Percent World Share of Papers in Select OECD Science Fields (2008 - 2012)**



**Relative Citation Impact of Papers in Select OECD Science Fields (2008 - 2012)**



**Top 10 ESI Fields by Percent World Share of Highly Cited Papers (2002 - 2011)**

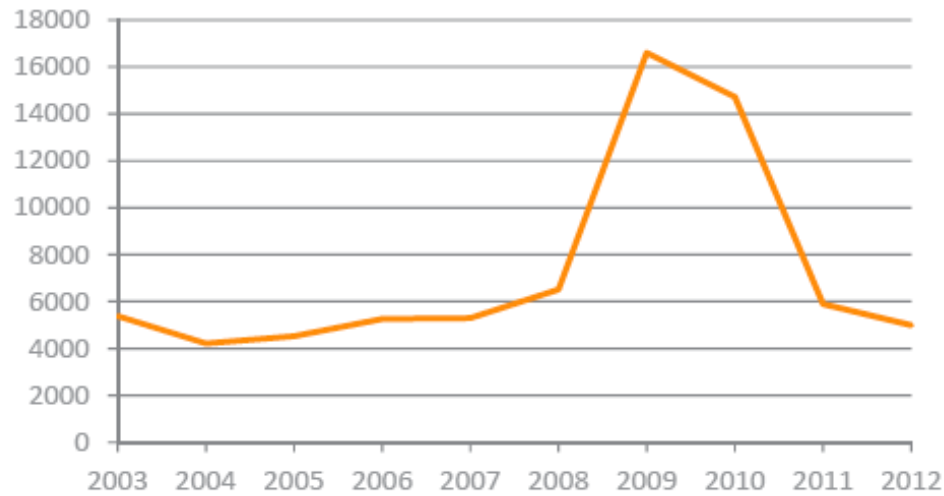




# ITALY

## Intellectual Property Research

IT Patent Applications with IT Priority 2003-2012



Source: Thomson Reuters Derwent World Patents Index

Resident vs. Non-Resident

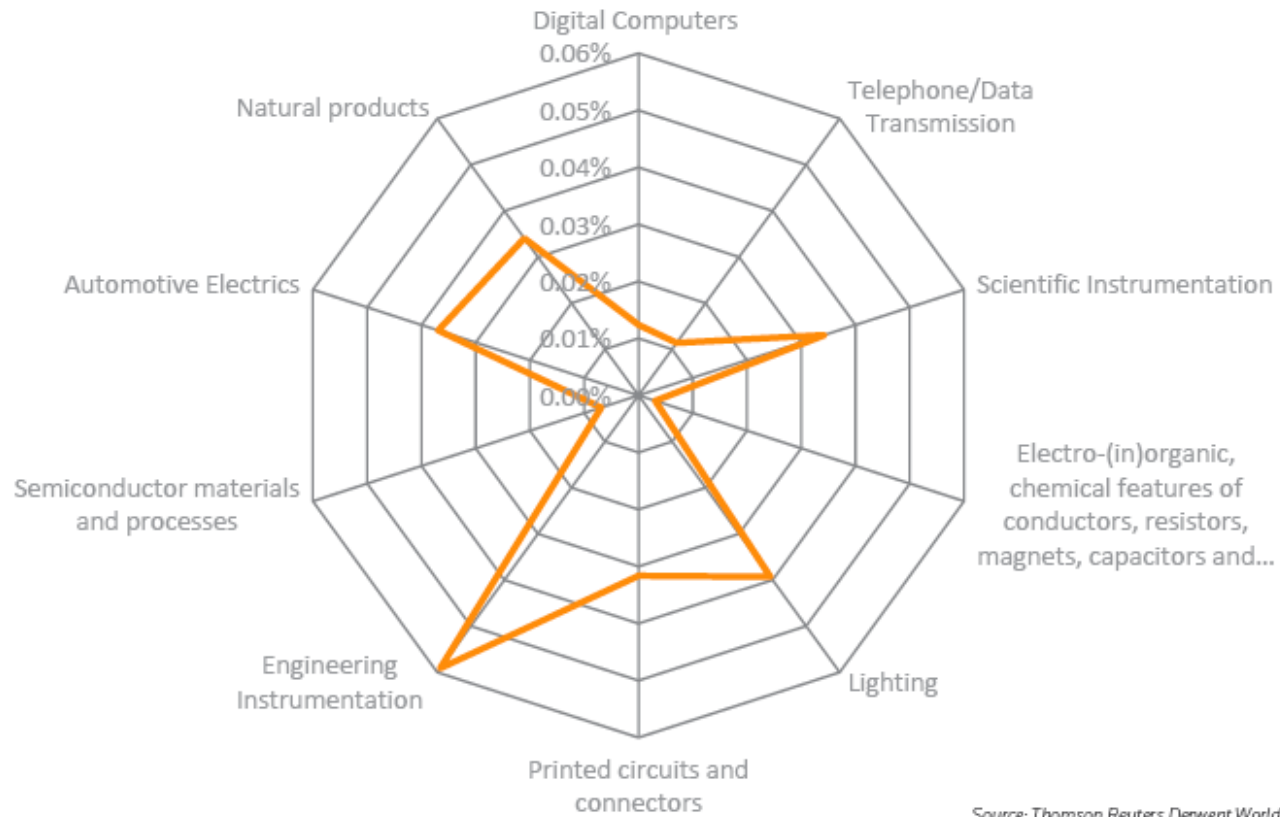


Source: Thomson Reuters Derwent World Patents Index



Source: Thomson Reuters Derwent World Patents Index

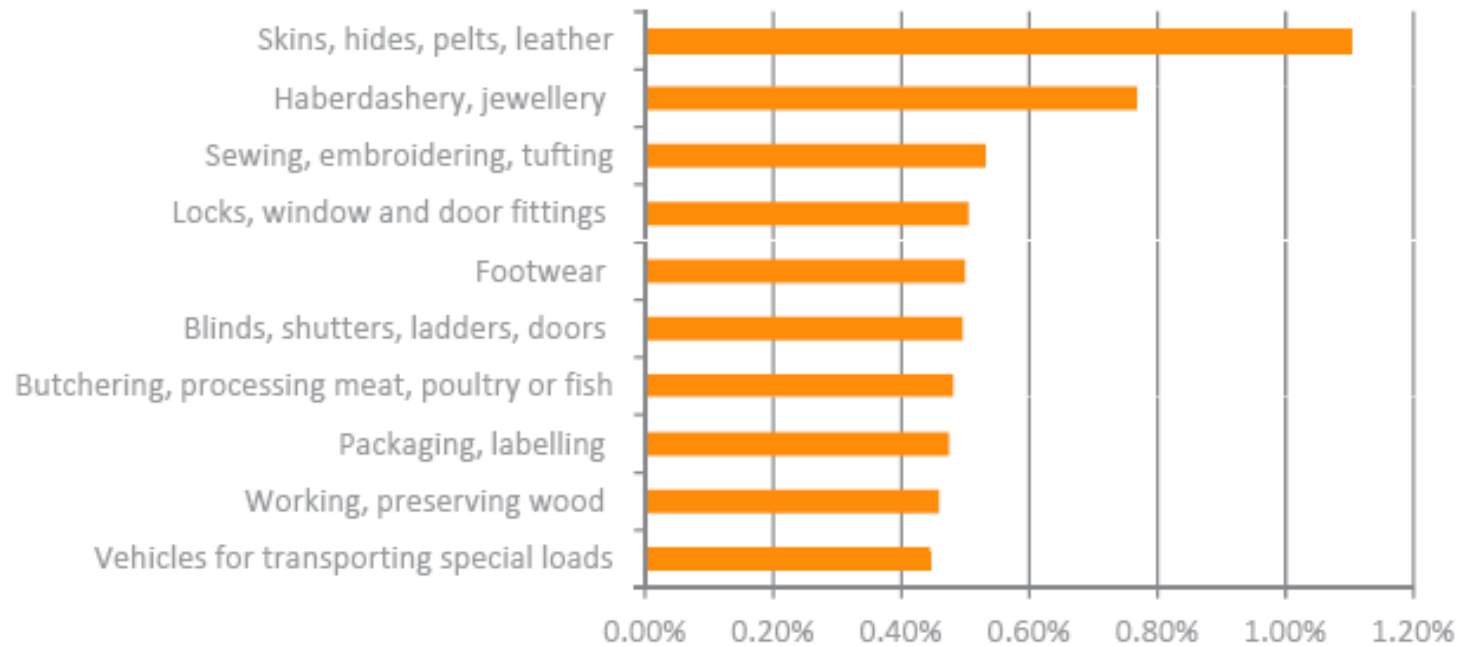
### Share of Top 10 Global Technologies 2012



Source: Thomson Reuters Derwent World Patents Index



### Share of Global Inventions 2012



Source: Thomson Reuters Derwent World Patents Index





COMPANY - FOREIGN & RESIDENT	ALL IT INVENTIONS 2012
BOSCH GMBH ROBERT	20
MILANO POLITECNICO	13
GD SPA	7
INDESIT CO SPA	7
ENEA ENTE NUOVE TECNOLOGIE ENERGIA	6
FOND IST ITAL DI TECNOLOGIA	6
GRUPPO CIMBALI SPA	6
ISI HOLDING SRL	6
ENI SPA	5
IND MAGNETI MARELLI SPA	5

Coverage of Italian patent documents is restricted to type B documents (patents of invention – second publication), and analyses are based on this data. Italian priority patents averaged 5,000 p.a. over the last decade with a brief surge to over 15,000 applications in 2009 to 2010 returning to former levels in 2011 to 2012. Over the decade, resident patents form a larger proportion in 2012 compared to 2003. Italy's share of global Top 10 technologies is very low overall, the highest being just 0.06% in engineering instrumentation followed by lighting

COMPANY - RESIDENT	IT INVENTIONS WITH IT PRIORITY 2012
MILANO POLITECNICO	13
GD SPA	7
INDESIT CO SPA	7
ENEA ENTE NUOVE TECNOLOGIE ENERGIA	6
FOND IST ITAL DI TECNOLOGIA	6
GRUPPO CIMBALI SPA	6
ISI HOLDING SRL	6
ENI SPA	5
IND MAGNETI MARELLI SPA	5
META SYSTEM SPA	5

at 0.04%, and scientific instrumentation, automotive electrics and natural products at around 0.035% each. Italian patenting relative to global patenting is focused on technologies related to the fashion industry (skins, hides, haberdashery, jewelery, sewing and embroidery). Only one foreign company featured in the list of Top 10 companies with Italian basics in 2012 (Robert Bosch); the remainder are a mixture of Italian companies and academic institutes.



# Country ranking based on scientific publications

	Country	Documents	Citable documents	Citations	Self-Citations	Citations per Document	H index
1	United States	7.063.329	6.672.307	129.540.193	62.480.425	20,45	1.380
2	China	2.680.395	2.655.272	11.253.119	6.127.507	6,17	385
3	United Kingdom	1.918.650	1.763.766	31.393.290	7.513.112	18,29	851
4	Germany	1.782.920	1.704.566	25.848.738	6.852.785	16,16	740
5	Japan	1.776.473	1.734.289	20.347.377	6.073.934	12,11	635
6	France	1.283.370	1.229.376	17.870.597	4.151.730	15,60	681
7	Canada	993.461	946.493	15.696.168	3.050.504	18,50	658
8	Italy	959.688	909.701	12.719.572	2.976.533	15,26	588
9	Spain	759.811	715.452	8.688.942	2.212.008	13,89	476
10	India	750.777	716.232	4.528.302	1.585.248	7,99	301
11	Australia	683.585	643.028	9.338.061	2.016.394	16,73	514
12	Russian Federation	586.646	579.814	3.132.050	938.471	5,52	325
13	South Korea	578.625	566.953	4.640.390	1.067.252	10,55	333
14	Netherlands	547.634	519.258	10.050.413	1.701.502	21,25	576
15	Brazil	461.118	446.892	3.362.480	1.151.280	10,09	305
16	Taiwan	398.720	389.411	3.259.864	790.103	10,41	267
17	Switzerland	395.703	377.016	7.714.443	1.077.442	22,69	569
18	Sweden	375.891	361.569	6.810.427	1.104.677	20,11	511
19	Poland	346.611	339.712	2.441.439	652.956	8,25	302
20	Turkey	306.926	291.814	1.935.431	519.675	8,24	210
21	Belgium	299.077	285.735	4.696.153	701.283	18,16	454
22	Israel	224.674	215.590	3.663.004	530.340	17,78	414
23	Austria	214.844	204.243	3.047.983	433.709	16,67	378
24	Denmark	208.227	198.923	3.876.514	573.278	21,56	427
25	Iran	202.807	197.571	832.211	337.637	8,49	135
26	Finland	190.192	184.924	3.091.345	506.506	18,55	372
27	Greece	180.688	171.529	1.827.577	324.747	12,28	266
28	Mexico	166.604	162.116	1.346.721	295.320	10,00	232
29	Czech Republic	163.740	160.193	1.265.709	313.836	9,28	239
30	Hong Kong	162.812	156.923	2.004.708	294.791	14,07	292
31	Norway	162.390	154.481	2.299.463	382.990	17,23	327
32	Singapore	149.509	144.653	1.616.952	230.656	12,95	268
33	Portugal	138.892	134.447	1.342.075	270.626	13,06	234
34	New Zealand	129.822	122.601	1.705.695	276.798	15,73	282
35	South Africa	125.303	118.747	1.170.454	260.828	11,36	231
36	Argentina	118.347	114.659	1.167.884	259.247	11,44	222

238 Countries sorted by *SCImagojr* based on Scopus data base.

**Italy in the top 10** (growing trend) with respect to several metrics.

**ITALY IS, OVER ALL SUBJECT AREAS:**

**8th** with respect to total Scopus documents

**7th** with respect to Citations and H-index

Engineering Area perfectly in line with the National ranking over all subject Areas

Remarkable performances for the following Areas:

**5th H-index worldwide** in Mathematics

**6th H-index worldwide** in Computer science, Medicine, Neuroscience, Nursing, Physics and Astronomy

**ITALY IS, IN BIOMEDICAL ENGINEERING CATEGORY (ENGINEERING AREA):**

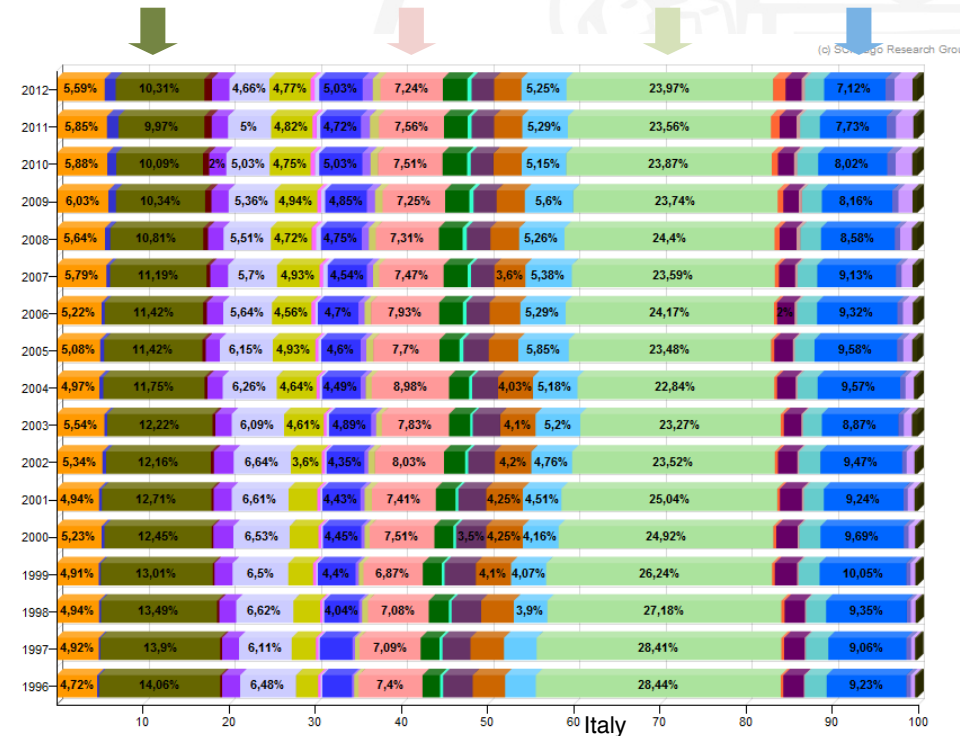
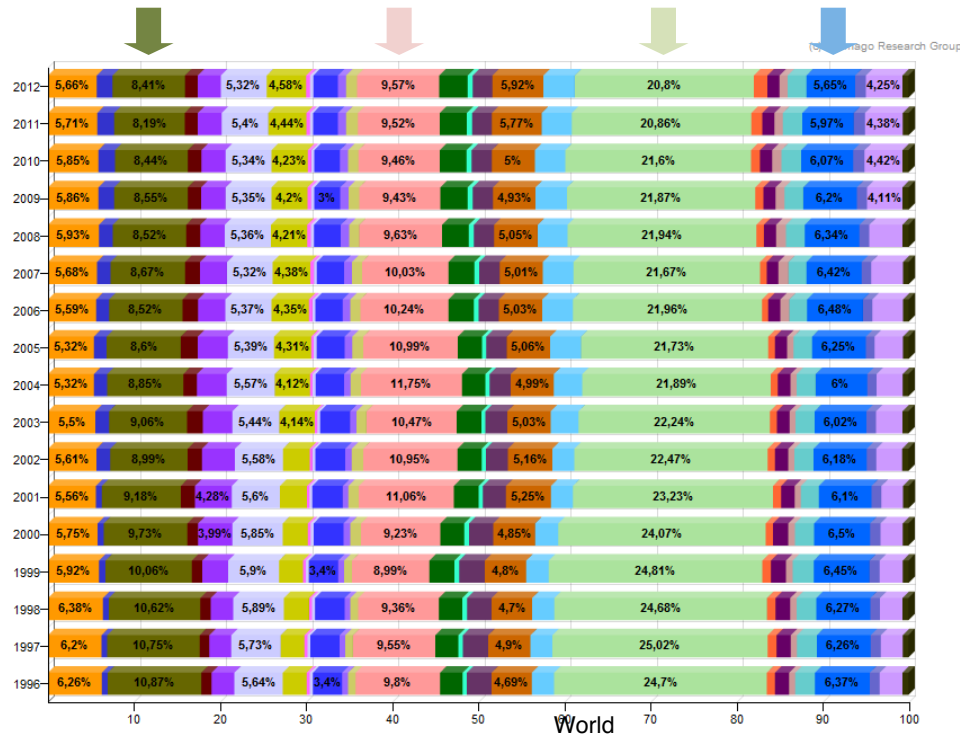
**7th** with respect to total Scopus documents (↑ National average)

**9th** with respect to Citations (↓↓ National average)

**10th** with respect to H-index (↓↓↓ National average)



# Weight of Subject Areas per number of scientific publications



- Agricultural and Biological Sciences
- Business, Management and Accounting
- Computer Science
- Earth and Planetary Sciences
- Engineering
- Immunology and Microbiology
- Medicine
- Nursing
- Psychology
- Arts and Humanities
- Chemical Engineering
- Decision Sciences
- Economics, Econometrics and Finance
- Environmental Science
- Materials Science
- Multidisciplinary
- Pharmacology, Toxicology and Pharmaceutics
- Social Sciences

- Biochemistry, Genetics and Molecular Biology
- Chemistry
- Dentistry
- Energy
- Health Professions
- Mathematics
- Neuroscience
- Physics and Astronomy
- Veterinary

Italy has a distribution of Subject Areas almost resembling the relative weights Worldwide



# Consistency and impact of engineering disciplines in Italy

## Among engineering disciplines, in Italy:

### Electrical & Electronic Engineering

has a significant critical mass (circle radius)  
highest total impact (x-axis)

### Control & Systems Engineering

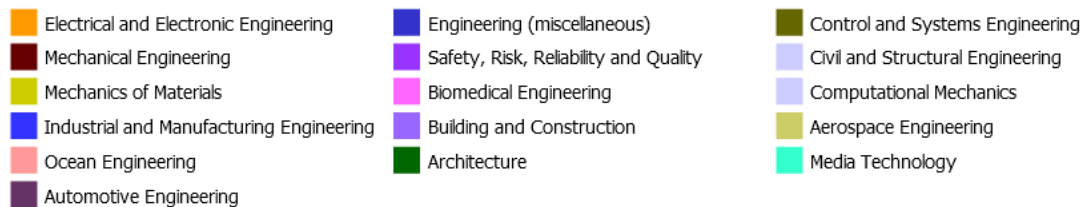
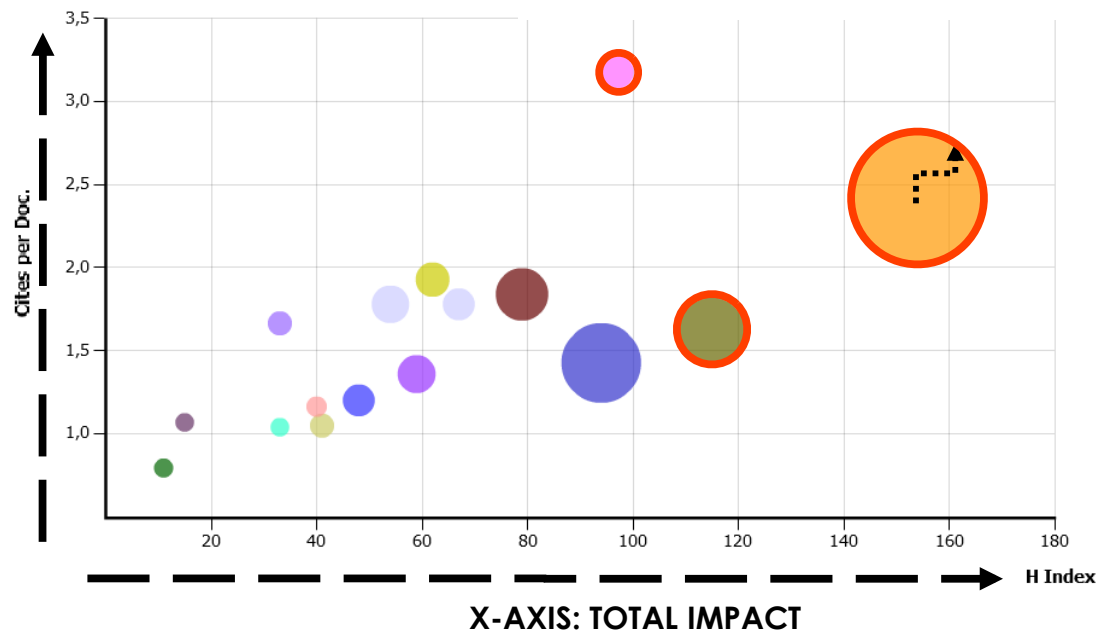
2nd total impact  
similar to Electrical & Electronic Engineering, but scaled down due to lower mass

### Biomedical Engineering

highest normalized impact (y-axis)  
3rd total impact but small mass  
outstanding growing potential due to high total impact vs. mass

Y-AXIS: IMPACT OF A SINGLE PUBLICATION

BUBBLE RADIUS: NUMBER OF PUBLICATIONS





# Most cited Italian papers over all Areas

## Scopus

Citations

Refine	Search Results	Author	Year	Journal	Citations
<input type="checkbox"/> SIR97: A new tool for crystal structure determination and refinement 1 View at Publisher	Altomare, A., Burla, M.C., Camalli, M., (...), Polidori, G., Spagna, R.	1999	Journal of Applied Crystallography	6855	
<input type="checkbox"/> Unified approach for molecular dynamics and density-functional theory 2 View at Publisher	Car, R., Parrinello, M.	1985	Physical Review Letters	5540	
<input type="checkbox"/> GEANT4 - A simulation toolkit 3 View at Publisher	Agostinelli, S., Allison, J., Amako, K., (...), Yoshida, H., Zschiesche, D.	2003	Nuclear Instruments and Methods in Physics Research, Section A: Accelerators, Spectrometers, Detectors and Associated Equipment	5497	
<input type="checkbox"/> Image processing with imageJ 4	Abràmoff, M.D., Magalhães, P.J., Ram, S.J.	2004	Biophotonics International	4699	
<input type="checkbox"/> Peginterferon alfa-2a plus ribavirin for chronic hepatitis C virus infection 5 View at Publisher	Fried, M.W., Shiffman, M.L., Rajender Reddy, K., (...), Hoffman, J., Yu, J.	2002	New England Journal of Medicine	4657	
<input type="checkbox"/> The European Organization for Research and Treatment of Cancer QLQ-C30: A quality-of-life instrument for use in international clinical trials in oncology 6 View at Publisher	Aaronson, N.K., Ahinedzai, S., Bergman, B., (...), Sullivan, M., Takeda, F.	1993	Journal of the National Cancer Institute	4633	
<input type="checkbox"/> Analysis of the genome sequence of the flowering plant Arabidopsis thaliana 7 View at Publisher	Kaul, S., Koo, H.L., Jenkins, J., (...), Chory, J., Somerville, C.	2000	Nature	4608	
<input type="checkbox"/> Radiotherapy plus concomitant and adjuvant temozolomide for glioblastoma 8 View at Publisher	Stupp, R., Mason, W.P., Van Den Bent, M.J., (...), Eisenhauer, E., Mirimanoff, R.O.	2005	New England Journal of Medicine	4562	
<input type="checkbox"/> Electroluminescence in conjugated polymers 9 View at Publisher	Friend, R.H., Gymer, R.W., Holmes, A.B., (...), Lögdgård, M., Salaneck, W.R.	1999	Nature	4320	
<input type="checkbox"/> Effects of intensive blood-pressure lowering and low-dose aspirin in patients with hypertension: Principal results of the Hypertension Optimal Treatment (HOT) randomised trial 10 View at Publisher	Hansson, L., Zanchetti, A., Carruthers, S.G., (...), Wedel, H., Westerling, S.	1998	Lancet	4313	
<input type="checkbox"/> Ant system: Optimization by a colony of cooperating agents 11	Dorigo, M., Maniezzo, V., Colomi, A.	1996	IEEE Transactions on Systems, Man, and Cybernetics, Part B: Cybernetics	4303	

- Italian H-index was 588 in 2012 (last release of Scimagojr research) and is 709 in 2014
- 2 Engineering papers among the 11 most cited studies that have at least one Italian affiliation



# Most cited Italian papers in Engineering Area

## Scopus

Citations

Refine

Limit to Exclude

Year

- 2014 (5,075)
- 2013 (13,991)
- 2012 (13,564)
- 2011 (12,913)
- 2010 (12,619)

Author Name

- Dario, P. (441)
- Benini, L. (365)
- Zorzi, M. (332)
- Montanari, G.C. (328)
- Massa, A. (322)

Subject Area

- Engineering (182,026)
- Computer Science (39,792)
- Physics and Astronomy (34,259)
- Materials Science (26,263)
- Mathematics (14,098)

Document Type

- Article (92,091)
- Conference Paper (82,685)
- Review (2,463)
- Editorial (1,888)
- Book Chapter (969)

Source Title

Keyword

Affiliation

Country

Source Type

Language

Limit to Exclude

<input type="checkbox"/> Image processing with imageJ 1	Abrámoff, M.D., Magalhães, P.J., Ram, S.J.	2004 Biophotonics International	4699
<input type="checkbox"/> Ant system: Optimization by a colony of cooperating agents 2 <a href="#">View at Publisher</a>	Dorigo, M., Maniezzo, V., Colomi, A.	1996 IEEE Transactions on Systems, Man, and Cybernetics, Part B: Cybernetics	4303
<input type="checkbox"/> Performance analysis of the IEEE 802.11 distributed coordination function 3 <a href="#">View at Publisher</a>	Bianchi, G.	2000 IEEE Journal on Selected Areas in Communications	4252
<input type="checkbox"/> A dynamic subgrid-scale eddy viscosity model 4 <a href="#">View at Publisher</a>	Germano, M., Piomelli, U., Moin, P., Cabot, W.H.	1991 Physics of Fluids A	2842
<input type="checkbox"/> Nanostructured materials for advanced energy conversion and storage devices 5 <a href="#">View at Publisher</a>	Aricò, A.S., Bruce, P., Scroasti, B., Tarascon, J.-M., Van Schalkwijk, W.	2005 Nature Materials	2601
<input type="checkbox"/> Energies, structures, and electronic properties of molecules in solution with the C-PCM solvation model 6 <a href="#">View at Publisher</a>	Cossi, M., Rega, N., Scalmani, G., Barone, V.	2003 Journal of Computational Chemistry	2172
<input type="checkbox"/> Bit-interleaved coded modulation 7 <a href="#">View at Publisher</a>	Caire, G., Taricco, G., Biglieri, E.	1998 IEEE Transactions on Information Theory	1397
<input type="checkbox"/> Geant4 developments and applications 8 <a href="#">View at Publisher</a>	Allison, J., Amako, K., Apostolakis, J., (...), Yoshida, H., Peigntili, M.	2006 IEEE Transactions on Nuclear Science	1365
<input type="checkbox"/> Permanent scatterers in SAR interferometry 9 <a href="#">View at Publisher</a>	Ferretti, A., Prati, C., Rocca, F.	2001 IEEE Transactions on Geoscience and Remote Sensing	1177
<input type="checkbox"/> The explicit linear quadratic regulator for constrained systems 10 <a href="#">View at Publisher</a>	Bemporad, A., Morari, M., Dua, V., Pistikopoulos, E.N.	2002 Automatica	1161
<input type="checkbox"/> Face recognition: Features versus templates 11	Brunelli, Roberto, Poggio, Tomaso	1993 IEEE Transactions on Pattern Analysis and Machine Intelligence	1155

... ..

- In 2014 31 Engineering publications (4,4 %) contributed to the National H-index (709)



# Italian scientists with highest number of scientific publications

## Scopus

Search | Alerts | My list | Settings

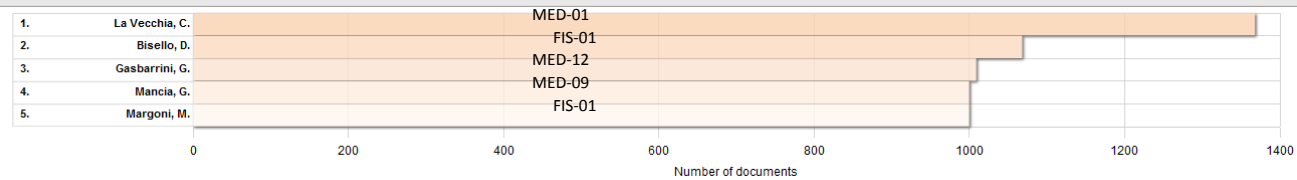
Your query: AFFILCOUNTRY(italy)

### Analyze results | [Back to results](#)

Date range: 1834 to 2014 Analyze Document results 1,534,505

Year | Source title | Author name | Affiliation name | Country | Document type | Subject area

Author name This chart shows the total number of documents for this query by Author.



In all Areas (source: scopus)

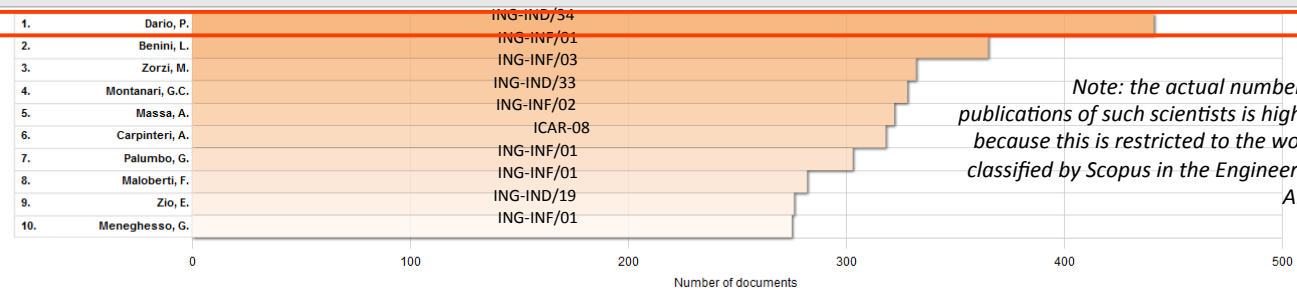
Your query: AFFILCOUNTRY(italy) AND (LIMIT-TO(SUBJAREA, "ENG"))

### Analyze results | [Back to results](#)

Date range: 1932 to 2014 Analyze Document results 182,026

Year | Source title | Author name | Affiliation name | Country | Document type | Subject area

Author name This chart shows the total number of documents for this query by Author.



Note: the actual number of publications of such scientists is higher, because this is restricted to the works classified by Scopus in the Engineering Area

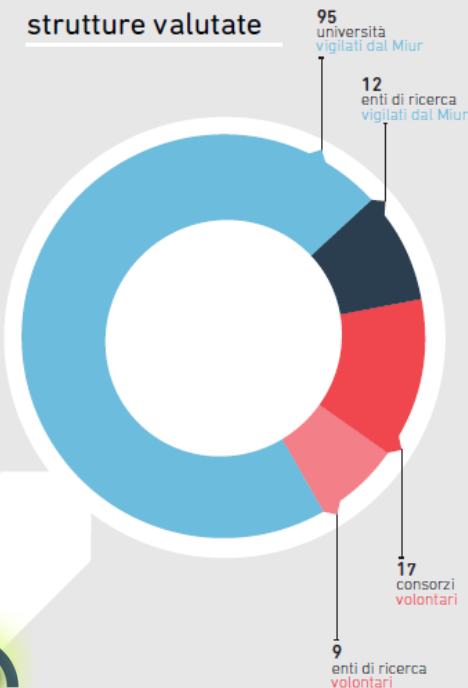
In Engineering Area (source: scopus)



### I NUMERI DELLA VQR

La Valutazione della Qualità della Ricerca (VQR) è un esercizio mirato a valutare i risultati della ricerca scientifica condotta dalle università e dagli enti di ricerca pubblici e privati. Si tratta del più grande esercizio di valutazione della ricerca nel suo genere mai realizzato a livello internazionale: la VQR ha valutato la qualità della ricerca di 133 strutture, analizzando quasi 200.000 prodotti.

**133**  
strutture valutate



**2004-2010**  
settennio in analisi

per la valutazione di prodotti e strutture

**14**  
GEV

Gruppi di Esperti della Valutazione

**450**  
membri GEV

selezionati per esperienza nella valutazione e produttività ed eccellenza

**184.878**  
prodotti valutati

articoli di riviste, libri, brevetti, mostre, opere d'arte, ...

**14.770**  
revisori

due per ogni prodotto

**20 mesi**  
durata VQR

a partire dal bando del 7 novembre 2011

### LE 14 AREE SCIENTIFICHE

La valutazione ha riguardato tutte le 14 aree di ricerca scientifica definite dal CUN. Di seguito sono indicate con le rispettive quote di prodotti attesi per la VQR (n), per un totale di 194.763 prodotti attesi (N).







## LA RICERCA

L'analisi dei prodotti valutati dà un quadro interessante della scienza in Italia e delle differenze tra le aree scientifiche. A titolo esemplificativo, si può notare la netta prevalenza di articoli su riviste scientifiche nell'AREA09 e di monografie in AREA14. Il tasso di inattività medio (misurato come lo scarto tra prodotti attesi e quelli effettivamente conferiti) mostra un soddisfacente livello di attività dei soggetti valutati e l'impegno delle strutture a rispondere adeguatamente al bando VQR. In particolare si distinguono per valori molto bassi di inattività, l'AREA02 e l'AREA11, risultando le più produttive.

### LEGENDA

TIPOLOGIA PRODOTTI VALUTATI	LINGUA PRODOTTI VALUTATI
articoli su rivista	non indicata
monografie, contributi in volume, curatele	altra lingua
contributi, abstract in atti di convegno	inglese
edizioni critiche, traduzioni, commenti scientifici	italiano
brevetti	
altro	

### INATTIVITÀ PER AREA

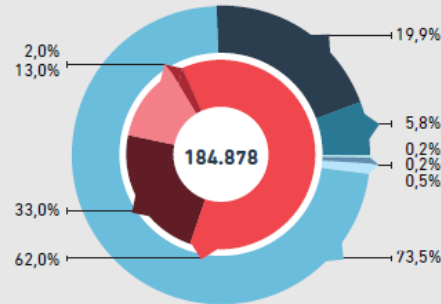
### tasso di inattività

scarto tra prodotti attesi e prodotti conferiti



### distribuzione media

per tipologia e lingua dei prodotti valutati



97,5%

tasso di attività maggiore

AREA02  
scienze fisiche

AREA11  
scienze storiche,  
filosofiche, pedagogiche  
e psicologiche



98,4%

presenza maggiore di articoli

AREA09  
ingegneria industriale  
e dell'informazione



69%

presenza maggiore di monografie

AREA14  
scienze politiche  
e sociali



## LA TERZA MISSIONE

La "terza missione" è l'insieme delle attività con cui università e enti di ricerca interagiscono con la società. Riguarda la valorizzazione della conoscenza e può essere di tipo economico e socio-culturale. Nel primo ambito rientrano la gestione della proprietà intellettuale, la creazione di imprese, la ricerca conto terzi e i rapporti ricerca-industria, e la gestione di strutture di intermediazione e di supporto, su scala territoriale. Nel secondo, rientrano i beni culturali e la gestione di poli museali, gli scavi archeologici e la divulgazione scientifica.

### LEGENDA

	università
	enti di ricerca
	consorzi

### CONTO TERZI

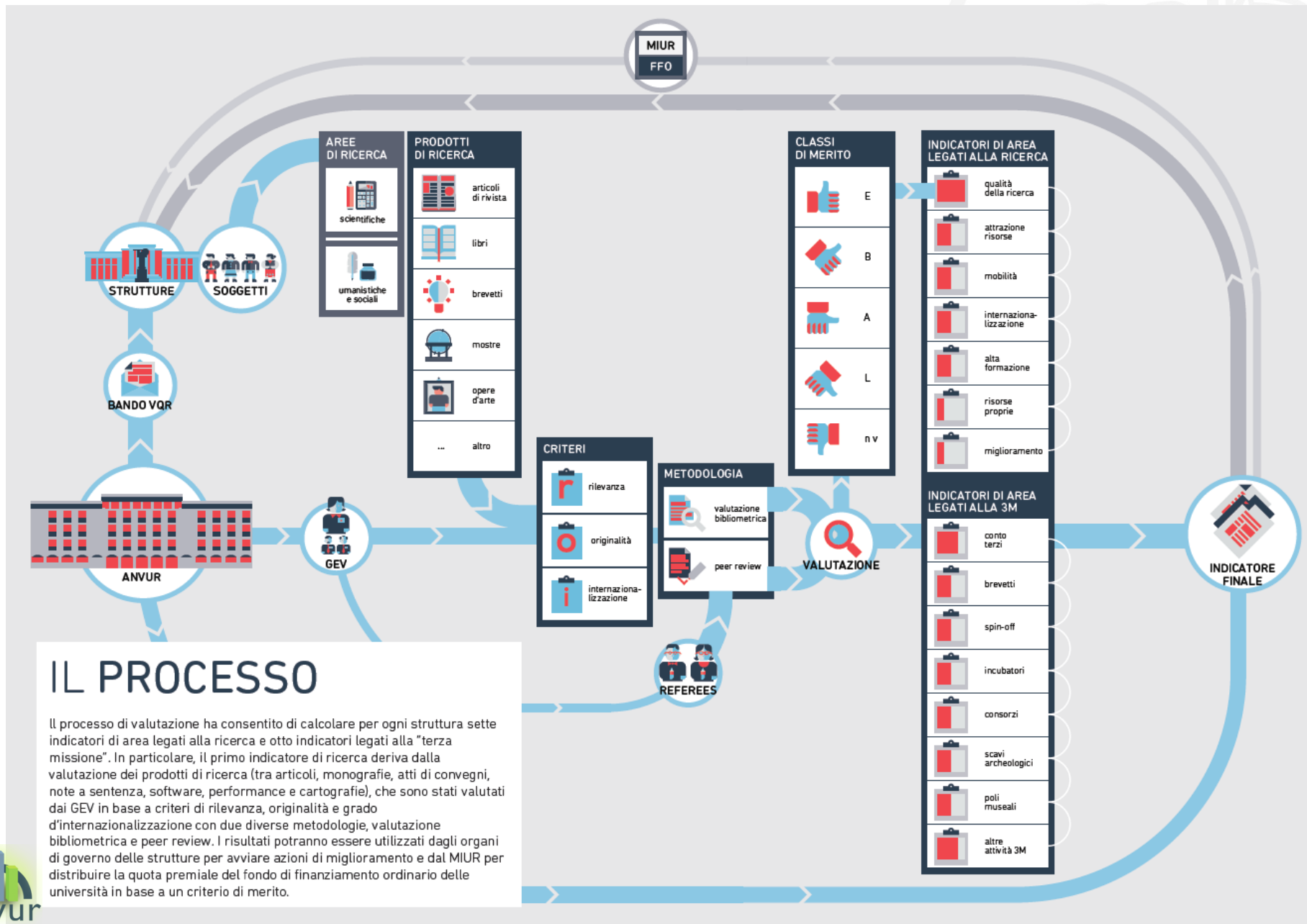


### BREVETTI



### SCAVI ARCHEOLOGICI





## IL PROCESSO

Il processo di valutazione ha consentito di calcolare per ogni struttura sette indicatori di area legati alla ricerca e otto indicatori legati alla "terza missione". In particolare, il primo indicatore di ricerca deriva dalla valutazione dei prodotti di ricerca (tra articoli, monografie, atti di convegni, note a sentenza, software, performance e cartografie), che sono stati valutati dai GEV in base a criteri di rilevanza, originalità e grado d'internazionalizzazione con due diverse metodologie, valutazione bibliometrica e peer review. I risultati potranno essere utilizzati dagli organi di governo delle strutture per avviare azioni di miglioramento e dal MIUR per distribuire la quota premiale del fondo di finanziamento ordinario delle università in base a un criterio di merito.



## VQR ANVUR 2004-2010 Top Universities for all Areas

Questa graduatoria mostra le università che hanno avuto la migliore performance media nelle diverse aree. Le università sono state divise tra grandi, medie e piccole sulla base del numero di soggetti valutati di ciascuna struttura. La graduatoria premia le strutture che hanno lo scarto maggiore tra il numero di aree “azzurre” e “verdi” e il numero di aree “rosse”. Nei casi di ex aequo, è stata considerata come migliore la struttura che ha il numero maggiore di aree “verdi”.

### LE UNIVERSITÀ AL TOP IN TUTTE LE AREE: GRANDI UNIVERSITÀ

	1	2	3	4	5	6	7	8a	8b	9	10	11a	11b	12	13	14
Padova	1,12	1,09	1,05	1,38	1,29	1,47	1,22	1,06	0,96	1,12	1,1	1,16	1,29	1,08	1,84	1,16
Milano Bicocca	1,17	1,06	1,12	1,11	1,24	1,39				0,73	1,14	1,19	1,2	1,09	1,24	1,35
Verona	1,27	1,02	1,17		1,13	1,49	1,31			1,11	1,14	1,09	1,29	1,27	1,01	1,18
Bologna	1,02	0,99	1,06	1,21	1,14	1,31	1,19	1,12	1,16	1,07	1,05	1,02	1,14	1,02	1,41	1,18
Pavia	1,4	1,07	1,02	1,11	0,94	1,09		0,85	0,86	1,01	1,14	1,14	1,27	1,1	1,32	0,9

### LE UNIVERSITÀ AL TOP IN TUTTE LE AREE: MEDIE UNIVERSITÀ

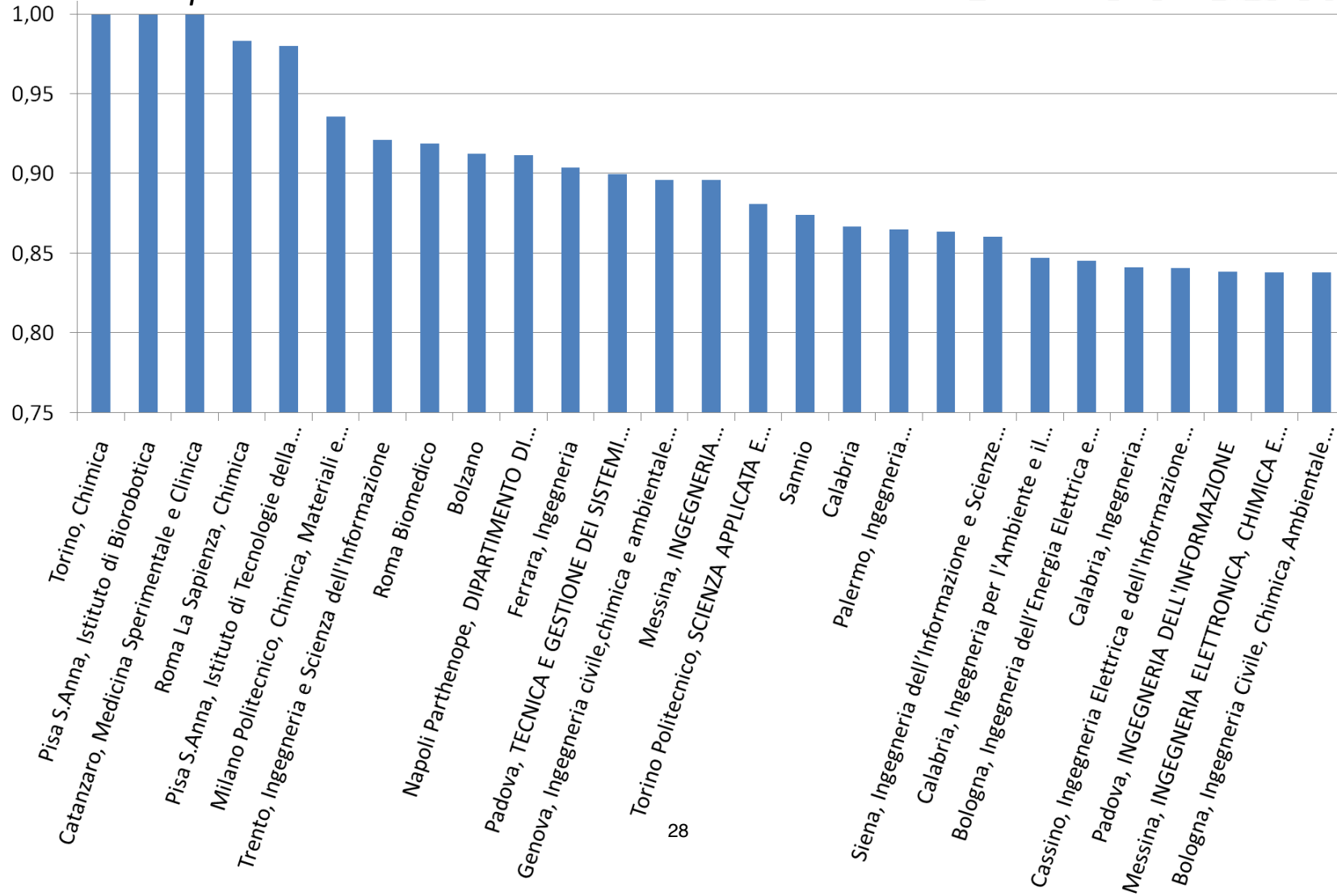
	1	2	3	4	5	6	7	8a	8b	9	10	11a	11b	12	13	14
Trento	1,16	1,14	1,06		1,47	2,01	0,66	1,36	0,87	1,18	1,24	1,29	1,56	1,41	1,1	1,24
Bolzano	1,47						1,53		0,88	1,26	1,07	1		1,35	1,81	1,45
Ferrara	0,78	1,02	0,94	1,35	1,1	1,07		1,27	1,14	1,17	1,12	1,08	0,93	1,34	1,35	
Milano San Raffaele					1,5	1,84						1,18	1,32			
Piemonte Orientale	1,23	0,98	1,01		1,3	1,54					1,17	1,25		1,04	1,07	1,36
Venezia Cà Foscari	1,03	1,2	0,9	0,83	0,99		0,77			1,08	1,15	1,21		1,04	1,23	1,13

### LE UNIVERSITÀ AL TOP IN TUTTE LE AREE: PICCOLE UNIVERSITÀ

	1	2	3	4	5	6	7	8a	8b	9	10	11a	11b	12	13	14
Pisa Sant'Anna					1,34		1,56			1,13				1,21	2,08	1,5
Pisa Normale	1,25	1,22			1,07						1,18	1,12				
Roma LUISS														1,2	1,35	1,32
Trieste SISSA	1,64	1,17			1,54											
Roma Biomedico					1,4	1,26				1,27						



Top 20% with respect to I index





# Evaluation of Universities and Research Institutes is mandatory and has high attention by society and media

**nature**

International weekly journal of science

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NATURE | NEWS

## Italian universities get report cards

First comprehensive ranking confirms quality gap between north and south.

Nicola Nosengo

17 July 2013

### CONFRONTO TRA DIMENSIONE & QUALITÀ DELLE STRUTTURE



Queste tabelle accostano alla dimensione di università e enti un valore qualitativo, legato alla ricerca. Le strutture sono state divise tra grandi, medie e piccole sulla base del numero di soggetti valutati di ciascuna struttura<sup>(1)</sup>. L'indicatore finale di ricerca di struttura (IRFS) tiene conto di tutti gli indicatori utilizzati nella valutazione: qualità delle pubblicazioni e dei processi di reclutamento, capacità di attrarre risorse esterne e di istituire collegamenti internazionali, propensione alla formazione per la ricerca e all'utilizzo di fondi propri per finanziare la ricerca, miglioramento della "performance" scientifica rispetto all'esercizio di valutazione precedente. La dimensione delle strutture è data dalla percentuale dei prodotti attesi sul totale.

<sup>(1)</sup> Per ciascuna Struttura, è stato preso in considerazione il numero di Soggetti Valutati Equivalenti a Tempo Pieno (SVETP), che si ottiene dividendo il numero dei Prodotti Attesi per sei.

### LE UNIVERSITÀ

SEGMENTO DIMENSIONALE	DENOMINAZIONE	n/N	IRFS	% MIGLIORAMENTO
GRANDI	Siena	1,63	2,20	35,76
	Verona	1,27	1,70	34,42
	Milano Bicocca	1,52	2,00	31,29
	Padova	3,73	4,86	30,40
	Milano Politecnico	2,20	2,76	25,26
MEDIE	Milano San Raffaele	0,16	0,33	106,19
	Milano Bocconi	0,48	0,91	90,35
	Trento	1,00	1,59	59,52
	Bolzano	0,17	0,24	42,68
	Venezia Ca' Foscari	0,88	1,11	26,32
PICCOLE	Pavia IUSS	0,01	0,04	196,46
	Firenze - Istituto Italiano di Scienze Umane	0,01	0,03	161,23
	Pisa Sant'Anna	0,14	0,35	158,82
	Pisa Normale	0,15	0,35	135,59
	Trieste SISSA	0,11	0,25	130,90

«... The National Agency for the Evaluation of the University System and Research (ANVUR) presented its first report in Rome on 16 July. The University of Padua stands out as the best large university overall, making the top spot in 7 out of 14 research areas. The University of Trento tops the ranking for medium ones, and the Scuola Superiore Sant'Anna in Pisa, an elite applied-science school, took the first place among small universities.

“There were no big surprises,” says ANVUR president Stefano Fantoni. “Italian universities have a good average scientific output, particularly in chemistry, physics and industrial engineering, but with great differences. Small universities work better than large ones, and the best ones are mostly in the north”. ...»

### GLI ENTI DI RICERCA

SEGMENTO DIMENSIONALE	DENOMINAZIONE	n/N	IRFS	% MIGLIORAMENTO
GRANDI	Istituto Nazionale di Geofisica e Vulcanologia	5,48	6,70	22,24
	Istituto Nazionale di fisica Nucleare	16,25	19,46	19,76
MEDI	Istituto Italiano di Tecnologia - IIT	1,05	2,55	144,13
	IRCSS - Fondazione Santa Lucia	1,02	1,33	29,57



# Evaluation of Universities and Research Institutes is mandatory and has high attention by society and media

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Le nuove classifiche del Sole 24 Ore sulla qualità - Anche il Politecnico di Milano sul podio, male gli atenei del Mezzogiorno tranne Salerno

## Università, Trento e Verona al top

Tra le non statali vince il San Raffaele di Milano, Luiss e Bocconi seconde a pari merito

**TRASPARENZA**  
**Misurare per poter migliorare**  
di Daniele Checchi

Trento premege negli indicatori della didattica, dall'attività alla puntualità degli iscritti, Verona stacca tutti sulla ricerca, e i due atenei si trovano appaiati sul primo scalinone della classifica generale, qual che punto sopra il Politecnico di Milano. Tra le non statali, la palma va all'Università San Raffaele di Milano, seguita a pari merito da Luiss e Bocconi. In questo il quadro della qualità universitaria italiana offerta dalle nuove classifiche del Sole 24 Ore, che rispetto alle edizioni precedenti ampliano la gamma di indicatori messi sotto esame e sfruttano i dati dell'agenzia di Valutazione. Buoni risultati per Bologna e Padova, mentre crescono le difficoltà al Sud, con l'eccezione di Salerno, vede tutti i propri atenei nella parte basse della graduatoria.

**I migliori**  
Le università prime in classifica fra le statali e le non statali

ATENEI STATALI		ATENEI NON STATALI	
1 Verona	84	1 Milano San Raffaele	87
1 Trento	84	2 Milano Bocconi	81
3 Milano Politecnico*	79	2 Roma Luiss	81
4 Bologna	78	4 Roma Campus Biomedico	68
5 Padova	76	5 Bolzano	67

**ONLINE**  
Gli atenei ai raggi X  
Sul sito del Sole 24 Ore il dossier gratuito sulle «classifiche di qualità» degli atenei, con il dettaglio dei risultati sede per sede.

- Ø Rigorous report, merging evaluation of research and didactic outcomes
- Ø But not including some universities (Normale, Sant'Anna, SISSA, ...)

**Le graduatorie**

CLASSIFICA GENERALE	CLASSIFICA DIDATTICA	CLASSIFICA RICERCA
Classifica con pesatura al 50% di didattica e ricerca	Classifica didattica senza pesature	Classifica ricerca senza pesature
<b>ATENEI STATALI</b>	<b>ATENEI STATALI</b>	<b>ATENEI STATALI</b>
1 Verona 84	1 Trento 75	1 Verona 99
Trento 84	Milano Politecnico* 75	2 Trento 92
3 Milano Politecnico* 79	3 Pavia 73	3 Bologna 87
4 Bologna 78	Modena e Reggio E. 73	4 Milano Bicocca 86
5 Padova 76	5 Torino Politecnico 72	Padova 86
6 Marche Politecnica 75	Venezia Iuav 72	6 Marche Politecnica 85
7 Venezia Ca' Foscari 73	7 Verona 70	Venezia Ca' Foscari 85
Milano Bicocca 73	8 Bologna 69	8 Milano Politecnico 83
Siena 73	9 Ferrara 68	9 Macerata 82
Torino Politecnico 73	10 Trieste 67	10 Piemonte Orientale 81
Udine 72	Udine 67	Siena 81
...	...	...
<b>ATENEI NON STATALI</b>	<b>ATENEI NON STATALI</b>	<b>ATENEI NON STATALI</b>
57 Bari 30	57 Napoli Orientale 32	57 L'Aquila 14
58 Napoli II Università 29	58 Reggio Calabria Mediterranea 31	58 Camerino 14
Perugia Stranieri 29	59 Benevento 24	59 Bari 9
Palermo 29	60 Catanzaro* 21	60 Napoli Parthenope 5
61 Napoli Parthenope 11	61 Napoli Parthenope 17	61 Perugia Stranieri 4
<b>ATENEI NON STATALI</b>	<b>ATENEI NON STATALI</b>	<b>ATENEI NON STATALI</b>
1 Milano San Raffaele 87	1 Milano San Raffaele 79	1 Milano San Raffaele 96
2 Milano Bocconi* 81	2 Roma Campus Biomedico 73	2 Roma Luiss 92
Roma Luiss** 81	3 Milano Bocconi* 73	3 Milano Bocconi 90
4 Roma Campus Biomedico 68	4 Castellanza Liuc 71	4 Bolzano 71
5 Bolzano 67	5 Roma Luiss** 69	Napoli Suor Orsola 71
6 Castellanza Liuc 61	6 Aosta 64	6 Roma Campus Biomedico 63
7 Milano Cattolica* 53	Bolzano 64	7 Milano Cattolica 56



# POLITICHE PER IL FUTURO



## EMPOWERMENT OF RESEARCHERS

***Granting  
autonomy  
leads to  
Empowerment***

Italian researchers are one of the excellence of the Country that guarantee Italy's reputation

Italy is ranked in the top 5 for cross border scientific publications: with **499.8** publications per 1 M citizens, Italy is well above EU average\*

Granting researchers **autonomy** is a priority. They need to pursue their studies and research, build up their careers

\* Data from Researchers<sup>32</sup>Report 2013, DG Research & Innovation





# Democratizing research

Empowering Researcher doesn't mean leaving them in the ivory tower of Academia.

The Peer Review methods are showing their weaknesses compared to well coordinated **crowdsourcing** dynamics.

*Inducement Prize:  
this new instrument is  
changing  
open innovation's  
dynamics*

i.e. NASA's Centennial Challenges;  
H 2020, EU Commission will launch  
three ICT-related inducement prizes in 2014-2015.



## Academy = Multilateralism

European Commission: *“the benefits of mobility across institutions, disciplines, countries and sectors are becoming increasingly recognized”*

The EU achieves its goals when it uses a multilateral approach.  
E. Letta - Scuola Sant'Anna  
June 2014

- Italian PhD students mobility: **37%** (EU: 23%)
- PostDoc cross-sectoral mobility: **6%** (EU: 30%)

\* Data from Researchers' Report 2013, DG Research & Innovation



## Italian Scholars are significantly underpaid

### Pros

- Stimulus for individual creativity
- Proactivity in networking
- Crowdsourcing and communities of intermediaries
- Engagements with other institutions

### Cons

- Entropy
- Depletion of the institution
- “Follow the money”
- Lack of independence



*“My focus is on what science  
can do to deliver better policies  
and  
ultimately a more rewarding  
life for all of us. [...]*

*So I am here to say  
what science can do for you,  
rather than asking  
what you should do for science.”*

**Prof. Anne Glover,  
Chief Scientific Adviser,  
European Commission**

High **complexity** of  
technical issues.

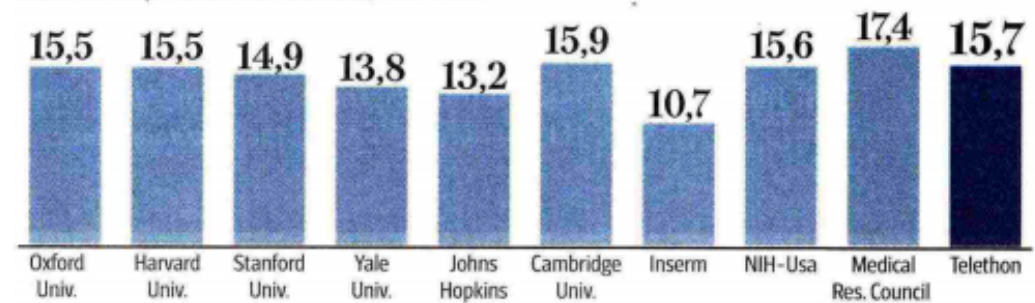
Democratic institutions  
play the decision-maker  
role, but they need to be  
**advised.**



# Un esempio di gestione virtuosa dei programmi di ricerca: Telethon

## La classifica

La produzione scientifica della ricerca Telethon rispetto ad altre istituzioni leader nel campo della ricerca biomedica, 2008-2012



Fonte: Thompson Reuters

D'ARCO

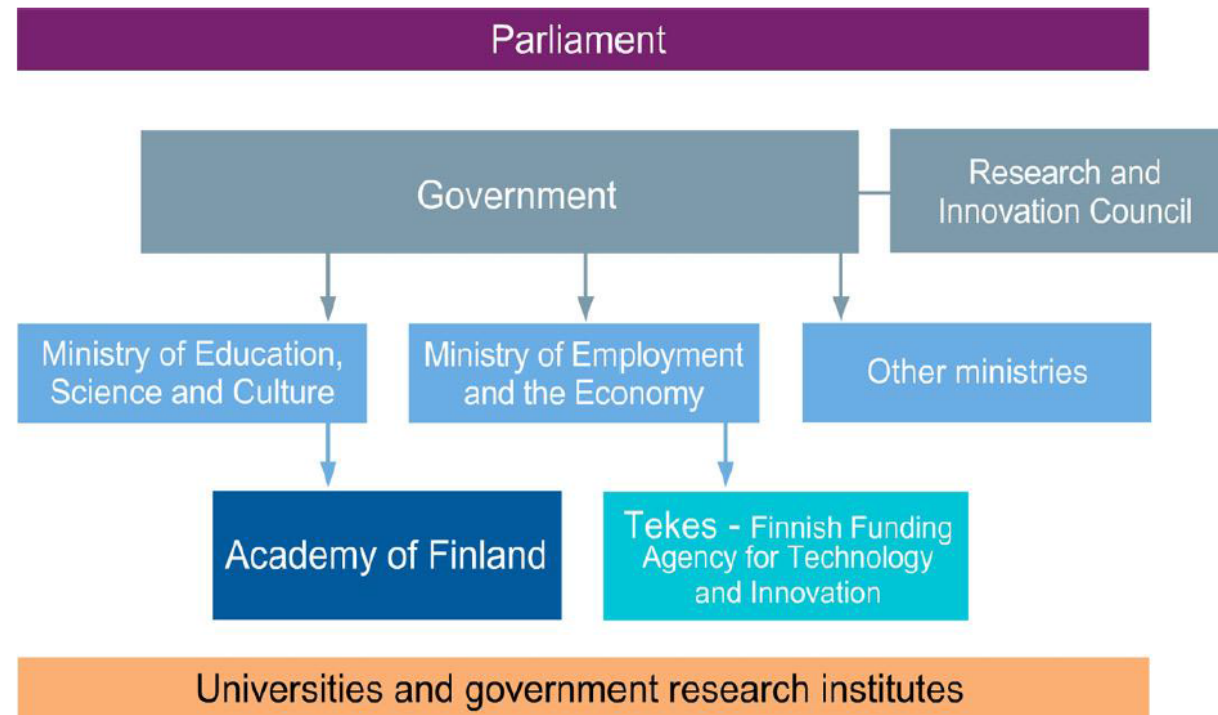




# AN AGENCY FOR RESEARCH?



# The Finnish R&I model



Finland	Horizon 2020
Academy of Finland	Excellent Science
Tekes	Industrial Leadership
Strategic Research*	Societal Challenges

\*) A new funding instrument for policy relevant scientific research. Funding will be available from 2015. The volume will increase gradually from 22 M € to 70 M € per year during 2015 – 2017. The funding can be used as national contribution in EU joint calls.



# The spanish R&I model

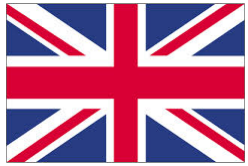


- *Agencia Estatal de Investigación (AEI)* has been approved by the Parliament in June 2011 and it should be established in 2014
  - In Spain, the R&I is under the responsibility of the Ministry of Economy and Competitiveness that considers the AEI the key-instrument for the national research system
  - The AEI will create more effective funding and control instruments, that will increase the impact of public funding to research and that will manage the competitive assignment of such funding, by using international model and criteria
  - The AEI is chaired by the National Secretary of Research and Innovation and it is independent in terms of management of public funding, evaluation and control of the research activities funded by public money
  - The AEI will also develop the interoperability of Spanish model with international models, to implement collaboration and integration of the European Research Area (ERA)





# UK – the dual support system



Public funding for research in the university sector in the UK is provided through two main routes:

**Backward assessment of research performance** - Allocation of funds through the Funding Councils for England, Scotland and Wales and the Department for Employment and Learning in Northern Ireland based upon periodic Research Assessment Exercises. This is the mainstream QR or quality related component of research funding. The Funding Councils have also in recent years allocated further sums based not on research quality assessment but on the attraction of business or charity funding and the scale of PhD training provision

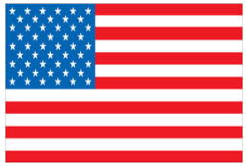
**Forward looking exercise** - Research funding allocated through seven research councils and which covers the whole of the UK:

- Arts and Humanities Research Council (AHRC)
- Biotechnology and Biological Sciences Research Council (BBSRC)
- Economic and Social Research Council (ESRC)
- Engineering and Physical Sciences Research Council (EPSRC)
- Medical Research Council (MRC),
- Natural Environment Research Council (NERC)
- Science and Technology Facilities Council (STFC)



# USA – Office of Science and Technology Policy

## Mission



- To provide the President and his senior staff with accurate, relevant, and timely scientific and technical advice on all matters of consequence
- To help develop and implement sound science and technology policies and budgets that reflect Administration priorities and make coordinated progress toward important national policy goals.

Broadly speaking, OSTP's work can be thought of as falling into four main topic areas:

### Science



The Obama administration and the Office of Science and Technology Policy are committed to restoring science to its rightful place in America as a tool for crafting smart policies that will strengthen the nation. [Learn more...](#)

### Technology & Innovation



In the face of unprecedented challenges, technological advances can provide a powerful engine for advancing economic growth and new opportunity. [Learn more...](#)

### Environment & Energy



Of all the challenges we face as a nation and as a planet, none is as pressing as the three-pronged challenge of climate change, sustainable development and the need to foster new and cleaner sources of energy. [Learn more...](#)

### National Security & International Affairs



New developments in science and technology (S&T) play a key role in predicting and addressing threats to our national and economic security and in meeting transnational priorities that improve the quality of life and global security. [Learn more...](#)

## R&D Budgets

The Office of Science and Technology Policy (OSTP) has responsibility, in partnership with the Office of Management and Budget (OMB), for **advising the President on the Federal Research and Development (R&D) budget and shaping R&D priorities across those Federal agencies** that have significant portfolios in science and technology. OSTP also has responsibility—with the help of the National Science and Technology Council (NSTC), which is administered out of OSTP—for **coordinating interagency research initiatives.**



# Italy – Some features of the current model



12 Public Research Institutions controlled by the Ministry of Education, Research and University

6+ additional Public Research Institutions controlled by other Ministries (Economic Development, Health, ...)

Public budget for research managed by several national authorities

Overlapping and fragmentation of competences and resources

A sound medium term national programme for research and innovation is still missing

A common model for researchers' careers is still missing



## Policy level

- Creation of a permanent “**Think Thank on research and industrial policies**” of the Council of Ministers to advise the Council in the definition of mid and long term development strategies (see the USA OSTP); this think thank should be composed of excellent people with excellent track record and should be approved by ALL political parties, so that its advice will be accepted by all governments

## Management level

- The creation of an **Italian Research Executive Agency (IREA)** to maximise the efficiency and impact of EU research and innovation programmes; IREA should have no political mandate because it should focus on managing ALL the research proposals and funded projects; IREA should manage the funding for research and innovation from ALL ministers and from Regions; simplification by implementing H2020-inspired funding instruments and guidelines for all Italian proposal; IREA should be an Agency of the Ministry of Research (see REA that is an agency of DG Research)

## Research level

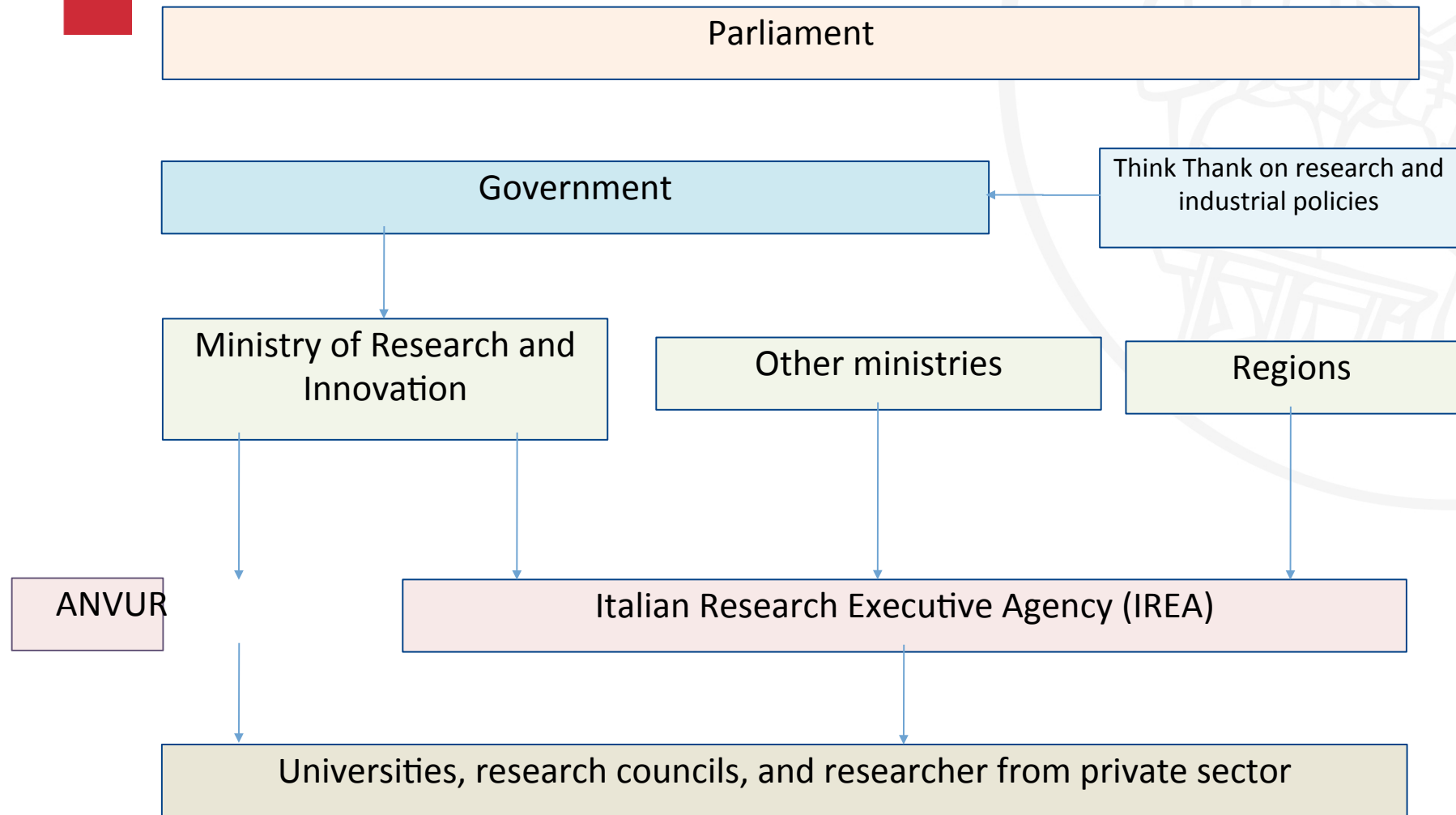
- Implementation of the UK-inspired **dual support system**:
  - Backward assessment of research performance carried out by a revised ANVUR
  - Looking forward exercise: Research funding allocated through seven research councils and which covers the whole of the Italy. **ALL 18+ research institution should be rearranged in seven thematic research councils**

## People level

- Simplified, clear, and meritocratic recruitment procedure and career progression of researchers



# Italy – the proposed model





**THANK YOU FOR YOUR  
KIND ATTENTION**

