Max Planck Society

Benefits of Excellent Science to Europe

Professor Dr. Peter Gruss
President, Max Planck Society

Hearing of the ITRE-Committee,
Brussels, March 20th, 2012

Why do we need excellent basic research in Europe?

What is the Max Planck Society‘s contribution to excellent science?

What are the Max Planck positions regarding excellent science in H2020?

Benefits of basic research

- Stretching the boundaries of **knowledge**: cultural contribution as to how people see themselves and the world around them
- **Education** of high qualified personnel and our future generations
- Foundations and strategies for solving **global problems** (e.g. climate, energy, health, demographics)
- Significant impact on the development of new products and thus on the **economic prosperity** and competitiveness through technolgy transfer

Basic research as a driver for economic growth

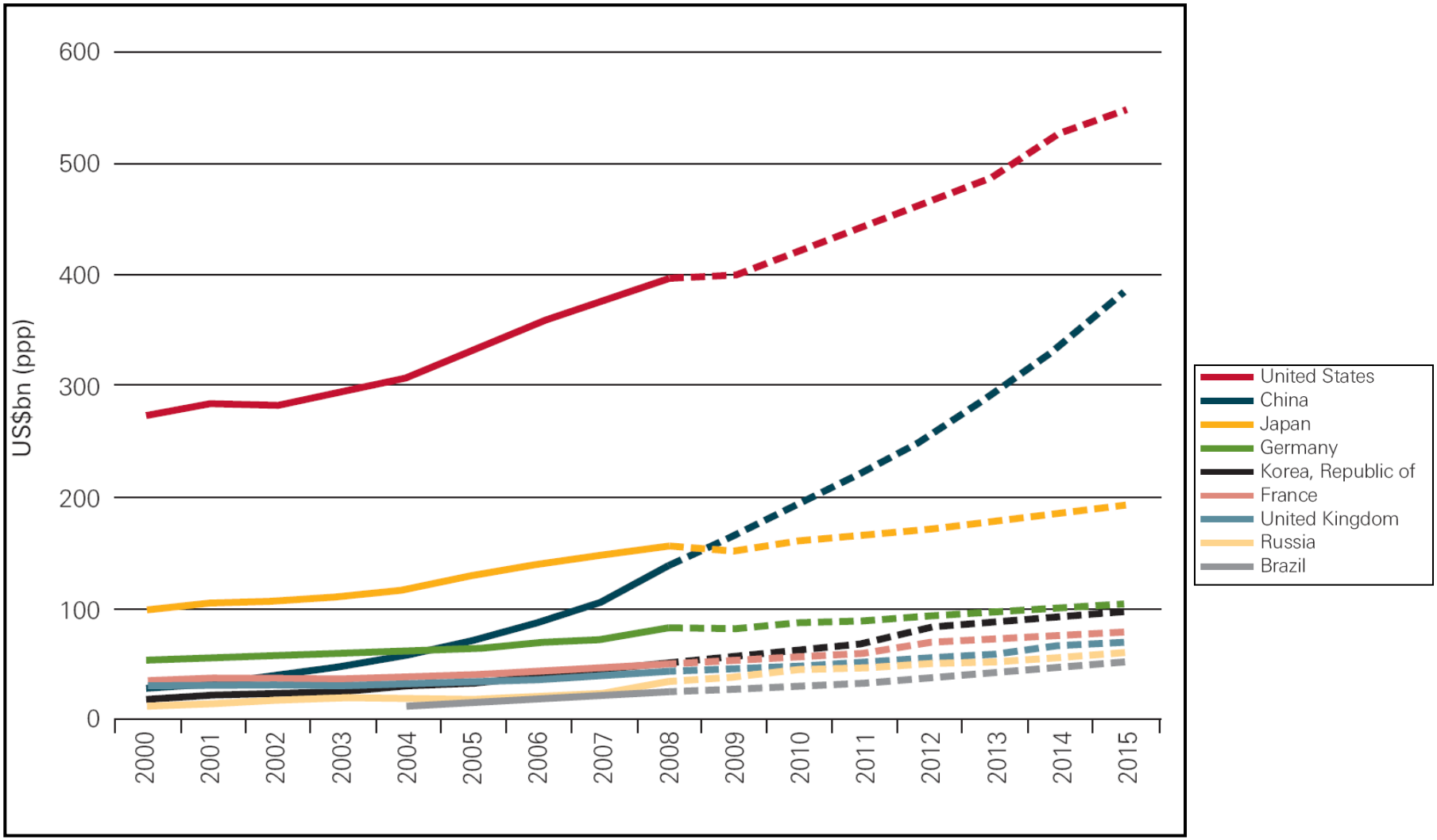
Robert Solow
Nobel Prize for Economic Sciences 1987

- **Technological advancement, rather than labour and capital, is the driving force in economic growth in industrial countries:**
- **The introduction of new technologies accounts for up to 80% of gross domestic product**

Hans Gersbach, ETH Zürich

- **"How much a country should invest into basic research can only be answered within a new growth concept. (...)**
- **We find that the more technologically advanced a country is, the more the amount of optimal basic research expenditures increases."**

Projections of R&D expenditure worldwide

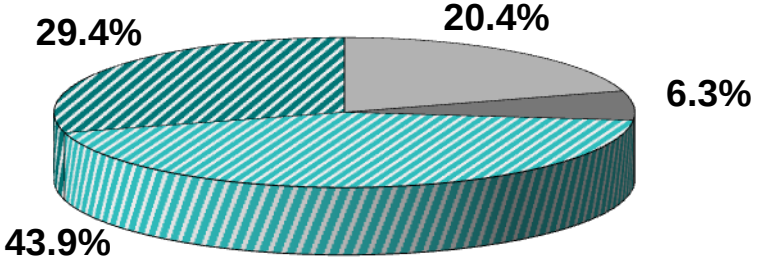


Quelle: Knowledge, networks and nations – Global Scientific collaboration in the 21st century. The Royal Society 2011

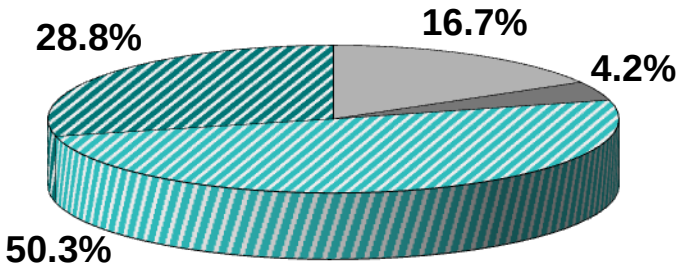
Significance of publicly sponsored science for industry

Academic research is of crucial importance for innovative products!

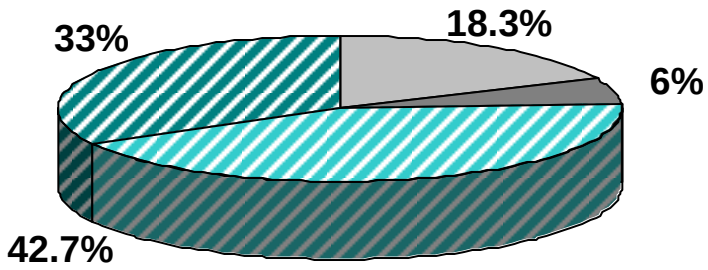
All patents 73.3%



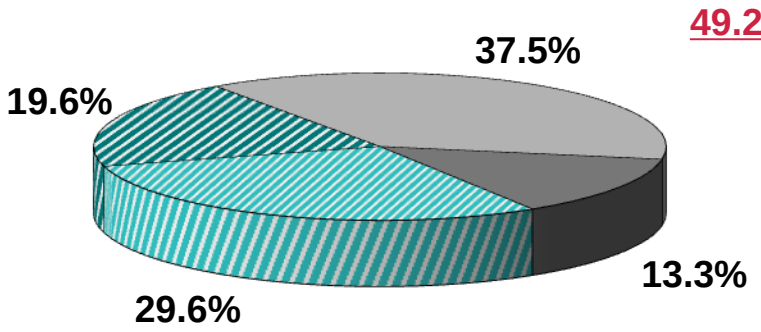
Pharmaceutical/medical patents 79.1%



Chemical patents 75.7%



Patents on electronic components 49.2%



US public science
Foreign public science
US industry
Foreign industry

Source : F. Narin et al., 1997. The increasing linkage between US technology and public science

Research excellence and innovation are firmly linked

A study by Narin et al. in 2000 shows that highly cited American papers are selectively cited by American patents. A US paper among the top 1% most highly cited papers is 9 times more likely to be cited by a US patent than a randomly chosen US paper.

- **Conclusion**

  "**Governments hoping that the research they fund will foster innovation should therefore emphasize research excellence** because agencies supporting the best research will support the research most likely to contribute to innovation. When mediocre research is supported, for whatever reason, neither science nor innovation is likely to gain much direct benefit."

Source: D. Hicks, A. Breitzman Sr, K. Hamilton and F. Narin, Research excellence and patented innovation, Science and Policy, Vol. 27, page 310 (2000)

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Advantages of small scientific institutions

ESSAY

The end of the science superpowers

Could the end of US world dominance over research mark the passing of national science giants, ask **J. Rogers Hollingsworth**, **Karl H. Müller** and **Ellen Jane Hollingsworth**.

- "Excellence in science requires **nimble, autonomous organisations** — qualities more likely to be found in small research settings."
- "In the recent past, some of the most creative small centres were the Rockefeller University,…, and various **Max Planck Institutes**."

Model Max Planck Society:
A magnet for top scientists at all levels

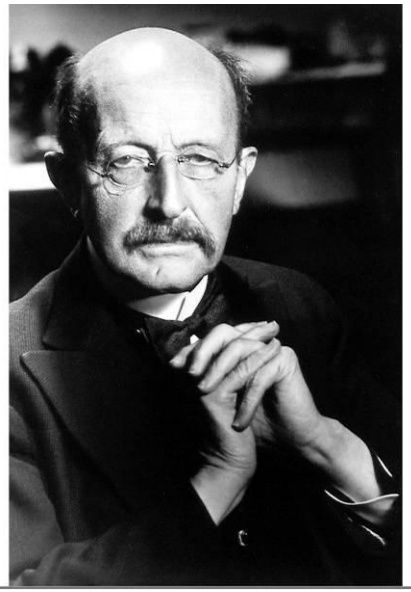
Mission

Advancing innovative and interdisciplinary research
Providing excellent working conditions for excellent minds

16,900 staff members (Jan 1st, 2011)

plus 4,600 junior and guest scientists from all over the world (Jan 1st, 2011)

annual budget € 1.3 billion (2011)
plus € 280 million third-party funds



Knowledge must precede application.

(Max Planck, 1858 - 1947, Nobel Laureate 1918)

Max-Planck-Gesellschaft
International background of staff

Proportion of international scientific staff*

International share of individual groups

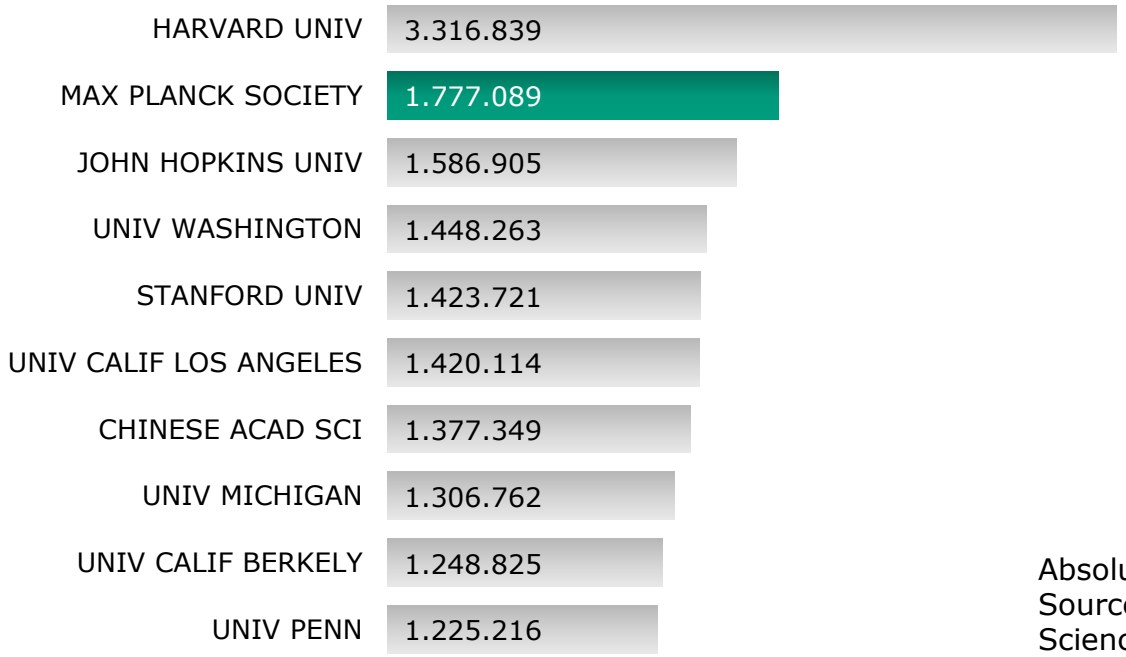
Institutes‘ Directors	275	100%
▪ From outside Germany	82	29,8%
Post Docs	2.440	100%
▪ From outside Germany	2.161	88,6%
Ph.D. Students	5.259	100%
▪ From outside Germany	2.456	46,7%
Guest Scientists	1.549	100%
▪ From outside Germany	971	61,8%

* Over the whole of 2010

Scientific Excellence

- **17** Max Planck scientists have been **honoured** with a **Nobel Prize** since 1948

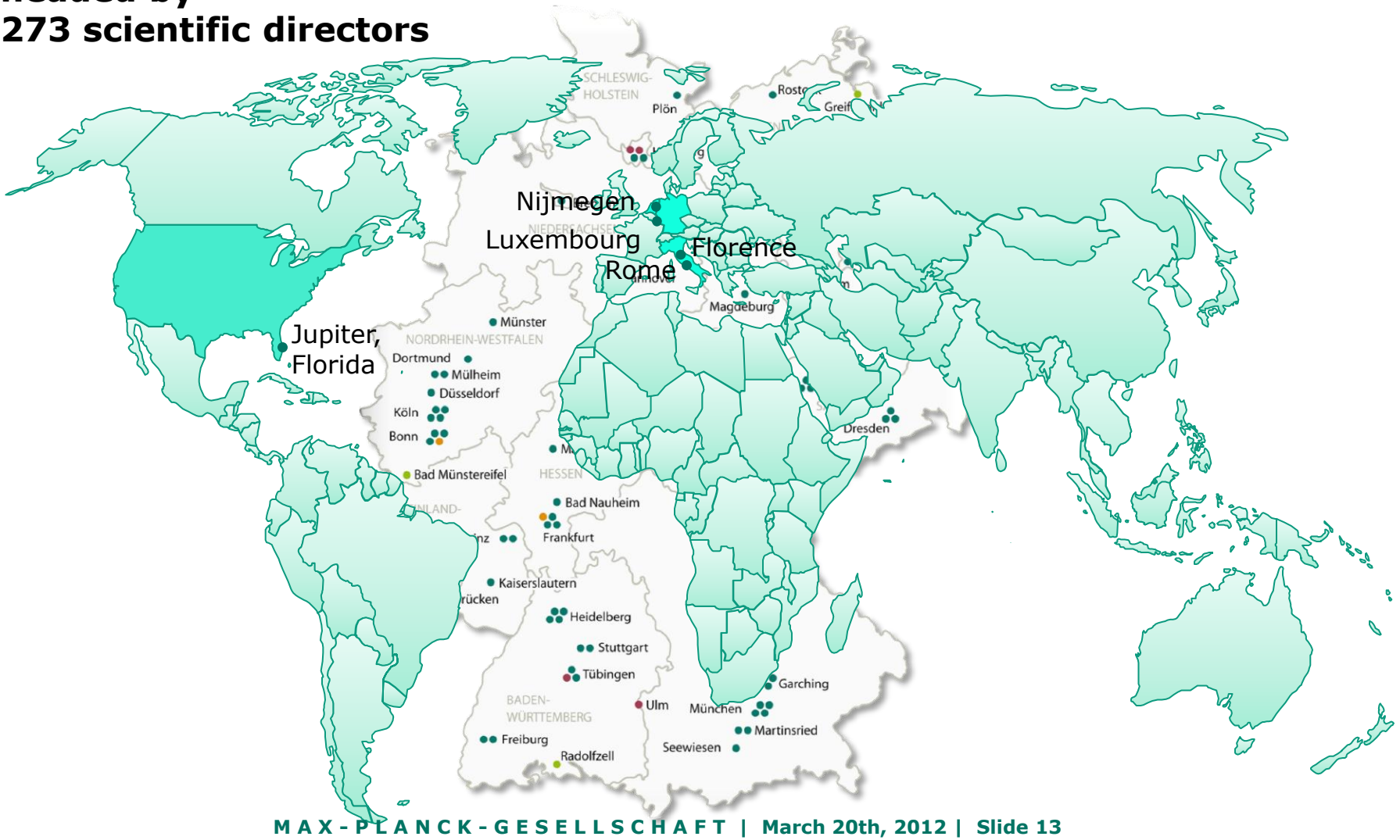
- **Impact of publications** (citation ranking):



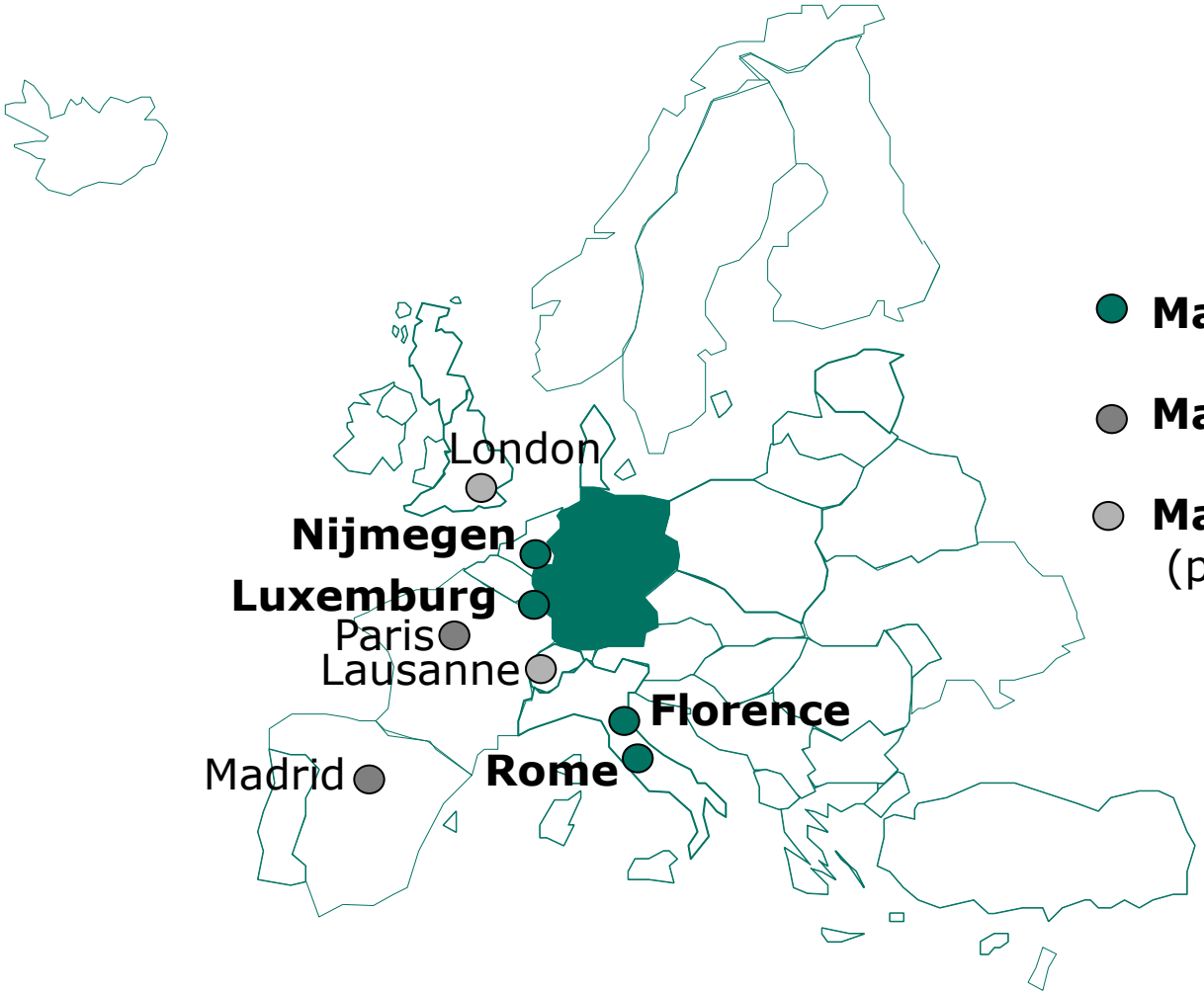
Absolute number of citations 2001-2011
Source: Thomson Reuters – Essential Science Indicators

Max Planck Institutes in Germany at home – present in the world

82 Institutes and research units headed by 273 scientific directors



Max Planck Institutes and Max Planck Centers in Europe



- **Max Planck Institute**
- **Max Planck Center**
- **Max Planck Center** (plannings)

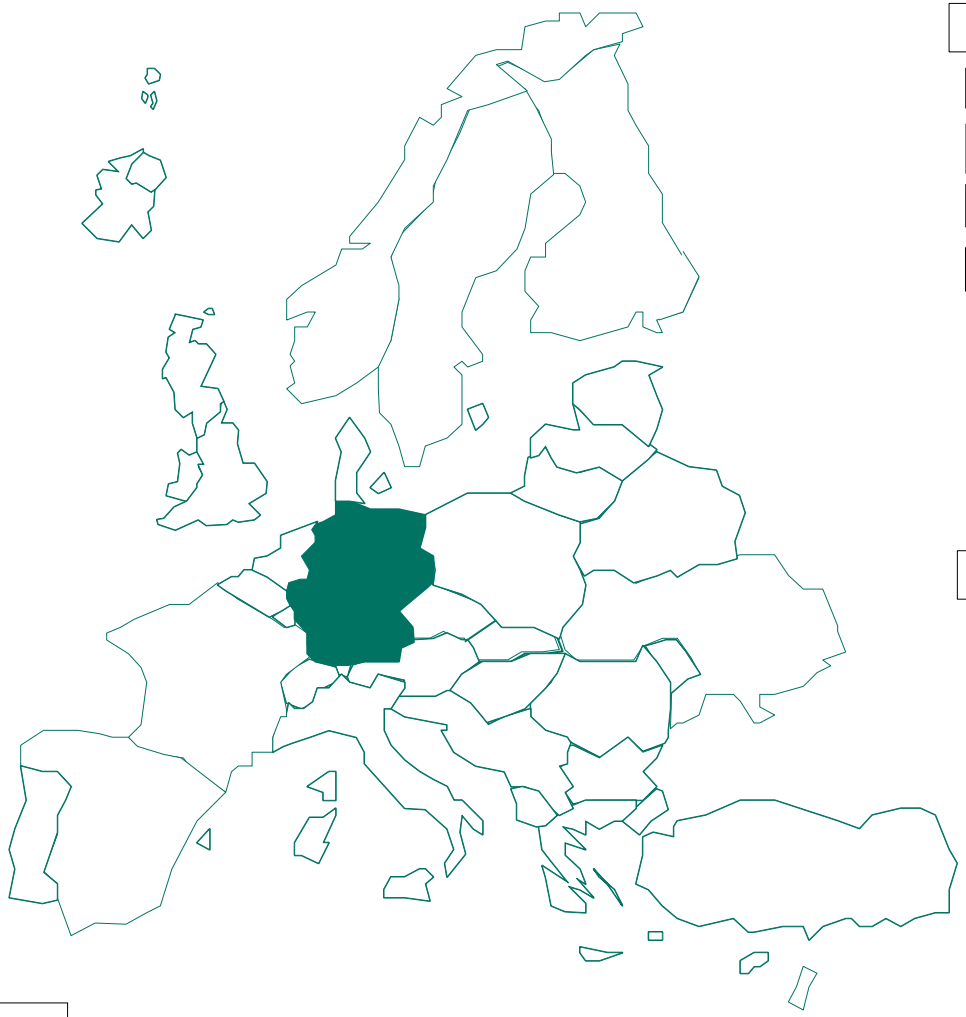
Max Planck-EU Cooperations within the 7th Framework Programme

Western Europe:

- France: 138
- Great Britain: 131
- Netherlands: 88
- Austria: 32
- Belgium: 31
- Ireland: 21
- Switzerland: 42

Southern Europe:

- Italy: 123
- Spain: 102
- Portugal: 29
- Greece: 22



Northern Europe:

- Sweden: 40
- Norway: 32
- Finland: 27
- Denmark: 21

Central and Eastern Europe:

- Poland: 31
- Czech Republic: 29
- Hungary: 26
- Romania: 18

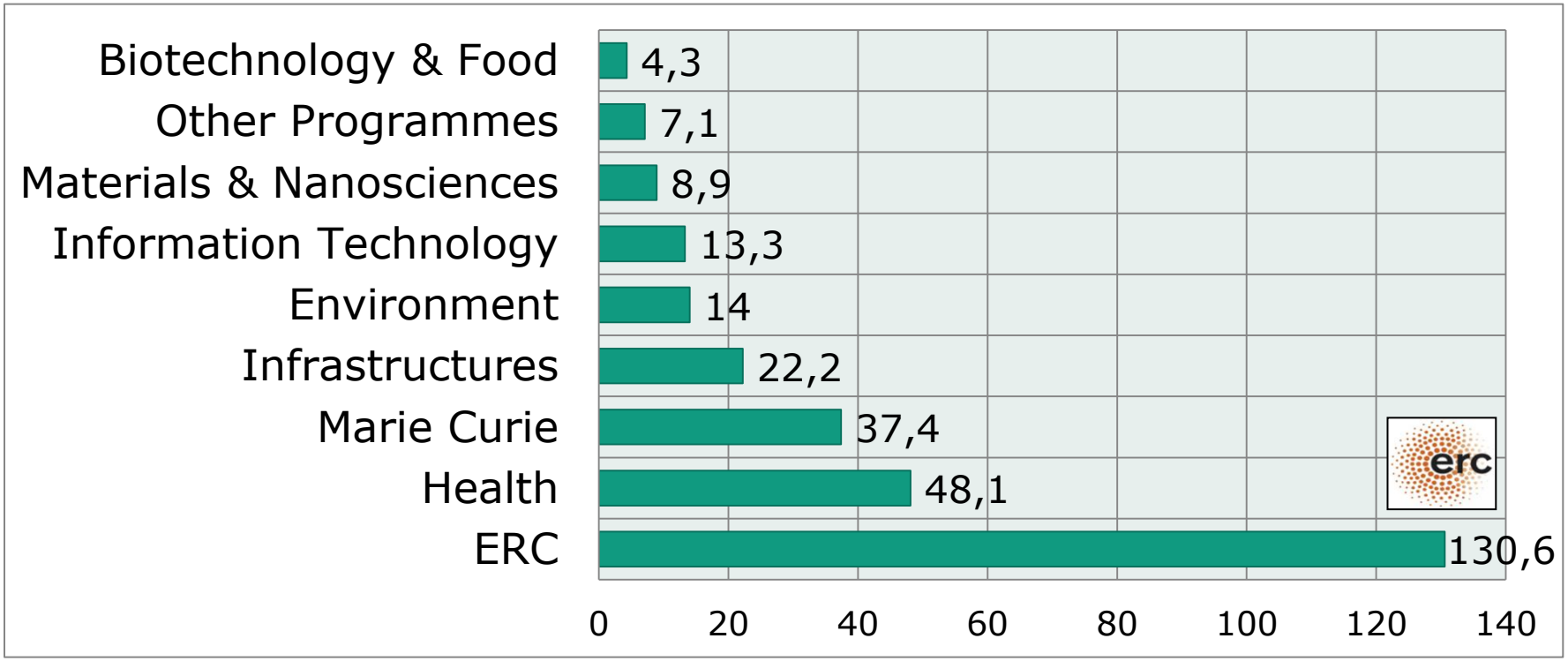
- USA: 34
- Russia: 23

EU-Funding of the Max Planck Society

Granted Funds of the EU	Funded Projects	Granted (in Mio. €)	per Year, average (in Mio. €)
FP7 (2007- 2011)	486	296,8	59,36
FP6 (2003-2006)	430	147	36,8
FP5 (1999-2002)	382	83	20,8
FP4 (1995-1998)	357	54	13,5

Areas of EU-Funding

Framework Programme 7	296,8 Mio. Euro



EURATOM/IPP (2007-2010)	136,5 Mio. Euro
All funds Max Planck Society	433,3 Mio. Euro

ERC funded Success Story on Ageing and Ageing-related Diseases

ERC Project „Experimental Research into Ageing", Linda Partridge, MPI for Biology of Ageing

- Will this rise of life expectancy come to an end one day?
- Can the rate of ageing be manipulated?
- What are the molecular mechanisms of ageing?
- What is the connection between the ageing process and the aetiology of ageing-related diseases?
- Is it possible to develop broad-spectrum, preventative drugs for the diseases of ageing?

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Horizon 2020- Three Pillars

ERC in Horizon2020

MPG Recommendations:

- **Safeguarding ERC** as a central cornerstone in Horizon 2020
- **Bottom-up-approach** as most preferred method
- Keeping **excellence as a key criterion** for selecting new grants
- Securing of the **Increased budget** in Horizon 2020
- Improving of **participation of female scientists**
- Enhancing **Internationalization**

Marie Curie Actions (MCA) in Horizon 2020

MPG Recommendations:

- Safeguarding MCA as a **success story of ERA**
- **Bottom-up-approach** as most preferred method in MCA
- Enabling **inter- and transdisciplinary research** for a competitive Europe

Future and Emerging Technologies (FET) in Horizon2020

MPG Recommendations:

- Keeping **FETs** as an **essential** instrument for safeguarding the future **competitiveness** of the European Union
- Focus on supporting **small and medium research projects**

Horizon 2020- Three Pillars

Industrial Leadership in Horizon 2020

MPG Recommendations:

- Install research programmes for **FET** („knowledge hubs“) aiming at improved **cooperation with SMEs and industry** and shortening the value chain
- Enabling creation of **excellent research clusters in less R&I-intensive regions** by combining Horizon 2020 and the Cohesion Fund (role model: Max Planck Centers)
- Keep substantial funding options for small and medium sized cooperation projects

Horizon 2020- Three Pillars

Societal Challenges in Horizon 2020

- **MPG Recommendations:**

- Install research programmes for **FET** („knowledge hubs“)
- Support of **Social Sciences and Humanities as cross-cutting area of research** in all pillars and thematical domains
- Keep substantial funding options for small and medium sized **cooperation projects**

Summary

- Funding of Basic research on the European level is a must for safeguarding European competitiveness
- Basic research has to be addressed in all pillars of Horizon2020
- Excellence has to be the most important selection criterion within European research funding schemes


Thank You

3. Max Planck Society and European Research Council

The most successful organizations	Total of Grants	Starting Grants			
		4. Call	3.Call	2.Call	1.Call
1. CNRS	83	23	35	8	17
2. University of Cambridge	48	23	14	4	7
3. University of Oxford	38	15	11	6	6
4. Max-Planck-Gesellschaft	**36**	**14**	**9**	**4**	**9**
5. The Hebrew University Jerusalem	27	7	9	5	6
6. Ecole Politechnique Fédérale de Lausanne	23	6	7	8	2
7. Commissariat à l´Energie Atomique et aux Energies Alternatives	23	8	8	5	2
8. Imperial College of Science, Technology and Medicine	23	9	5	3	6
9. University College London	23	10	4	6	3
10. Helmholtz Gemeinschaft	22	7	10	3	2

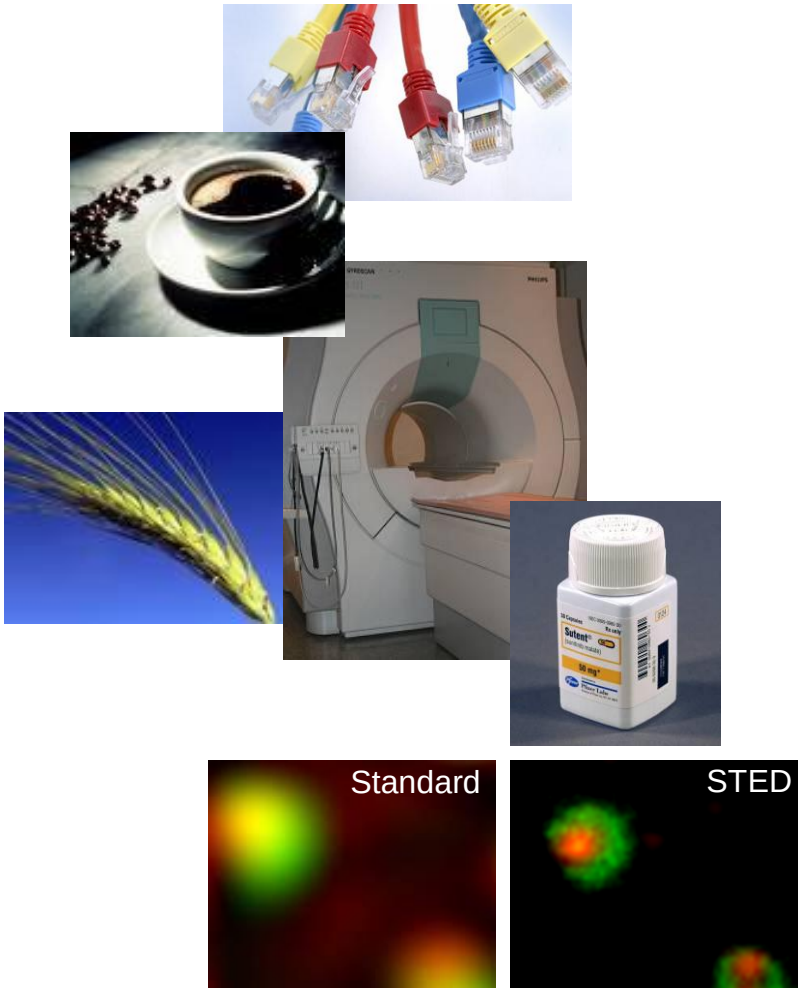
3. Max Planck Society and European Research Council

The most successful organizations	Total of Grants	Advanced Grants			
		4. Call	3.Call	2.Call	1.Call
1. CNRS	38	4	12	9	13
2. University of Cambridge	33	10	9	9	5
3. Max-Planck-Gesellschaft	32	8	13	7	4
4. University of Oxford	32	11	6	7	8
5. ETH Zürich	31	7	7	10	7
6. Ecole Politechnique Fédérale Lausanne	25	4	6	4	11
7. Imperial College London	20	6	3	4	7
8. Weizman Institut of Science	18	1	5	4	8
9. University College London	18	5	1	8	4
10. The Hebrew University of Jerusalem	17	4	4	6	3

4. Max Planck Society and Marie Curie Actions

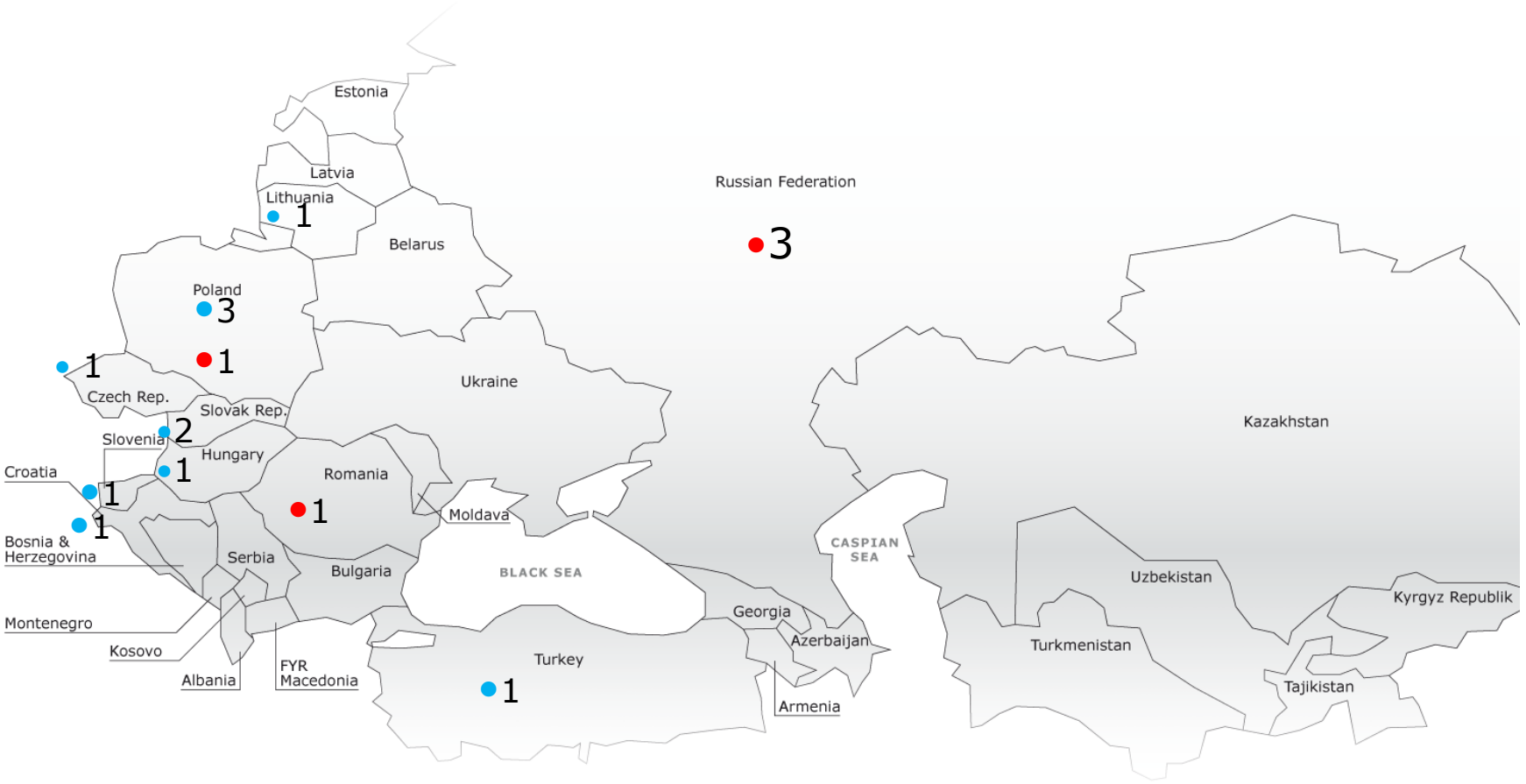
Participation of Max Planck Institutes

Transfer of Max Planck Institute's research results into marketable products



- **Polyethylene & polypropylene** (Ziegler → catalysis)
- **Decaffeinated coffee** (Zosel → "CO_2 destraction")
- **Magnetic resonance imaging** (Frahm, Hase → fast image capture)
- **Paternity test, forensics** (Jäckle, Tautz → STR analysis)
- **Plant transformation** (Leemans, Schell → Ti plasmid)
- **Cancer drug Sutent** (Ullrich → kinase inhibitor)
- **Super-resolution microscopy** (Hell → STED)

Max Planck Partner Groups in Eastern and Central Asia Countries 2002-2012 (in total 16)



- *countries with current partner groups (5)*
- *countries with former partner groups (11)*

R&D Expenditures Worldwide