



# Chancen im Wissenspotential der Arbeitnehmer

## Spitzenforschung schafft Arbeit

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Kufstein, 29.01.2009

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<http://www.tbi.univie.ac.at/~pks>

### **Kurt Tucholsky: Europa (1932)**

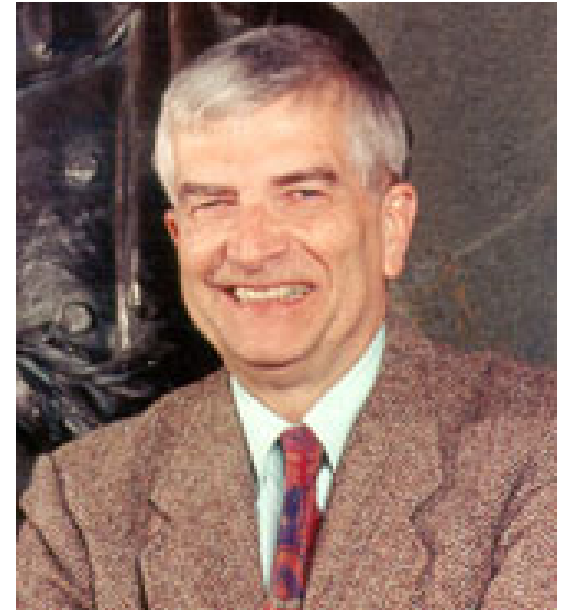
Der Schriftsteller Kurt Tucholsky zeichnet in der Weltwirtschaftskrise ein Bild Europas, das von einem extremen wirtschaftlichen Egoismus gekennzeichnet ist.

[ ... ] Da liegt Europa. Wie sieht es aus?  
Wie ein bunt angestrichenes Irrenhaus.  
Die Nationen schufteten auf Rekord:  
Export! Export!  
Die andern! Die andern sollen kaufen!  
Die andern sollen die Weine saufen!  
Die andern sollen die Schiffe heuern!  
Die andern sollen die Kohlen verfeuern!  
Wir?  
Zollhaus, Grenzpfahl und Einführschein:  
wir lassen nicht das geringst herein.  
Wir nicht. Wir haben ein Ideal:  
Wir hungern. Aber streng national.  
Fahnen und Hymnen an allen Ecken.  
Europa? Europa soll doch verrecken!  
Und wenn alles der Pleite entgeht:  
daß nur die Nation erhalten bleibt!

Menschen braucht es nicht mehr zu geben.  
England! Polen! Italien muß leben!  
Der Staat frißt uns auf. Ein Gespenst. Ein Begriff.  
Der Staat, das ist ein Ding mit Pfiff.  
Das Ding ragt auf bis zu den Sternen –  
von dem kann noch die Kirche was lernen.  
Jeder soll kaufen. Niemand kann kaufen.  
Es rauchen die völkischen Scheiterhaufen.  
Es lodern die völkischen Opferfeuer:  
Der Sinn des Lebens ist die Steuer!  
Der Himmel sei unser Konkursverwalter!!  
Die Neuzeit tanzt als Mittelalter.  
Die Nation ist das achte Sakrament –!  
Gott segne diesen Kontinent.

J. Rogers Hollingsworth:

„The more functions an individual or an organization tries to fulfill, the more unlikely it is to achieve excellence in all or in only one even. **Scientists who teach a lot have less time for research.**“



J.R. Hollingsworth. Institutionalizing Excellence in Biomedical Research: The case of The Rockefeller University. In: D.H. Stapelton, ed. *Creating a Tradition of Biomedical Research. Contributions to the History of The Rockefeller University*. The Rockefeller University Press, pp.17-63, New York 2004.

J. Rogers Hollingsworth:

„The **optimal environment for great innovation** and scientific break-through is characterized by

1. **a maximum of flexibility** without hindrance by hierarchical structures,
2. **a maximum of independence of researchers** and strong encouragement for risky projects, and
3. a large variety of different cultural backgrounds of the researchers.“

J.R. Hollingsworth. Institutionalizing Excellence in Biomedical Research: The case of The Rockefeller University. In: D.H. Stapelton, ed. *Creating a Tradition of Biomedical Research. Contributions to the History of The Rockefeller University*. The Rockefeller University Press, pp.17-63, New York 2004.

*„Sollten unsere naturwissenschaftlichen Institute jemals mit denen Deutschlands in Konkurrenz treten, so wird es nicht genügen hier und dort durch momentane Flickarbeit die ärgsten Mängel zu beheben; es wird einer großen und groß angelegten Aktion bedürfen um die Schäden, die durch die langjährige Vernachlässigung entstanden sind wieder gutzumachen..... Daß jemand aus dem Ausland nach Wien an eine experimentelle Lehrkanzel kommt, ist so gut wie ausgeschlossen.“*

*Denkschrift über die gegenwärtige Lage der Philosophischen Fakultät der Universität Wien, Adolf Holzhausen 1902 (zitiert C.Goschler: Wissenschaft und Öffentlichkeit in Berlin 1870 –1930, p.201)*

1885 - Separation of 'didym' into *neodym* and *praseodym*.

1885 - Gas burner mantle for incandescent lighting.

1890 - First industrial process using powder metallurgy.

1898 - Electric bulb with osmium filament.

1903 - Pyrophoric alloys (cerium-iron) used as flints.

1907 - Foundation of the 'Treibacher Chemische Werke GmbH' in Treibach-Althofen for the production of ferrocerium-lighter flints under the trade name 'Original Auermetall'.



Dr. Carl Auer von Welsbach  
1858 - 1929

2006 - About one hundred years later the 'Treibacher Chemische Werke' are still flourishing and represent the major industry and employer in the whole region.

Source: Auer von Welsbach-Museum, Treibach-Althofen, Kaernten, Austria.

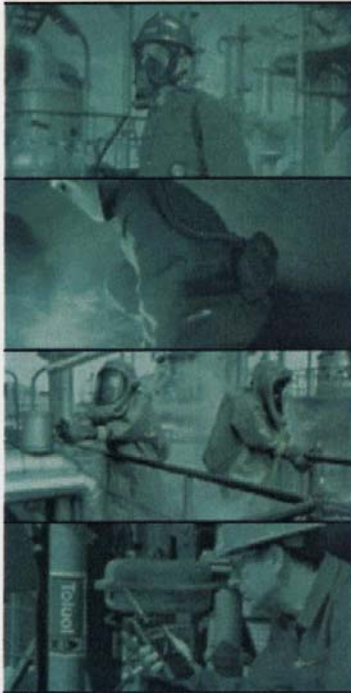




Abb. 2008-2/292

Fabrikgebäude der Degea-Fabrik (Deutschen Gasglühlichtgesellschaft AG / Auergesellschaft) und der Osram-Fabrik Berlin O. 17, Friedrichshain, nach 1906 (Gründung von OSRAM 1906)

Produkte	Über uns	Neuigkeiten & Veranstaltungen	Kontakt & Service	Presse	Erweiterte Suche
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++ MSA kündigt Preiserhöhung an ++ ++ Erweitert: 9010/9020 LCD ++ ++ NEU: I



Isolieratemschutz

Filteratemschutz

Fluchtgeräte



Kopfschutz

Augenschutz

Gehörschutz



Tragbare Messtechnik

Stationäre Messtechnik

Wärmebildkameras



Schutzkleidung

Software

Service & Werkstattlösungen

## Top 20 Global R&D Spenders, 2006

RANK 2006	RANK 2005	COMPANY	R&D SPENDING			HEADQUARTERS LOCATION	INDUSTRY
			2006, IN MILLIONS	CHANGE FROM 2005	AS A % OF SALES		
1	3	Toyota	\$7,691	9.6%	3.7%	Japan	Auto
2	2	Pfizer	\$7,599	4.7%	15.7%	North America	Health Care
3	1	Ford	\$7,200	-10.0%	4.5%	North America	Auto
4	7	Johnson & Johnson	\$7,125	10.3%	13.4%	North America	Health Care
5	4	DaimlerChrysler	\$6,678	-5.6%	3.5%	Europe	Auto
6	5	General Motors	\$6,600	-1.5%	3.2%	North America	Auto
7	8	Microsoft	\$6,584	6.5%	14.9%	North America	Software and Internet
8	10	GlaxoSmithKline	\$6,351	10.2%	14.9%	Europe	Health Care
9	6	Siemens	\$6,294	-2.5%	5.8%	Europe	Industrials
10	9	IBM	\$6,107	4.5%	6.7%	North America	Computing and Electronics
11	11	Samsung	\$5,924	2.8%	6.7%	Rest of World	Computing and Electronics
12	12	Intel	\$5,873	14.1%	16.6%	North America	Computing and Electronics
13	14	Sanofi-Aventis	\$5,571	9.5%	15.6%	Europe	Health Care
14	16	Novartis	\$5,349	10.9%	14.8%	Europe	Health Care
15	13	Volkswagen	\$5,312	4.0%	4.0%	Europe	Auto
16	19	Roche Holding	\$5,262	16.2%	15.7%	Europe	Health Care
17	15	Matsushita	\$4,992	2.4%	6.3%	Japan	Computing and Electronics
18	17	Nokia	\$4,892	1.9%	9.5%	Europe	Computing and Electronics
19	22	Merck	\$4,783	24.3%*	21.1%	North America	Health Care
20	20	Honda	\$4,765	8.1%	5.0%	Japan	Auto
			\$120,950 TOTAL**	5.0% AVG.	6.9% AVG.		

Source: Booz Allen Hamilton

\* Includes substantial acquired research.

\*\* Sums do not add up to total due to rounding.

**RANKING OF INDUSTRIAL SECTORS BY AGGREGATE R&D FROM THE WORLD TOP  
1,400 COMPANIES IN THE 2007 EU SCOREBOARD - 2006**

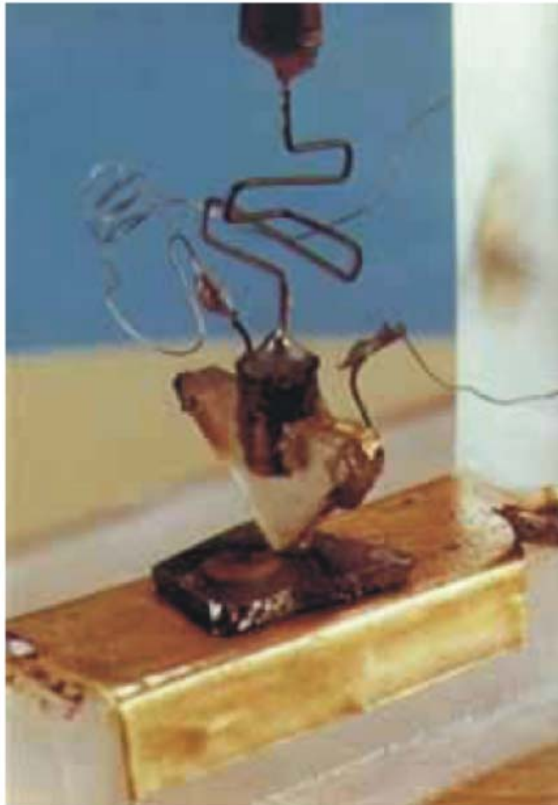
Sector (according to the ICB)	R&D investment (€ million)	Share in R&D investment (%)	R&D/Sales ratio (%)
Pharmaceuticals & Biotechnology	70,523.5	19.3	15.9
Technology hardware & equipment	64,531.5	17.6	8.6
Automobiles & parts	60,807.1	16.6	4.1
Electronic & electrical Equipment	27,138.9	7.4	4.4
Software & computer services	26,522.8	7.3	9.8
Chemicals	17,186.0	4.7	3.1
Aerospace & Defence	15,991.3	4.4	4.8
Leisure goods	14,208.6	3.9	6.5
Industrial engineering	9,319.3	2.5	2.7
General industrials	8,867.6	2.4	2.1
Fixed line telecommunications	7,283.1	2.0	1.6
Health care equipment & services	6,446.1	1.8	6.8
Oil & gas producers	4,923.7	1.3	0.3
Food producers	3,918.5	1.1	2.2
Household goods	3,911.9	1.1	1.6
Others (22 sectors)	24,243.9	6.6	0.9
<b>Grand Total (37 sectors)*</b>	<b>365,823.9</b>	<b>100.0</b>	<b>3.4</b>

\* Totals do not add due to rounding

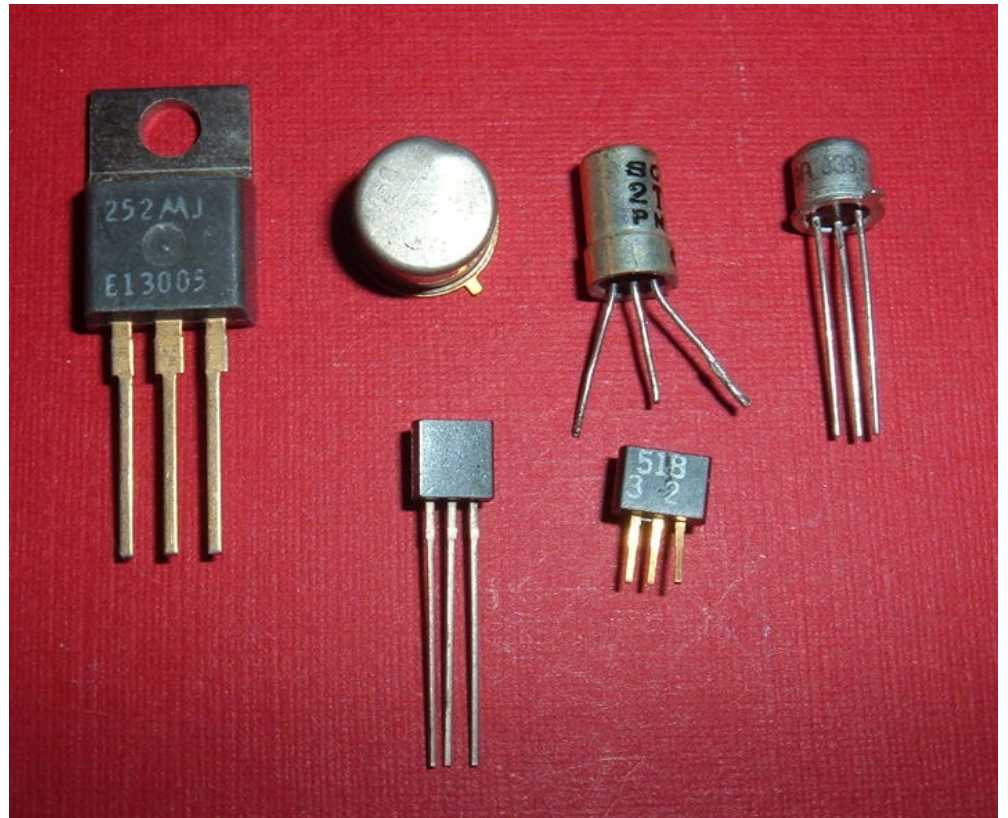
Note: ICB: Industrial Classification Benchmark set up by FTSE (Financial Times Stock Exchange) & Dow Jones

Data relate to the top 1,400 companies with registered offices in the EU, Japan, the USA and the Rest of the World, ranked by the size of their R&D investment (over € 23 million)

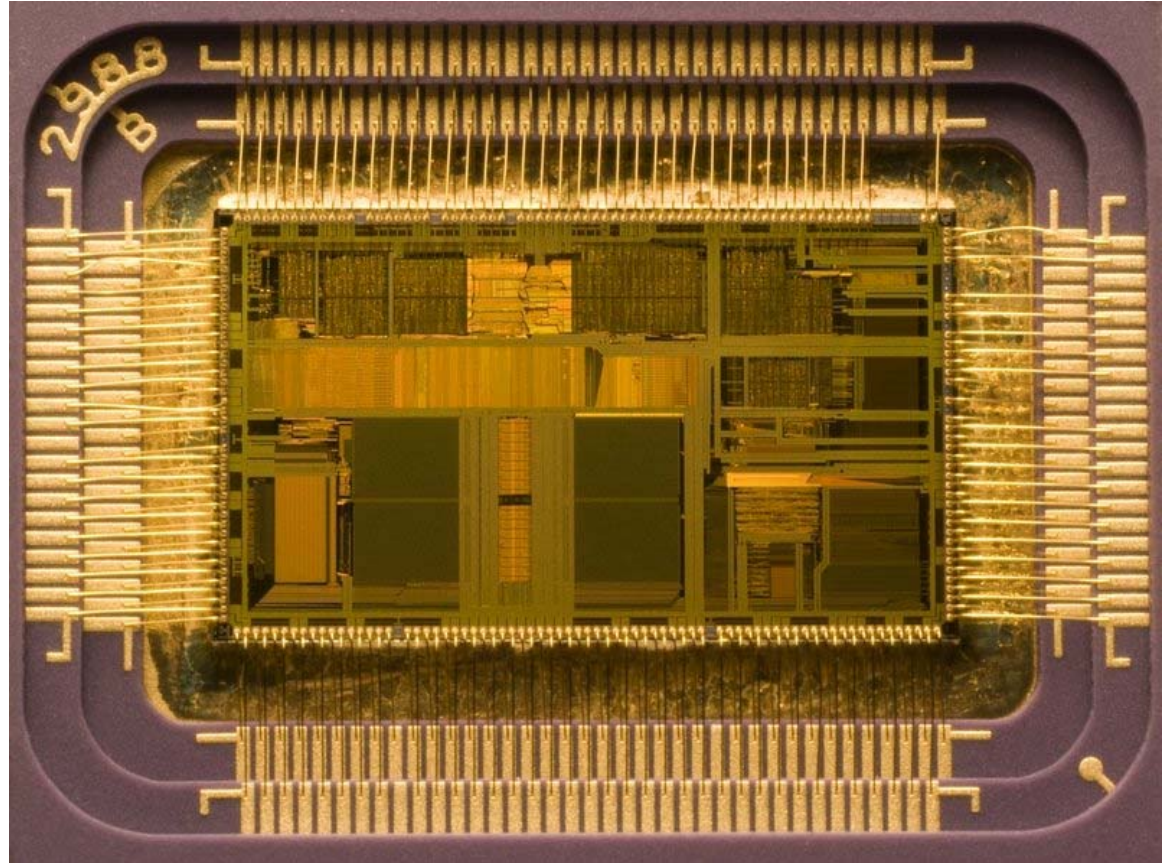
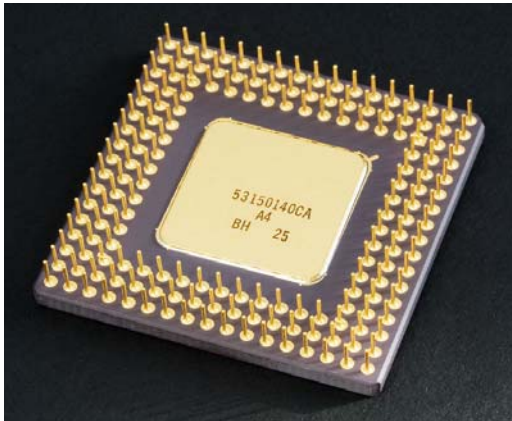
Source: The 2007 EU Industrial R&D Investment Scoreboard, Joint Research Centre, Directorate General Research, European Commission



Der erste Transistor



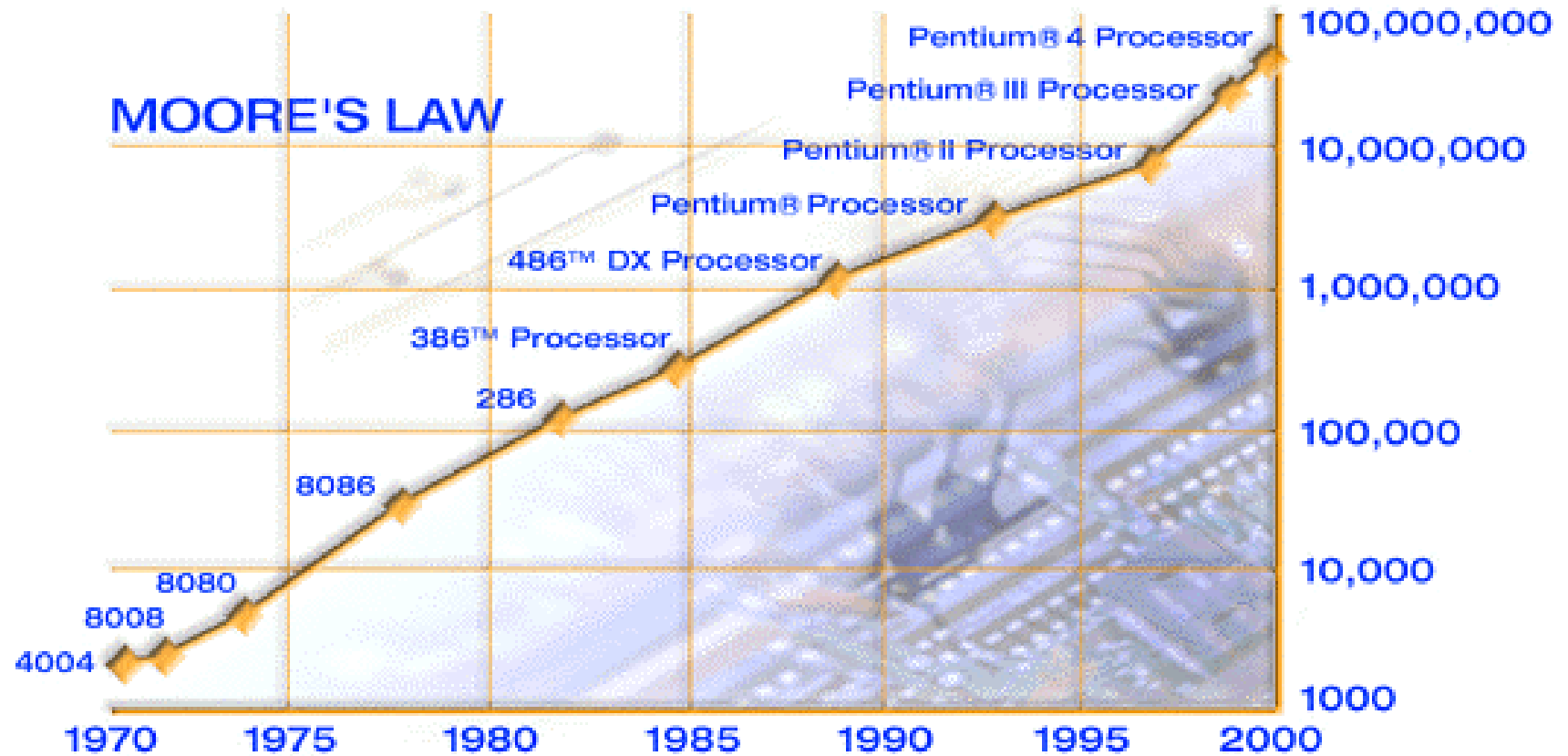
Transistoren der späteren Generationen

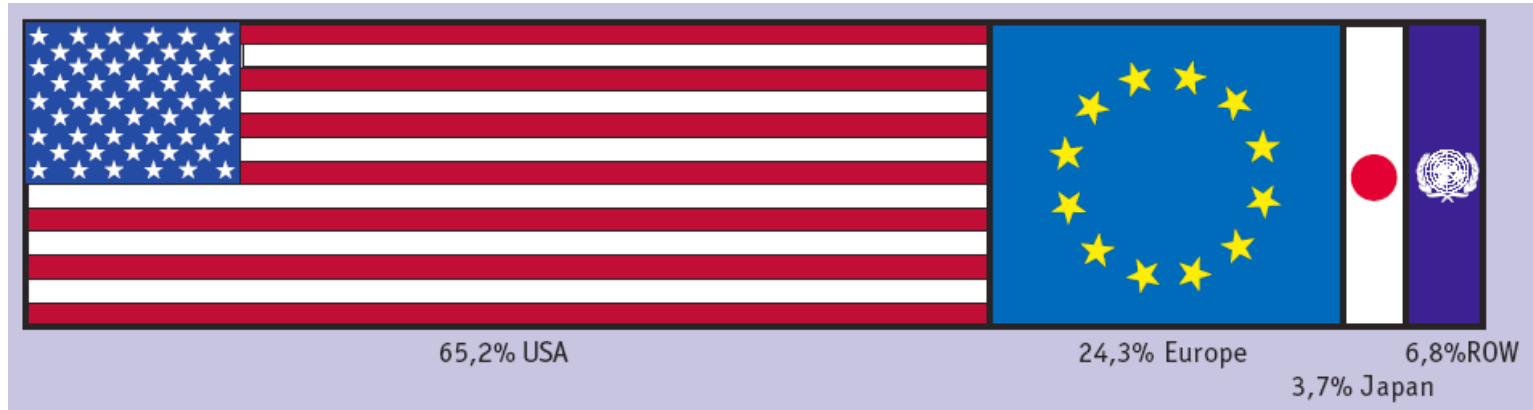


Beispiel für einen integrierten Schaltkreis:

Der 80486 Prozessor

transistors

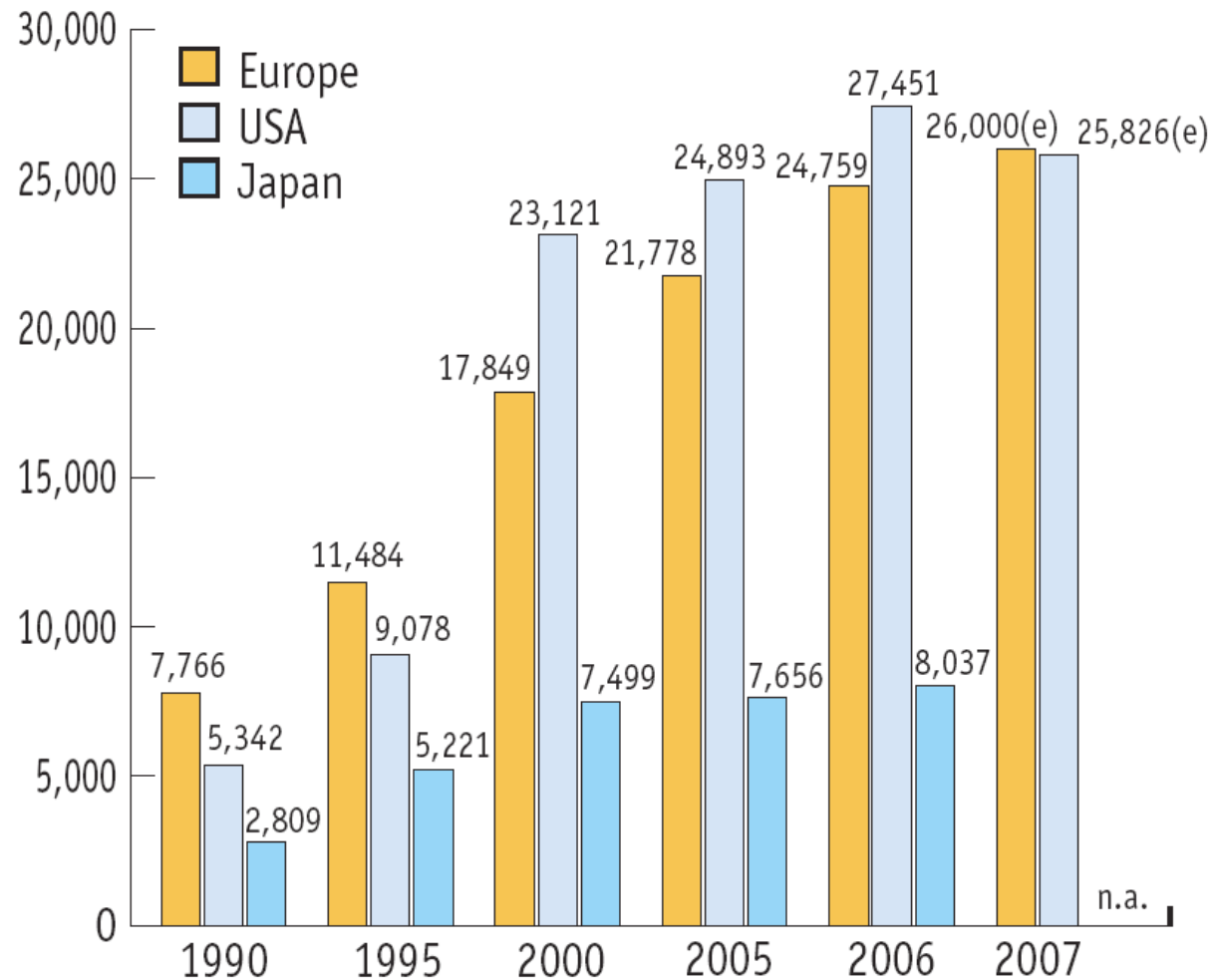




Geographical breakdown of sales of new medicines  
launched during the period 2002 - 2007



## Pharmaceutical R&D Expenditure (million €, current exchange rates)



The research-based pharmaceutical industry accounts for approximately 3.5% of the total EU manufacturing value added and for 19% of the global business R&D expenditure. The pharmaceutical industry performs well on most standard indicators, such as:

- employment: more than 643,100 jobs in Europe, including 107,000 in R&D units;
- R&D investment: € 24,800 million in 2006 (up from € 7,800 in 1990);
- trade surplus: € 44,400 million in 2006 (up from € 7,100 in 1990).

INDUSTRY (EFPIA total) <sup>(1)</sup>	1990	1995	2000	2005	2006	2007
Production	63,010	88,912	123,282	172,098	182,339	190,000 (e)
Exports <sup>(2)</sup>	23,180	44,188	90,935	181,575	202,316	210,000 (e)
Imports <sup>(2)</sup>	16,113	31,018	68,841	145,823	157,941	161,000 (e)
Trade balance	7,067	13,170	22,094	35,752	44,375	49,000 (e)
R&D expenditure	7,766	11,484	17,849	21,778	24,759	26,000 (e)
Employment (units)	500,879	506,052	538,438	635,937	643,138	645,000 (e)
R&D employment (units)	75,760	82,282	88,524	100,013	106,974	107,000 (e)
Pharmaceutical market value at ex-factory prices	41,147	59,871	86,812	129,462	133,350	140,500 (e)
Pharmaceutical market value at retail prices	64,626	93,032	136,627	188,109	194,524	205,000 (e)
Payment for pharmaceuticals by statutory health insurance systems <sup>(3)</sup>	40,807	58,128	74,743	104,370	107,844	111,000 (e)

Values in € million unless otherwise stated

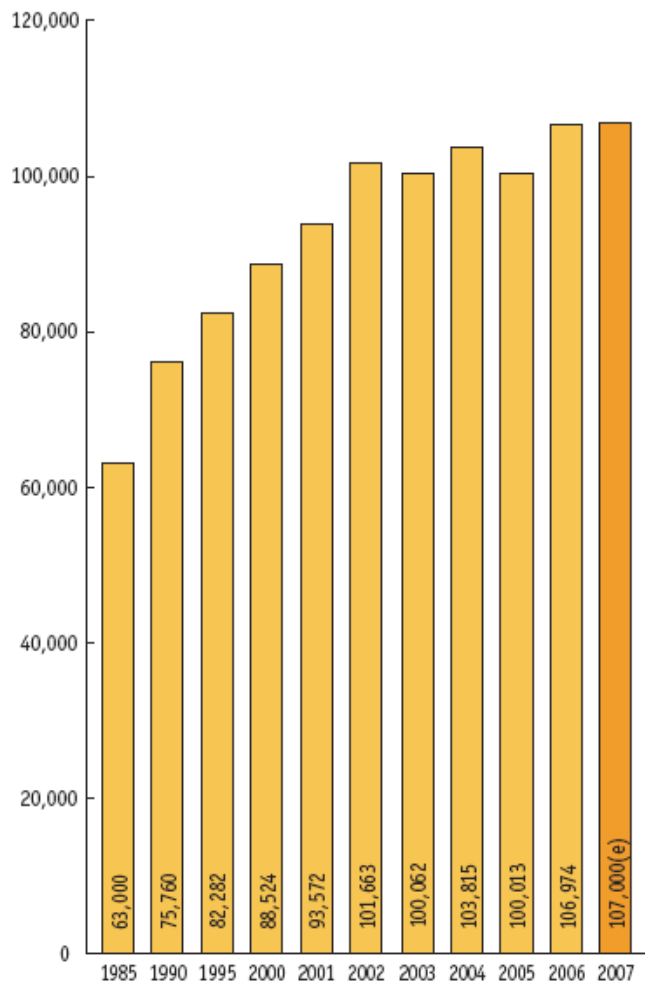
(1) Data relate to EU-27, Norway and Switzerland since 2005 (EU-15 before 2005)

(2) Data relating to total exports and total imports include EU-27 intra-trade (double counting in some cases)

(3) Since 1998 data relate to ambulatory care only

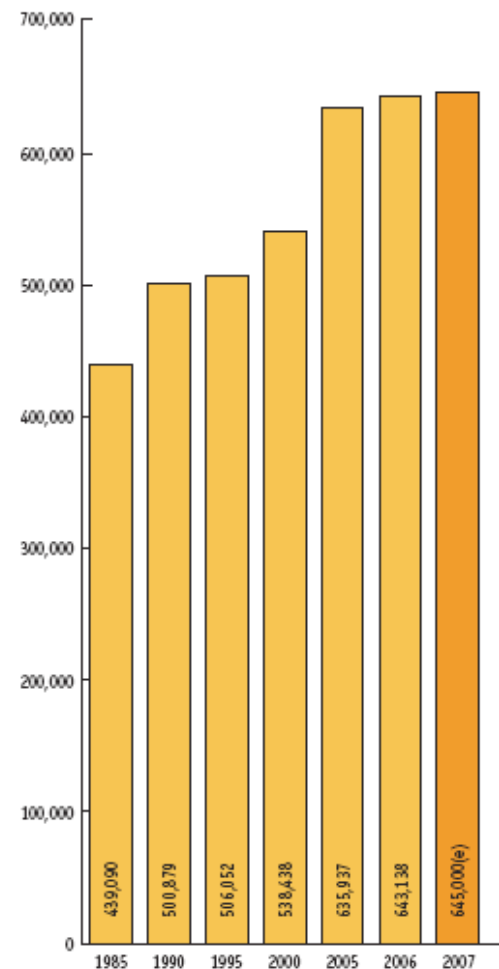
Source: EFPIA member associations (official figures) - (e): EFPIA estimate; Eurostat (EU-27 trade data 1995-2007)

## EMPLOYMENT IN PHARMACEUTICAL R&D (1985-2007)



Note: Data include Slovenia (since 2004) and Romania (since 2005)  
Bulgaria, Cyprus, Czech Republic, Estonia, Greece, Hungary, Iceland, Latvia, Lithuania, Malta,  
Poland, Portugal, Slovakia: data not available  
Source: EFPIA member associations - (e): EFPIA estimate

## EMPLOYMENT IN THE PHARMACEUTICAL INDUSTRY (1985-2007)



Note: As of 2005 data include Malta,  
Poland, Romania, Slovakia and  
Slovenia

Source: EFPIA member associations  
(official figures) - (e): EFPIA  
estimate



Science and society

## Drug discovery in jeopardy

Pedro Cuatrecasas

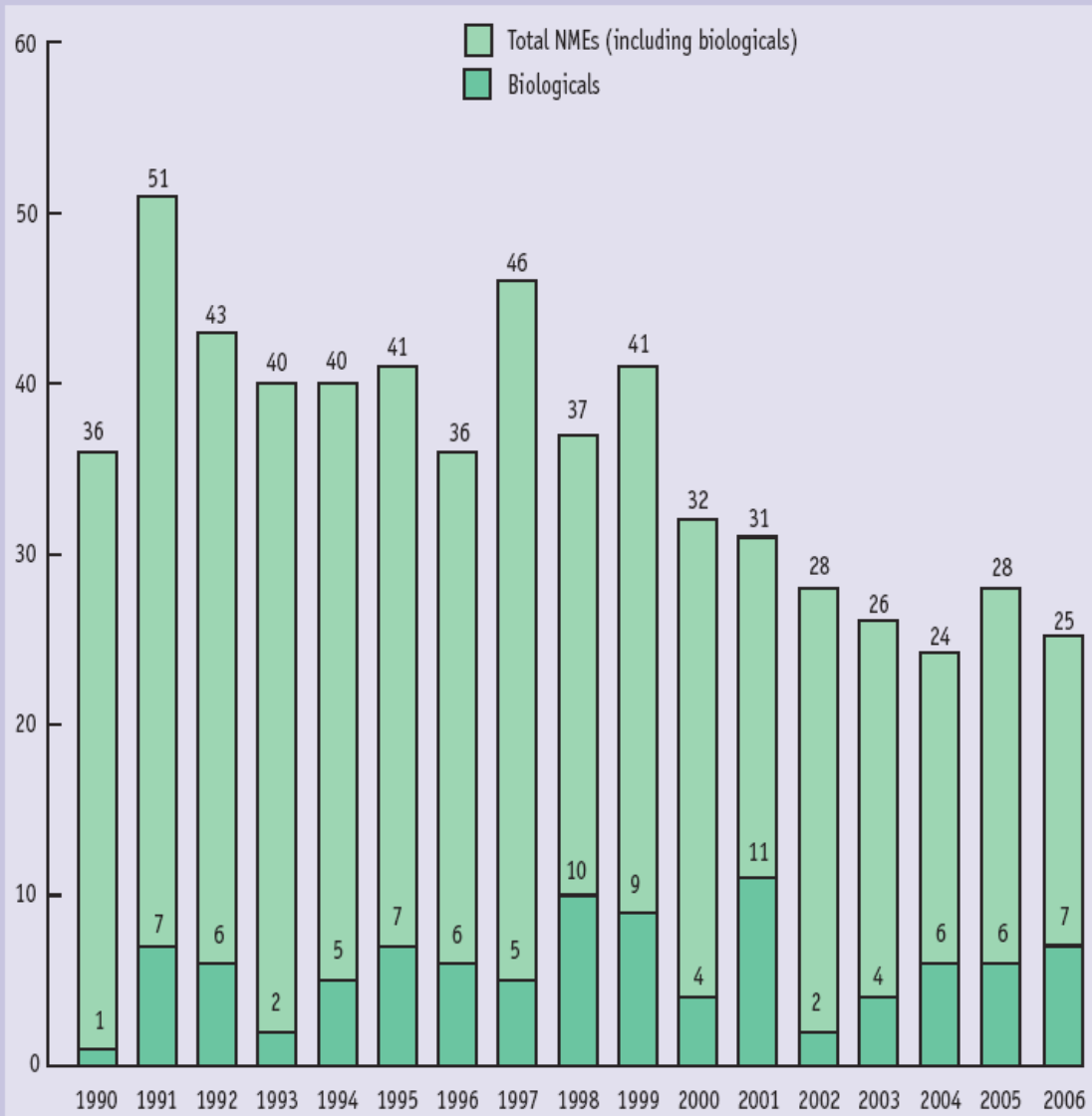
Departments of Pharmacology and Medicine, University of California San Diego, San Diego, California, USA.



Despite striking advances in the biomedical sciences, the flow of new drugs has slowed to a trickle, impairing therapeutic advances as well as the commercial success of drug companies. Reduced productivity in the drug industry is caused mainly by corporate policies that discourage innovation. This is compounded by various consequences of mega-mergers, the obsession for blockbuster drugs, the shift of control of research from scientists to marketers, the need for fast sales growth, and the discontinuation of development compounds for nontechnical reasons. Lessons from the past indicate that these problems can be overcome, and herein, new and improved directions for drug discovery are suggested.

Journal of Clinical Investigations **116**(11):2837-2842, 2006

## NUMBER OF NEW MOLECULAR ENTITIES (NMEs) FIRST LAUNCHED WORLDWIDE 1990-2006



Source: CMR International



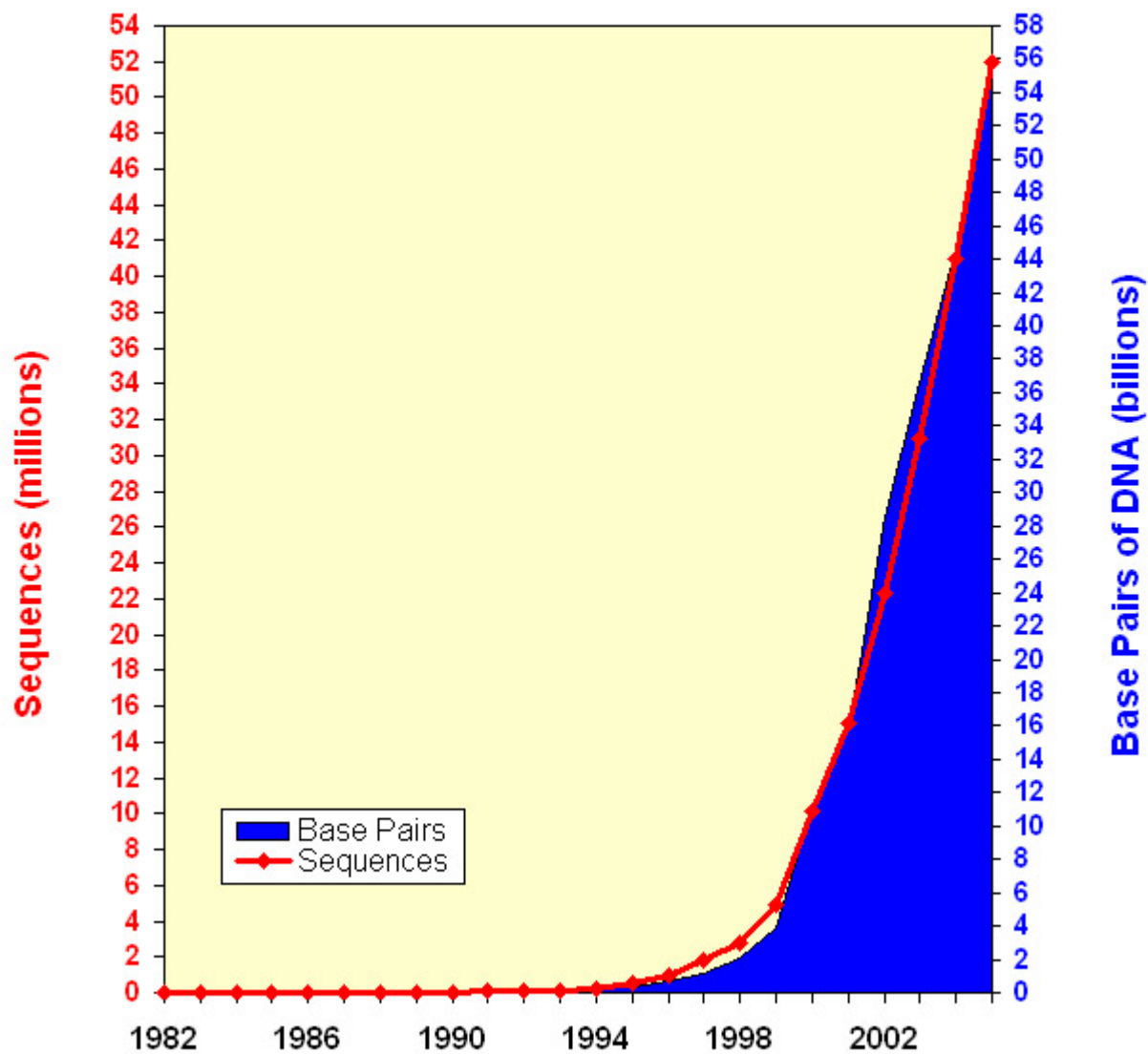
„Leuchtende Tabakpflanze“



„Goldener Reis“

Beispiele gentechnisch hergestellter Pflanzen

# Growth of GenBank (1982 - 2005)





## BIOPHARMACEUTICALS (2006)

Year 2006	Global	USA	Europe	Canada	Asia-Pacific
Revenues (€ million)	58,501	44,154	9,147	2,581	2,619
R&D expenditure (€ million)	22,119	18,205	2,891	705	319
Net loss (€ million)	4,336	2,760	896	417	264
Number of employees (units)	195,820	146,100	32,470	7,440	9,810
Number of public and private companies (units)	4,275	1,452	1,621	465	737

Source: Ernst & Young, 'Beyond Borders, Global Biotechnology Report 2007'  
 (data relate only to publicly traded companies)

Web-Page for further information:

<http://www.tbi.univie.ac.at/~pks>

