



# **Innovation and the Birth of the Fusion Economy: Financial Implications of IP**

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# Best(?) Laid Plans...

## ● Stevenson-Wydler Technology Innovation Act of 1980

- It is the continuing responsibility of the Federal Government to ensure the full use of the results of the Nation's Federal investment in research and development. ... **including plans for securing intellectual property rights in laboratory innovations with commercial promise and plans for managing such innovations so as to benefit the competitiveness of United States industry.**

## ● Small Business Innovation Development Act of 1982

- Federal research and development as a base for technological innovation to meet agency needs and to contribute to the growth and strength of the Nation's economy

## ● Executive Order 12591 – April 10, 1987

- Identify areas of research and technology of potential importance to long- term national economic competitiveness

## ● European Commission Enterprise Policy - Lisbon, 2000

- Protection of intellectual property is another *sine qua non* for innovation. Without adequate protection of inventions and creations, there is no motivation to invest in them. Furthermore, their use as an asset by their authors may be hampered.





# R&D = Patents?

Over 75% of ALL Federal and Corporate R&D in the U.S. goes to:

- Computer/Electronic Products
- Chemicals\*
- Computer-related Services
- Aerospace\*
- Automotive

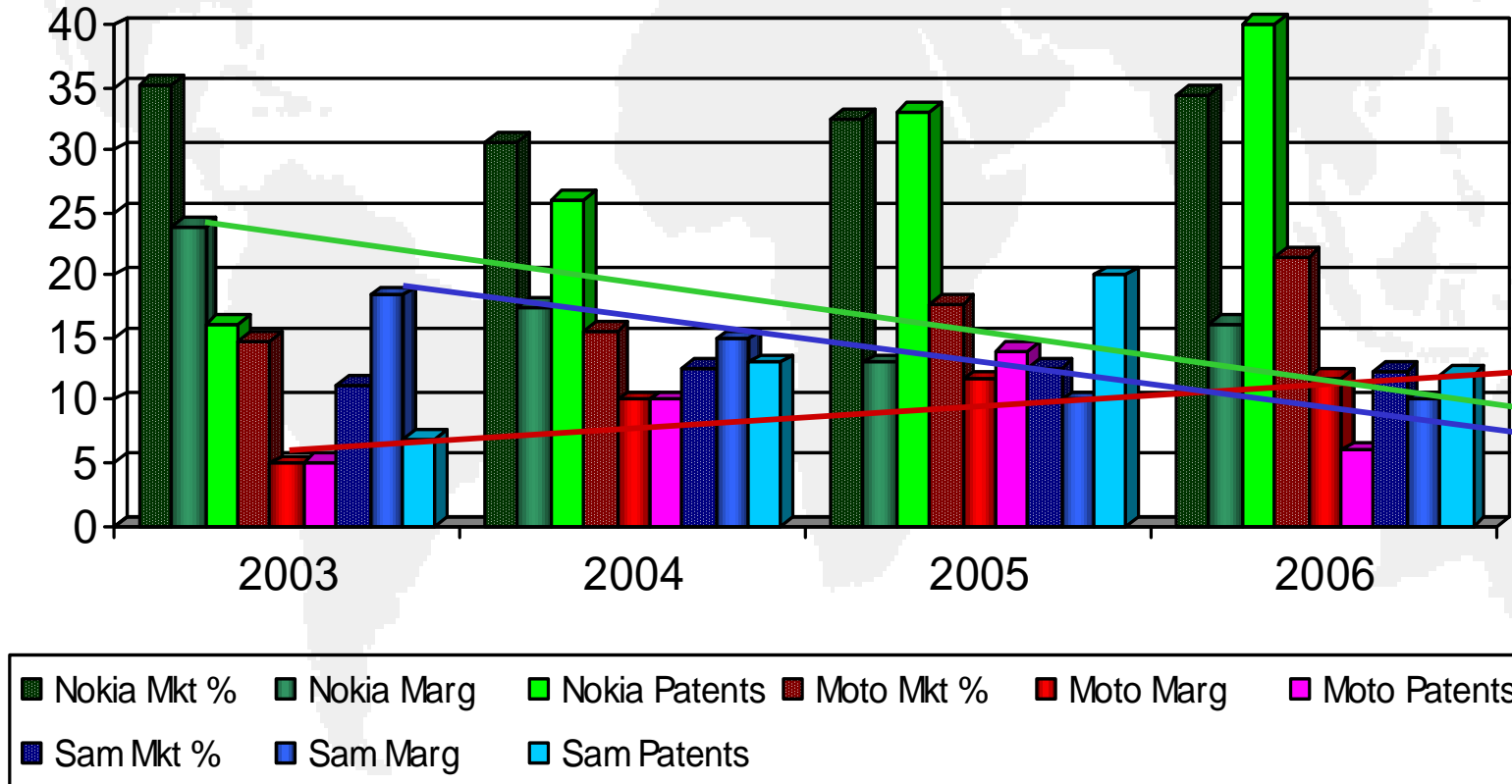
Source: 2006 NSF Division of Science Resources Statistics

TOP 20 USPTO Patent Recipients - 2005
International Business Machines Corporation
Canon Kabushiki Kaisha
Hewlett-Packard Development Company, L.P. (a)
Matsushita Electric Industrial Co., Ltd.
Samsung Electronics Co., Ltd.
Micron Technology, Inc.
Intel Corporation
Hitachi, Ltd
Toshiba Corporation
Fujitsu Limited
Sony Corporation
General Electric Company
Seiko Epson Corporation
Infineon Technologies AG
Koninklijke Philips Electronics N.V.
Robert Bosch GmbH
Fuji Photo Film Co., Ltd
Microsoft Corporation
Texas Instruments, Incorporated
Honda Giken Kogyo K.K. (Honda Motor Co., Ltd.)



# Value Accretion or Actuarial Deferral

- “Great” patents on “must have” product enhancements may not mean increased revenue
- All value is additive and positive?
  - What happens when a patent slows the rate of market loss rather than adding market value?**

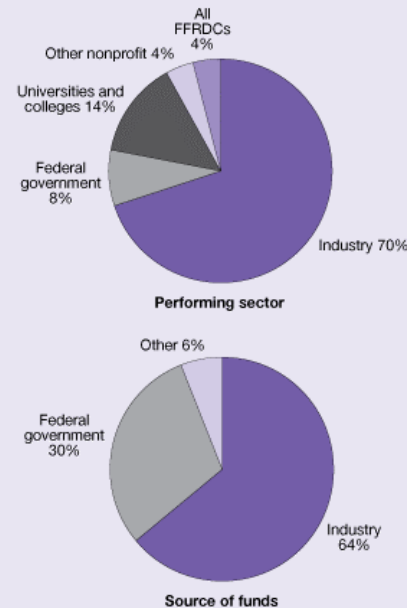




# Upstream Incentives, or...

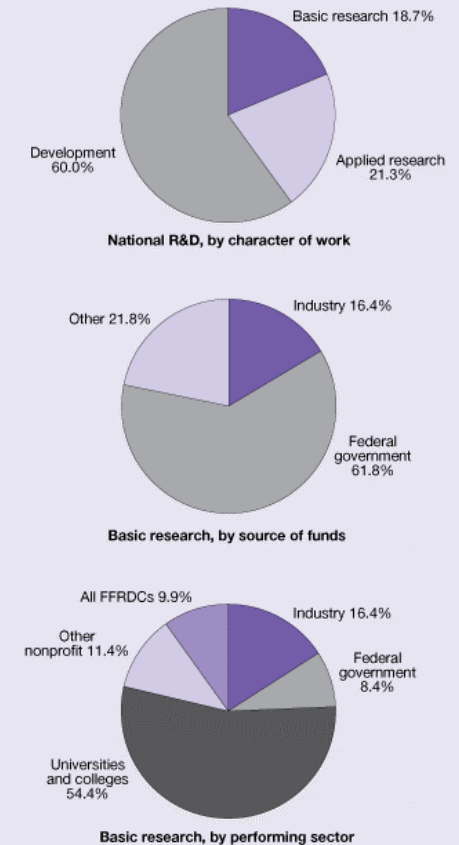
- Fundamental Assumptions Untested
  - Are all patents equal?
  - Are all industries equal? ≠ Uniform mode unsubstantiated
- Patents ≠ R&D ≠ Funding
- Innovations created with Federal funds seldom transfer with economic benefit to creators

Figure 4-2  
Shares of national R&D expenditures, by performing sector and source of funds: 2004



FFRDC = federally funded research and development center  
 NOTES: Values rounded to nearest whole number. National R&D expenditures estimated at \$312 billion in 2004.  
 SOURCE: National Science Foundation, Division of Science Resources Statistics, *National Patterns of R&D Resources* (annual series). See appendix tables 4-3 and 4-5.  
 Science and Engineering Indicators 2006

Figure 4-4  
National R&D by character of work, basic research by source of funds, and basic research by performing sector: 2004



FFRDC = federally funded research and development center  
 NOTES: Figures rounded to nearest whole number. National R&D expenditures estimated at \$313 billion in 2004.  
 SOURCE: National Science Foundation, Division of Science Resources Statistics, *National Patterns of R&D Resources* (annual series). See appendix tables 4-3, 4-7, 4-11, and 4-15.  
 Science and Engineering Indicators 2006



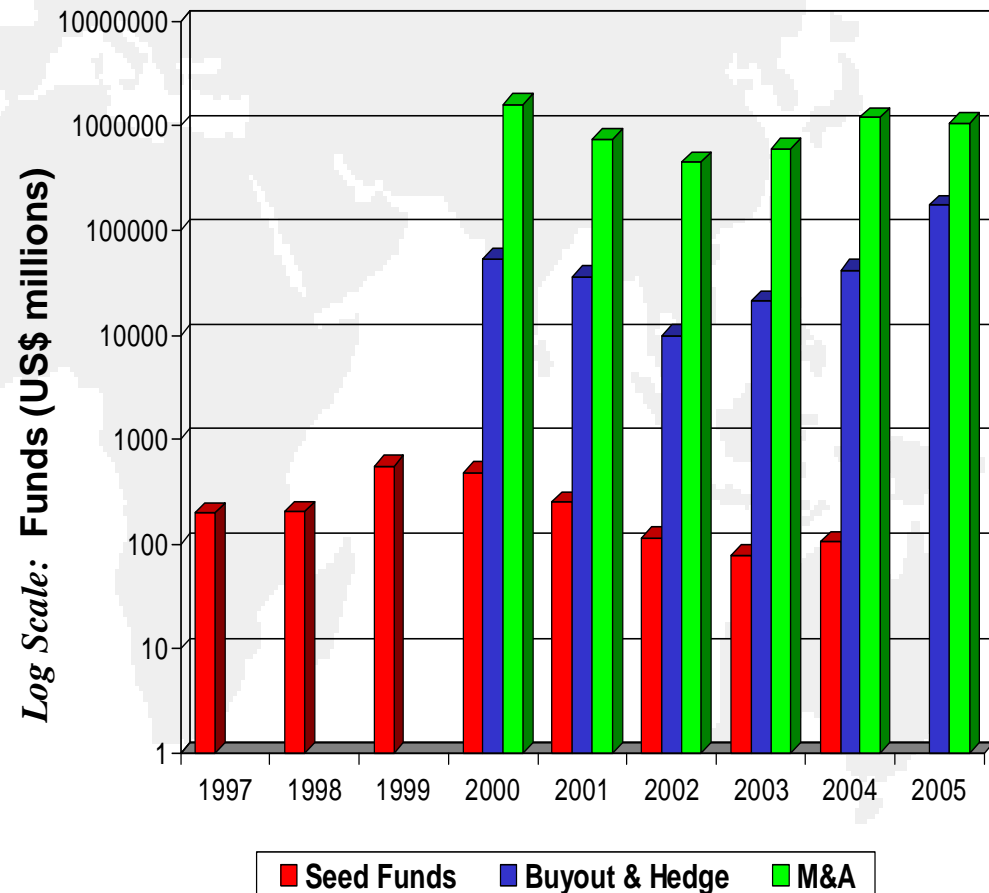
# Downstream Effects

## Market trends

- US\$1.98 billion in seed capital
- US\$8 trillion in M&A and Hedge

## Acquisition exits

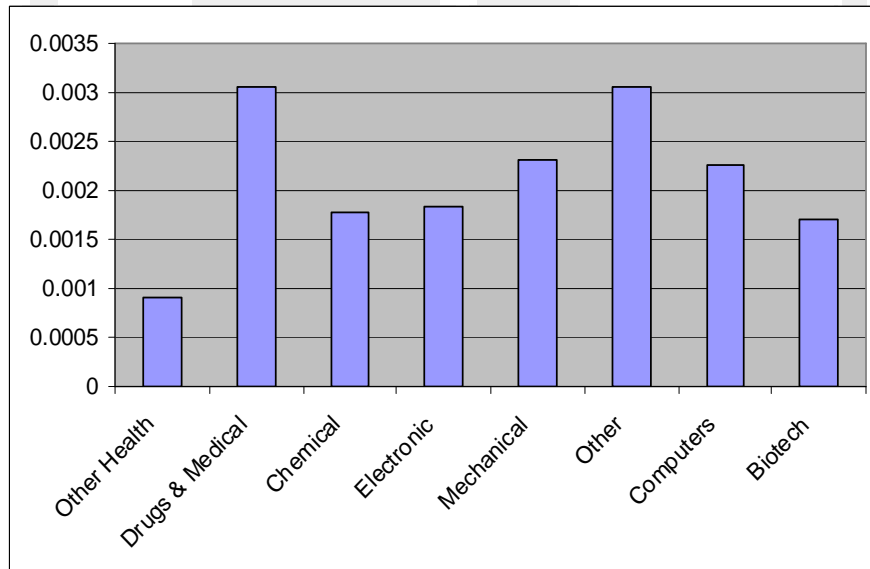
- Private equity premiums paid for technology >40%
- IP “widows & orphans” over 50% in preliminary studies



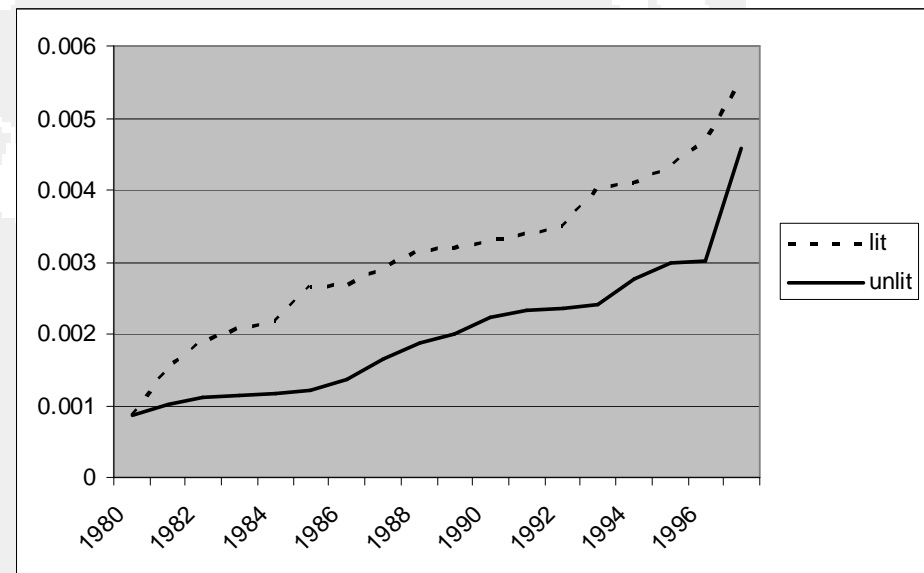


# Where money is flowing

Patent Weakness by Industry\*



Litigation Trends on “Weak” Patents\*

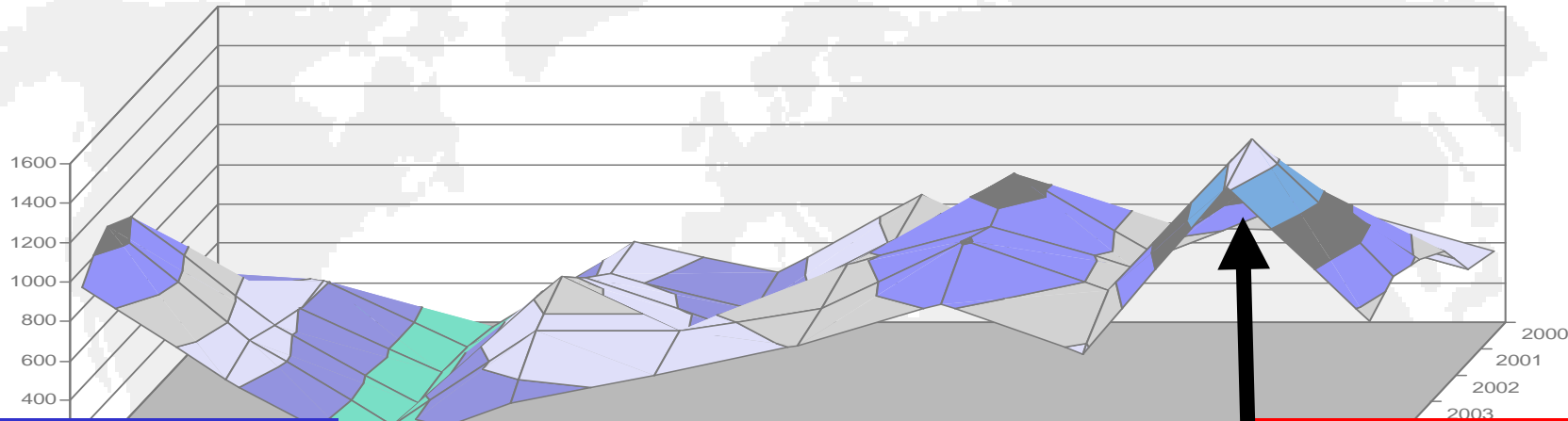


- While clear differences of weakness exist across industry sectors, uninformed capital is driving increased litigation on more questionable patents
  - More funding for weaker cases works against espoused value accretion incentive arguments
  - Quality discussion must include economic consequence inputs

\*Source: “Weak Patents, Open Source Patenting, and Implications for the Bayh-Dole Act in Developing Countries.”  
S.N. Boettiger; B. Wright, D. Zilberman, B. Hall. Dissertation, University of California, Berkeley. 2007.

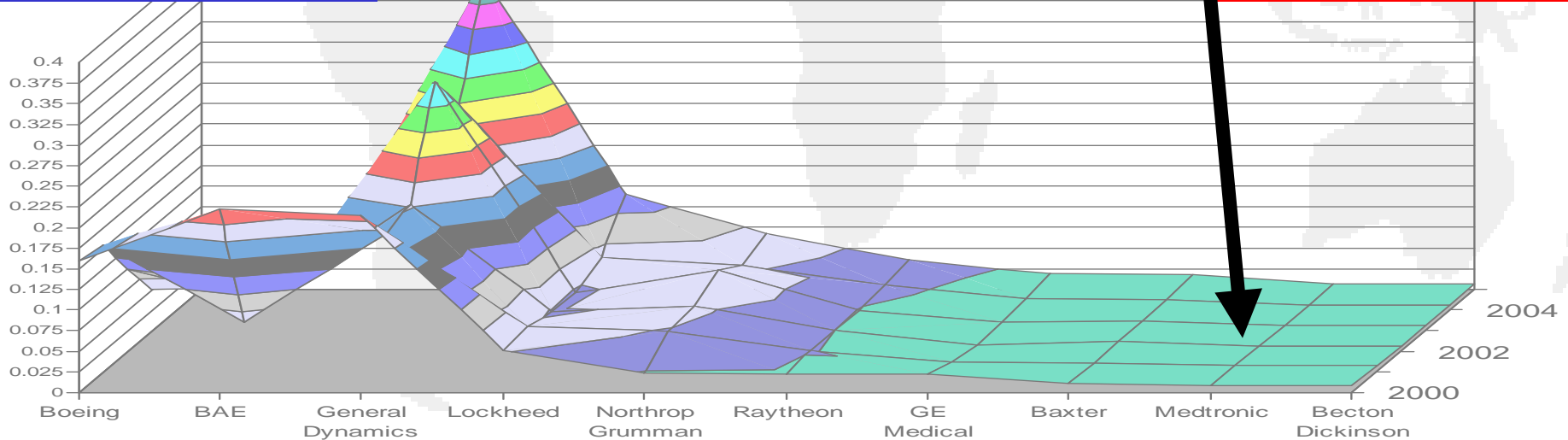


# Quantity Does Not Beget Quality



**Few High Value Innovations**

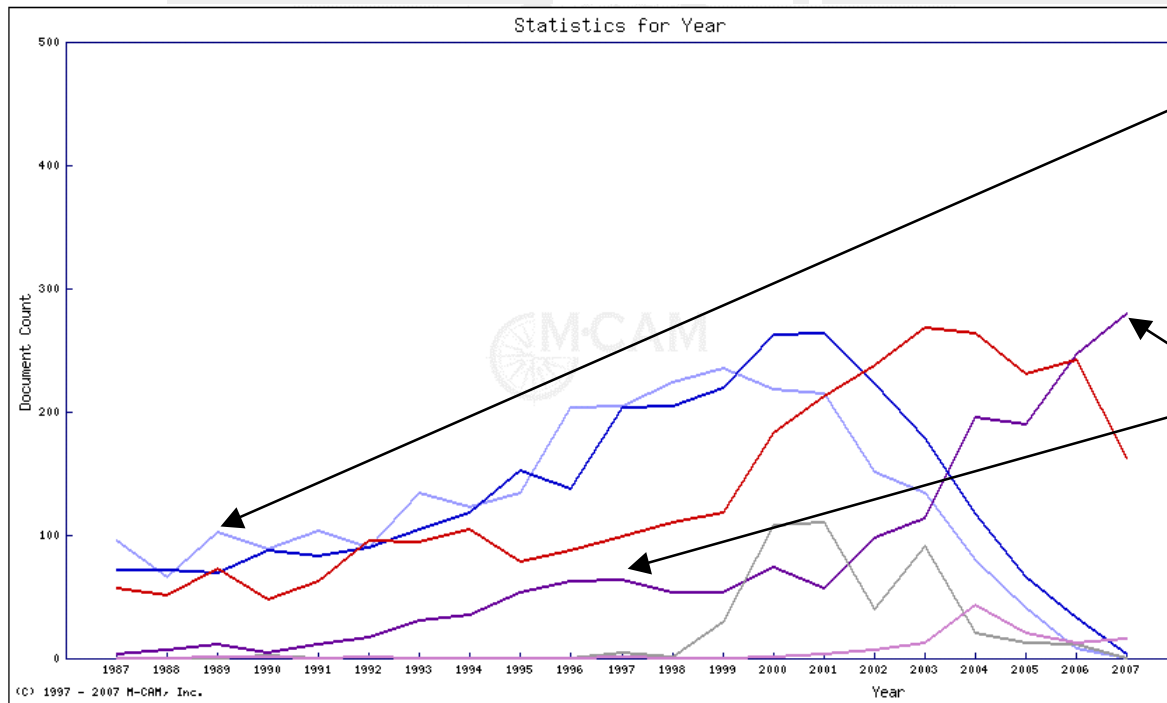
**Many Low Value Innovations**







# When the Future Comes: Hydrogen Powered Vehicles



● Broad claims on hydrogen propulsion issued 15-20 years ago

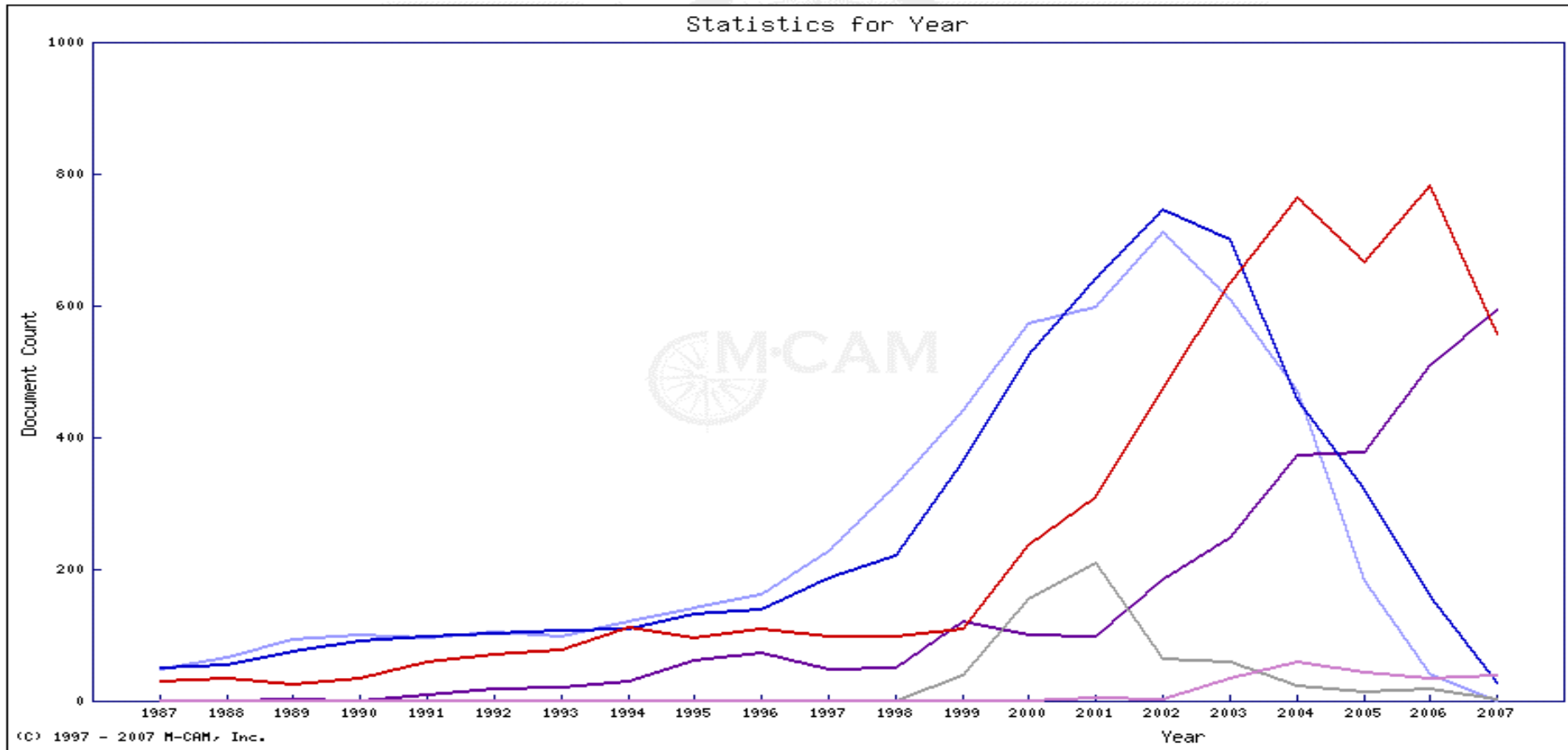
● Mass abandonments now litter the “freedom to operate” space

● Increasing difficulty to patent commercial applications today

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	
priority	95	66	102	89	103	90	134	123	134	203	205	224	235	218	215	151	134	80	41	8	0	priority
abandoned	3	7	11	5	11	17	31	35	53	62	64	53	53	74	57	98	114	196	190	247	279	abandoned
transfer	0	0	0	2	0	1	0	0	0	0	4	1	29	108	110	40	91	20	13	11	0	transfer
file	72	72	89	87	83	90	104	118	152	138	203	205	219	262	264	223	178	117	86	33	3	file
issue	57	51	73	48	63	95	94	105	78	68	99	110	118	183	212	238	268	264	231	242	163	issue
disallowed	0	0	1	1	0	1	0	0	0	0	1	0	0	1	3	7	13	43	20	13	16	disallowed
total	227	196	256	232	260	294	363	381	417	491	576	593	654	846	861	757	798	720	561	554	461	total



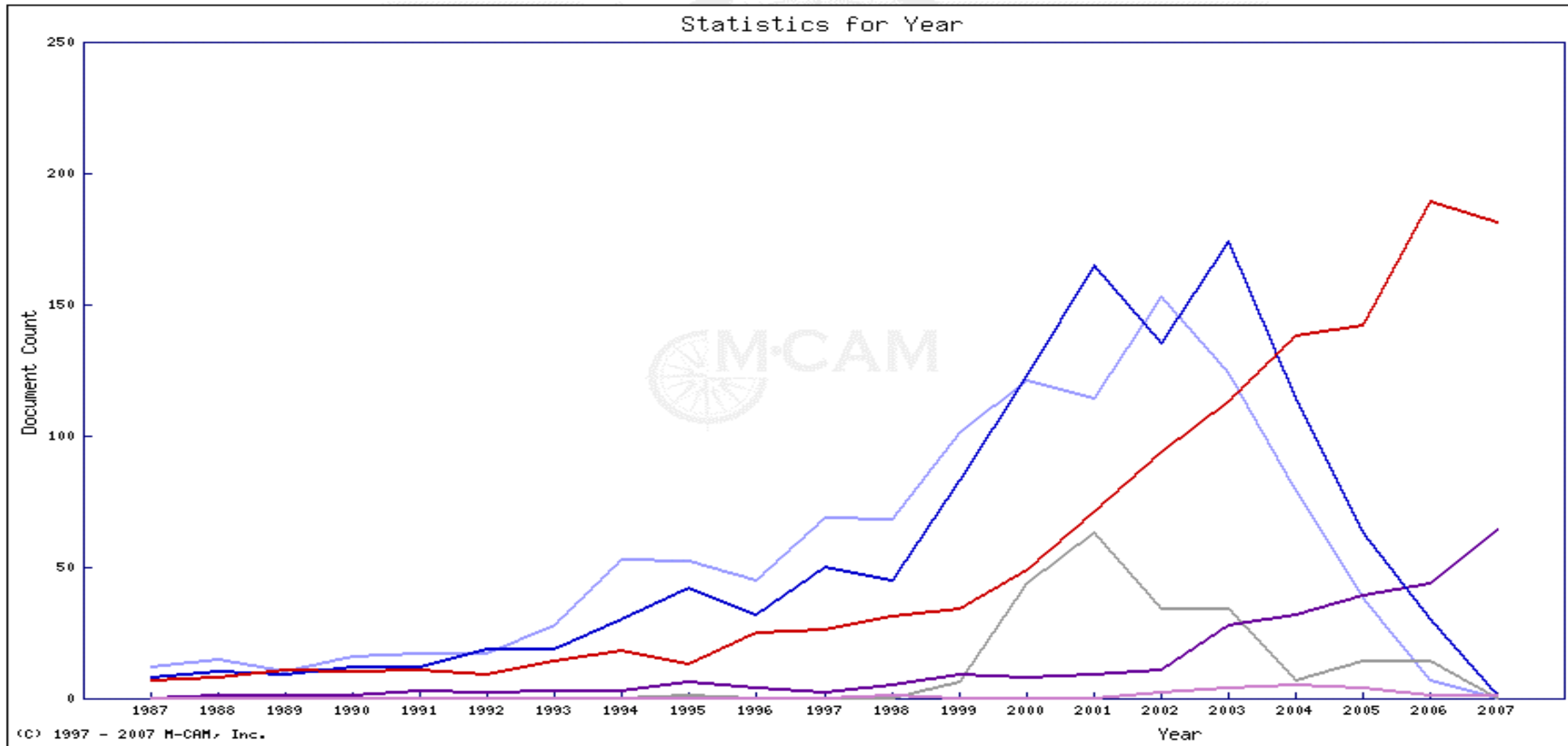
# Fuel Cells



	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	
priority	48	65	93	100	96	104	97	121	142	161	227	328	442	572	597	712	609	471	182	40	0	priority
abandoned	0	1	2	1	8	18	21	29	61	73	48	51	120	101	98	184	248	373	377	510	594	abandoned
transfer	0	0	0	0	0	0	0	0	0	0	1	1	38	155	209	64	59	22	14	18	2	transfer
file	50	55	74	91	98	102	106	109	131	139	187	221	363	525	642	745	700	457	321	160	28	file
issue	29	33	25	35	60	71	78	111	95	108	97	98	110	236	308	475	633	764	667	781	557	issue
disallowed	1	0	0	0	0	0	0	0	1	0	0	1	0	1	5	3	33	60	44	34	39	disallowed
total	128	154	194	227	262	295	302	370	430	481	560	700	1073	1590	1859	2183	2282	2147	1605	1543	1220	total



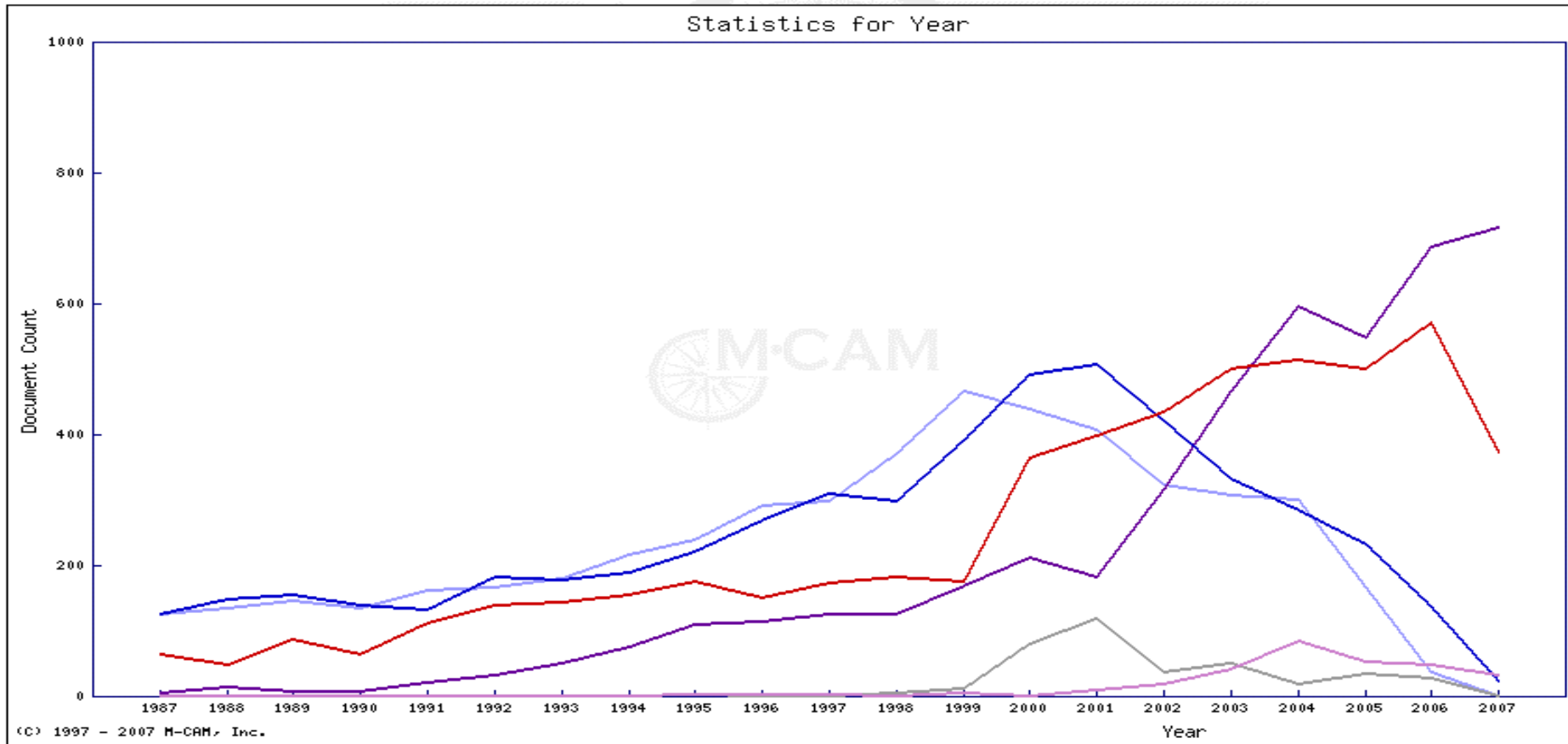
# Nanotechnology



	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	
priority	12	15	10	16	17	17	28	53	52	45	69	68	101	121	114	153	124	79	38	7	0	priority
transfer	0	0	0	0	0	0	0	0	1	0	0	0	6	44	63	34	34	7	14	14	0	transfer
abandoned	0	1	1	1	3	2	3	3	6	4	2	5	9	8	9	11	28	32	39	44	64	abandoned
file	8	10	9	12	12	19	19	30	42	32	50	45	83	123	165	135	174	114	63	30	1	file
issue	7	8	11	10	11	9	14	18	13	25	26	31	34	49	71	94	113	138	142	189	181	issue
disallowed	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	4	5	4	1	1	disallowed
total	27	34	31	39	43	47	64	104	114	106	147	150	233	345	422	429	477	375	300	285	247	total



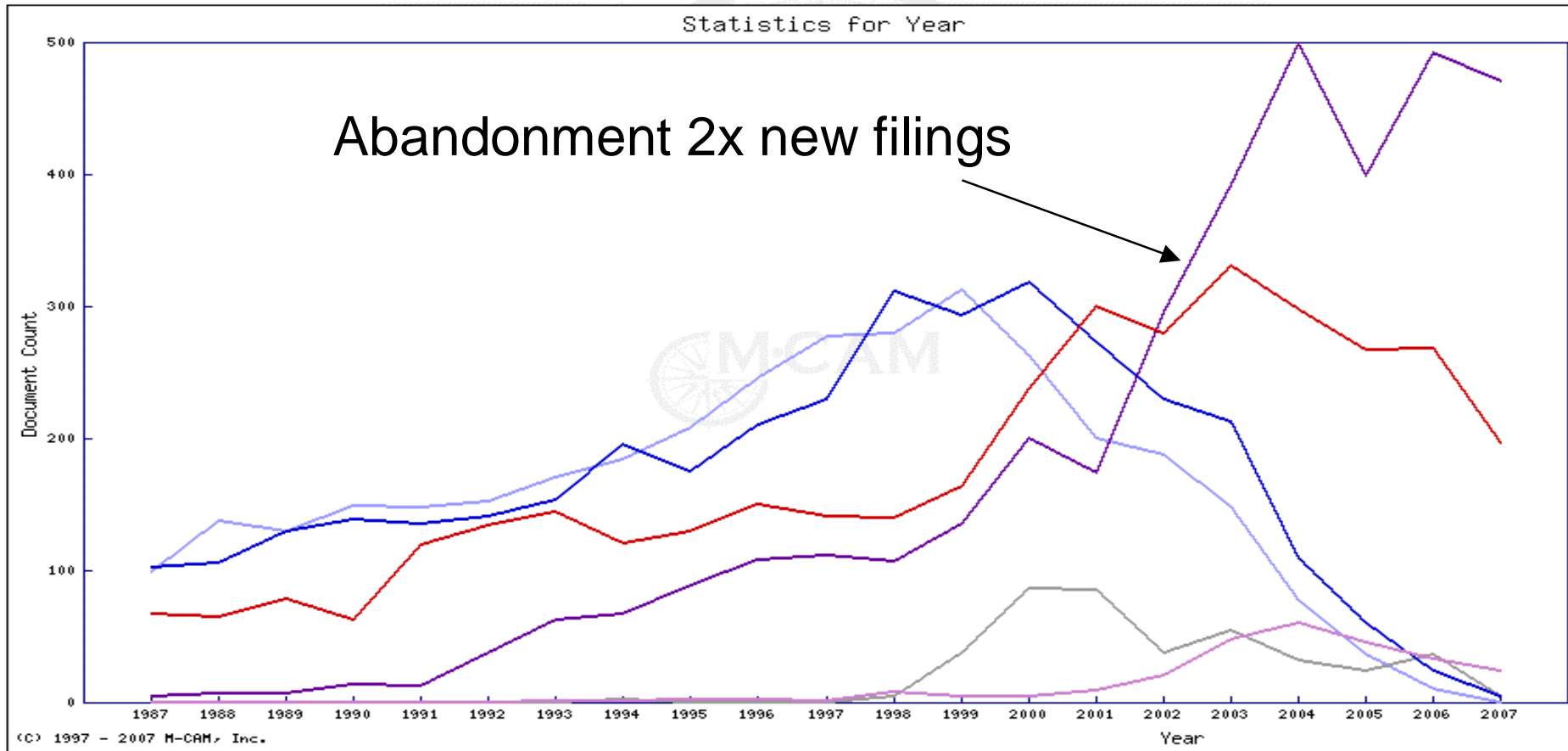
# Wind Power



	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	
priority	126	133	146	133	161	167	179	217	238	291	297	371	466	438	406	322	307	301	166	37	0	priority
abandoned	4	13	6	5	20	32	50	75	110	113	125	124	168	212	182	316	466	596	548	686	715	abandoned
transfer	1	0	0	0	0	0	0	0	3	1	1	5	12	80	118	36	50	19	35	27	0	transfer
file	126	148	155	138	132	182	178	188	220	269	308	297	392	491	506	420	332	284	232	136	23	file
issue	63	47	86	64	112	139	143	154	176	150	172	182	176	364	398	433	499	513	499	570	372	issue
disallowed	1	0	0	0	0	0	1	1	3	3	2	0	4	1	9	18	42	85	53	47	31	disallowed
total	321	341	393	341	425	520	551	635	750	827	905	979	1218	1586	1619	1545	1696	1798	1533	1503	1141	total



# Water



	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	
priority	99	137	130	149	148	152	171	184	208	245	277	280	312	263	200	188	148	77	36	10	0	priority
abandoned	5	7	7	14	13	38	62	67	89	108	111	107	135	200	174	296	392	499	399	492	471	abandoned
transfer	0	0	0	0	0	0	0	2	0	0	0	5	37	86	85	38	54	32	24	36	5	transfer
file	102	106	130	139	135	141	153	196	175	210	229	311	293	318	273	229	212	109	60	24	4	file
issue	67	65	78	63	119	134	144	121	130	150	141	140	164	238	300	280	331	298	267	268	197	issue
disallowed	0	0	0	0	0	0	1	1	2	2	1	8	5	5	9	21	48	60	45	33	24	disallowed
total	273	315	345	365	415	465	531	571	604	715	759	851	946	1110	1041	1052	1185	1075	831	863	701	total





# Information Implications

- ⊗ Prior art filled with over-broad abandoned positions
- ⊗ Latency of commercial deployment increases need to carefully examine **former** market players
- ⊗ Classification and keywords increasingly confounded by scientific and market nomenclature drift
- ⊗ Opposition and clearance potentially more active than new application filing



# Financial Implications

- ⊗ Increasing use of patent estates and commons rather than blockbuster patents
- ⊗ Legislature on anti-trust will be challenged in coming years changing landscape for patent pools
- ⊗ New forms of professional liability for information and service providers as financial risks increase with global awareness of proprietary rights' value





# Where is the Next Next Thing?

**Largest GDP Growth**  
**Most Active Basic Scientists**  
**Most Active Engineers**  
**Largest Growth in Published Research**

**WWII to 2002**

**WWII to 2002**

**Today and Beyond**

