October 28, 2010

IBM Research - Zurich Research Laboratory

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Outline

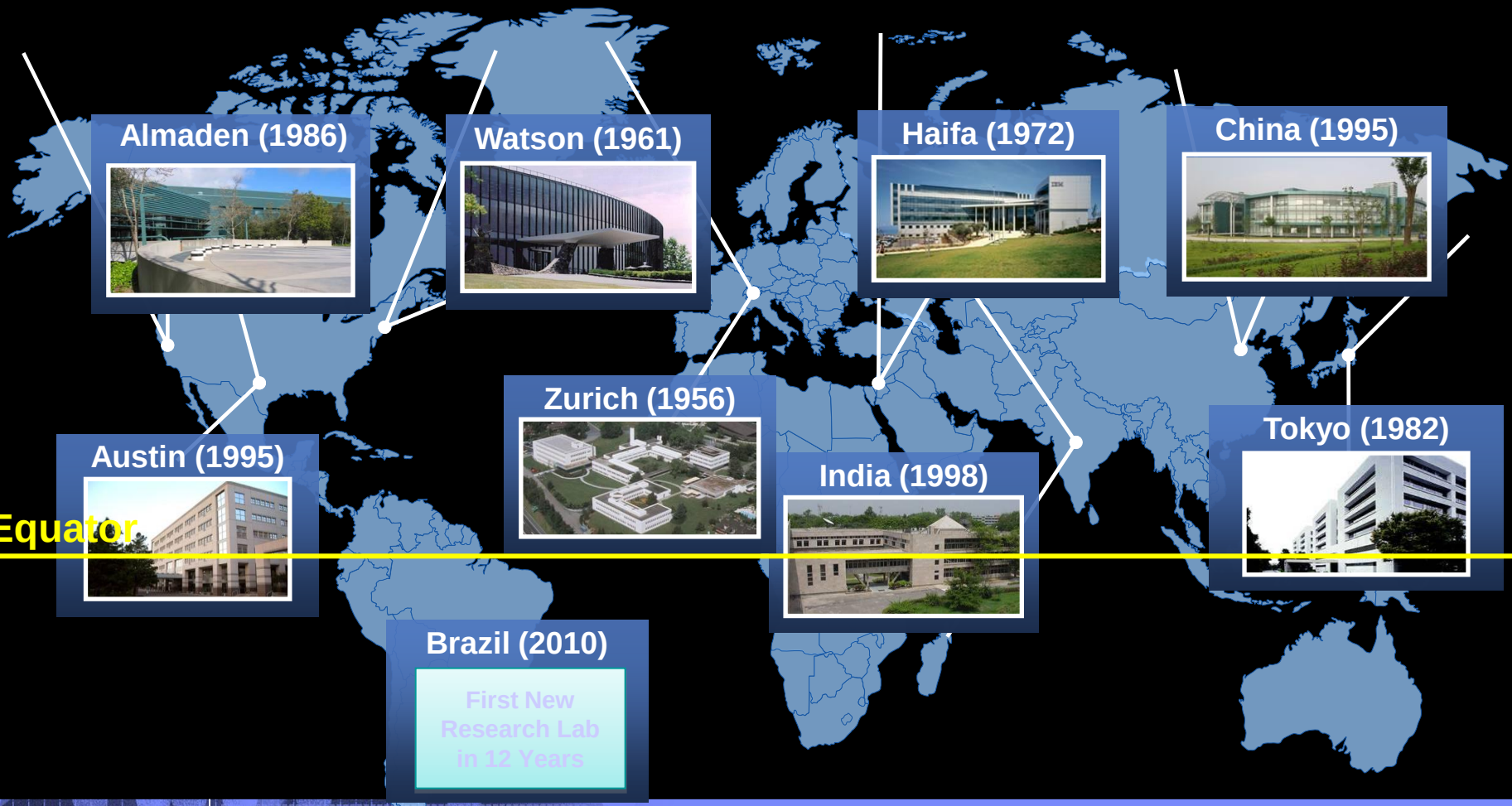
- IBM Research
- IBM Research – Zurich
- Science & Technology
- Outlook

IBM Research Worldwide

More than *3,000 scientists* and *engineers* at 8 *labs* in 6 *countries*

+75 Development Labs

IBM spent nearly $6B in 2009 on R&D



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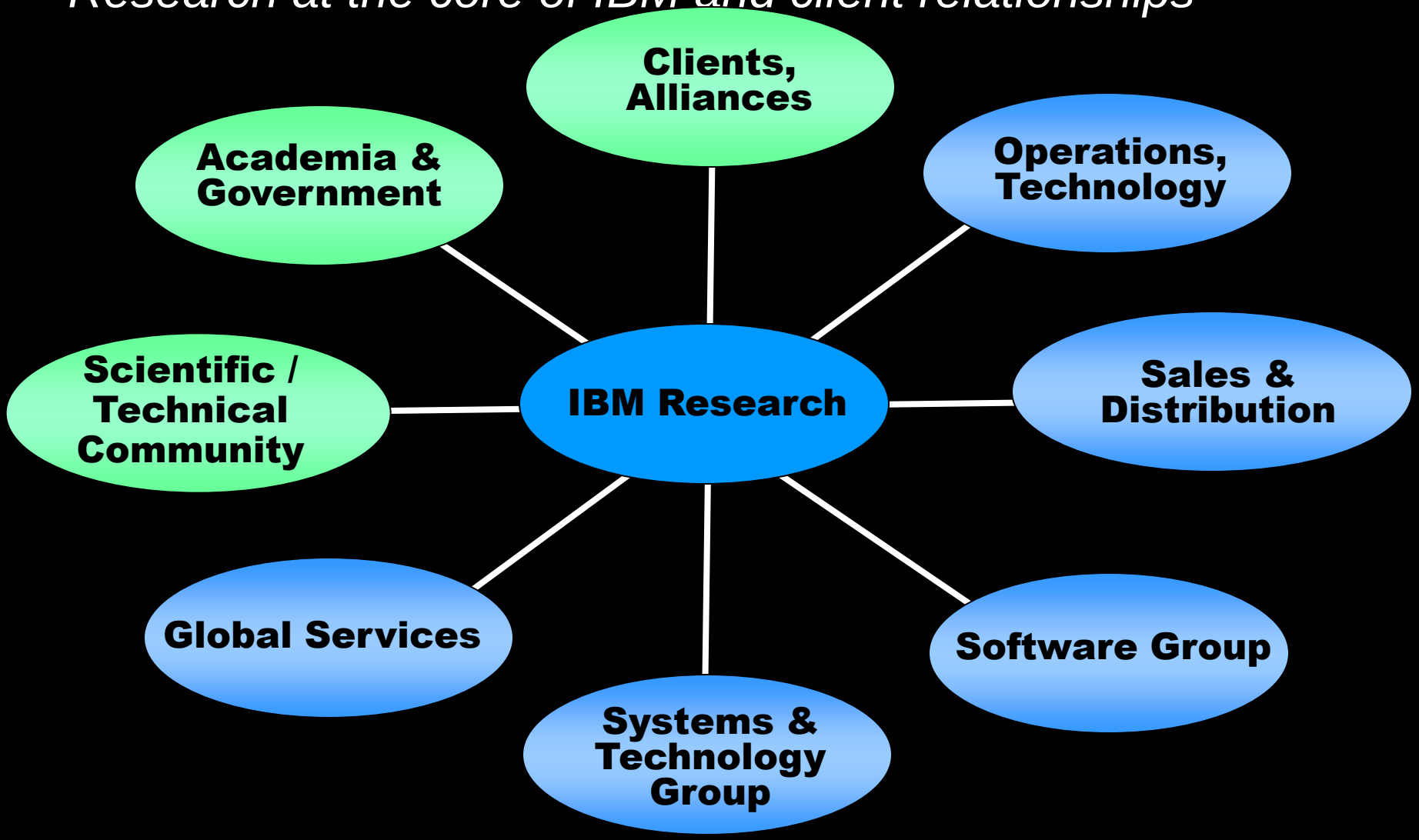
IBM Research Ecosystem

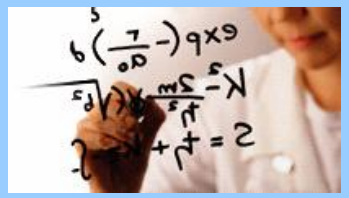
Research at the core of IBM and client relationships



Research's Strategic Thrusts

From Technology to Services Research

Business Analytics & Math. Sciences



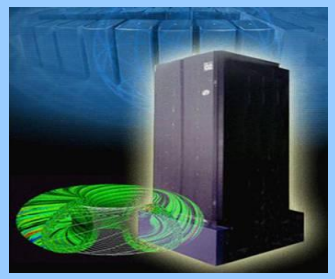
Industry Solutions

Services

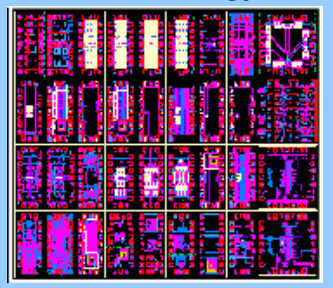
Software

Storage Systems

Systems



Technology



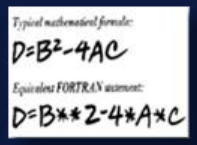
Exploratory

A Legacy of World-Class Research

1944:
Mark 1

1948:
SSEC

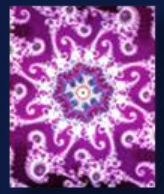
1956:
RAMAC



1957:
FORTRAN

1964:
System/360

1966:
One-Device
Memory Cell

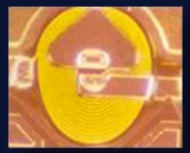


1967:
Fractals

1970:
Relational
Database

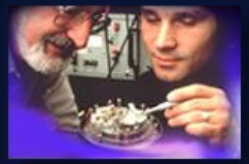
1971:
Speech
Recognition

1973:
Winchester
Disk



1979:
Thin Film
Recording
Heads

1980:
RISC

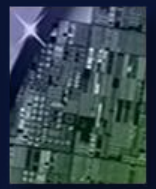


1986:
Scanning
Tunneling
Microscope

1987:
High Temperature
Superconductivity

Nobel Prizes:

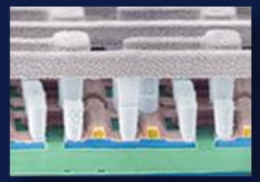
1990:
Chemically
Amplified
Photoresists



1994:
SIGe

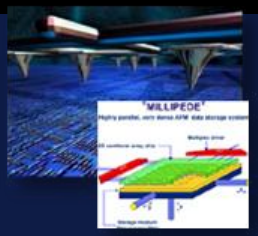
1993: RS/6000 SP
1996,97: Deep Blue

1997:
Copper
Interconnect
Wiring



1998:
Silicon-on-Insulator

1998:
Microdrive



2002:
Millipede

2004:
Blue Gene
The fastest
supercomputer
in the world

2006:
5-stage Carbon
Nanotube Ring
Oscillator

2008:
World's First Petaflop
Supercomputer

A Culture of Innovation – External Recognition

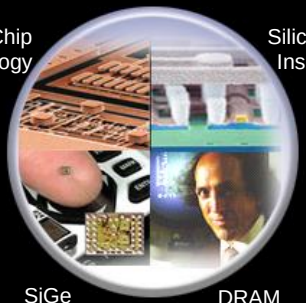
5 Nobel Laureates

High Temperature Superconductivity

Electron Tunneling Effect

Scanning Tunneling Microscope

9 US National Medals of Technology



Copper Chip Technology

Silicon-on-Insulator

SiGe

DRAM

5 US National Medals of Science

Nuclear Magnetic Resonance Techniques

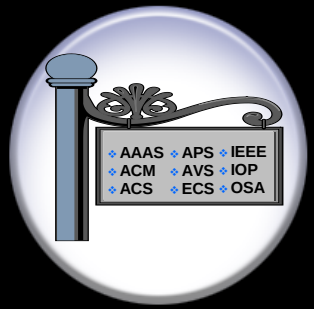
Basis for MRI today

6 Turing Awards

High Performance Computing
First woman recipient in the history of this prestigious ACM award

22 Members in National Academy of Sciences

> 330 Professional Society Fellows



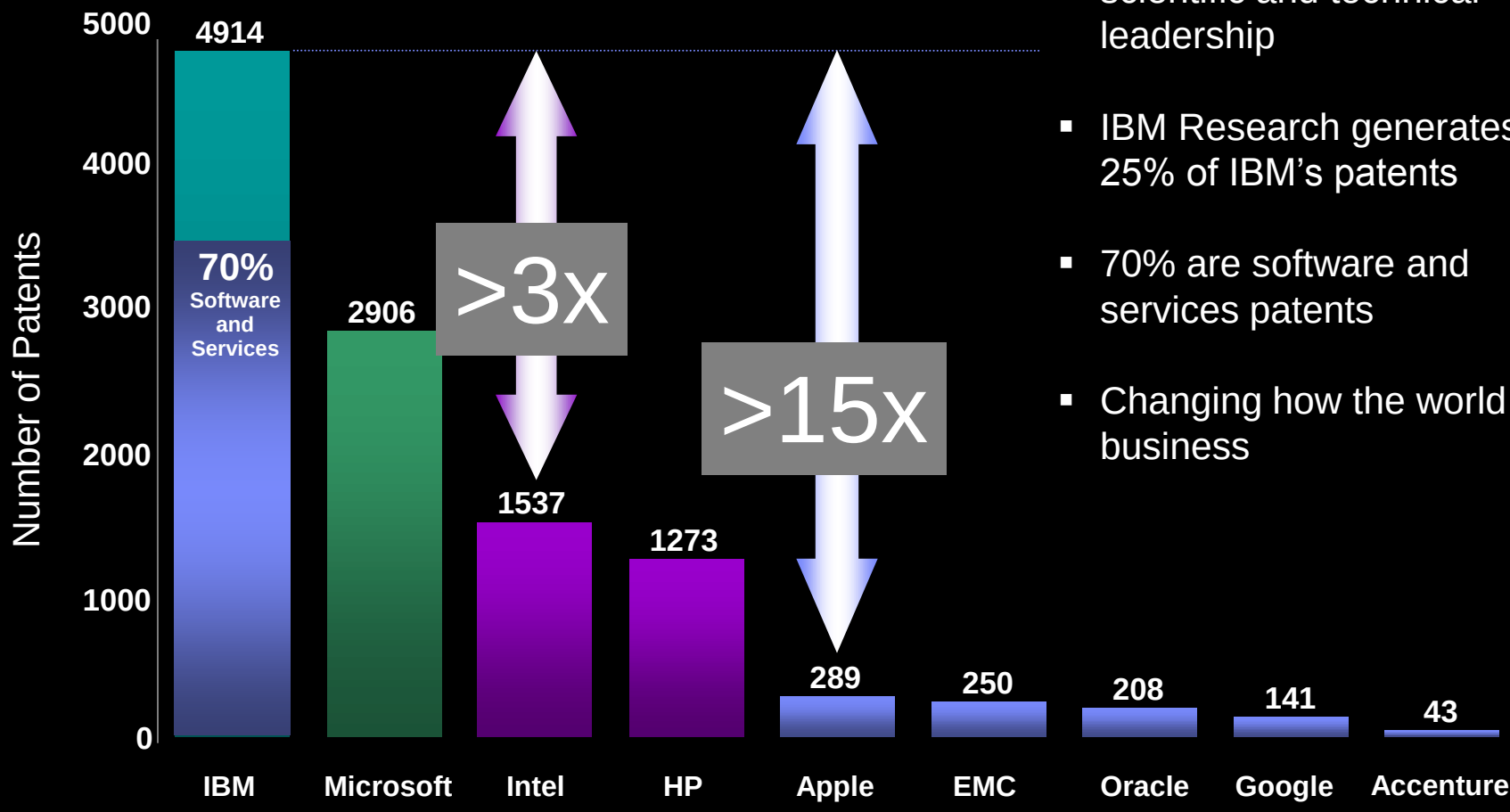
62 Members in National Academy of Engineering

10 Inductees in National Inventors Hall of Fame

Laser-etched hair based on excimer laser surgery – foundation for LASIK surgery

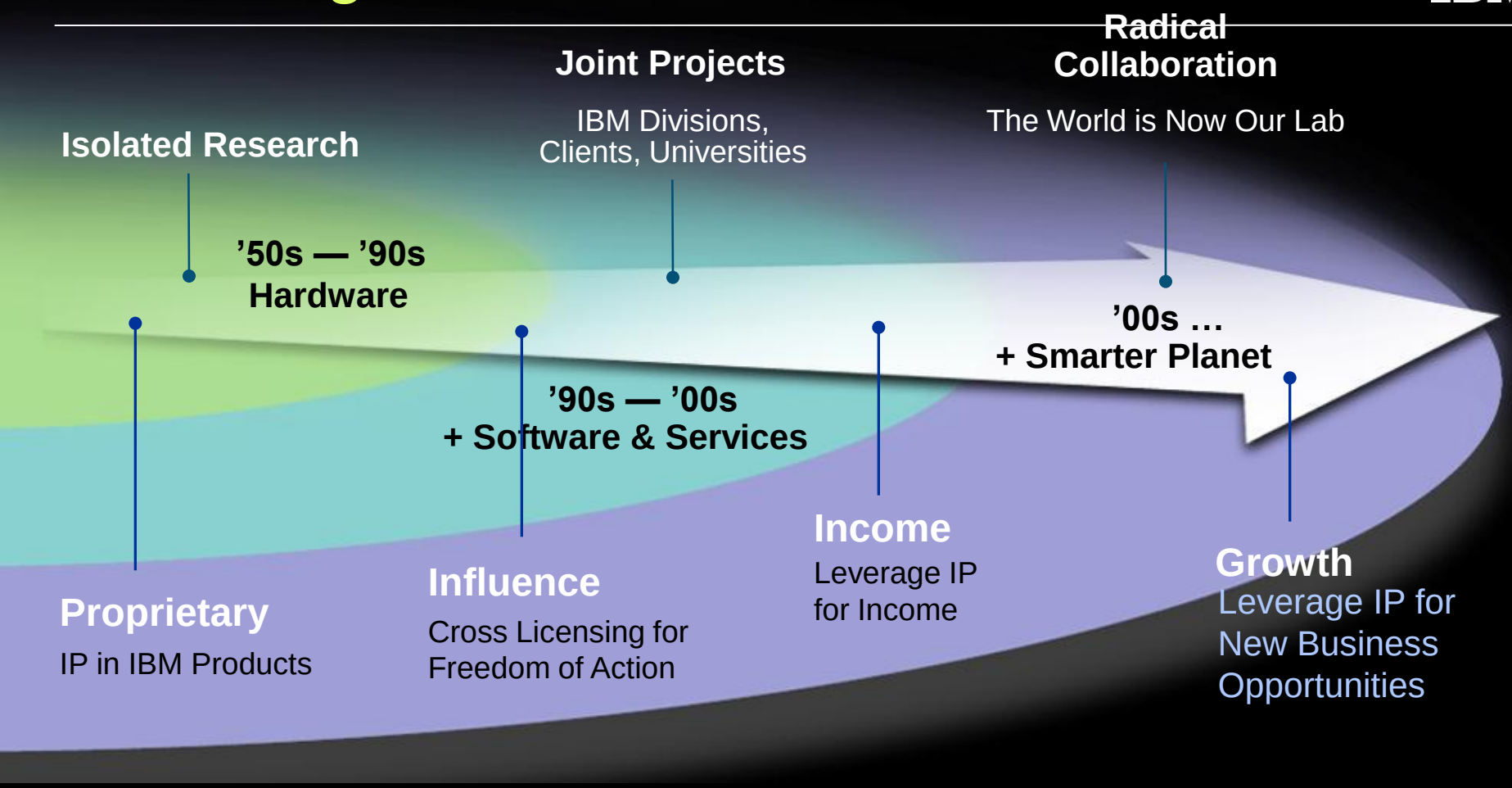
17 Consecutive Years of Patent Leadership

2009 US Patent Leaders



- An important metric of our scientific and technical leadership
- IBM Research generates > 25% of IBM's patents
- 70% are software and services patents
- Changing how the world does business

Innovating How We Do Our Work



Globally-Focused New Commercial Partnerships
Locally-Driven "Smarter Planet" Initiatives

Outline

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- IBM Research – Zurich
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- Outlook

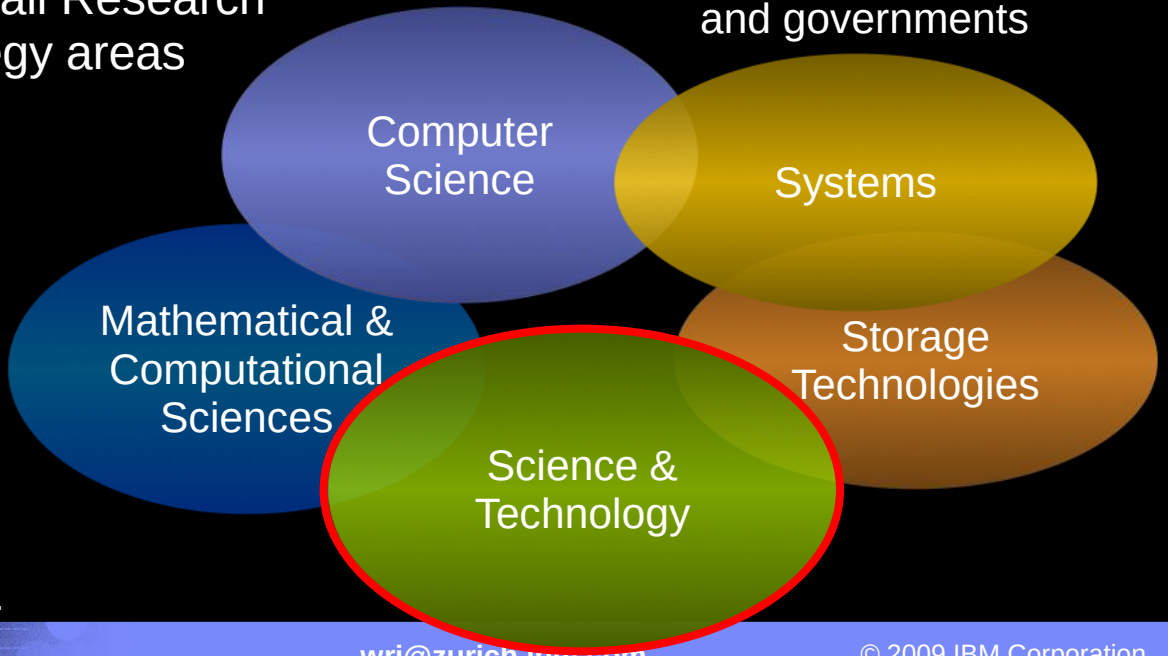
IBM Research – Zurich

ZRL population: ~340 employees

- Regular research & technical staff
- Pre-docs
- Post-docs & visiting scientists
- Students

40 different nationalities
90 Collaborative projects with universities, industrial partners and governments

ZRL research projects span all Research strategy areas

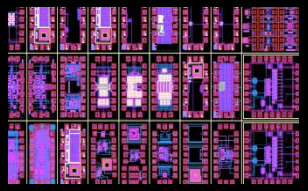


http://www.zurich.ibm.com/st

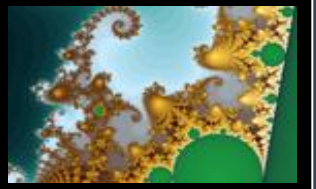
IBM Research: Zurich Research Focus Areas

Computer Science: Security and Privacy, Business Integration Technologies, Systems Management

Systems: Server Technology, Accelerator Technology, I/O Link Technologies, System Software, Energy Management



Storage: Tape Technologies, Heads and Actuators, Storage Systems, Memory and Probe Technologies



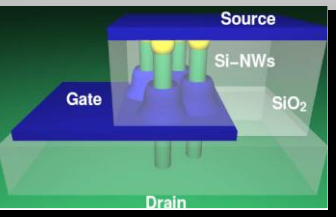
Math & Computational Science: Business Optimization, Computational Sciences. Data Analytics

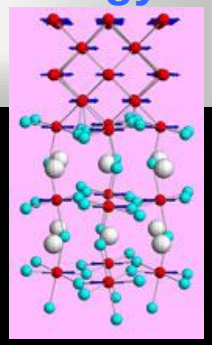
Science & Technology: Semiconductors, Systems Technologies, Beyond the Transistor, Nanotechnology, Health

Science & Technology

Semiconductor Technology

- Materials for future CMOS
- Ultimate transistors



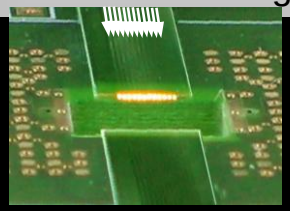


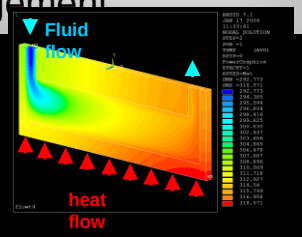
Energy

- Reuse of Energy
- Concentrator PV

Systems technologies

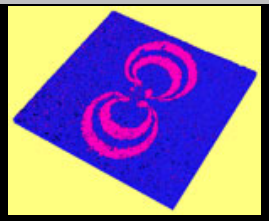
- Heterogeneous integration
- Optical interconnects/photonics
- Thermal management

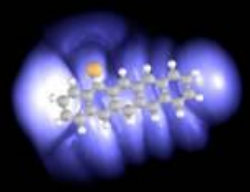




Beyond the Transistor

- Semiconducting Nanowires
- Magnetism/Spintronics
- Molecular electronics
- Nanoscale science



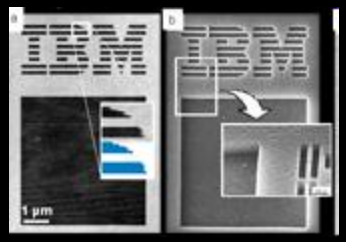


NanoTech Center

- Cleanroom for micro/nanofabrication
- "Noise-free" labs

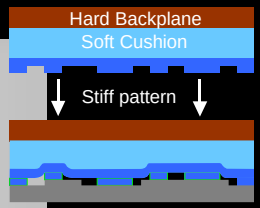
Micro-/Nanomechanics

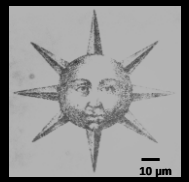
- Probe-based nanofabrication
- NEMS/MEMS
- Metrology

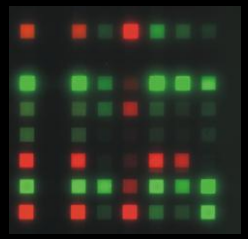


Fabrication at the nanometer scale

- Self-assembly & Patterning







Health

- Microfluidics for point-of-care
- Microfluidic probe

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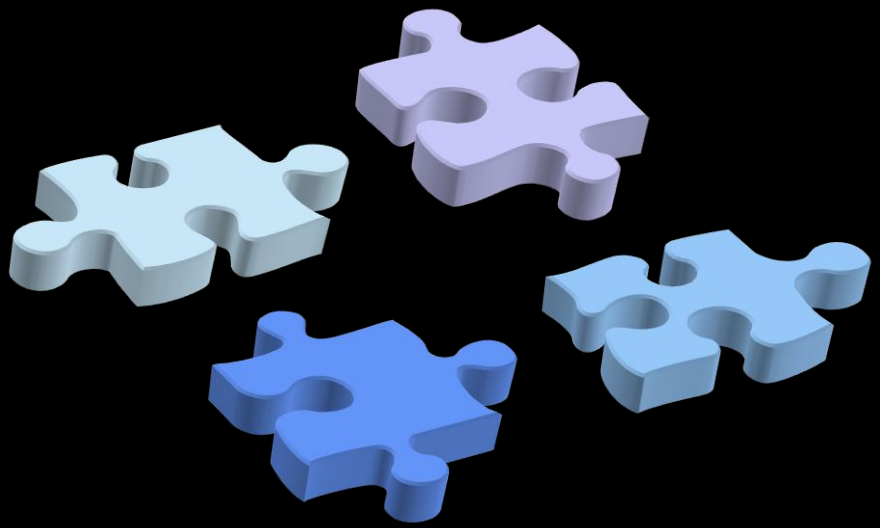
The Future of Nanoelectronics

"The best way to predict the future is to invent it."
Alan Kay



There is STILL plenty of room at the bottom!

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IBM Research – Zurich Nanotechnology Center:

A Collaboration with the Swiss Federal Institute of Technology (ETH Zurich)

ETH Zurich
(Swiss Federal Institute of Technology)

- IBM constructs the building ($60 million)
- ETH Zurich rents for a minimum of 10 years
- 1000 m^2 cleanroom facilities
- “Noise-free” laboratories
- $30 million in equipment
- Both joint and independent research projects
- Scheduled to open in 2011
- Additional partners welcome

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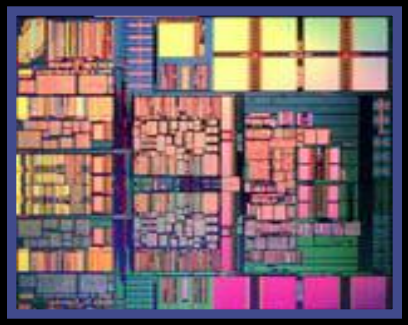
Diversity of Disciplines at IBM Research

Behavioral Sciences

Chemistry

Computer Science

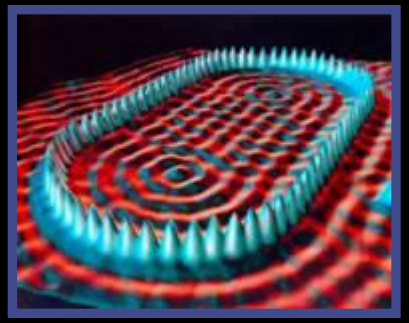
Electrical Engineering



Materials Science

Mathematical Sciences

Physics



Service Science, Management & Engineering