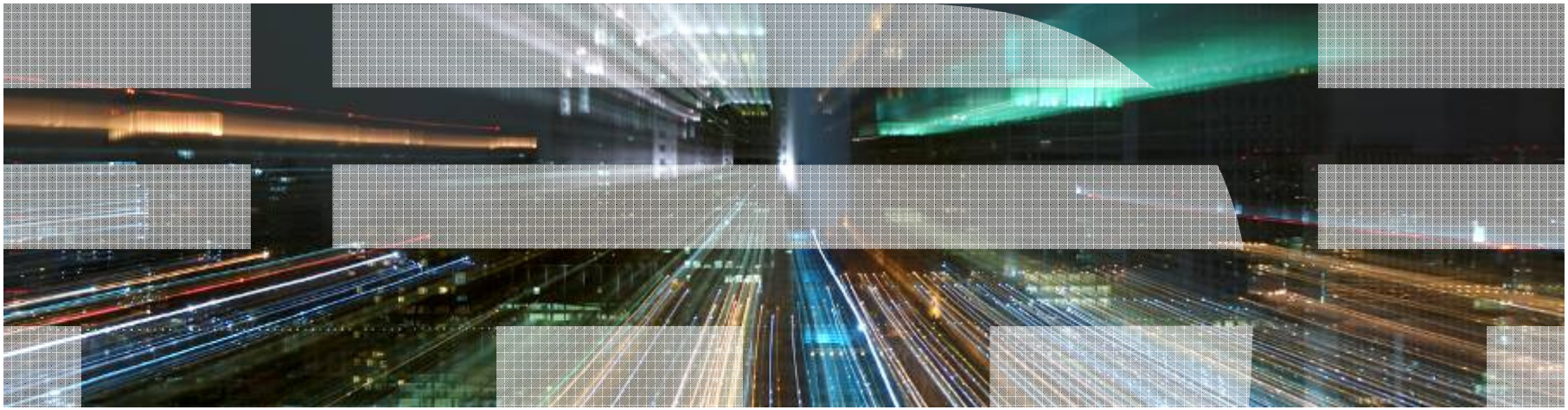
Marian Kovacik – International Field Technical Sales Support for System x
26th October 2009

IBM Technologies for GRID Solutions
IT Trends Today and for the Future



Global Technology Outlook – Statements from the Past

“I think there is a world market for maybe five computers.”

Thomas Watson, chairman of IBM, 1943

“Computers in the future may weigh no more than 1.5 tons. ”

Popular Mechanics, 1949

“There is no reason anyone would want a computer in their home. ”

Ken Olsen, founder of DEC, 1977

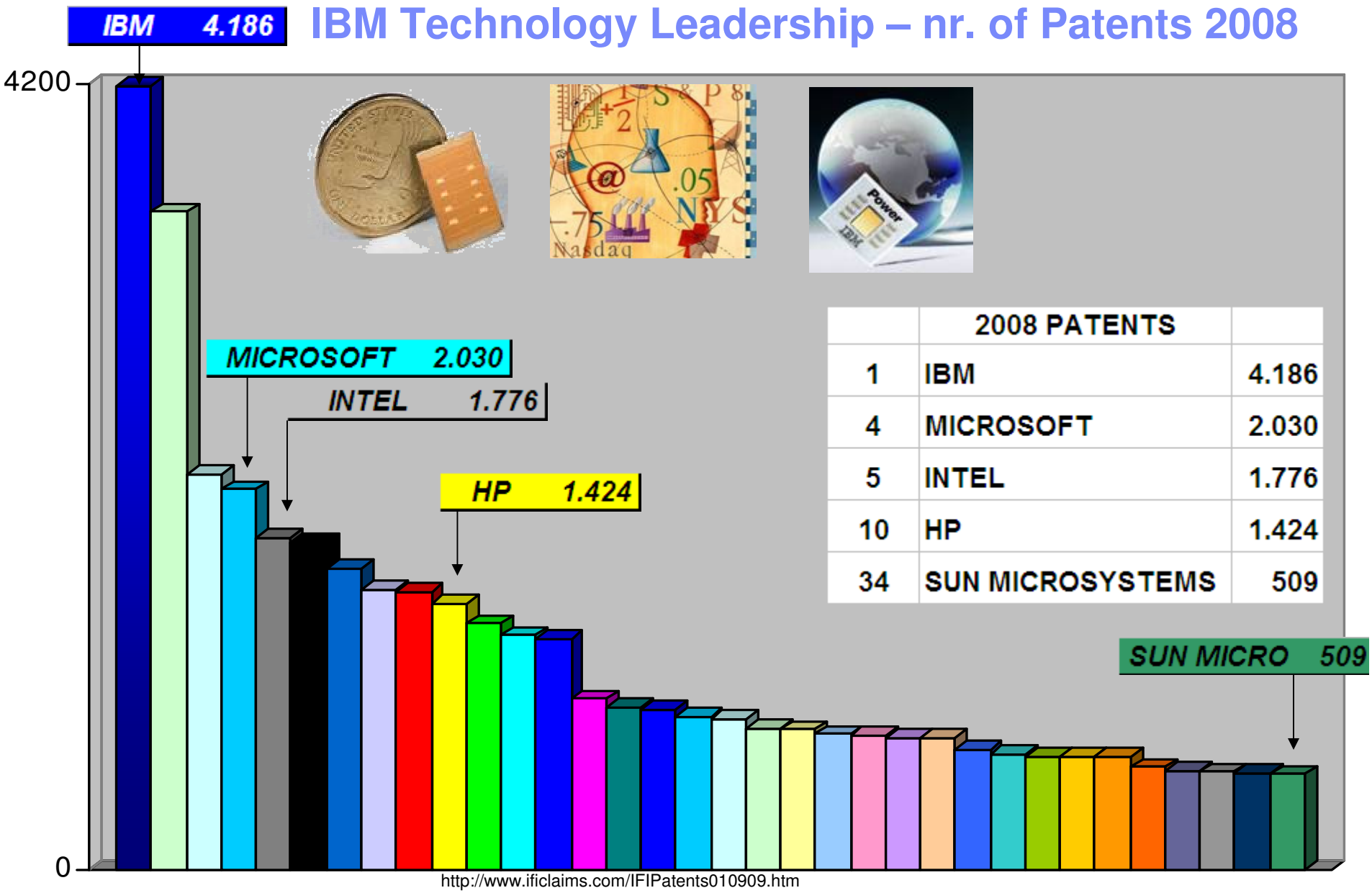
“640K ought to be enough for anybody. ”

Bill Gates, 1981

“Prediction is difficult, especially about the future”

Yogi Berra

IBM Technology Leadership – nr. of Patents 2008



	2008 PATENTS	
1	IBM	4.186
4	MICROSOFT	2.030
5	INTEL	1.776
10	HP	1.424
34	SUN MICROSYSTEMS	509

http://www.ificlaims.com/IFIPatents010909.htm

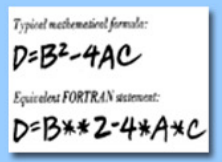
History of Innovations

60 Years of World Class Research

1944: Mark 1

1948: SSEC

1956: RAMAC



1957: FORTRAN

1966: One-Device Memory Cell

1967: Fractals

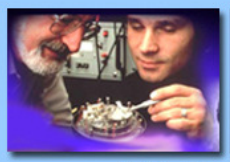
1970: Relational Database

1971: Speech Recognition

1973: Winchester Disk

1979: Thin Film Recording Heads

1980: RISC



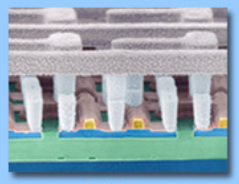
Nobel Prizes:
1986: Scanning Tunneling Microscope
1987: High Temperature Supercon-ductivity

1990: Chemically Amplified Photoresists

1994: SiGe

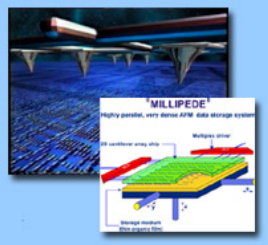
1993: RS/6000 SP
1996,97: Deep Blue

1997: Copper Interconnect Wiring



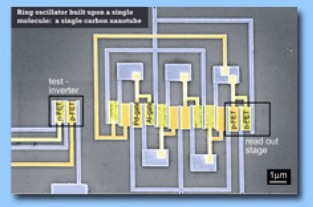
1998: Silicon-on-Insulator

1998: Microdrive



2002: Millipede

2004: Blue Gene/L
The fastest supercomputer in the world

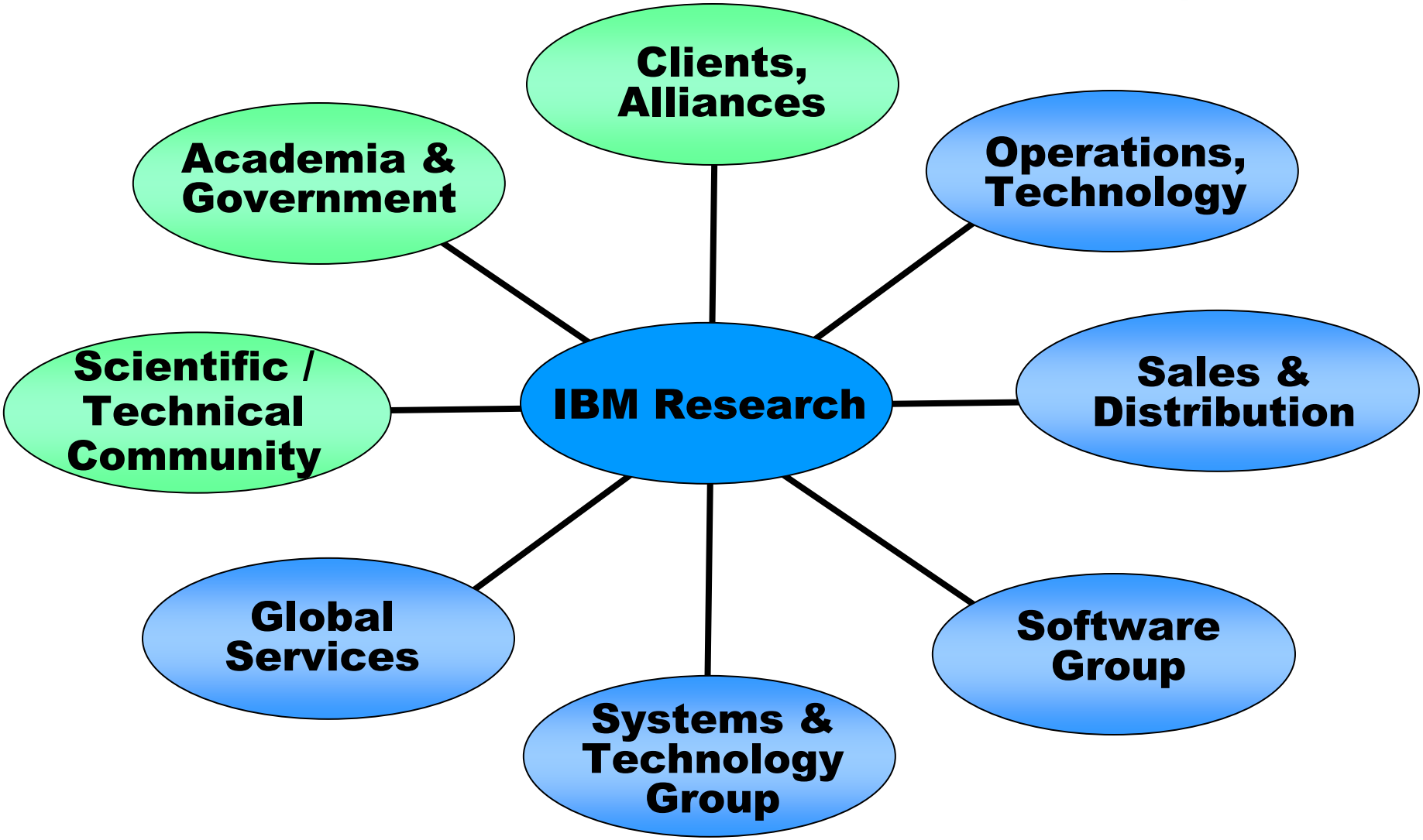


2006:
5-stage Carbon Nanotube Ring Oscillator

IBM Research Worldwide

IBM Research Ecosystem

Research at the core of IBM and client relationships



Culture of Innovation

External Recognition

5 Nobel Laureates

Scanning Tunneling Microscope

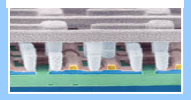
High Temperature Superconductivity

Electron Tunneling Effect

7 National Medals of Technology

Copper Chip Technology

Silicon-on-Insulator



SiGe

DRAM

5 National Medals of Science

Nuclear Magnetic Resonance Techniques

Basis for MRI today

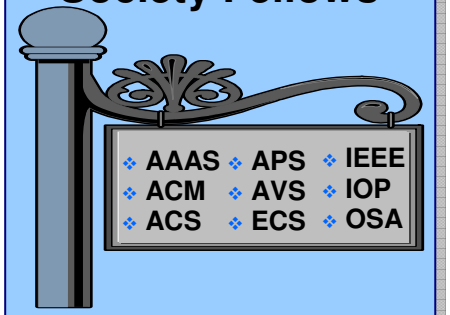
6 Turing Awards

High Performance Computing

First woman recipient in the history of this prestigious ACM award

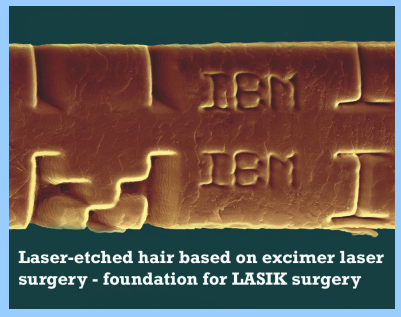
21 Members in National Academy of Sciences

Over 330 Professional Society Fellows



59 Members in National Academy of Engineering

8 Inductees in National Inventors Hall of Fame



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

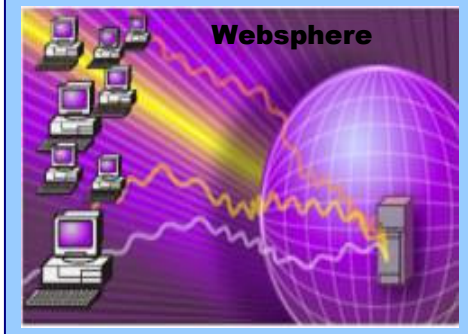
Research's Strategic Thrusts

From Technology to Services Research

Industry Solutions

Services

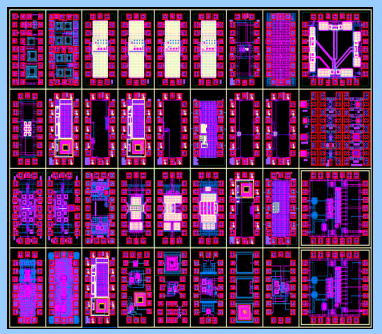
Software



Storage Systems

Systems

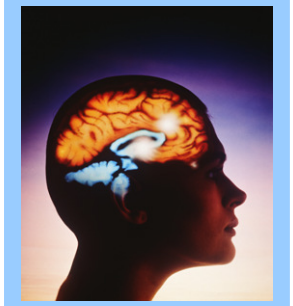
Technology



Exploratory

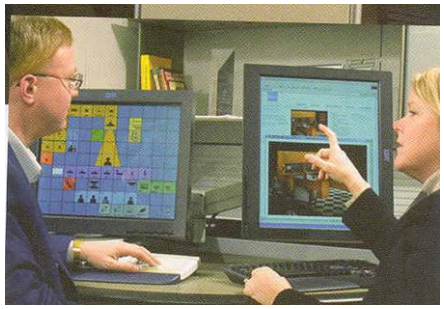
Diversity of Disciplines at IBM Research

Behavioral Sciences

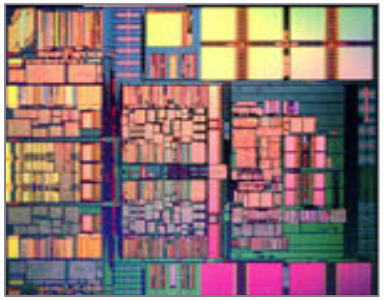


Chemistry

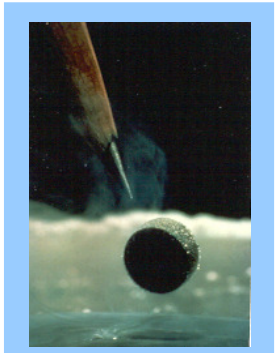
Computer Science



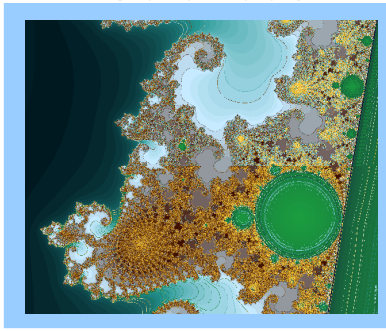
Electrical Engineering



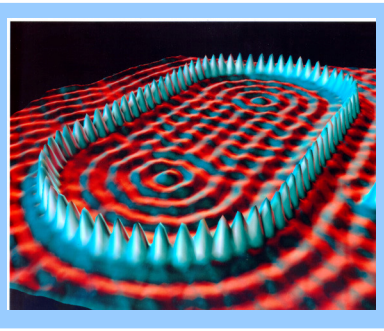
Materials Science



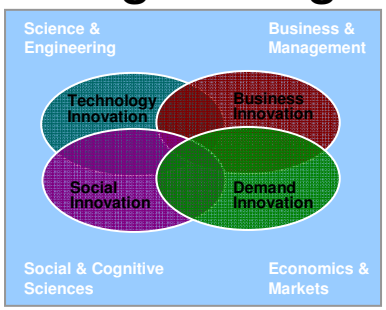
Mathematical Sciences



Physics



Service Science, Management & Engineering

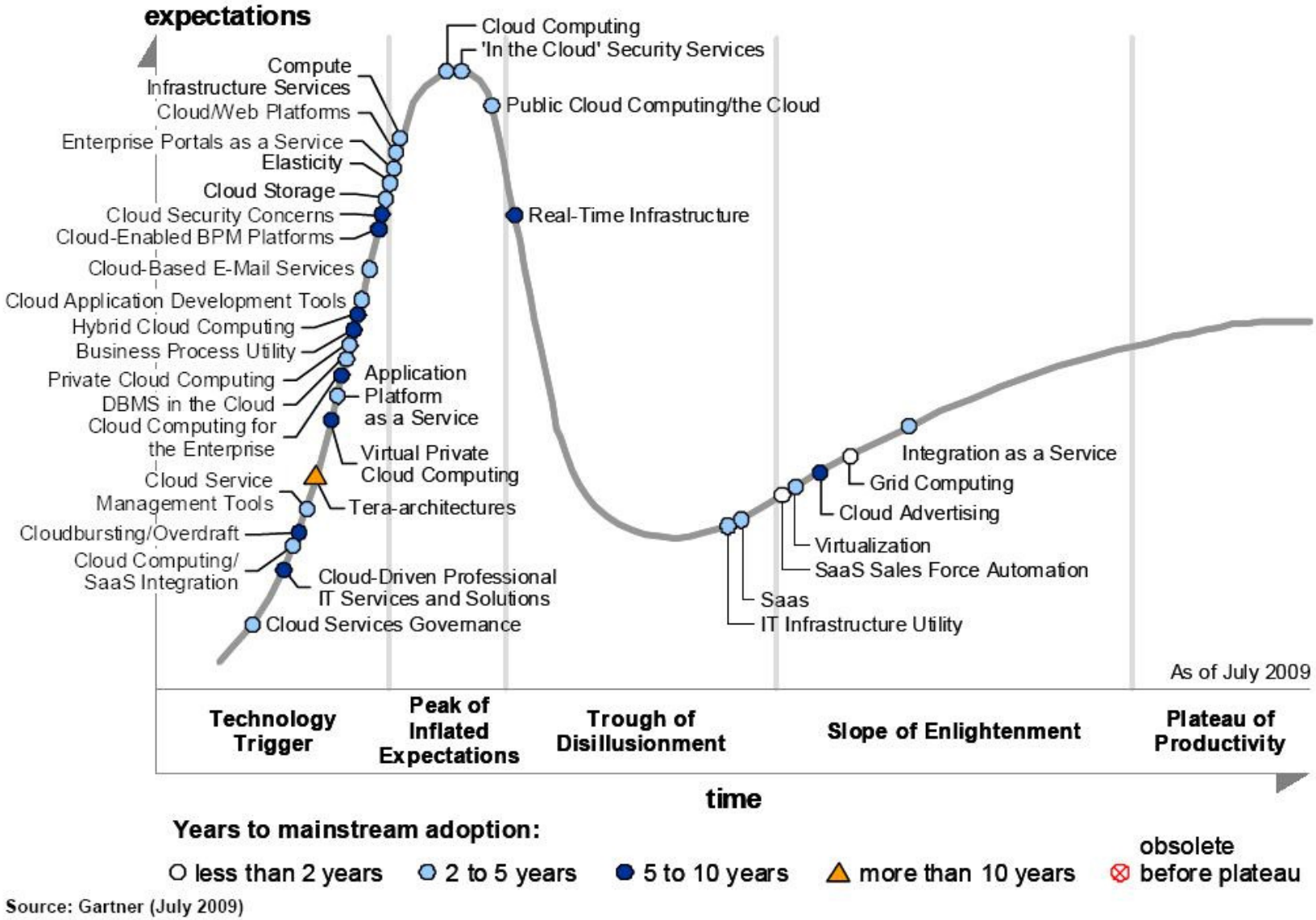


Deep Computing – Main Topics

- As deeper understanding of physics and biology lifts the human spirit,
- As better physical and biological models are devised,
- As volumes of experimental data are collected,
- As the Internet grows to encompass more people and institutions,
- As pervasive devices connect to the network,
- As more business is done online,
  - *A wealth of data is becoming available in digital form.*
- Finding the value buried in that data will be an increasingly powerful tool
  - *For business and for society.*

- **Deep computing** combines several techniques to solve extremely complex problems in this sea of digital data:
  - Advanced mathematics
  - Domain-specific knowledge
  - Specialized software
  - Powerful hardware

Deep Computing – Trends (based on CloudComputing)



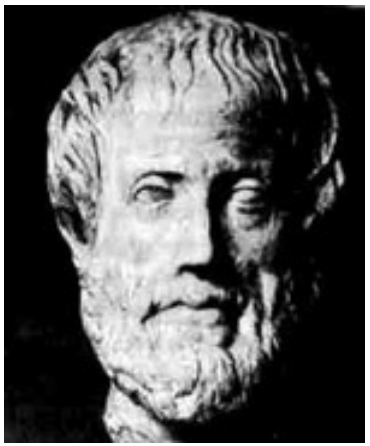
Source: Gartner (July 2009)

Computation environment definition

*A **multi-server system**, comprised of **interconnected computers** and associated **networking and storage** devices, that are **unified** via systems management, networking and middleware software to accomplish a **specific purpose**.*

- Computation environments are comprised of standard components that could be used separately in other types of computing configurations
  - Compute power (servers)
  - Network
  - Local and/or external storage for data
  - Systems management software and middleware
  - Operating System
  - Applications

"Commodity-based computing"

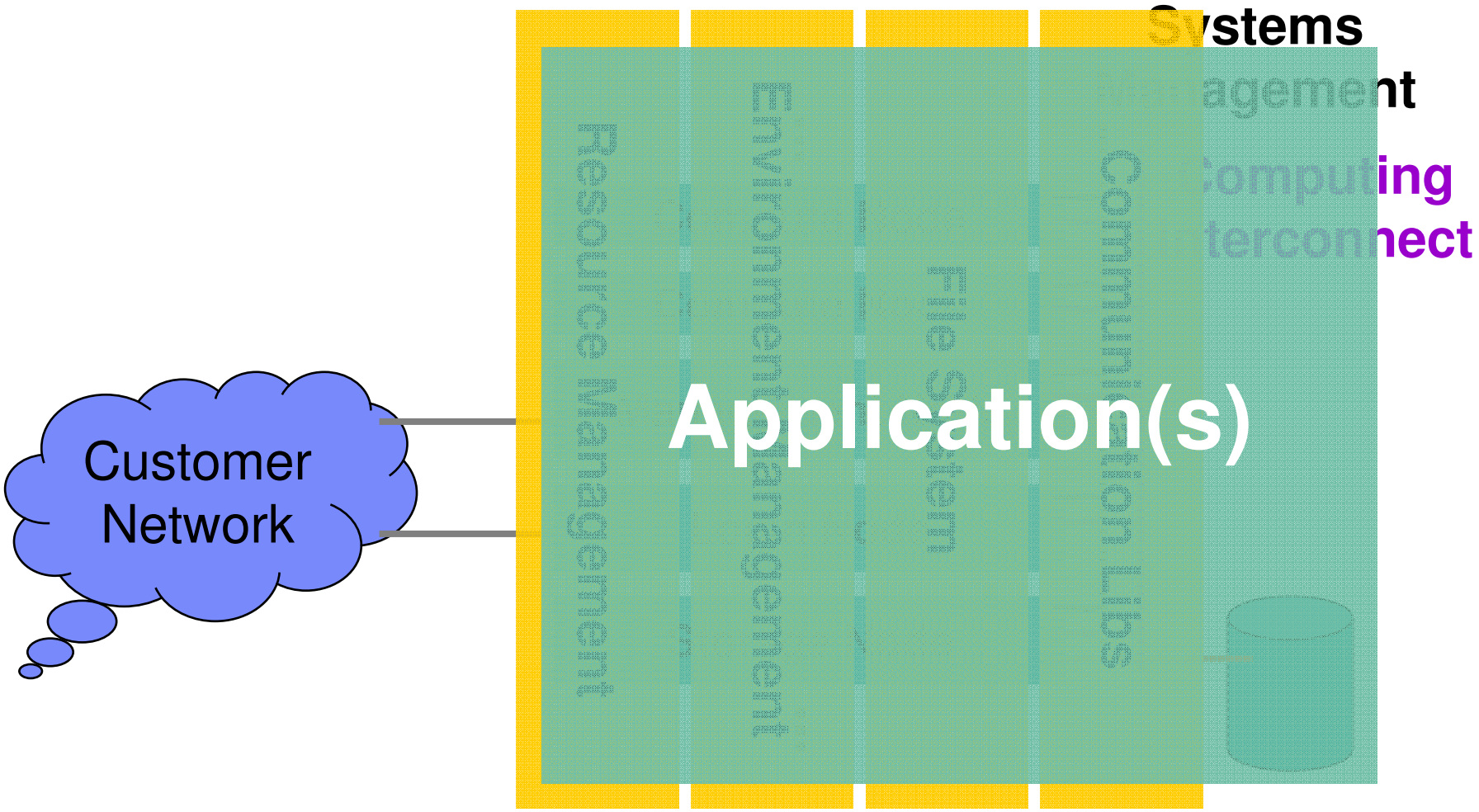


Aristotle

"...the true object of architecture is not bricks, mortar, or timber, but the house; and so the principal object of natural philosophy is not the material elements, but their composition, and the totality of the substance, independently of which they have no existence…"
-- Aristotle

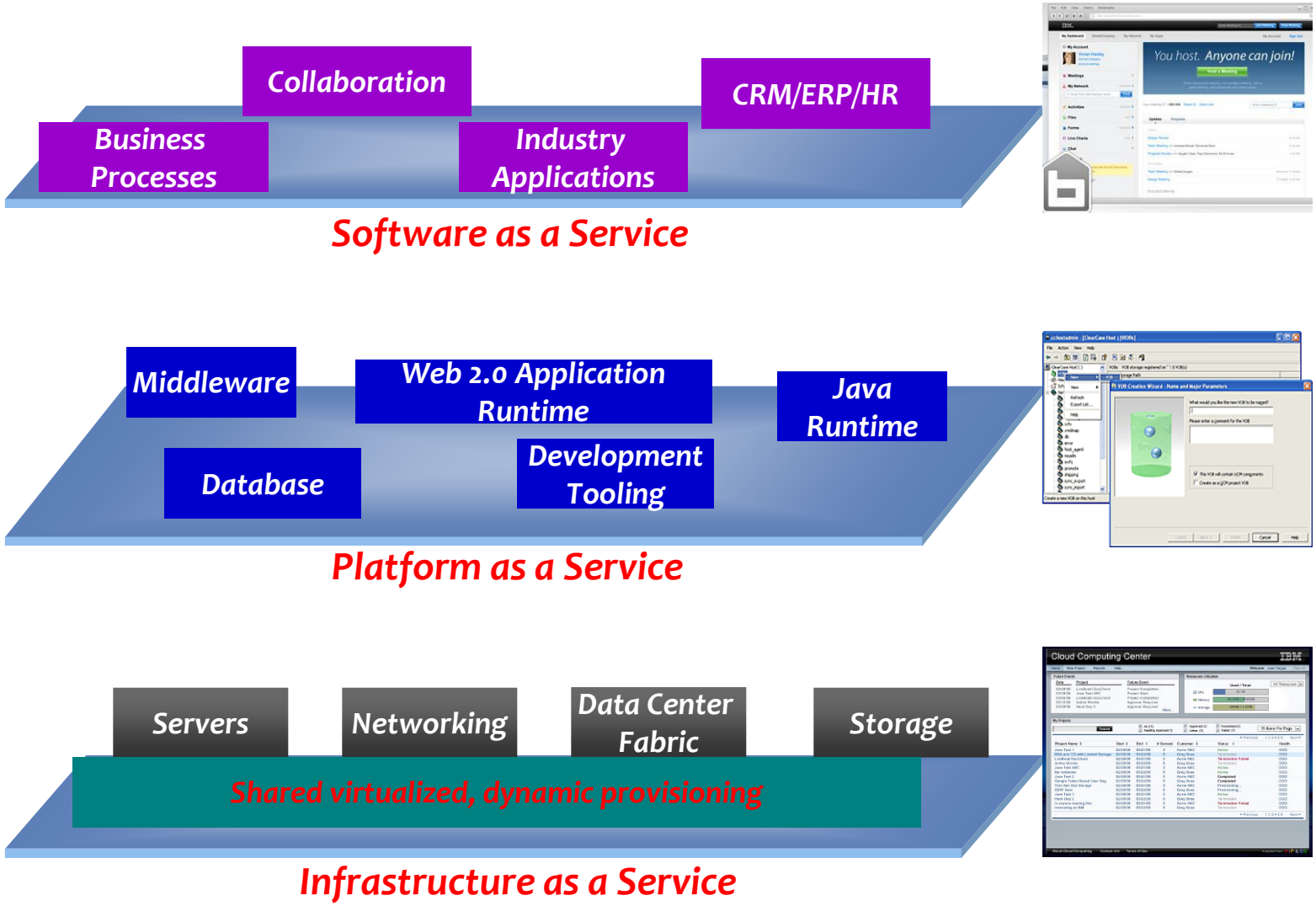
The whole is greater than the sum of the parts

Deep Computing Building Blocks

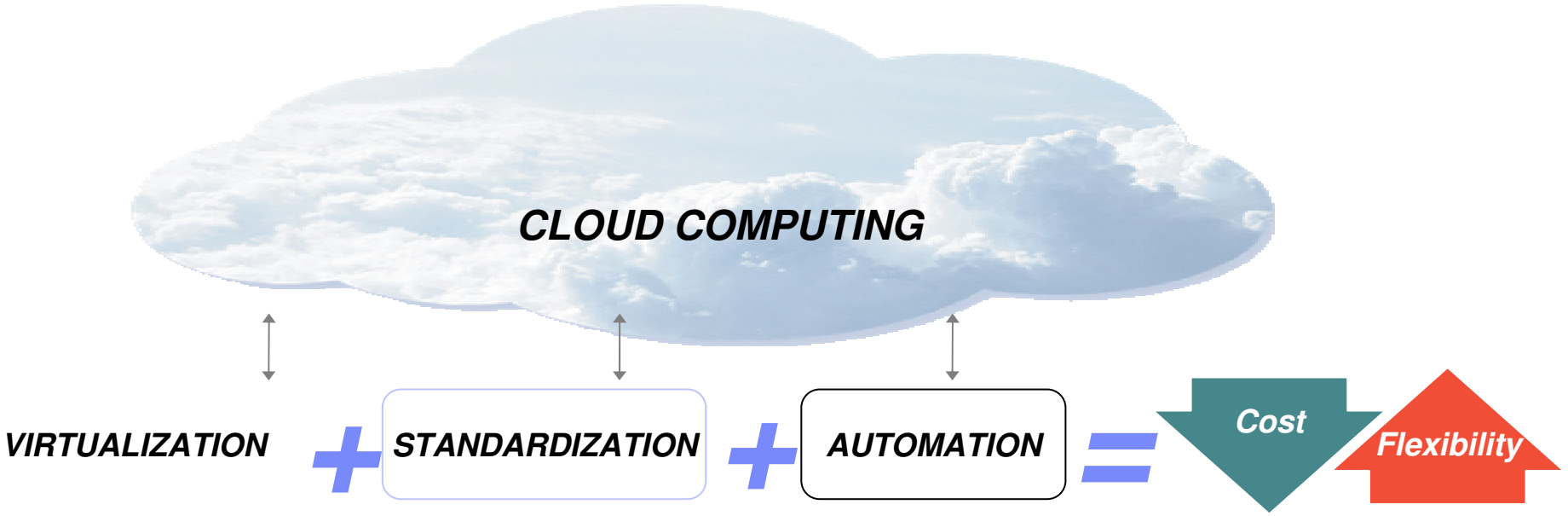


Deep Computing Components and Implementation

Cloud Computing Delivery Models



An Effective Cloud Deployment is Built on a Dynamic Infrastructure ….



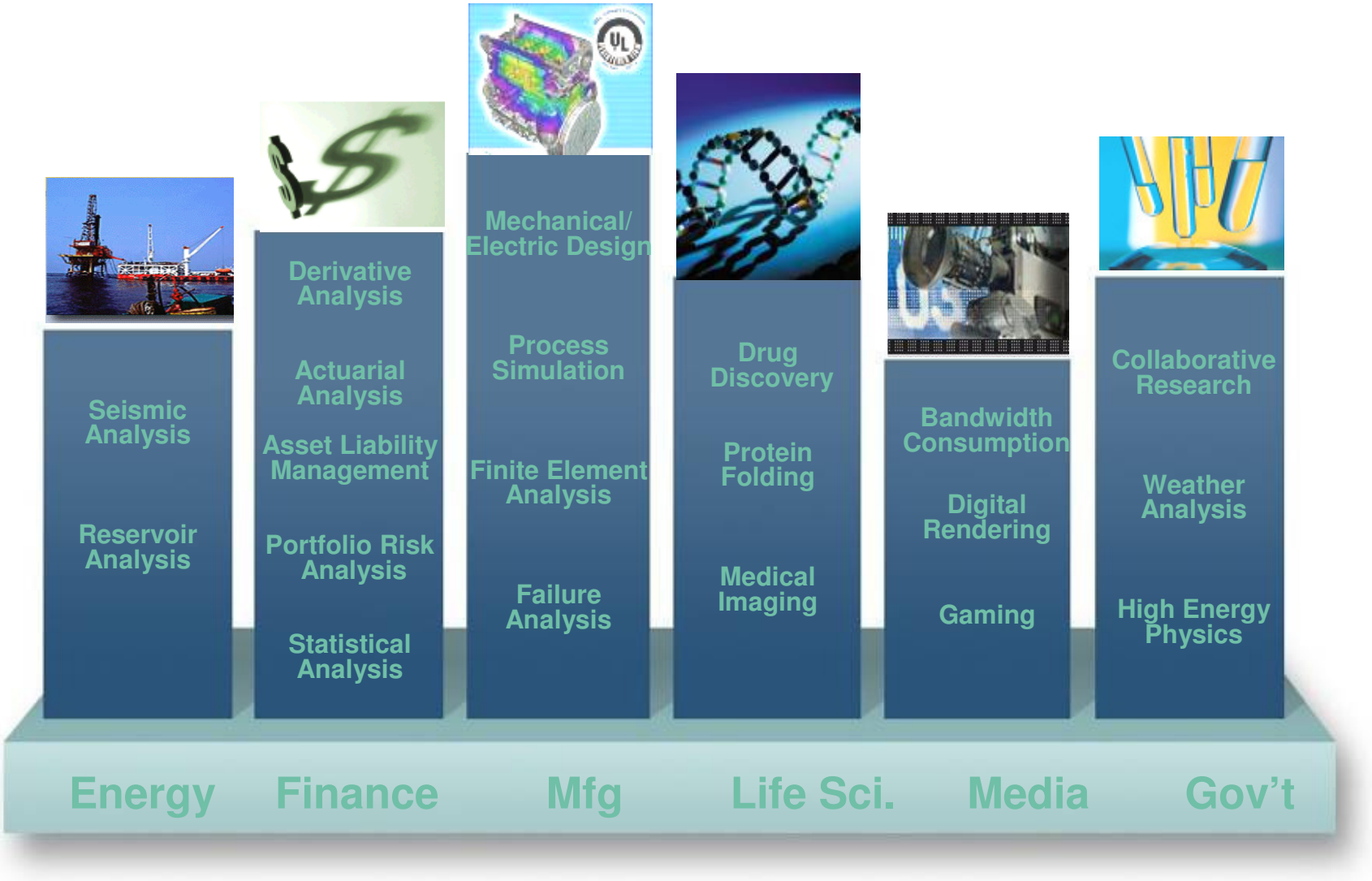
…leveraging virtualization, standardization and automation to free up operational budget for new investment.

New deployment choices

	Analytics	Collaboration	Development and Test	Desktop and Devices	Infrastructure Compute	Infrastructure Storage	Business Services	
Smart Business on the IBM Cloud Standardized services on the IBM Cloud		IBM Lotus Live NEW - **iNotes**	IBM Smart Business Dev & Test on the IBM Cloud (Beta)	IBM Smart Business Desktop on the IBM Cloud IBM Smart Business End User Support on the IBM Cloud	IBM Compute on Demand (HPC)	IBM Information Protection Services	IBM BPM Blueworks (Design tools)	IBM Smart Business Expense Reporting on the IBM Cloud
Smart Business Cloud Private c*loud services*, *behind your firewall,* built and/or managed by IBM	IBM Smart Analytics Cloud		IBM Smart Business Test Cloud	IBM Smart Business Desktop Cloud		IBM Smart Business Storage Cloud		
Smart Business Systems Pre-integrated, workload optimized systems	IBM Smart Analytics System		IBM CloudBurst			IBM Information Archive	IBM Smart Business for SMB (backed by the IBM cloud)	

Existing **New - Oct**

Deep Computing Applications – Spectrum of Customers



Deep Computing - Results

IBM supercomputing leadership ...

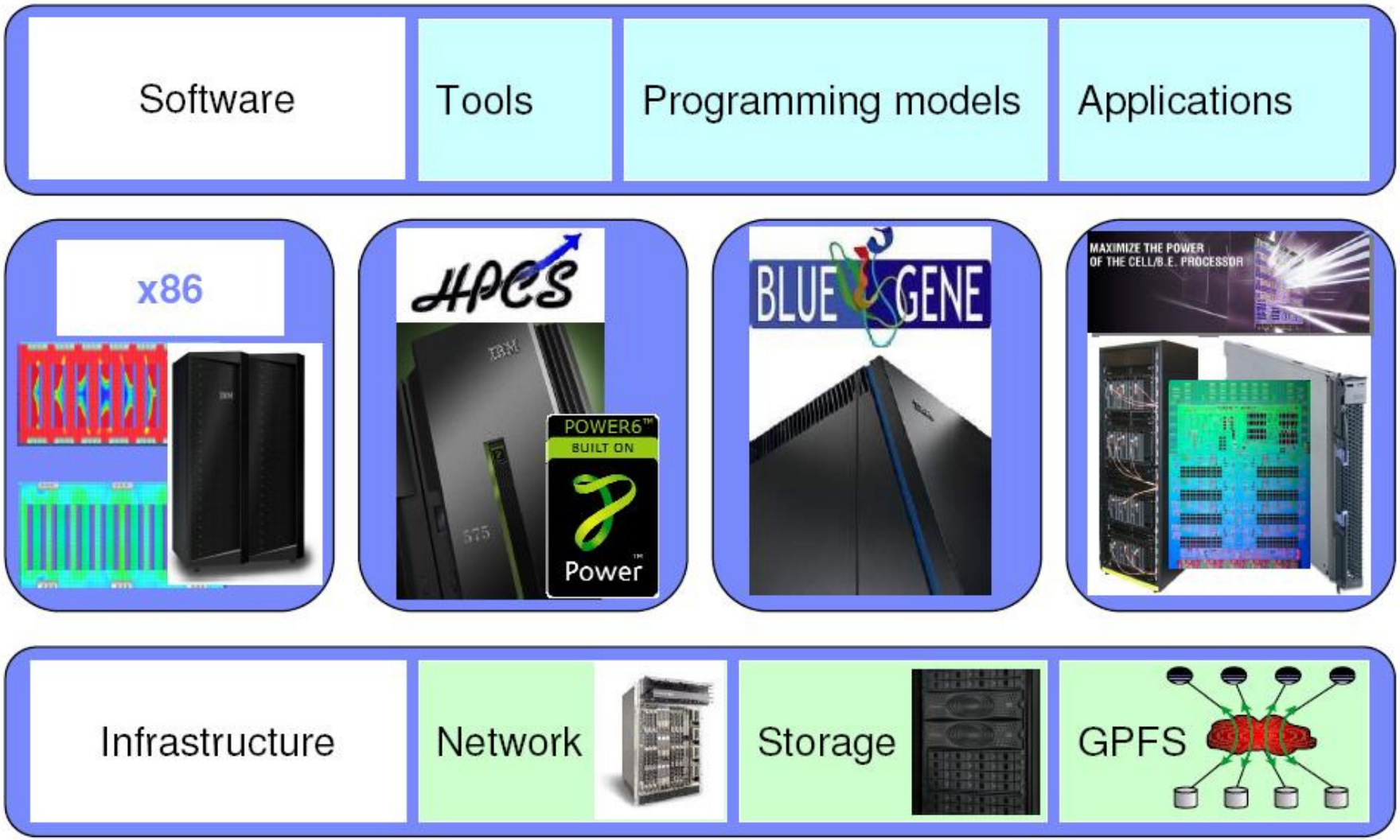
- ✓ DOE/NNSA/LANL Roadrunner system still #1
  - ✓ 1.105 Petaflops
- ✓ Number 1 system for 10 TOP500 Lists in a row, new record
- ✓ Most installed aggregate throughput with over 8,903 out of 22,608 Teraflops (39.4%)
- ✓ Most systems in TOP20 with 7
- ✓ Most systems in TOP50 systems with 17 (34%)
- ✓ Most systems in TOP100 systems with 35 (35%)
- ✓ Fastest machine in USA (QS22/LS21 at LANL)
- ✓ Fastest machine in Europe (Blue Gene/P at Juelich)
- ✓ Fastest machine in Canada (iDataPlex at SciNet)
- ✓ Fastest machine in Middle East (Blue Gene/P at KAUST)
- ✓ **19 of 20 most power efficient systems are all IBM (and 73 out of 104 most efficient)**

Deep Computing - Customers

#	Ven-dor	Rmax TFlops	Installation
1	**IBM**	**1105**	**DOE/NSSA/LANL** (QS22/LS21)
2	Cray	1059	**Oak Ridge NL - Jaguar** (XT5 QC 2.3 GHz Opteron)
3	**IBM**	**825.5**	**FZJ Juelich** Upgrade (72 racks Blue Gene/P)
4	SGI	487.0	**NASA Ames** (Altix QC 3.0/2.8 Xeon)
5	**IBM**	**478.2**	**DOE/NSSA/LLNL** (104 racks BlueGene/L)
6	Cray	463.3	**NICS U Tenn - Kraken** New (XT5 QC 2.3 GHz Opteron)
7	**IBM**	**450.3**	**Argonne Natl Lab** (40 racks Blue Gene/P)
8	Sun	433.2	**Texas Adv Comp Center** (QC 2.3 GHz Opteron)
9	**IBM**	**415.7**	**DOE/NSSA/LLNL** New (36 racks Blue Gene/P)
10	Bull	274.8	**FZJ Juelich** New (QC 2.93 GHz Nehalem)

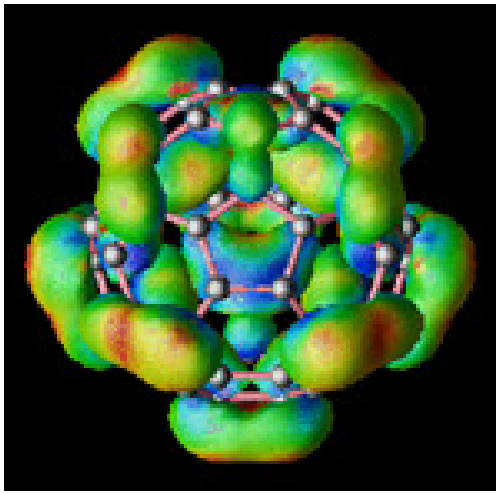
#	Ven-dor	Rmax TFlops	Installation
11	Cray	266.3	**NERSC/LBNL** (XT4 QC 2.3 GHz Opteron)
12	Cray	205.0	**Oak Ridge Natl Lab** (XT4 QC 2.1 GHz Opteron)
13	Cray	204.2	**Sandia NL – Red Storm** (XT3/XT4 DC/QC Opteron)
14	IBM	185.2	**KAUST** New (16 racks Blue Gene/P)
15	Dawn -ing	180.6	**Shanghai SC Ctr** (QC Opteron/Windows HPC)
16	IBM	168.6	**SciNet/U of Toronto** New (Nehalem iDataPlex)
17	SGI	133.2	**New Mexico CAC** (Altix Clovertown)
18	HP	132.8	**TATA Research Lab** (Clovertown)
19	Appro	131.6	**LLNL** New (Altix QC Xeon)
20	SGI	128.4	**GENCI-CINES** (QC Opteron)

Deep Computing – Full Picture (Summary)



In the end, it's not about the technology. It's what you do with it that counts. IBM will:

- Continue to innovate across the whole systems stack to deliver leadership performance and usability.
- Help solve problems that are currently intractable or not cost-effective.
- Accelerate discovery in science, engineering, and business



धन्यवाद
Hindi

Спасибо
Russian

תודה רבה
Hebrew

Gracias
Spanish

Grazie
Italian

شكرا
Arabic

Thank You
English

Obrigado
Portuguese

Merci
French

Danke
German

多謝
Traditional Chinese

ありがとうございました
Japanese

감사합니다 감사합니다 감사합니다 감사합니다 감사합니다 감사합니다
Korean

多谢
Simplified Chinese

ขอบคุณ
Thai

நன்றி
Tamil