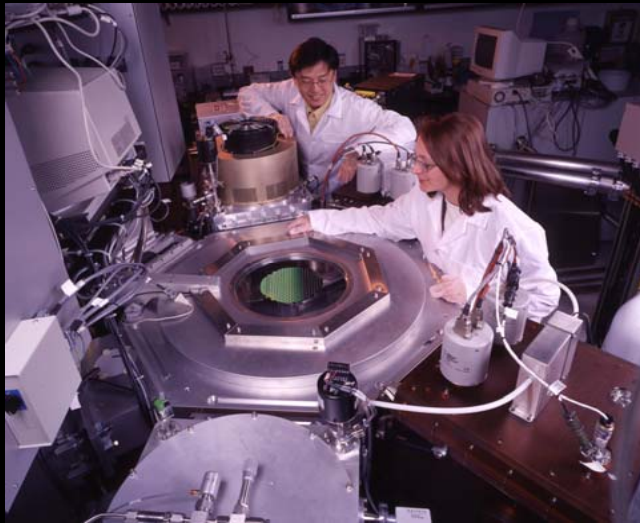




Albany NanoTech.

A Successful New Paradigm for Innovation and Education “The New York Strategy”



Michael Fancher

**Associate Professor of Nanoeconomics
College of Nanoscale Science & Engineering**

**Director of Economic Outreach
Albany NanoTech**



Partnerships for Innovations



New York State's Integrated Strategy for Success Four Key Drivers



Key Driver # 1: Nano-Chips.

A Backbone of 21st Century Global Economy

Pervasive Tether-free Computing



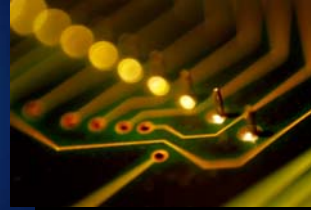
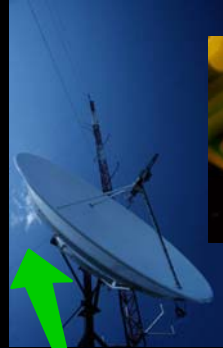
Set Top Box

Wireless Data



Cellular

Communications



Energy



Transportation

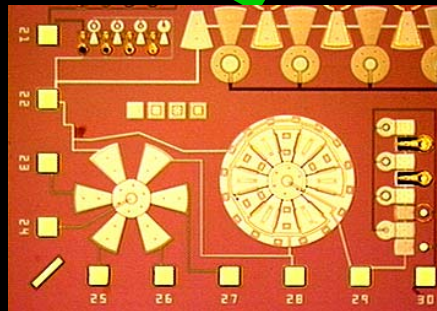


Defense

**Nano-Chip
Innovations**



Biohealth



Sensors



Aerospace

Partnerships for Innovations

Key Driver # 2:

State-of-the-Art Infrastructure

Shared-Use, Co-location Model

NanoFab 300 South Annex

- 16,500 Ft²/14,000 Ft² Cleanroom
- Completed: February, 2004
- IDC, Welliver McGuire

NanoFab 300 South


- 127,000 Ft²/17,000 Ft² Cleanroom
- Completed: February, 2003
- CDM, M&W Zander, Welliver McGuire

NanoFab 300 North

- 225,000 Ft²/37,000 Ft² Cleanroom/Clean SubFab
- Completion Date: Fall, 2004
- CDM, M&W Zander, Welliver McGuire

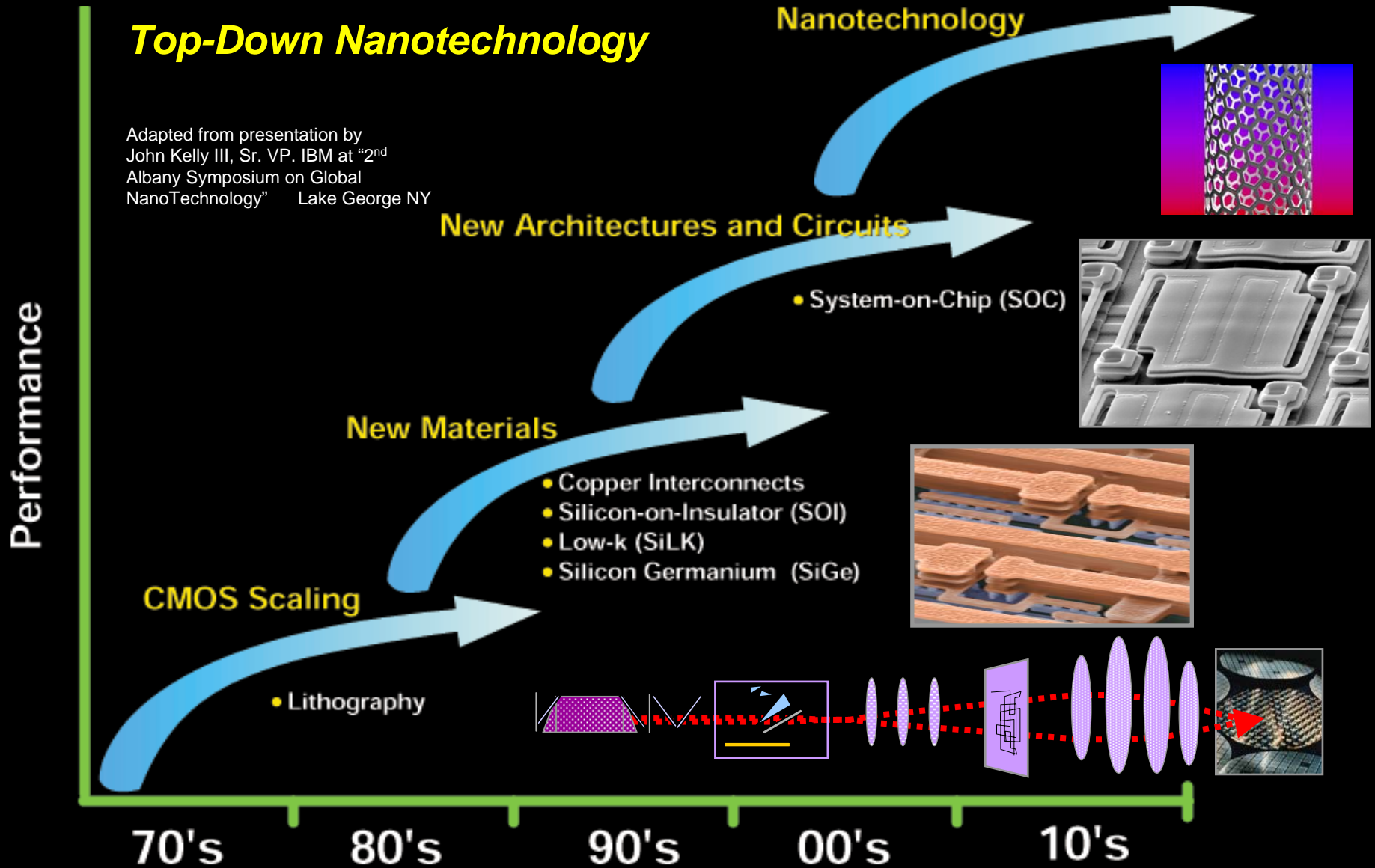
NanoFab 200

- 75,000 Ft²/6,000 Ft² Cleanroom
- Completed 1996
- Canon Design

- 
- 750,000 sq. ft cutting edge facilities (with 85,000 sq. ft 300 mm Wafer Cleanrooms).
 - \$3.0B in assets by end of 2006 (in addition to the brick and mortar shown above).
 - Partners include SEMATECH, IBM, AMD, Micron, Infineon, AMAT, Tokyo Electron, ASML
 - 200 Researchers at ANT/CNSE & 300 Industry Scientists. By end 2007, 1600 People with current programs

Key Driver #2

International Tech. Roadmap for Semiconductors



Adapted from presentation by
John Kelly III, Sr. VP. IBM at "2nd
Albany Symposium on Global
NanoTechnology" Lake George NY

Key Driver # 3:

World-Class Hands-on Education & Training

- **College for Nanoscale Science and Engineering:**

First college in the world dedicated to the education of the workforce of 21st century with constellations in:

- **Nanoscience**
- **Nanoengineering**
- **Nanobiotechnology**
- **Nanoeconomics**



Key Driver #3:

R&D – Manufacturing Eco-system

The Electronics Industry: Market Sectors

Growth Rate
(CAGR)

\$ Forecast

1990 → 2000 → 2010

10%

Electronic Systems (End Equipment)

\$452B → \$1,067B → \$2,230B

16%

Nanoelectronics, Nano-Systems, Photonics

\$54B → \$204B → \$902B

17%

Manufacturing Equipment

\$10B → \$45B → \$215B

11%

Materials

\$11B → \$28B → \$80B

Source: SEMI-SEAJ, SIA WSTS, IC INSIGHTS, Rose Associates, SEMI Consensus Forecast

Key Driver # 4:

Leveraged Public-Private Partnerships



Center for Advanced Technology
(~\$2M/year)

10/93

06/97

NanoFab 200 Building
(\$16.5M)



National Focus Center Consortium
(\$10M/year)

08/98

04/01

Nanoelectronics Center of Excellence
(\$150M)



International SEMATECH

North
(\$320M/5 years)

07/02

11/02

TEL R&D Center
(\$300M/7 years)



NanoFab 300S
(\$50M)

04/03



ASML R&D Center
(\$400M/5 years)

04/04

04/04

SUNY College for Nanoscale Science & Engineering



INVENT
(\$600M/7 years)

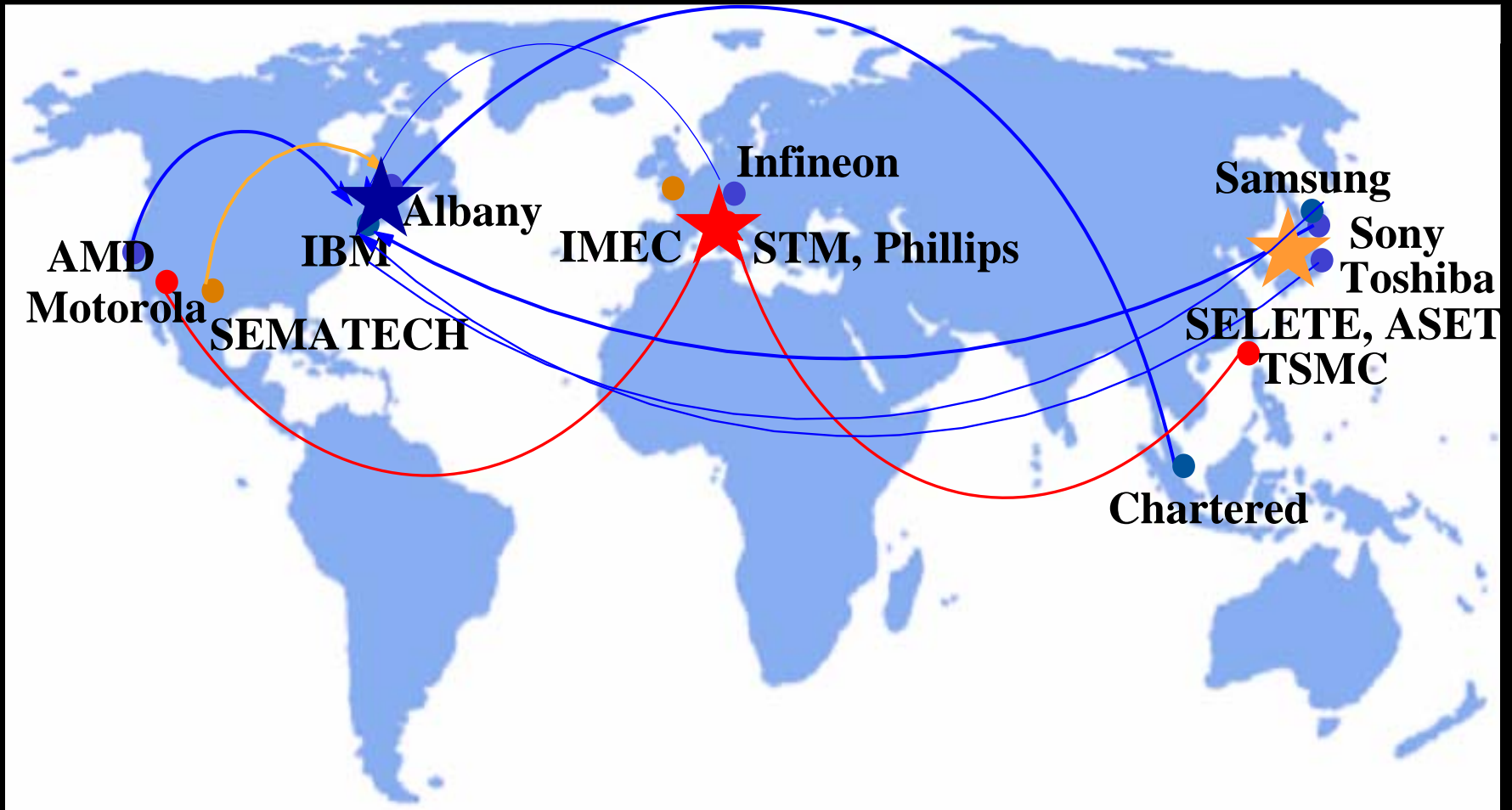
01/05

01/05

IBM-Albany Center for Semiconductor Research
(\$320M)



Key Driver # 4: Relentless International Competition



**Global R&D competition drives the industry clustering effect
\$8.0 billion investments and 2500 high tech jobs since 2002**



National Defense Priorities

Clusters of Innovation

The R&D – Manufacturing Ecosystem

President’s Council of Advisors on Science & Technology

“Sustaining the Nation’s Innovation Ecosystems, Information Technology Manufacturing and Competitiveness”, January 2004

“Continued damage to U.S. information technology ecosystems through the degradation of its principal anchors – R&D or manufacturing – has serious implications for the U.S. economy and standards of living.

Defense Science Board Task Force: High Performance

Microchip Supply, February 2005

“Semiconductor technology and manufacturing is a national priority that must be maintained if the U.S. military is to continue to lead in the application of electronics to meet the needs for defense and homeland security”

Defense Partnership Strategy: One-Stop-Shop Lab-to-Fab

Linkages Between Technology Development, Workforce Training & Manufacturing

Albany NanoTech
Complex



College of NanoScale Science & Engineering
Albany NanoTech (Industrial Partnerships)

Watervliet Arsenal
Technology Park



Arsenal Business & Technology Partnership
Benet Laboratories

Center for Construction Trades Training (CT2)
Center for Nanomaterials & Nanocoatings (CNN)

Existing Navy Related Programs at ANT

- **NRL/ONR sponsored Rad-Hard Focus Center**
 - Features rad hard by design and rad hard by process activities
 - Involves universities, government and industrial labs for research
 - Involves industrial and government partners as part of advisory board
- **The High-density Energy Advanced Technology (HEAT)**
 - Cryo-electronics - (ONR/DARPA)
 - Power for extreme environments - (NASA)
 - Low loss coated conductor, DEW - (Air Force)
 - Energy Storage for Hybrid vehicles - (Military, Transportation)
- **Cryo-Power Electronics for All Electric Ship Program**
 - Partnership with Naval Research Lab and MTech



Short, Medium, Long-Term Horizon

- National Interconnect Focus Center
 - Partnership between ALNT, RPI, MIT, Stanford, GIT
 - \$10 M Annual Funding from SIA, DARPA & NYS
- Advanced Infrared Imaging (VISA) Program
 - Partnership with Raytheon
- 3-D Integration Program
 - Partnership with IBM
- Low-cost Infrared Imaging Program
 - Partnership with Critical Imaging
- Bio Sensor Development
 - Partnership with Draper Labs
- Radiation Hardened Materials for Aerospace
 - Partnership with , NRL, Lockheed Martin (prior)

Future Activities at Center

- Perform Research Projects related to exploratory development, advanced development, test and evaluation in a wide range of nanoelectronics areas including:

- Radiation Hard Electronics
- Electronics for Harsh Environments
- Sensor-on-chip Technologies
- NanoElectronics in Power/Energy Applications
- Electronics for All Electric Ship Program





Conclusion:

Albany NanoTech as International Resource for Research, Development & Manufacturing

**Full continuum of
hands-on workforce training
& education for scientists,
engineers, operators,
technicians & trades.**

*Nanotechnology roadmap
driven by world leaders in
nanochip manufacturing.
(ITRS)*



Next Generation “Bell Labs” Model



**R&D partnerships with
small & large companies,
academic & gov't. labs,
supporting national defense
& economic security.**

*Tight R&D-manufacturing
ecosystem with Nanochip,
OEM & materials suppliers
via vertically-integrated
consortia.*